

## 1.1 Features

The Toshiba T4900CT is one of the lightest and most advanced portable computers available. Utilizing advanced technology and high-speed components, the T4900CT offers excellent color display legibility, battery operation, and IBM PC/AT compatibility. The T4900CT system unit consists of the following features:

- ❑ Microprocessor

The T4900CT uses an Intel Pentium™ Processor (referred to as Pentium in this manual) that operates at 75 MHz, 3.3 Volts.

- ❑ Math co-processor

The T4900CT has a math co-processor which is stored in the Pentium.

- ❑ Cache memory

The T4900CT has a writeback type 16 KB cache memory which is stored in the Pentium. The 16 KB cache consists of an 8 KB instruction cache and an 8 KB data cache.

- ❑ Disk storage

The T4900CT has an internal 2.5-inch 810 MB HDD. A 3.5-inch FDD supports 2 HD (1.44 MB) floppy disks and 2DD (720 KB) floppy disks.

- ❑ Memory

The T4900CT comes standard with 8 MB of CMOS type Dynamic Random Access Memory (DRAM) 3.3 Volts. This includes 640 KB of conventional memory and 7,360 KB of extended memory which can be utilized as expanded memory compatible with the Lotus/Intel/Microsoft Expanded Memory Specifications (LIM-EMS).

- ❑ TFT color LCD

The T4900CT has a high-resolution 10.4-inch full-color, Thin Film Transistor (TFT) color LCD that displays 640 x 480 pixels.

The T4900CT internal display controller supports VGA functions on the internal display and SVGA functions on an external display.

- ❑ Keyboard

An easy-to-use 82/84-key enhanced keyboard with full-size keys and standard spacing is compatible with IBM standard software. The T4900CT's keyboard supports software that used a 101/102-key enhanced keyboard.

Batteries

The T4900CT has three different batteries: a main battery, a backup battery, and a Real Time Clock (RTC) battery.

Status indicator panel

The T4900CT has a status indicator panel. It is a liquid crystal display (LCD) panel which displays a battery charge indicator and 11 icons indicating the system status.

Memory card slot

The T4900CT has one optional memory card slot, which enables you to install an optional memory card.

Personal Computer Memory Card International Association (PCMCIA) card slot

The T4900CT has two PCMCIA slots, which enable you to install a MiNC Toshiba card modem or other industry standard PCMCIA release 2.0 card. These slots are a type II (5mm) and type III (10.5mm) card thickness.

Expansion port

The T4900CT has one unique 150-pin expansion port, which attaches to a Desk Station IV.

RS-232C port

The T4900CT has one 9-pin serial interface port.

PRT port

The T4900CT's Centronics compatible parallel interface port serves two purposes and can be used to connect a Centronics compatible printer.

Mouse port

The T4900CT has one 6-pin mouse port on the back that can be connected to an IBM PS/2 mouse.

Keyboard port

The T4900CT has one 6-pin keyboard port on the back that can be connected to an IBM PS/2 keyboard.

❑ RGB port

The T4900CT 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 shut-off switch.
- Use a headphone with an impedance of 16W.
- Microphone, standard 3.5 mm diameter miniature monaural jack.

❑ Accu point

The T4900CT pointer control stick, located in the center of the keyboard, provides convenient control of the cursor without requiring desk space for a mouse.

The T4900CT Personal Computer is shown in figure 1-1. The system configuration is shown in figure 1-2.

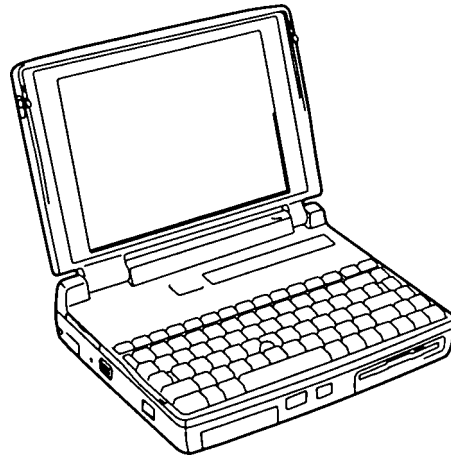


Figure 1-1 T4900CT personal computer

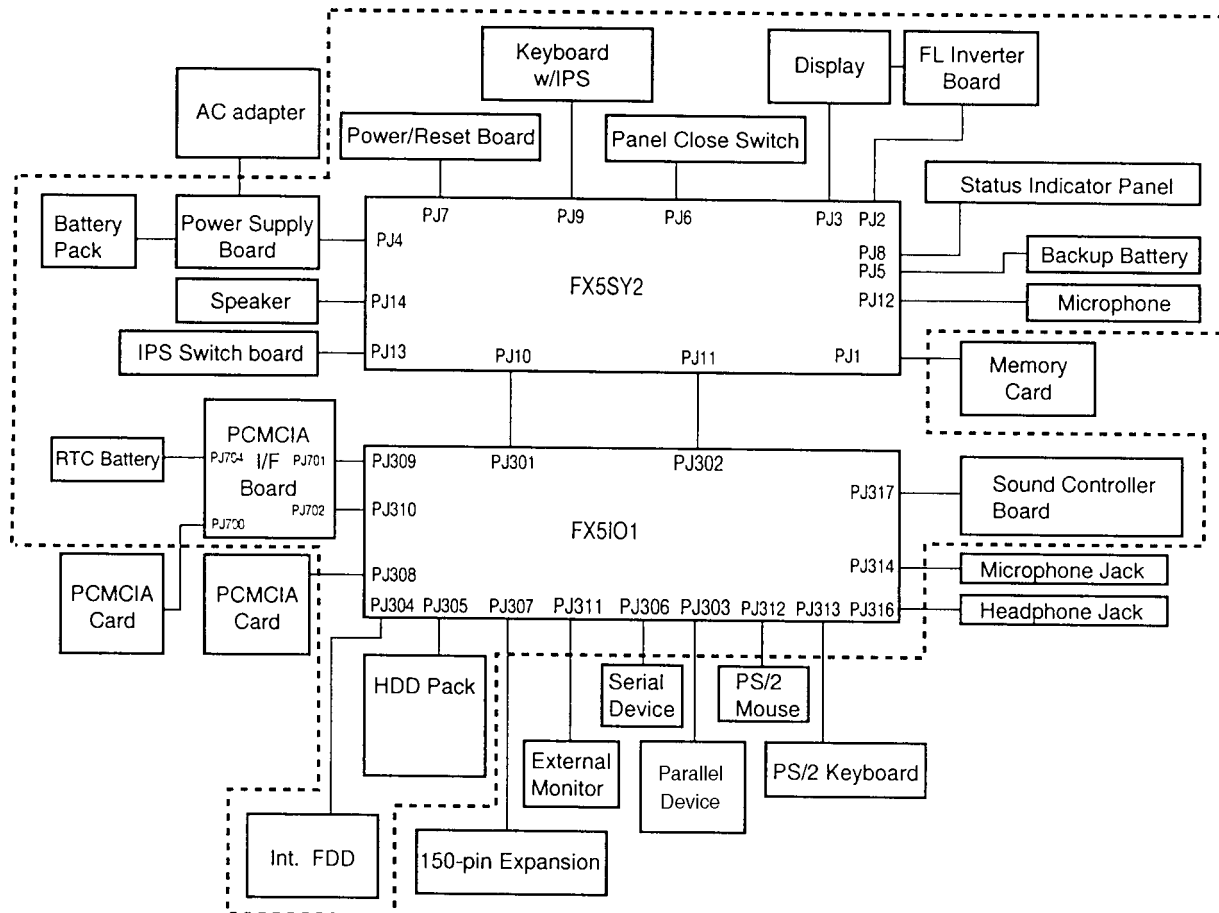
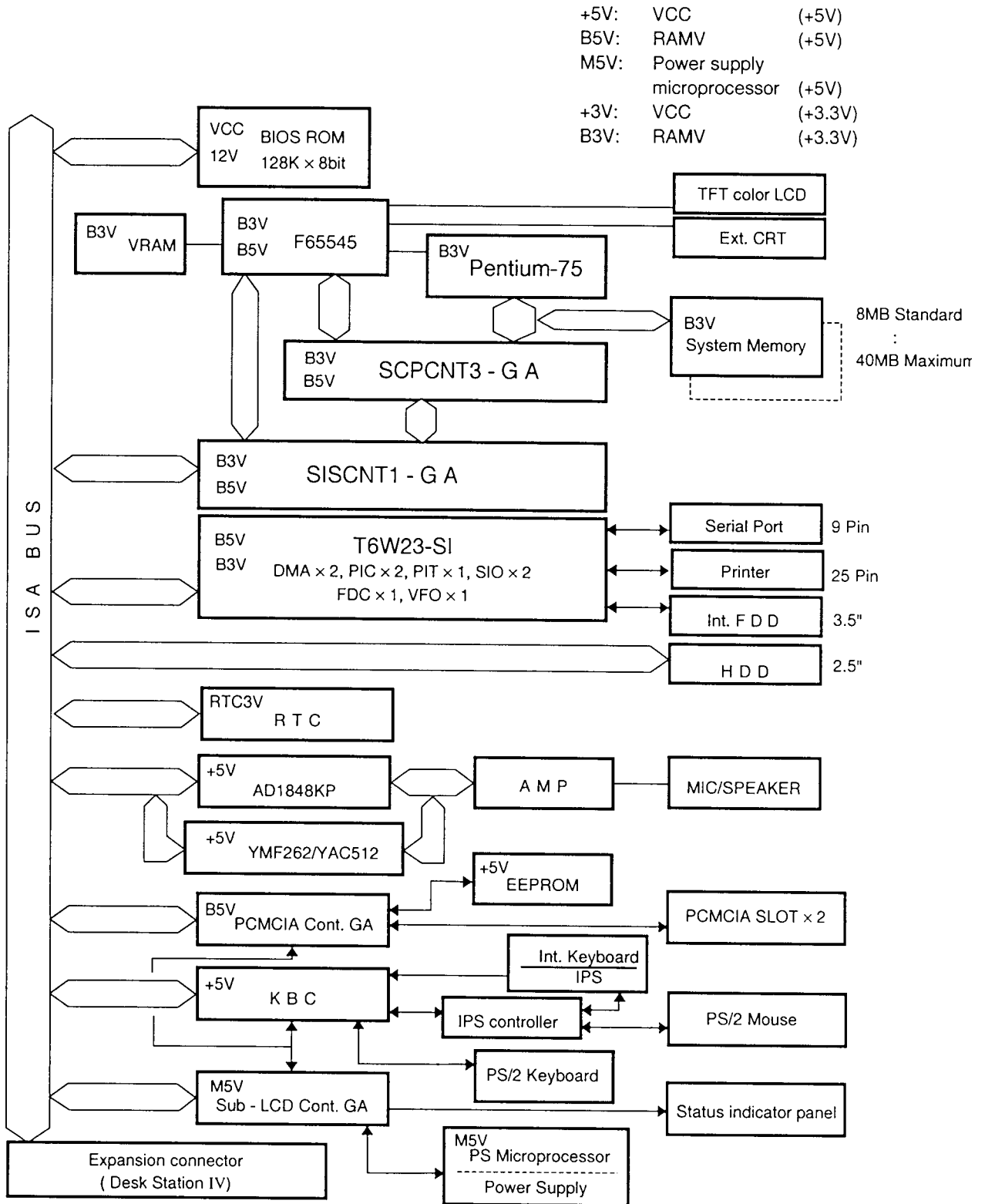


Figure 1-2 T4900CT system unit configuration

## 1.2 System Unit Block Diagram

Figure 1-3 is a block diagram of T4900CT system unit.



The T4900CT system board shown in figure 1-3 is composed of the following major components:

- ❑ A pentium processor, which incorporates a math co-processor and 16 KB cache memory.

- ❑ The following memory components:

Standard RAM: 8 MB, 64-bit data width (70 ns)  
Cache memory: Total 16 KB (inside a Pentium)  
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, 16, or 32 MB memory card can be installed.  
32-bit data width.

- ❑ Super Integration (SI) T6W23, 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): 16550
- 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 bytes of memory. Fourteen bytes of 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 pointing stick.

- ❑ VGA display controller: F65545 (208-pin)

3.3 volt operation. 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.

❑ Sound Controller

Windows Sound System compatible sound unit is used. One AD1848 chip supports PCM sound, and YMF262 (OPL3) with YAC512 (DAC) supports FM synthesizer sound.

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

- 50 MHz for the CPU (CPU operates 75MHz)
- 14.7456 MHz for the COM
- 24 MHz for the FDC and VFO
- 16 MHz is used for GA
- 14.31818 MHz for Video Controller

OSC (X3) generates 32.768 KHz for RTC.

❑ Gate Array

System Controller Gate Array

This gate array has the following functions:

- CPU Controller
  - SMI Control
  - CPU Clock Control
- Memory Controller
  - 64-bit bus memory control (standard DRAM area)
  - 32-bit bus memory control (expansion memory area)
- Bus Controller
  - 64 to/from 32-bit data path width convert
  - 32-bit local bus control
- Address Latch Controller
  - Address convert
  - Address Latch
- I/O Register
  - Register re-storing for resume
  - Special Register
- Processing Speed Controller

## ISA Bus Controller Gate Array

This gate array has the following functions:

- Bus controller
  - 32 to/from 16-bit bus width convert
  - ISA bus interface control
  - ISA bus access control
  - DMAC control
  - DMA address generate
  - I/O control
- Memory Controller
  - ISA bus interface control
  - Refresh address control
- I/O Register
  - ISA compatible bus I/O port
  - Special Registers
- Suspend/Resume Controller

## Sub LCD Controller Gate Array

This gate array has the following functions:

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

## IC Card Controller Gate Array

This gate array has the following functions:

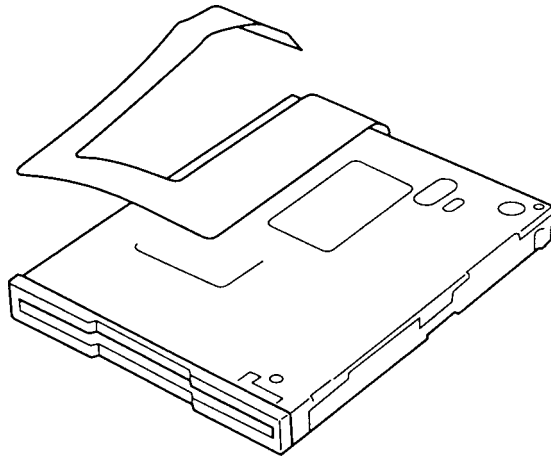
- IC Card Controller
  - PCMCIA IC Card Controller
  - Toshiba Modem Card Controller
- EEPROM (for security) Controller
  - KBC-Security-EEPROM Communication Controller
- Others
  - KBC Communication Controller
  - Disable the PRT/FDD Port, HDD Access Controller
  - EEPROM (for BIOS) Access Mode Controller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



### 1.3 3.5-inch Floppy Disk Drive

The T4900CT 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 T4900CT 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	1,475	737
Number of heads	2	2
Number of cylinders	80	80
Access time (ms)		
Track to track	3	3
Average	94	94
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.

T4900CT supports 810 MB HDD. The T4900CT HDD is shown in figure 1-5. Specifications for the HDD are described in table 1-2.

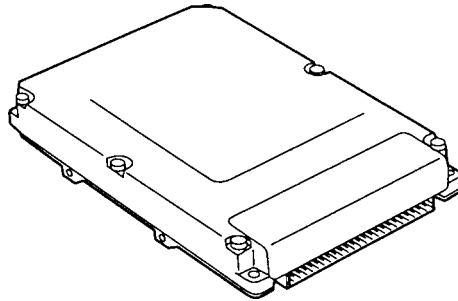


Figure 1-5 2.5-Inch HDD

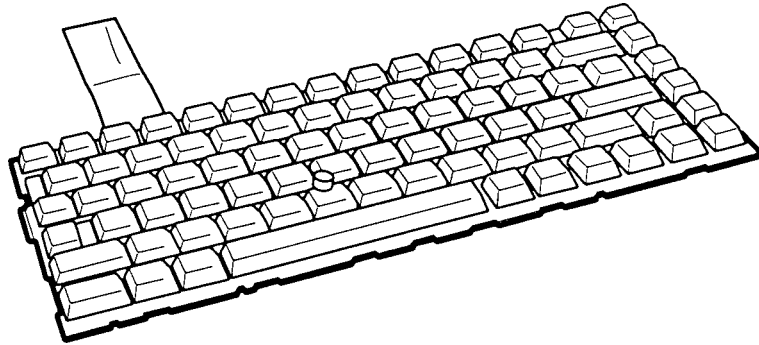
Table 1-2 2.5-Inch HDD specifications

	810MB
	DVAA-2810
Physical specifications	
Formatted capacity (MB)	810.0
Disks	3
Heads	6
Cylinders	1,571
Bytes per sector (bps)	512
Cording	1-7RLL
Performance specifications	
Access time (average) (track to track)	14.5 4
Maximum stroke	23.5
Rotation speed (rpm)	3,800
Data transfer rate (Mbps)	24.9 to 36.0
Power requirement	
DC voltages (V)	+5 only
Power	(typical)
Seek (W)	2.8
Read (W)	2.8
Write (W)	2.8
Standby mode (Spin only) (W)	0.4
Sleep mode (Motor off) (W)	0.4
Spin-up mode (mA)	940

## 1.5 Keyboard

The 82-(USA) or 84-(European) keyboard is mounted on the T4900CT'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 TFT Color LCD

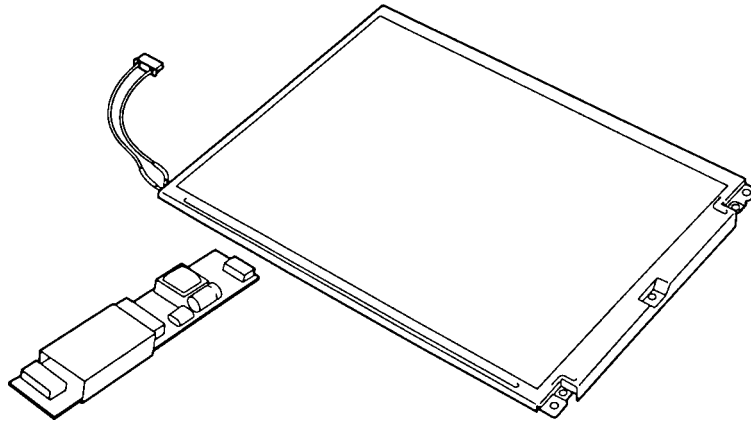
The TFT Color Liquid Crystal Display (LCD) contains an LCD module, a Fluorescent Lamp (FL), and an FL inverter board.

### 1.6.1 TFT Color LCD Module

The T4900CT TFT color LCD supports 640 x 480 pixels with an internal display controller and 262144 colors for graphics and characters. This controller includes the functions of Video Graphics Array (VGA) and Super VGA (SVGA) for external display.

The T4900CT's LCD receives 18-bit data signals, data enable, and shift clock for data transmission. All signals are CMOS-level compatible.

The TFT LCD and FL inverter board are shown in figure 1-7. The specifications for the LCD are described in table 1-3.



*Figure 1-7 TFT color LCD*

*Table 1-3 TFT color LCD specifications*

Item		Specifications
Number of dots	(dots)	640x480
Dot pitch	(mm)	0.33 (W)x0.33 (H)
Display area	(mm)	211.2 (W)x158.4 (H)
Contrast		60:1 (minimum)
FL current	(mA)	4
FL frequency	(KHz)	47

## 1.6.2 Fluorescent Lamp (FL) Inverter Board

The FL inverter board supplies high frequency current to light the LCD's Fluorescent Lamp. The specifications for the T4900CT's FL inverter are described in table 1-4.

*Table 1-4 FL inverter board specifications*

Item		Specifications
Input	Voltage (VDC)	18
	Power (W)	3
Output	Voltage (VAC)	1,100
	Current (mA)	4.0
	Frequency (KHz)	47
	Current limits (mA)	2.5 to 4.5

## 1.7 Power Supply

The power supply supplies five kinds of voltages to the T4900CT system board. The T4900CT 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 1-5.

*Table 1-5 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	2,200	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	2,200	60
RS-232C	M12V	–7 to –12.6	–	10	–

## 1.8 Batteries

The T4900CT has three types of batteries:

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

These batteries' specifications are described in table 1-6.

*Table 1-6 Batteries' specifications*

<b>Battery name</b>	<b>Material</b>	<b>Output voltage</b>	<b>Capacity</b>
Main battery	Nickel Metal Hydride	12 V	2,600 mAh
Backup battery	Nickel Metal Hydride	7.2 V	35 mAh
RTC battery	Lithium-Vanadium	3.0 V	50 mAh

### 1.8.1 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.

## 1.8.2 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 fully 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 1-7 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	4 to 6 hours (typical: 5 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 the charge time.*
- 2: Using quick charge 1, the power supply microprocessor automatically stops the charge after two hours and twenty minutes regardless of the condition of the battery.*

If 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.

### 1.8.3 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 power is turned on and off. Table 1-8 shows the charging time and data preservation period of the backup battery.

*Table 1-8 Backup battery charging/data preservation time*

		<b>Time</b>
Charging Time	Power On	3 H
	Power Off	3 H
Data preservation period (full charge)		3 H

### 1.8.4 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 1-9 shows the charging time and data preservation period of the RTC battery.

*Table 1-9 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 T4900CT 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 T4900CT 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 CRT

## 2.2 Troubleshooting Flowchart

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

- Ask the user if a password is registered, and if it is, ask him or her to enter the password. If the user has forgotten the password, contact your Toshiba representative for further action.
- 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.

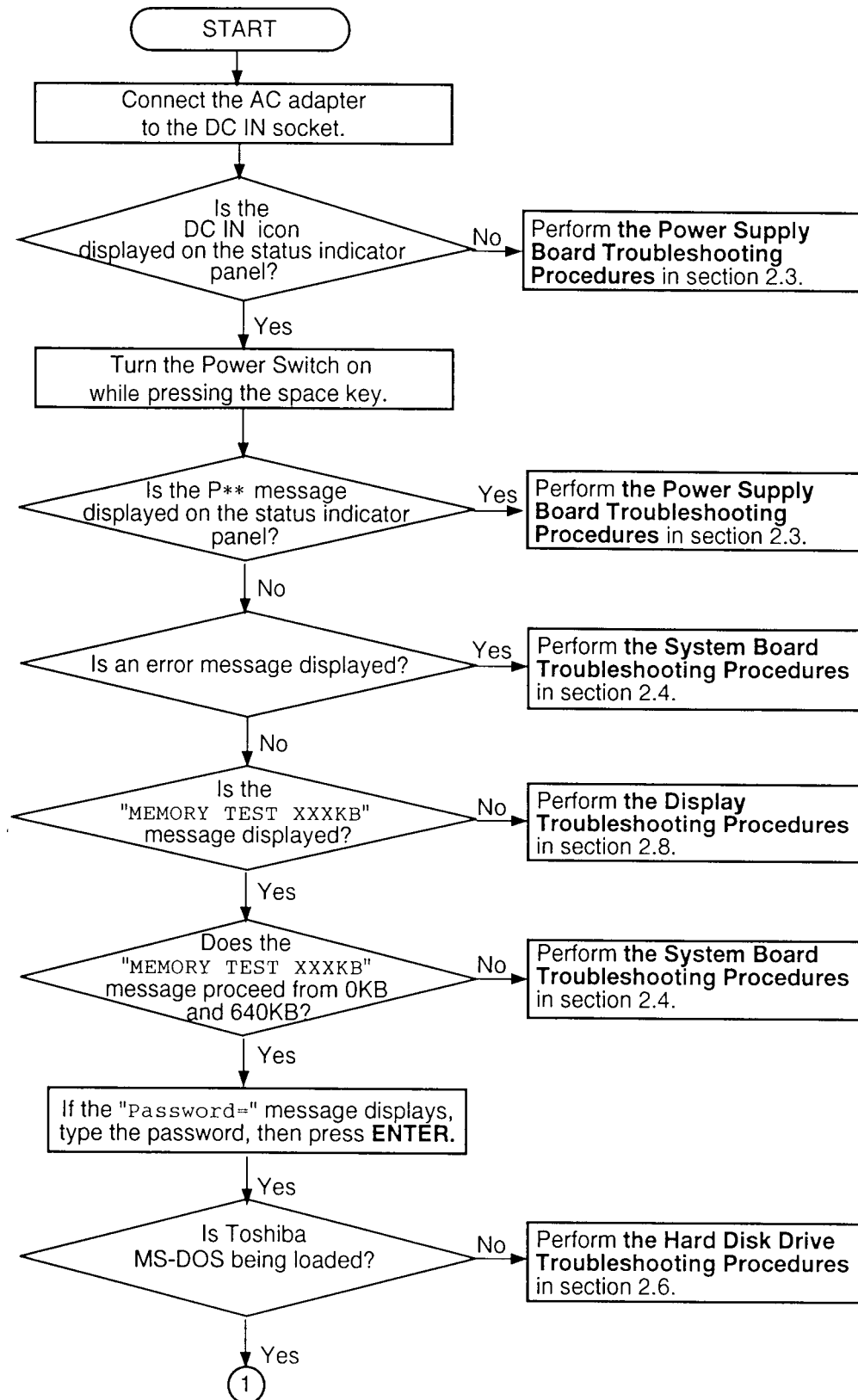


Figure 2-1 Troubleshooting flowchart (1/2)

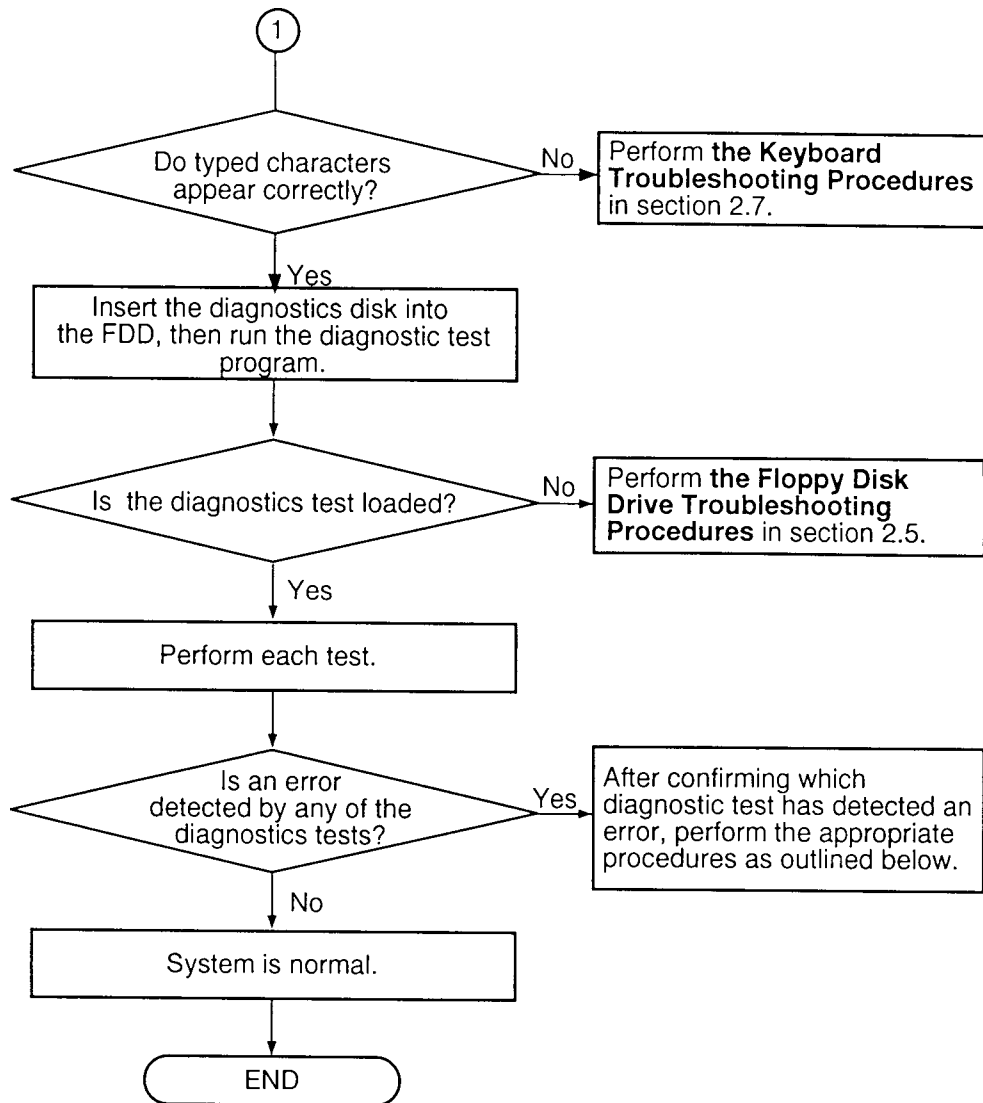


Figure 2-1 Troubleshooting flowchart (2/2)

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 T4900CT's power supply controls many functions and components in the T4900CT. 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 5: Battery 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 remaining battery time or percentage drops unexpectedly when you unplug the AC adapter, while the status indicator displays 100% battery charge, go to Procedure 5.
- 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*

<b>Status</b>	<b>Source of Error</b>
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*	Sub battery error
P8*	Environment

Adapter (AC Adapter or DeskStation)

<b>Status</b>	<b>Meaning</b>
P01	AC Adapter Voltage is over the maximum allowed limit.
P02	Desk Station Voltage is over the maximum allowed limit.
P04	AC Adapter or Desk Station Current is over the maximum allowed limit.
P05	AC Adapter or Desk Station Current is not within the normal range while the power is off.

Battery

<b>Status</b>	<b>Meaning</b>
P10	Battery Voltage is over the maximum allowed limit.
P11	Charge current is over the maximum allowed limit.
P12	Discharging current is not within the normal range while the power is off.

VCC Output

<b>Status</b>	<b>Meaning</b>
P20	VCC Voltage is over the maximum allowed limit.
P21	VCC Voltage is below the minimum allowed limit.
P22	VCC Voltage error during the power on sequence.



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 in the resume mode.
P33	B3V Voltage range error during the power on sequence.

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.
P51	Program error.

Power Supply On/Off Sequence

Status	Meaning
P60	Sub-Battery Voltage is over the maximum allowed limit.
P61	Sub-Battery Charge Current is over the maximum allowed limit.

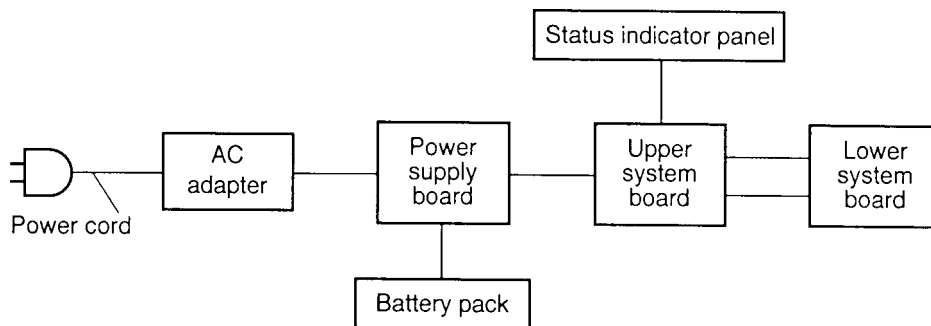
Environment

Status	Meaning
P80	Frame temperature is not within the normal range.
P81	CPU temperature is not within the normal range.

- 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.
  - 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.
  - Connect a new AC adapter.  
If the status still exists, go to Check 4.
- Check 4 When **P04, P05, P11** is displayed, perform the following steps:
- Make sure the battery pack is correctly installed in the computer.
  - 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  $-20^{\circ}\text{C}$  or more than  $110^{\circ}\text{C}$ .
- Place the computer in the room air until the PC temperature normalizes.
  - If **P80** is displayed, even after the computer is placed in the room air until the PC temperature normalizes, go to Procedure 4. A thermistor on the power supply board might be damaged.
- Check 6 When **P80** is displayed, it indicates that the computer's internal temperature is less than  $-20^{\circ}\text{C}$  or more than  $120^{\circ}\text{C}$ .
- Place the computer in the room air until the PC temperature normalizes.
  - If **P80** is displayed, even after the computer is placed in the room air until the PC temperature normalizes, go to Procedure 4. A thermistor near the CPU might be damaged.
- Check 7 When **P10, P12, P20, P21, P22, P30, P31, P32, P33, P40, P41, P42, P50, P51, P60, or P61** is displayed, go to procedure 4.

## Procedure 2 Connection Check

The power supply wiring diagram is 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 the 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 in the T4900CT.
2. Attach the AC adapter to the T4900CT, 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 characters on battery capacity display area of the status indicator panel.

If the characters match any code of the following tables, go to each check item. If any characters do not display, go to Procedure 4.

Code	Contents	Check items
C	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 be completely discharged. Wait a few minutes to charge the battery pack. If the battery pack still 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 the battery pack still 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 T4900CT following the steps described in chapter 4, *Replacement Procedures*, and check the connection between the power supply and system board(s) and the 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.

## Procedure 5 Battery Check

If the status indicator panel displays 100% charge for the battery and the time or percentage displayed drops unexpectedly when you disconnect the AC adapter, the battery may not have been used for a long time. If the remaining capacity display or available time to operate decreases quickly after removing the AC adapter and the status indicator indicates 100%, the following reasons may apply.

- Battery was not used for long period of time.
- Battery charging was started with the temperature difference between the computer and the battery pack at more than 10°C. (A cold battery was installed into an overheated PC.)

Then, perform the following checks:

- Check 1 Fully discharge the battery by leaving the computer power on until it automatically turns off.
- Check 2 Connect the AC adapter and charge the battery. The battery charge may increase quickly to 99%. Wait for the charge to reach 100%.
- Check 3 Repeat checks 1 and 2 two or three times until the battery capacity recovers.

## 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 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) often appears 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. The 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.

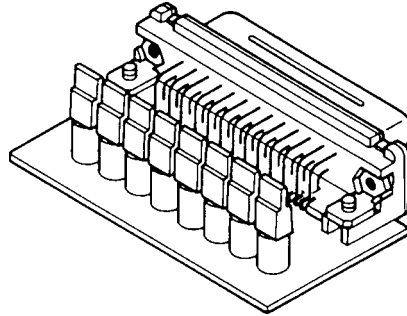


Figure 2-2 Printer port LED

To use the printer port LED follow these steps:

1. Turn off the T4900CT's power.
2. Plug the printer port LED into the T4900CT's PRT connector.
3. Hold down the space bar and turn on the T4900CT'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 25 and halts, the IRT test has already completed the system memory test. In this instance, the IRT indicates an error with the extended memory test.*

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

Error status	Test item	Message
00H	Boot block test	—
01H	Check system	—
02H	PIT test	—
03H	DRAM size check	—
04H	SM-RAM ready for stack	—
05H	CMOS check complete	—
06H	System BIOS copy (ROM to RAM) complete	—
07H	Display control finish	—
09H	Check finished	—
0AH	First 64KB memory test	FIRST 64KB MEMORY ERROR
0CH	System initialize	
0DH	Interrupt vector initialization	—
18H	PIC initialization	—
1FH	Display initialization	CRTC ERROR
		VRAM ERROR READ DATA = XXXXXXXXXH WRITE DATA = XXXXXXXXXH
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
50H	Mouse initialization	-
55H	KBC initialization	-
5AH	Password	-
60H	HDD initialization	HDC ERROR HDC #0 ERROR HDC #1 ERROR
62H	Hard RAM initialization	-
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	-
C0H	Boot password 2	-
FEH	Boot setup	-
FFH	Expansion system ROM	-

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

01h, 02h, 03h, 04h, 05h, 06h, 07h, 0Ah, 0Ch, 0Dh, 18h, 1Fh, 25h, 30h, 40h,  
41h, 42h, 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, set resume mode in *SETUP*.

To use the printer port LED follow these steps:

1. Turn on the T4900CT's power, then set to resume mode.
2. Turn off the T4900CT's power
3. Plug the printer port LED into the T4900CT's PRT connector.
4. Turn on the T4900CT'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*

<b>Error status</b>	<b>Meaning of status</b>
F0H	Pre initialize
F1H	SMI check
F2H	Display card on expansion bus check
F3H	HDD pack connection check
F4H	SM-RAM checksum check
F5H	Main memory checksum check
F6H	Video RAM checksum error
F7H	Extended memory checksum error
FBH	Security card check
FCH	Card modem check

## Procedure 4 Diagnostic Test Program Execution Check

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

1. System test
2. Memory test
3. Printer test
4. ASYNC test
5. Real Timer test
6. 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 T4900CT 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), 01H, 02H, 03H, 04H, 05H, 06H, 07H, 0AH, 0CH, 0DH, 18H,  
1FH, 25H, 30H, 4AH, 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 T4900CT's internal 3.5-inch floppy disk drive is functioning properly. Perform the steps below starting with Procedure 1 and continuing with the other procedures as required.

Procedure 1: FDD Head Cleaning Check

Procedure 2: Diagnostic Test Program Check

Procedure 3: Connector Check and Replacement Check

### Procedure 1 FDD Head Cleaning Check

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

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

If the test program cannot be executed on T4900CT, go to Procedure 2.

## Procedure 2 Diagnostic Test Program Execution Check

The Floppy Disk Drive Diagnostic Test program is stored on the T4900CT Diagnostics Disk. After loading Toshiba MS-DOS, run the diagnostic program. Refer to Chapter 3, *Tests and Diagnostics*, for more information about the diagnostics test procedures.

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

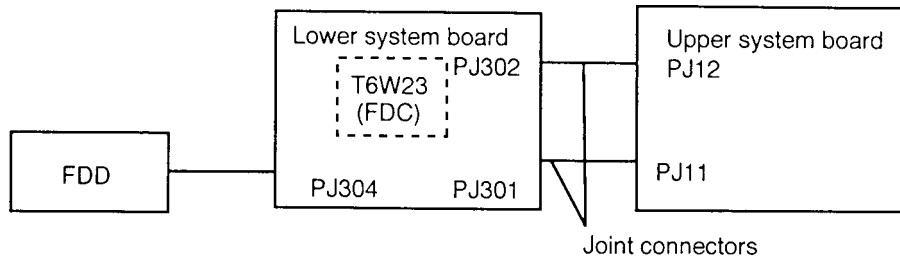
Check 1 If the following message is displayed, disable the write protect tab on the floppy disk. If any other message appears, perform Check 2.

Write protected

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

### Procedure 3 Connector Check and Replacement Check

The FDD wiring diagram is 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 may be damaged. Disassemble the T4900CT 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 T4900CT'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

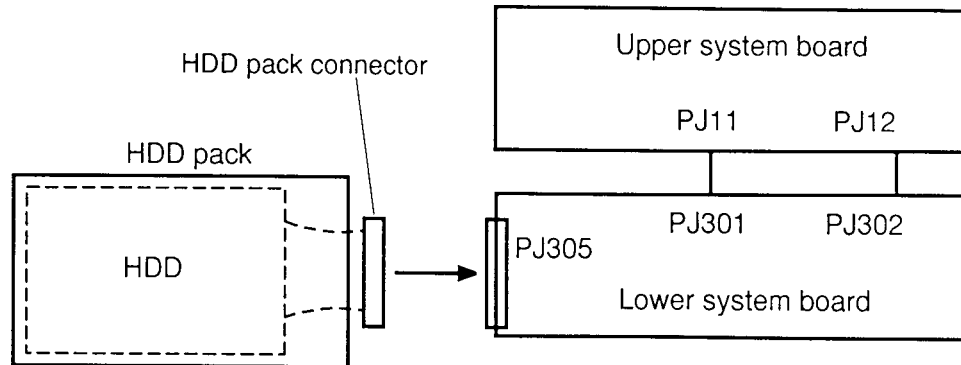
Check 3 Using the Toshiba MS-DOS system disk, install a system program on the hard disk using the SYS command.

If the following message appears on the display, the system program has been transferred to the HDD. Restart the T4900CT. If the error message still appears, perform Procedure 3.

System transferred

### Procedure 3 Connector Check

The HDD wiring diagram is shown below.



The HDD is stored inside the HDD pack. The HDD pack connector is connected between the HDD and the lower system board. This connector may be disconnected from the lower system board or the HDD. Disassemble the T4900CT 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 T4900CT'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 T4900CT Diagnostic Disk, format the HDD with a low level format option. Refer to Chapter 3, *Tests and Diagnostics*, for more information about the diagnostic program.

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

```
Format complete
```

If you cannot format the HDD using the Tests and Diagnostic program, go to Procedure 5.

## Procedure 5 Diagnostic Test Program Execution Check

The HDD test program is stored in the T4900CT Diagnostics Disk. Perform all of the HDD tests in the Hard Disk Drive Test. Refer to Chapter 3, *Tests and Diagnostics*, for more information about the HDD test program.

If an error is detected during the HDD test, an error code and status will be displayed; perform 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 enabled
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 the HDD, HDD pack connector, lower system board, and upper system board. If any component is damaged, disassemble the T4900CT 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 the HDD is still not functioning properly, perform Check 3.
  
- Check 3 Replace the lower system board with a new one. If the 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 T4900CT's keyboard is functioning properly, perform the following procedures. Start with Procedure 1 and continue with the other procedures as instructed.

Procedure 1: Diagnostic Test Program Execution Check

Procedure 2: Connector and Replacement Check

### Procedure 1 Diagnostic Test Program Execution Check

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

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

### Procedure 2 Connector and Replacement Check

The keyboard is connected to the system board by a 19-pin flat cable. This cable may be disconnected or damaged. Disassemble the T4900CT as described in Chapter 4, *Replacement Procedures*, and perform the following checks:

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



If this cable is damaged, replace the 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 T4900CT's display is functioning properly. Start with Procedure 1 and continue with the other procedures as instructed.

- Procedure 1: Hot Key Check
- Procedure 2: External CRT Check
- Procedure 3: Diagnostic Test Program Execution Check
- Procedure 4: Connector Check
- Procedure 5: Replacement Check

## Procedure 1 Hot Key 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.

- 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.

- Check 2 Pressing **Fn+F1** 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.



Increases the brightness of the LCD panel.



Decreases the brightness of the LCD panel.

## Procedure 2 External CRT Check

Connect the external CRT to the T4900CT'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.

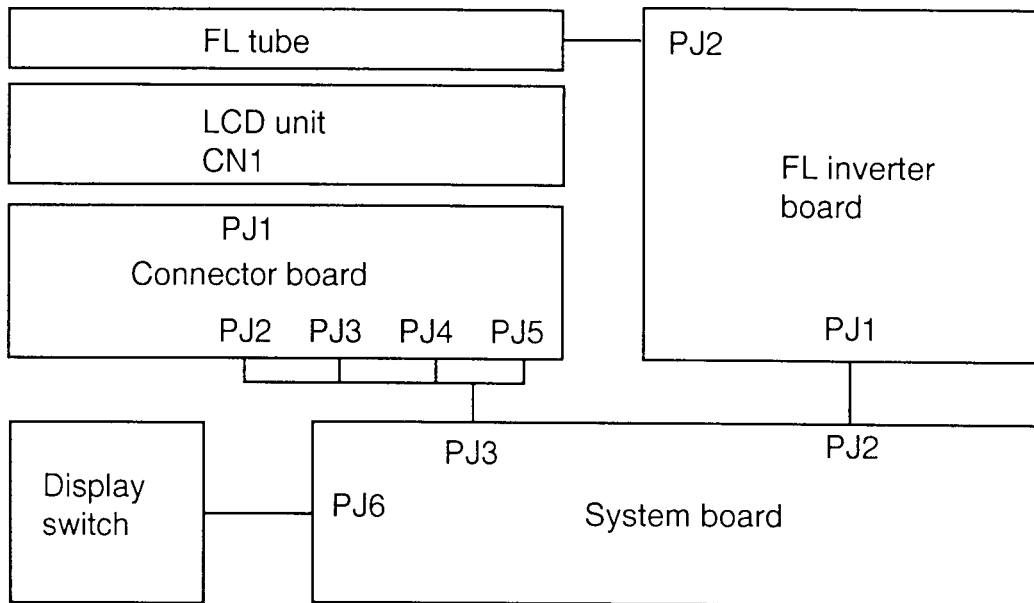
### Procedure 3 Diagnostic Test Program Execution Check

The Display Test program is stored on the T4900CT Diagnostic Disk. This program checks the display controller on the system board. After loading Toshiba MS-DOS, run the Diagnostic Program. Refer to Chapter 3, *Tests and Diagnostics*, for details.

### 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 T4900CT 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 4.

Check 4 Replace the display switch with a new one and test the display again. If the problem still exists, perform Check 5.

Check 5 Replace the display cable with a new one and test the display again. If the problem still exists, perform Check 6.

Check 6 The upper system board may be damaged. Replace the upper system board with a new one and test the display again. If the problem still exists, perform Check 7.

Check 7 Replace the lower system board with a new one.

## 2.9 Status Indicator Panel Troubleshooting

To determine if the T4900CT'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

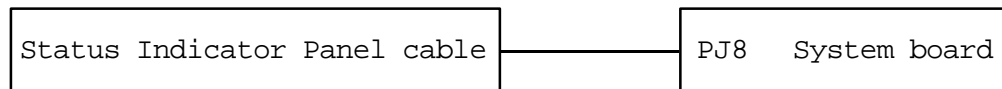
Execute the Status Indicator Panel Test in the Diagnostic Program. Refer to Chapter 3, *Tests and Diagnostics*, for more information on how to perform the test program.

If an error occurs, go to Procedure 2. If an error does not occur, the 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 T4900CT 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 is 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 T4900CT's Diagnostic Test Program (TEST4900) to test the functions of the T4900CT's hardware modules. The Diagnostics Test Program is stored on the T4900CT Diagnostic Disk. The Diagnostic Test consists of 8 programs that are grouped into the Service Program Module (DIAGNOSTIC MENU) and the Test Program Module (DIAGNOSTIC TEST MENU).

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

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

The DIAGNOSTIC TEST MENU contains the following twelve functional tests:

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

You will need the following equipment to perform some of the T4900CT's Diagnostic test programs.

- The T4900CT Diagnostics Disk (all tests)
- A formatted working disk for the floppy disk drive test (all tests)
- 3.5-inch 2HD/2DD disk for the 3.5-inch FDD
- A cleaning kit to clean the floppy disk drive heads (Head Cleaning)
- A PCMCIA wraparound connector for the I/O card test (PCMCIA test)
- A printer wraparound connector for the printer wraparound test (Printer test)
- An RS-232-C wraparound connector for the RS-232-C port wraparound test (ASYNC test)

The following sections detail the tests within the Diagnostic Test function of the DIAGNOSTIC TEST MENU. Refer to sections 3.18 through 3.24 for detailed information on the remaining seven Service Program Module functions.



## 3.2 Executing the Diagnostic Test

Toshiba MS-DOS is required to run the T4900CT's Diagnostics Test Program. To start the Diagnostics Test Program follow these steps:

1. Turn on the computer, and allow the computer to boot. Insert the T4900CT Diagnostics Disk in the computer's internal floppy disk drive.
2. At the system prompt, change to drive A and type **TEST4900**, and press **Enter**. The following menu will appear:

```
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 menu, press the **Esc** key. If a test program is in progress, press **Ctrl + Break** to exit the test program or press **Ctrl + C** to stop the test program.*

If the following message appears on the screen, open the computer's CONFIG.SYS file.

```
Cannot execute in a virtual 8086 mode.
```

The computer's CONFIG.SYS file will have an expanded memory manager such as EMM386.EXE, EMM386.SYS, or QEMM386.SYS. Remove it or use the REM command to ignore it. Restart the DIAGNOSTIC PROGRAM.

If the following message appears on the screen the program is not used for the T4900CT.

```
Incompatible machine type,
This TEST program is for the TOSHIBA TXXXX.
```

Change the Diagnostic disk to the correct one. Restart the Diagnostics Test Program.

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

```
TOSHIBA Personal Computer 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
12 - SOUND TEST
88 - ERROR RETRY COUNT SET [HDD & FDD]
99 - EXIT TO DIAGNOSTICS MENU
```

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

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

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

```
SYSTEM TEST      XXXXXXXX
```

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

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

```
SUB-TEST MENU :
```

```
01 - ROM checksum
02 - HW status
03 - Version check
04 - Main battery charge
05 - Thermistor check
99 - Exit to DIAGNOSTIC TEST MENU
```

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

***NOTE:** The menu displayed by your T4900CT may be slightly different from the one shown above.*

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

```
TEST LOOP : YES
```

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

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

6. The following message will appear:

```
ERROR STOP : YES
```

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

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

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

These three selections have the following functions:

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

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

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

Table 3-1 in section 3.3 describes the function of each test on the subtest menu.  
Table 3-3 in section 3.15 describes the error codes and error status for each error.

### 3.3 Subtest Names

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

*Table 3-1 Subtest names (1/2)*

No.	Test name	Subtest No.	Subtest item
1	SYSTEM	01	ROM checksum
		02	H/W status
		03	Version check
		04	Main battery charge
		05	Thermistor check
2	MEMORY	01	RAM constant data
		02	RAM address pattern data
		03	RAM refresh
		04	Protected mode
		05	Memory module
		06	Cache memory
3	KEYBOARD	01	Pressed key display (82/84)
		02	Pressed key code display
		03	PS/2 Mouse connect check
		04	IPS
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*350/480 Graphics display
		08	Display page
		09	"H" pattern display/Border color
		10	LCD/DAC pallet
		11	TFT color display
		12	Status indicator panel
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	Wrap around

Table 3-1 Subtest names (2/2)

No.	Test name	Subtest No.	Subtest item
7	ASYNC	01	Wrap around (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 test
11	EXPANSION	01	PCMCIA Wrap around
12	SOUND	01	CODEC (REC/PLAY)
		02	SIN wave playback
		03	FM Synthesizer

### 3.4 System Test

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

#### Subtest 01 ROM checksum

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

#### Subtest 02 H/W status

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

```

              76543210
H/W status = 10001000

Bit7 -           =
Bit6 - CPU clock   = 75MHz
Bit5 - Notch signal = 2HD
Bit4 - FDD type    = 2MB
Bit3 -           =
Bit2 -           =
Bit1 -           =
Bit0 - Internal FDD = 2HD
```

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

*Table 3-2 Hardware bit status*

Bit	H/W status	1	0
7	Reserved	—	—
6	CPU clock speed	75MHz	75MHz
5	Notch signal	2DD	2HD
4	FDD type	1.6 MB	2 MB
3	Reserved	—	—
2	Reserved	—	—
1	Reserved	—	—
0	Internal FDD	2DD	2HD

Subtest 03    Version check

This subtest checks the version of the following four items:

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

This subtest compares these four items to the reference data stored in the test program. When the read information is lower than the reference data, the speaker beeps and displays the following screen image. To exit this screen, press the **S** key. When the read information is higher, the display is unchanged.

```
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
```

Reference data                      Current data

Subtest 04    Main battery charge

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

```
[Main battery charge]
```

Subtest 05    Thermistor check

This subtest checks the CPU temperature sensing thermistor.

## 3.5 Memory Test

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

### Subtest 01 RAM constant data (real mode)

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

### Subtest 02 RAM address pattern data (real mode)

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

### Subtest 03 RAM refresh (real mode)

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

The constant data is AAAAh and 5555h.

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

### Subtest 04 Protected mode

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

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



Subtest 05    Memory module

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

This subtest functions the same as subtest 04, except it is used for testing an optional memory card. Memory module capacity is 4 MB, 8 MB, 16 MB, and 32MB.

After selecting subtest 05, the following message will appear:

```
Extended memory size (1:4 MB,2:8 MB,3:16 MB,4:32 MB) ?
```

Select the number that corresponds to the memory card installed in the T4900CT.

Subtest 06    Cache memory

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

Number of miss hit < Number of hit → OK

Number of miss hit ≥ Number of hit → Fail

## 3.6 Keyboard Test

To execute the Keyboard Test, select **3** from the DIAGNOSTIC TEST MENU, press **Enter** and follow the directions displayed on the screen. The Keyboard test contains two subtests that test the T4900CT's keyboard actions. Move the highlight bar to the subtest you want to execute and press **Enter**.

Subtest 01      Pressed key display (82/84)

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

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

KEYBOARD TEST    IN PROGRESS    301000

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

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

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

Subtest 02    Pressed key code display

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

```
KEYBOARD TEST IN PROGRESS 302000

          Scan code      =
          Character code =
          Keytop         =

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

PRESS [Enter] KEY
```

Subtest 03    PS/2 mouse connect check

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

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

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

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

```
KBC - MOUSE INTERFACE ERROR

          [[ HALT OPERATION ]]

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

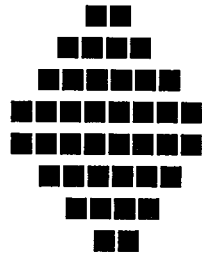
Subtest 04 IPS

This subtest checks the functions of the pointing stick as shown below.

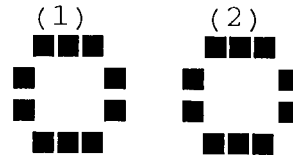
- a) IPS stick pressure sensing direction and parameter.
- b) IPS switch function check.

This test reports the IPS motion response from the IPS stick and IPS switch by displaying the location parameters. When the stick is pressed towards the upper left, the <POINTING> display changes to the following image. If an IPS switch is pressed, the <BUTTON> display alternates black and white and appears on the right side of the display. If two IPS switches are pressed, it returns to the subtest menu.

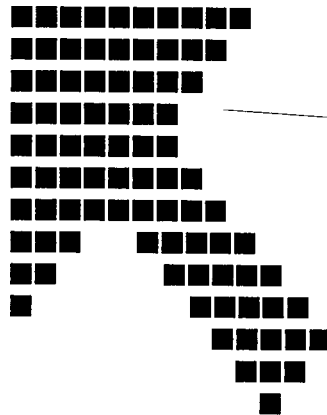
```
***** IPS TEST PROGRAM (V1.00) *****
< POINTING >          < PARAMETER >
                        STATUS:0008h
                        X-RATE:0000h
                        Y-RATE:0000h
```



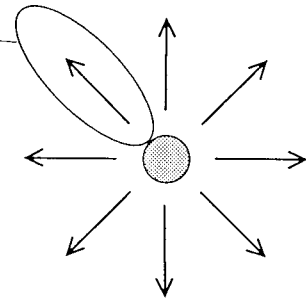
< BUTTON >



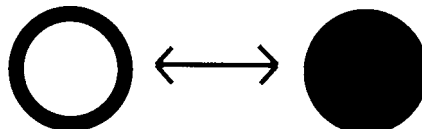
<< PRESS BUTTON1 + BUTTON2 THEN END >>



There are eight directions of arrow mark as shown below.



When the button is pressed, it alternates as shown below.



### 3.7 Display Test

To execute the Display Test, select **4** from the DIAGNOSTIC TEST MENU, press **Enter**, and follow the directions displayed on the screen. The Display test contains ten subtests that test the T4900CT's display in various modes. Move the highlight bar to the subtest you want to execute 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 the original data.

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

This subtest displays the following character attribute modes; normal, intensified, reverse, and blinking as shown in the display below. The character attribute modes display the foreground color 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 display below appears on the screen when this subtest is executed.


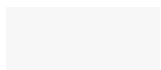
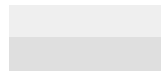
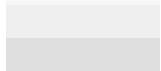




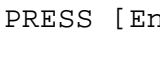
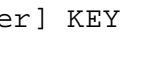




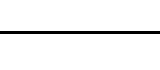
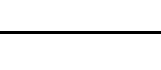
#### CHARACTER ATTRIBUTES

NEXT LINE SHOWS NORMAL DISPLAY.  
NN

NEXT LINE SHOWS INTENSIFIED DISPLAY.  
II

NEXT LINE SHOWS REVERSE DISPLAY.  
RR

NEXT LINE SHOWS BLINKING DISPLAY  
BB

		00 08 ; BLACK
		01 09 ; BLUE
		04 0C ; RED
		05 0D ; MAGENTA
		02 0A ; GREEN
		03 0B ; CYAN
		06 0E ; YELLOW
		07 0F ; WHITE

PRESS [Enter] KEY

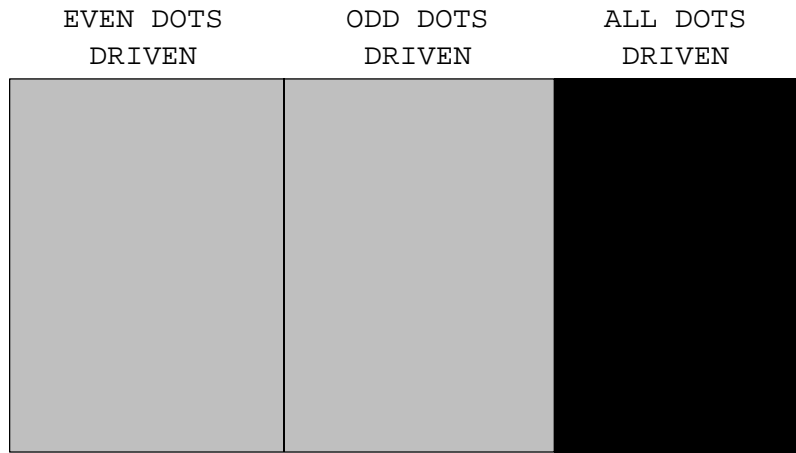




Subtest 06 640x200 Graphics display (mode 6, E)

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

640\*200 GRAPHICS DISPLAY : [X]



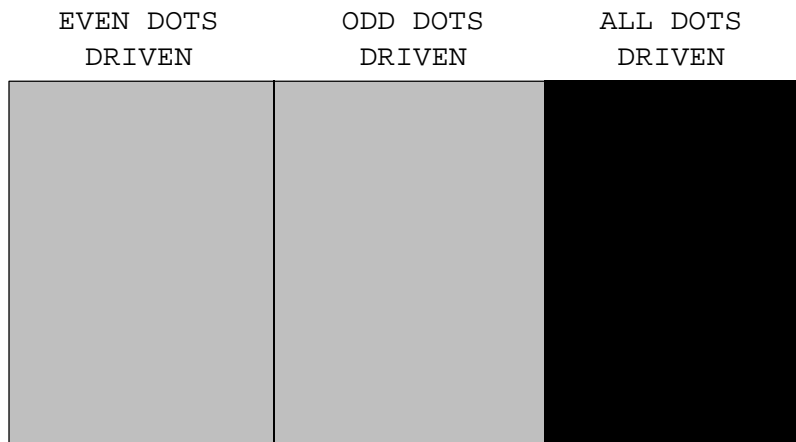
PRESS [Enter] KEY

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

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

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

640\*XXX GRAPHICS DISPLAY



PRESS [Enter] KEY

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





## Subtest 10 LCD/DAC Pallet

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

```
[ Caps/Arrow/Num/Scroll LCD test ]

(1) Press [ Caps Lock    ] key !...Caps (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 two messages:

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

```
[DAC pallet W-R-CMP test ]      = (about 5 seconds)
[ Processor latch test   ]      =
Processor latch test (1:256 times, 2:endless) ?
```

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

## Subtest 11 TFT color display

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 screens display 256 shades (mode 5F) 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 selecting this subtest, the following message will appear and all icons will be on.

```
[Status Indicator Panel Display]
Status Indicator Panel ALL ON

PRESS [Enter] KEY
```

After pressing **Enter**, all icons will be off, press **Enter** again to exit this subtest.

## 3.8 Floppy Disk Test

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

To execute the Floppy Disk Test, select **5** from the DIAGNOSTIC TEST MENU, press **Enter**, and follow the directions displayed on the screen. The Floppy Disk test contains five subtests that test the T4900CT's internal floppy disk drive. The following messages will appear after selecting the Floppy Disk Test from the DIAGNOSTIC TEST MENU. Answer each question with the appropriate response to execute the test.

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

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

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

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

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

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

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

```
FLOPPY DISK      XXXXXXXX
```

```
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 which cylinder is being tested. The fourth digit indicates the head, and the last two digits indicate the sector being tested.

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

Subtest 01 Sequential Read

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

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

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

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

Subtest 02 Sequential Read/Write

This subtest continuously writes data pattern B5ADADh to all the specified tracks selected in step 3 above. The data is then read and compared to the original data.

Subtest 03 Random Address/Data

This subtest writes random data to random addresses on all tracks defined in step 3 above. The data is then read and compared to the original data.

Subtest 04 Write Specified Address

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

Subtest 05 Read Specified Address

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

### 3.9 Printer Test

To execute the Printer Test, select **6** from the DIAGNOSTIC TEST MENU, press **Enter** and follow the directions displayed on the screen. The Printer Test contains three subtests that test the output of the printer connected to the T4900CT.

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

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

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

The printer I/O port address is specified by the XXXXh number. The T4900CT supports three printer channels. Select the printer channel number, and press **Enter** to execute the selected subtest.

#### Subtest 01 Ripple Pattern

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

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

## Subtest 02      Function

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

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

This subtests prints the various print types shown below:

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

## Subtest 03      Wrap around

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

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

### 3.10 Async Test

To execute the Async Test, select **7** from the DIAGNOSTIC TEST MENU, press **Enter**, and follow the directions displayed on the screen. The async test contains four subtests that test the T4900CT's asynchronous communication functions. Move the highlight bar to the subtest you want to execute and press **Enter**.

**NOTE:** To execute the async test, set default for COM port setting in SETUP.

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 serial port channel number, and press **Enter** to start the subtest.

Subtest 01    Wraparound (board)

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

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

Subtest 02    Point to point (Send)

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

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

Subtest 03 Point to point (Receive)

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

Subtest 04 Interrupt Test

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



## 3.11 Hard Disk Test

To execute the Hard Disk Test, select **8** from the DIAGNOSTIC TEST MENU, press **Enter**, and follow the directions displayed on the screen. The hard disk test contains 10 subtests that test the T4900CT's hard disk drive functions. The following messages will appear after selecting the hard disk test from the DIAGNOSTIC TEST MENU. Answer each of the following questions with the appropriate response to execute the test:

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

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

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

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

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

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

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

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

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

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

5. This message is used to select whether the HDD status is displayed on the screen. The HDD status is described in section 3.15. Select **1** or **2** and press **Enter**.

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

```
HARD DISK TEST      XXXXXXXX

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

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

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

Subtest 01 Sequential Read

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

Subtest 02 Address Uniqueness

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

- Forward sequential
- Reverse sequential
- Random

Subtest 03 Random Address/Data

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

Subtest 04 Cross Talk & Peak Shift

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

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

Subtest 05 Write/read/compare (CE)

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

Subtest 06 Write specified address

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

Subtest 07 Read specified address

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

Subtest 08 ECC circuit

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

Subtest 09 Sequential write

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

Subtest 10 W-R-C specified address

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

## 3.12 Real Timer Test

To execute the Real Timer Test, select **9** from the DIAGNOSTIC TEST MENU, press **Enter**, and follow the directions on the screen. The real timer test contains three subtests that test the T4900CT's real timer functions. Move the highlight bar to the subtest you want to execute and press **Enter**.

### Subtest 01 Real Time

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

- (a) 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
```

- (b) 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 :
```

- (c) If the current time is not correct, input the correct time in 24-hour format.

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

### Subtest 02 Backup Memory

This subtest performs the following backup memory check:

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

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

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

Subtest 03 Real Time Carry

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

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

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

Pressing **Enter** displays the following:

```
Current date 1   :      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 T4900CT's NDP functions.

Subtest 01      NDP test

This test checks the following functions 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 TEST MENU, press **Enter**, and follow the directions on the screen. The expansion test contains one subtest that tests the T4900CT's expansion port functions. The following message will appear after selecting the expansion test from the DIAGNOSTIC TEST MENU.

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

Select the test slot number of the PCMCIA slot to be tested and press **Enter**.

Subtest 01 PCMCIA Wraparound

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

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

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

This subtest is executed in the following order:

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

## 3.15 Sound Test

To execute the expansion test, select **12** from the DIAGNOSTIC TEST MENU, press **Enter**, and follow the directions on the screen. The sound test contains three subtests that test the T4900CT's sound functions.

### Subtest 01 CODEC (REC/PLAY)

Test the functions of the Codec (AD1848) A/D, D/A converter. At the same time, test the microphone and headphone terminals. When you execute AD1848.com, a key-input message is displayed. Press Enter to record sound. Immediately after recording, the sound will be played.

### Subtest 02 SIN wave playback

Use DMA and IRQ to play previously sampled sine wave data. The channels used are DRQ1 and IRQ7.

### Subtest 03 FM Synthesizer

Test the OPL3 (YMF262) functions. The sound interval and tone can be controlled by an internal register. When the program is executed, an 8-note scale is played.



### 3.16 Error Code and Error Status Names

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

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

<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	Pointing Stick 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
PRINTER	80	Time Out Error
	EE	Write Buffer Error
	01	Time Out
	08	Fault
	10	Select Line
PRINTER	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 Enabled
	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	Multiplay Error
PCMCIA	C1	Address Line Error
	C2	REG# Line Error
	C3	CE#1 Line Error
	C4	CE#2 Line Error
	C5	DATA Line Error
	C6	WAIT Line Error
	C7	BSY# Line Error
	C8	BVD1 Line Error
	CD	No PCMCIA

### 3.17 Hard Disk Test Detail Status

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

```
HDC status = XXXXXXXX
```

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

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

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

*Table 3-4 Hard disk controller status register contents*

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

Table 3-5 Error register contents

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

## 3.18 Hard Disk Format

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

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

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

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

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

### 3.18.1 Function Description

1. All track FORMAT

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

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

*Table 3-6 Hard disk formatting sequence*

	<b>810 MB</b>
	<b>DVAA-2810</b>
Sector sequences	1
Cylinders	0 to 1,570
Heads	0 to 15
Sectors	1 to 63
Sector length (bps)	512

## 2. Good track FORMAT

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

## 3. Bad track FORMAT

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

## 4. Bad track CHECK

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

### 3.18.2 Operations

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

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

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

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

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

### 1. All track FORMAT

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

```
[All track FORMAT]
```

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

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

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

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

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

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

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

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

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

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

- (d) Bad track register

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

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

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

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

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

- (e) All track format

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

- (f) Track verification

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

## 2. Good track FORMAT

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

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

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

## 3. Bad track FORMAT

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

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

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

## 4. Bad track CHECK

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

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

```
Bad tracks will be displayed in the format shown below.
```

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

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



## 3.19 Head Cleaning

### 3.19.1 Function Description

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

### 3.19.2 Operations

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

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

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

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

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



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

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

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

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

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

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

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

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

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

## 3.21 Running Test

### 3.21.1 Function Description

This function automatically executes the following tests in sequence:

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

The system automatically detects the number of floppy disk drives connected to the T4900CT for the FDD test.

### 3.21.2 Operations

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

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

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

Selecting **Y (yes)** executes the printer wraparound test. A printer wraparound connector must be connected to the **PRT** port on the back of the T4900CT to properly execute this test.

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

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

Selecting **Y (yes)** executes the ASYNC wraparound test. An RS-232-C wrap-around connector must be connected to the **serial port** on the back of the T4900CT to properly execute this test.

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

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

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

## 3.22 Floppy Disk Drive Utilities

### 3.22.1 Function Description

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

#### 1. FORMAT

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

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

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

#### 2. COPY

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

#### 3. DUMP

This program displays the contents of the floppy disk and the designated sectors of the hard disk on the display.

### 3.22.2 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**. A message similar to the one below will be displayed:

```
Warning : Disk data will be destroyed.  
  
Insert work disk into drive A:  
Press any key when ready.
```

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

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

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

```
Format start
```

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

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

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

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

## 3. COPY program

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

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

- (b) 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 will appear, indicating the program has started.

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

Copy start

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

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

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

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

#### 4. DUMP program

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

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

- (b) Select a format type number. If **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 the track number you want to dump. Then, the system will access the disk and dump a list.



## 3.23 System Configuration

### 3.23.1 Function Description

The System Configuration program contains the following configuration information for the T4900CT:

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

### 3.23.2 Operations

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

SYSTEM CONFIGURATION :

```
* - BIOS(BOOT)ROM VER =  VX.XX  VGA = F65545
                               (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.

## 3.24 SETUP

### 3.24.1 Function Description

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

1. MEMORY
  - (a) Total
  - (b) Base
  - (c) Extended
  - (d) Shadow BIOS ROM
  
2. DISPLAY
  - (a) Display Adapter
  - (b) LCD Display Mode
  - (c) Ext. Scan Mode
  - (d) LDC Display Colors
  - (e) Power On Display
  - (f) Text Mode Stretch
  
3. COM/PRT
  - (a) Serial Port
  - (b) Int. Parallel Port
  - (c) DS Parallel Port
  
4. HARD DISK
  - (a) HDD Mode
  
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) Pointing Devices
  - (g) Hotkey
  - (h) Boot Priority
  - (i) Sound I/O Address
  - (j) Ext. Keyboard “Fn” key equivalent

### 3.24.2 Accessing the SETUP Program

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

```

                                T4900CT  SETUP                                BIOS Version = *.*.*
----- MEMORY -----
Total           = 8192KB
Base           = 640KB
Extended       = 7360KB
Shadow BIOS ROM = 192KB

----- BATTERY -----
Battery Save Mode = Economy Power
Battery Display   = Time
Manual Set of Battery Level
                  = E  F

----- DISPLAY -----
Display Adapter   = VGA Compatible
LCD Display Mode  = Color
Ext. Scan Mode    = Interlace
LCD Display Colors = 256K Colors
Power On Display = Internal/External
Text Mode Stretch = Disabled

----- POWER ON PASSWORD -----
Not Registered

----- COM/PRT -----
Serial Port       = COM1 (IRQ4/3F8H)
Int. Parallel Port = LPT1(378H)
DS Parallel Port  = Output

----- OTHERS -----
Power-up Mode     = Boot
CPU Cache         = Enabled
Speaker Volume    = High

----- HARD DISK -----
HDD Mode          = Enhanced IDE(Normal)

Alarm Power On     = Disabled
Pointing Devices  = Auto-selected
Boot Priority      = FDD→HDD
Sound I/O Address = 0530H
Ext. Keyboard "Fn" key equivalent
                  = Disabled

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

```

### Moving Within the SETUP Menu and Changing Values

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

### Accepting Changes and Exiting the SETUP Window

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

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

```
Are you sure? (Y/N)
```

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

```
Are you sure? (Y/N)
The changes you made will cause the system to reboot.
```

The changes you made will cause the system to reboot.

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

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

## The Factory Preset Configuration

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

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

## SETUP Options

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

1. Memory

These options list the computer's memory allocations. The values displayed cannot be changed.

- (a) Total

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

- (b) Base

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

- (c) Extended

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

- (d) Shadow BIOS ROM

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

## 2. Display

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

### (a) Display Adapter

This option selects either the internal or an external display.

*VGA Compatible* Enables the internal display adapter.

*Not Used* Enables an external display adapter in the Desk Station IV. Additional setup options are not displayed.

### (b) LCD Display Mode

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

*Color* Displays in color mode in a maximum of 4096, or 226K colors. (Default)

*Monochrome* Displays in the monochrome mode. The intensity levels of gray are converted to the appropriate intensity levels of gray for the color LCD.

### (c) Ext. Scan Mode

This option selects interlace or non-interlace mode for an external monitor with a resolution of 1,024 x 768 pixels.

*Interlace* Every other line is scanned during each total vertical (full) screen refresh. (Default)

*Non-Interlace* Each line is scanned during each total vertical (full) screen refresh.

(d) LCD Display Colors

This option determines whether the color LCD display supports the following colors. According to the display installed on the machine, the following options are valid:

- (1) If the machine has 12-bit type TFT Color LCD, the following values are available:

*4096 Colors* Supports 4096 colors.

*226K Colors* Supports 226K (226,981) colors. (Default)

**NOTE:** Only the 12-bit type LCD machine can change this item.

- (2) If the machine has 18-bit type TFT Color LCD, the following item will be displayed.

*256K Colors* Supports 256K (262,144) colors.

(e) Power On Display

This option selects the display on which the system starts up when the computer is turned on. The default setting is Internal/External. Once the system starts up, you can switch the active display by using the hot key, **Fn+F5**.

*Internal/External* 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.

*Simultaneous* The system starts up by using both the internal and external displays.

(f) Text Mode Stretch

This option sets the text mode stretch on the LCD.

*Enabled* Text mode stretch is enabled. (Default)

*Disabled* Text mode stretch is disabled.

### 3. COM/PRT

#### (a) Serial Port

This option allows you 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 below:

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

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

#### (b) Internal Parallel Port

This option sets the parallel port mode for the PRT port. If the Desk Station is not attached, the following settings are available.

*LPT1(378H)*            Activates parallel port as LPT1. (Default)

*LPT2(278H)*            Activates parallel port as LPT2.

*LPT3(3BCH)*            Activates parallel port as LPT3.

*Not used*                Disables parallel port operation.

#### (c) DS Parallel Port

This option sets the communication mode for the PRT port to either output-only or bi-directional. For most printers, the port should be set to output. With some other parallel devices, the setting should be set to bi-directional.

*Output*                 Activates uni-directional operation. (Default)

*Bi-directional*        Activates bi-directional operation.

#### 4. Hard Disk

This option allows you to select whether the hard disk drive is set to Enhanced IDE (Normal) or standard IDE mode.

*Enhanced IDE (Normal)* You can select this option in most cases. (Default)

*Standard IDE* Select this option if you cannot obtain the expected result with the Enhanced IDE (Normal) mode, for example, if you use the hard disk drive of 810MB with UNIX or NetWare.

*No drive* Indicates that no hard disk drive is installed.

#### 5. Battery

##### (a) Battery Save Modes

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

*Full Power/*  
*Economy Power/*  
*Low Power/*  
*User Setting* 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 ones shown here. Options in the sub-windows cannot be changed and are for informational purposes only.

*Full Power* The following shows full power settings.

BATTERY SAVE OPTIONS		
Processing Speed	=	High
CPU Sleep Mode	=	Disabled
Display Auto Off	=	30 Min.
HDD Auto Off	=	Disabled
System Auto Off	=	Disabled (only Resume mode)
Max. LCD Brightness	=	High

*Economy Power* The following shows economy power settings.

BATTERY SAVE OPTIONS		
Processing Speed	=	High
CPU Sleep Mode	=	Enabled
Display Auto Off	=	03 Min.
HDD Auto Off	=	03 Min.
System Auto Off	=	Disabled (only Resume mode)
Max. LCD Brightness	=	Low



## Low Power

The following shows low power settings.

BATTERY SAVE OPTIONS		
Processing Speed	=	Low
CPU Sleep Mode	=	Enabled
Display Auto Off	=	03 Min.
HDD Auto Off	=	03 Min.
System Auto Off	=	30 Min. (only Resume mode)
Max. LCD Brightness	=	Low

## User settings

This option allows you to set the battery save parameters in the sub-windows, **BATTERY SAVE OPTIONS**. When you select this option, 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**, and **Low Power**. *User settings* lets you select the following options.

### Processing Speed

This option is used to set the CPU operating speed to High or Low.

Processing speed	CPU speed
High	75MHz
Low	37.5 MHz (Equivalent)

### CPU Sleep Mode

This option is used to enable and disable the CPU sleep function.

*Enabled*      Enables sleep mode.

*Disabled*     Disables sleep mode.

### 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.

*Disabled* Disables display automatic power off.

*xx Min.* 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.

### HDD Auto Off

This option is used to disable or set the duration of the HDD automatic power off function.

*Disabled* Disables HDD automatic power off.

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

### System Auto Off

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

*Disabled* System automatic power off is disabled.

*xx Min.* System automatic power off is enabled.

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

### Max. LCD Brightness

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

*High* LCD's maximum brightness level is set to high.

*Low* LCD's maximum brightness level is set to low.

(b) Battery Display

This option selects how the status indicator panel indicates the remaining battery capacity when the T4900CT is not connected to the AC adapter. The options are:

- Time*                      The status indicator panel indicates how much battery power is left. The status indicator panel indicates an estimated time for which the T4900CT can operate with the remaining battery power.
- % remaining*              The status indicator panel displays the remaining battery capacity in a percentage amount.

The status indicator panel displays the remaining battery capacity in a percentage amount whenever the T4900CT 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 T4900CT 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

This option allows you to set or reset the power on password.

*Registered*                      Password has been registered.

*Not registered*                      Password has not been registered.

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

## 7. Others

Whether or not you need to configure the T4900CT with these options depends primarily on the kind of software or peripherals to be used.

### (a) Power-up Mode

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

*Boot* Turns off AutoResume. (Default)

*Resume* Turns on the AutoResume feature.

### (b) CPU Cache

This option enables and disables the CPU cache.

*Enabled* Enables the CPU cache. (Default)

*Disabled* Disables the CPU cache.

If the CPU Cache is enabled, setup will display another box to select. It sets the cache mode of the CPU.

*Write-back* Caching for memory write. (Default)

*Write-through* Caching for memory read.

When the CMOS checksum error or bad battery error is detected, this value is set to the Write-back mode. Even if the setup default (Home-key) is selected, this value will not be changed.

### (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 Hot Key.

*Off* Disables the speaker.

*Low* Selects the minimum speaker volume.

*Medium* Selects the medium speaker volume.

*High* Selects the maximum speaker volume. (Default)

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

### System Speaker

This option enables or disables the system speaker.

*Enabled* Enables the system speaker. (Default)

*Disabled* Disables the system speaker.

### 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. (Default)

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

### 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. (Default)

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

#### (d) 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. (Default)

(e) 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 T4900CT will be powered on and boot up, or resume automatically at the time you set here.

(f) Pointing Devices

This option enables selection of the pointing device.

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

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

(g) 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→HDD

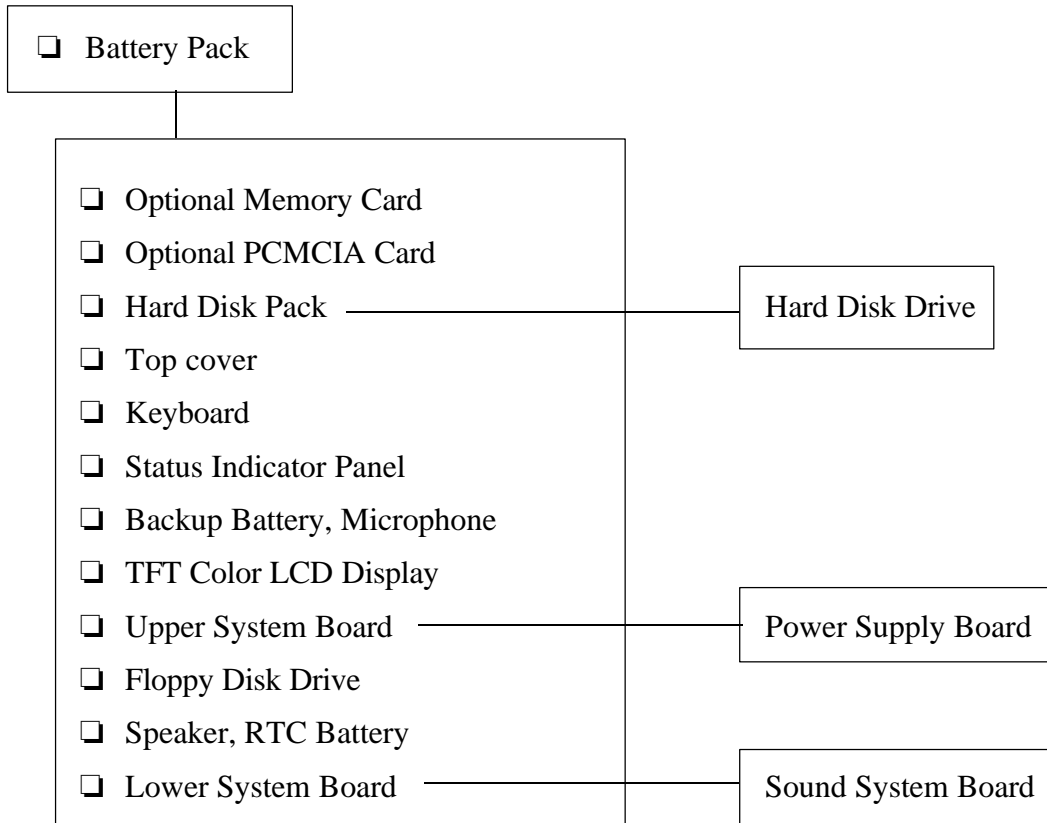
*HDD→FDD* HDD→FDD A

**NOTE:** *If you turn the T4900CT 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.*



## 4.1 General

This section explains how to disassemble the T4900CT 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 the FRUs which 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 T4900CT to operate improperly.





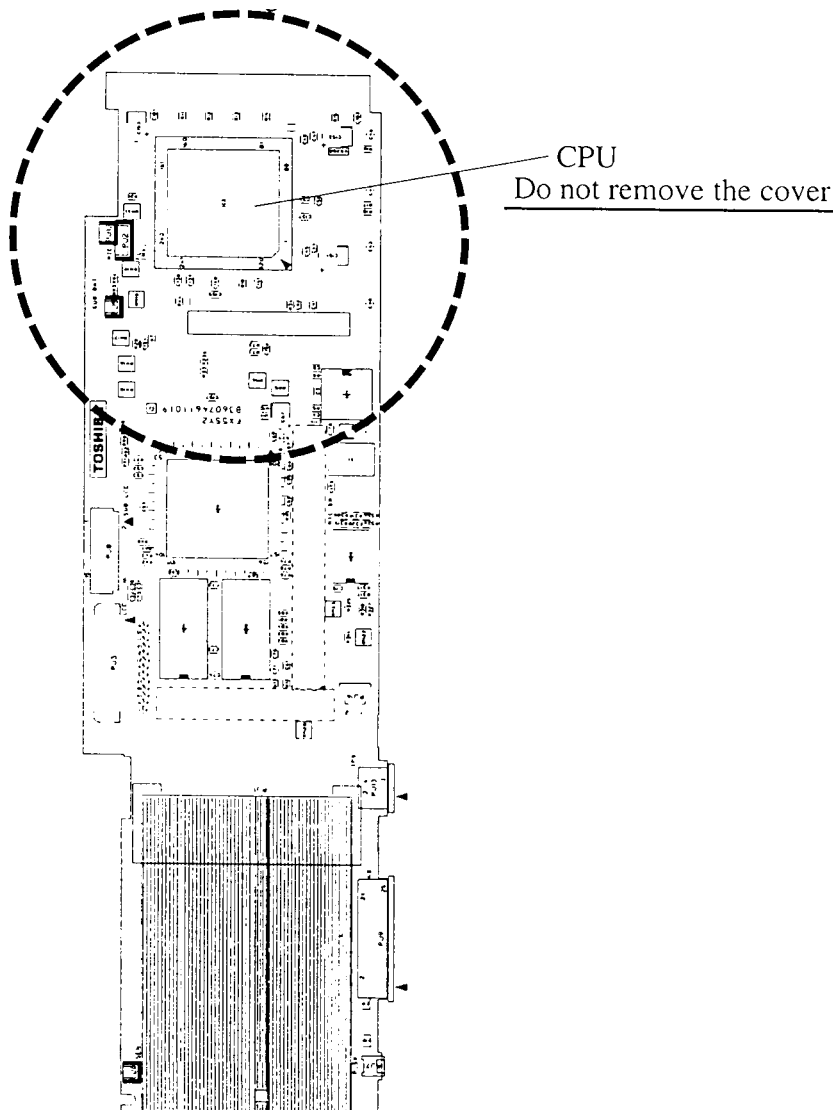
## Before You Begin

Look over the procedures in this section before you begin disassembling the T4900CT. Familiarize yourself with the disassembly and reassembly steps. Begin each procedure by removing the AC adapter and the battery pack as instructed in section 4.2, *The Battery Pack*.

**Warning:** Wait at least five minutes after turning off the power before you begin disassembly. The T4900CT's processor operates at high temperature and there is a danger of incurring burns if you touch the chassis while it is hot.

**Warning:** If you need to operate the machine while it is partially disassembled, be sure that each PCB is mounted on the middle frame and that the upper system board cover is securely mounted. The system board cover works as a heatsink to help cool the CPU.

The following figure indicates the area of greatest heat concentration.



1. Do not disassemble the T4900CT 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 T4900CT:
  - Dust and contaminates
  - Static electricity
  - Extreme heat, cold, and humidity
4. Make sure the FRU you are replacing is causing the abnormal operation by performing the necessary diagnostics tests described in this manual.
5. Do not perform any operations that are not necessary and use only the described procedures for disassembling and installing FRUs in the T4900CT.
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 T4900CT. When you remove screws, make sure they are placed in a safe place and identified with the correct parts.
8. When assembling the T4900CT make sure you use the correct screws to secure the various pieces in place. Screw sizes are listed in the corresponding figures.
9. The T4900CT contains many sharp edges and corners, so be careful not to injure yourself.
10. After you have replaced an FRU make sure the T4900CT is functioning properly by performing the appropriate test on the FRU you have fixed or replaced.

## **Disassembly Procedures**

The T4900CT has two basic types of cable connectors:

- Pressure Plate Connectors
- Normal Pin Connectors

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

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

## Assembly Procedures

After you have disassembled the T4900CT and fixed or repaired the problem that was causing the T4900CT to operate abnormally, you will need to reassemble the T4900CT.

While assembling the T4900CT, remember the following general points:

- Take your time, making sure you follow the instructions closely. Most problems arise when you hurry to assemble the T4900CT.
- 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 damage either the threads on the screw or the head of the screw, and may prevent proper seating of an FRU.
- Be sure to fasten screws securely. If a screw is not fully fastened, it could come loose, creating a danger of a short circuit, which could cause heat and smoke.
- If you replace the battery pack, RTC battery, or backup battery, be sure to use only the same model battery or an equivalent battery recommended by Toshiba. Installation of the wrong battery can cause the battery to explode.

After installing an FRU in the T4900CT, confirm that the FRU and the T4900CT 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 T4900CT:

- 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 T4900CT battery pack, follow the steps below and refer to figure 4-1.

1. Turn off the power to the T4900CT. Disconnect the AC adapter, power cord, and all external cables connected to the T4900CT.
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.
4. Firmly grasp the **battery pack** and pull it out.

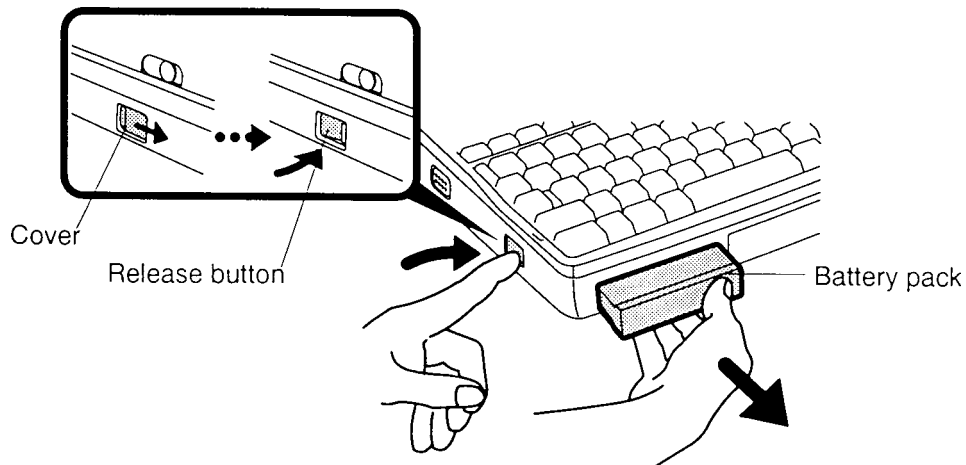


Figure 4-1 Removing the battery pack

### Installing the Battery Pack

**NOTE:** The battery pack is designed to fit into the T4900CT in only one way.

To install the T4900CT 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 groove on the side of the battery faces left and the smooth side faces right.
2. Push the **battery pack** in until it locks into place.

## 4.3 Optional Memory Card

### Removing an Optional Memory Card

To remove an optional memory card from the T4900CT, follow the steps below and refer to figures 4-2 and 4-3.

1. Turn off the power to the T4900CT. Disconnect the AC adapter, power cord, and all external cables connected to the T4900CT.
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).

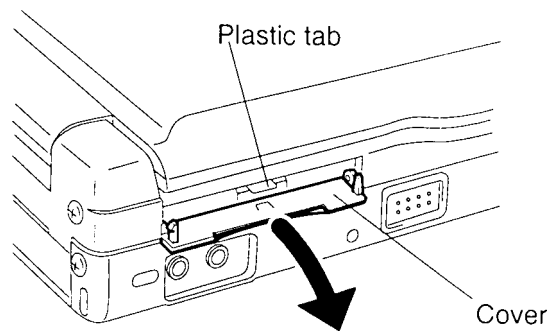


Figure 4-2 Opening the cover

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).

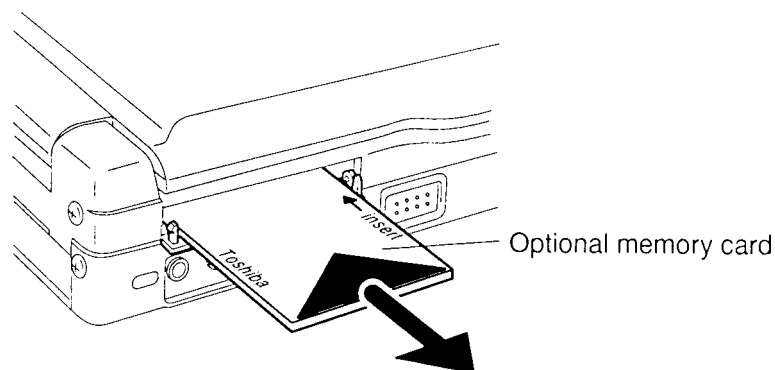


Figure 4-3 Removing the optional memory card

**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 T4900CT, 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.

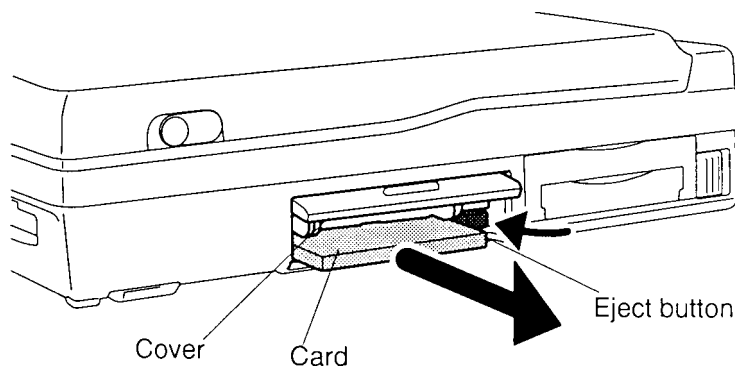
The T4900CT automatically configures all additional memory as extended memory.

## 4.4 Optional PCMCIA Card

### Removing an Optional PCMCIA Card

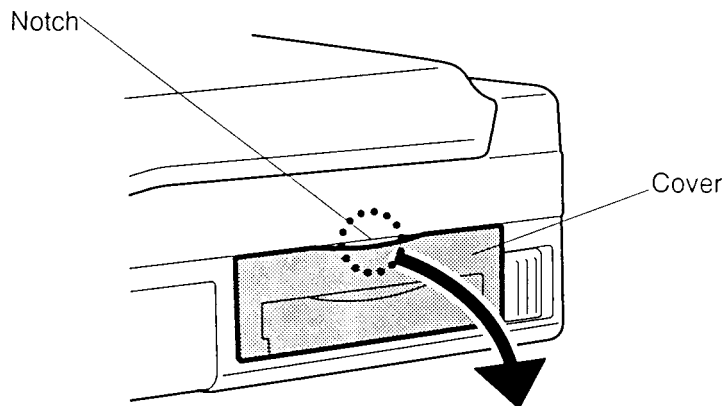
The T4900CT has two PCMCIA slots: one for a card up to 5.0 mm (slot 2) and one for a card up to 16 mm (slot 1). To remove optional PCMCIA cards, follow the steps below and refer to figures 4-4 through 4-6:

1. Turn off the power to the T4900CT. Disconnect the AC adapter, power cord, and all external cables connected to the T4900CT.
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 slot **cover** 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).



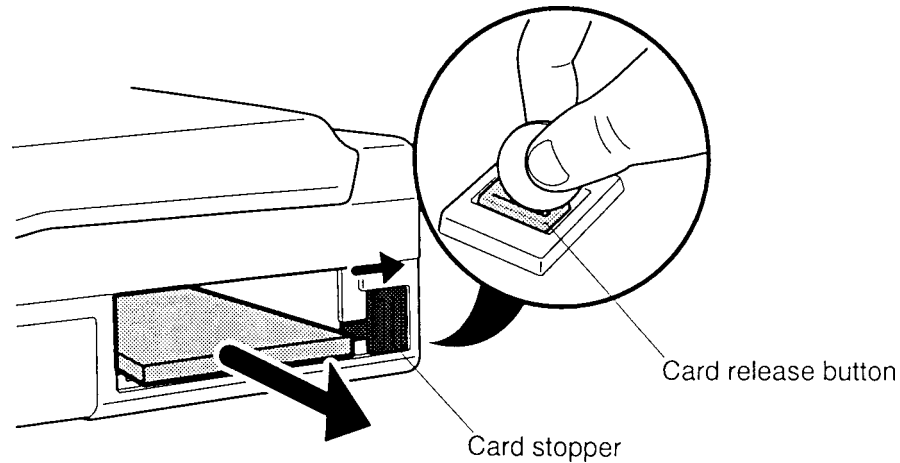
*Figure 4-4 Removing the card from the PCMCIA card slot 2*

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 a 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 T4900CT, 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.

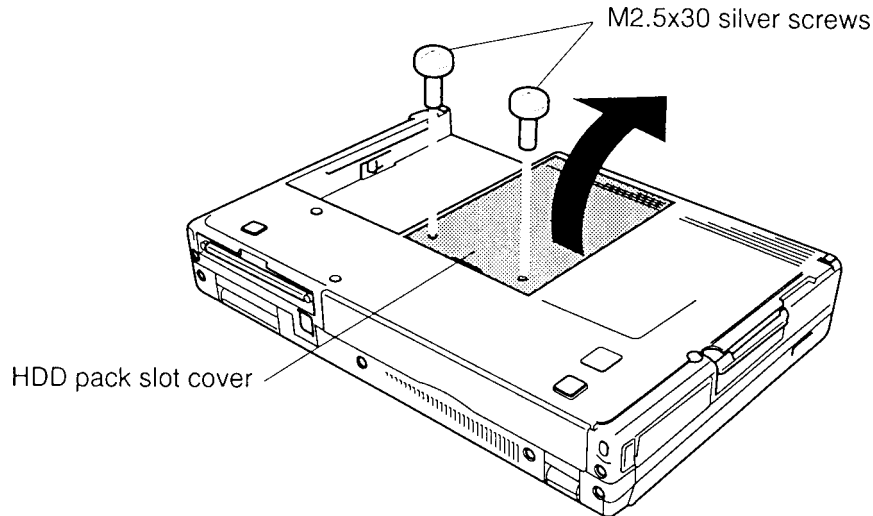


## 4.5 Hard Disk Drive

### Removing the Hard Disk Drive

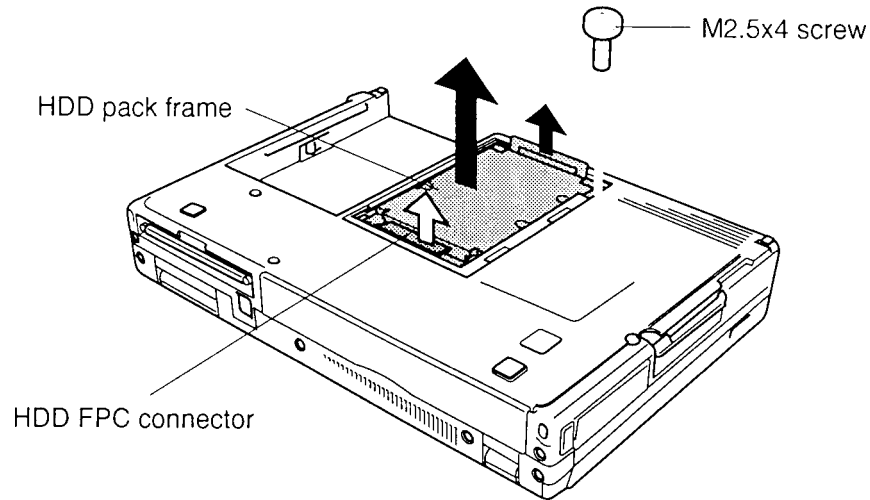
To remove the T4900CT's hard disk drive, follow the steps below and refer to figures 4-7 through 4-10.

1. Turn off the power to the T4900CT. Disconnect the AC adapter, power cord, and all external cables connected to the T4900CT.
2. Remove the battery pack as described in section 4.2.
3. Turn the computer upside down.
4. Remove two **M2.5x30 screws** securing the **HDD pack slot cover**, and lift off the cover (figure 4-7).



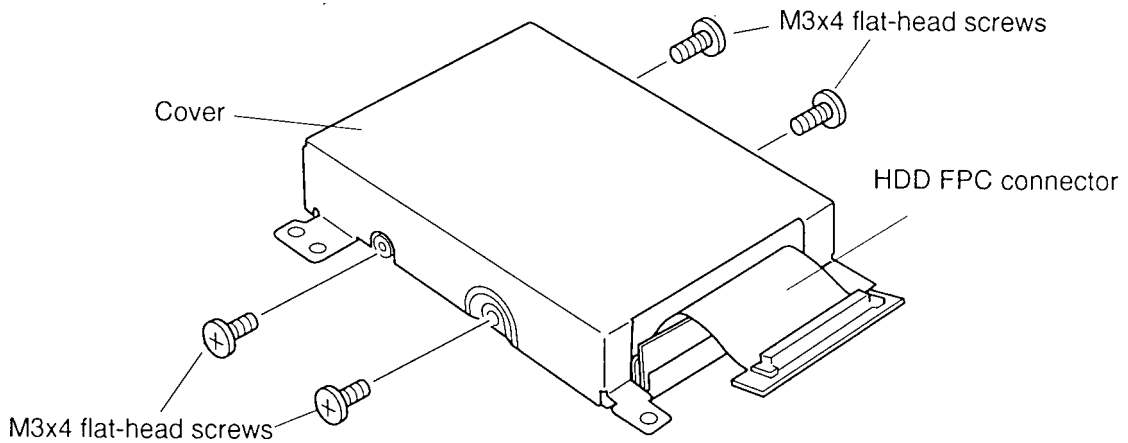
*Figure 4-7 Removing the HDD pack cover*

5. Remove one **M2.5x4** screw securing the **HDD pack frame** to the computer. (figure 4-8).
6. Disconnect the **HDD Flexible Printed Circuit (FPC)** from the computer.
7. Insert a fingernail or similar object under the notch on the HDD pack, lift it, and pull up to remove the HDD pack (figure 4-8).



*Figure 4-8 Removing the HDD pack*

8. Remove the **VOID seal**, and remove four **M3x4** flat-head screws securing the case to the HDD pack. Open the case and lift out the HDD pack (figure 4-9).



*Figure 4-9 Removing the cover*

- Carefully disconnect the FPC from the HDD pack. Use a thin object to pry each side of the FPC connector a little at a time to avoid bending the pins, then grasp the connector and pull it off (figure 4-10).

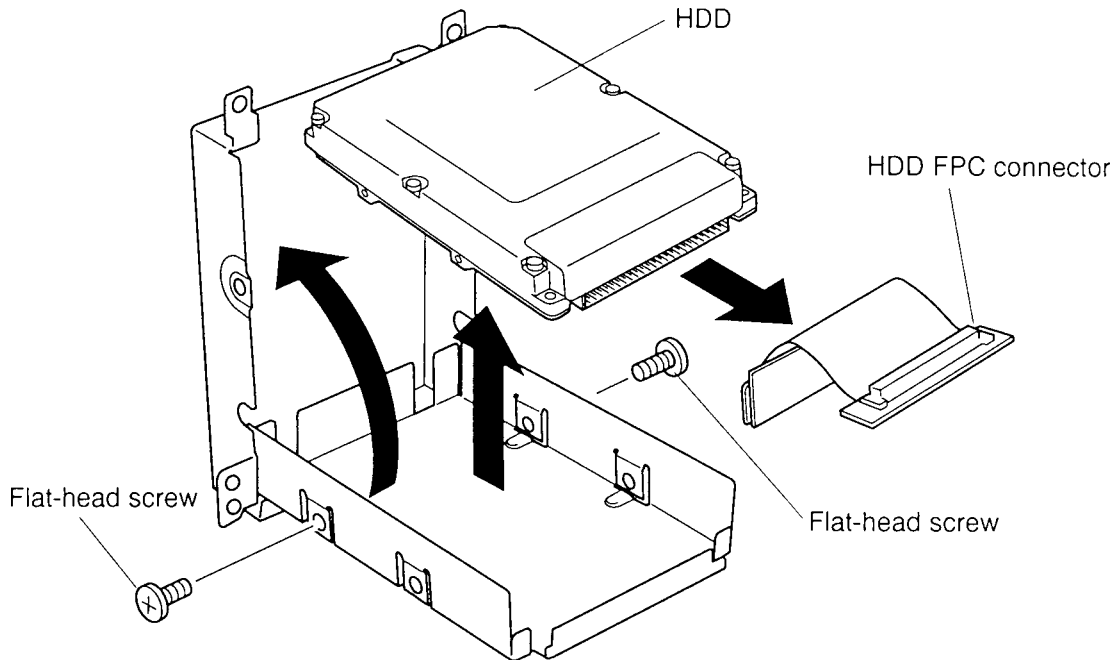


Figure 4-10 Removing the HDD

## Installing the HDD

To install the T4900CT's HDD, follow the steps below and refer to figures 4-7 through 4-10.

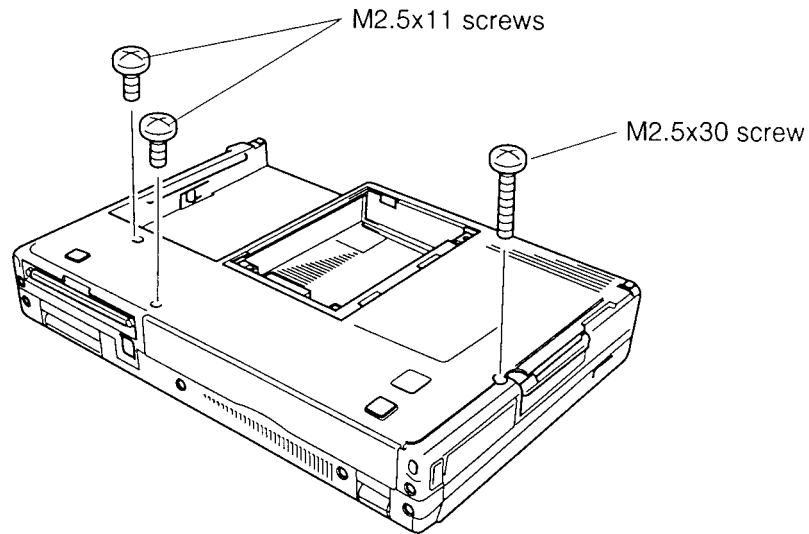
- Connect the FPC connector to the HDD and seat the HDD into the bottom half of the case (figures 4-9 and 4-10).
- Align the screw holes in the HDD and case, then secure the HDD with **two flat-head screws** at the end opposite the FPC connector (figure 4-9).
- Fit the plastic tab into slots on the bottom half of the case and seat the **HDD pack cover** into the case (figure 4-7).
- Close the case and secure the remaining **two flat-head screws**.
- Apply a **new VOID seal** to the HDD pack.
- Seat the **HDD pack** in the computer and secure one **M2.5x4 screw** (figure 4-8).
- Fit the **tabs** on the HDD pack cover into **notches** on the computer and rotate the cover into place. Secure the cover with **two M2.5x30 screws** (figure 4-7).
- Install the battery pack as described in section 4.2.

## 4.6 Top Cover

### Removing the Top Cover

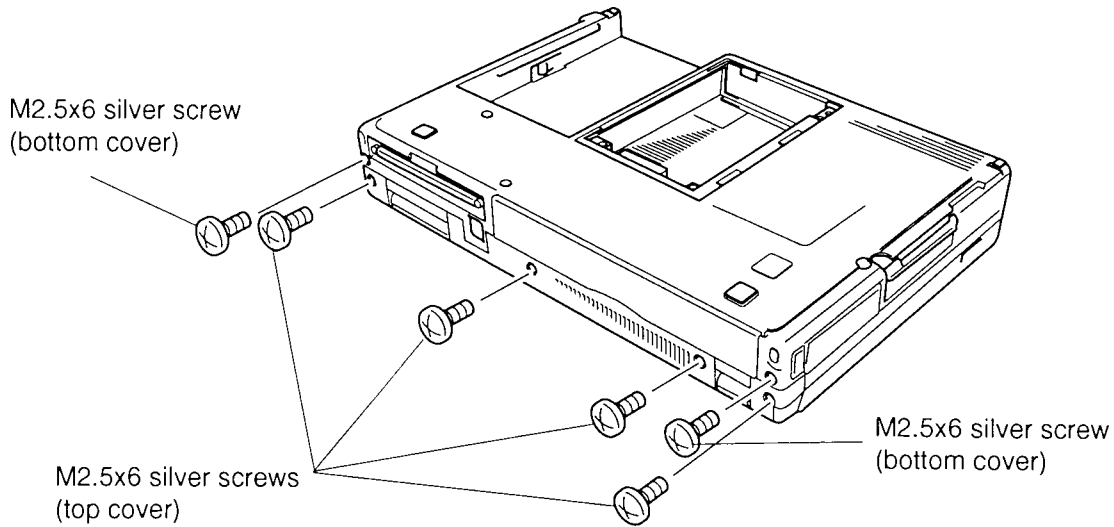
To remove the T4900CT's top cover, follow the steps below and refer to figures 4-11 to 4-13.

1. Turn off the power to the T4900CT. Disconnect the AC adapter, power cord, and all external cables connected to the T4900CT.
2. Remove the battery pack, optional memory card, optional PCMCIA cards, and HDD pack as described in sections 4.2 through 4.5.
3. Turn the computer upside down and remove **one M2.5x30 screw** and **two M2.5x11 screws** (figure 4-11).



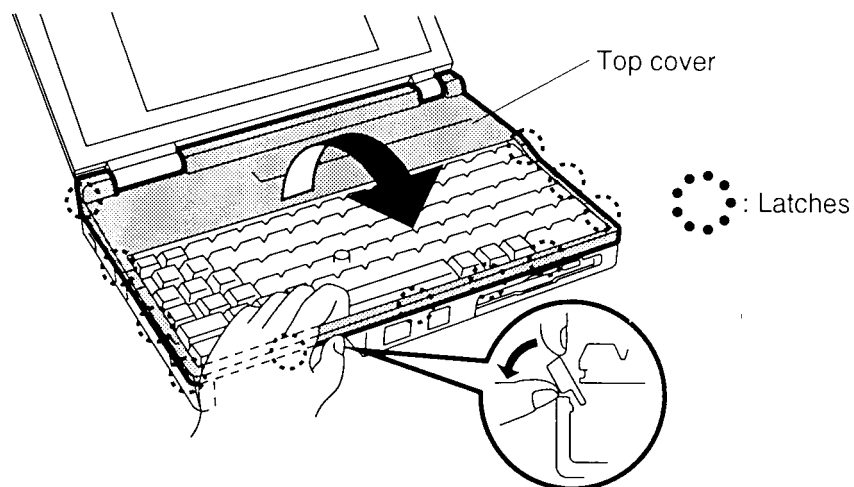
*Figure 4-11 Removing screws (bottom of the computer) securing the top cover*

- Turn the T4900CT 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 T4900CT. If you are going to disassemble the middle frame, also remove two **M2.5x6 screws** securing the bottom cover (figure 4-12).



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

- 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.)
- Unsnap the **12 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).
- 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 T4900CT's top cover, follow the steps below and refer to figures 4-11 through 4-13.

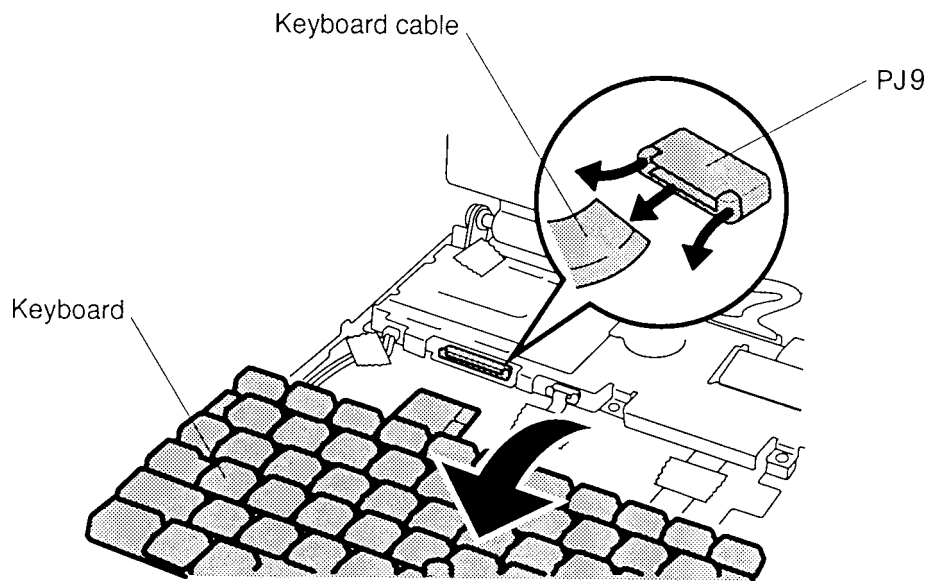
1. Place the **top cover** on the T4900CT.
2. Begin at the back and snap the top cover into place, continuing along the sides and finally the front until all **14 latches** are snapped (figure 4-13).
3. Close the display.
4. Fasten the **four M2.5x6 silver screws** at the back of the T4900CT, to secure the top cover. If you removed them, also fasten **two M2.5x6** screws to secure the bottom cover (figure 4-12).
5. Turn the computer over.
6. Secure **one M2.5x30 screw** and **two M2.5x11 screws** on the bottom of the T4900CT (figure 4-11).
7. Install the HDD pack, optional PCMCIA card, optional memory card, and battery pack as described in sections 4.5 back through 4.2.

## 4.7 Keyboard

### Removing the Keyboard

To remove the T4900CT's keyboard, follow the steps below and refer to figure 4-14.

1. Turn off the power to the T4900CT. Disconnect the AC adapter, power cord, and all external cables connected to the T4900CT.
2. Remove the battery pack, optional memory card, optional PCMCIA card, HDD pack, and top cover as described in sections 4.2 through 4.6.
3. Carefully lift off the **keyboard** to expose the keyboard connector.
4. Disconnect the **keyboard cable** from the **pressure plate connector (PJ9)** on the upper system board.

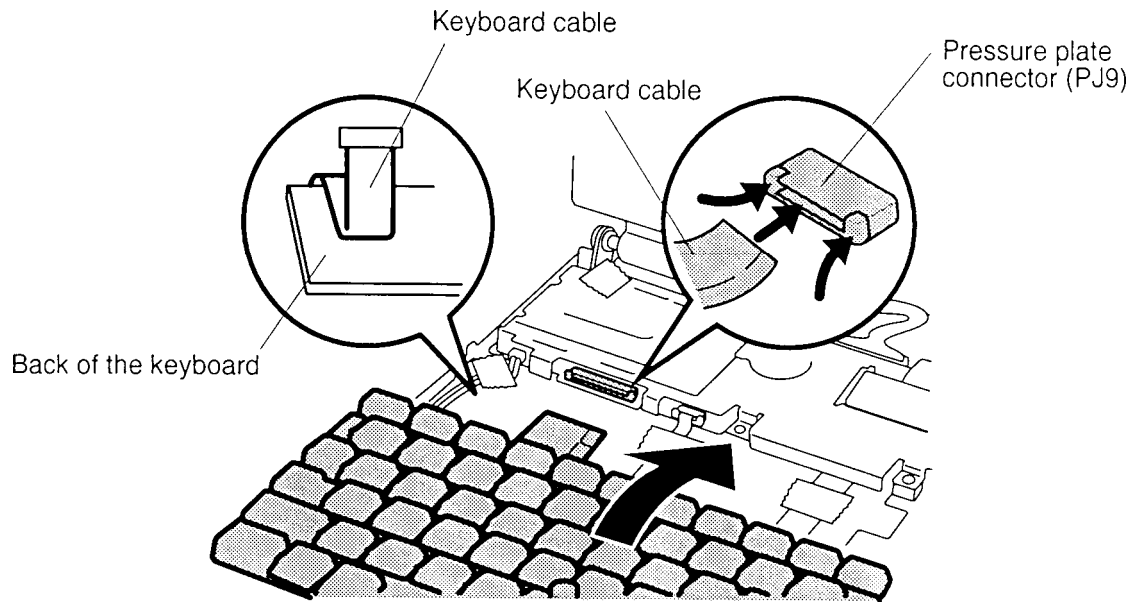


*Figure 4-14 Removing the keyboard*

## Installing the Keyboard

To install the T4900CT's keyboard, follow the steps below and refer to figure 4-15.

1. Connect the **keyboard cable** to the **pressure plate connector (PJ9)** on the upper system board.
2. Seat the keyboard in the T4900CT. 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 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 back through 4.2.



## 4.8 Status Indicator Panel

### Removing the Status Indicator Panel

To remove the T4900CT's status indicator panel, follow the steps below and refer to figure 4-16.

1. Turn off the power to the T4900CT. Disconnect the AC adapter, power cord, and all external cables connected to the T4900CT.
2. Remove the battery pack, optional memory card, optional PCMCIA card, HDD pack, and top cover as described in sections 4.2 through 4.6.
3. Remove the **tape** securing the **status indicator panel cable**.
4. Disconnect the **status indicator panel cable** from **PJ8** on the upper system board and lift the panel out of its brackets.

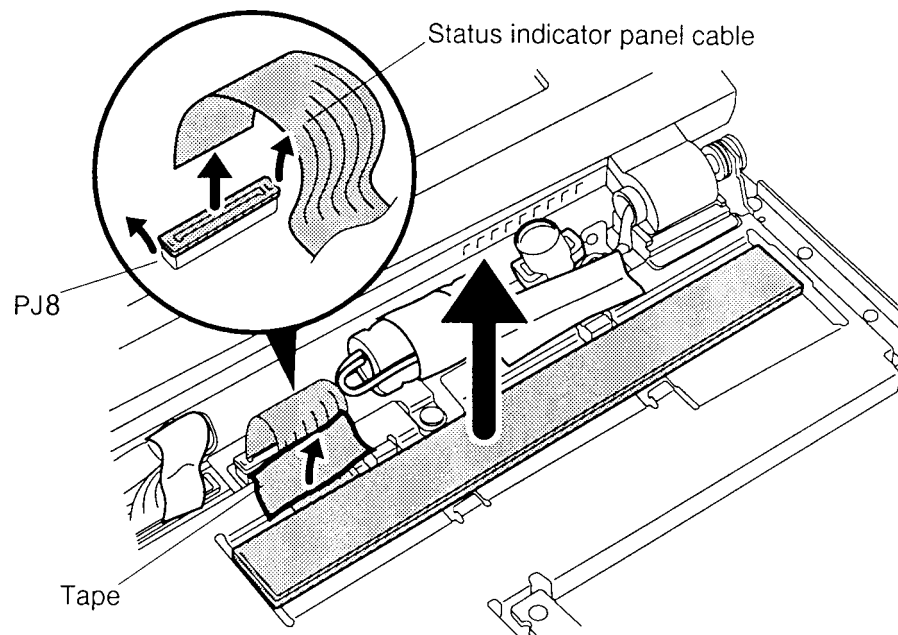


Figure 4-16 Removing the status indicator panel

## Installing the Status Indicator Panel

To install the T4900CT's status indicator panel, follow the steps below and refer to figure 4-16.

1. Connect the **status indicator panel cable** to the **pressure plate connector (PJ8)** on the upper system board.
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.
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 back through 4.2.

## 4.9 Backup Battery and Microphone

### Removing the Backup Battery and Microphone

To remove the T4900CT's backup battery and microphone, follow the steps below and refer to figure 4-17.

1. Turn off the power to the T4900CT. Disconnect the AC adapter, power cord, and all external cables connected to the T4900CT.
2. Remove the battery pack, optional memory card, optional PCMCIA card, HDD pack, and top cover as described in sections 4.2 through 4.6.
3. Remove the **tape** securing the **backup battery**.
4. Disconnect the **backup battery cable** from **PJ5** on the upper system board, then remove the tape securing the backup battery cable.
5. Lift up the **microphone** slightly and disconnect the **microphone cable** from **PJ12** on the upper system board.

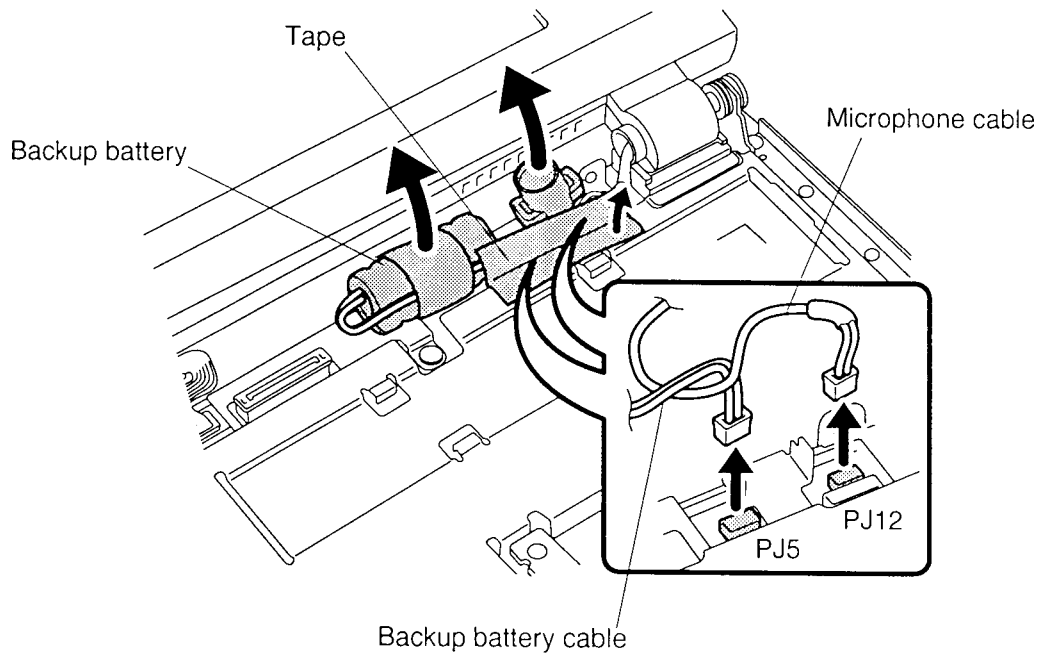


Figure 4-17 Removing the backup battery and microphone

## Installing the Backup Battery and Microphone

**WARNING:** If you replace the backup battery, be sure to use only the same model battery or an equivalent battery recommended by Toshiba. Installation of the wrong battery can cause the battery to explode.

To install the T4900CT's backup battery and microphone, follow the steps below and refer to figures 4-18 through 4-20.

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

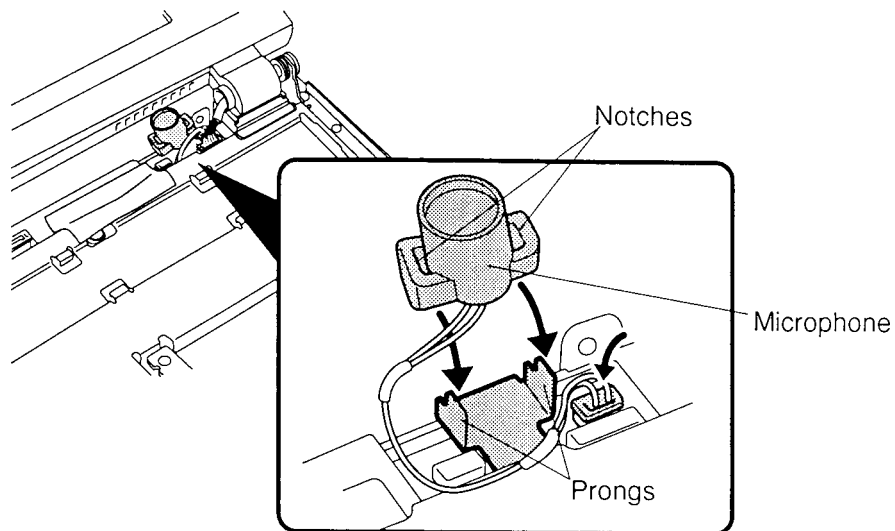


Figure 4-18 Installing the microphone

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 and leave a small loop so it won't be too long to lie flat at the connector (figure 4-19).

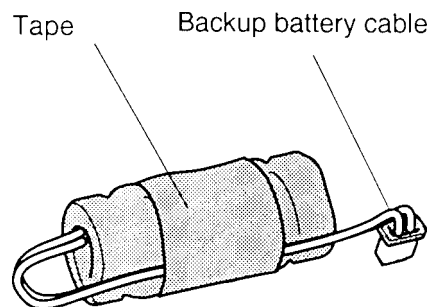
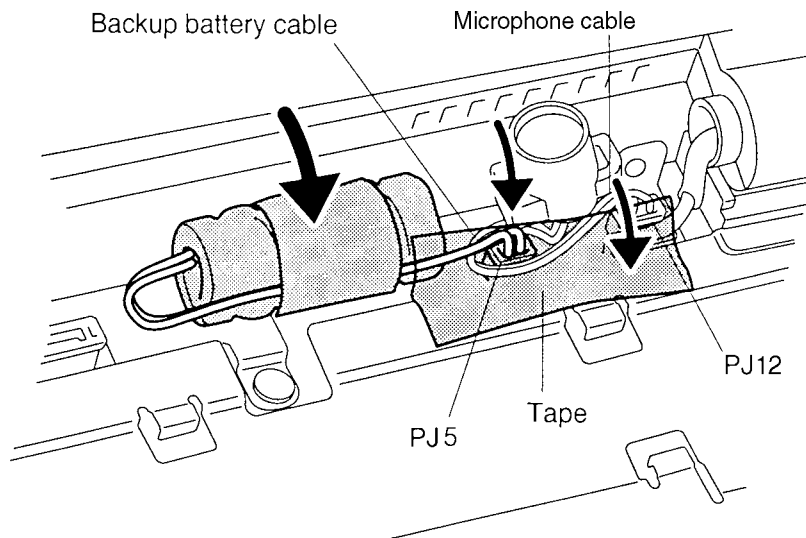


Figure 4-19 Securing the backup battery cable

3. Connect the **backup battery cable** to **PJ5** 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 **PJ12** on the upper system board (figure 4-20).



*Figure 4-20 Installing the backup battery*

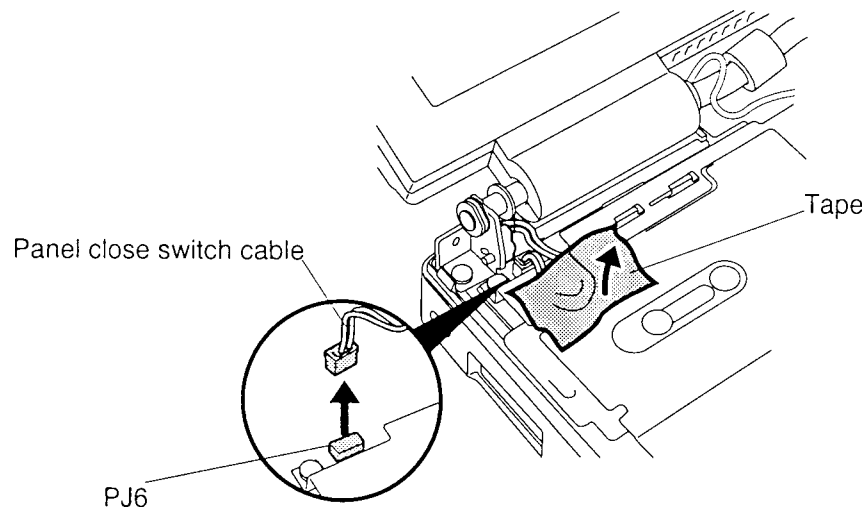
4. Lay the **backup battery** and cables in place on the computer and secure them with **tape** (figure 4-20).
5. Install the top cover, HDD pack, optional PCMCIA card, optional memory card, and battery pack as described in sections 4.6 back through 4.2.

## 4.10 Display Assembly

### Removing the Display Assembly

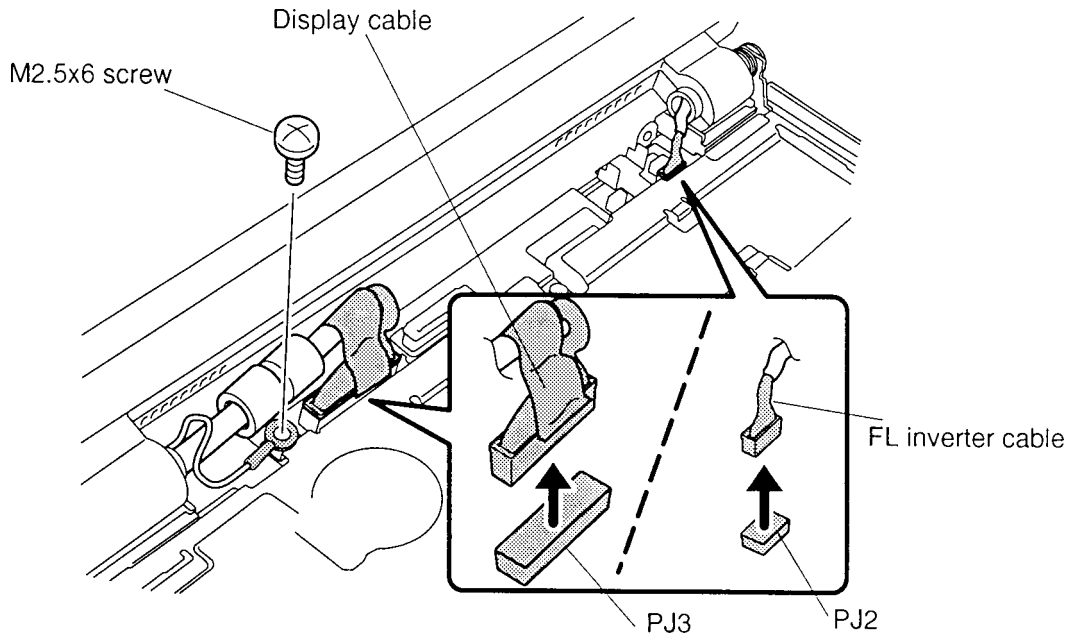
To remove the T4900CT's display assembly, follow the steps below and refer to figures 4-21 through 4-24.

1. Turn off the power to the T4900CT. Disconnect the AC adapter, power cord, and all external cables connected to the T4900CT.
2. Remove the battery pack, optional memory card, optional PCMCIA card, HDD pack, and top cover as described in sections 4.2 through 4.6.
3. Remove the **tape** securing the **panel close switch cable**, then disconnect it from **PJ6** on the upper system board (figure 4-21).



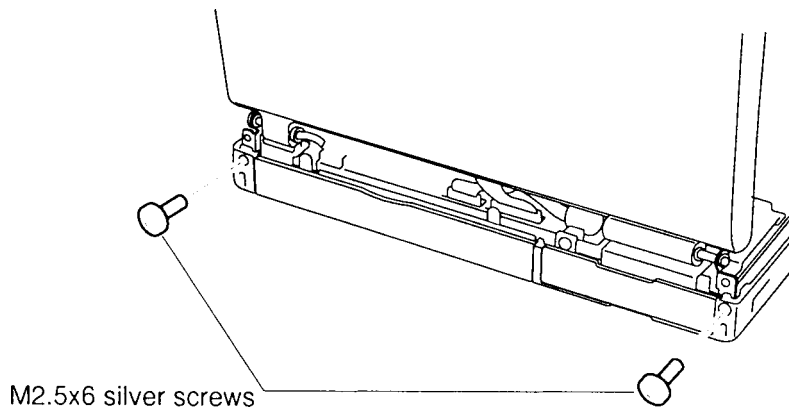
*Figure 4-21 Removing the panel close switch cable*

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



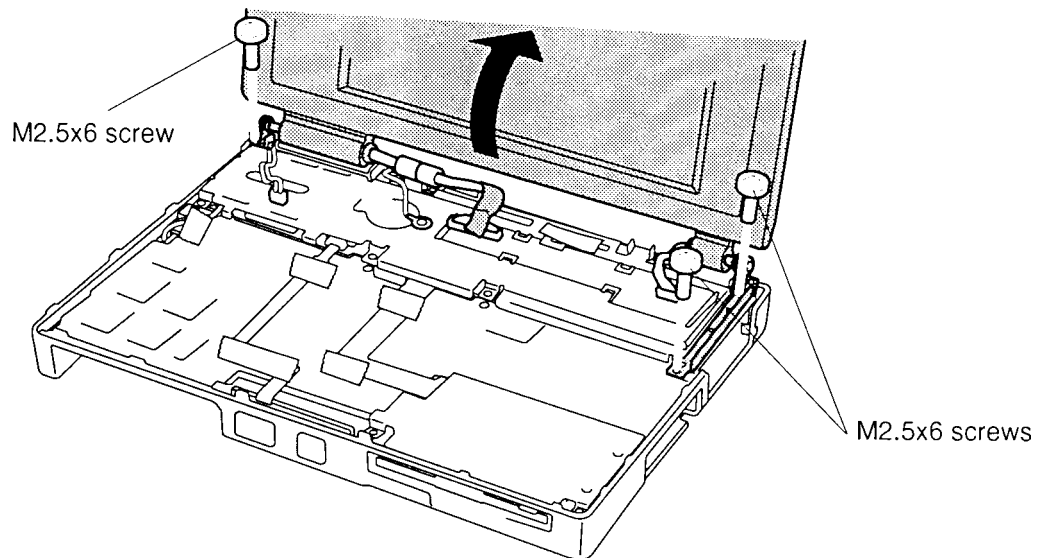
*Figure 4-22 Removing the display, FL, and ground cables*

6. Turn the computer around and remove the **two M2.5x6 silver screws** on the back of the computer which secure 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 T4900CT'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 fasten 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 **panel close switch cable** to **PJ6** on the upper system board, then secure it with **tape** (figure 4-21).
5. Connect the **display cable** to **PJ3** and the **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 back through 4.2.

## 4.11 Speaker, Upper System Board, and Power Supply Board

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

To remove the T4900CT'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 T4900CT. Disconnect the AC adapter, power cord, and all external cables connected to the T4900CT.
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 through 4.10.
3. If you have not already done so, turn the computer upside down and remove one **M2.5x11 screw** (next to the battery terminal).
4. Remove the **left hinge cover** and **tape**, then remove the **five M2.5x6 screws** securing the **upper system board cover** (figure 4-25).
5. Remove **two M2.5x6 screws** securing the FDD plate and remove the plate.

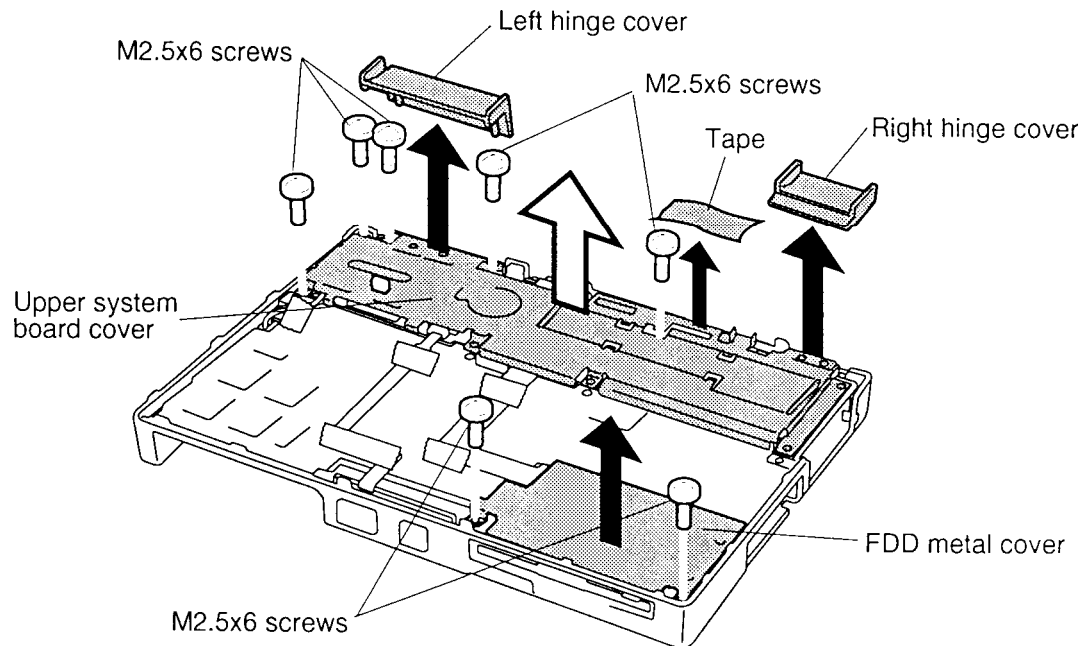
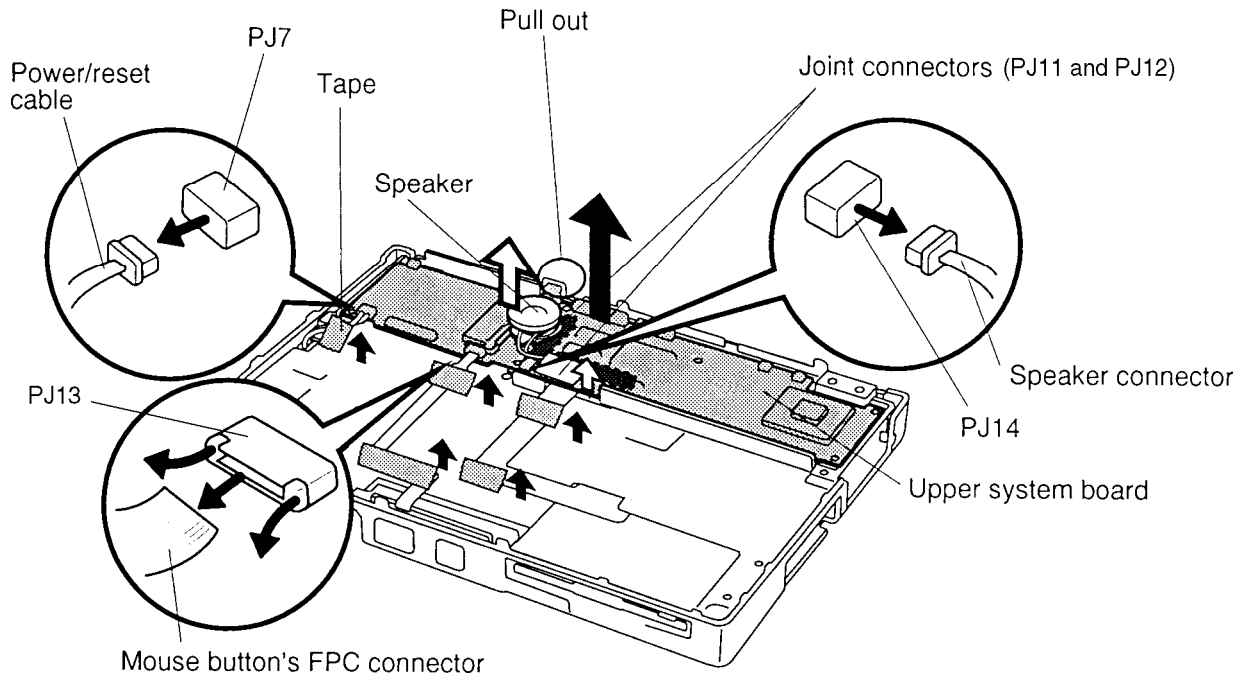


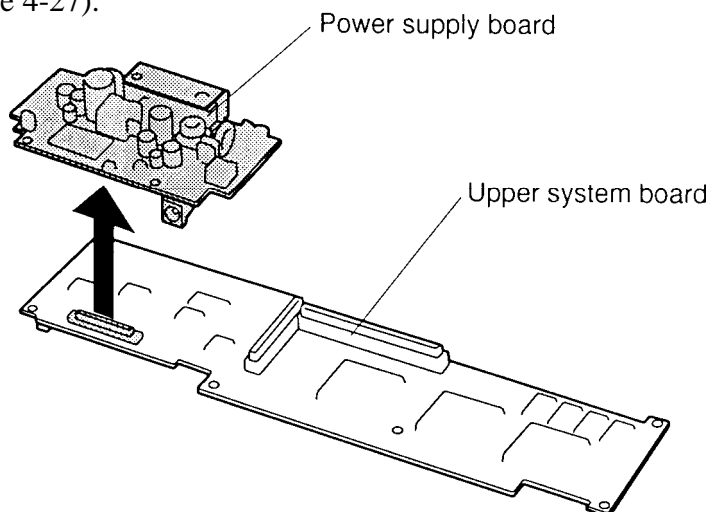
Figure 4-25 Removing the upper system board cover

6. Remove **tape** from the **speaker cable**, disconnect the cable and lift out the speaker with its plastic holder (figure 4-26).
7. Remove the **tape** securing the **power/reset cable** and disconnect the cable from **PJ7** on the **upper system board** (figure 4-26).
8. Disconnect the **mouse button's FPC connector** from **PJ13** and remove the tape (figure 26).
9. Carefully lift up the **upper system board** with the **power supply board** to disconnect **two joint connectors, PJ11 and PJ12**. You may have to pull the computer frame out slightly to clear the DC IN jack (figure 26).



*Figure 4-26 Removing the upper system board*

10. 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 Speaker, Upper System Board, and Power Supply Board

To install the T4900CT's speaker, upper system board, and power supply board, follow the steps below and refer to figures 4-25 through 4-27.

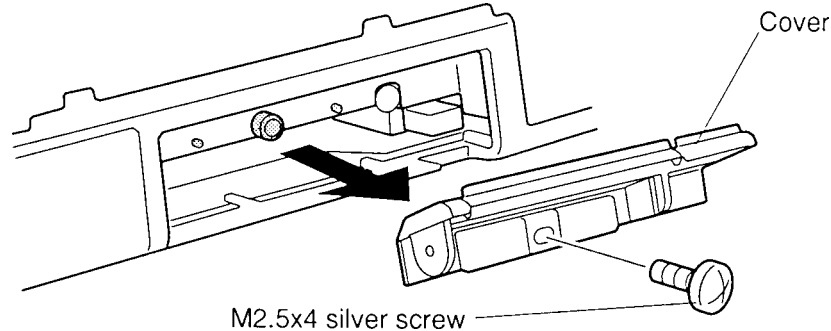
1. Connect the **power supply board** to the **upper system board** (figure 4-27).
2. Turn the **upper system board** over and place it on the lower system board (figure 4-26).
3. Align the **two joint connectors (PJ11 and PJ12)**, then gently press the upper system board to connect them (figure 4-26).
4. Connect the mouse's **FPC connector** to **PJ13** (figure 4-26).
5. Connect the **power/reset cable** to **PJ7** on the upper system board and secure it with **tape** (figure 4-26).
6. Seat the **speaker holder** in place. Fit **two pins** on the holder into holes in the computer. Position the **speaker** in the holder so that it lies flush with the top of the holder and connect the **speaker cable** to **PJ14** on the upper system board.
7. Wrap the **speaker cable** so that it does not lie on top of sharp projections from the lower board connector and secure it with tape.
8. Set the **FDD metal cover, right hinge cover, and upper system board cover** in place (figure 4-25).
9. Secure the **upper system board cover** with **five M2.5x6 screws** and set the **left hinge cover**, then apply the **tape** (figure 4-25).
10. Secure the **two M2.5x6 screws** on the FDD cover.
11. 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 back through 4.2.

## 4.12 Base Assembly and Power/Reset Board

### Removing the Base Assembly

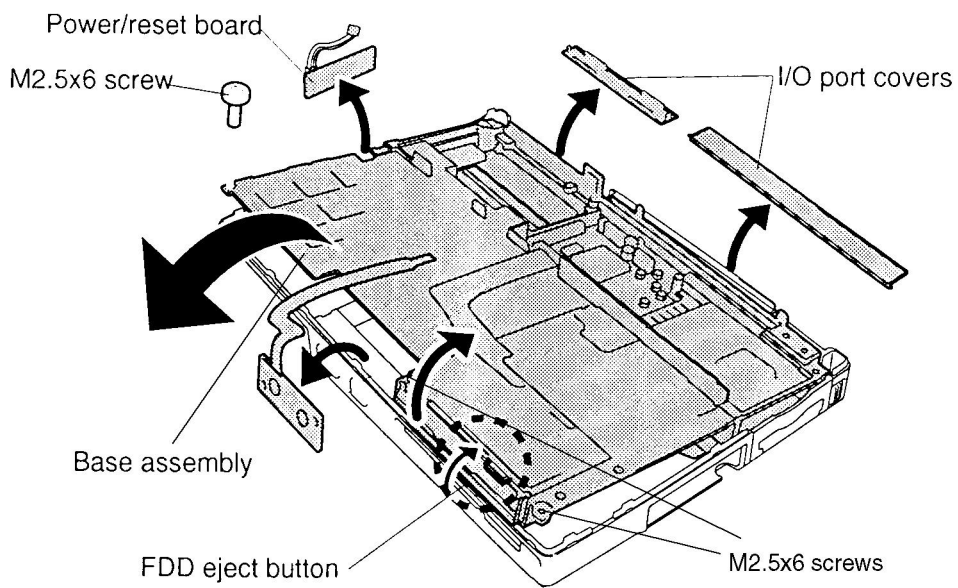
To remove the T4900CT's base assembly, follow the steps below and refer to figures 4-28 through 4-31.

1. Turn off the power to the T4900CT. Disconnect the AC adapter, power cord, and all external cables connected to the T4900CT.
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 through 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.



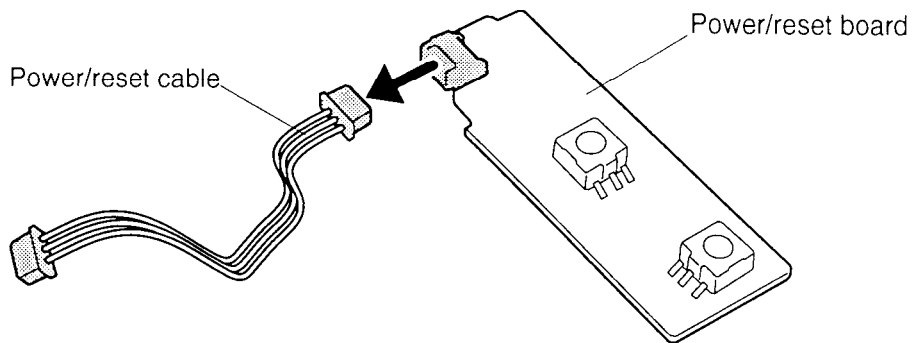
*Figure 4-28 Removing the PCMCIA slot cover*

4. Remove **one M2.5x6 screw** securing the base assembly to the **bottom cover** and **two M2.5x6 screws** securing the **FDD cover** (figure 4-29).
5. Remove the **FDD cover**.
6. Also lift out the **FPC connector** to the mouse.
7. Press the **FDD eject button** so that it clears the bottom cover and lift up the front of the base assembly (figure 4-29).
8. After lifting up the front of the **base assembly**, open the **I/O port cover** on the bottom cover and gently pry the I/O port frame slightly away from the base assembly to separate the base assembly from the bottom cover. It's a tight fit, so be careful not to damage the assembly. Remove the tape and lift the **power/reset board** out of the bottom cover (figures 4-29 and 4-31).



*Figure 4-29 Removing the base assembly*

9. Disconnect the **power/reset cable** from the **power/reset board** (figure 4-30).

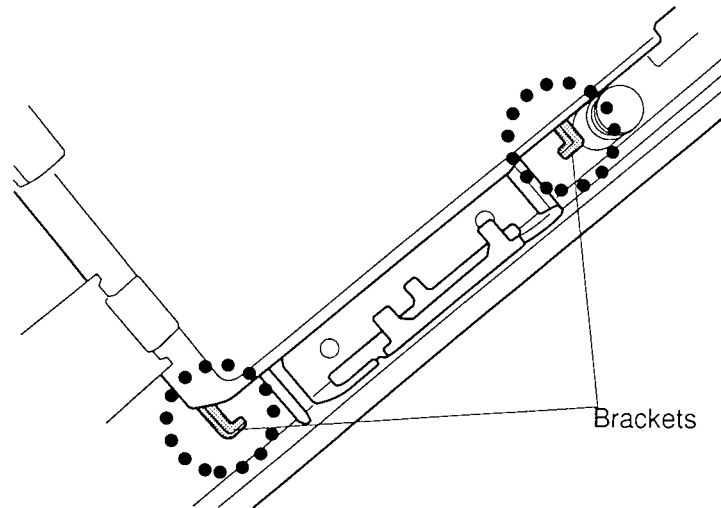


*Figure 4-30 Removing the power/reset cable*

## Installing the Base Assembly

To install the T4900CT's base assembly and power/reset board, follow the steps below and refer to figures 4-26 and 4-28 through 4-31.

1. Connect the **power/reset cable** to the **power/reset board** (figure 4-30).
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 4-31).



*Figure 4-31 Power/reset cable setting*

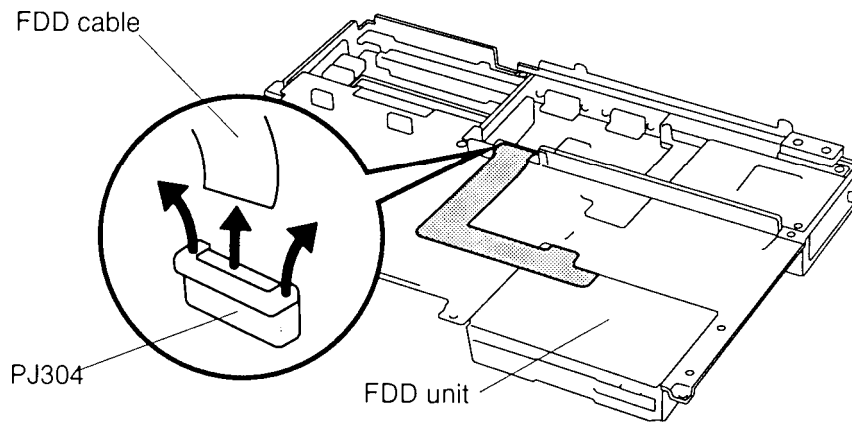
3. Fit the I/O port connector side of the **base assembly** into the bottom cover. Then, make sure the **power/reset cable** extends through the **notch** on the base assembly and lay the base assembly into the bottom cover. Press the **FDD eject button** so the base assembly can clear the bottom cover (figure 4-29).
4. Place the mouse's **FPC** back into the bottom cover and replace the **tape** (figure 4-26).
5. Secure the base assembly's front-left corner with **one M2.5x6 screw** (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 back through 4.2.

## 4.13 Floppy Disk Drive

### Removing the Floppy Disk Drive

To remove the T4900CT's floppy disk drive, follow the steps below and refer to figures 4-32 and 4-33.

1. Turn off the power to the T4900CT. Disconnect the AC adapter, power cord, and all external cables connected to the T4900CT.
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 through 4.12.
3. Disconnect the **FDD cable** from **PJ304** of the lower system board and remove the tape (figure 4-32).

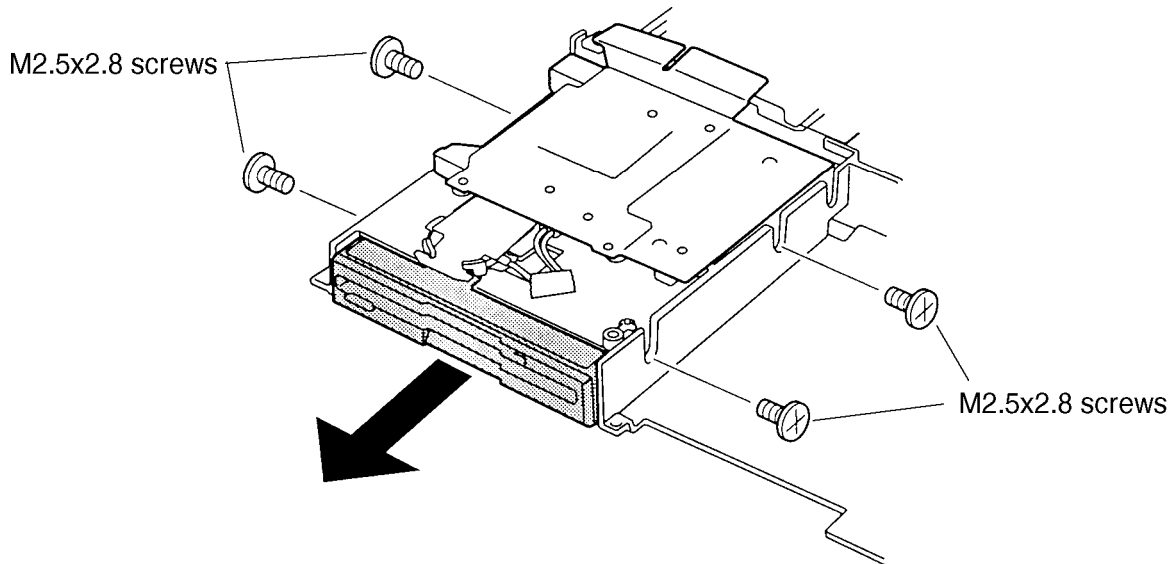


*Figure 4-32 Disconnecting the FDD cable*



4. Turn the base assembly over and remove the **four M2.5x2.8 screws**, shown in figure 4-33, which secure the **FDD** and pull the FDD out of the base assembly.

*Caution: Be careful not to touch the rectangle on the FDD. This area is just above the read/write head and is very sensitive to damage.*



*Figure 4-33 Removing the FDD*

## Installing the Floppy Disk Drive

To install the T4900CT's floppy disk drive, follow the steps below and refer to figures 4-32 and 4-33.

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 **four M2.5x2.8 screws**. Fasten the two inner screws first, then the two outer screws. Tighten these screws to a torque of less than 2.2 kgf/cm (figure 4-33).
3. Secure the **tape** and connect the **FDD cable** to the **pressure plate connector PJ304** on the lower system board (figure 4-32).
4. 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 back through 4.2.

## 4.14 RTC Battery

### Removing the RTC Battery

To remove the T4900CT's speaker and RTC battery follow the steps below and refer to figures 4-34 and 4-35.

1. Turn off the power to the T4900CT and disconnect the AC adapter, power cord, and all external cables connected to the T4900CT.
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 through 4.12.
3. Turn the **base assembly** upside down.
4. Remove the tape and lift up the battery's plastic cover.
5. 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 4-34).
6. Remove **two M2.5x4 screws** on the edge opposite the **PCMCIA slot 2 connectors**.
7. Lift the front part of the metal plate to locate and then disconnect **two PCMCIA slot 2 connectors** from the **lower system board** and lift out the PCMCIA slot 2 connector's board (figure 4-34).

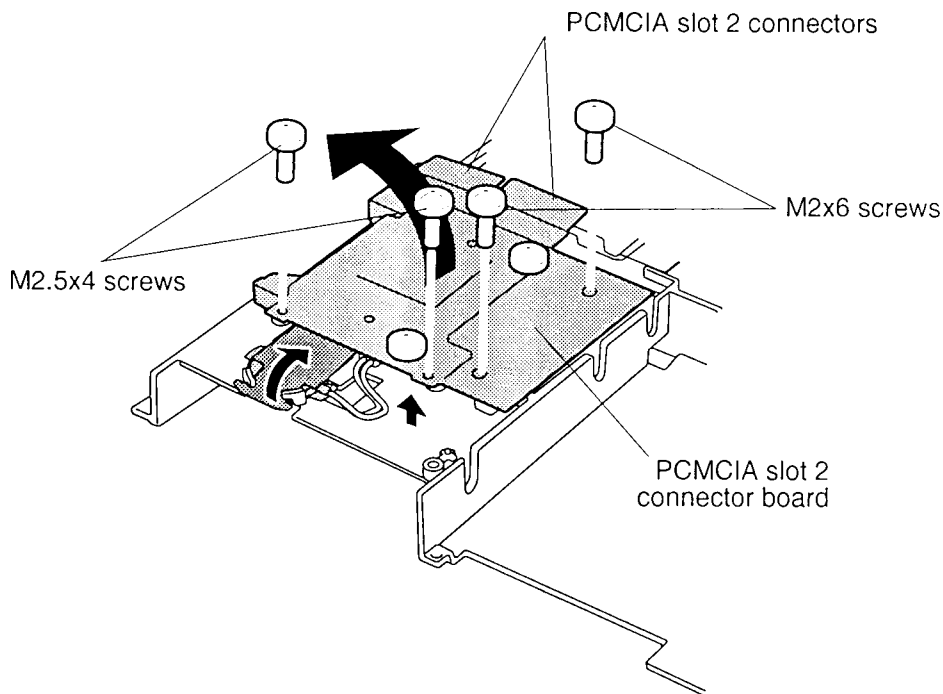
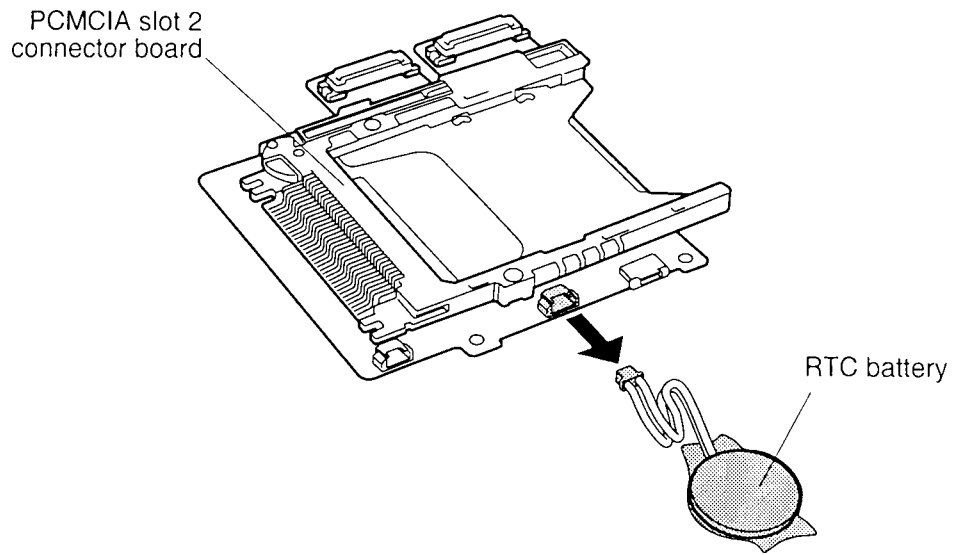


Figure 4-34 Removing the PCMCIA slot 2 connector board

8. Disconnect the **RTC battery cable** from the **PCMCIA slot 2 connector board** (figure 4-35).



*Figure 4-35 Disconnecting the RTC battery*

## Installing the RTC Battery

**WARNING:** *If you replace the RTC battery, be sure to use only the same model battery or an equivalent battery recommended by Toshiba. Installation of the wrong battery can cause the battery to explode.*

To install the T4900CT's RTC battery follow the steps below and refer to figures 4-34 and 4-35.

1. Connect the **RTC battery** cable to the **PCMCIA slot 2 connector board** (figure 4-35).
2. Seat the **PCMCIA slot 2 connector board** with the RTC battery attached, then connect the **two PCMCIA slot 2 connectors** to the **lower system board** (figure 4-34).
3. Secure the **PCMCIA slot 2 connector board** with **two M2x6 screws**, then set the **RTC battery** in place (figure 4-34).
4. Secure the cover with **two M2.5x4 screws** (figure 4-34).
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 back through 4.2.

## 4.15 Lower System Board

### Removing the Lower System Board

To remove the T4900CT's lower system board, follow the steps below and refer to figures 4-36 through 4-38.

1. Turn off the power to the T4900CT and disconnect the AC adapter, power cord, and all external cables connected to the T4900CT.
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 through 4.12, and 4.14.
3. Disconnect the **FDD cable** from **PJ304** of the lower system board, if not disconnected earlier.
4. Remove **three M2.5x6 screws** securing the **lower system board's metal cover**, then lift it off (figure 4-36). Be careful to clear **two audio ports** projecting slightly through holes in the cover.

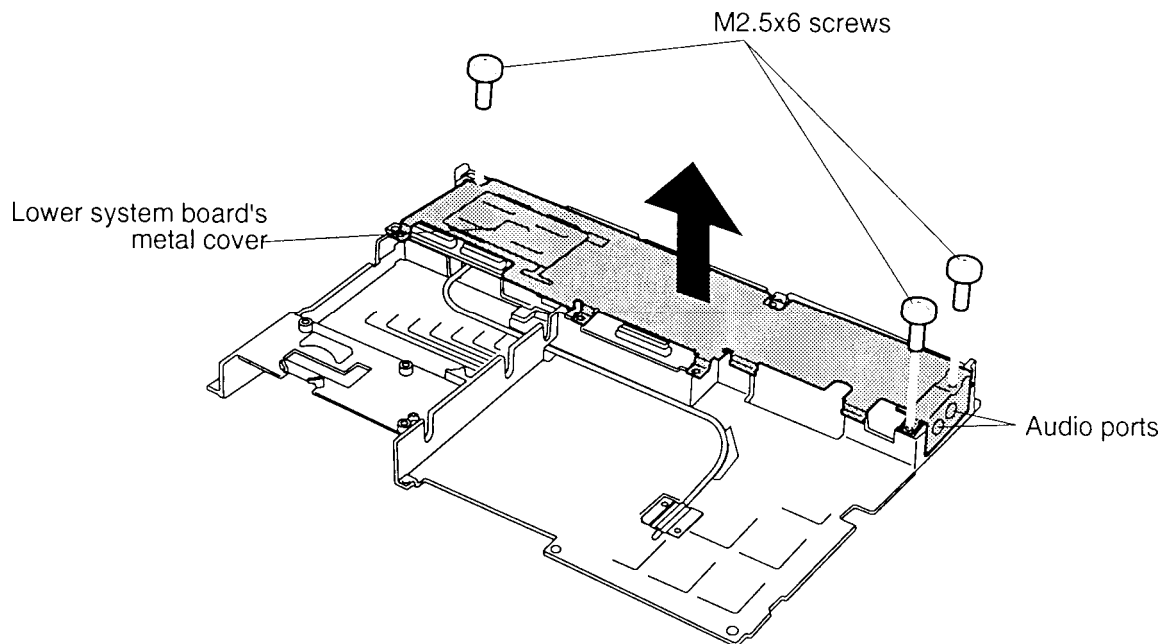
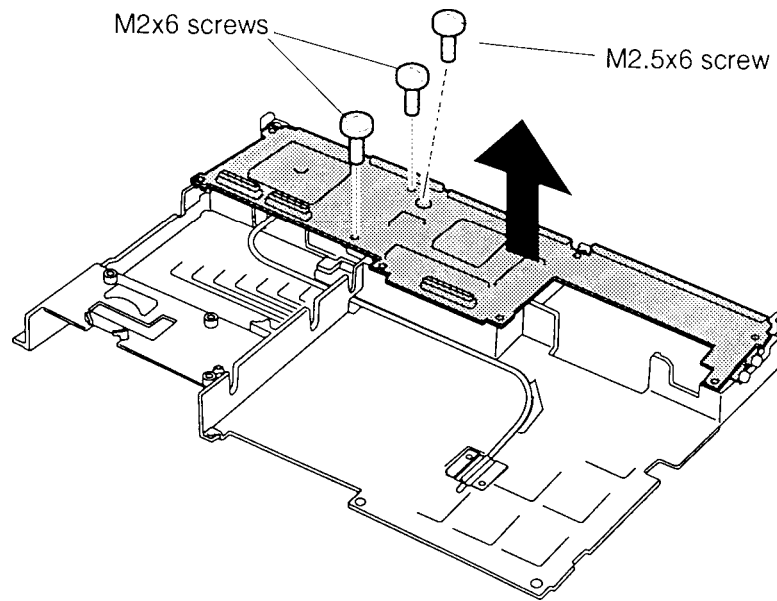


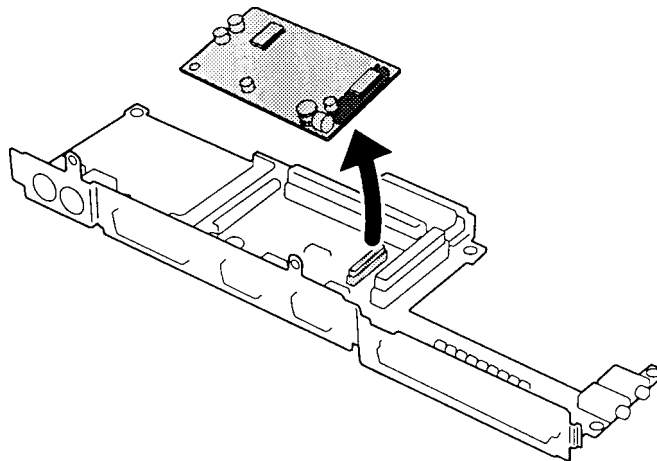
Figure 4-36 Removing the lower system board's metal cover

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 4-37).



*Figure 4-37 Removing the lower system board*

6. Turn the lower system board over and disconnect the **sound system board** from the **lower system board** (figure 4-38).



*Figure 4-38 Removing the sound system board*

## Installing the Lower System Board

To install the T4900CT's lower system board, follow the steps below and refer to figures 4-36 through 4-38.

1. Connect the **sound system board** to **lower system board**, then place the lower system board on the base assembly frame (figure 4-38).
2. Secure the **lower system board** with **one M2.5x6 screw** and **two M2x6 screws** (figure 4-37).
3. Set the **lower system board's metal cover** in place. Be sure the **two audio ports** extend through the holes in the cover (figure 4-36).
4. Fasten the **three M2.5x6 screws** to secure the **lower system board's metal cover** (figure 4-36).
5. Connect the **FDD cable** to **PJ304** on the lower system board.
6. 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 and 4.12 back through 4.2.



## 4.16 Display Mask

### Removing the Display Mask

To remove the T4900CT's display mask, follow the steps below and refer to figure 4-39.

1. Turn off the power to the T4900CT and disconnect the AC adapter, power cord, and all external cables connected to the T4900CT.
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**.
4. Remove the **two M2.5x6 screws** that were covered by the cushions.
5. Carefully insert your fingers between the mask and the LCD panel and pry open the latches. Start with the **three latches** across the top of the display mask.
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.

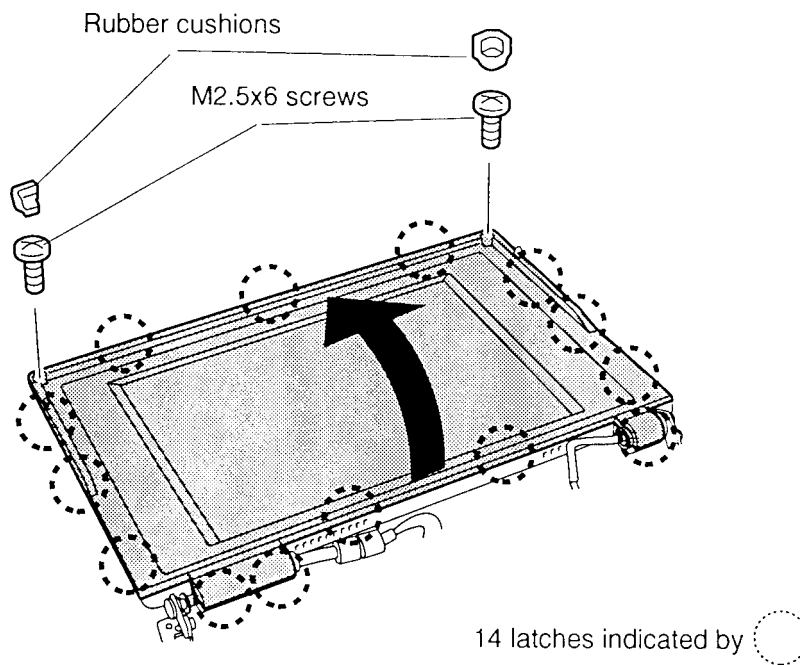


Figure 4-39 Removing the display mask

## Installing the Display Mask

To install the T4900CT's display mask, follow the steps below and refer to figure 4-39.

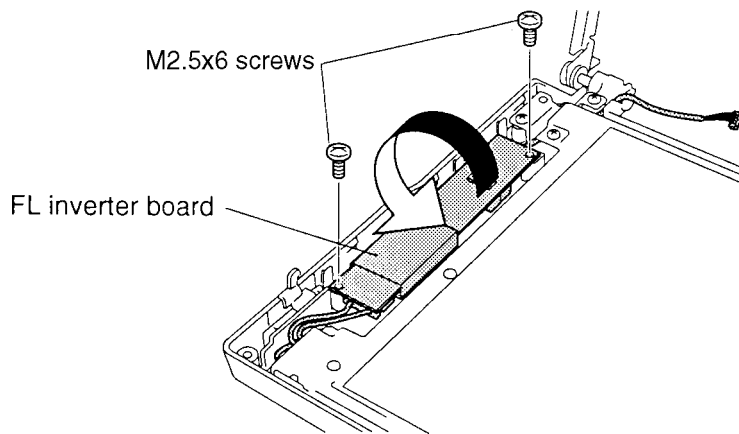
1. Set the **display mask** in place and secure the **latches** beginning with the three **latches** in the display supports (two in the larger support and one in the small support).
2. Continue along the bottom of the display (**two latches**), along the sides (**three latches**) and across the top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

## 4.17 T4900CT FL Inverter Board

### Removing the FL Inverter Board

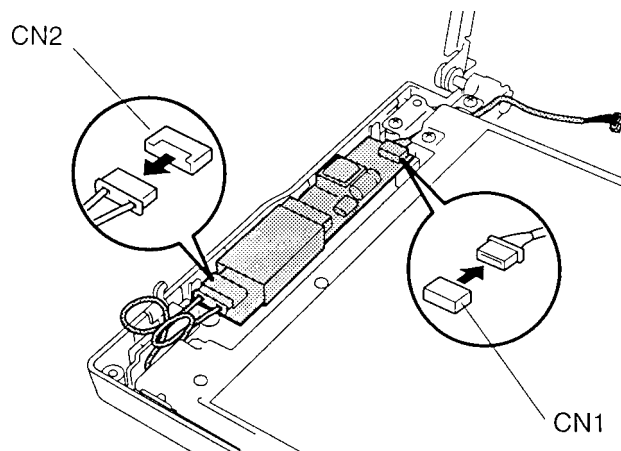
To remove the T4900CT's FL inverter board, follow the steps below and refer to figures 4-40 and 4-41.

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 M2.5x6 screws** securing the **FL inverter board** (figure 4-40).



*Figure 4-40 Removing screws from the FL inverter board*

4. Disconnect the **FL inverter cable** from **CN1** and the **FL cable** from **CN2**, then lift out the **FL inverter board** (figure 4-41).



*Figure 4-41 Disconnecting the FL cables*

## Installing the FL Inverter Board

To install the T4900CT's FL inverter board, follow the steps below and refer to figures 4-40 and 4-41.

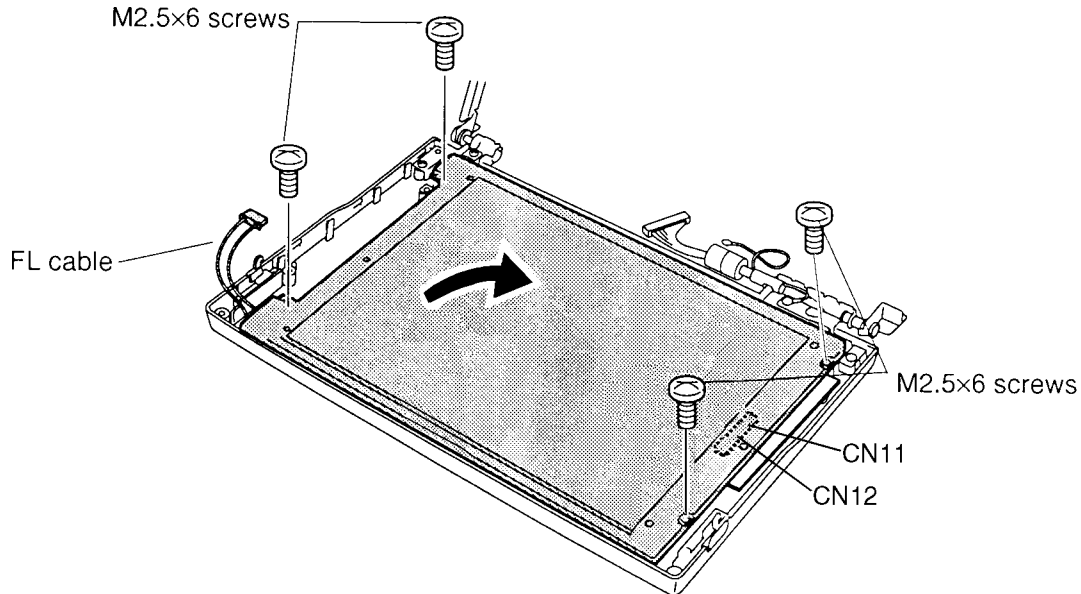
1. Connect the **FL inverter cable** to **CN1** and the **FL cable** to **CN2** on the FL inverter board (figure 4-41).
2. Replace the **FL inverter board** and secure it with the **two M2.5x6 screws** (figure 4-40).
3. Install the TFT color LCD module, display mask, top cover, and battery pack as described in sections 4.2, 4.6, 4.16, and 4.21.

## 4.18 T4900CT TFT Color LCD Module

### Removing the TFT Color LCD Module

To remove the T4900CT's LCD module, follow these steps and refer to figure 4-42.

1. Turn off the power to the T4900CT. Disconnect the AC adapter, power cord, and all external cables connected to the T4900CT.
2. Remove the battery pack, top cover, and display mask as described in sections 4.2, 4.6, and 4.16.
3. Remove **four M2.5x6 screws** securing the **LCD module** to the LCD cover.
4. Carefully rotate the **LCD module** from left to right out of the display cover and disconnect the **cables** from **CN11** and **CN12** on the LCD module.



*Figure 4-42 Removing the four screws and connectors*

## Installing the TFT Color LCD Module

To install the T4900CT's TFT color LCD module, follow the steps below and refer to figure 4-42.

1. Connect the **display cables** to **CN11** and **CN12** on the **LCD module**.
2. Align the **LCD module** and then secure it with **four M2.5x6 screws**.
3. Install the battery pack, top cover, and display mask as described in sections 4.2, 4.6, and 4.16.

## 4.19 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 contaminate the **LCD panel**. Any contamination can affect the performance of the unit.

To remove the T4900CT's FL unit, follow the steps below and refer to figure 4-43.

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, FL inverter board, and TFT color LCD module as described in sections 4.2, 4.6, 4.16, 4.17, and 4.21.
3. Place the **LCD unit** face down and remove **two M1.5x5** and **one M1.5x2** screws.
4. Lift off the **FL tube cover**.
5. Pull up the reflective sheet and lift the **FL tube** out of the frame.

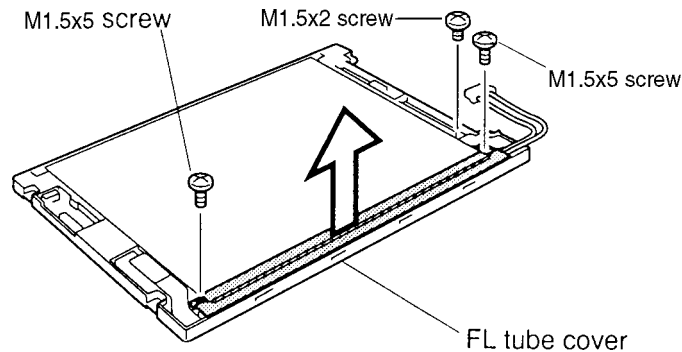


Figure 4-43 Removing the FL unit

### Installing the FL Unit

To install the T4900CT's FL unit, follow the steps below and refer to figure 4-43.

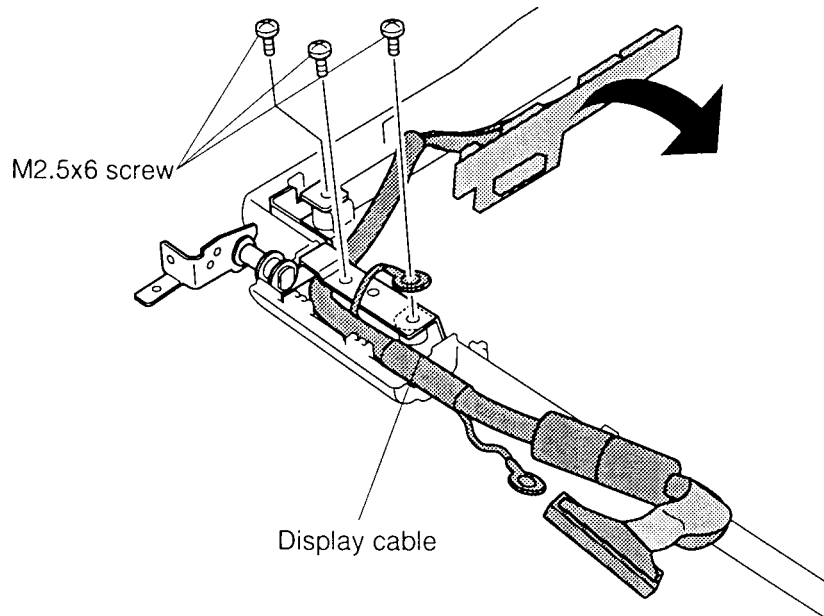
1. Replace the **FL tube** in the frame, under the reflective sheet, and thread the **FL tube cable** in the frame. Set the **FL tube cover**, then secure it with **two M1.5x5** and **one M1.5x2** screws.
2. Install the TFT color LCD module, FL inverter board, the display mask, top cover, and the battery pack as described in sections 4.2, 4.6, 4.16, 4.17, and 4.21.

## 4.20 FL Inverter Cable, Display Cable

### Removing the Display Cable

To remove the T4900CT's display cable, follow the steps below and refer to figure 4-44.

1. Turn off the power to the T4900CT. Disconnect the AC adapter, power cord, and all external cables connected to the T4900CT.
2. Remove the battery pack, top cover, display assembly, display mask, FL inverter board, and TFT color LCD module as described in sections 4.2, 4.6, 4.10, 4.16, 4.17, and 4.21.
3. Remove the **three M2.5x6 screws** securing the display hinge. Note the ground cable.
4. Remove the **display hinge** and the **tape**, then lift off the **display cable**.



*Figure 4-44 Removing the display cables*



## Installing the Display Cable

To install the T4900CT's display cable, follow the steps below and refer to figure 4-44.

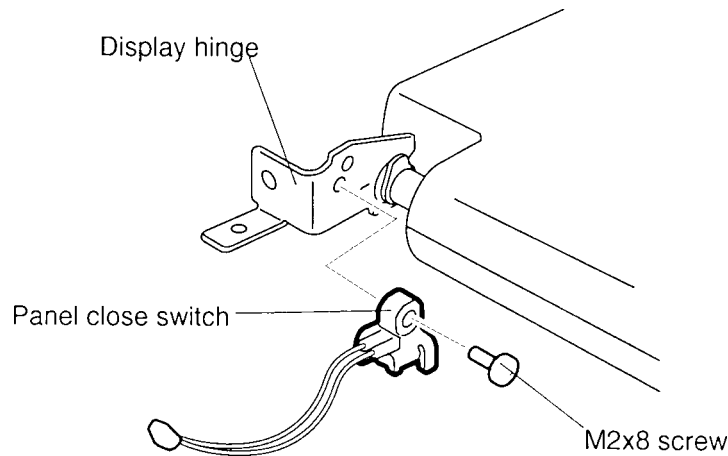
1. Fit the **display cable** to the display cover and secure the **display hinge** with **two M2.5x6 screws**. Secure the **ground cable** to the display cover with **one M2.5x6 screw**.
2. Replace the **tape**.
3. Install the TFT color LCD module, FL inverter board, display mask, display assembly, top cover, and battery pack as described in sections 4.2, 4.6, 4.10, 4.16, 4.17, and 4.21.

## 4.21 Panel Close Switch

### Removing the Panel Close Switch

To remove the T4900CT's panel close switch, follow the steps below and refer to figure 4-45.

1. Turn off the power to the T4900CT. Disconnect the AC adapter, power cord, and all external cables connected to the T4900CT.
2. Remove the battery pack, top cover, and display assembly as described in sections 4.2, 4.6, and 4.10.
3. Remove the **M2x8 screw** securing the **panel close switch** on the **display hinge**.



*Figure 4-45 Removing the panel close switch*

### Installing the Panel Close Switch

To install the T4900CT's panel close switch, follow the steps below and refer to figure 4-45.

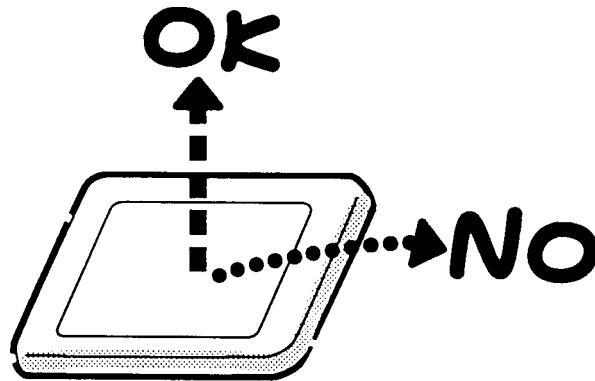
1. Fit the **panel close switch** to the display hinge and secure the **panel close switch** with **one M2x8 screw**.
2. Install the display assembly, top cover, and battery pack as described in sections 4.2, 4.6, and 4.10.

## Appendix A Handling the LCD Module

### Precautions for Handling the LCD Module

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

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



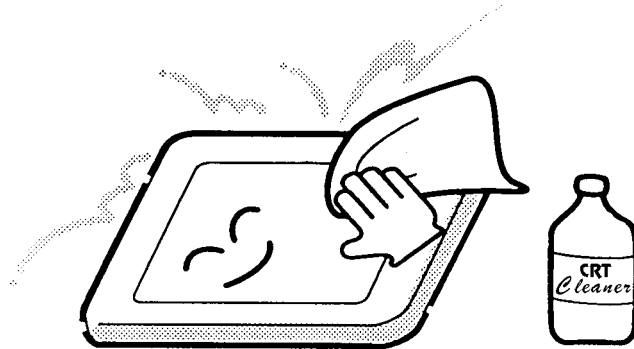
2. Be careful to align the holes at the four corners of the LCD module with the corresponding holes in the LCD cover before securing the module with screws. Do not force the module into place, because stress can affect its performance.

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

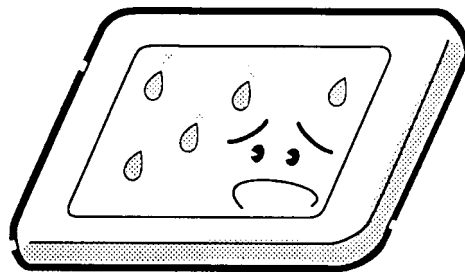


3. If the panel's surface gets dirty, wipe it with cotton or a soft cloth. If it is still dirty, try breathing on the surface to create a light condensate and wipe it again.

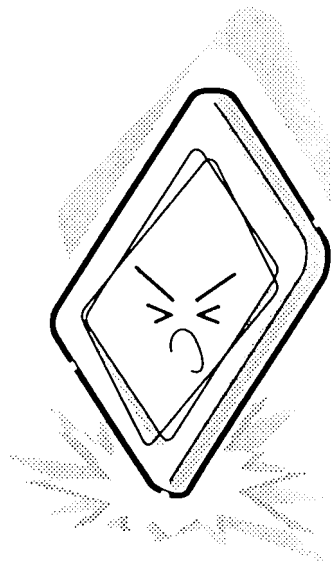
If the surface is very dirty, we recommend a CRT cleaning agent. Apply the agent to a cloth and then wipe the panel's surface. Do not apply cleanser directly to the panel.



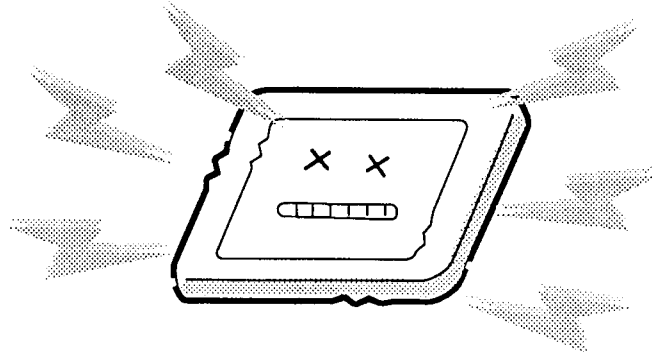
4. If water or other liquid is left on the panel's surface for a long period, it can change the screen's tint or stain it. Be sure to quickly wipe off any liquid.



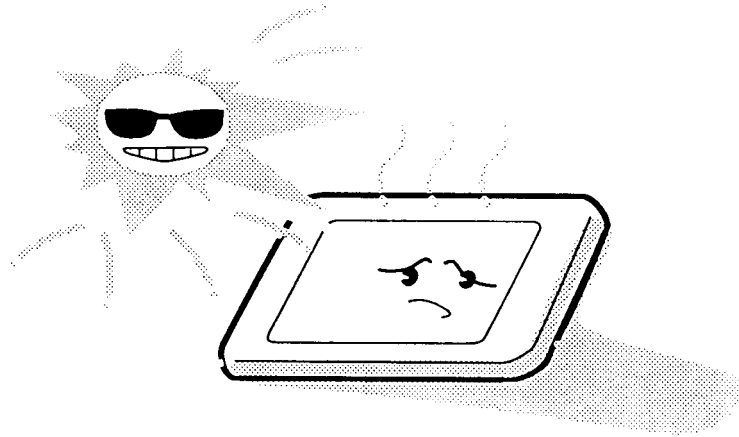
5. Glass is used in the panel, so be careful not to drop it or let it strike a hard object, which could cause breakage or cracks.



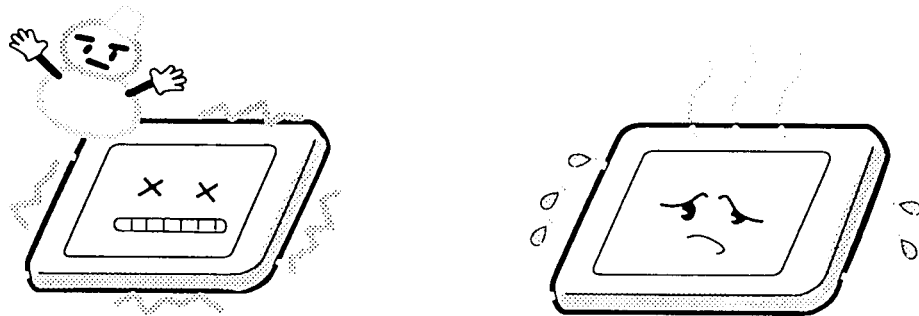
6. CMOS-LSI circuits are used in the module, so guard against damage from electrostatic discharge. Be sure to wear a wrist or ankle ground when handling the module.



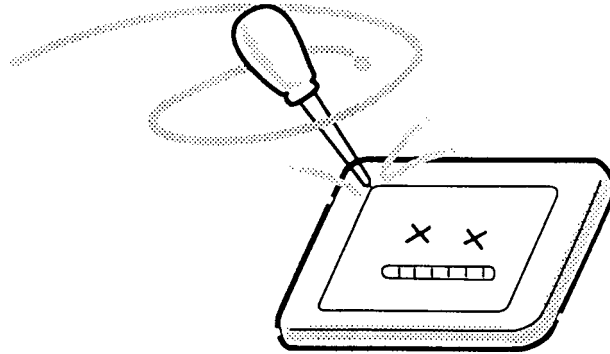
7. Do not expose the module to direct sunlight or strong ultraviolet rays for long periods.



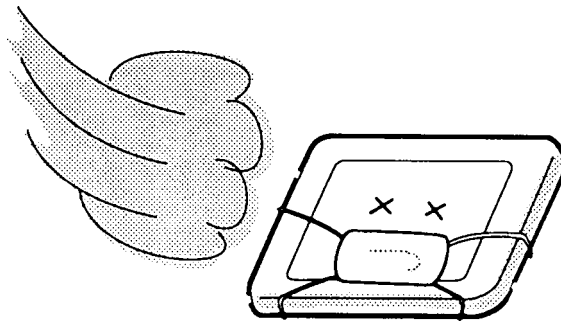
8. Do not store the module at temperatures below specifications. Cold can cause the liquid crystals to freeze, lose their elasticity or otherwise suffer damage.



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



10. If you transport the module, do not use packing material that contains epoxy resin (amine) or silicon glue (alcohol or oxime). These materials can release gas that can damage the panel's polarization.



# Appendix B Board Layout

## B.1 Upper System Board

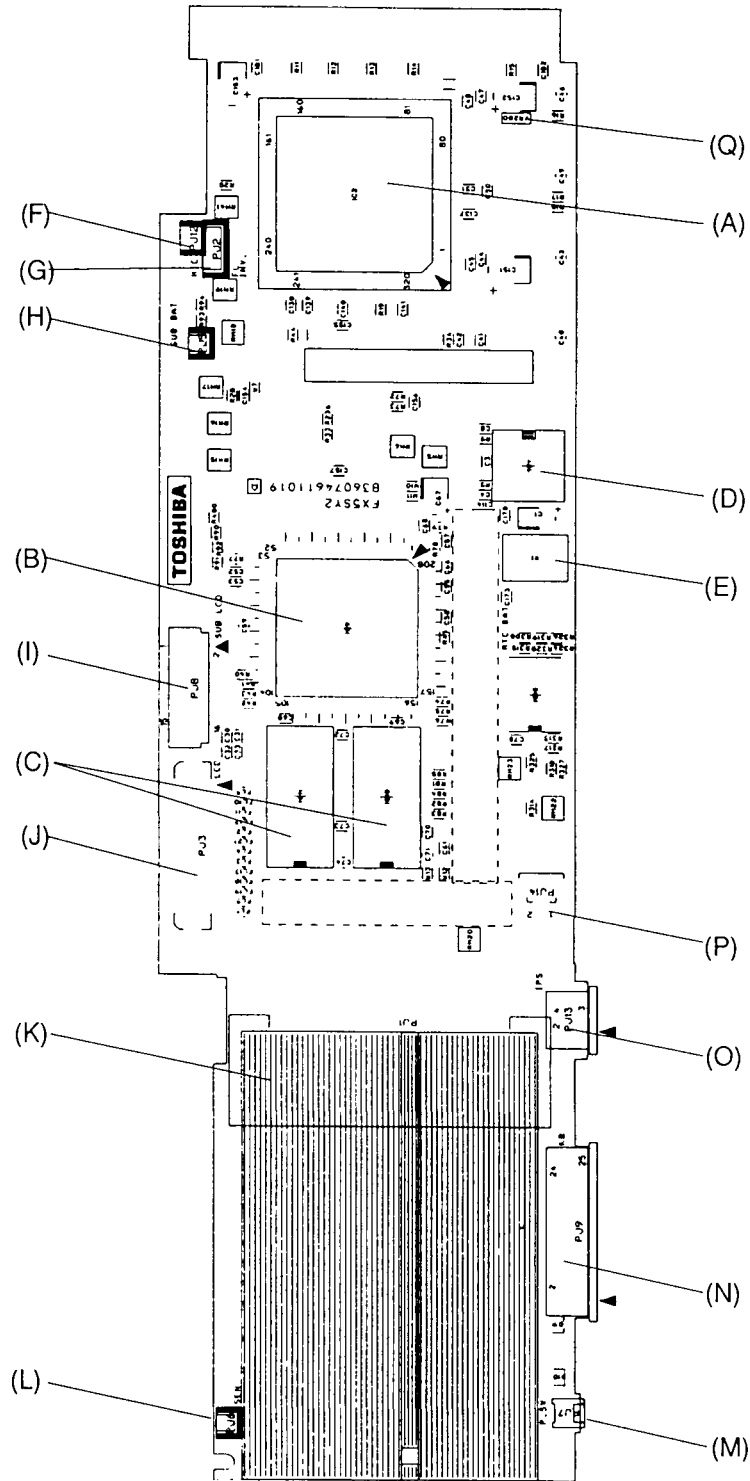


Figure B-1 Upper system board (front)

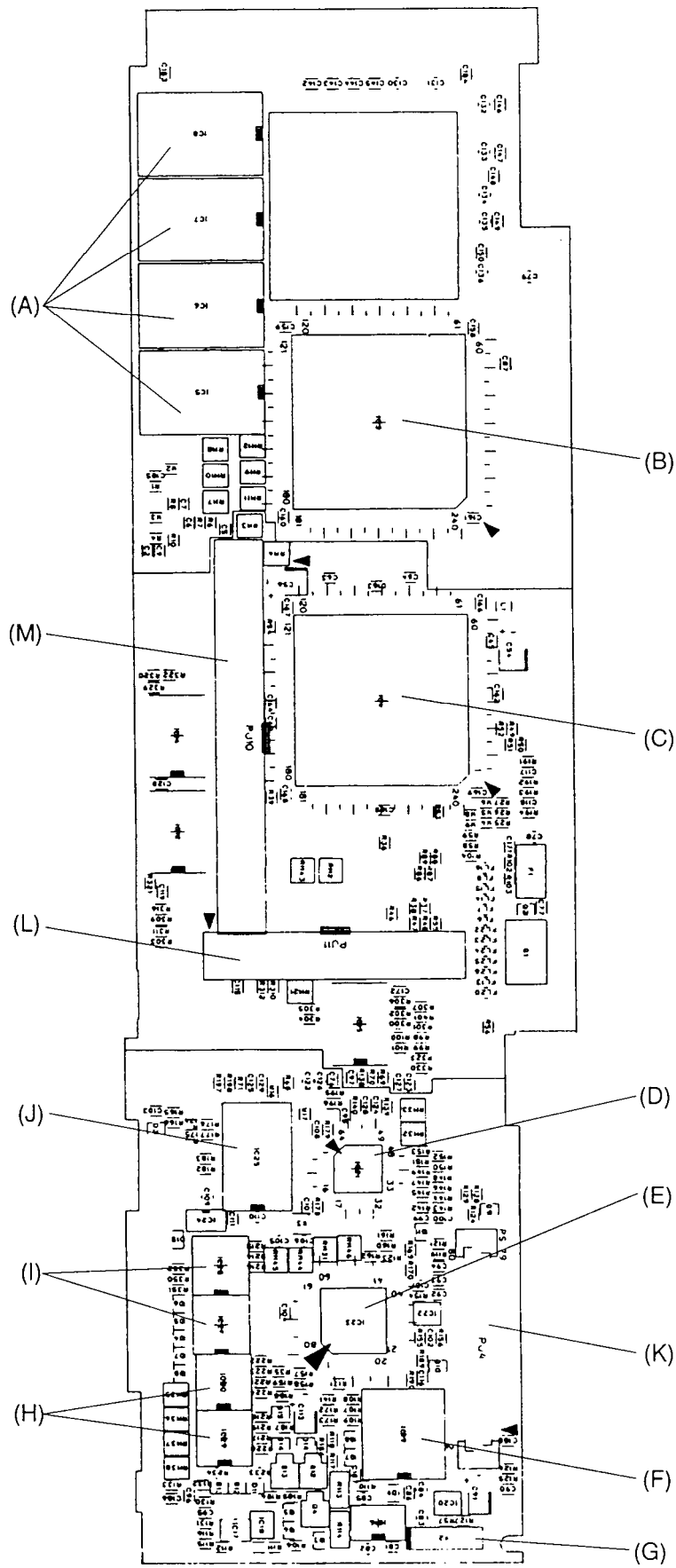


Figure B-2 Upper system board (back)



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

<b>Mark</b>	<b>Number</b>	<b>Name</b>
(A)	IC2	CPU : Pentium Processor
(B)	IC9	Video Controller : F65545
(C)	IC10,11	Video RAM
(D)	IC1	Clock Generator
(E)	X1	Crystal Oscillator (14.31818MHz)
(F)	PJ12	Internal Microphone Connector
(G)	PJ2	FL Inverter Connector
(H)	PJ5	Sub Battery Connector
(I)	PJ8	Status Indicator Panel Connector
(J)	PJ3	Display Connector
(K)	PJ1	Memory Card Connector
(L)	PJ6	LCD Panel Close Switch connector
(M)	PJ7	Power/Reset Switch Connector
(N)	PJ9	Keyboard Connector
(O)	PJ13	IPS Switch Connector
(P)	PJ14	Speaker Connector
(Q)	VR200	CPU Temperature Sensor

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

<b>Mark</b>	<b>Number</b>	<b>Name</b>
(A)	IC5 to IC8	System Memory
(B)	IC3	SCPCNT-GA
(C)	IC4	SISCNT-GA
(D)	IC21	SLCDC-GA
(E)	IC23	Keyboard Controller
(F)	IC19	RTC
(G)	X2	32.768KHz Crystal
(H)	IC29,30	KB Scan Return Buffer
(I)	IC27,28	KB Scan Output Buffer
(J)	IC25	IPS Controller
(K)	PJ4	PS Connector
(L)	PJ11	Joint Connector 2
(M)	PJ10	Joint Connector 1

## B.2 Lower System Board

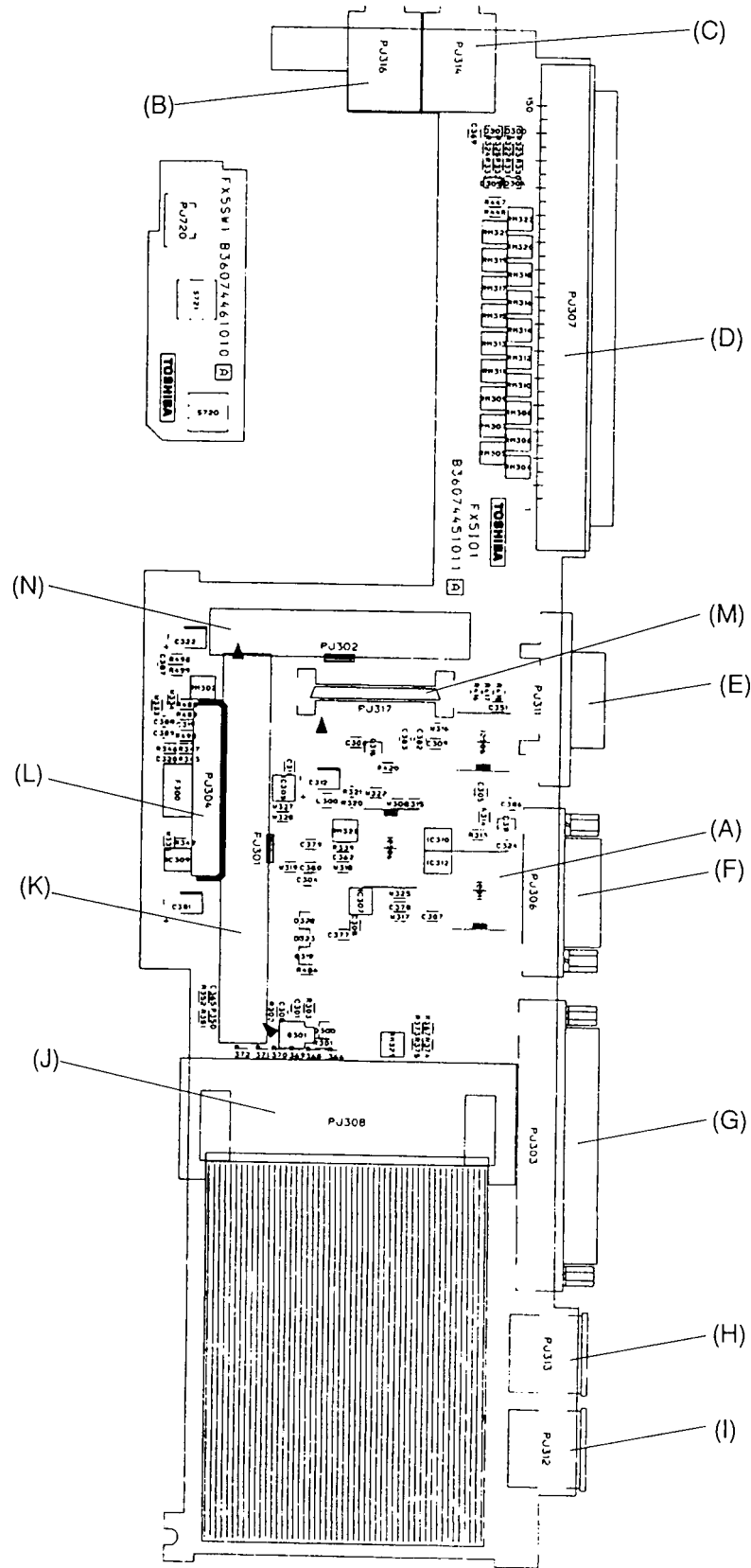


Figure B-3 Lower system board (front)



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

<b>Mark</b>	<b>Number</b>	<b>Name</b>
(A)	IC311	Async Transceiver
(B)	PJ316	Headphone Jack
(C)	PJ314	Ext. MIC Connector
(D)	PJ307	150-pin Expansion Connector
(E)	PJ311	External Display Connector
(F)	PJ306	Serial Connector
(G)	PJ303	PRT Connector
(H)	PJ313	PS/2 Keyboard Connector
(I)	PJ312	PS/2 Mouse Connector
(J)	PJ308	PCMCIA Slot 1 Connector
(K)	PJ301	Joint Connector 1
(L)	PJ304	FDD Connector
(M)	PJ317	Sound Board Connector
(N)	PJ302	Joint Connector 2

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

<b>Mark</b>	<b>Number</b>	<b>Name</b>
(A)	IC303	SI : T6W23
(B)	IC314	PCMCIA Card Controller GA
(C)	IC300	BIOS BOM
(D)	PJ305	HDD Connector
(E)	PJ309,310	PCMCIA Slot 2 Joint Connector

## Appendix C Pin Assignments

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

Table C-1 Memory slot connector pin assignments (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	NC	—	55	ERAS2;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	NC	—	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	ERAS1;001	O
22	ERAS0;001	O	66	ECAS2;001	O
23	ECAS0;001	O	67	GND	—
24	ECAS1;001	O	68	ECAS3;011	O
25	NC	—	69	ERAS1;001	O
26	ERAS0;001	O	70	EMWE2;001	O
27	B3V	—	71	NC	I/O
28	NC	I/O	72	NC	I/O
29	NC	I/O	73	GND	—
30	NC	I/O	74	NC	I/O
31	ECAS0;001	O	75	NC	I/O
32	ECAS1;001	O	76	NC	I/O
33	GND	—	77	ECAS2;001	O
34	D08;100	I/O	78	ECAS3;001	O
35	NC	—	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	—

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

Table C-2 FL inverter connector pin assignments (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 assignments (40-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	LCDVCC	—	21	P2;104	O
02	LCDVCC	—	22	P21;104	O
03	P4;104	I	23	P1;104	O
04	GND	—	24	GND	—
05	PNEL0;100	I	25	P5;104	O
06	P10;104	—	26	P3;104	O
07	P14;104	O	27	P11;104	O
08	GND	—	28	GND	—
09	P8;104	O	29	SHFCLK;104	O
10	GND	O	30	P15;104	O
11	P22;104	O	31	ENDATA;104	O
12	GND	—	32	GND	—
13	P6;104	O	33	P0;104	O
14	P19;104	O	34	FP;104	O
15	P12;104	O	35	P7;104	O
16	GND	—	36	GND	—
17	P9;104	O	37	LP;104	O
18	P20;104	O	38	GND	—
19	P13;104	O	39	P23;104	—
20	GND	—	40	P18;104	—

## C.4 PJ4 PS I/F Connector (80-Pin)

Table C-4 PS I/F connector pin assignments (80-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	SPKVOL;100	I	41	PSAD3;100	I/O
02	B2V	-	42	GND	-
03	BRTCNT;100	O	43	PSAD2;100	I/O
04	B3V	-	44	GND	-
05	PSRST;000	O	45	PSAD1;100	I/O
06	B3V	-	46	DSKDC	I
07	RSTSW;000	O	47	PSAD0;100	I/O
08	B3V	-	48	DSKDC	I
09	PWRSW;000	O	49	N.C	-
10	B3V	-	50	DSKDC	I
11	PNLOF;000	O	51	GND	-
12	B3V	-	52	DSKDC	I
13	PSRWO;000	O	53	GND	-
14	B3V	-	54	DSKDC	I
15	PSTMG;000	O	55	GND	-
16	B3V	-	56	DSKDC	I
17	ADPCNT;100	I	57	GND	-
18	B3V	-	58	DSPV	I
19	GND	-	59	GND	-
20	PSUPDT;100	O	60	DSPV	I
21	GND	-	61	GND	-
22	SUSSTA;001	O	62	P12V	-
23	GND	-	63	MCV	-
24	PSREQ;000	I	64	VCC	-
25	GND	-	65	RCLR;100	I
26	N9V	-	66	VCC	-
27	GND	-	67	LOBAT;000	I
28	GND	-	68	VCC	-
29	CPUGND	O	69	PCLR;000	I
30	GND	-	70	VCC	-
31	CPUTMP	O	71	BEEP;000	I
32	GND	-	72	VCC	-
33	PSAD7;100	I/O	73	CPCNF;100	I
34	GND	-	74	VCC	-
35	PSAD6;100	I/O	75	ENVCC;010	I
36	GND	-	76	VCC	-
37	PSAD5;100	I/O	77	ENB3V;000	I
38	GND	-	78	VCC	-
39	PSAD4;100	I/O	79	SUBBAT	I
40	GND	-	80	VCC	-

### C.5 PJ5 Backup Battery Connector (2-Pin)

*Table C-5 Backup battery connector pin assignments (2-pin)*

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

### C.6 PJ6 Panel Close Switch Connector (2-Pin)

*Table C-6 Panel close switch connector pin assignments (2-pin)*

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

### C.7 PJ7 Power/Reset Switch Connector (3-Pin)

*Table C-7 Power/Reset switch connector pin assignments (3-pin)*

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



## C.8 PJ8 Status Indicator Panel Connector (16-Pin)

Table C-8 Status indicator panel I/F pin assignments (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.9 PJ9 KB I/F Connector (25-Pin)

Table C-9 KB I/F connector pin assignments (25-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	KBOT00;010	O	14	KBOT06;010	O
02	KBRT6;110	I	15	KBOT08;010	O
03	KBRT0;110	I	16	KBOT02;010	O
04	KBRT2;110	I	17	KBOT07;010	O
05	KBRT3;110	I	18	KBOT09;010	O
06	KBRT1;110	I	19	KBOT10;010	O
07	KBRT7;110	I	20	IPSY;100	I
08	KBRT5;110	I	21	GND	-
09	KBRT4;110	I	22	IPSX;100	I
10	KBOT01;010	O	23	IPSX;100	I
11	KBOT03;010	O	24	VCC	-
12	KBOT04;010	O	25	IPSX;100	I
13	KBOT05;010	O			

## C.10 PJ10 (PJ301) Joint Connector 1 (100-Pin)

Table C-10 Joint connector 1 pin assignments (100-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	SA11;100	I/O	51	GND	-
02	B5V	-	52	GND	-
03	SA10;100	I/O	53	INTRQ;100	O
04	P12V	-	54	IRQ0;100	O
05	SA09;100	I/O	55	INTA;000	O
06	B5V	-	56	IRQ13;100	O
07	SA08;100	I/O	57	IRQ8;100	O
08	SA19;100	O	58	EMCS16;000	I
09	SA07;100	I/O	59	CPHLDA;100	O
10	RTCBAT	I	60	EICS16;000	I
11	GND	-	61	LA18;100	I/O
12	SA18;100	O	62	IOCHCK;000	I
13	SA06;100	I/O	63	DRVSL;000	I
14	SA17;100	O	64	LA17;100	I/O
15	SA05;100	I/O	65	IIO16;000	I/O
16	SA16;100	I/O	66	SBHE;000	I/O
17	SA04;100	I/O	67	ALED;100	I
18	SA15;100	I/O	68	LA20;100	I/O
19	SA03;100	I/O	69	IIRDY;100	I
20	SA14;100	I/O	70	LA19;100	I/O
21	SA02;100	I/O	71	GND	-
22	SA13;100	I/O	72	GND	-
23	SA01;100	I/O	73	\$24MHZ;100	O
24	SA12;100	I/O	74	LA21;100	I/O
25	SA00;100	I/O	75	CRTEN;000	O
26	BUFOFF;000	I	76	LA23;100	I/O
27	DMAENB;100	I	77	OVSUNC;100	O
28	ESMI2;000	I	78	LA22;100	I/O
29	DMARD;000	O	79	BLUE;100	O
30	ESMI1;000	I	80	HSUNC;100	O
31	GND	-	81	LGREN;100	O
32	GND	-	82	RED;100	O
33	DMAWR;000	O	83	SD00;100	I/O
34	IMCS16;000	I	84	SD15;100	I/O
35	DMARDY;100	I	85	SD01;100	I/O
36	ZEROWS;000	I	86	SD14;100	I/O
37	DMACLK;100	O	87	SD02;100	I/O
38	BALE;100	O	88	SD13;100	I/O
39	HLDACK;100	O	89	SD03;100	I/O
40	ROMCS;000	O	90	SD12;100	I/O
41	DMEN16;100	O	91	GND	-
42	PCLR;000	O	92	GND	-
43	HREQ;100	I	93	SD04;100	I/O
44	PCMRST;100	O	94	SD11;100	I/O
45	KBCS;000	I	95	SD05;100	I/O
46	MERD;000	I/O	96	SD10;100	I/O
47	TMOUT;100	I	97	SD06;100	I/O
48	MEWR;000	I/O	98	SA09;100	I/O
49	TMOUT2;100	I	99	SD07;100	I/O
50	TIMGT2;100	O	100	SD08;100	I/O

## C.11 PJ11 (PJ302) Joint Connector 2 (60-Pin)

Table C-11 Joint connector 2 pin assignments (60-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	VCC	-	31	\$14R7M;100	O
02	VCC	-	32	GND	-
03	VCC	-	33	CK32K;100	O
04	VCC	-	34	EIORDY;100	I
05	EKBDAT;100	O	35	\$14R3M;110	O
06	EKBCLK;100	O	36	AEN;100	I
07	EBIRQ1;100	O	37	IOCLK;100	O
08	MOSCK;100	O	38	DACK0;000	I
09	MOSDT;100	O	39	RESET;000	O
10	KBOT07;000	I/O	40	DACK3;000	I
11	KBOT06;000	I/O	41	SPKDRV;000	O
12	GND	-	42	DACK2;000	I
13	GND	-	43	SPKVOL;100	O
14	KBOT05;000	I/O	44	EPNLOF;000	O
15	KBOT03;000	I/O	45	IOWR;000	I/O
16	KBOT04;000	I/O	46	IORD;000	I/O
17	KBOT01;000	I/O	47	IMICIN;100	O
18	KBOT02;000	I/O	48	GND	-
19	KBOT00;000	I/O	49	SPKM;100	O
20	KEYPRS;100	O	50	N9V	-
21	KBTMG;100	I	51	AGNDIM	O
22	MASTER;000	I	52	BEEP;000	I
23	KBRWO;000	I	53	DSKDC	I
24	DACK4;000	I	54	SMER;000	O
25	IHMED;000	I	55	DSKDC	I
26	DACK7;000	I	56	SMEW;000	O
27	REFRSH;000	I/O	57	DSKDC	I
28	DACK6;000	I	58	CPCNF;100	I
29	GND	-	59	SPKP;100	O
30	IRQ12;100	O	60	ADPCNT;100	I

### C.12 PJ12 Microphone Connector (3-Pin)

*Table C-12 Microphone connector pin assignments (3-pin)*

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

### C.13 PJ13 Switch Board Connector (4-Pin)

*Table C-13 Switch board connector pin assignments (4-pin)*

Pin	Signal	I/O	Pin	Signal	I/O
01	GND	-	03	GND	-
02	SWL	I	04	SWR	-

### C.14 PJ14 Speaker Connector (2-Pin)

*Table C-14 Speaker connector pin assignments (2-pin)*

Pin	Signal	I/O	Pin	Signal	I/O
01	SPKP;100	O	02	SPKM;100	O

### C.15 PJ303 PRT Connector (25-Pin)

Table C-15 PRT connector pin assignments (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.16 PJ304 FDD Connector (26-Pin)

Table C-16 FDD connector pin assignments (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	ITR0;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.17 PJ305 HDD I/F Connector (60-Pin)

Table C-17 HDD I/F connector pin assignments (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.18 PJ306 Serial I/F Connector (9-Pin)

*Table C-18 Serial I/F connector pin assignments (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.19 PJ307 Expansion Connector (150-Pin)

Table C-19 Expansion connector pin assignments (150-pin) (1/2)

Pin	Signal	I/O	Pin	Signal	I/O
01	DSKDC	I	31	SA11;101	I/O
02	DSKDC	I	32	SA12;101	I/O
03	DSKDC	I	33	SA13;101	I/O
04	DSKDC	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-19 Expansion connector pin assignments (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	MOSDT;100	I/O
76	SD11;101	I/O	121	MOSCK;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.20 PJ308 PCMCIA Slot 1 Connector (68-Pin)

Table C-20 PCMCIA slot 1 connector pin assignments (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.21 PJ309 PCMCIA Slot 2 Joint Connector 1 (40-Pin)

Table C-21 PCMCIA slot 2 joint connector 1 pin assignments (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

## C.22 PJ310 PCMCIA Slot 2 Joint Connector 2 (40-Pin)

Table C-22 PCMCIA slot 2 joint connector 2 pin assignments (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.23 PJ311 CRT I/F Connector (15-Pin)

Table C-23 CRT I/F connectors pin assignments (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.24 PJ312 PS/2 Mouse Connector (6-Pin)

Table C-24 PS/2 mouse connector pin assignments (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.25 PJ313 PS/2 Keyboard I/F Connector (6-Pin)

Table C-25 PS/2 keyboard I/F connector pin assignments (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.26 PJ314 Microphone Jack Connector (6-Pin)

Table C-26 Microphone jack connector pin assignments (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.27 PJ316 Headphone Jack Connector (6-Pin)

Table C-27 Headphone jack connector pin assignments (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.	—

## C.28 PJ317 Sound Controller Board Connector (40-Pin)

Table C-28 Sound controller board connector pin assignments (40-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	GND	—	21	PDRQ;100	I
02	GND	—	22	CDRQ;100	I
03	SD00;100	I/O	23	PDAK;000	O
04	SD01;100	I/O	24	CDAK;000	O
05	SD02;100	I/O	25	SBEEP;100	O
06	SD03;100	I/O	26	IOWR;000	O
07	SD04;100	I/O	27	SA00;100	O
08	SD05;100	I/O	28	IORD;000	O
09	SD06;100	I/O	29	SA01;100	O
10	SD07;100	I/O	30	GND	—
11	VCC	—	31	GND	—
12	VCC	—	32	IMICIN;100	O
13	SPKP;100	I	33	LHPHON;100	I
14	SPKM;100	I	34	AGNDIM	O
15	SDEX;000	I	35	RHPHON;100	I
16	SDMUTE;100	O	36	AGNDHP	I
17	SDPRDN;000	O	37	SPKOFF;100	O
18	FMCS;000	O	38	EMICIN;100	O
19	AD18CS;000	O	39	IMICOF;100	O
20	AUDINT;100	I	40	AGNDEM	O

# 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	▸	▹	►	ϑ	°
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		î	£	¼	▻	▼	▽	∞	∞
D	♪	↔	-	=	M	]	m	}	ì	¥	ı	▻	▼	▽	φ	2
E	♫	▲	.	>	N	^	n	~	Ä	Pt	«	▻	▼	▽	€	■
F	☼	▼	/	?	O	_	o	Δ	Å	f	»	▻	▼	▽	∩	BLANK FF

## Appendix E Keyboard Scan/Character Codes

Table E-1 Scan codes (set 1 and set 2) (1/3)

Cap No.	Keypop	Code set 1		Code set 2		Note
		Make	Break	Make	Break	
01	' ~	29	A9	0E	F0 0E	
02	1 !	02	82	16	F0 16	
03	2 @	03	83	1E	F0 1E	
04	3 #	04	84	26	F0 26	
05	4 \$	05	85	25	F0 25	
06	5 %	06	86	2E	F0 2E	
07	6 ^	07	87	36	F0 36	
08	7 &	08	88	3D	F0 3D	*2
09	8 *	09	89	3E	F0 3E	*2
10	9 (	0A	8A	46	F0 46	*2
11	0 )	0B	8B	45	F0 45	
12	- _	0C	8C	4E	F0 4E	
13	= +	0D	8D	55	F0 55	
15	BkSp	0E	8E	66	F0 66	
16	Tab	0F	8F	0D	F0 0D	
17	Q	10	90	15	F0 15	
18	W	11	91	1D	F0 1D	
19	E	12	92	24	F0 24	
20	R	13	93	2D	F0 2D	
21	T	14	94	2C	F0 2C	
22	Y	15	95	35	F0 35	
23	U	16	96	3C	F0 3C	*2
24	I	17	97	43	F0 43	*2
25	O	13	98	44	F0 44	*2
26	P	19	99	4D	F0 4D	*2
27	[ {	1A	9A	54	F0 54	
28	] }	1B	9B	5B	F0 5B	
29 (42)	\	2B	AB	5D	F0 5D	*5
30	Caps Lock	3A	BA	58	F0 58	
31	A	1E	9E	1C	F0 1C	
32	S	1F	9F	1B	F0 1B	
33	D	20	A0	23	F0 23	
34	F	21	A1	2B	F0 2B	
35	G	22	A2	34	F0 34	
36	H	23	A3	33	F0 33	
37	J	24	A4	3B	F0 3B	*2
38	K	25	A5	42	F0 42	*2
39	L	26	A6	4B	F0 4B	*2
40	; :	27	A7	4C	F0 4C	*2



Table E-1 Scan codes (set 1 and set 2) (2/3)

Cap No.	Keytop	Code set 1		Code set 2		Note
		Make	Break	Make	Break	
41	' "	28	A8	52	F0 52	
43	Enter	1C	9C	5A	F0 5A	
44	Shift (L)	2A	AA	12	F0 12	
45	No.102 key	56	D6	61	F0 61	
46	Z	2C	AC	1A	F0 1A	
47	X	2D	AD	22	F0 22	
48	C	2E	AE	21	F0 21	
49	V	2F	AF	2A	F0 2A	
50	B	30	B0	32	F0 32	
51	N	31	B1	31	F0 31	
52	M	32	B2	3A	F0 3A	*2
53	, <	33	B3	41	F0 41	*2
54	. >	34	B4	49	F0 49	*2
55	/ ?	35	B5	4A	F0 4A	*2
57	Shift (R)	36	B6	59	F0 59	
58	Ctrl	1D	9D	14	F0 14	*3
60	Alt (L)	38	B8	11	F0 11	*3
61	Space	39	B9	29	F0 29	
62	ALT (R)	E0 38	E0 B8	E0 11	E0 F0 11	
75	Ins	E0 52	E0 D2	E0 70	E0 F0 70	*1
76	Del	E0 53	E0 D3	E0 71	E0 F0 71	*1
79	←	E0 4B	E0 CB	E0 6B	E0 F0 6B	*1
80	Home	E0 47	E0 C7	E0 6C	E0 F0 6C	*1
81	End	E0 4F	E0 CF	E0 69	E0 F0 69	*1
83	↑	E0 48	E0 C8	E0 75	E0 F0 75	*1
84	↓	E0 50	E0 D0	E0 72	E0 F0 72	*1
85	PgUp	E0 49	E0 C9	E0 7D	E0 F0 7D	*1
86	PgDn	E0 51	E0 D1	E0 7A	E0 F0 7A	*1
89	→	E0 4D	E0 CD	E0 74	E0 F0 74	*1
110	Esc	01	81	76	F0 76	

Table E-1 Scan codes (set 1 and set 2) (3/3)

Cap No.	Keytop	Code set 1		Code set 2		Note
		Make	Break	Make	Break	
112	F1	3B	3B	05	F0 05	
113	F2	3C	BC	06	F0 06	
114	F3	3D	BD	04	F0 04	
115	F4	3E	BE	0C	F0 0C	
116	F5	3F	BF	03	F0 03	
117	F6	40	C0	0B	F0 0B	
118	F7	41	C1	83	F0 83	
119	F8	42	C2	0A	F0 0A	
120	F9	43	C3	01	F0 01	
121	F10	44	C4	09	F0 09	
122	F11	57	D7	78	F0 78	*3
123	F12	58	D8	07	F0 07	*3
124	PrintSc	*6	*6	*6	*6	*6
126	Pause	*7	*7	*7	*7	*7
202	Fn	—	—	—	—	*4

**Notes:**

- 1\* Scan codes differ by mode.
- 2\* Scan codes differ by overlay function.
- 3\* Combination with **Fn** key makes different codes.
- 4\* **Fn** key does not generate a code by itself.
- 5\* This key corresponds to key No. 42 in 102-key model.
- 6\* Refer to table E-6, scan codes with **Ctrl** key.
- 7\* Refer to table E-7, scan codes with **Alt** key.

Table E-2 Scan codes with left Shift key

Cap No.	Key top	Code set 1		Code set 2	
		Make	Break	Make	Break
75	INS	E0 AA E0 52	E0 D2 E0 2A	E0 F0 12 E0 70	E0 F0 70 E0 12
76	DEL	E0 AA E0 53	E0 D3 E0 2A	E0 F0 12 E0 71	E0 F0 71 E0 12
79	←	E0 AA E0 4B	E0 CB E0 2A	E0 F0 12 E0 6B	E0 F0 6B E0 12
80	Home	E0 A E0 47	E0 C7 E0 2A	E0 F0 12 E0 6C	E0 F0 6C E0 12
81	End	E0 AA E0 4F	E0 CF E0 2A	E0 F0 12 E0 69	E0 F0 69 E0 12
83	↑	E0 AA E0 48	E0 C8 E0 2A	E0 F0 12 E0 75	E0 F0 75 E0 12
84	↓	E0 AA E0 50	E0 D0 E0 2A	E0 F0 12 E0 72	E0 F0 72 E0 12
85	PgUp	E0 AA E0 49	E0 C9 E0 2A	E0 F0 12 E0 7D	E0 F0 7D E0 12
86	PgDn	E0 AA E0 51	E0 D1 E0 2A	E0 F0 12 E0 7A	E0 F0 7A E0 12
89	→	E0 AA E0 4D	E0 CD E0 2A	E0 F0 12 E0 74	E0 F0 74 E0 12

*Note: The table above shows scan codes with the left **Shift** key. In combination with the right **Shift** key, scan codes are changed as below:*

	<i>With left Shift</i>	<i>With right Shift</i>
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.

# Appendix F Key Layout

## F.1 United States (US) Keyboard

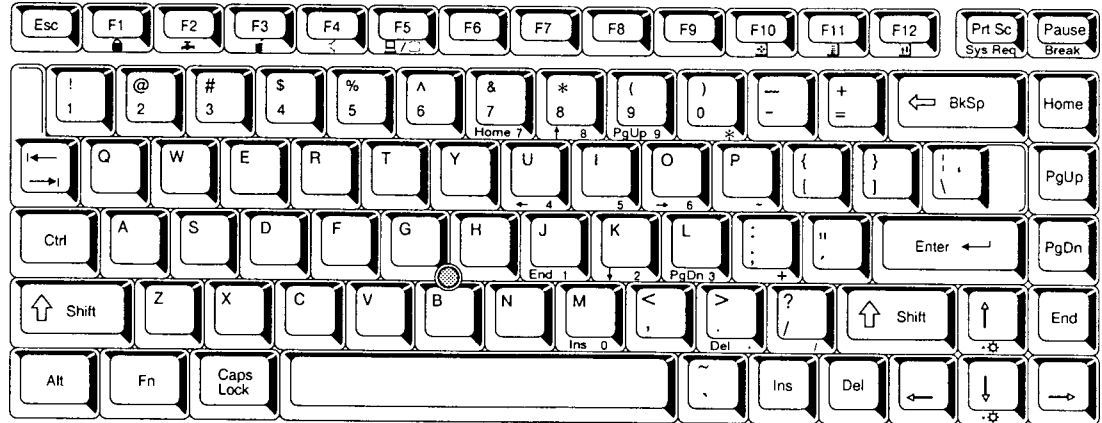


Figure F-1 US keyboard

## F.2 United Kingdom (UK) Keyboard

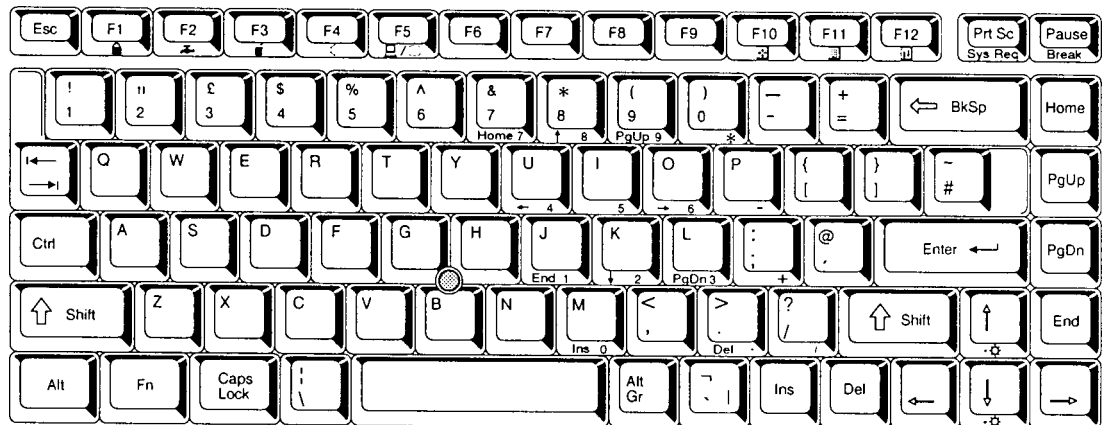


Figure F-2 UK keyboard

### F.3 German (GR) Keyboard

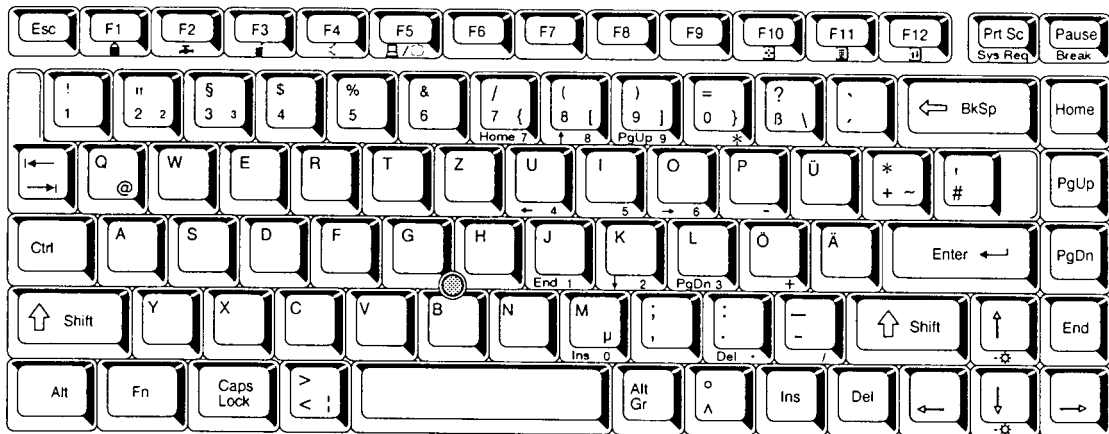


Figure F-3 GR keyboard

### F.4 French (FR) Keyboard

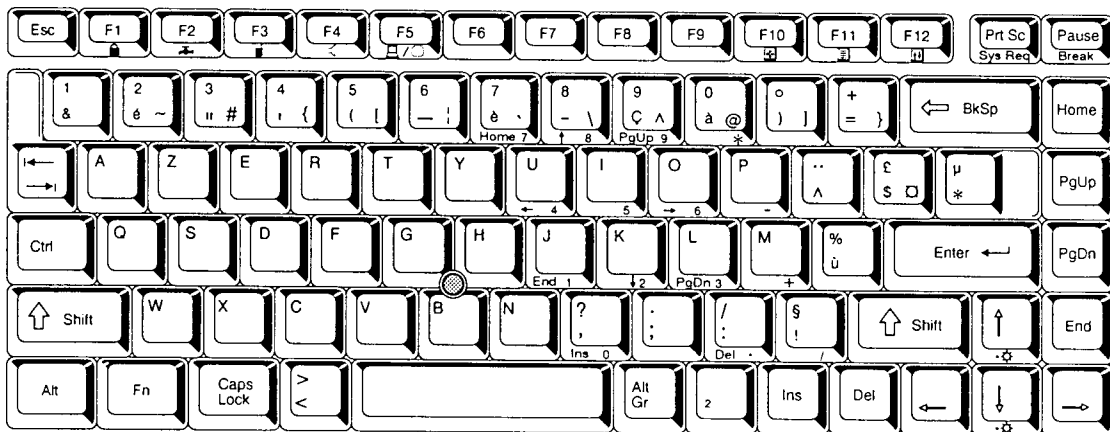


Figure F-4 FR keyboard

## F.5 Spanish (SP) Keyboard

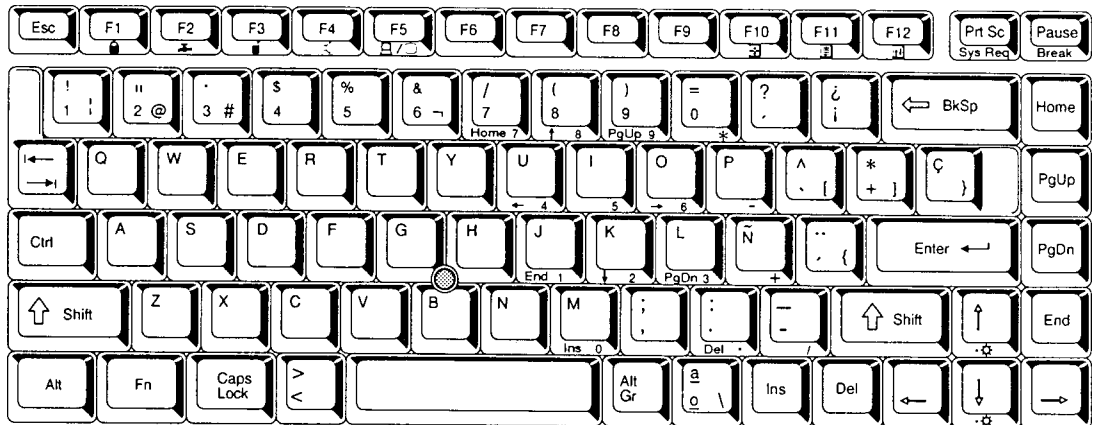


Figure F-5 SP keyboard

## F.6 Italian (IT) Keyboard

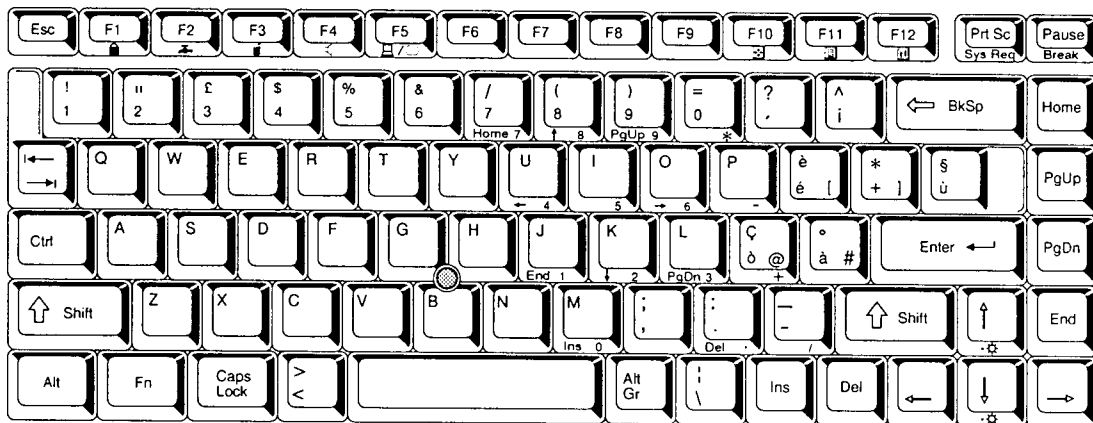


Figure F-6 IT keyboard



## F.7 Scandinavian (SC) Keyboard

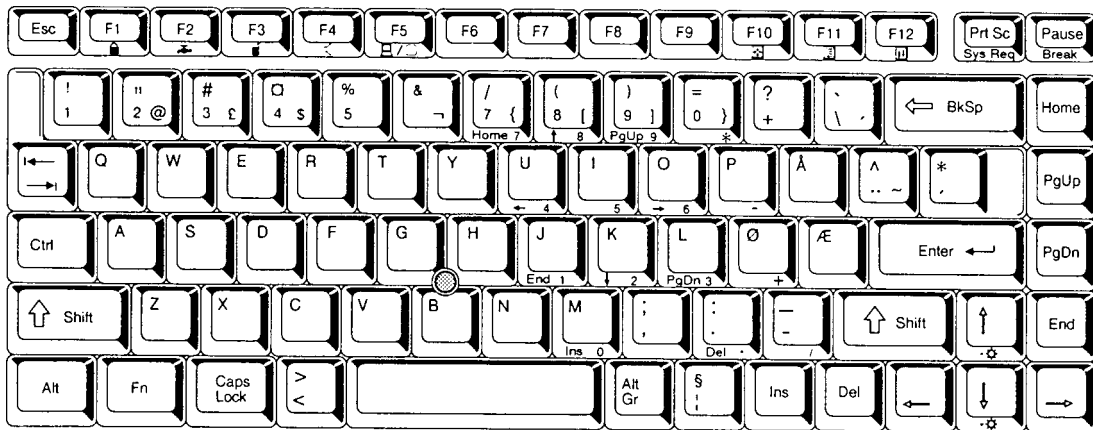


Figure F-7 SC keyboard

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

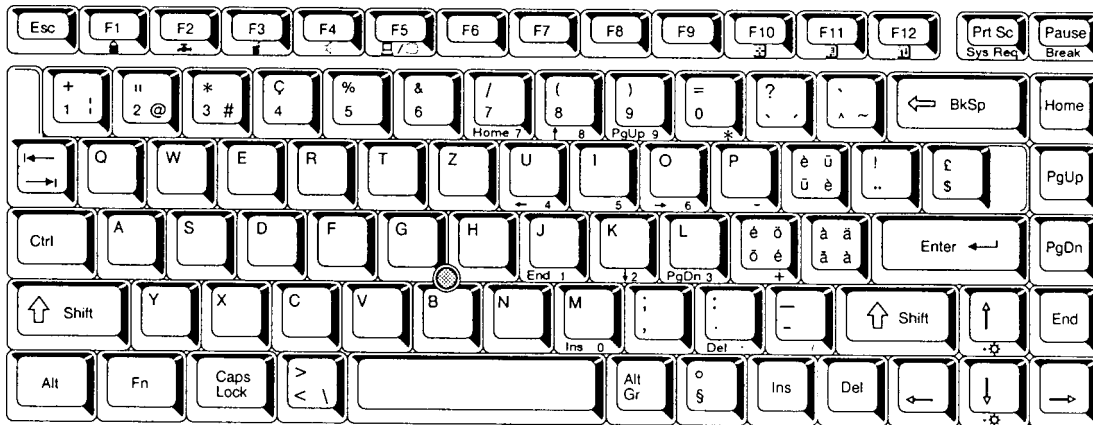
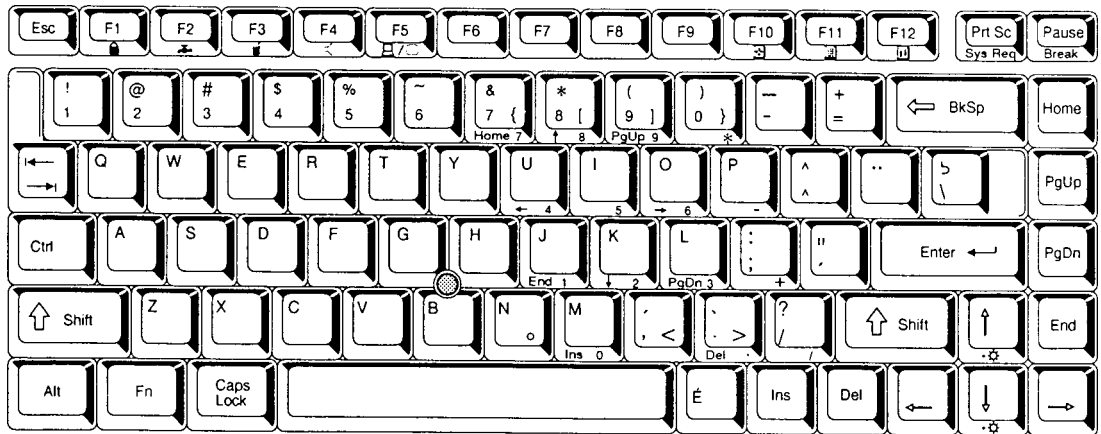


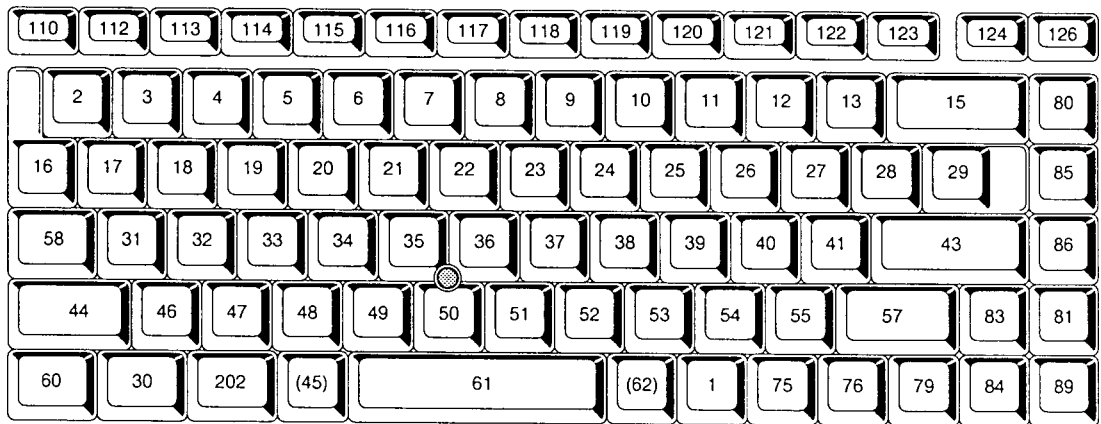
Figure F-8 SL keyboard

## F.9 Canadian (Specialized) Keyboard



*Figure F-9 Canadian keyboard*

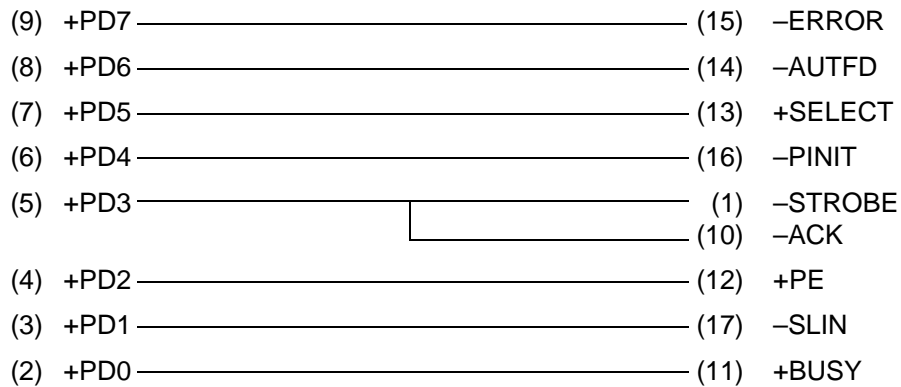
## F.10 Keycap Number Keyboard



*Figure F-10 Keycap number keyboard*

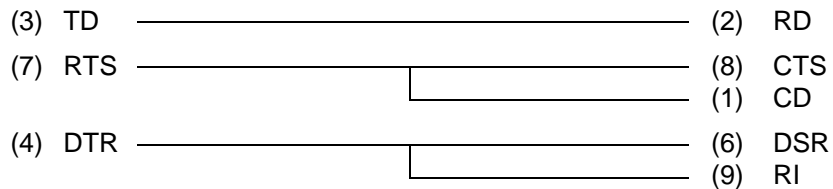
## Appendix G Wiring Diagrams

### G.1 Printer Wraparound Connector



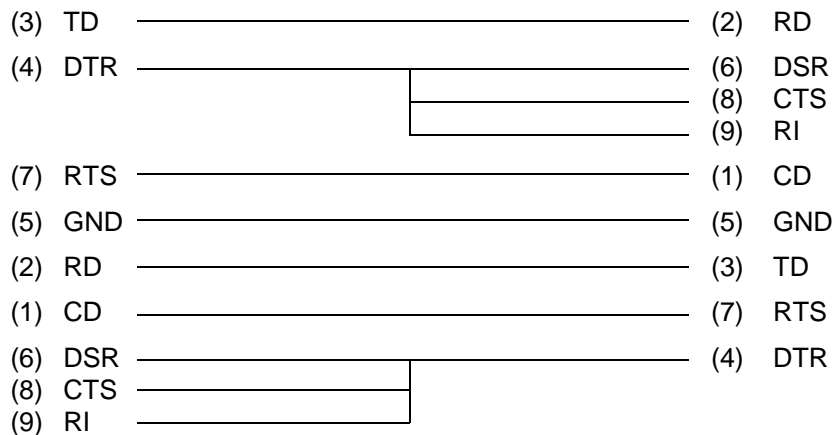
*Figure G-1 Printer wraparound connector*

### G.2 RS-232-C Wraparound Connector



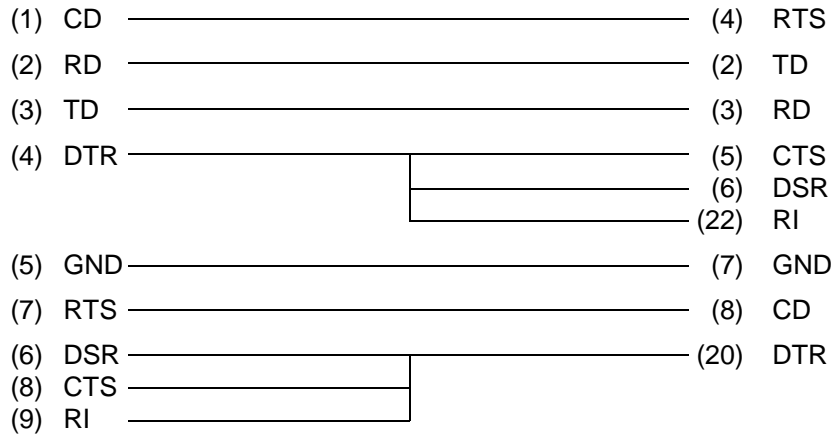
*Figure G-2 RS-232-C wraparound connector*

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



*Figure G-3 RS-232-C direct cable (9-pin to 9-pin)*

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



*Figure G-4 RS-232-C direct cable (9-pin to 25-pin)*

## **Appendix H Deleting the Password**

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

If the owner forgets the password, the computer must be returned to Toshiba's facility in Irvine, California for servicing.

## Appendix I BIOS Rewrite Procedures

This Appendix explains how to rewrite the system BIOS program when you update the system BIOS.

### Tools

To rewrite the BIOS, you need the following tool:

- ❑ BIOS rewrite disk for T4900CT

### Rewriting the BIOS

1. Set the system to Boot Mode.
2. Turn off the power to the T4900CT.
3. Remove the external cable, memory card, 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 BIOS message is displayed, insert the BIOS rewrite disk into the FDD. Press the **Enter** key to start the BIOS rewrite program.
6. When the process is completed, eject the rewrite disk and restart the system.