

1.1 Features

The Toshiba T4850CT is one of the lightest and most advanced portable computers available. Utilizing advanced technology and high-speed components, the T4850CT offers excellent color display legibility, battery operation and IBM PC/AT compatibility. The T4850CT system unit consists of the following features:

- Microprocessor

The Intel DX4™ Processor (referred to as DX4 in this manual) operates at 75 MHz, 3.3 Volts.

- Math co-processor

The math co-processor is stored in the DX4.

- Cache memory

16 KB of cache memory is stored in the DX4.

- Disk storage

The T4850CT has an internal 2.5-inch 500 or 810 MB HDD. The 3.5-inch FDD supports 2 HD (1.44 MB) floppy disks and 2DD (720 KB) floppy disks.

- Memory

The T4850CT comes standard with 8 MB of CMOS Random Access Memory (RAM) 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 T4850CT has a high-resolution 10.4-inch full-color, Thin Film Transistor (TFT) color LCD that displays 640 x 480 pixels.

The 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.

Batteries

The T4850CT has three different batteries: a main battery, backup battery, and a Real Time Clock (RTC) battery.

Status indicator panel

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

Memory card slot

The optional memory card slot enables you to install a Toshiba optional memory card.

Personal Computer Memory Card International Association (PCMCIA) card slot

The two PCMCIA slots enable you to install an MiNC Toshiba card modem or other industry-standard PCMCIA release 2.0 card.

Expansion port

The unique 150-pin expansion port allows you to connect the T4850CT to a Desk Station IV.

PRT/FDD port

The Centronics-compatible parallel interface port serves two purposes: the port can be used to connect a Centronics-compatible printer or an external 5.25-inch floppy disk drive.

RS-232-C port

The RS-232-C port is a 9-pin serial interface port.

Mouse port

The 6-pin mouse port on the back supports an IBM PS/2 mouse.

Keyboard port

The 6-pin keyboard port on the back supports an IBM PS/2 keyboard.

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

The T4850CT has one BPQP2 port on the right.

❑ RGB port

The 15-pin RGB port on the back supports 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 16Ω .

- Microphone, standard 3.5 mm diameter miniature monaural jack.

The T4850CT Personal Computer is shown in Figure 1-1, and its system configuration is illustrated in Figure 1-2.

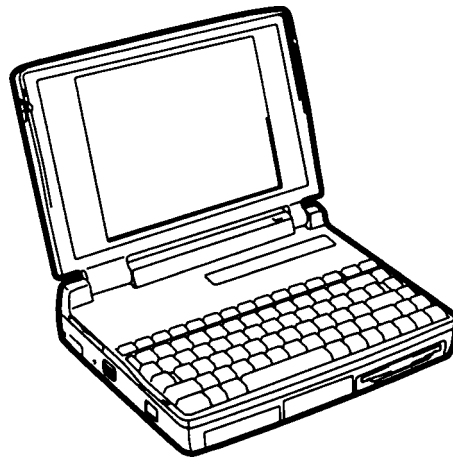


Figure 1-1 T4850CT personal computer

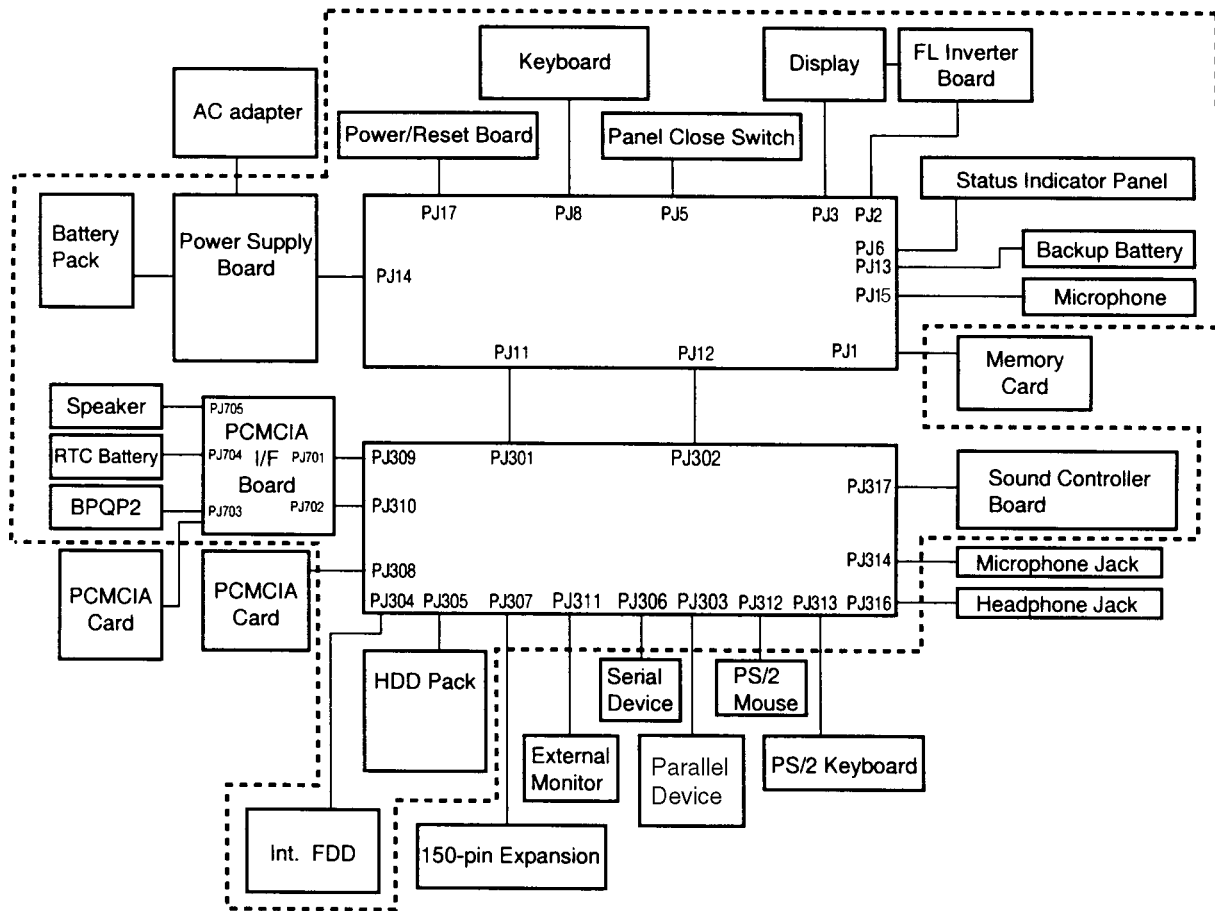


Figure 1-2 T4850CT system unit configuration

1.2 System Unit Block Diagram

Figure 1-3 is a block diagram of the T4850CT system unit.

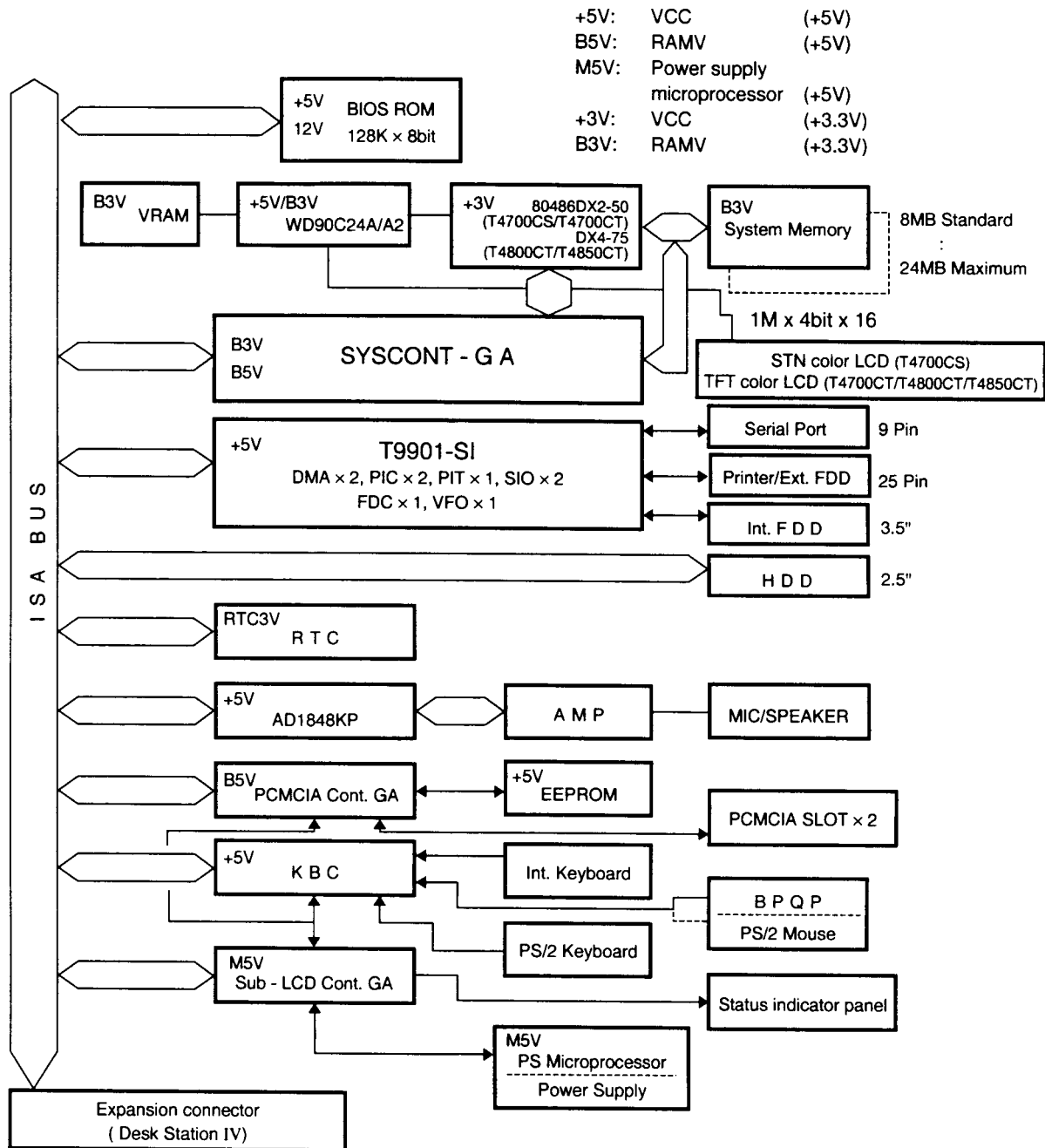


Figure 1-3 T4850CT system board block diagram

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

- ❑ A DX4-75 CPU, which incorporates a math co-processor and 16 KB cache memory.
- ❑ The following memory components:

Standard RAM: 8 MB, 32-bit data width (70 ns)
Cache memory: 16 KB (inside the DX4-75 CPU)
System, Video, 128 KB (96 KB are used), 8-bit data width
BIOS: 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 256K x 16 bit chips are used.
Memory card: 4, 8, or 16 MB memory card can be installed.
32-bit data width.

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

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

- ❑ Real Time Clock (RTC)

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

- ❑ Keyboard Controller (KBC)

One M37452M4 chip is used. This KBC includes the keyboard scan controller and keyboard interface controller. The KBC controls the internal keyboard, external keyboard port, PS/2 mouse port, and BPQP2 port.

- ❑ VGA display controller: WD90C24A/A2 (208-pin) (3.3 volt operation)

This controller controls both internal and external VGA-compatible displays and external SVGA-compatible displays with an Analog Digital Converter (DAC). The controller can display data on the internal and external display simultaneously.

❑ Sound Controller

An AD1848 chip is used which controls the internal sound system.

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

- 75 MHz for the CPU
- 14.7456 MHz for the COM
- 24 MHz for the FDC and VFO
- 16 MHz is used for GA
- 14.31818 MHz for WD90C24A (for VGA)

OSC (X3) generates 32.768 KHz for the RTC.

❑ Gate Arrays

System Controller Gate Array

This gate array performs the following functions:

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

Sub LCD Controller Gate Array

This gate array performs the following functions:

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

IC Card Controller Gate Array

This gate array performs 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 T4850CT 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 FDD is shown in Figure 1-4, and its specifications are listed in Table 1-1.

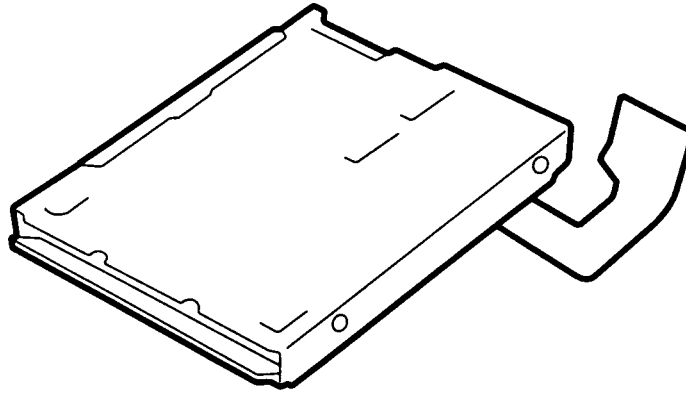


Figure 1-4 3.5-inch FDD

Table 1-1 3.5-inch FDD specifications

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

1.4 2.5-inch Hard Disk Drive

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

The T4850CT supports a 500 MB and 810 MB HDDs.

The HDD is shown in Figure 1-5, and its specifications are listed in Table 1-2.

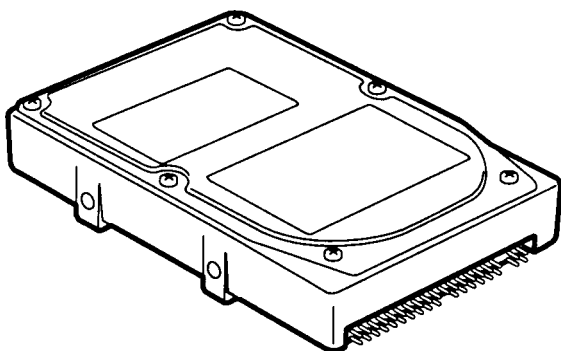


Figure 1-5 2.5-inch HDD

Table 1-2 2.5-inch HDD specifications

Items	500 MB		810 MB
	MK2428FC	DHAA-2540	DVAA-2810
Physical specifications			
Formatted capacity (MB)	524.0	528.0	810.0
Disks	4	2	3
Heads	8	4	6
Cylinders	1,920	1,024	1,571
Bytes per sector (bps)	512	512	512
Recording method	1-7RLL	1-7RLL	1-7RLL
Performance specifications			
Access time (average)	12	14.5	14.5
(track to track)	3	4	4
Maximum stroke	25	23.5	23.5
Rotation speed (rpm)	4,000	3,800	3,800
Data transfer rate (Mbps)	18.9 to 31.6	24.9 to 36.0	24.9 to 36.0
Power requirements			
DC voltages (V)	+5 only	+5 only	+5 only
Power (typical)			
Seek (W)	3.6	2.0	2.8
Read (W)	2.8	2.8	2.8
Write (W)	2.8	2.8	2.8
Standby mode (Spin only) (W)	0.4	0.4	0.4
Sleep mode (Motor off) (W)	0.15	0.4	0.4
Spin-up mode (mA)	780	940	940

1.5 Keyboard

The 82-(USA) or 84-(European) keyboard is mounted on the T4850CT's system unit, and 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.

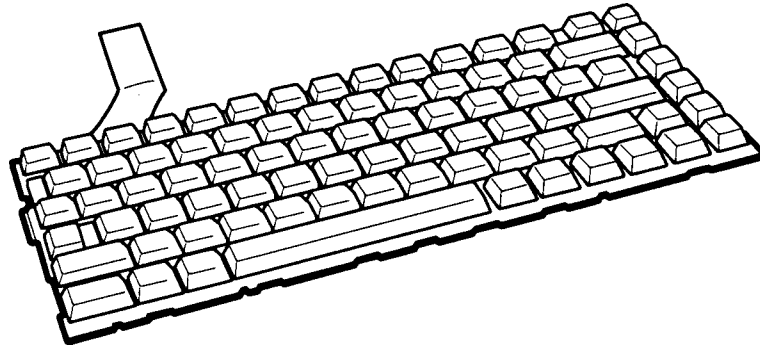


Figure 1-6 Keyboard

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 T4850CT TFT color LCD supports 640 x 480 pixels with an internal display controller and 4096 colors for graphics and characters. This controller includes the functions of Video Graphics Array (VGA) and Super VGA (SVGA) for external display.

The LCD receives 12-bit data signals, data enable, LP signal, FP signal, 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, and specifications for the LCD are listed in Table 1-3.

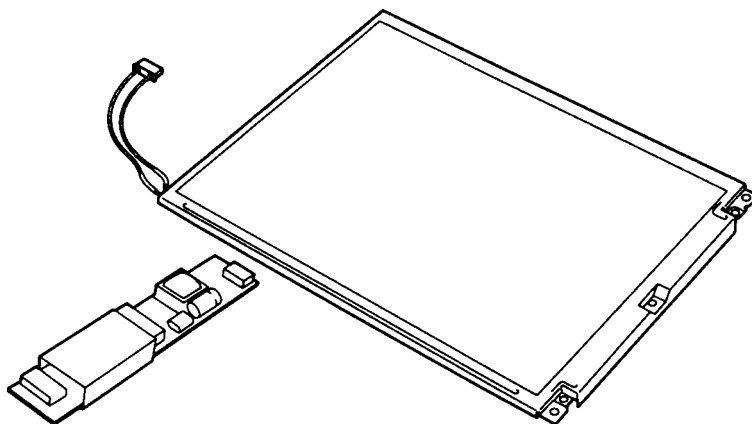


Figure 1-7 TFT color LCD

Table 1-3 TFT color LCD specifications

Item		Specifications
Number of dots	(dots)	640 x 480
Dot pitch	(mm)	0.33 (W) x 0.33 (H)
Display area	(mm)	211.2 (W) x 158.4 (H)
Contrast		60:1 (minimum)
FL current	(mA)	3.7
FL frequency	(KHz)	47

1.6.2 TFT Color Fluorescent Lamp (FL) Inverter Board

The FL inverter board supplies high frequency current to light the LCD's Fluorescent Lamp. Specifications for the T4850CT's FL inverter are listed 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 T4850CT system board. The power supply has one microprocessor and operates at 500 KHz (power off) or 20 MHz (power on). It performs 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 of the display.
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	2,700	100
RS-232-C, Flash ROM	12V	+12	±5	120	240
Display	DSPV	+9.5 to +23	–	4.02 W	–
RAM, CPU	B3V	+3.3	±5	1,200	60
RS-232-C	M12V	–7 to –12.6	–	10	–

1.8 Batteries

The T4850CT has three types of batteries:

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

Battery specifications are listed in Table 1-6.

Table 1-6 Battery specifications

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

1.8.1 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 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 main 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 charges: 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

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

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

2: *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.*

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 a full charge

A full charge is detected only when the battery is charging at quick charge, and 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 is powered on. Table 1-8 lists the charging time and data preservation period of the backup battery.

Table 1-8 Backup battery charging/data preservation time

Item		Time
Charging Time	Power On	20 H
	Power Off	75 H
Data preservation period (full charge)		8.0 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

Item		Time
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 T4850CT 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 Diagnostic 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 T4850CT Diagnostics Disk
2. A Phillips head screwdriver (2 mm)
3. A Toshiba MS-DOS system disk
4. A 2DD or 2HD formatted work disk for floppy disk drive testing
5. A cleaning kit for floppy disk drive troubleshooting
6. A printer port LED
7. An RS-232-C wraparound connector
8. A printer wraparound connector
9. A multimeter
10. An external 5.25-inch floppy disk drive
11. An external CRT

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.
- 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.

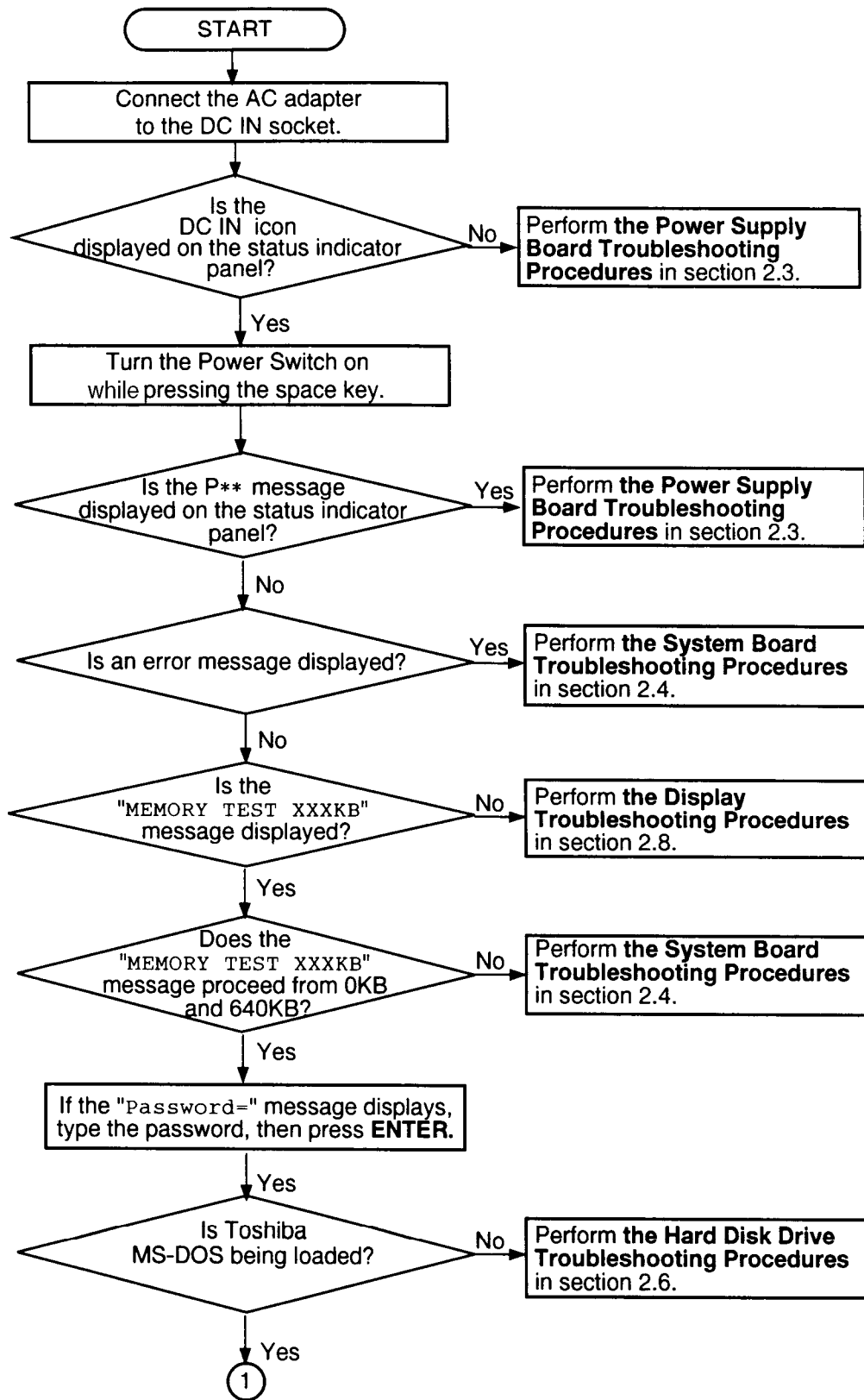


Figure 2-1 Troubleshooting flowchart (1/2)

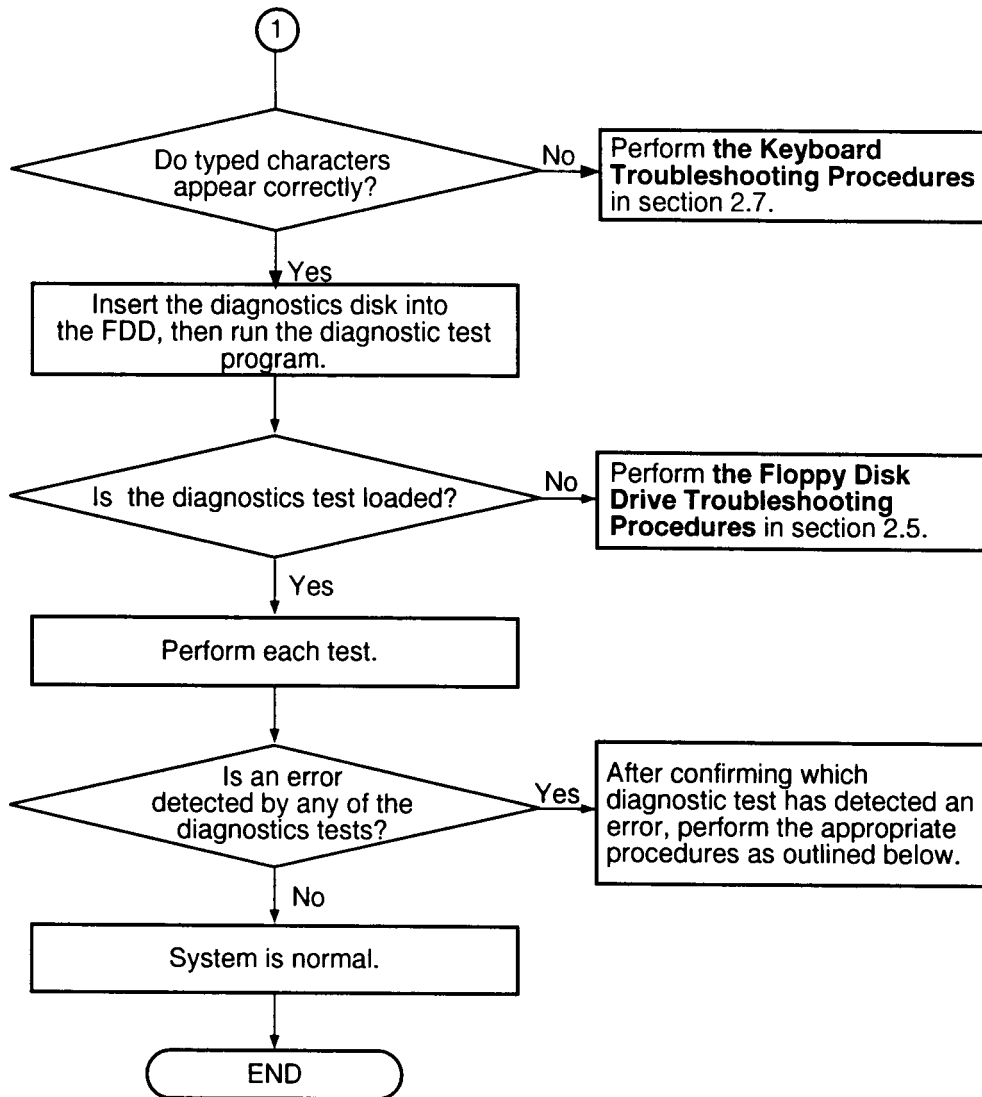


Figure 2-1 Troubleshooting flowchart (2/2)

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 T4850CT's power supply controls many functions and components in the computer. 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 the 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 Power supply error status

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

- Adapter (AC Adapter or Desk Station)

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

- Battery

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

- VCC Output

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

B3V Output

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

Output Voltage (12V or M12V)

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

Power Supply Microprocessor

Status	Meaning
P50	Firmware error.
P52	Program error.

Power Supply On/Off Sequence

Status	Meaning
P60	VCC and B3V error.

Environment

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

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

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

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

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

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

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

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

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

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

Procedure 2 Connection Check

The power supply related wiring diagram is shown below in Figure 2-2.

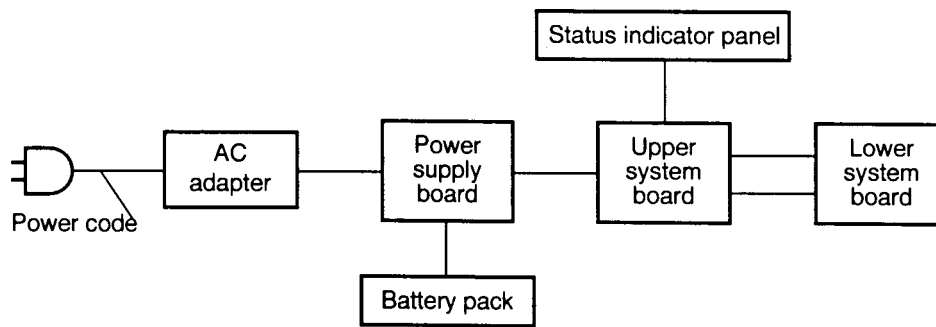


Figure 2-2 Power Supply Wiring Diagram

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 be charging the battery pack. Perform the following procedures.

1. Install the battery pack on the T4850CT.
2. Attach the AC adapter to the computer, 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 System Configurations.
4. Read the character(s) on the battery capacity display area of the status indicator panel.

If the character matches any of the codes in the following table, go to each check item. If none of the codes display, go to Procedure 4.

Table 2-3 Battery Capacity Display Codes

Code	Contents	Check items
C	The AC adapter is quick charging.	Normal
1	The AC adapter is not attached, or the AC adapter's output voltage is abnormal.	Check 1
2	The battery pack is not installed, or the 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 may be completely discharged. Wait a few minutes to charge the battery pack. If the battery pack still does not charge, replace the battery pack with a new one.

Check 3 The battery's temperature is hot or cold. Remove the battery and let it return to a normal operating temperature.

If the battery pack still does not charge, 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 T4850CT following the steps described in Chapter 4, *Replacement Procedures*, and check the connection between the power supply board and system board(s) and status indicator panel. After checking the connection, perform the following checks.

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

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. Perform the following checks.

- Check 1 Fully discharge the battery by leaving the computer with its 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 Toshiba MS-DOS is properly loaded, go to Procedure 3.

Check 1 If any of the following error messages displays on the screen, press the **F1** key as the message instructs.

- (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

These errors occur when the system configuration preserved in the RTC memory (CMOS type memory) is not the same as the actual configuration or when the data is lost.

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

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

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

This 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.

Check 3 The IRT checks the system board. When an error is detected, the system stops or an error message appears. Following is a list of error messages.

- (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

- ❑ If any of the following error messages display, replace the system board:
Error Messages 1 through 17, 19, 20, 25 or 26
- ❑ If Error Message 18 displays, go to the Keyboard Troubleshooting Procedures in Section 2.7.
- ❑ If Error Message 21 or 22 displays, go to the HDD Troubleshooting Procedures in Section 2.6.
- ❑ If Error Message 23 or 24 displays, go to the FDD Troubleshooting Procedures in Section 2.5.

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 2-3 shows the printer port LED.

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

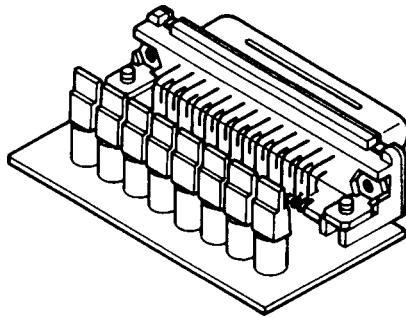


Figure 2-3 Printer port LED

To use the printer port LED follow these steps:

1. Turn off the T4850CT's power.
2. Plug the printer port LED into the computer's PRT/FDD connector.
3. Hold down the space bar and turn on the computer.
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 2-4, perform Check 1.

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

Table 2-4 Printer port LED error status (1/2)

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

Table 2-4 Printer port LED error status (2/2)

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

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

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

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

Check 3 If error code **5Ah** is displayed, go to the HDD Troubleshooting Procedures in Section 2.6.

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

Procedure 3 Printer Port LED Check on Resume Mode

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

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

To use the printer port LED follow these steps:

1. Turn on the T4850CT's power, then set it to resume mode.
2. Turn off the computer.
3. Plug the printer port LED into the computer's PRT/FDD connector.
4. Turn on the computer again.
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 2-5, go to Procedure 5.

Table 2-5 Printer port LED resume mode error status

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

Procedure 4 Diagnostic Test Program Execution Check

Execute the following tests from the *Diagnostic Test* Menu. Refer to Chapter 3, *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 T4850CT following the steps described in Chapter 4, *Replacement Procedures*, and check the connection between the upper system board and lower system board, and other components. After checking the connections, perform the following checks.

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

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

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

F2H, FDH

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

System test
Memory test
Real Timer test
NDP test

- If any of the following diagnostic tests detect an 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 T4850CT's internal 3.5-inch floppy disk drive is functioning properly. Perform the steps below starting with Procedure 1 and continue with the other procedures as required.

- Procedure 1: FDD Head Cleaning Check
- Procedure 2: External 5.25-inch FDD Check
- Procedure 3: Diagnostic Test Program Check
- Procedure 4: Connector Check and Replacement Check

Procedure 1 FDD Head Cleaning Check

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

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

If the test program cannot be executed on the T4850CT, go to Procedure 2.

Procedure 2 External 5.25-inch FDD Check

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

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

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

Procedure 3 Diagnostic Test Program Execution Check

The Floppy Disk Drive Diagnostic Test program is stored on the T4850CT 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 2-6. 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 2-6 Floppy disk drive error code and status

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

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

Write protected

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

Procedure 4 Connector Check and Replacement Check

The 3.5-inch FDD related wiring diagram is shown below in Figure 2-4.

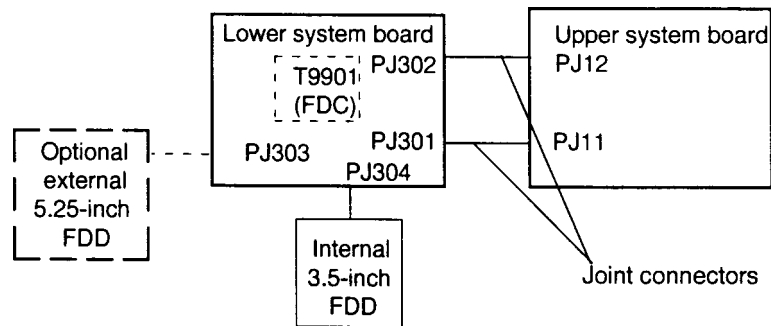


Figure 2-4 FDD Wiring Diagram

The 3.5-inch Floppy Disk Drive is connected to the system unit by the FDD cable. This cable may be disconnected from the system board or damaged. Disassemble the T4850CT 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. 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.

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 T4850CT'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 3.

Note that the error messages appear on the display for five (5) seconds, then disappear.

```
HDC ERROR
      or
HDD #0 ERROR
      or
HDD #1 ERROR
```

- 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 computer. If the error message still appears, perform Procedure 3.

```
System transferred
```

Procedure 3 Connector Check

The HDD wiring diagram is shown below in Figure 2-5.

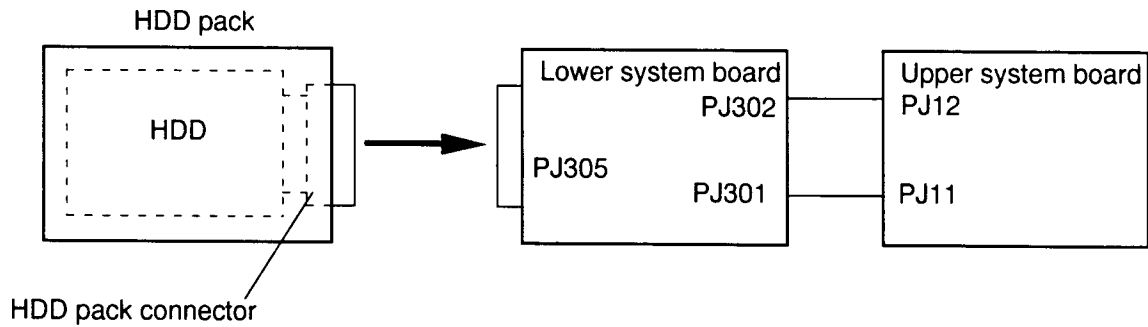


Figure 2-5 HDD Wiring Diagram

The HDD is stored inside the HDD pack. The 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 T4850CT 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, reconnect it. 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, reconnect them. If the HDD is still not functioning properly, perform Procedure 4.

Procedure 4 Format Check

The T4850CT'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. Then 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 an error message appears on the display, refer to the *Toshiba MS-DOS Manual* for more information and perform Check 2.

- Check 2 Using the T4850CT 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.

```
Format complete
```

Partition and format the HDD using the MS-DOS FORMAT command. 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 T4850CT 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. Error codes and statuses are described in Table 2-7.
- If an error code is not generated, the HDD is operating properly.

Table 2-7 Hard disk drive error code and status

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

Procedure 6 Replacement Check

The HDD peripheral component is composed of the HDD, HDD pack connector, lower system board, and upper system board. One of the components may be damaged. Disassemble the T4850CT 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 T4850CT's keyboard is functioning properly, perform the following procedures. Start with Procedure 1 and continue with the other procedure as instructed.

Procedure 1: Diagnostic Test Program Execution Check

Procedure 2: Connector and Replacement Check

Procedure 1 Diagnostic Test Program Execution Check

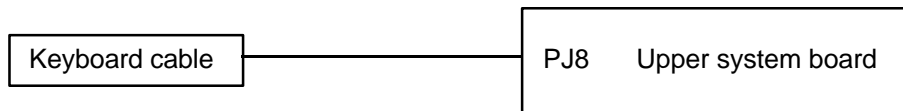
Execute the Keyboard Test in the Diagnostic Program. Refer to Chapter 3, *Tests and Diagnostics*, for more information on how to perform the test program.

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 T4850CT 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 T4850CT's display is functioning properly. Start with Procedure 1 and continue with the other procedures as instructed.

Procedure 1: Brightness Control Check (Hot Key Check)

Procedure 2: External CRT Check

Procedure 3: Diagnostic Test Program Execution Check

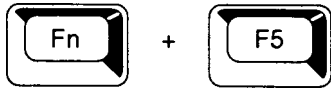
Procedure 4: Connector Check

Procedure 5: Replacement Check

Procedure 1 Hot Key Check

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

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



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

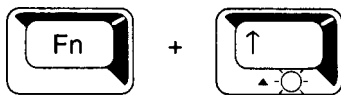
NOTE: Regardless of the Power-on display setting (SETUP option), the **Fn+F5** hot keys change the display in the following order:

→ Internal → Simultaneous → External →

- 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** keys increases or decreases the brightness of the 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 T4850CT'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 T4850CT 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 a cable; the FL inverter board and upper system board are connected by a cable; and the LCD module and system board are connected by a signal cable as illustrated below. Any of these cables may be disconnected.

Disassemble the display unit and check the following cable connections. Refer to Chapter 4 for more information about how to disassemble the computer.

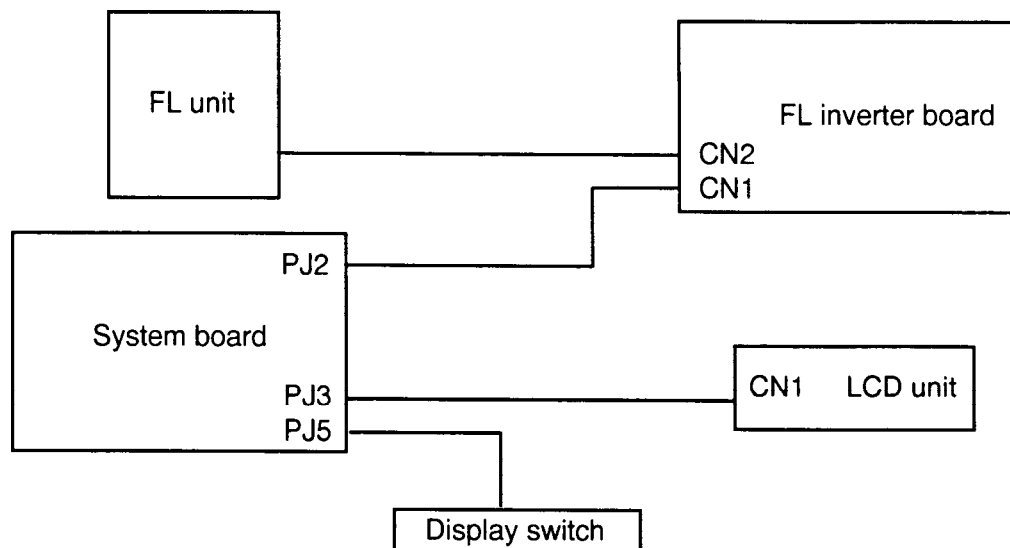


Figure 2-6 T4850CT display connection

If any of these cables are not connected, firmly reconnect them 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 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 T4850CT's Status Indicator Panel is functioning properly, perform the following procedures. Start with Procedure 1 and continue as instructed.

Procedure 1: Diagnostic Test Program Execution Check

Procedure 2: Connector and Replacement Check

Procedure 1 Diagnostic Test Program Execution Check

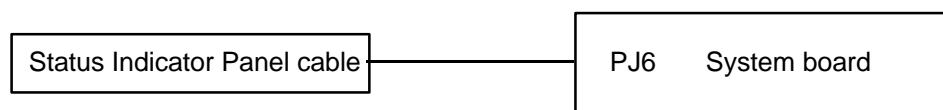
Execute the Status Indicator Panel Test in the Diagnostic Program. Refer to Chapter 3, *Tests and Diagnostics*, for more information on how to perform the test program.

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 T4850CT as described in Chapter 4 and perform the following checks.

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



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

Check 2 The status indicator panel controller on the system board may be damaged. Replace the upper system board with a new one. If the status indicator panel still is 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 T4850CT's Diagnostic Test Program (TEST4850) to test the functions of the computer's hardware modules. The Diagnostics Test Program, stored on the T4850CT Diagnostic Disk, consists of 8 programs that are grouped into the Service Program Module (DIAGNOSTICS MENU) and the Test Program Module (DIAGNOSTICS TEST Menu).

The DIAGNOSTICS MENU consists of the following functions.

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

The DIAGNOSTIC TEST menu contains the following 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

The following equipment is needed to perform some of the T4850CT's Diagnostic test programs.

- The T4850CT Diagnostics Disk (all tests)
- A formatted working disk for the floppy disk drive test (all tests)
- 3.5-inch 2HD/2DD disk for the internal 3.5-inch FDD
- 5.25-inch 2D disk for the external 5.25-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 Service Program Module functions.

3.2 Executing the Diagnostic Test

Toshiba MS-DOS is required to run the T4850CT'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 T4850CT Diagnostics Disk in the computer's internal floppy disk drive.
2. At the system prompt, change to drive A and type **TEST4850**, 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 program, or press **Ctrl + C** to stop the test.

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 has an expanded memory manager such as EMM386.EXE, EMM386.SYS or QEMM386.SYS. Remove it or use the REM command to ignore it, then restart the DIAGNOSTIC PROGRAM.

If the following message appears on the screen, the program is not used for the T4850CT.

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

Change the Diagnostic disk to the correct one, then restart the Diagnostics Test Program.

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

```
TOSHIBA Personal Computer TXXXX DIAGNOSTICS
Version X.XX (C) Copyright TOSHIBA Corp. 19XX
DIAGNOSTIC TEST menu :
```

```
1 - SYSTEM TEST
2 - MEMORY TEST
3 - KEYBOARD TEST
4 - DISPLAY TEST
5 - FLOPPY DISK TEST
6 - PRINTER TEST
7 - ASYNC TEST
8 - HARD DISK TEST
9 - REAL TIMER TEST
10 - NDP TEST
11 - EXPANSION TEST
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 descriptions of each Diagnostic Test. Function 88 sets the floppy disk and hard disk drive error retry count. Function 99 exits the submenus of the Diagnostic Test and returns to the Diagnostic Menu.

4. Select the option you want to execute and press **Enter**. The following message appears:

```
SYSTEM TEST      XXXXXXXX
```

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

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

```
SUB-TEST Menu :
```

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

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

NOTE: The menu displayed by your T4850CT may be slightly different from the one shown above.

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

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

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

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

Selecting **YES** for *ERROR STOP* 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.

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

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

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

3.3 Subtests

Table 3-1 lists the subtest names and functions for each test program in the DIAGNOSTIC TESTS menu.

Table 3-1 Subtest names and functions (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
2	MEMORY	01	RAM constant data
		02	RAM address pattern data
		03	RAM refresh
		04	Protected mode
		05	Memory module
		06	Cache memory
3	KEYBOARD	01	Pressed key display (82/84)
		02	Pressed key code display
		03	PS/2 Mouse connect check
		04	DCBP connect check
4	DISPLAY	01	VRAM read/write
		02	Character attributes
		03	Character set
		04	80*25/30 Character display
		05	320*200 Graphics display
		06	640*200 Graphics display
		07	640*350/400/480 Graphics display
		08	Display page
		09	"H" pattern display/Border color
		10	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	Wraparound

Table 3-1 Subtest names and functions (2/2)

No.	Test name	Subtest No.	Subtest item
7	ASYNC	01	Wraparound (board)
		02	Point to point (send)
		03	Point to point (receive)
		04	Interrupt test
8	HDD	01	Sequential read
		02	Address uniqueness
		03	Random address/data
		04	Cross talk & peak shift
		05	Write/read/compare (CE)
		06	Write specified address
		07	Read specified address
		08	ECC circuit
		09	Sequential write
		10	W-R-C specified address
9	REAL TIMER	01	Real time
		02	Backup memory
		03	Real time carry
10	NDP	01	NDP test
11	EXPANSION	01	PCMCIA Wraparound
12	SOUND	01	CODEC (REC/PLAY)
		02	SINE 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 = 50MHz (75MHz)
Bit5 - Notch signal = 2HD
Bit4 - FDD type   = 2MB
Bit3 -           =
Bit2 - Drive A/B  = Ext. = B
Bit1 - External FDD = OFF
Bit0 - Internal FDD = 2HD
```

Table 3-2 lists the hardware bit status for each bit tested. Pressing **Enter** returns you to the Subtest Menu.

Table 3-2 Hardware bit status

Bit	H/W status	1	0
7	Reserved	—	—
6	CPU clock speed	75 MHz	75 MHz
5	Media type	2DD	2HD
4	FDD type	1.6 MB	2 MB
3	Reserved	—	—
2	Drive A/B	Ext. = A	Ext. = B
1	External FDD	ON	OFF
0	Internal FDD	2DD	2HD

Subtest 03 Version check

This subtest checks the version of the following four items:

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

The 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:

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

When the read information is higher than the reference data, the display is unchanged.

To exit this screen, press the **S** key.

Subtest 04 Main battery charge

This subtest executes a quick charge to the main battery. The following message displays during the subtest:

[Main battery charge]

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 results 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 the conventional memory program end to 640 KB, then reads the new data and compares the results 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 results 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 new data and compares the results 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, 8, 16, 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 T4850CT.

Subtest 06 Cache memory

To test the cache memory, a pass-through write-read comparison of '5A' data is run repeatedly to the 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

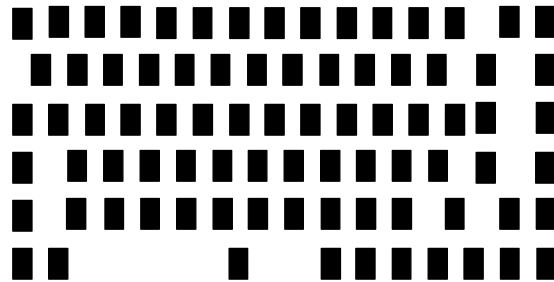
To execute the Keyboard Test, select **3** from the DIAGNOSTIC TEST menu, press **Enter** and follow the directions displayed on the screen. The Keyboard test contains two subtests that test the T4850CT's keyboard actions, and two subtests that test the mouse connections. Move the highlight bar to the subtest you want to execute and press **Enter**.

Subtest 01 Pressed key display (82/84)

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

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

KEYBOARD TEST IN PROGRESS 301000



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

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

Subtest 02 Pressed key code display

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

```
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 or not a PS/2 mouse is connected to the computer.

If the test does not detect an error, it returns to the subtest menu. If it does detect an error, the following message appears:

```
KBC - MOUSE INTERFACE ERROR
```

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

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

Subtest 04 DCBP Connect Check

***NOTE:** To execute the DCBP mouse connect check, a ballpoint mouse must be connected to the computer and the DCBP driver software must be removed. Be sure to disconnect the PS/2 mouse.*

This subtest checks whether or not a ballpoint mouse is connected to the computer.

If the test does not detect an error, it returns to the subtest menu. If it does detect an error, the following message appears:

KBC-DCBP INTERFACE ERROR

[[HALT OPERATION]]

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

3.7 Display Test

To execute the Display Test, select **4** from the DIAGNOSTIC TEST menu, press **Enter** and follow the directions displayed on the screen. The Display test contains 12 subtests that test the T4850CT'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 (modes 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.


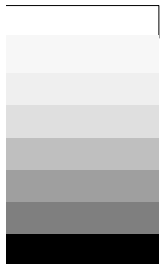
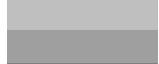
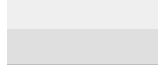
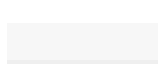

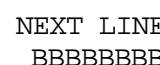

CHARACTER ATTRIBUTES

NEXT LINE SHOWS NORMAL DISPLAY.
NN

NEXT LINE SHOWS INTENSIFIED DISPLAY.
II

NEXT LINE SHOWS REVERSE DISPLAY.
RR

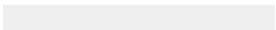




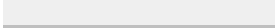


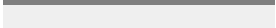




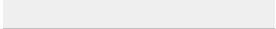


NEXT LINE SHOWS BLINKING DISPLAY
BB

		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

After pressing **Enter**, 16 colors or 16 gray scales of mode 13h appear in the 320x200 graphics mode as shown below:

320*200 GRAPHICS DISPLAY [13]

	BLACK
	BLUE
	GREEN
	CYAN
	RED
	MAGENTA
	BROWN
	WHITE
	GRAY
	LIGHT BLUE
	LIGHT GREEN
	LIGHT CYAN
	LIGHT RED
	LIGHT MAGENTA
	YELLOW
	INTENSE WHITE

PRESS [ENTER] KEY

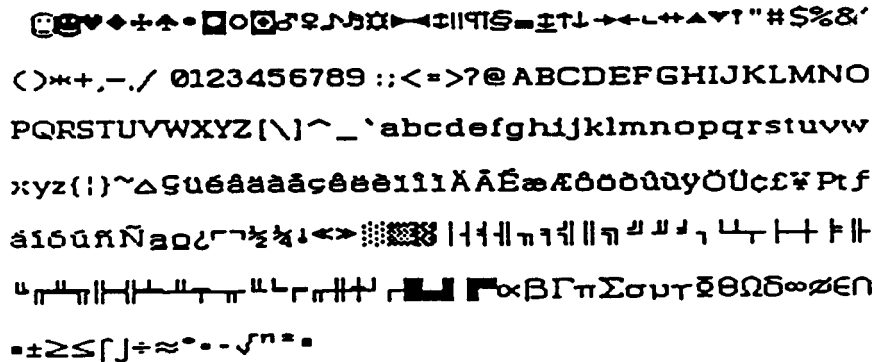
Pressing **Enter** toggles between the two tests.

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

Subtest 03 Character Set

In this subtest, the character set (addressed 00h to FFh) is displayed in the 40x25 character mode as shown below.

CHARACTER SET IN 40*25



Press [Enter] KEY

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

Subtest 04 80x25/30 Character display (modes 3, 12)

In this subtest, the character string is displayed shifting one character to the right, line by line in the 80x25 and 80x30 character modes as shown below.

```
80*XX CHARACTER DISPLAY
01234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNPOQRSTUVWXYZ[\]^_`abcdefghijklmnopq
! "$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNPOQRSTUVWXYZ[\]^_`abcdefghijklmnopq
"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNPOQRSTUVWXYZ[\]^_`abcdefghijklmnopq
#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNPOQRSTUVWXYZ[\]^_`abcdefghijklmnopq
$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNPOQRSTUVWXYZ[\]^_`abcdefghijklmnopq
%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNPOQRSTUVWXYZ[\]^_`abcdefghijklmnopq
&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNPOQRSTUVWXYZ[\]^_`abcdefghijklmnopq
'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNPOQRSTUVWXYZ[\]^_`abcdefghijklmnopqrs
`()+,-./0123456789:;<=>?@ABCDEFGHIJKLMNPOQRSTUVWXYZ[\]^_`abcdefghijklmnopqrst
()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNPOQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstu
) +,-./0123456789:;<=>?@ABCDEFGHIJKLMNPOQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuv
*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNPOQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvw
+, -./0123456789:;<=>?@ABCDEFGHIJKLMNPOQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwx
, -./0123456789:;<=>?@ABCDEFGHIJKLMNPOQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxy
-./0123456789:;<=>?@ABCDEFGHIJKLMNPOQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz
./0123456789:;<=>?@ABCDEFGHIJKLMNPOQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{
/0123456789:;<=>?@ABCDEFGHIJKLMNPOQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|
0123456789:;<=>?@ABCDEFGHIJKLMNPOQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}
123456789:;<=>?@ABCDEFGHIJKLMNPOQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~
23456789:;<=>?@ABCDEFGHIJKLMNPOQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~•
3456789:;<=>?@ABCDEFGHIJKLMNPOQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~•ç
456789:;<=>?@ABCDEFGHIJKLMNPOQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~•çü
PRESS [ENTER] KEY
```

Pressing **Enter** toggles between the tests. To exit this subtest and return to the DISPLAY TEST menu, press **Ctrl + Break**.

Subtest 05 320x200 Graphics display (modes 4, D)

This subtest displays two color sets for the color display in 320x200 dot graphics modes 4 and D. One example is shown below.

```
320*200 GRAPHICS DISPLAY
COLOR SET X : [X]
```



PRESS [Enter] KEY

Pressing **Enter** toggles between the tests. To exit this subtest and return to the DISPLAY TEST menu, press **Ctrl + Break**.

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

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

640*200 GRAPHICS DISPLAY : [X]



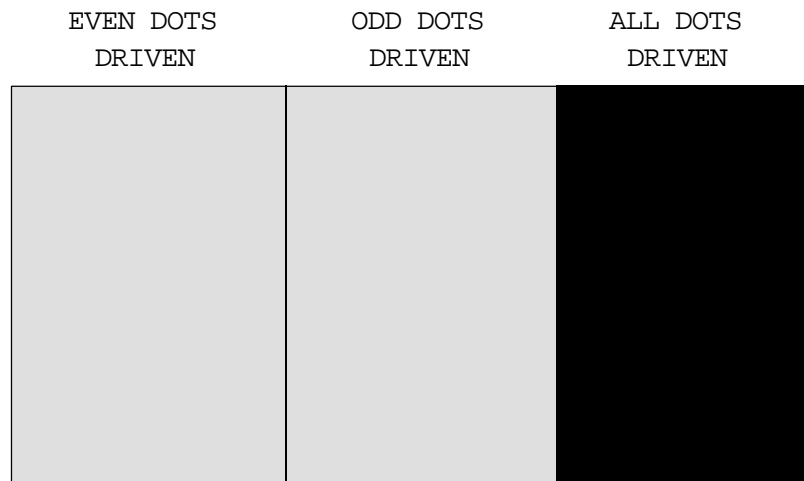
PRESS [Enter] KEY

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

Subtest 07 640x350/400/480 Graphics display (modes 10, 74, 12)

This subtest displays even dots, odd dots, and all dots in the 640x350, 640x400 and 640x480 dot graphics modes 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 icons on the 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 messages:

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

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

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

Select either **1** (256 times) or **2** (endless), and press **Enter**.

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

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

Subtest 11 TFT color display

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

3.8 Floppy Disk Test

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

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 T4850CT's internal floppy disk drive.

The following messages will appear after selecting the Floppy Disk Test. Answer each question with an appropriate response to execute the test.

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

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

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

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

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

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

4. The floppy disk test menu will appear after you select the starting 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 starting 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 starting 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 T4850CT.

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

The following messages will appear after selecting the Printer Test from the DIAGNOSTIC TEST menu. Type in an appropriate response to execute the test.

```
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 T4850CT 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:;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abcdefghijklmnop
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abcdefghijklmnop
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abcdefghijklmnop
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abcdefghijklmnopqr
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abcdefghijklmnopqr
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abcdefghijklmnopqrstu
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abcdefghijklmnopqrstu
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abcdefghijklmnopqrstuv
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abcdefghijklmnopqrstuvw
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNQRSTUvwxyz[\]^_`abcdefghijklmnopqrstuvwxy
```

Subtest 02 Function

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

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

The subtest prints the various print types as 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
    !"#$$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNPOQRSTUVWXYZ[\]^_`abcdefghijklmnop
opqrstuvwxyz{|}~
```

Subtest 03 Wraparound

NOTE: To execute this subtest, a printer wraparound connector must be connected to the computer's printer port. The printer wraparound connector (34M741986G01) wiring diagram is shown 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 T4850CT's asynchronous communication functions. Move the highlight bar to the subtest you want to execute and press **Enter**.

The subtests 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 appears at the bottom of the screen when a subtest is 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 RS-232-C wraparound connector wiring diagram is shown 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 shown in Appendix G.*

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

Subtest 03 Point to point (Receive)

This subtest, used with subtest 02 described above, receives the data from the send side, then sends the received data.

Subtest 04 Interrupt Test

This subtest checks the Interrupt Request Level of IRQs 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 T4850CT hard disk drive functions.

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 backup system. 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.

The following messages will appear after selecting the hard disk test from the DIAGNOSTIC TEST menu. Answer each of the questions with an appropriate response to execute the test.

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

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

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

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

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

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

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

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

5. This message is used to select whether or not the HDD status is displayed on the screen. The HDD status is described in Section 3.17. 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 displays during each subtest.

```
HARD DISK TEST      XXXXXXXX

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

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

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

Subtest 01 Sequential Read

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

Subtest 02 Address Uniqueness

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

- Forward sequential
- Reverse sequential
- Random

Subtest 03 Random Address/Data

This subtest writes random data to random addresses on the HDD cylinder, head and sector. The 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 T4850CT'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 the steps listed below.

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

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

```
Enter new date:
```

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

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

```
Enter new time :
```

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

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

Subtest 02 Backup Memory

This subtest performs the following backup memory check:

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

The subtest then 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   : 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 T4850CT's NDP (math coprocessor) functions.

Subtest 01 NDP test

This test checks the following functions of the 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 T4850CT's expansion port functions. The following message appears after selecting the expansion test.

```
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 lines of the PCMCIA slot:

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

The subtest is executed in the following order:

Sub#	Address	Good	Bad	Contents
01	00001	nn	xx	Address line
	00001	nn	xx	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 sound 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 T4850CT's sound functions.

Subtest 01 CODEC (REC/PLAY)

Tests the functions of the Codec (AD1848) A/D, D/A converter. At the same time, tests 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 back.

Subtest 02 SINE wave playback

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

Subtest 03 FM Synthesizer

Tests the OPL3 (YMF262) functions. The sound interval and tone can be controlled by an internal register. When the program is executed, an eight-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)

Device name	Error code	Error status name
(COMMON)	FF	Data Compare Error
System	01	ROM Checksum Error
Memory	01	Parity Error
	02	Protected Mode Not Changed
	DD	Cache Memory Error
Keyboard	03	Mouse Interface Error
	04	DCBP Interface Error
FDD	01	Bad Command
	02	Address Mark Not Found
	03	Write Protected
	04	Record Not Found
	06	Media Removed
	08	DMA Overrun Error
	09	DMA Boundary Error
	10	CRC Error
	20	FDC Error
	40	Seek Error
	60	FDD Not Drive Error
	80	Time Out Error
	EE	Write Buffer Error
Printer	01	Time Out
	08	Fault
	10	Select Line
	20	Out Of Paper
	40	Power Off
	80	Busy Line

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

Device name	Error code	Error status name
ASYNC	01	DSR On Time Out
	02	CTS On Time Out
	04	RX-READY Time Out
	08	TX-BUFFER Full Time Out
	10	Parity Error
	20	Framing Error
	40	Overrun Error
	80	Line Status Error
	88	Modem Status Error
HDD	01	Bad Command Error
	02	Bad Address Mark Error
	04	Record Not Found
	05	HDC Not Reset Error
	07	Drive Not Initialized
	08	HDC Overrun (DRQ)
	09	DMA Boundary Error
	0A	Bad Sector
	0B	Bad Track Error
	10	ECC Error
	11	ECC Recover Enable
	20	HDC Error
	40	Seek Error
	80	Time Out Error
	AA	Drive Not Ready
	BB	Undefined Error
CC	Write Fault	
E0	Status Error	
NDP	01	No Coprocessor
	02	Control Word Error
	03	Status Word Error
	04	Bus Error
	05	Addition Error
	06	Multiply Error
PCMCIA	C1	Address Line Error
	C2	REG# Line Error
	C3	CE#1 Line Error
	C4	CE#2 Line Error
	C5	DATA Line Error
	C6	WAIT Line Error
	C7	BSY# Line Error
	C8	BVD1 Line Error
	CD	No PCMCIA

3.17 Hard Disk Test Detail Status

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

```
HDC status = XXXXXXXXX
```

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 two 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 settled over a track.
3	DRQ (Data request)	"0" --- The drive is not ready for data transfer. "1" --- The 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 an 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 performs a low-level (physical) 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 backup system. 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

Item	500 MB		810 MB
	MK2428FC	DHAA-2540	DVAA-2810
Sector sequences	1	1	1
Cylinders	0 to 1,015	0 to 1,023	0 to 1,570
Heads	0 to 15	0 to 15	0 to 15
Sectors	1 to 63	1 to 63	1 to 63
Sector length (bps)	512	512	512

2. Good track FORMAT

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

3. Bad track FORMAT

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

4. Bad track CHECK

This option searches 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 screen:

```
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.

***NOTES:** 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

The Bad Track register prompt will appear as shown below. Enter the cylinder and head numbers of the bad tracks and press **Enter**. Note that if there are no bad tracks, pressing **Enter** alone is the same as executing an 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 numbers for the 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 numbers for the 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 function.

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 function is completed.

2. Error information displayed on the screen can be manipulated with 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 01)
2. Memory test (subtests 01, 02, 04, 06, and 07)
3. Display test (subtests 01 to 08)
4. FDD test (subtest 02)
5. HDD test (subtests 01 and 05)
6. Real timer test (subtest 02)
7. Printer test (subtest 03)
8. Async test (subtest 01)

The system automatically detects the number of floppy disk drives connected to the T4850CT 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 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 display:

Printer wraparound test (Y/N) ?

Selecting **Y (yes)** executes the printer wraparound test. A printer wraparound connector must be connected to the **PRT/FDD** port on the back of the T4850CT to properly execute this test.

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

Serial #A wraparound test (Y/N) ?

Selecting **Y (yes)** executes the ASYNC wraparound test. An RS-232-C wraparound connector must be connected to the **serial port** on the back of the T4850CT 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 a dump list for both the FDD and HDD.

1. FORMAT

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

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

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

2. COPY

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

3. DUMP

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

3.22.2 Operations

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

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

2. FORMAT program

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

```
DIAGNOSTICS - FLOPPY DISK FORMAT : VX.XX
Drive number select (1:A, 2:B) ?
```

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

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

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

```
Warning : Disk data will be destroyed.

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

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

The following message displays 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 appears:

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

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

3. COPY program

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

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

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

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

- (c) Remove the Diagnostics Disk from the FDD, insert the source disk and press any key. The following message appears, 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, or enter **2** to return 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. 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 T4850CT:

1. BIOS ROM version
2. Boot ROM version
3. The number of math coprocessors
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

3.23.2 Operations

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

```
SYSTEM CONFIGURATION :  
  
* - BIOS(BOOT)ROM VER = VX.XX  VGA = WD90C24A2  
                               (VX.XX)  
* - 1 MATH COPROCESSOR  
* - 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  
* - XXXXX 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) LCD Display Colors
 - (e) Power On Display

3. COM/FDD/PRT
 - (a) Serial Port
 - (b) External FDD/PRT
 - (c) Printer Port Type

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) Boot Priority
 - (g) Sound I/O Address
 - (h) Ext. Keyboard "Fn" key equivalent

3.24.2 Accessing the SETUP Program

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

```

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

----- BATTERY -----
Battery Save Mode = Economy Power
Battery Display   = Time

----- DISPLAY -----
Display Adapter   = VGA Compatible
LCD Display Mode  = Color
Ext. Scan Mode    = Interlace
LCD Display Colors = 226K Colors
Power On Display = Internal/External

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

----- COM/FDD/PRT -----
Serial Port       = COM1 (IRQ4/3F8H)
External FDD/PRT = Printer
Printer Port Type = Output

----- OTHERS -----
Power-up Mode     = Boot
CPU Cache         = Enabled
Speaker Volume    = High
Panel Power On/Off = Disabled
Alarm Power On    = Disabled
Boot Priority      = FDD→HDD
Sound I/O Address = 0530H
Ext. Keyboard "Fn" key equivalent
                  = Disabled

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

↑ ↓ ← → : 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 displays:

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

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

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

- To make other changes, press **N** and repeat the steps above.
- 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

Displays the total amount of memory installed and is automatically calculated by the computer.

(b) Base

Displays the amount of base (conventional) memory installed (**640 KB**) and is automatically calculated by the computer.

(c) Extended

Displays the amount of extended memory the computer has available.

(d) Shadow BIOS ROM

Displays 192 KB of RAM, which is reserved for the Shadow BIOS ROM.

2. Display

These options help 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.

<i>Color</i>	Displays in color mode to a maximum of 4,096, or 226K colors. (Default)
<i>Monochrome</i>	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.

<i>Interlace</i>	Every other line is scanned during each total vertical (full) screen refresh. (Default)
<i>Non-Interlace</i>	Each line is scanned during each total vertical (full) screen refresh.

(d) LCD Display Colors

This option selects the number of colors the LCD display supports.

<i>226K colors</i>	Supports 226K (226,981) colors. (Default)
<i>4096 colors</i>	Supports 4,096 colors.

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

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

NOTE: Regardless of the Power on display setting, the **Fn+F5** hot key changes the display in the following order:

→ Internal → Simultaneous → External →

3. COM/FDD/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 is automatically set to the remaining COM level when the serial port is set.

(b) External FDD/PRT

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

Printer Configures the port for output to a printer or other parallel device. (Default)

FDD A Configures the port for output and input to and from an external 5.25-inch floppy disk drive and assigns the letter A to the external drive. By default the internal drive becomes drive B.

FDD B Configures the port for output and input to and from an external 5.25-inch floppy disk drive and assigns the letter B to the external drive. By default the internal drive remains drive A.

(c) Printer Port Type

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

Output Activates unidirectional operation. (Default)

Bidirectional Activates bidirectional operation.

4. Hard Disk

(a) HDD Mode

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

Enhanced IDE (Normal) This option is used in most cases. (Default)

Standard IDE Select this option if you cannot obtain expected results with the Enhanced IDE (Normal) mode (*i.e.*, if you use an 810MB hard disk drive with UNIX or NetWare).

No drive Indicates that no hard disk drive is installed.

5. Battery

(a) Battery Save Mode

This option is used to select either the Full Power, Economy Power, Low Power, or the User Setting options of the BATTERY SAVE OPTIONS.

*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 one shown below. The options in the sub-window cannot be changed and are for informational purposes only.

Full Power

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

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

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-window's 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, or Low Power. User settings lets you select the following options:

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

Battery save options are described below.

CPU Sleep Mode

This option enables or disables the CPU sleep function.

Enabled Enables sleep mode.

Disabled Disables sleep mode.

Display Auto Off

This option disables or sets the duration of the display automatic power off function, which turns the display illumination off if you make no entry for the set period of time.

Disabled Disables the display automatic power off function.

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 disables or sets the duration of the HDD automatic power off function.

Disabled Disables the HDD automatic power off function.

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.

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

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

(b) Battery Display

This option selects which way the status indicator panel indicates the remaining battery capacity when the T4850CT is not connected to the AC adapter. The status indicator panel indicates how much battery power is left.





Time The status indicator panel indicates an estimated time for which the T4850CT can operate with the remaining battery power.

% remaining The status indicator panel displays a remaining battery capacity in percent.

The status indicator panel displays a remaining battery capacity in percent whenever the T4850CT is connected to the AC adapter.

Manual Set of Battery Level

This option displays only if the status indicator panel cannot indicate the charge level because the T4850CT 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 left on the battery. 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 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 The password has been registered.

Not registered The password has not been registered.

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

7. Others

Whether or not you need to configure the T4850CT with these options depends primarily on the kind of software or peripherals you use.

(a) Power-up Mode

This option enables or 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 or disables the CPU cache.

Enabled Enables the CPU cache. (Default)

Disabled Disables the CPU cache.

(c) Speaker Volume

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

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 or disables the automatic panel close suspend function, which automatically turns off the computer when the display panel is closed and turns on the computer when the display panel is opened.

Note that this option appears only when the Power-up mode is set to AutoResume. 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 or disables the alarm power-on feature.

Disabled The alarm power-on feature is disabled.

hh:mm:ss The alarm power-on feature is enabled.

If you enable this option, the T4850CT will be powered on and boot up, or resume automatically at the time you set here.

(f) Boot Priority

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

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

***NOTE:** If you turn the T4850CT on while pressing the **F10** key, the system attempts to load the operating system in the reverse order that you set by using this option. However, the option setting is not affected by simply pressing the **F10** key.*

(g) Sound I/O Address

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

0530H
0604H
0E80H
Disabled

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

Power

This option enables or disables the system speaker.

On The sound system's power is always on.

Off The sound system's power is always off.

Setting this option Off disables the sound system so that you can save more battery power than setting the Windows' Sound System's audio value to zero.

(h) Ext. Keyboard “Fn” key equivalent

This option disables or selects substitute key functions for the **Fn** key.

Disable Disables any key substitution for the **Fn** key.
(Default)

Left Ctrl + Left Alt **Left Ctrl + Left Alt** functions as the **Fn** key.

Right Ctrl + Right Alt **Right Ctrl + Right Alt** functions as the **Fn** key.

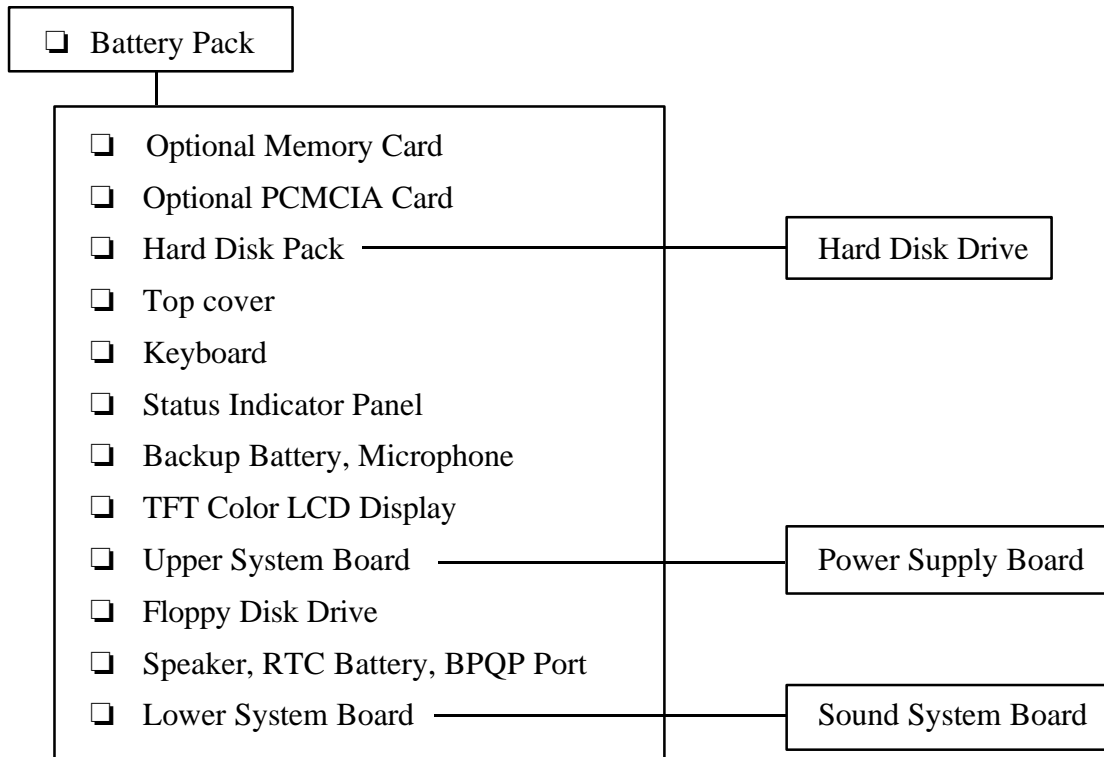
Left Alt + Left Shift **Left Alt + Left Shift** functions as the **Fn** key.

Right Alt + Right Shift **Right Alt + Right Shift** functions as the **Fn** key.

Left Alt + Caps Lock **Left Alt + Caps Lock** functions as the **Fn** key.

4.1 General

This section explains how to disassemble the T4850CT and replace Field Replaceable Units (FRUs). It may not be necessary to remove all the FRUs in order to replace one. The chart below is a guide to which FRUs need to be removed in order to remove others. Always start by removing the battery pack, then follow the lines on the chart to determine which FRU you must remove next in order to repair the one you think is causing the T4850CT to operate improperly.



Before You Begin

Look over the procedures in this section before you begin disassembling the T4850CT. Familiarize yourself with the disassembly and reassembly steps. Begin each procedure by removing the AC adapter and the battery pack as instructed in Section 4.2, *The Battery Pack*.

1. Do not disassemble the T4850CT 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 T4850CT:
 - ❑ 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 T4850CT.
6. After removing parts from the computer, place them in a safe place 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 T4850CT. When you remove screws, make sure they are placed in a safe place and identified with the correct parts.
8. When assembling the T4850CT make sure you use the correct screws to secure the various pieces in place. Screw sizes are listed in the corresponding figures.
9. The T4850CT contains many sharp edges and corners, so be careful not to injure yourself.
10. After you have replaced an FRU, make sure the T4850CT is functioning properly by performing the appropriate test on the FRU you have fixed or replaced.

Disassembly Procedures

The T4850CT 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 in 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, reconnect it 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 T4850CT and fixed or repaired the problem that was causing it to operate abnormally, you will need to reassemble the computer.

While assembling the T4850CT, remember the following general points:

- Take your time, making sure you follow the instructions closely. Most problems arise when you get in a hurry.
- 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 the FRUs. Using the wrong screw can either damage the threads or the head of the screw, and may prevent proper seating of an FRU.
- Be sure to fasten all screws securely. If a screw is not fully fastened, it could come loose, creating 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 T4850CT, confirm that the FRU and the computer 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 T4850CT:

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

4.2 The Battery Pack

Removing the Battery Pack

To remove the battery pack, follow the steps below and refer to Figure 4-1.

1. Turn off the power to the T4850CT, then disconnect the AC adapter, power cord and all external cables connected to the computer.
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.

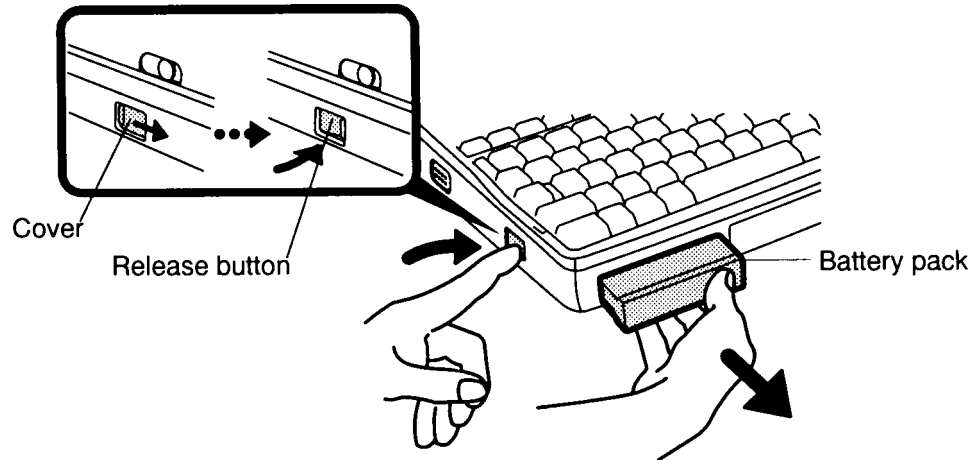


Figure 4-1 Removing the battery pack

Installing the Battery Pack

NOTE: The battery pack is designed to fit into the T4850CT in only one way. Notice that the battery packs for the T4800CT and T4850CT are different.

To install the T4850CT 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 T4850CT, follow the steps below and refer to Figures 4-2 and 4-3.

1. Turn off the power to the T4850CT, then disconnect the AC adapter, power cord and all external cables connected to the computer.
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).

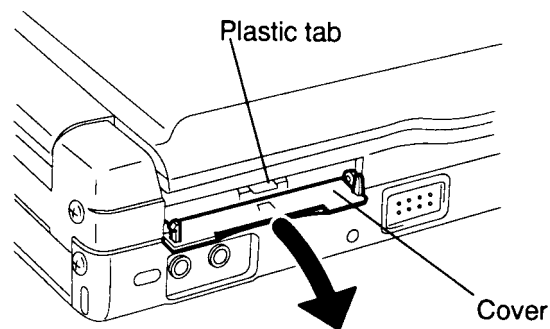


Figure 4-2 Opening the cover

4. Grasp the **plastic tab** and pull it so 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).

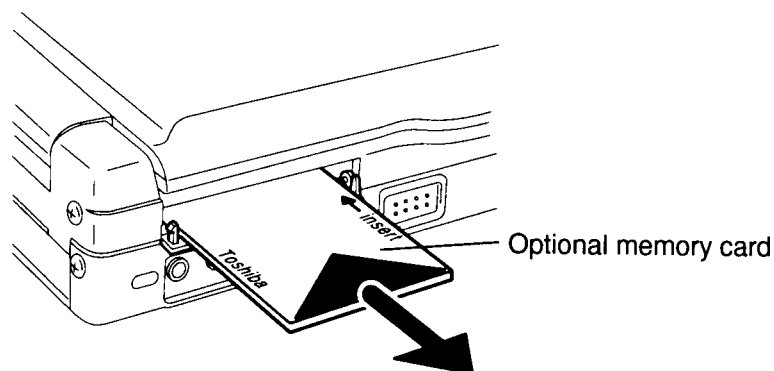


Figure 4-3 Removing the optional memory card

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 T4850CT, follow the steps below and refer to Figures 4-3 and 4-2.

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 T4850CT automatically configures all additional memory as extended memory.

4.4 Optional PCMCIA Card

Removing an Optional PCMCIA Card

The T4850CT 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 T4850CT, then disconnect the AC adapter, power cord and all external cables connected to the computer.
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).

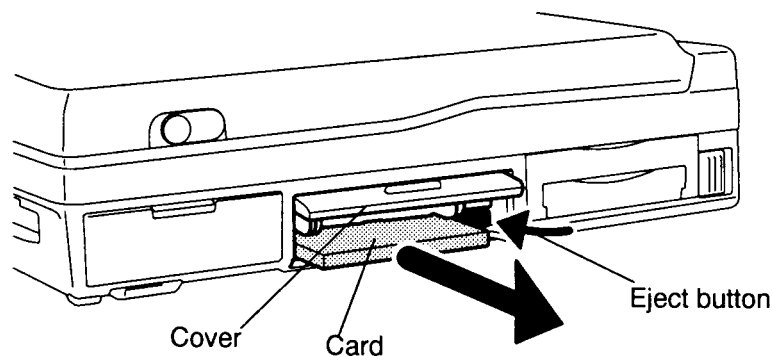


Figure 4-4 Removing the card from PCMCIA card slot 2

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).

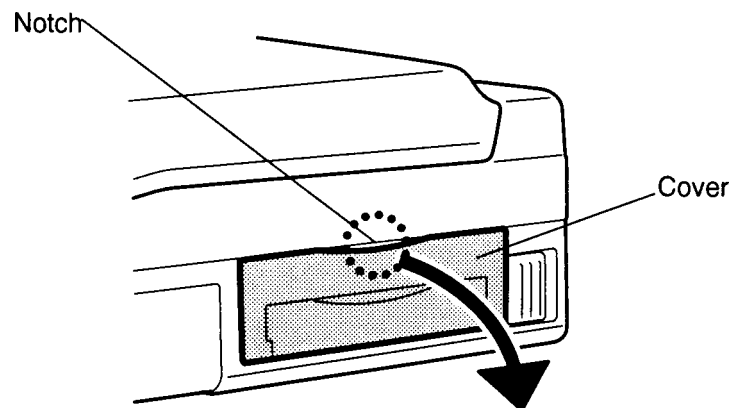


Figure 4-5 Removing the PCMCIA card slot 1 cover

6. Push the PCMCIA **card stopper** to the right to release the card, then use a coin or similar object 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.

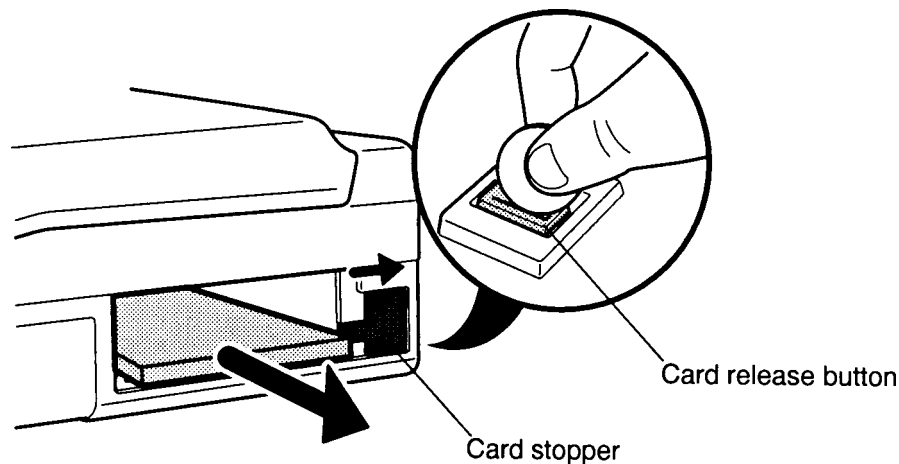


Figure 4-6 Removing the card from PCMCIA card slot 1

Installing an Optional PCMCIA Card

To install an optional PCMCIA card in the T4850CT, 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 T4850CT's hard disk drive, follow the steps below and refer to Figures 4-7 through 4-10.

1. Turn off the power to the T4850CT, then disconnect the AC adapter, power cord and all external cables connected to the computer.
2. Remove the battery pack as described in Section 4.2.
3. Turn the computer upside down.
4. Remove the **M2.5x4 silver screw** securing the **HDD pack slot cover** at the bottom of the computer (Figure 4-7).
5. Slightly lift up the side of the **HDD pack slot cover** that was secured by the screw. A **latch** holds the other side to the computer (Figure 4-7).
6. Slide the **cover** to disengage the latch and lift off the cover. You will see the HDD pack (Figure 4-7).

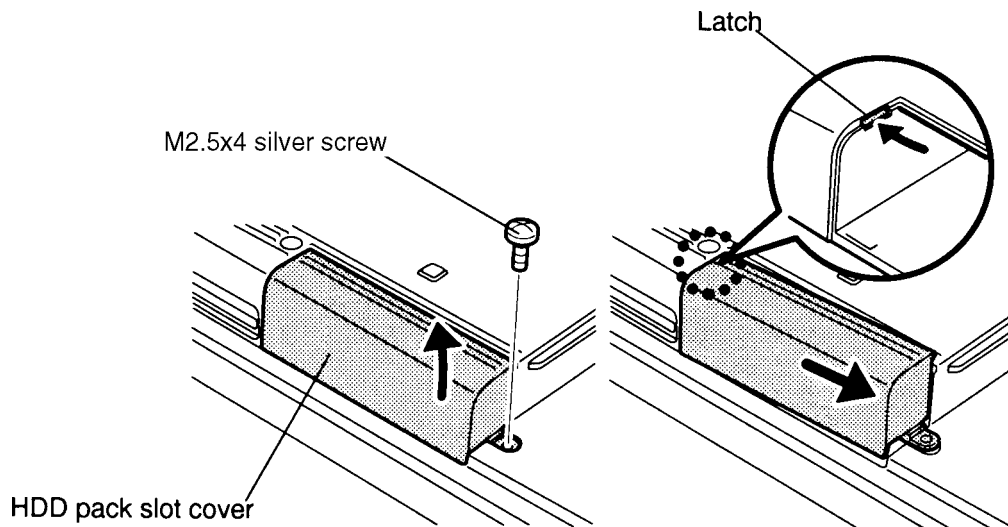


Figure 4-7 Removing the HDD pack cover

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

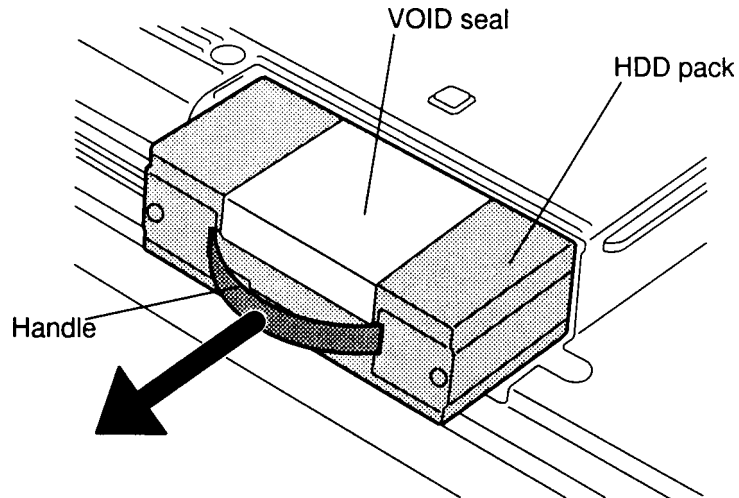


Figure 4-8 Removing the HDD pack

8. Remove the **VOID seal**, **two flat screws** securing the **ground plate** to the pack, and **two screws** securing the **cover** to the pack. Slide the **cover** forward slightly (about 2 cm) and lift it off (Figure 4-9).

CAUTION: *The ground plate is thin, so be careful not to cut yourself when handling it.*

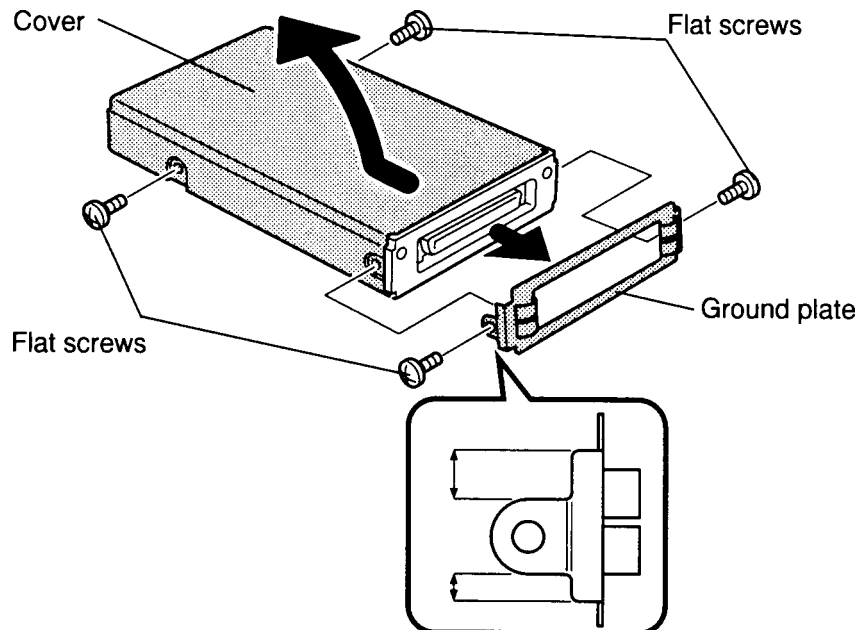


Figure 4-9 Removing the HDD cover

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

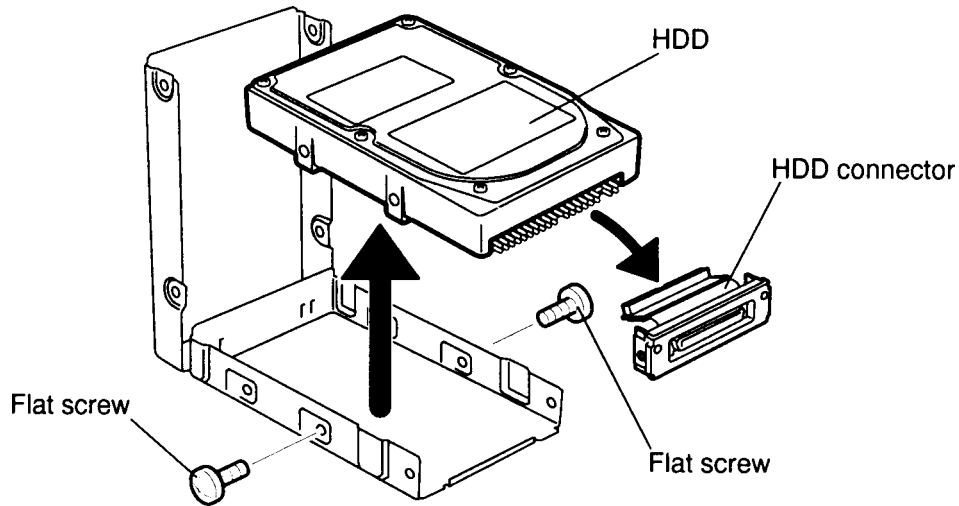


Figure 4-10 Removing the HDD

Installing the HDD

To install the T4850CT's HDD, follow the steps below and refer to Figures 4-10 back through 4-7.

1. Connect the HDD connector to the HDD. Fit the slot on the bottom of the connector into the groove on the case and seat the HDD into the case (Figure 4-10).
2. Align the screw holes in the HDD and case, then secure the HDD with **two flat screws** (Figure 4-10).
3. Place the **HDD pack cover** onto the case aligning the screw holes and **ground plate**. Secure the cover with **four flat screws** (Figure 4-9).

NOTE: Be sure to secure the **ground plate** right side up, otherwise you will not be able to insert the HDD pack. The longer edge should be up. Refer to Figure 4-9.

4. Apply a **new VOID seal** to the HDD pack.
5. Insert the **HDD pack** into the HDD slot until you hear it click into place. Press the HDD gently; do not force it. The HDD pack is designed so it will go into the slot only one way (Figure 4-8).
6. Fit the **latch** on the HDD pack cover into the **notch** on the computer, rotate the cover into place, and secure the **one M2.5x4 silver screw** (Figure 4-7).
7. Install the battery pack as described in Section 4.2.

4.6 Top Cover

Removing the Top Cover

To remove the T4850CT's top cover, follow the steps below and refer to Figures 4-11 to 4-13.

1. Turn off the power to the T4850CT, then disconnect the AC adapter, power cord and all external cables connected to the computer.
2. Remove the battery pack, optional memory card, optional PCMCIA cards and HDD pack as described in Sections 4.2, 4.3, 4.4 and 4.5.
3. Turn the computer upside down and remove **three M2.5x30 screws** securing the top cover of the T4850CT and **one M2.5x12 screw** (Figure 4-11).

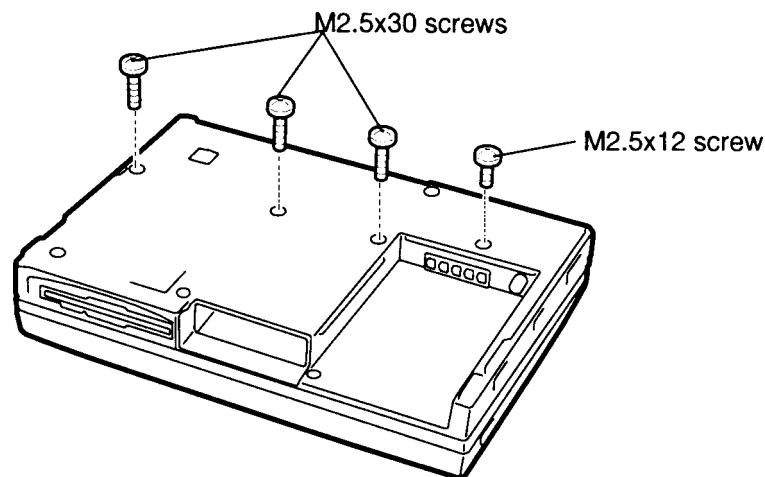


Figure 4-11 Removing screws (bottom of the computer) securing the top cover

4. Turn the computer right side up so the back of the computer faces you. Remove the **four M2.5x6 silver screws** securing the top cover at the back of the T4850CT (Figure 4-12).

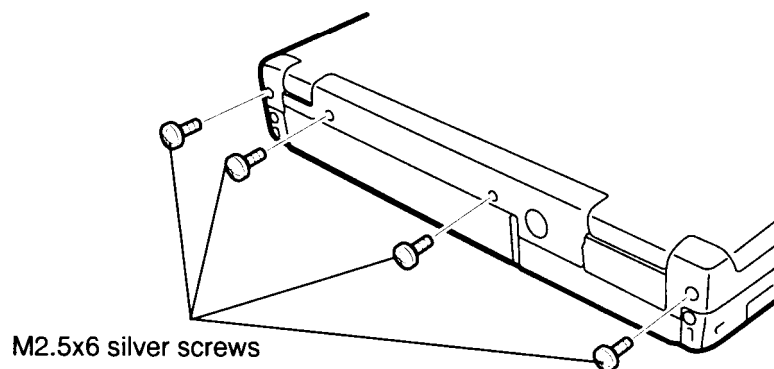


Figure 4-12 Removing screws (back of the computer) securing the top cover

5. Turn the computer around so the front faces you and open the display. Stand the computer on its left side.
6. Unsnap the **14 latches** securing the **top cover** to the bottom cover. Start by releasing the three latches on the right side, then lay the computer down and, going clockwise, release the seven front latches by rotating the keyboard's front edge toward you (Figure 4-13).
7. Grasp the right side of the top cover and carefully rotate it to the left to release the four latches on the left, then lift off the **top cover** (Figure 4-13).

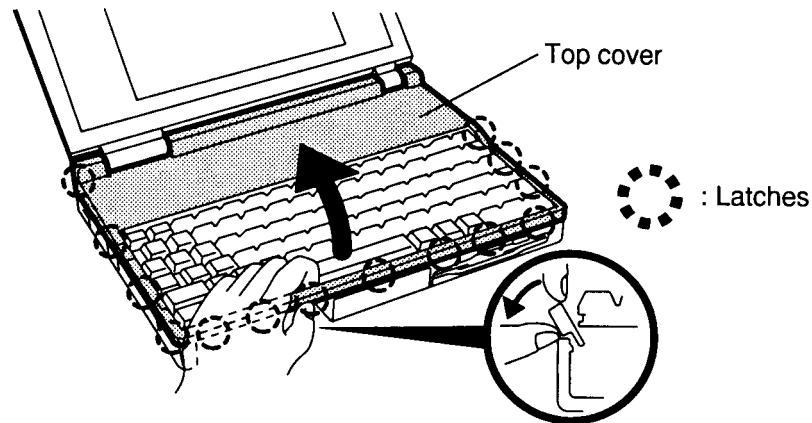


Figure 4-13 Unlatching the top cover

Installing the Top Cover

To install the top cover, follow the steps below and refer to Figures 4-13 back through 4-11.

1. Place the **top cover** on the T4850CT.
2. Begin at the back and snap the cover into place, continuing along the sides and finally the front until all **14 latches** are secured (Figure 4-13).
3. Close the display.
4. Secure the **four M2.5x6 silver screws** at the back of the T4850CT (Figure 4-12).
5. Turn the computer over.
6. Secure the **three M2.5x30 screws** and **one M2.5x12 screw** on the bottom of the T4850CT (Figure 4-11).
7. Install the HDD pack, optional PCMCIA card, optional memory card and battery pack as described in Sections 4.5, 4.4, 4.3 and 4.2.

4.7 Keyboard

Removing the Keyboard

To remove the T4850CT's keyboard, follow the steps below and refer to Figure 4-14.

1. Turn off the power to the T4850CT, then disconnect the AC adapter, power cord and all external cables connected to the computer.
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 (PJ8)** on the upper system board.

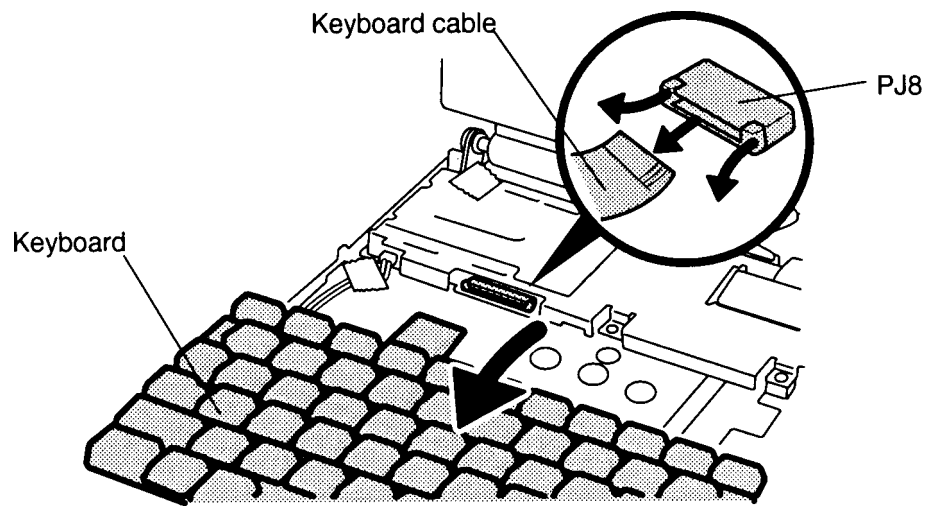


Figure 4-14 Removing the keyboard

Installing the Keyboard

To install the keyboard, follow the steps below and refer to Figures 4-14 and 4-15.

1. Connect the **keyboard cable** to **pressure plate connector (PJ8)** on the upper system board (Figure 4-14).
2. Seat the keyboard in the T4850CT. Note that a fold is built into the keyboard cable. Do not try to bend the cable at any other point when you install the keyboard (Figure 4-15).

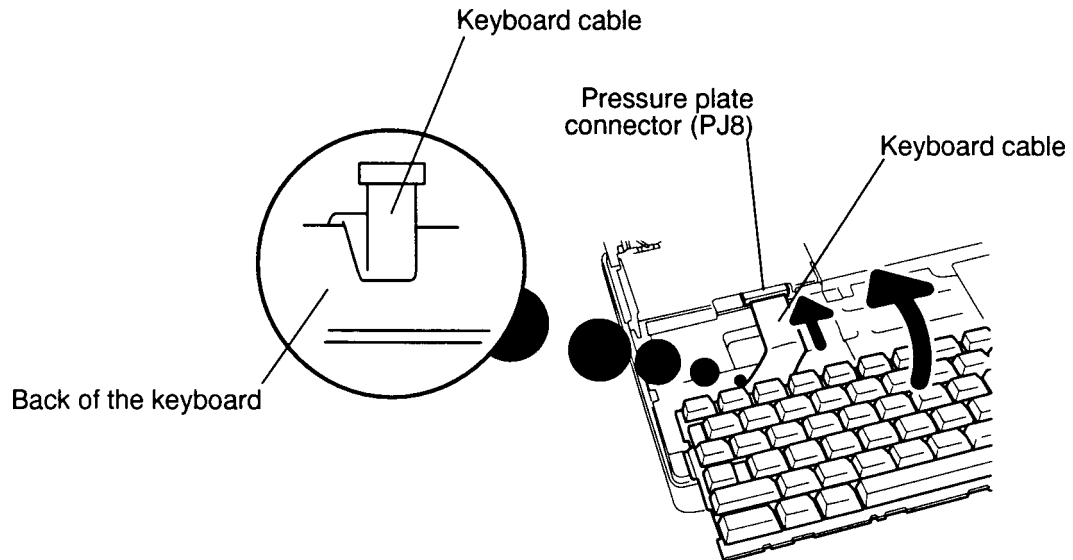


Figure 4-15 Seating the keyboard

3. Install the top cover, HDD pack, optional PCMCIA card, optional memory card and battery pack as described in Sections 4.6 back through 4.2.

4.8 Status Indicator Panel

Removing the Status Indicator Panel

To remove the T4850CT's status indicator panel, follow the steps below and refer to Figure 4-16.

1. Turn off the power to the T4850CT, then disconnect the AC adapter, power cord and all external cables connected to the computer.
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 **PJ6** on the upper system board and lift the panel out of its brackets.

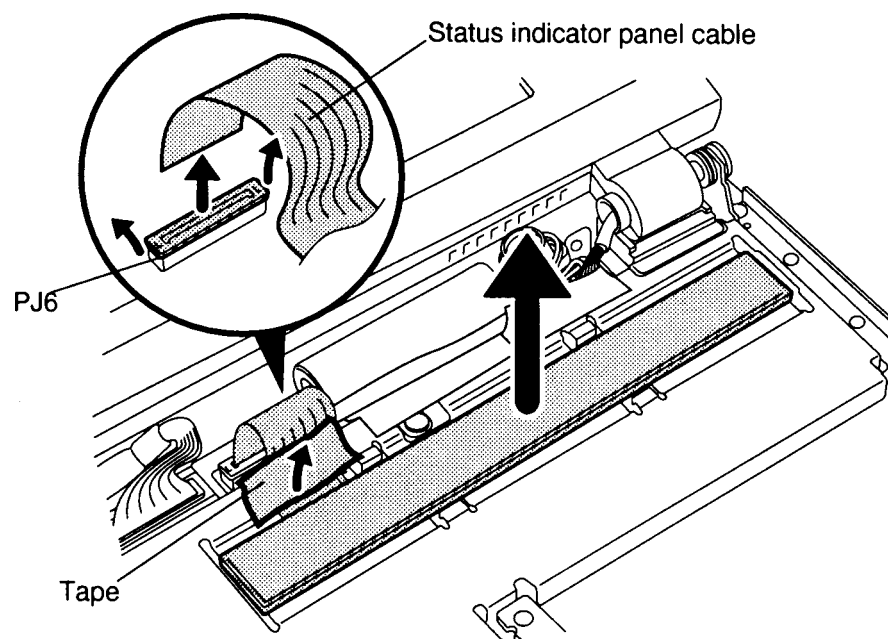


Figure 4-16 Removing the status indicator panel

Installing the Status Indicator Panel

To install the status indicator panel, follow the steps below and refer to Figure 4-16.

1. Connect the **status indicator panel cable** to **pressure plate connector (PJ6)** 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 T4850CT's backup battery and microphone, follow the steps below and refer to Figure 4-17.

1. Turn off the power to the T4850CT, then disconnect the AC adapter, power cord and all external cables connected to the computer.
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 **PJ13** 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 **PJ15** on the upper system board.

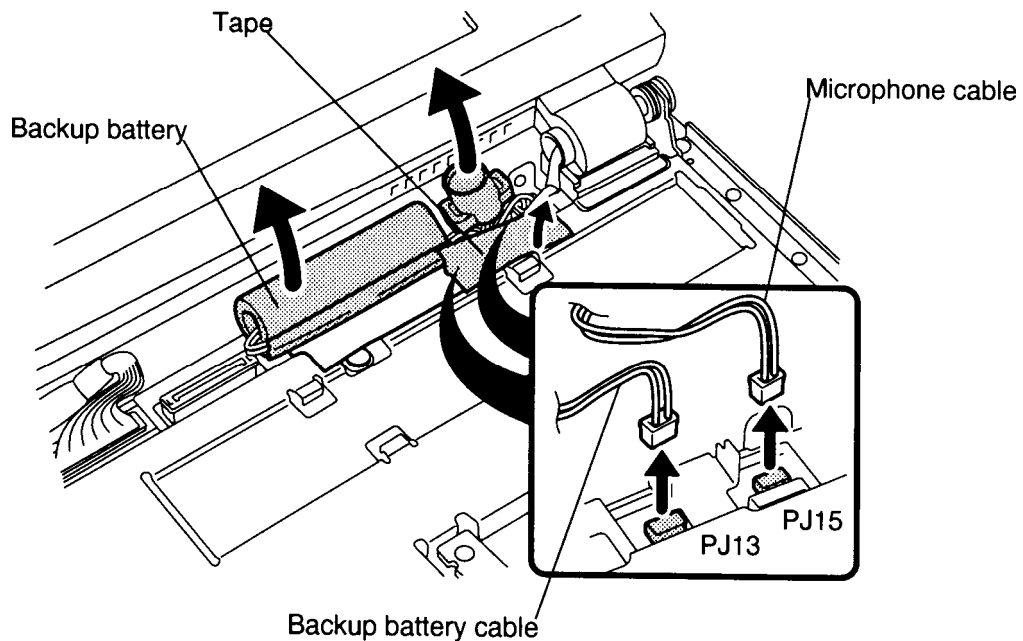


Figure 4-17 Removing the backup battery and microphone

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 T4850CT'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 into the two prongs on the computer (Figure 4-18).

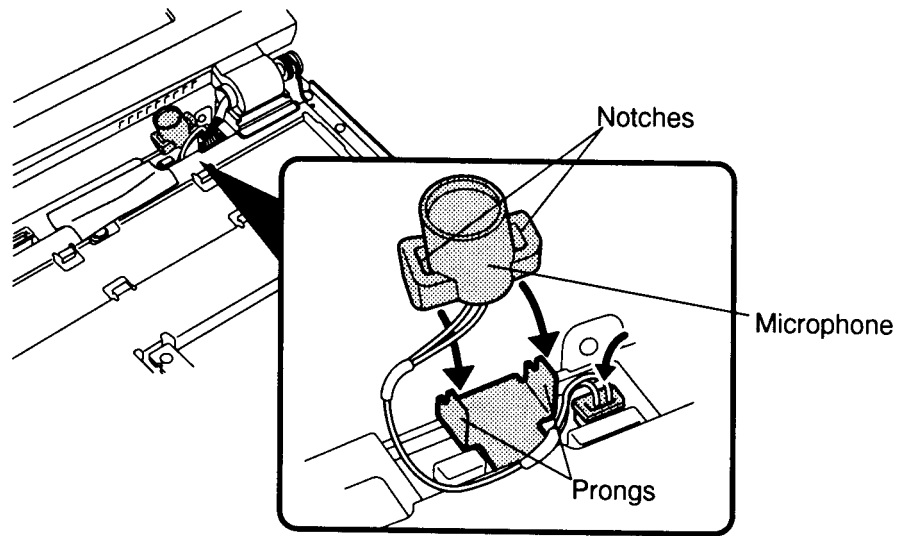


Figure 4-18 Installing the microphone

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

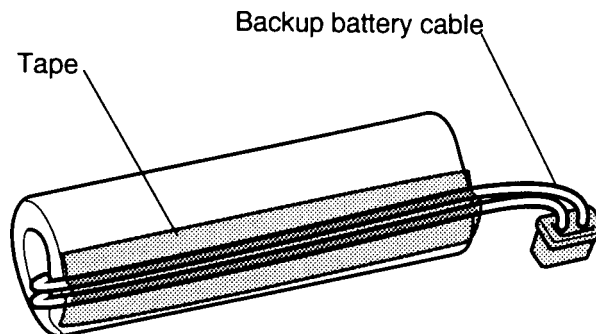


Figure 4-19 Securing the backup battery cable

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

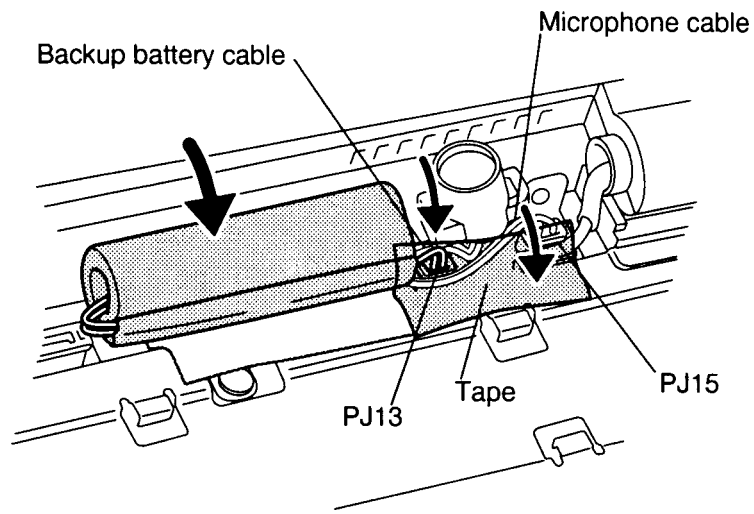


Figure 4-20 Installing the backup battery

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

4.10 Display Assembly

Removing the Display Assembly

To remove the T4850CT's display assembly, follow the steps below and refer to Figures 4-21 through 4-24.

1. Turn off the power to the T4850CT, then disconnect the AC adapter, power cord and all external cables connected to the computer.
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 the cable from **PJ5** on the upper system board (Figure 4-21).

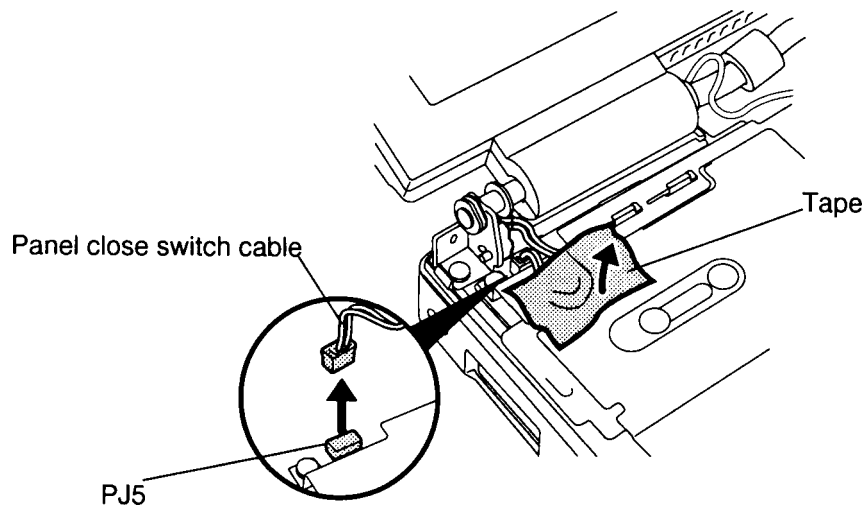


Figure 4-21 Removing the panel close switch cable

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

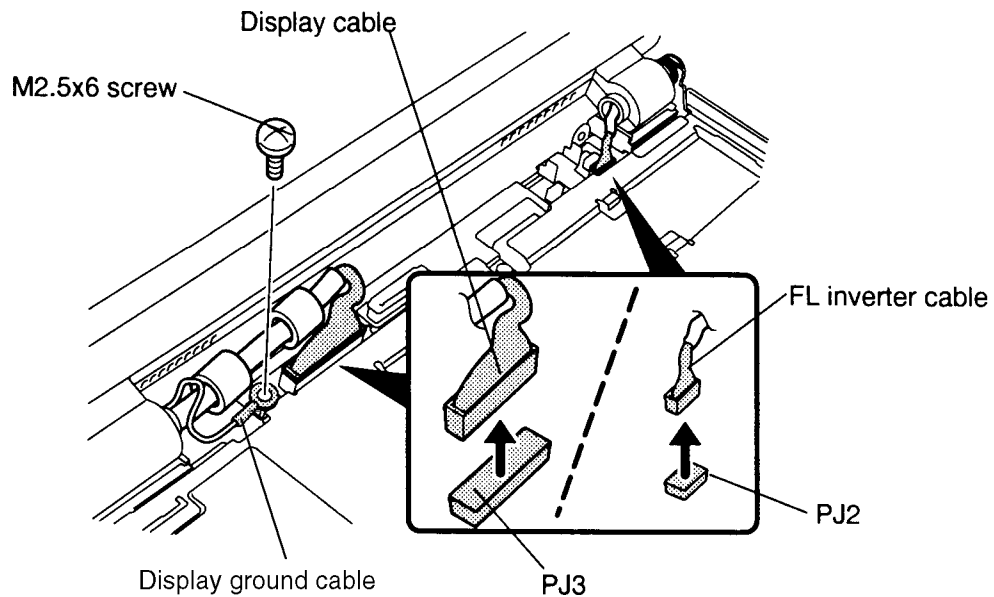


Figure 4-22 Removing the display, FL, and ground cables

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

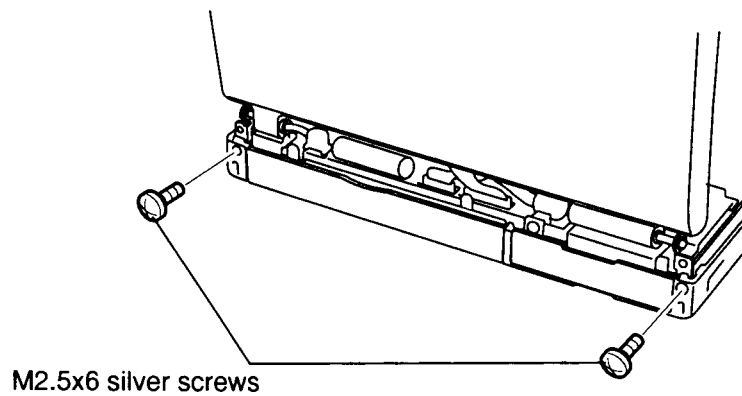


Figure 4-23 Removing the screws (back of computer) securing the display assembly

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

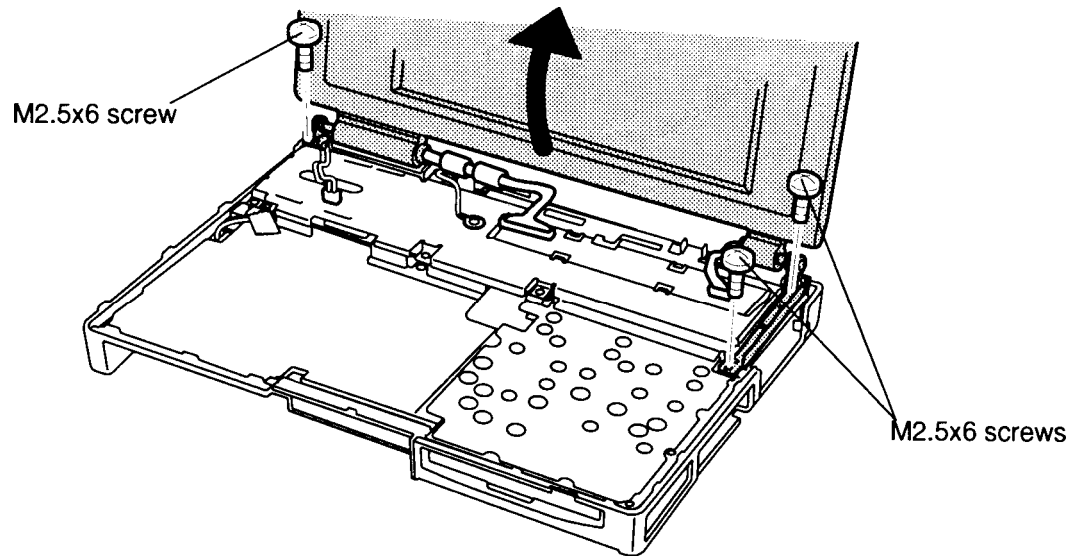


Figure 4-24 Removing the display assembly

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

Installing the Display Assembly

To install the display assembly, follow the steps below and refer to Figures 4-24 back through 4-21.

1. Place the **display assembly** on the computer making sure the brackets on the display fit in front of the corresponding brackets on the computer.
2. Hold the display to steady it and secure the **three M2.5x6 screws** for the **display hinges** to secure the display assembly (Figure 4-24). Secure the screw for the display hinge brace at the right side of the computer first, then secure the screws at the corners.
3. Turn the computer around and secure the **two M2.5x6 silver screws** on the back (Figure 4-23).
4. Turn the computer again so the front faces you and secure the **display ground cable** to the upper system board with one **M2.5x6 screw** (Figure 4-22).
5. Connect the **display cable** to **PJ3** and **FL cable** to **PJ2** on the upper system board (Figure 4-22). Replace the tape over the display cable connector.
6. Connect the **panel close switch cable** to **PJ5** on the upper system board, then secure it with **tape** (Figure 4-21).
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 Upper System Board and Power Supply Board

Removing the Upper System Board and Power Supply Board

To remove the T4850CT'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 T4850CT, then disconnect the AC adapter, power cord and all external cables connected to the computer.
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. Remove the **left hinge cover** and **tape**, then remove the **five M2.5x6 screws** securing the **upper system board cover**.
4. Lift off the **upper system board cover**, the **FDD metal cover**, and the **right hinge cover** (Figure 4-25).

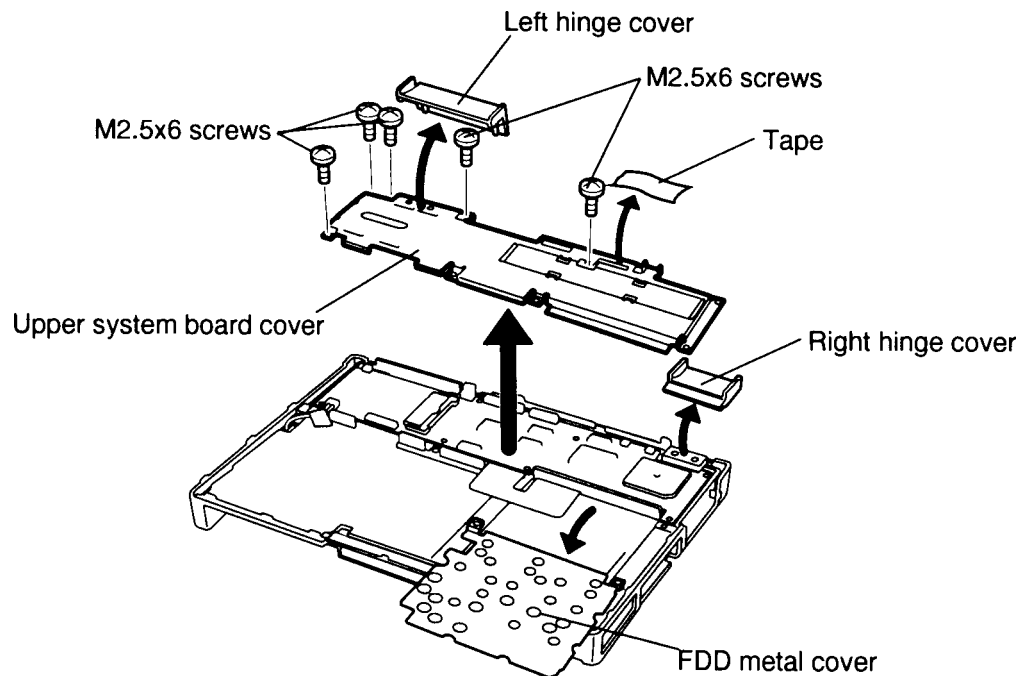


Figure 4-25 Removing the upper system board cover

5. Remove the **tape** securing the **power/reset cable** and disconnect the cable from **PJ17** on the **upper system board** (Figure 4-26).
6. Remove the card ejector assembly on the left of the system board.
7. Hold down the system board's edges circled in Figure 4-26 and carefully lift up the **upper system board** to disconnect **two joint connectors** that connect the upper system board to the lower system board.

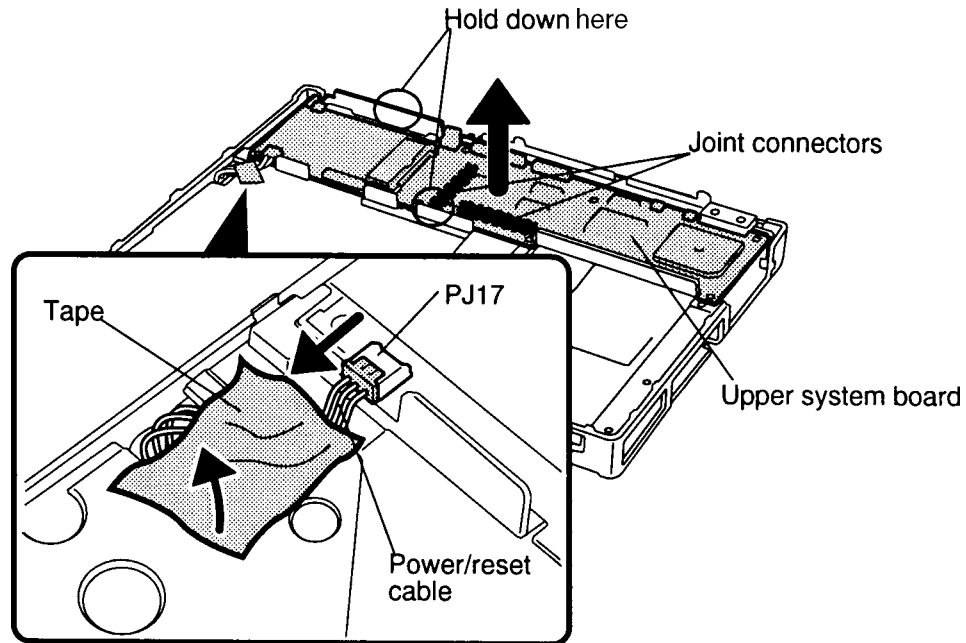


Figure 4-26 Removing the upper system board

8. Turn the **upper system board** over and remove the **power supply board** (Figure 4-27).

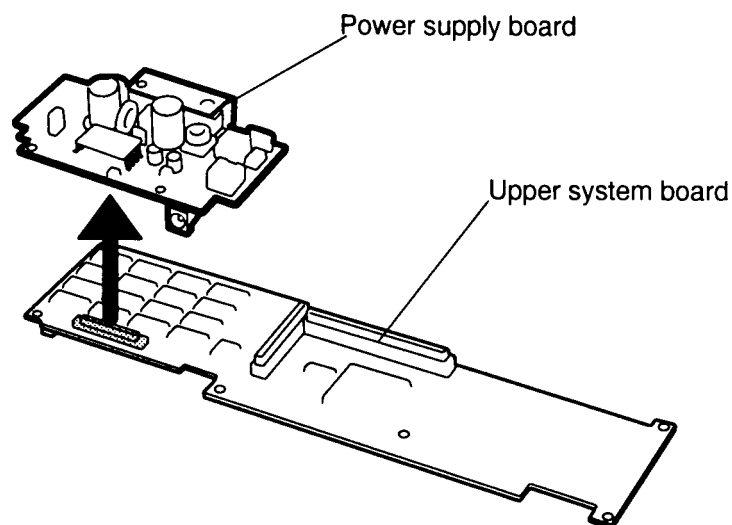


Figure 4-27 Removing the power supply board

Installing the Upper System Board and Power Supply Board

To install the T4850CT's upper system board and power supply board, follow the steps below and refer to Figures 4-27 back through 4-25.

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 aligning the **two joint connectors (PJ11 and PJ12)**, then gently press the upper system board into place (Figure 4-26).
3. Connect the **power/reset cable** to **PJ17** on the upper system board and secure it with **tape** (Figure 4-26).
4. Place the card ejector assembly on the **upper system board**.
5. Set in place the **FDD metal cover, right hinge cover and upper system board cover** (Figure 4-25).
6. Secure the **upper system board cover** with **five M2.5x6 screws** and set the **left hinge cover** in place, securing it with **tape** (Figure 4-25).
7. Install the display assembly, backup battery, microphone, status indicator panel, keyboard, top cover, HDD pack, optional PCMCIA card, optional memory card and battery pack as described in Sections 4.10 back through 4.2.

4.12 Base Assembly and Power/Reset Board

Removing the Base Assembly

To remove the T4850CT's base assembly, follow the steps below and refer to Figures 4-28 through 4-31.

1. Turn off the power to the T4850CT, then disconnect the AC adapter, power cord and all external cables connected to the computer.
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. On the right side of the computer, open the **cover** to PCMCIA slot 2 and remove the **M2.5x4 silver screw** securing the cover (Figure 4-28). Set the cover aside.

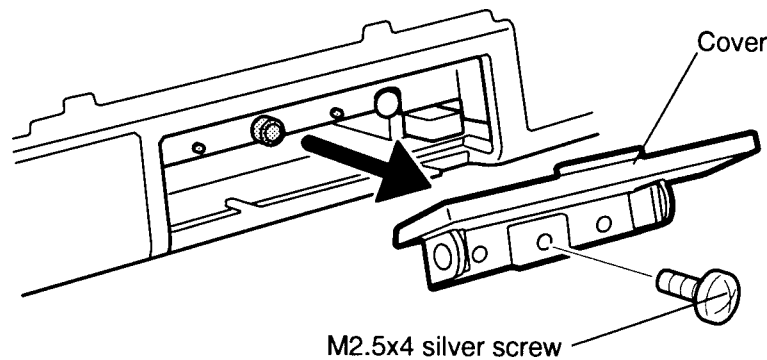


Figure 4-28 Removing the PCMCIA slot cover

- Stand the T4850CT on its back and grasp the computer with your hand covering the base assembly. While holding the computer with one hand to steady it and to protect the base assembly, remove **two M2.5x6 silver screws** and **one M2.5x12 silver screw** on the bottom of the computer (Figure 4-29).

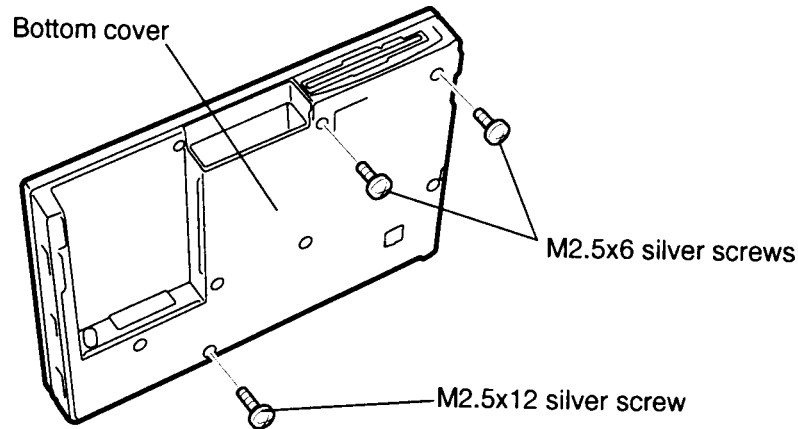


Figure 4-29 Removing the screws securing the base assembly

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

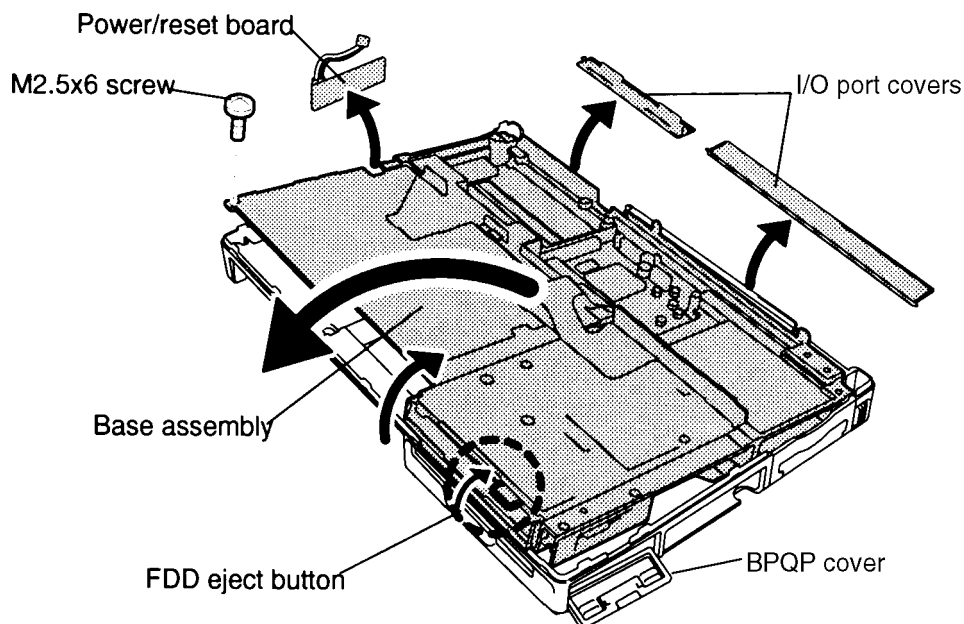


Figure 4-30 Removing the base assembly

9. Lift the **power/reset board** out of the bottom cover (Figure 4-30).
10. Disconnect the **power/reset cable** from the **power/reset board** (Figure 4-31).

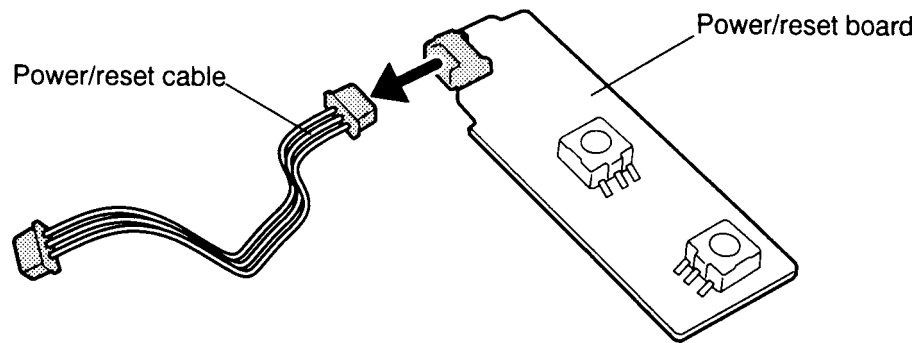


Figure 4-31 Removing the power/reset cable

Installing the Base Assembly

To install the T4850CT's base assembly and power/reset board, follow the steps below and refer to Figures 4-32 back through 4-28.

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

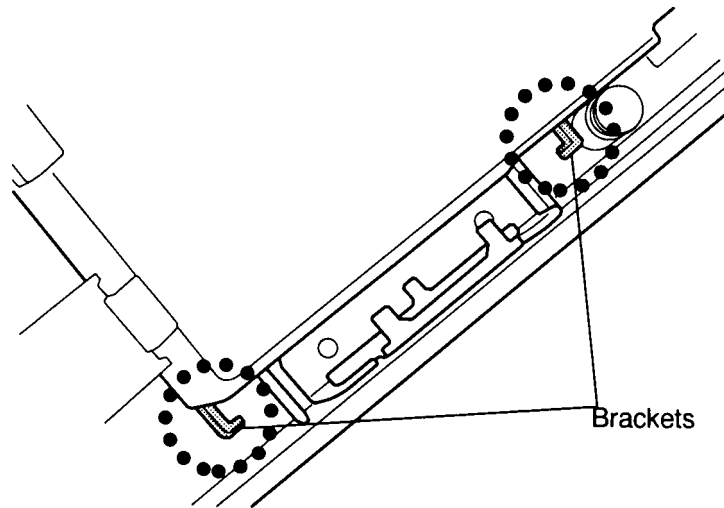


Figure 4-32 Power/reset board brackets

3. Fit the I/O port connector side of the **base assembly** into the bottom cover. 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. When seating the base assembly, make sure the **BPQP cover** is pulled outward so as not to trap it inside the bottom cover (Figure 4-30).
4. Secure the base assembly's front-left corner with **one M2.5x6 screw** (Figure 4-30).
5. Install the left **I/O port cover** and close the right **I/O port cover** (Figure 4-30).
6. Secure the **two M2.5x6 silver screws** and **one M2.5x12 silver screw** on the bottom cover (Figure 4-29).
7. Secure the **PCMCIA slot 2 cover** with **one M2.5x4 silver screw** and close the slot cover (Figure 4-28).
8. 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 T4850CT's floppy disk drive, follow the steps below and refer to Figures 4-33 through 4-35.

1. Turn off the power to the T4850CT, then disconnect the AC adapter, power cord and all external cables connected to the computer.
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. Remove the tape securing the FDD cable.
4. Disconnect the **FDD cable** from **PJ304** on the lower system board (Figure 4-33).

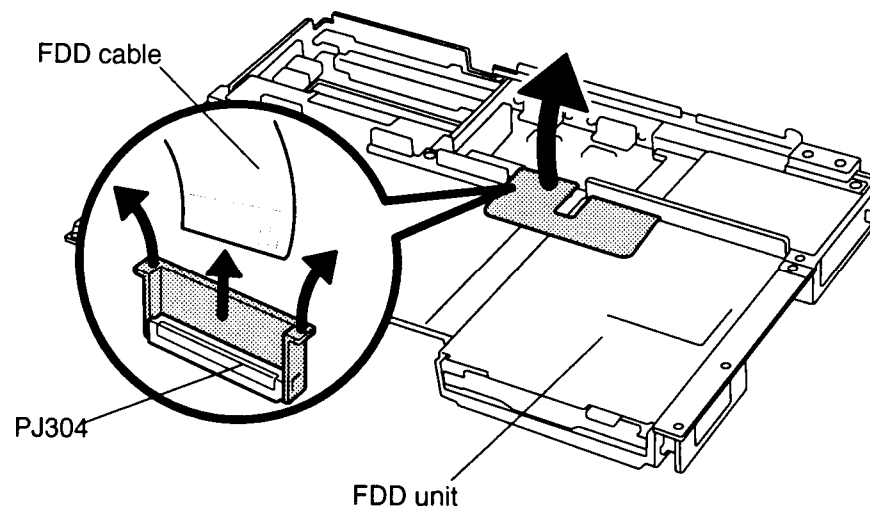


Figure 4-33 Disconnecting the FDD cable

5. Turn the **base assembly** over and remove the **two M2.5x6 screws** securing the **BPQP port** (Figure 4-34). Pull the **BPQP port** away from the base assembly, but do not disconnect the cable.

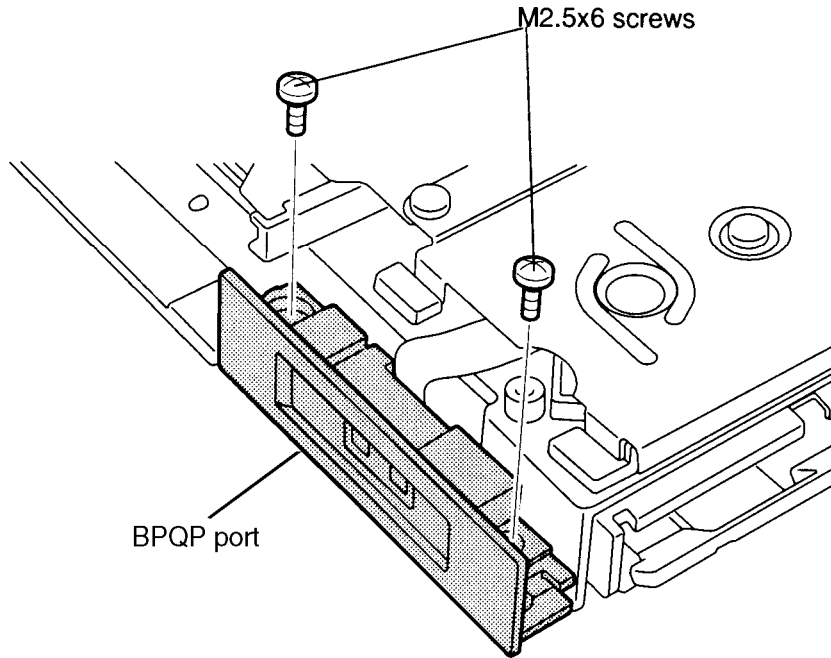


Figure 4-34 Removing the BPQP port screws

6. Remove the **four M2x4 screws** securing the **FDD** and lift the base assembly off the FDD (Figure 4-35).

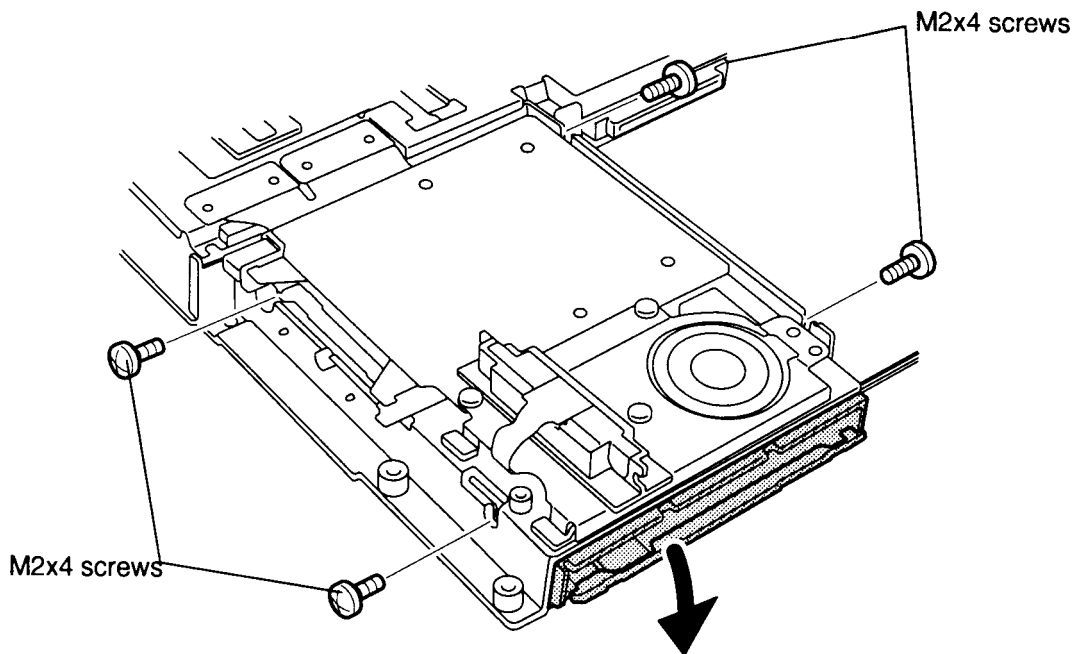


Figure 4-35 Removing the FDD

Installing the Floppy Disk Drive

To install the T4850CT's floppy disk drive, follow the steps below and refer to Figures 4-35 back through 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 M2x4 screws** (Figure 4-35).
3. Secure the **BPQP port** to the base assembly with **two M2.5x6 screws** (Figure 4-34).
4. Turn the base assembly over and connect the **FDD cable** to **pressure plate connector PJ304** on the lower system board (Figure 4-33).
5. Secure the FDD cable with tape.
6. Install the base assembly, power supply board, upper system board, display assembly, backup battery and microphone, status indicator panel, keyboard, top cover, HDD, optional PCMCIA cards, optional memory card and battery pack as described in Sections 4.12 back through 4.2.

4.14 Speaker, RTC Battery and BPQP Port

Removing the Speaker, RTC Battery and BPQP Port

To remove the T4850CT's speaker, RTC battery and BPQP port, follow the steps below and refer to Figures 4-34 and 4-36 through 4-38.

1. Turn off the power to the T4850CT, then disconnect the AC adapter, power cord, and all external cables connected to the computer.
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 **two M2.5x6 screws** securing the **BPQP port**, if they were not removed earlier (Figure 4-34).
5. Remove the **three M2.5x4 screws** securing the **speaker's metal cover**, then lift up the front side to disengage **two latches** on the back side and remove the cover (Figure 4-36).

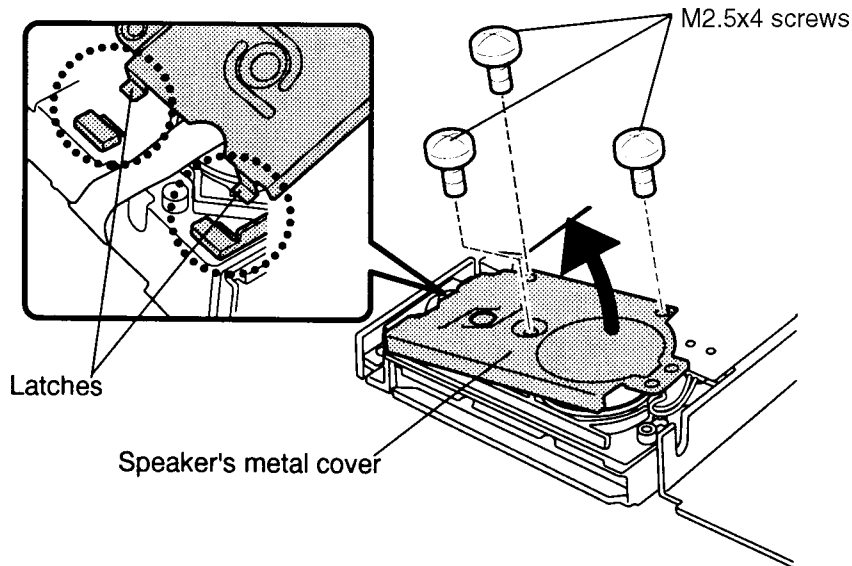


Figure 4-36 Removing the speaker's metal cover

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

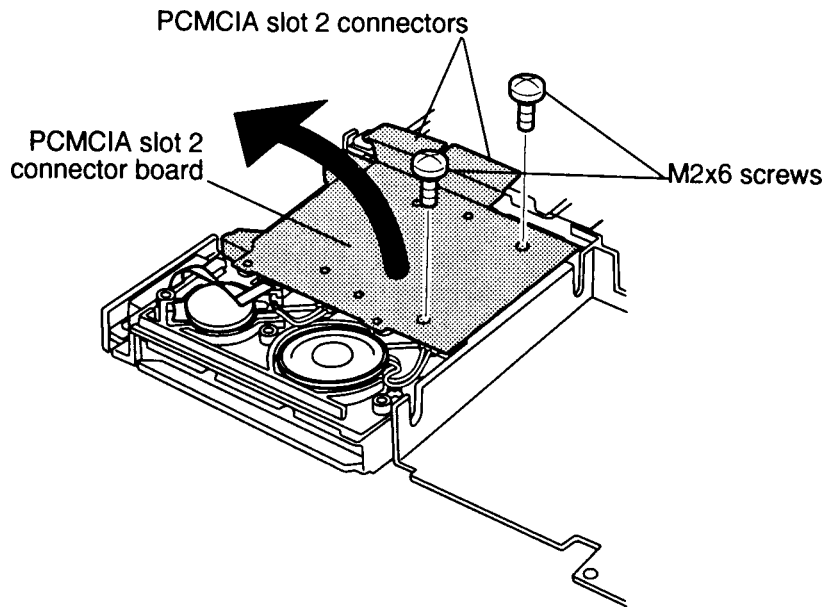


Figure 4-37 Removing the PCMCIA slot 2 connector board

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

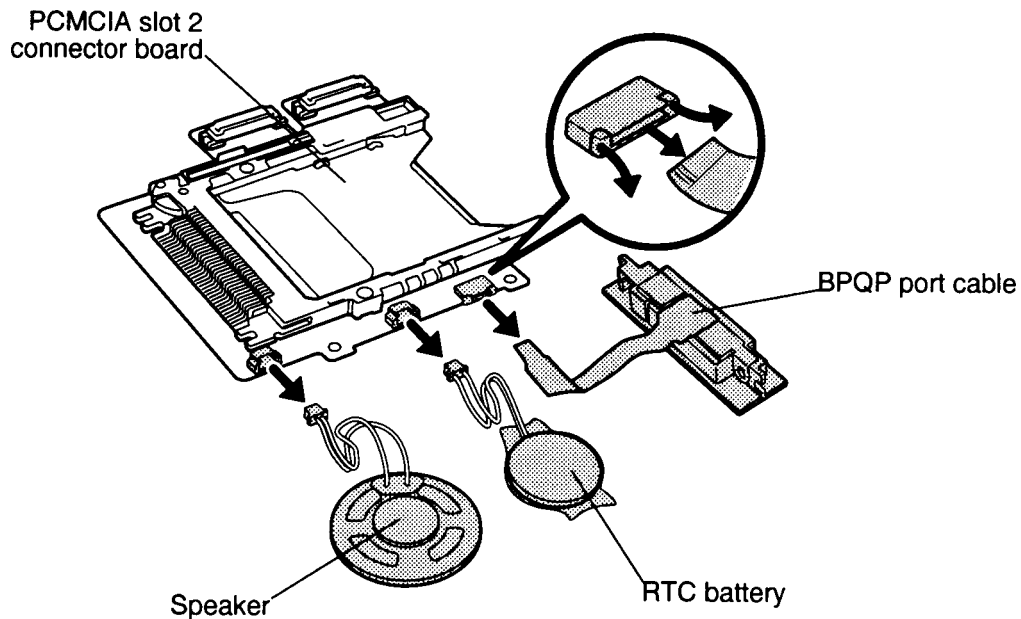


Figure 4-38 Disconnecting the speaker, RTC battery, and BPQP port cables

Installing the Speaker, RTC Battery, BPQP port

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 T4850CT's speaker, RTC battery, and BPQP port, follow the steps below and refer to Figures 4-38 back through 4-36 and Figure 4-34.

1. Connect the **speaker, RTC battery, and BPQP port** cable to the **PCMCIA slot 2 connector board** (Figure 4-38).
2. Seat the **PCMCIA slot 2 board** with speaker, RTC battery, and BPQP port attached, then connect the **two PCMCIA slot 2 connectors** to the **lower system board** (Figure 4-37).
3. Secure the PCMCIA slot 2 board with **two M2x6 screws**, then set the speaker, RTC battery and BPQP port in place. Make sure insulation for the speaker cables goes on top of the cables (Figure 4-37).
4. Fit the back of the **speaker's metal cover** into the **latches** on the base assembly and secure the cover with **three M2.5x4 screws** (Figure 4-36).
5. Secure the BPQP port with **two M2.5x6 screws** (Figure 4-34).
6. Install the base assembly, power supply board, upper system board, display assembly, backup battery and microphone, status indicator panel, keyboard, top cover, HDD, optional PCMCIA cards, optional memory card and battery pack as described in Sections 4.12 back through 4.2.

4.15 Lower System Board

Removing the Lower System Board

To remove the T4850CT's lower system board, follow the steps below and refer to Figures 4-33, and 4-39 through 4-41.

1. Turn off the power to the T4850CT, then disconnect the AC adapter, power cord and all external cables connected to the computer.
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** on the lower system board, if it was not disconnected earlier (Figure 4-33).
4. Lift off the **card ejector** (Figure 4-39).
5. Remove **three M2.5x6 screws** securing the **lower system board's metal cover**, then lift it off the lower system board (Figure 4-39). Be careful to clear the two audio ports projecting slightly through holes in the cover on the right.

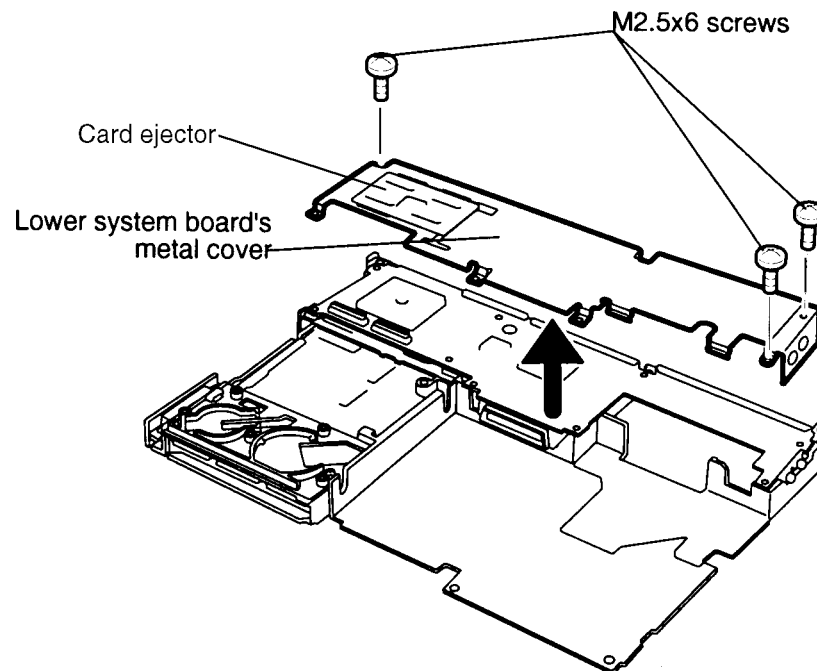


Figure 4-39 Removing the lower system board's metal cover

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

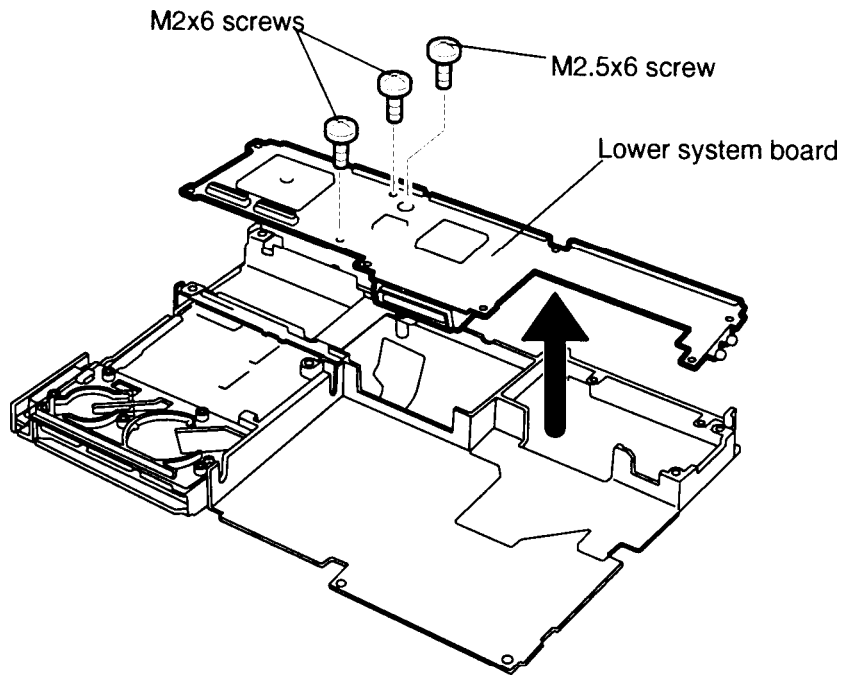


Figure 4-40 Removing the lower system board

- Turn the lower system board over and disconnect the **sound system board** from the **lower system board** (Figure 4-41).

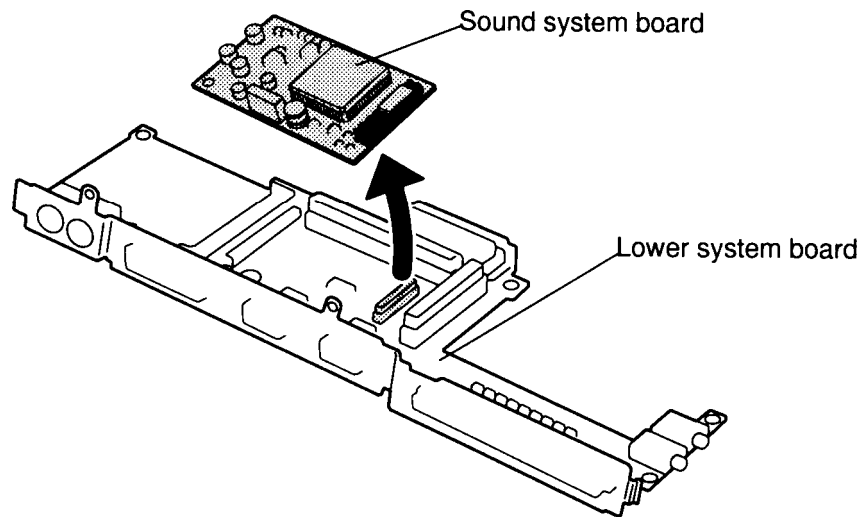


Figure 4-41 Removing the sound system board

Installing the Lower System Board

To install the T4850CT's lower system board, follow the steps below and refer to Figures 4-41 back through 4-39, and 4-33.

1. Connect the **sound system board** to the **lower system board**, then turn the board over and place the lower system board on the base assembly frame (Figures 4-41 and 4-40).
2. Secure the **lower system board** with **one M2.5x6 screw** and **two M2x6 screws** (Figure 4-40).
3. Set the **lower system board's metal cover** in place. Be sure the two audio ports extend through holes in the cover (Figure 4-39).
4. Secure the **lower system board's metal cover** with three M2.5x6 screws (Figure 4-39).
5. Place the **card ejector** on the metal cover (Figure 4-39).
6. Connect the **FDD cable** to **PJ304** on the lower system board (Figure 4-33).
7. 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 T4850CT's display mask, follow the steps below and refer to Figure 4-42.

1. Turn off the power to the T4850CT, then disconnect the AC adapter, power cord and all external cables connected to the computer.
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 **six latches** across the top of the display mask.
6. Continue unlatching the mask along the **sides (three latches on each side)**, and at the **bottom (two latches)** and the **display supports (one latch at the small support and two latches at the larger support)**.

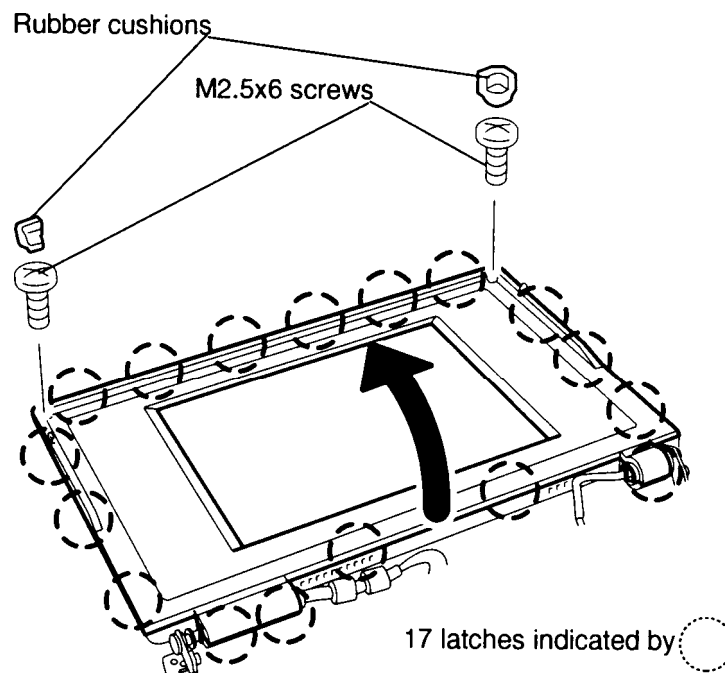


Figure 4-42 Removing the display mask

Installing the Display Mask

To install the display mask, follow the steps below and refer to Figure 4-42.

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 smaller support).
2. Continue along the bottom of the display (**two latches**), along the sides (**three latches**), then across the top (**six latches**).
3. Secure the cover with **two M2.5x6 screws** at the top corners.
4. Insert 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 FL Inverter Board

Removing the FL Inverter Board

To remove the T4850CT's FL inverter board, follow the steps below and refer to Figure 4-43.

1. Turn off the power to the T4850CT, then disconnect the AC adapter, power cord and all external cables connected to the computer.
2. Remove the battery pack, top cover, and display mask as described in Sections 4.2, 4.6, and 4.16.
3. Remove the **two M2.5x6 screws** securing the **FL inverter board**.
4. Carefully rotate the **FL inverter board** out from right to left and disconnect the **FL cable** from **CN2** and the **FL inverter cable** from **CN1**.

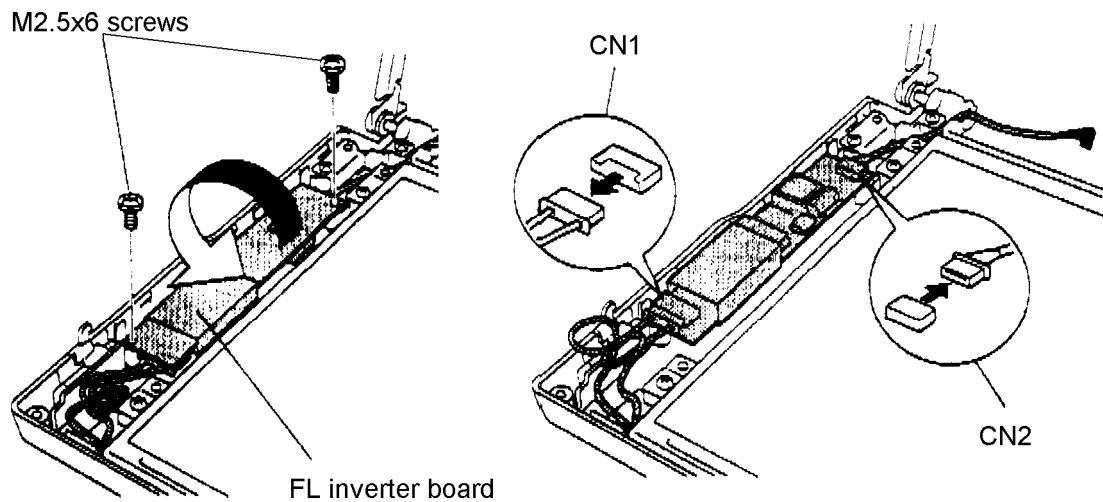


Figure 4-43 Removing the FL inverter board

Installing the FL Inverter Board

To install the T4850CT's FL inverter board, follow the steps below and refer to Figure 4-43.

1. Connect the **FL inverter cable** to **CN1** on the inverter board and the **FL cables** to **CN2**.
2. Route the **cables** so they are not pinched by the **FL inverter board, display hinge** or other component.
3. Replace the **FL inverter board** and secure it with **two M2.5x6 screws**.
4. Secure the **FL cables** with tape.
5. Install the display mask, top cover, and battery pack as described in Sections 4.16, 4.6, and 4.2.

4.18 LCD Module

Removing the Color LCD Module

To remove the T4850CT's color LCD module, follow the steps below and refer to Figure 4-44.

1. Turn off the power to the T4850CT, then disconnect the AC adapter, power cord and all external cables connected to the computer.
2. Remove the battery pack, top cover, display mask, and FL inverter board as described in Sections 4.2, 4.6, 4.16, and 4.17.
3. Remove the **four M2.5x6 screws** securing the **LCD module** to the LCD cover.
4. Carefully rotate the **LCD module** from top to bottom and disconnect the **LCD connector board** from the LCD module. Set the LCD module aside. *Be very careful to touch only the module's metal frame.*
5. Disconnect the **three display cables** from the **LCD connector board**.

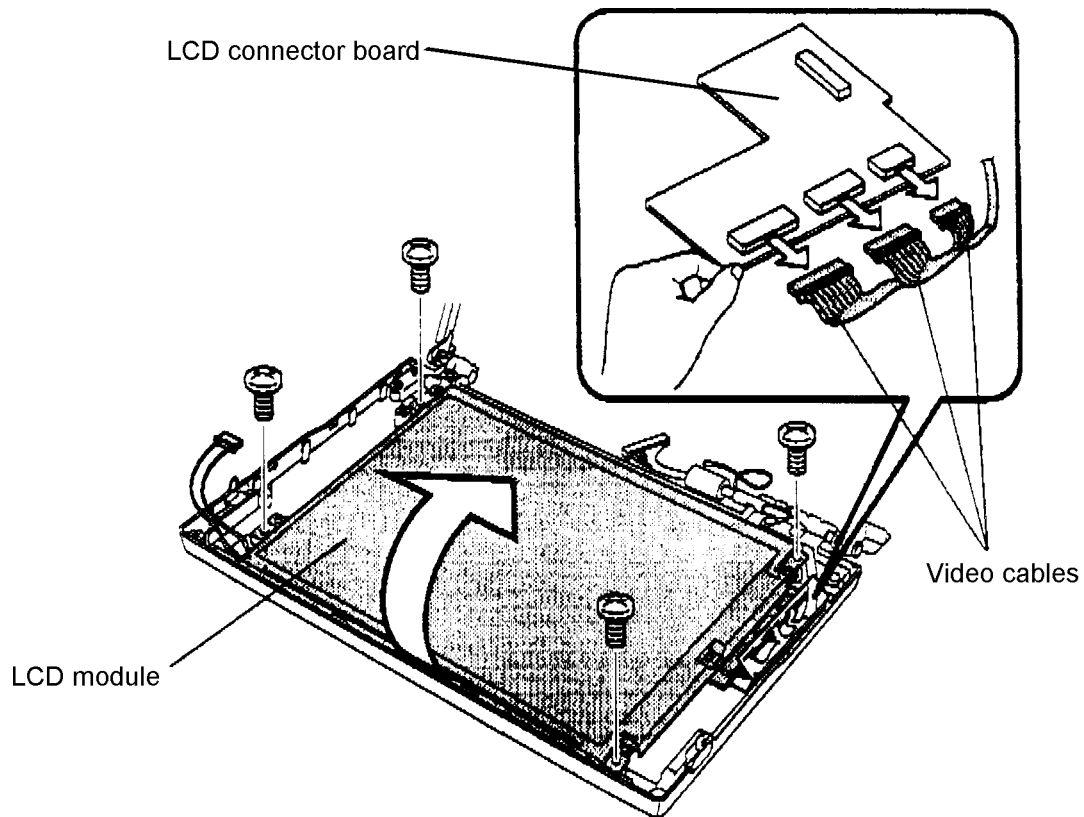


Figure 4-44 Removing the LCD module and connector board

Installing the LCD Module

To install the T4850CT's color LCD module, follow the steps below and refer to Figure 4-44.

1. Connect the **three display cables** to the **LCD connector board**.
2. Set the **LCD module** on edge at the base of the LCD cover and connect the **LCD connector board** to the **LCD module**. *Be careful to touch only the metal edge of the module.*
3. Make sure the plastic pins on the LCD cover fit into the corresponding holes on the **LCD module**, and carefully rotate the **LCD module** into the LCD cover.
4. Secure the **LCD module** with **four M2.5x6 screws**.
5. Install the FL inverter board, display mask, top cover, and battery pack as described in Sections 4.17, 4.16, 4.6 and 4.2.

4.19 Fluorescent Lamp (FL)

Removing the FL Unit

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

To remove the T4850CT's FL, follow the steps below and refer to Figure 4-45.

1. Turn off the power to the T4850CT, then disconnect the AC adapter, power cord and all external cables connected to the computer.
2. Remove the battery pack, top cover, display mask, FL inverter board, and LCD module as described in Sections 4.2, 4.6, 4.16, 4.17, and 4.18.
3. Remove the **flat-top screw** securing the **FL**.
4. Stand the **LCD module** on edge so the **FL** is at the top.
5. Hold the **LCD module's** frame at the screw hole with one hand and slide the **FL** out of the frame.

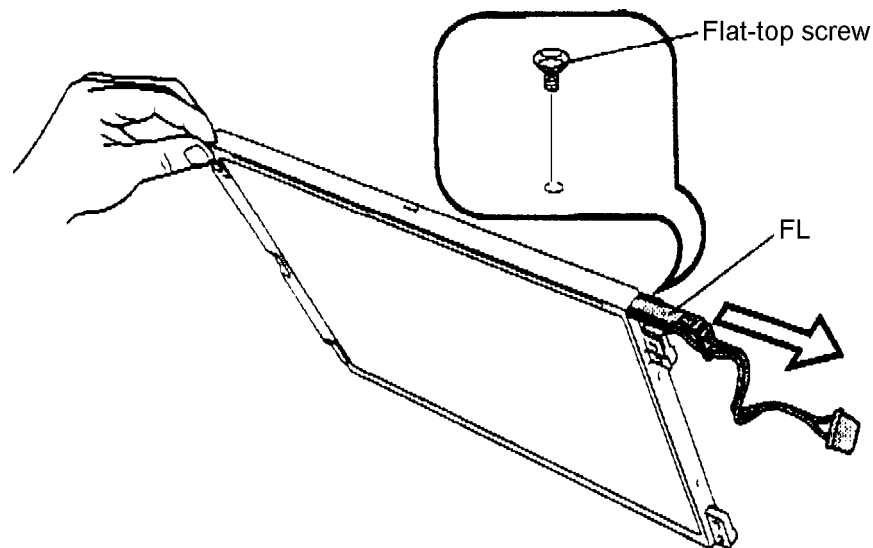


Figure 4-45 Removing the FL

Installing the FL

To install the T4850CT's FL, follow the steps below and refer to Figures 4-45 and 4-46.

1. Stand the **FL module** on edge so the FL side is at the top.
2. Insert the tip of the **FL** into its slot (Figure 4-46).

CAUTION: When you insert the FL, be careful to align the U-shaped optical shield with the optical diffusion plate. The shield should fit on either side of the bar. If the shield is not aligned or if it covers the bar slightly, the brightness of the display will be diminished.

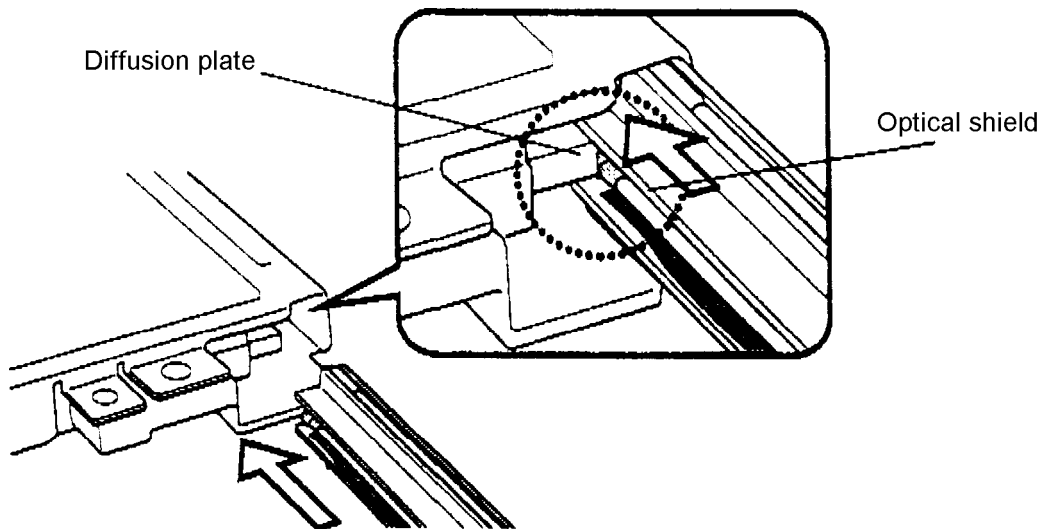


Figure 4-46 Inserting the FL

3. When you are sure the **optical shield** and **diffusion bar** are aligned, slide the **FL** fully into the **LCD module** and secure it with the **flat-top screw** (Figure 4-45).
4. Install the LCD module, FL inverter board, display mask, top cover, and battery pack as described in Sections 4.18, 4.17, 4.16, 4.6, and 4.2.

4.20 Display Cable

Removing the Display Cable

To remove the T4850CT's display cable, follow the steps below and refer to Figure 4-47.

1. Turn off the power to the T4850CT, then disconnect the AC adapter, power cord and all external cables connected to the computer.
2. Remove the battery pack, top cover, display mask, FL inverter board, LCD module, and FL as described in Sections 4.2, 4.6, 4.16, 4.17, 4.18, and 4.19.
3. Remove the **two M2.5x6 screws** securing the display hinge and **one M2.5x6 screw** securing the **ground cable**.
4. Remove the **display hinge** and lift off the **display cable**.

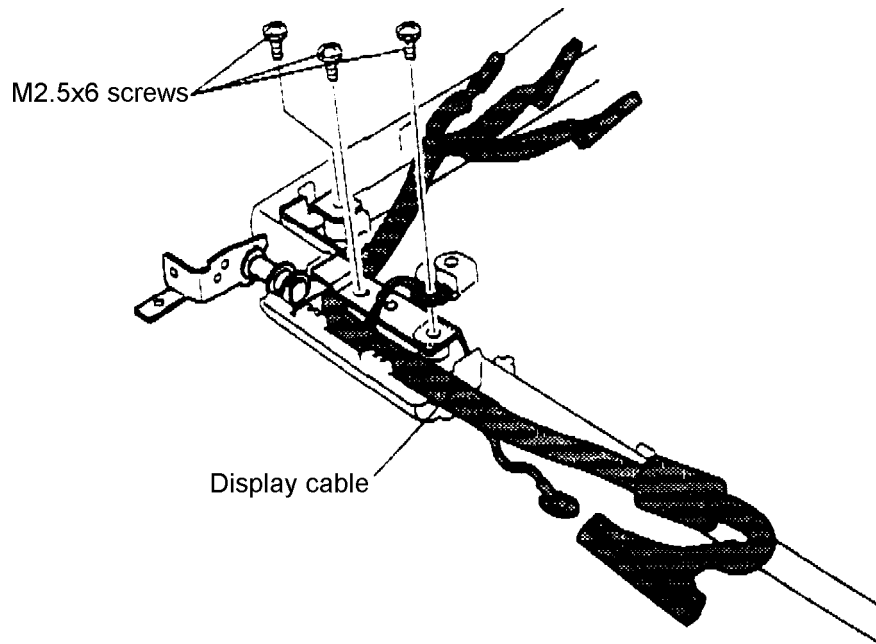


Figure 4-47 Removing the display cable

Installing the Display Cable

To install the T4850CT's display cable, follow the steps below and refer to Figure 4-47.

1. Fit the **display cable** to the display cover and secure the **display hinge** with **two M2.5x6 screws**. Make sure the display cable wires are placed within the clear insulator in the display cover.
2. Secure the **ground cable** to the display cover with **one M2.5x6 screw**.
3. Install the FL, LCD module, FL inverter board, display mask, top cover, and battery pack as described in Sections 4.19, 4.18, 4.17, 4.16, 4.6, and 4.2.

4.21 Panel Close Switch

Removing the Panel Close Switch

To remove the T4850CT's panel close switch, follow the steps below and refer to Figure 4-48.

1. Turn off the power to the T4850CT, then disconnect the AC adapter, power cord and all external cables connected to the computer.
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** to the **display hinge**.

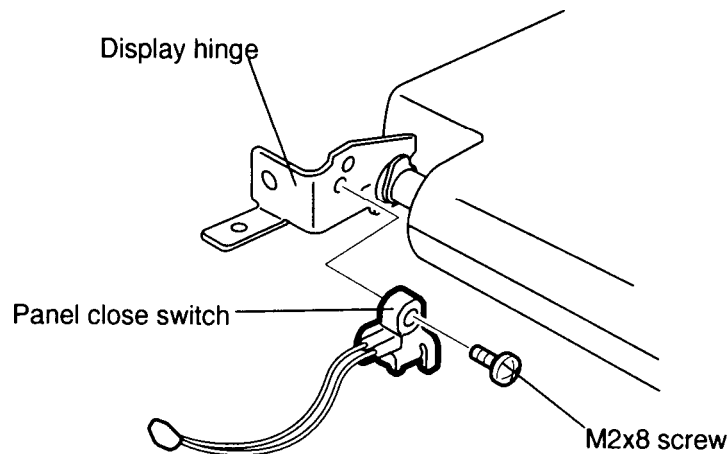


Figure 4-48 Removing the panel close switch

Installing the Panel Close Switch

To install the T4850CT's panel close switch, follow the steps below and refer to Figure 4-48.

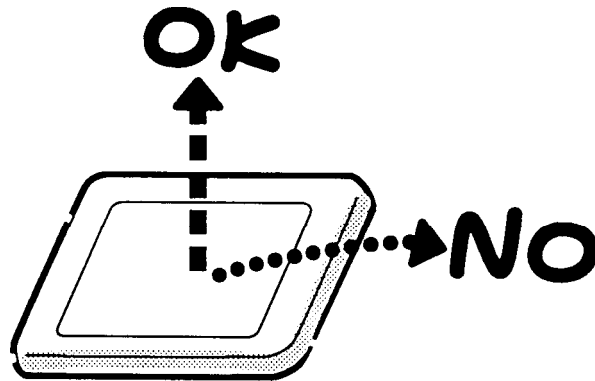
1. Fit the **panel close switch** to the display hinge and secure the **switch** with **one M2x8 screw**.
2. Install the display assembly, top cover, and battery pack as described in Sections 4.10, 4.6, and 4.2.

Appendix A Handling the LCD Module

Precautions for handling the LCD module

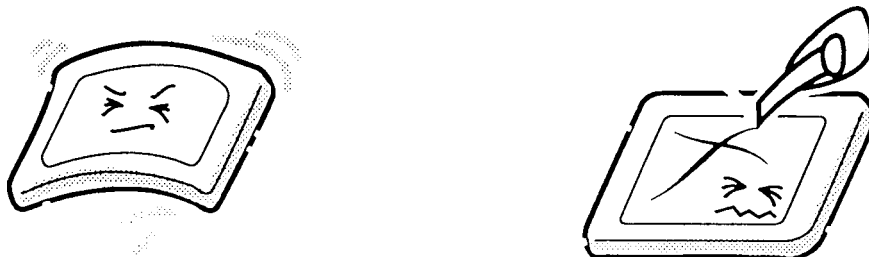
The computer's LCD module can be easily damaged during assembly or disassembly. Therefore, please observe the following precautions when handling the LCD module.

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



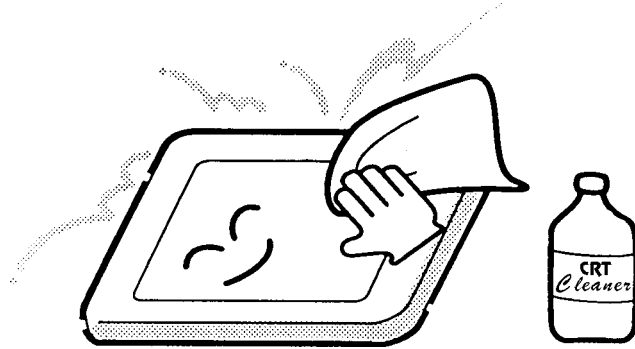
2. Be careful to align the holes at the four corners of the LCD module with the corresponding holes in the LCD cover before securing the module with screws. Do not force the module into place, because stress can affect its performance.

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

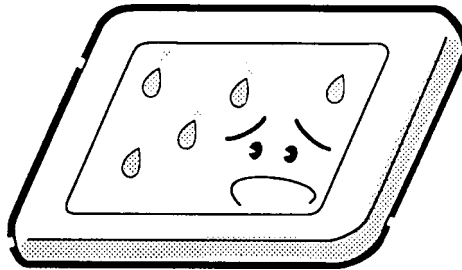


3. If the panel's surface gets dirty, wipe it with cotton or a soft cloth. If it is still dirty, try breathing on the surface to create a light condensate and wipe it again.

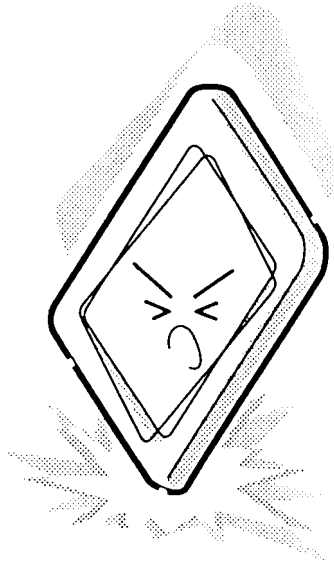
If the surface is very dirty, we recommend a CRT cleaning agent. Apply the agent to a cloth and then wipe the panel's surface. Do not apply cleanser directly to the panel.



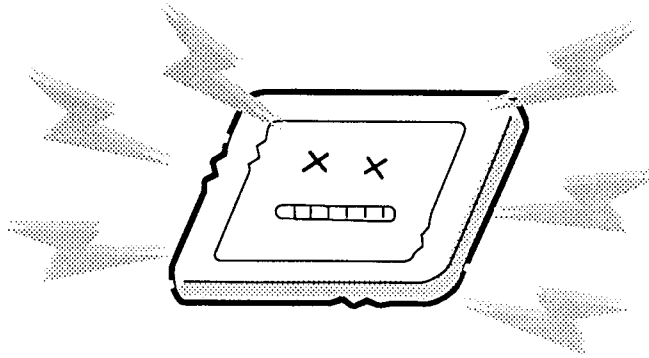
4. If water or other liquid is left on the panel's surface for a long period, it can change the screen's tint or stain it. Be sure to quickly wipe off any liquid.



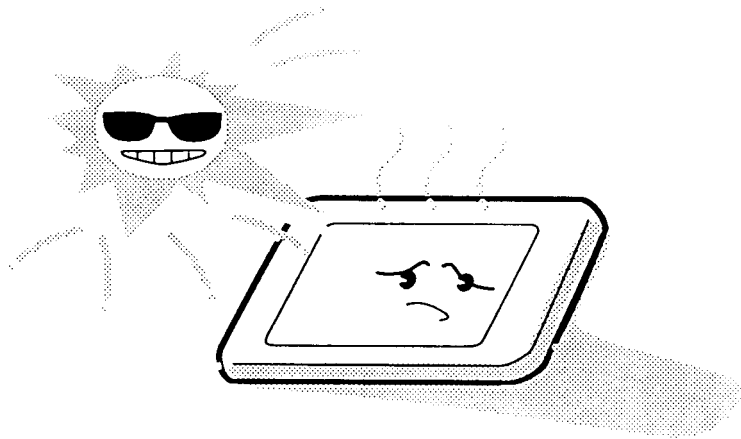
5. Glass is used in the panel, so be careful not to drop it or let it strike a hard object, which could cause breakage or cracks.



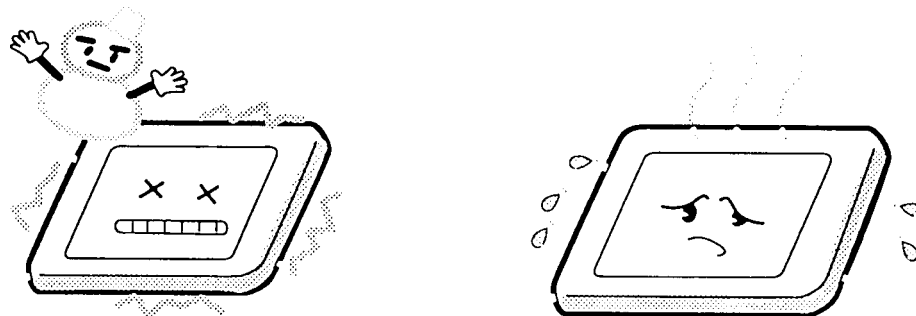
6. CMOS-LSI circuits are used in the module, so guard against damage from electrostatic discharge. Be sure to wear a wrist or ankle ground when handling the module.



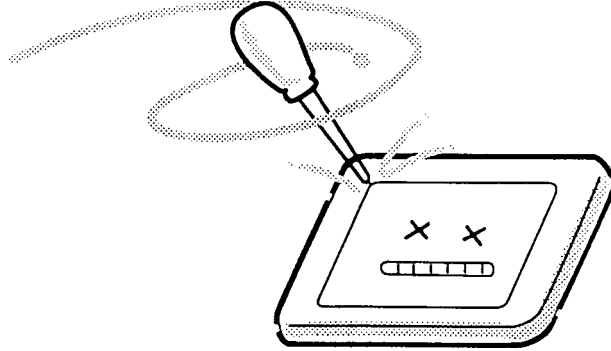
7. Do not expose the module to direct sunlight or strong ultraviolet rays for long periods.



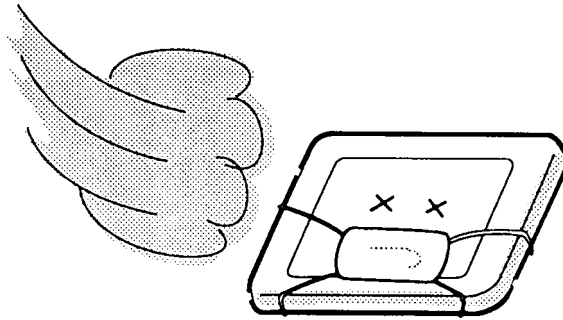
8. Do not store the module at temperatures below specifications. Cold can cause the liquid crystals to freeze, lose their elasticity or otherwise suffer damage.



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.



NOTE: The T4850CT's TAB IC on the LCD back panel is easily damaged, so be careful when handling it.

Appendix B Board Layout

B.1 Upper System Board

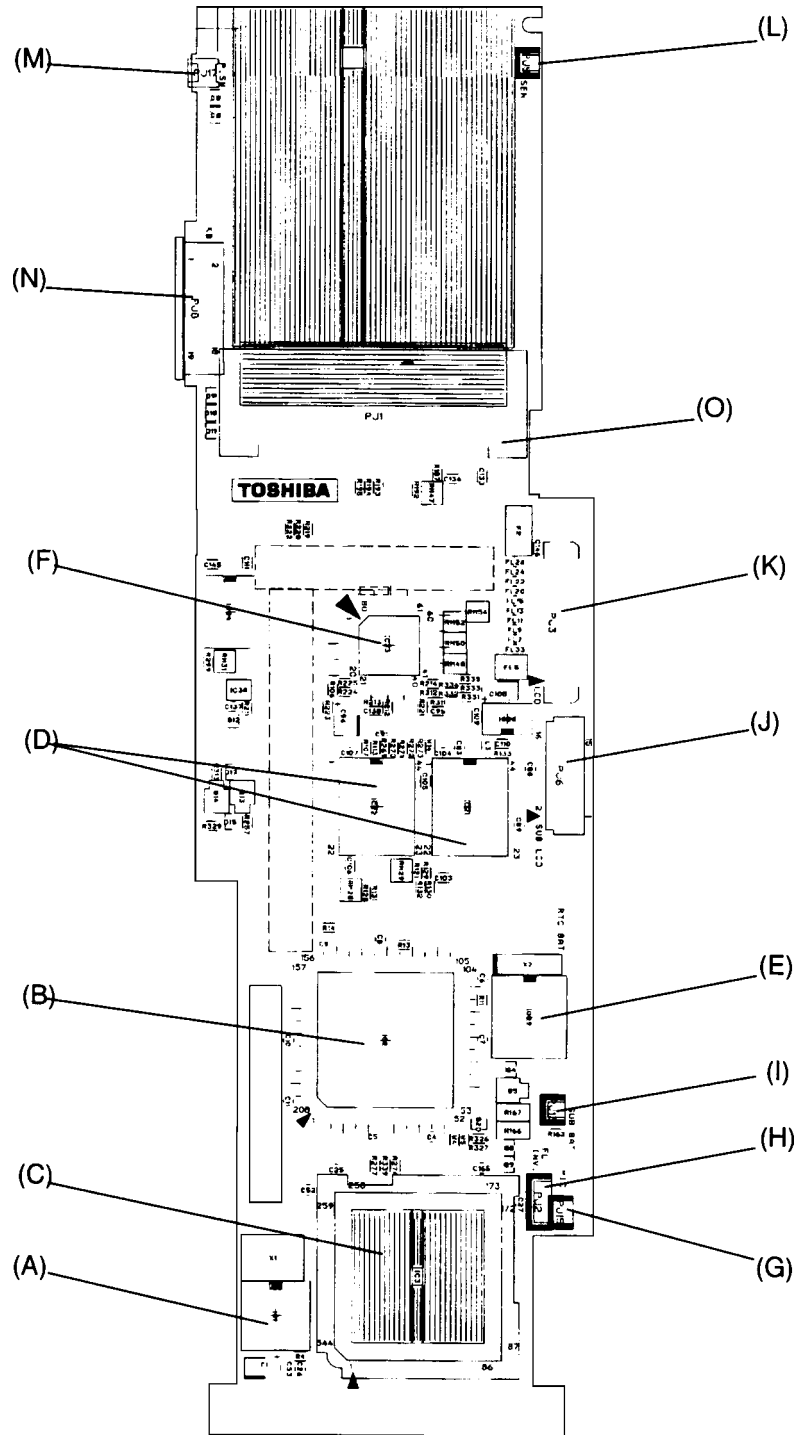


Figure B-1 Upper system board (front)

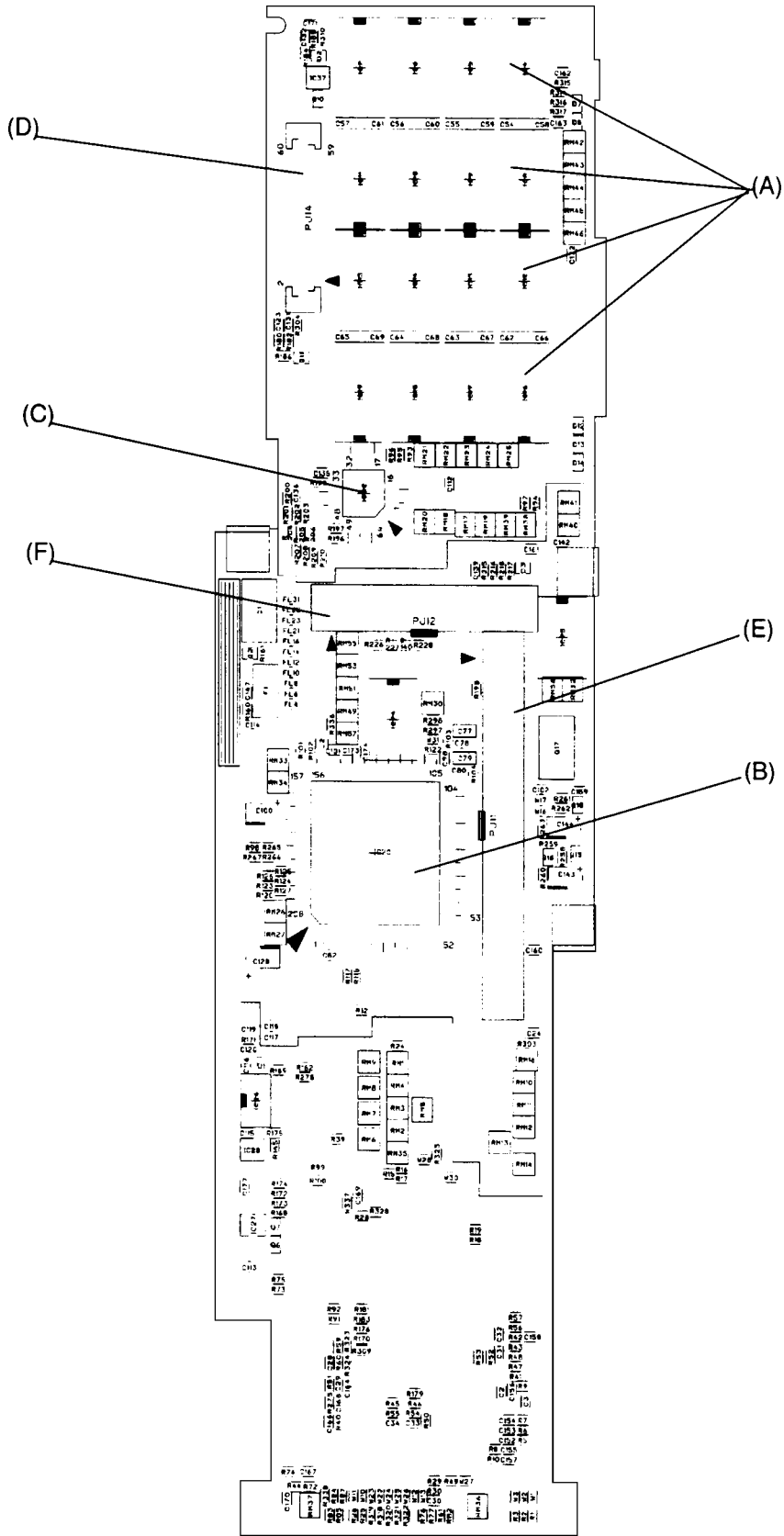


Figure B-2 Upper system board (back)

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

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

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

Mark	Number	Name
(A)	IC4 to IC19	System memory
(B)	IC20	Video controller (WD90C24A/A2)
(C)	IC32	Sub LCD controller gate array
(D)	PJ14	Power supply board connector
(E)	PJ11	Joint connector 1
(F)	PJ12	Joint connector 2

B.2 Lower System Board

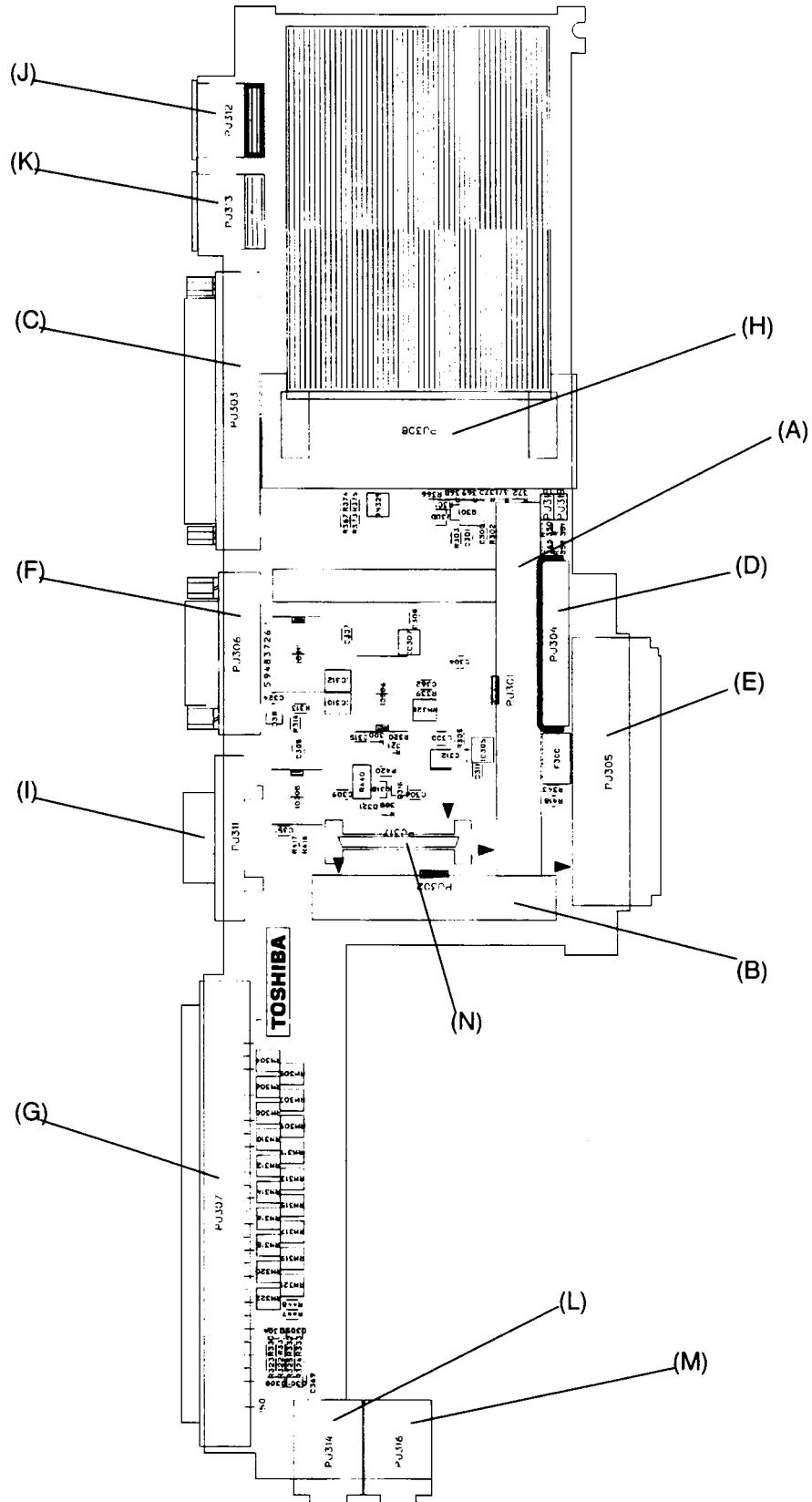


Figure B-3 Lower system board (front)

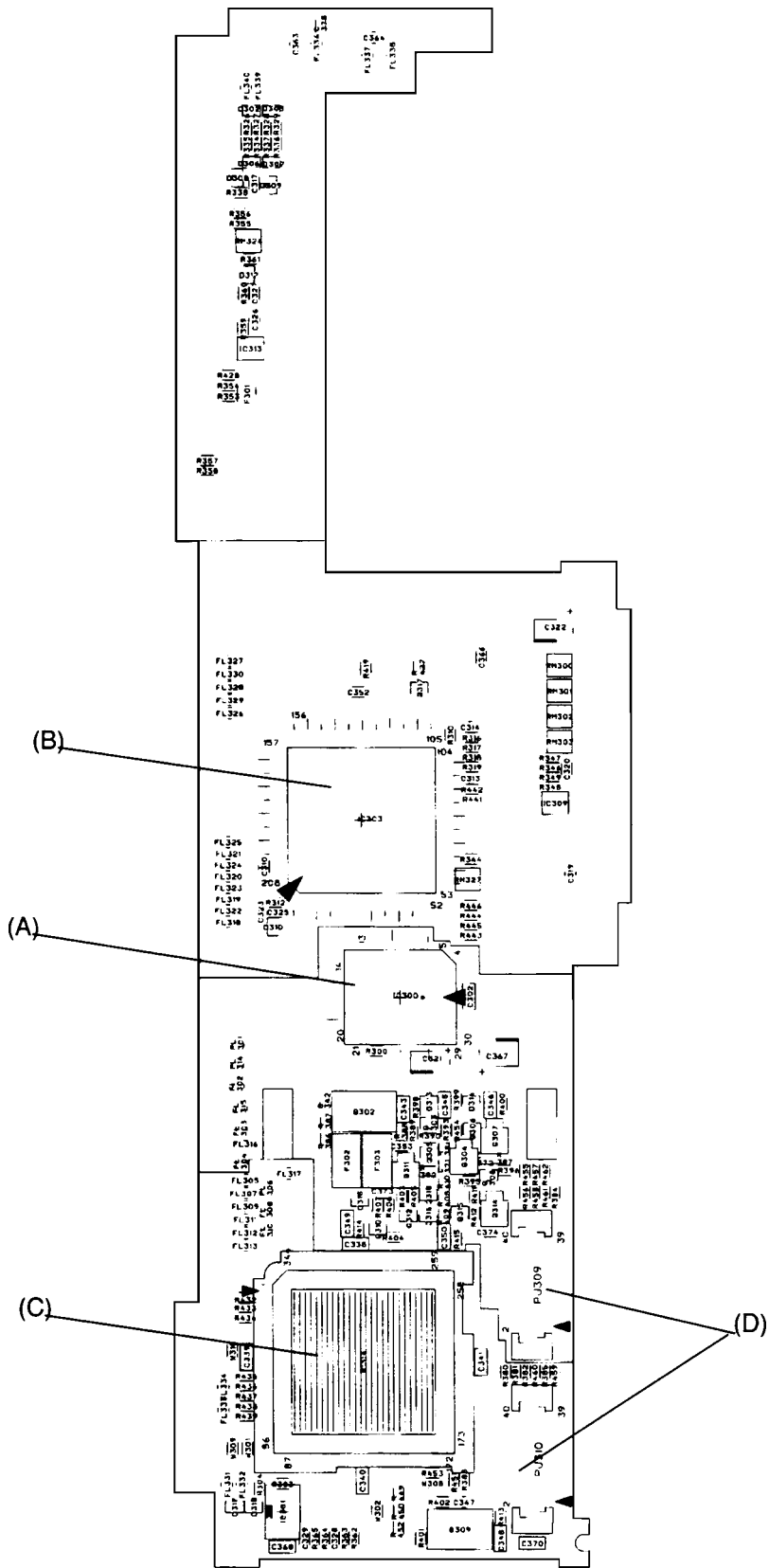


Figure B-4 Lower system board (back)

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

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

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

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

Appendix C Pin 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	VCC	—	55	RAS2;001	O
12	GND	—	56	GND	—
13	MA00;111	O	57	MA01;111	O
14	MA02;111	O	58	MA03;111	O
15	B3V	—	59	MA05;111	O
16	MA04;111	O	60	MA07;111	O
17	VCC	—	61	MA09;111	O
18	MA06;111	O	62	GND	—
19	MA08;111	O	63	GND	—
20	MA10;111	O	64	GND	—
21	GND	—	65	RAS1;001	O
22	RAS0;001	O	66	CAS2;011	O
23	CAS0;011	O	67	GND	—
24	CAS1;011	O	68	CAS3;011	O
25	VCC	—	69	RAS1;001	O
26	RAS0;001	O	70	MEMWE2;001	O
27	B3V	—	71	DRMST1;100	I/O
28	DRMST2;100	I/O	72	DRMST3;100	I/O
29	DRMST4;100	I/O	73	GND	—
30	DRMST6;100	I/O	74	DRMST5;100	I/O
31	CAS0;011	O	75	DRMST7;100	I/O
32	CAS1;011	O	76	DRMST8;100	I/O
33	GND	—	77	CAS2;011	O
34	D08;100	I/O	78	CAS3;011	O
35	VCC	—	79	GND	—
36	D09;100	I/O	80	D24;100	I/O
37	B3V	—	81	D25;100	I/O
38	D10;100	I/O	82	D26;100	I/O
39	D11;100	I/O	83	D27;100	I/O
40	D12;100	I/O	84	D28;100	I/O
41	D13;100	I/O	85	D29;100	I/O
42	D14;100	I/O	86	D30;100	I/O
43	D15;100	I/O	87	D31;100	I/O
44	GND	—	88	GND	—

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

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

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

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

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

Table C-5 Status indicator panel I/F pin 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.6 PJ8 KB I/F Connector (19-Pin)

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

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

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

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

Pin	Signal	I/O	Pin	Signal	I/O
01	SD07;100	I/O	51	TMOUT2;100	I
02	SD08;100	I/O	52	TIMGT2;100	O
03	SD06;100	I/O	53	TMOUT1;100	I
04	SD09;100	I/O	54	MEWR;000	I/O
05	SD05;100	I/O	55	KBCS;000	I
06	SD10;100	I/O	56	MERD;000	I/O
07	SD04;100	I/O	57	HREQ;100	I
08	SD11;100	I/O	58	RSTCPU;100	O
09	GND	—	59	DMEN16;100	O
10	GND	—	60	PCLR;001	O
11	SD03;100	I/O	61	HLDACK;100	O
12	SD12;100	I/O	62	ROMCS;000	O
13	SD02;100	I/O	63	DMACLK;100	O
14	SD13;100	I/O	64	BALE;100	O
15	SD01;100	I/O	65	DMARDY;100	I
16	SD14;100	I/O	66	ZEROWS;000	I
17	SD00;100	I/O	67	DMAWR;000	O
18	SD15;100	I/O	68	IMCS16;000	I
19	LGREN;100	O	69	GND	—
20	RED;100	O	70	GND	—
21	BLUE;100	O	71	DMARD;000	O
22	HSYNC;100	O	72	ESMI1;000	I
23	OVSNC;100	O	73	DMAEN8;100	I
24	LA22;100	I/O	74	ESMI2;000	I
25	CRTEN;000	O	75	SA00;100	I/O
26	LA23;100	I/O	76	BUFOFF;000	I
27	\$24MHZ;100	O	77	SA01;100	I/O
28	LA21;100	I/O	78	SA12;100	I/O
29	GND	—	79	SA02;100	I/O
30	GND	—	80	SA13;100	I/O
31	IIRDY;100	I	81	SA03;100	I/O
32	LA19;100	I/O	82	SA14;100	I/O
33	ALED;100	I	83	SA04;100	I/O
34	LA20;100	I/O	84	SA15;100	I/O
35	IIO16;000	I/O	85	SA05;100	I/O
36	SBHE;000	I/O	86	SA16;100	I/O
37	DRVSL;000	I	87	SA06;100	I/O
38	LA17;100	I/O	88	SA17;100	O
39	LA18;100	I/O	89	GND	-
40	IOCHCK;000	I	90	SA18;100	O
41	CPHLDA;100	O	91	SA07;100	I/O
42	EICS16;000	I	92	RTCBAT	I
43	IRQ8;100	O	93	SA08;100	I/O
44	EMCS16;000	I	94	SA19;100	O
45	INTA;000	O	95	SA09;100	I/O
46	IRQ13;100	O	96	B5V	-
47	INTR;100	O	97	SA10;100	I/O
48	IRQ0;100	O	98	12V	-
49	GND	-	99	SA11;100	I/O
50	GND	-	100	B5V	-

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

Table C-8 Joint connector 2 pin assignments (60-pin)

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

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

Table C-9 Backup battery connector pin assignments (2-pin)

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

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

Table C-10 PS IF connector pin assignments (60-pin)

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

C.11 PJ15 Microphone Connector (3-Pin)

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

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

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

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

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

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

Table C-13 PRT/FDD connector (for printer) pin 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.14 PJ303 PRT/FDD Connector (for FDD) (25-Pin)

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

Pin	Signal	I/O	Pin	Signal	I/O
01	RDY	I	14	LOWD	O
02	INDX	I	15	SSEL	O
03	TRO	I	16	DIRC	O
04	WPR	I	17	STEP	O
05	RDAT	I	18	GND	—
06	DKCH	I	19	GND	—
07	N/C	—	20	GND	—
08	N/C	—	21	GND	—
09	N/C	—	22	GND	—
10	DSL	O	23	GND	—
11	MON	O	24	GND	—
12	WDAT	O	25	GND	—
13	WEN	O			

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

Table C-15 FDD (Int) connector pin 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.16 PJ305 HDD I/F Connector (60-Pin)

Table C-16 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.17 PJ306 Serial I/F Connector (9-Pin)

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

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

C.18 PJ307 Expansion Connector (150-Pin)

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

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

Table C-18 Expansion connector pin 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	MOUSDT;100	I/O
76	SD11;101	I/O	121	MOUSCK;100	I/O
77	SD12;101	I/O	122	GND	—
78	IRQ12;101	I	123	STROB;000	I/O
79	GND	—	124	PDB00;100	I/O
80	SD13;101	I/O	125	PDB01;100	I/O
81	SD14;101	I/O	126	PDB02;100	I/O
82	IRQ6;101	I	127	PDB03;100	I/O
83	SD15;101	I/O	128	PDB04;100	I/O
84	LA22;101	I/O	129	PDB05;100	I/O
85	LA23;101	I/O	130	PDB06;100	I/O
86	DRQ2;101	I	131	PDB07;100	I/O
87	LA21;101	I/O	132	ACK;000	I/O
88	LA19;101	I/O	133	BUSY;101	I/O
89	LA20;101	I/O	134	PE;100	I/O
90	DACK6;001	O	135	SELCT;100	I/O
91	GND	—	136	AUTFD;000	I/O
92	REFRSH;001	I/O	137	ERROR;000	I/O
93	LA18;101	I/O	138	PINT;000	I/O
94	MASTER;001	I	139	SLIN;000	I/O
95	LA17;101	I/O	140	GND	—
96	SBHE;001	I/O	141	SD1;000	I
97	IOCHCK;001	I	142	DTR1;100	I
98	EMCS16;001	I	143	RTS1;100	I
99	GND	—	144	DCD1;100	O
100	EICS16;001	I	145	RD1;000	O
101	DACK2;001	O	146	DSR1;100	O
102	DRQ6;101	I	147	CTS1;100	O
103	DRQ5;101	I	148	RI1;100	O
104	DACK5;001	O	149	GND	—
105	MERD;001	I/O	150	GND	—

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

Table C-19 PCMCIA slot 1 connector pin 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.20 PJ309 PCMCIA Slot 2 Joint Connector 1 (40-Pin)

Table C-20 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.21 PJ310 PCMCIA Slot 2 Joint Connector 2 (40-Pin)

Table C-21 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.22 PJ311 CRT I/F Connector (15-Pin)

Table C-22 CRT I/F connector 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.23 PJ312 PS/2 Mouse Connector (6-Pin)

Table C-23 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.24 PJ313 PS/2 Keyboard I/F Connector (6-Pin)

Table C-24 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.25 PJ314 Microphone Jack Connector (6-Pin)

Table C-25 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.26 PJ316 Headphone Jack Connector (6-Pin)

Table C-26 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.27 PJ317 Sound Controller Board Connector (40-Pin)

Table C-27 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	LPHON;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				ϕ	°
9	○	↓	)	9	I	Y	i	y	ë	Ö	Γ				θ	•
A	●	→	*	:	J	Z	j	z	è	Ü	Γ				Ω	•
B	♂	←	+	;	K	[	k	{	ï	ç	½				δ	√
C	♀	└	,	<	L	\	l	!	↑	£	¼				∞	π
D	♪	↔	-	=	M	]	m	}	ì	¥	ì				φ	2
E	♪	▲	.	>	N	^	n	~	Ä	Pt	«				€	■
F	⚙	▼	/	?	O	_	o	Δ	Å	f	»				∩	BLANK FF

Appendix E Keyboard Scan/Character Codes

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

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

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

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

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

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

NOTES: 1* Scan codes differ by mode.

2* Scan codes differ by overlay function.

3* Combination with **Fn** key makes different codes.

4* **Fn** key does not generate a code by itself.

5* This key corresponds to key No. 42 in 102-key model.

6* Refer to table D-6, scan codes with **Ctrl** key.

7* Refer to table D-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>
<i>Set 1</i>	<i>E0 AA</i>	<i>E0 B6</i>
	<i>E0 2A</i>	<i>E0 36</i>
<i>Set 2</i>	<i>E0 F0 12</i>	<i>E0 F0 59</i>
	<i>E0 12</i>	<i>E0 59</i>

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

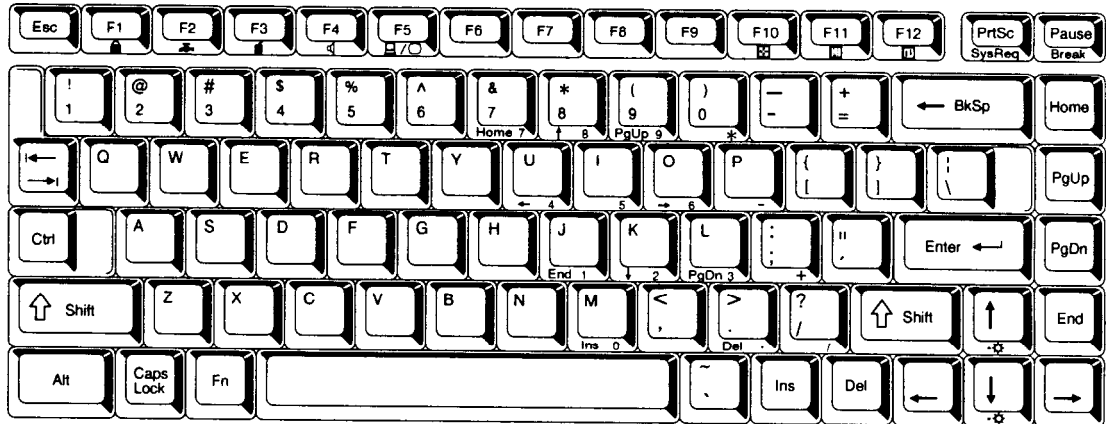


Figure F-1 US keyboard

F.2 United Kingdom (UK) Keyboard

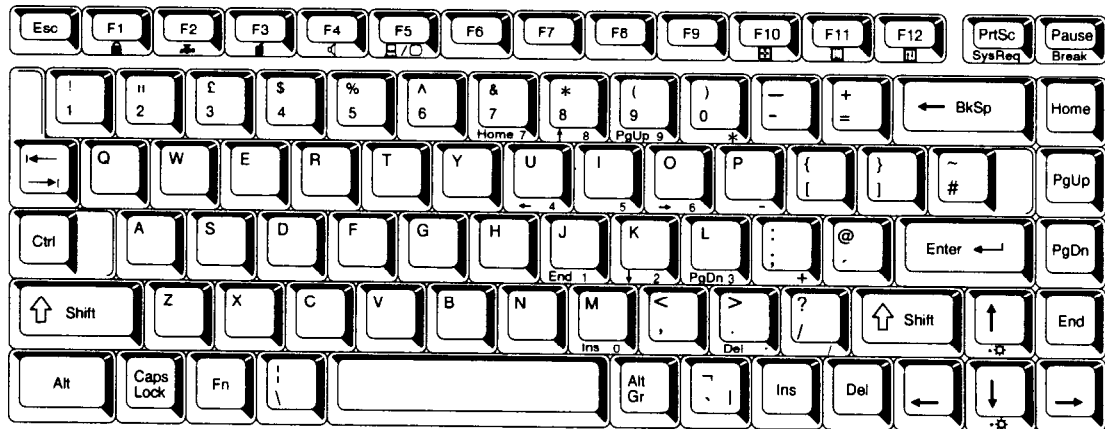


Figure F-2 UK keyboard

F.3 German (GR) Keyboard

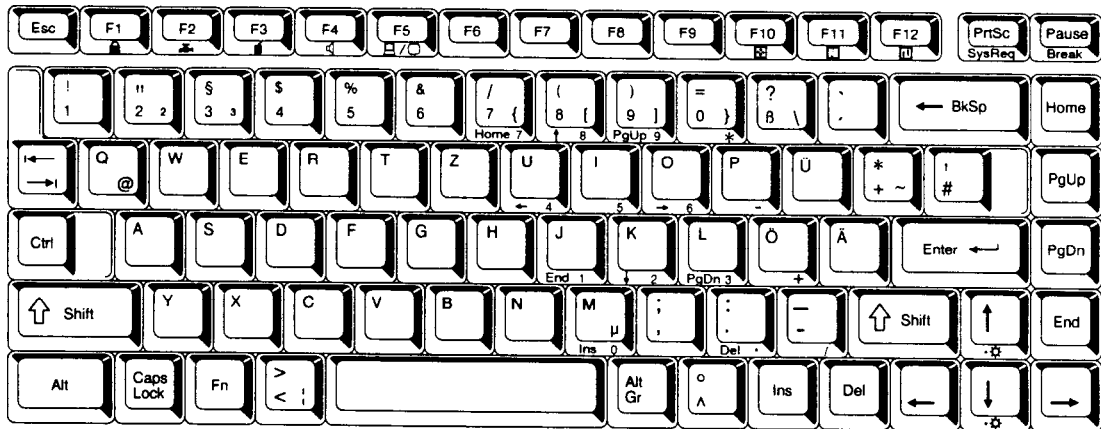


Figure F-3 GR keyboard

F.4 French (FR) Keyboard

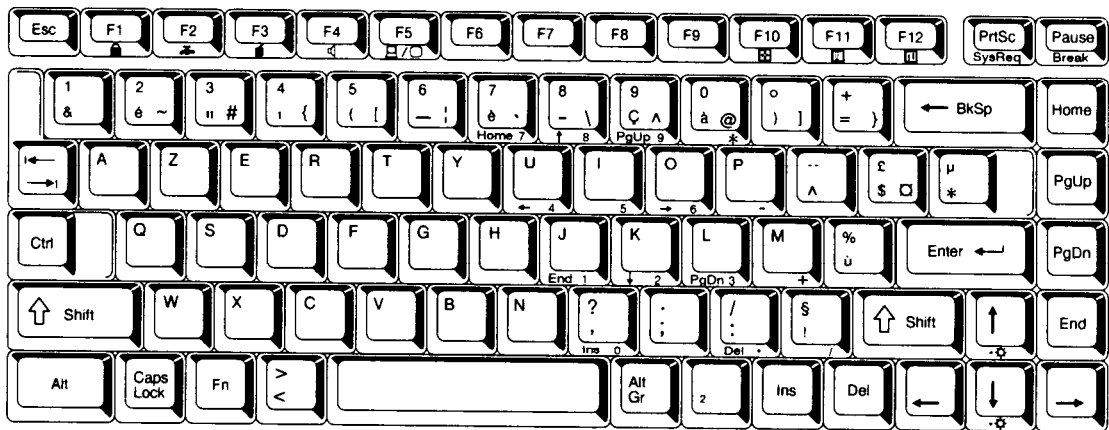


Figure F-4 FR keyboard

F.5 Spanish (SP) Keyboard

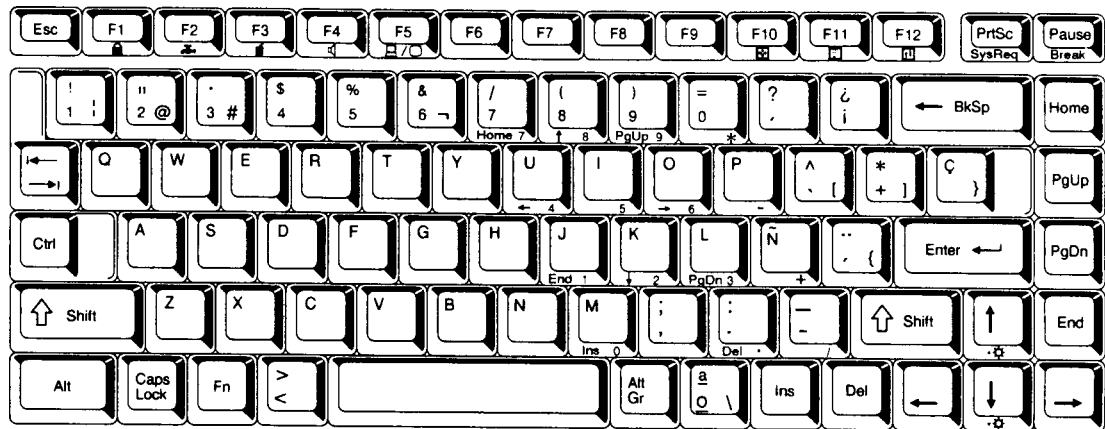


Figure F-5 SP keyboard

F.6 Italian (IT) Keyboard

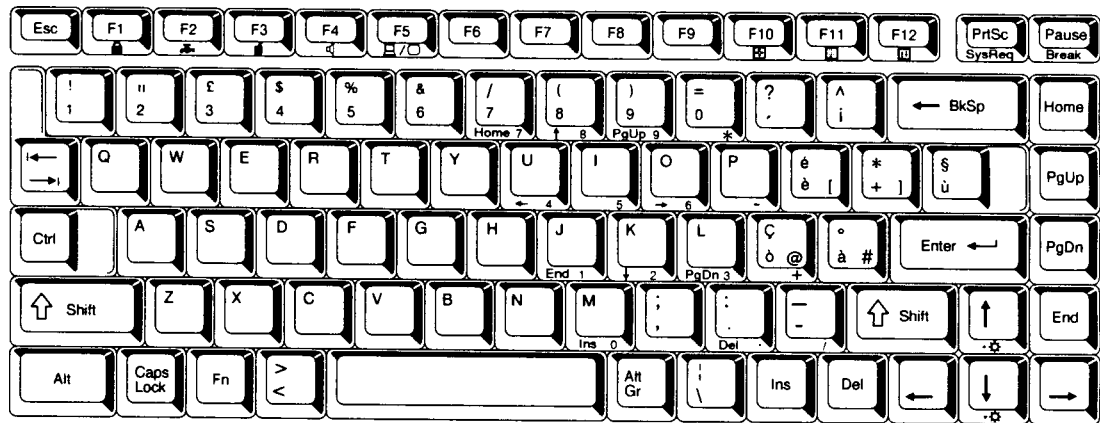


Figure F-6 IT keyboard

F.7 Scandinavian (SC) Keyboard

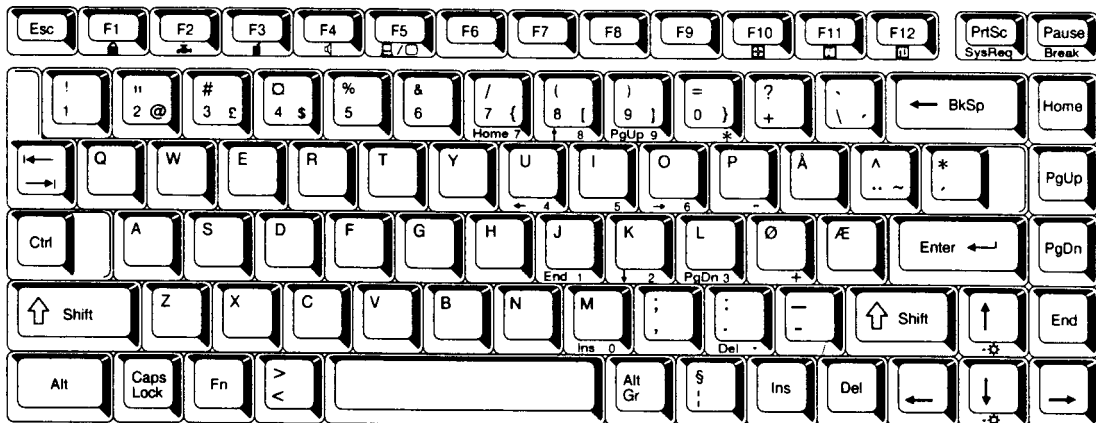


Figure F-7 SC keyboard

F.8 Swiss-German (SL) Keyboard

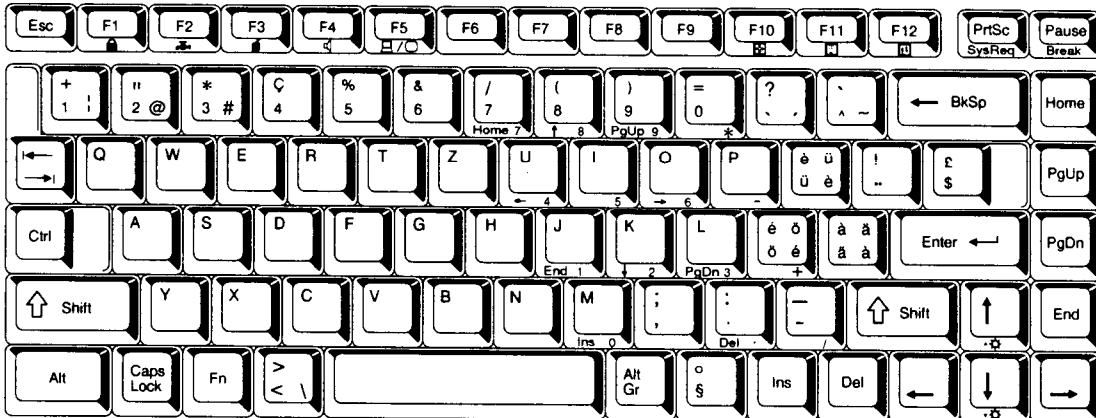


Figure F-8 SL keyboard

F.9 Canadian (Specialized) Keyboard

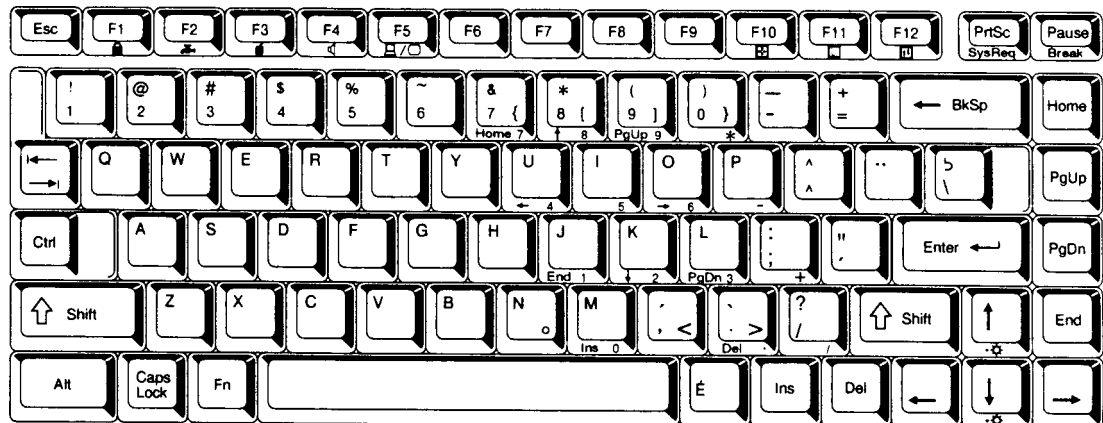


Figure F-9 Canadian keyboard

F.10 Keycap Number Keyboard

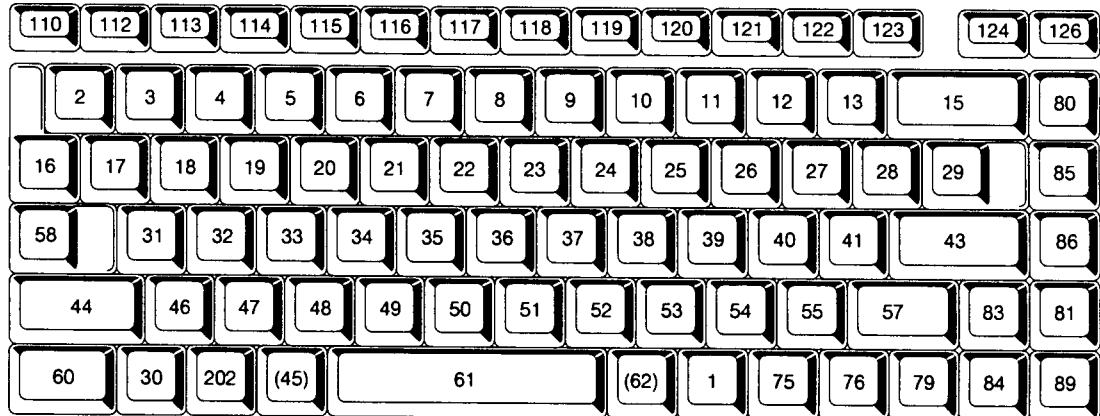


Figure F-10 Keycap number keyboard

Appendix G Wiring Diagrams

G.1 Printer Wraparound Connector

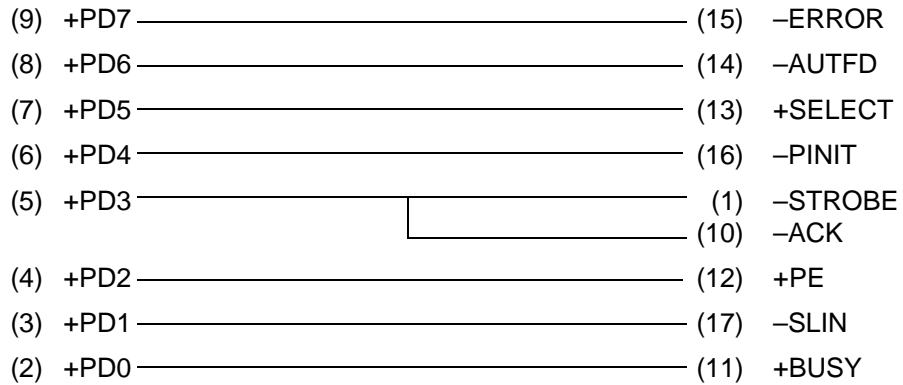


Figure G-1 Printer wraparound connector

G.2 RS-232-C Wraparound Connector

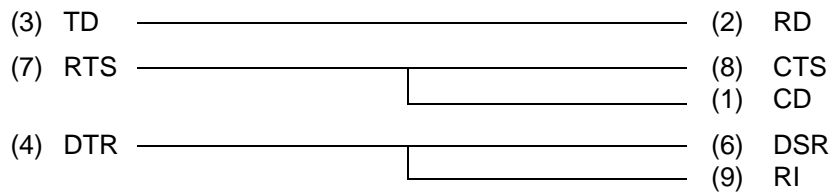


Figure G-2 RS-232-C wraparound connector

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

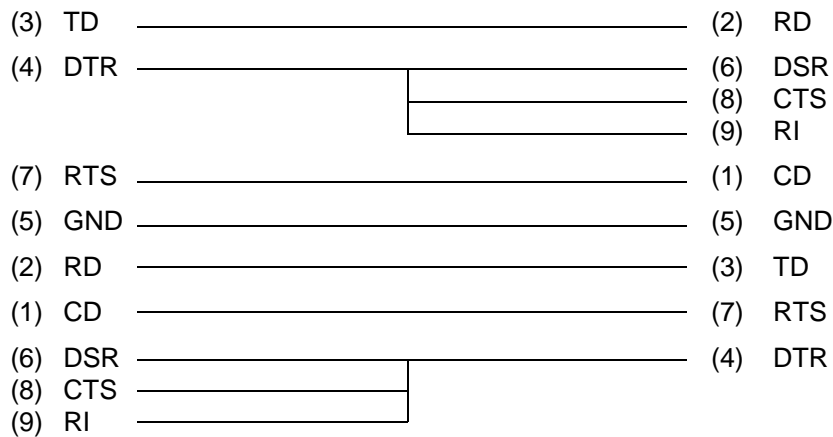


Figure G-3 RS-232-C direct cable (9-pin to 9-pin)

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

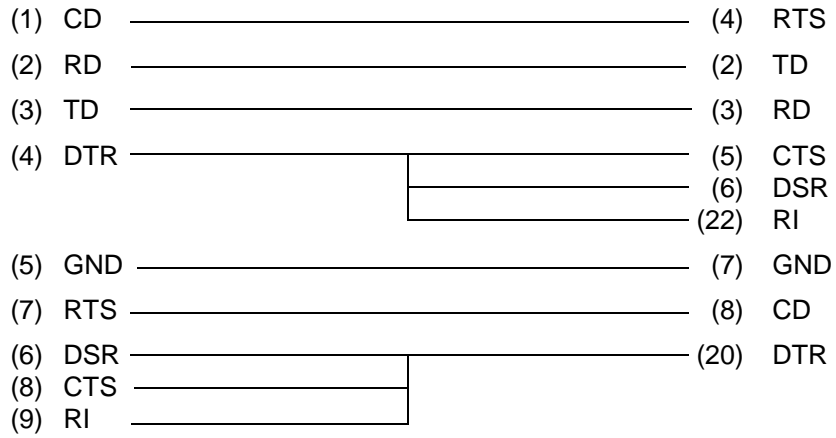


Figure G-4 RS-232-C direct cable (9-pin to 25-pin)

Appendix H Deleting the Password

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

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

Appendix I BIOS Rewrite Procedures

This Appendix explains how to rewrite the system BIOS program when updating the BIOS on the T4850CT computer.

Tools

To rewrite the BIOS, the following tool is required:

- BIOS rewrite disk for the T4850CT

Rewriting the BIOS

1. Set the system to Boot Mode.
2. Turn off the power to the computer.
3. Remove the external cable, optional 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 BIOS rewrite disk and restart the system.