

1.1 Features

The Toshiba T200/T200CS Pen Computer uses extensive Large Scale Integration (LSI), and Complementary Metal-Oxide Semiconductor (CMOS) technology to provide minimum size and weight, low power usage and high reliability. These computers include the following:

Microprocessor

The T200/T200CS uses an SL Enhanced Intel 486DX2-40 microprocessor that operates at 40 MHz and 3.3 volts.

Math co-processor

The T200/T200CS has a math co-processor stored in the i486DX2 microprocessor.

Cache memory

The T200/T200CS has an 8 KB cache memory stored in the i486DX2 microprocessor.

Disk storage

The T200/T200CS has an internal 1.8-inch IDE 80 Megabyte (MB) Hard Disk Drive (HDD).

Memory

The T200/T200CS comes standard with 4 MB of CMOS RAM. This includes 640 KB of conventional memory and 3,328 KB of extended memory, which can be utilized as expanded memory compatible with Lotus/Intel/Microsoft Expanded Memory Specifications (LIM-EMS).

Display screen

The T200 has a 9.5-inch high resolution monochrome Liquid Crystal Display (LCD) which displays 640x480 pixels with a 16-level gray scale, and an electromagnetic derivative tablet (transreflective).

The T200CS has a 9.5-inch high resolution Supertwist Nematic (STN) color LCD which displays 640x480 pixels and 256 colors, and an electromagnetic derivative tablet.

The T200/T200CS internal display controller supports Video Graphics Array (VGA) on the internal/external display and Super VGA (SVGA) on the external display.

Batteries

The T200/T200CS has three different batteries: a main battery, a backup battery, and a Real Time Clock (RTC) battery.

Exp. memory slot

An optional 4, 8, or 16 MB memory card can be installed in the memory slot.

PC card slot (Type II, Type III)

The T200/T200CS has two PC card slots which support Personal Computer Memory Card International Association (PCMCIA) standard version release 2.0 and MiNC Toshiba modem card.

FDD port

An optional external 3.5-inch Floppy Disk Drive (FDD) supports 2HD (1.44 Mbytes) floppy disks and 2DD (720 Kbytes) floppy disks.

Printer port

The T200/T200CS's Centronics-compatible printer interface port can be connected to the printer through a parallel printer cable.

Serial port

The T200/T200CS has one 9-pin serial interface port.

Ext. keyboard port

The T200/T200CS has an external keyboard interface port for connection with a PS/2-compatible keyboard.

Ext. monitor port

The T200/T200CS has an external monitor interface port for connection with an analog VGA or SVGA display.

72-pin Expansion port

The T200/T200CS has a 72-pin Expansion port which enables connection of a 72-pin Expansion connector. The Expansion port allows connection of a PS/2 keyboard, external monitor, printer, serial I/O and optional 3.5-inch FDD.

Stylus

The T200/T200CS has one cordless stylus (pen), which is used to enter information into the computer. The stylus does not need batteries.

The T200/T200CS Pen Computer is shown in Figure 1-1. Its system configuration is shown in Figure 1-2.

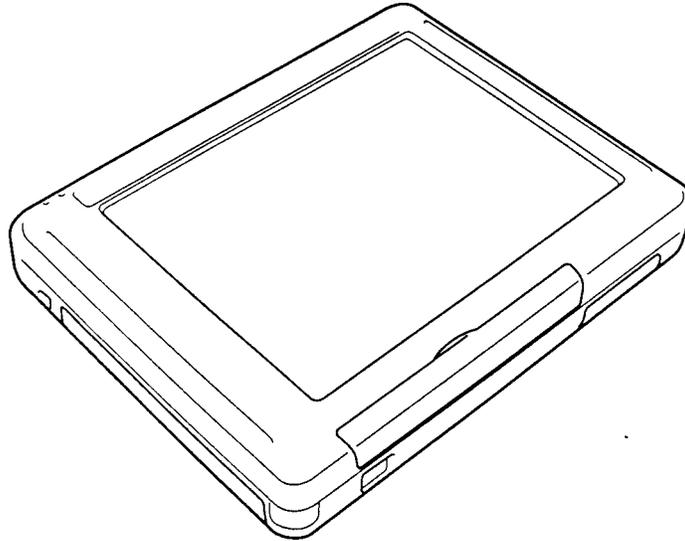


Figure 1-1 T200/T200CS Pen Computer

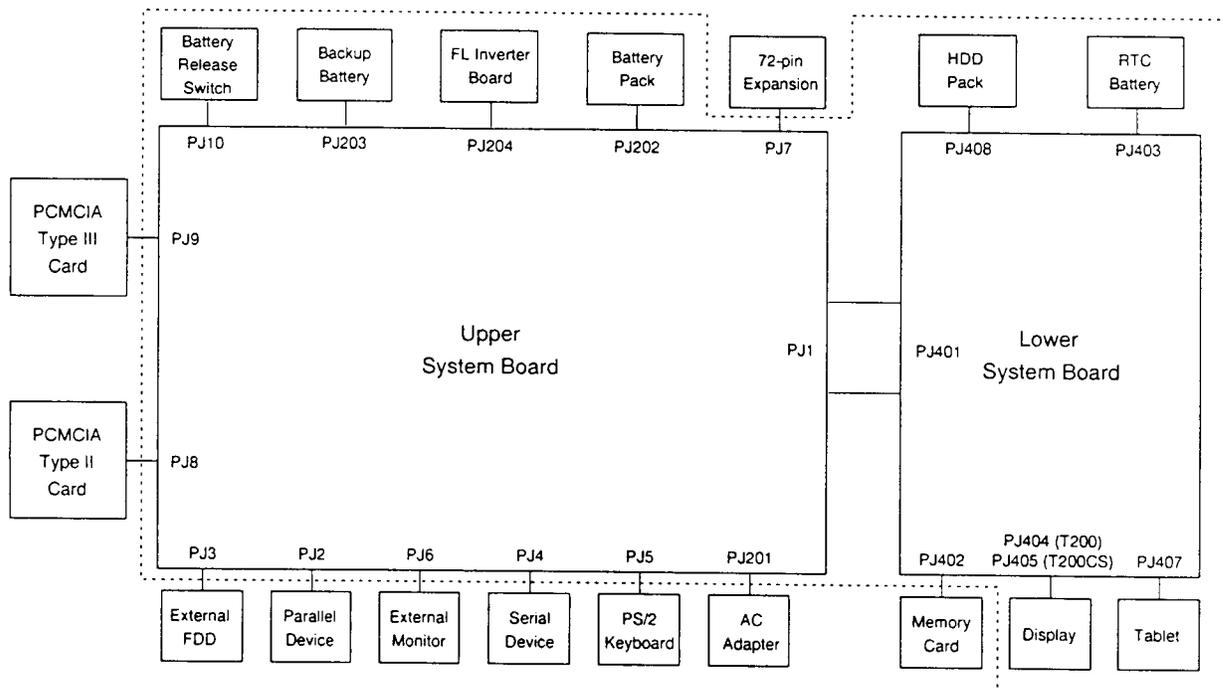
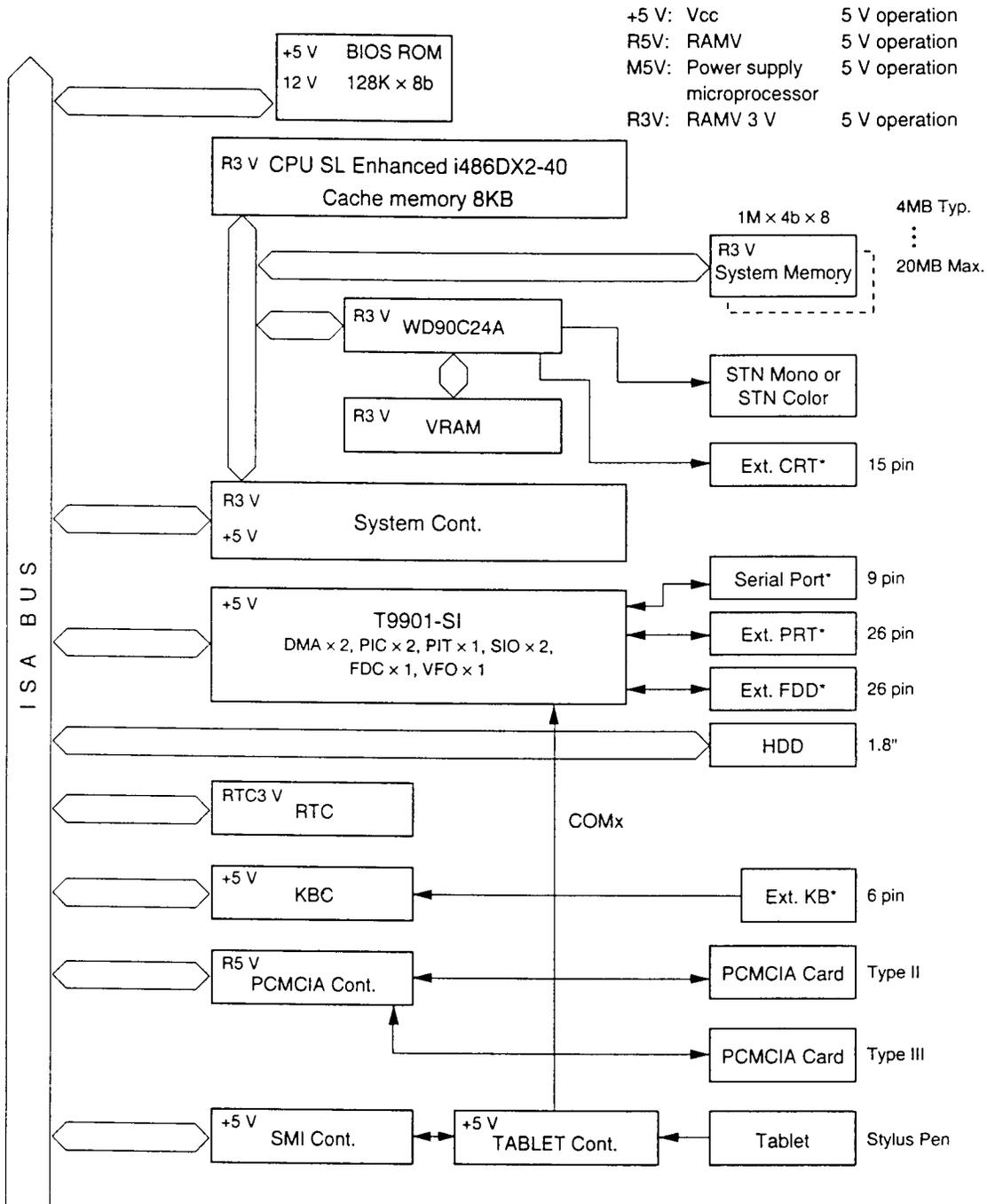


Figure 1-2 T200/T200CS System Unit Configuration

1.2 System Unit Block Diagram

Figure 1-3 is a block diagram of the computer's system unit.



* These port signals also output to the 72-pin Expansion port.

Figure 1-3 Block Diagram

The computer's system board is composed of the following major components:

- ❑ SL Enhanced i486DX2-40
- ❑ 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
 - Two Serial Input/Output Controllers (SIO): TC8570
 - One Variable Frequency Oscillator (VFO): TC8568
 - One I/O Controller
 - One Printer Port Controller
 - One Speaker Controller

- ❑ A Real Time Clock (RTC)

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

OSC (X2) generates 32.768 KHz for RTC.

- ❑ A Keyboard Controller (KBC)

One 80C42 chip is used. This KBC includes the keyboard interface controller and controls the external keyboard.

- ❑ The following memories:

Standard RAM:	4 MB
Cache memory:	8 KB (inside CPU)
BIOS ROM:	128 KB (96 KB are used)
	This ROM contains Initial Reliability Test (IRT), Basic Input/Output System (BIOS), and video BIOS.
Video RAM:	256 KB
	Optional memory cards expand memory to a maximum of 20 MB.

- ❑ VGA display controller (WD90C24A)

This controller controls internal VGA display and external SVGA compatible display.

- ❑ Clock Generator receives 14.31818 MHz (X3) and generates the following frequencies:

- 20 MHz for the CPU (CPU operates at 40MHz.)
- 14.7477 MHz for the COM
- 24 MHz for the FDC and VFO
- 16 MHz is used for the System Controller GA
- 14.31818 MHz is used for the T9901 (SI)

□ Gate Arrays

System Controller Gate Array

This gate array has the following functions:

- CPU Controller
- Memory Controller
 - DRAM Controller
 - Compatible Bus Interface Controller
- SMI Controller
- VL Bus Controller
- Bus Controller
 - Compatible Bus Interface Controller
 - Compatible Access Controller
 - DMA 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
 - Saving the data of the Register (in resume) Controller
 - Toshiba Special Register
- Processing Speed Controller
- Data Bus Change Controller
- Data Latch

PCMCIA Controller Gate Array

This gate array has the following functions:

- Memory Card Controller
 - PCMCIA IC Card Controller
 - Toshiba Modem Card Controller

SMI Controller Gate Array

This gate array has the following functions:

- Tablet Controller
 - Tablet Microprocessor Communication Controller
 - SMI Controller

- Others
 - Contrast Adjust PWM Controller

1.3 Optional External 3.5-inch Floppy Disk Drive

The computer's optional 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 computer's FDD is shown in Figure 1-4. The specifications for the FDD are provided in Table 1-1.

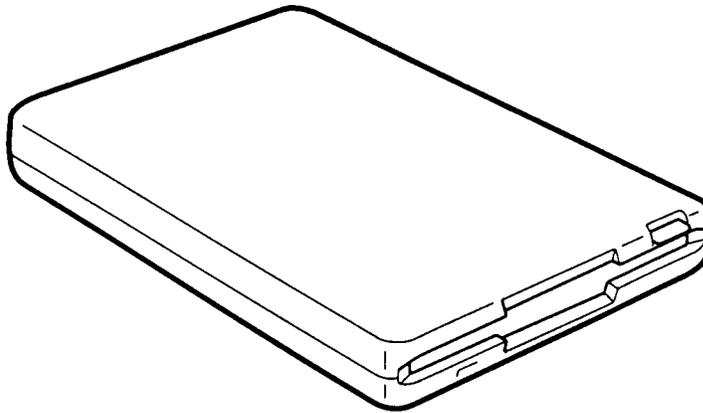


Figure 1-4 3.5-Inch FDD

Table 1-1 3.5-Inch FDD Specifications

Item	2-MB mode	1-MB mode
Storage capacity (KB)		
Unformatted	2,000	1,000
Formatted	1,474	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 1.8-inch Hard Disk Drive

The computer's 80-MB (formatted) Hard Disk Drive (HDD) is a random access non-volatile storage device. It has a non-removable 1.8-inch magnetic disk and mini-winchester type magnetic heads.

The HDD is shown in Figure 1-5. Specifications for the HDD are provided in Table 1-2.

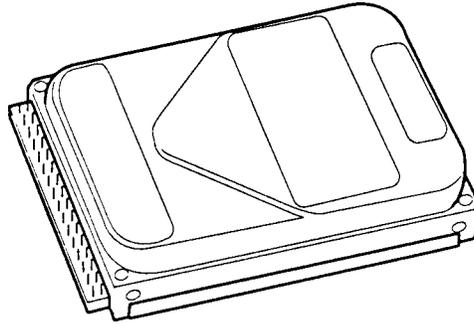


Figure 1-5 1.8-Inch HDD

Table 1-2 1.8-Inch HDD Specifications

Item	80 MB (ZA1094)
Storage capacity (MB) Formatted	85.0
Number of disks	2
Data heads	3
Data surfaces	3
Tracks per surface	2,750
Sectors per track	20
Bytes per sector	512
Access time (ms) Track to track Average Maximum	8 18 35
Rotation speed (rpm)	3,571
Data transfer rate (bps) To/from media	2.5M
Interleave	1:1
Recording method	1-7 RLL

1.5 Monochrome LCD

The monochrome LCD is composed of an LCD module, a Fluorescent Lamp (FL), and an FL inverter board.

1.5.1 Monochrome LCD Module

The computer's monochrome LCD supports 640 x 480 pixels with a video controller and 16 levels of gray. The video controller includes the functions of the VGA and SVGA for external display.

The LCD receives vertical and horizontal synchronizing signals, 8-bit data signals (4-bit upper block data signal and 4-bit lower block data signal), and shift clock for data transmission. All signals are CMOS-level compatible.

The sidelit LCD is shown in Figure 1-6 and its specifications are provided in Table 1-3.

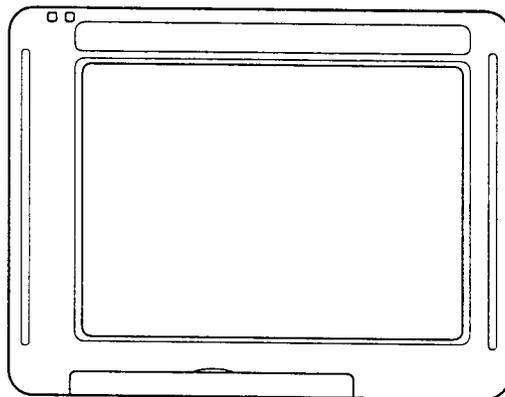


Figure 1-6 Monochrome LCD

Table 1-3 Monochrome LCD Specifications

Item		Specifications
Number of dots	(dots)	640 x 480
Dot pitch	(mm)	0.27 (W) x 0.27 (H)
Display area	(mm)	196 (W) x 147.6 (H)
Contrast		10:1 (typically)
FL current	(mA)	5.5 (r.m.s.)
FL frequency	(KHz)	39

1.5.2 Monochrome LCD Fluorescent Lamp (FL) Inverter Board

The FL inverter board supplies the high-frequency current needed to illuminate the LCD's FL. The FL inverter board is shown in Figure 1-7 and its specifications are provided in Table 1-4.

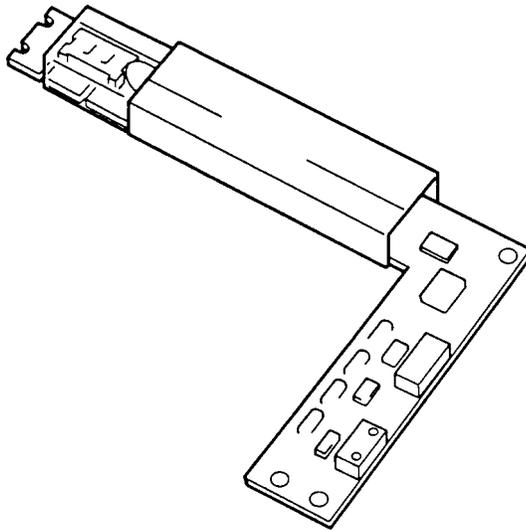


Figure 1-7 Monochrome LCD FL Inverter Board

Table 1-4 Monochrome LCD FL Inverter Board Specifications

Item			Specifications
Input	Voltage	(VDC)	5
	Power	(W)	2.7
Output	Voltage	(VAC)	1,100 (r.m.s)
	Current	(mA)	5.5 (r.m.s)
	Frequency	(KHz)	39

1.6 STN Color LCD

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

1.6.1 STN Color LCD Module

The computer's STN color LCD supports 640x480 pixels with a video controller. This video controller includes the functions of VGA and SVGA for external display.

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

The STN LCD is shown in Figure 1-8. The LCD specifications are provided in Table 1-5.

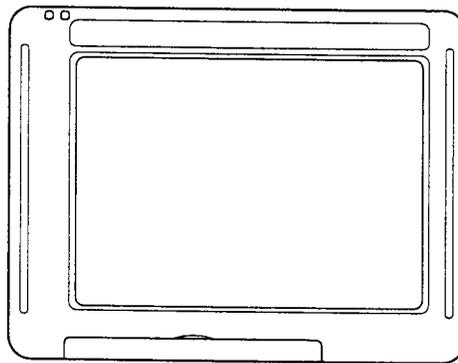


Figure 1-8 STN Color LCD

Table 1-5 STN Color LCD Specifications

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

1.6.2 STN Color LCD Fluorescent Lamp (FL) Inverter Board

The FL inverter board supplies high frequency current to light the LCD's Fluorescent Lamp. The FL inverter board is shown in Figure 1-9 and its specifications are described in Table 1-6.

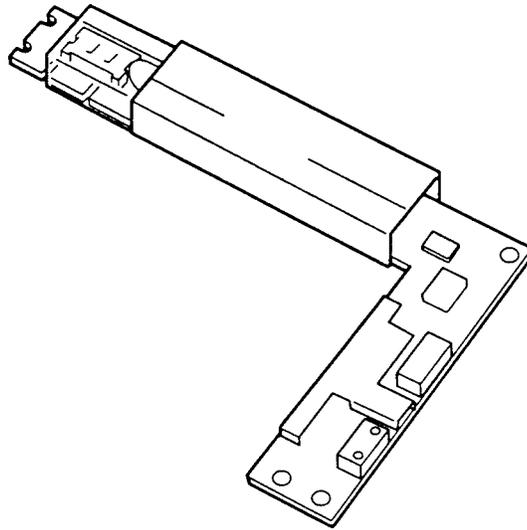


Figure 1-9 STN Color LCD FL Inverter Board

Table 1-6 STN Color LCD FL Inverter Board Specifications

Item		Specifications
Input	Voltage (VDC)	5
	Power (W)	4
Output	Voltage (VAC)	1,100 (r.m.s.)
	Current (mA)	6.0 (r.m.s.)
	Frequency (KHz)	47

1.7 Tablet

The tablet is the internal digitizer, which also acts as the interface between the stylus and the computer.

The tablets are shown in Figures 1-10 and 1-11 and their specifications are provided in Table 1-7.

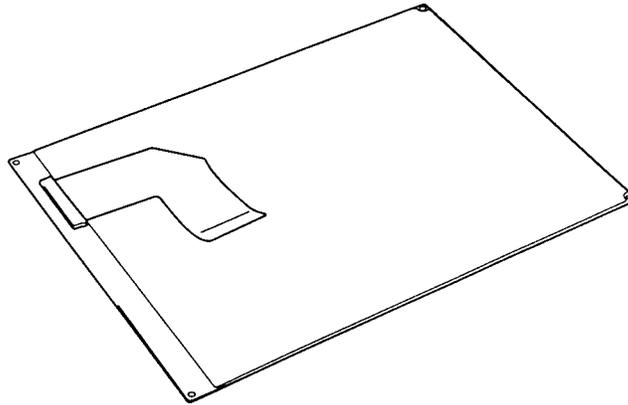


Figure 1-10 T200 Tablet

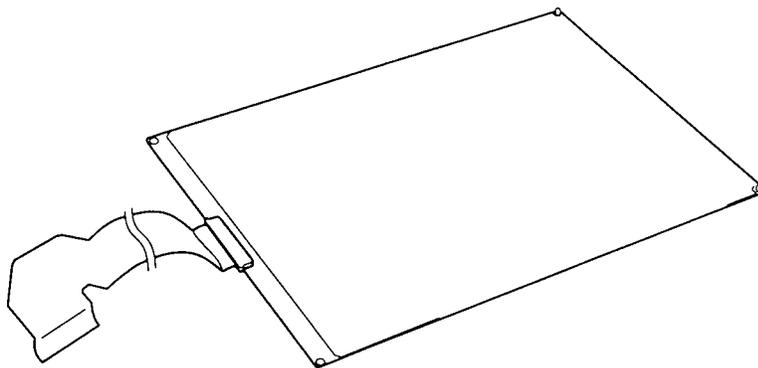


Figure 1-11 T200CS Tablet

Table 1-7 Tablet Specifications

Item		Specifications
Material		Electromagnetic derivative
Voltage	(VDC)	5V
Current	(mA)	30 (In use) 23 (In suspend) 5.2 (In sleep)
Resolution	(mm)	0.1
Precision	(mm)	±0.4
Data transfer	(point/sec)	205

1.8 Power Supply

The power supply supplies five kinds of voltages to the computer's system board. The computer's power supply has one microprocessor and it operates at 500 Hz. It contains the following functions:

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

The power supply output rating is specified in Table 1-8.

Table 1-8 Power Supply Output Rating

Use for	Name	DC voltage (V)	Regulation tolerance (%)	Maximum current (mA)	Ripple (mV)
System logic, FDD, HDD	VCC	+5	±5	1,720	100
RS-232C, Flash ROM	12V	+12	±5	120	240
RAM, CPU	B3V	+3.3	±5	1243	100
RS-232C	-9V	-9	15	15	150

1.9 Batteries

The computer has three types of batteries:

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

Battery specifications are provided in Table 1-9.

Table 1-9 Battery Specifications

Battery name	Material	Output voltage	Capacity
Main battery pack	Lithium-Ion	10.8 V	3,000 mAH
Backup battery	Nickel Metal Hydride	3.6 V	120 mAH
RTC battery	Lithium-Vanadium	3.0 V	50 mAH

1.9.1 Main Battery

The removable main battery pack is the primary power source when the AC adapter is not attached. The main battery recharges the backup battery when system power is on. The backup and main battery maintain the state of the computer system when AutoResume is enabled. The main battery is shown in Figure 1-12.

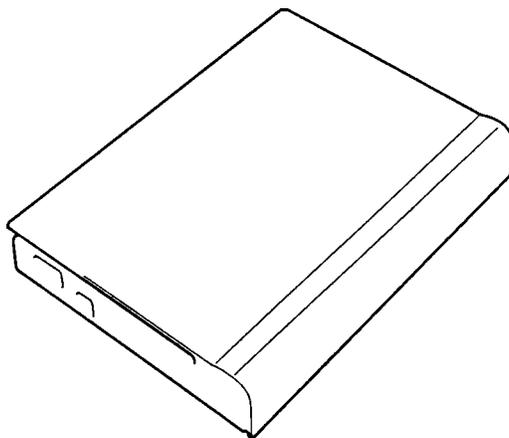


Figure 1-12 Main Battery

Battery Indicator

The battery indicator is located on the top cover of the computer. The indicator shows the status of the removable battery pack, power supply, and AC adapter. The status of each can be determined by color:

Orange The battery is being charged or an AC adapter is attached.

Green The battery is fully charged. (An AC adapter is attached.)

No light The AC adapter is disconnected from the computer or is connected, but cannot charge the battery for one of the following reasons:

- The battery is extremely hot. Allow the computer and the battery to reach room temperature before attempting to charge the battery.
- The battery is almost fully discharged and will not begin charging until a few minutes after the AC adapter is connected.
- The AC adapter is not receiving power.

1.9.2 Battery Charging Control

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

Quick Battery Charge

When the AC adapter is attached, there are two types of charge: quick charge when the system is powered off and trickle charge when powered on. Table 1-10 gives quick charging time requirements.

Table 1-10 Time Required For Quick Charges

Charge	Charging time
Quick charge (power off)	About 3 hours
Quick charge (power on)	About 8 hours

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 AC adapter output voltage is abnormal.
4. The charge current is abnormal.

Trickle Battery Charge

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

1.9.3 Backup Battery

The backup battery maintains data for AutoResume. The power source used to back up 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 1-11 shows the charging time and data preservation period of the backup battery.

Table 1-11 Backup Battery Charging/Data Preservation Time

		Time
Charging Time	Power On	10 H
	Power Off (with AC Adapter or main battery)	10 H
	Power Off (Without AC Adapter and main battery)	Doesn't charge
Data preservation period (full charge)		8 H

1.9.4 RTC Battery

The RTC battery provides power to keep the current date, time, and other setup information in memory while the computer is turned off. Table 1-12 shows the charging time and data preservation period of the RTC battery.

Table 1-12 RTC Battery Charging/Data Preservation Time

		Time
Charging Time	Power On	48 H
	Power Off	Doesn't charge
Data preservation period (full charge)		1 month

1.10 Stylus

The stylus is used to enter information into the computer by writing directly onto the screen. You can write letters or numerals to enter data, draw gestures to enter commands, or tap to select from menus.

The stylus is shown in Figure 1-13.

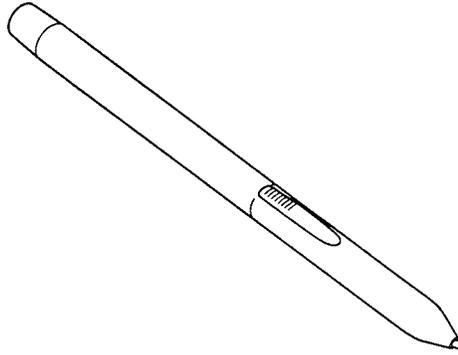


Figure 1-13 The Stylus

2.1 Troubleshooting

Chapter 2 describes how to determine if a Field Replaceable Unit (FRU) is causing a malfunction. FRUs covered are:

1. System Board
2. Floppy Disk Drive
3. Hard Disk Drive
4. Display Module
5. Tablet

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

The following tools are necessary for troubleshooting:

1. T200/T200CS Diagnostics Disk
2. Phillips-head screwdriver (2 mm)
3. 2DD or 2HD formatted work disk for FDD testing
4. Printer port LED
5. RS-232-C wraparound connector
6. Printer wraparound connector
7. Multimeter
8. Parallel cable (standard equipment)
9. External PS/2-type keyboard
10. Optional external 3.5-inch FDD

2.2 Troubleshooting Flowchart

Use the flowchart in Figure 2-1 as a guide to determine which procedures to execute. Before going through the flowchart steps, verify the following:

- Ask the user if a password is registered, and if it is, ask him or her to enter the password. If the user has forgotten the password, connect the printer port wraparound board (F31PRT), then turn the POWER switch on. The computer will skip the password function.

- Make sure all optional equipment is disconnected.

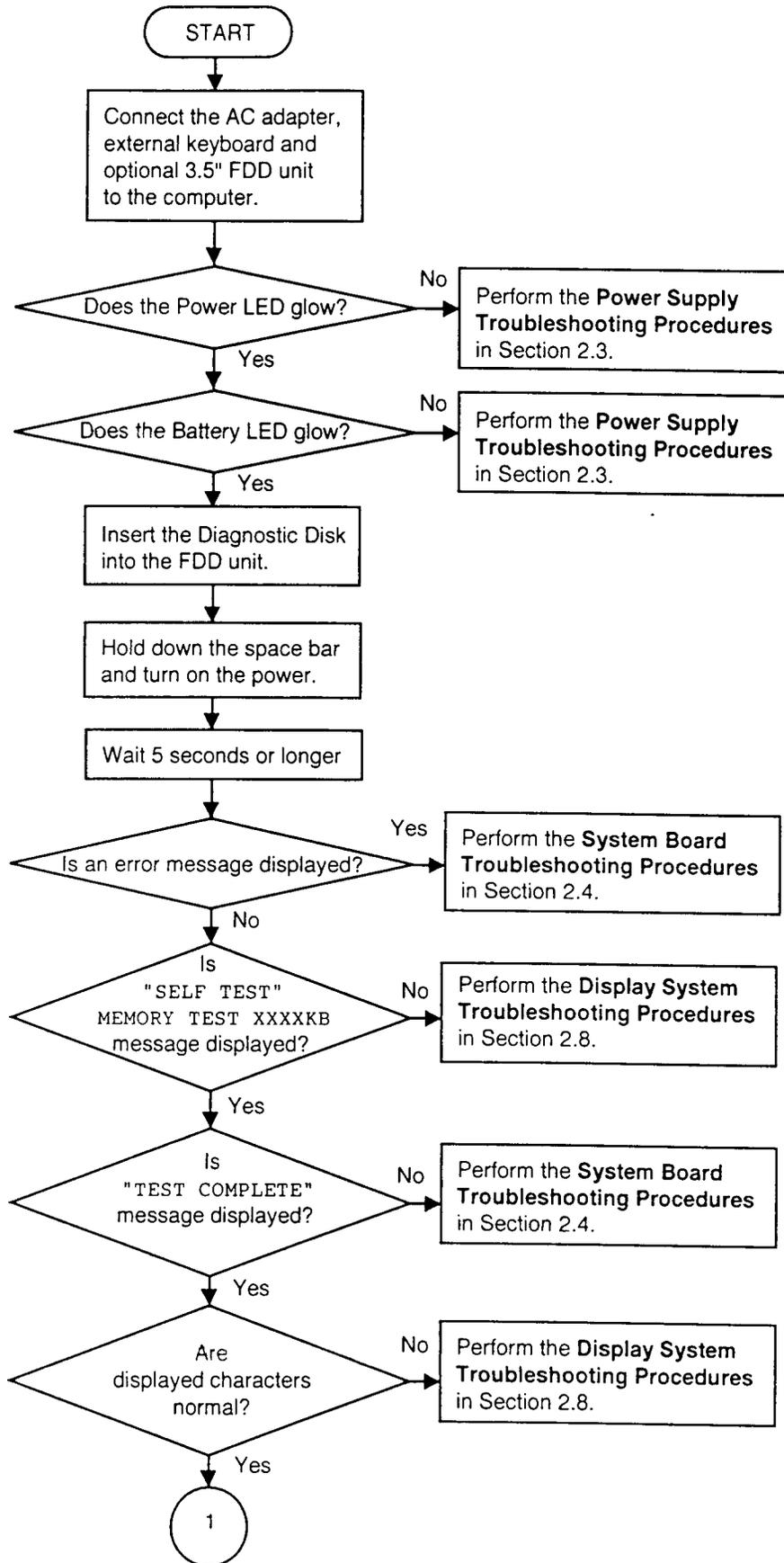


Figure 2-1 Troubleshooting Flowchart (1/2)

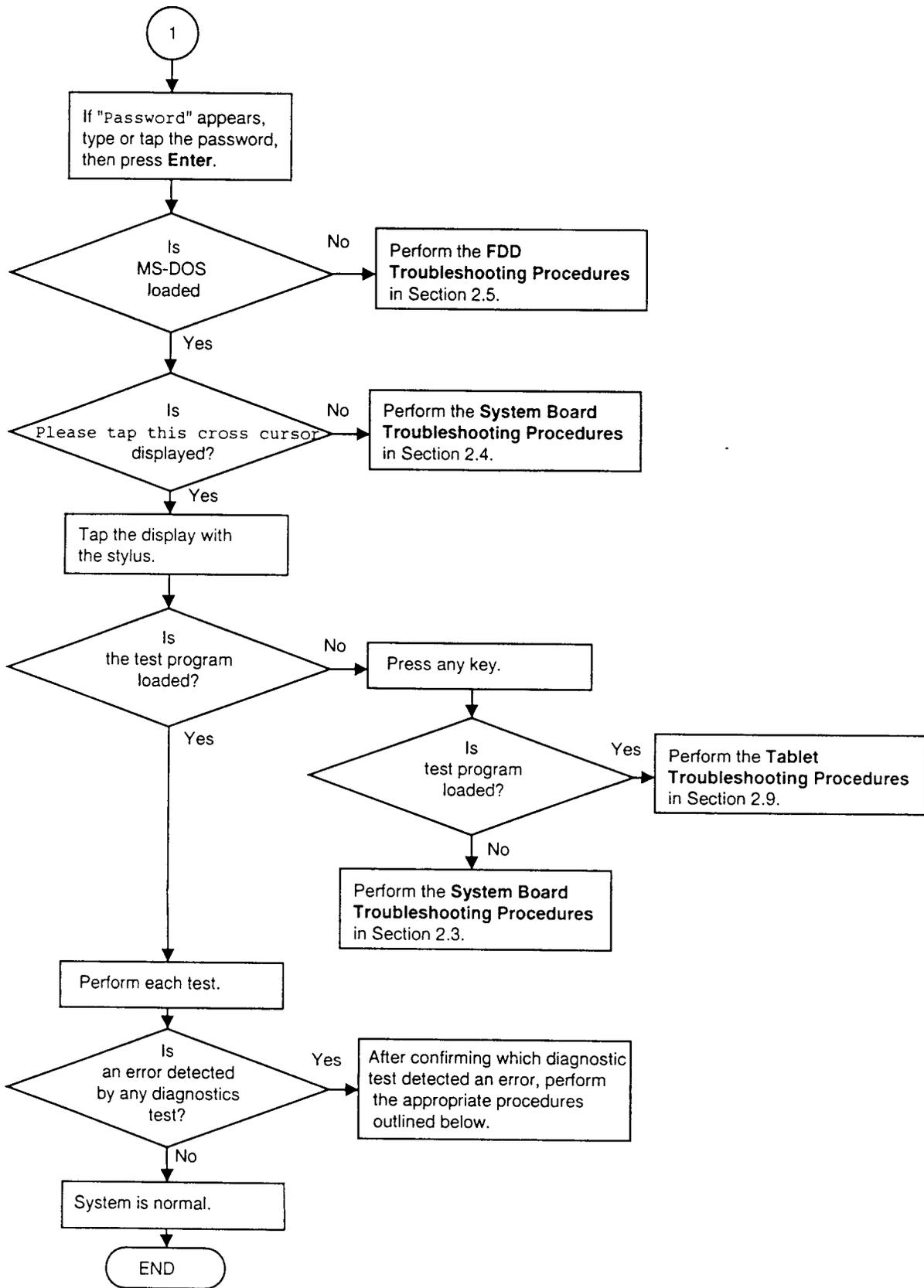


Figure 2-1 Troubleshooting Flowchart (2/2)

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 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.
5. If an error is detected on the tablet test, perform the tablet troubleshooting procedures in Section 2.9.

2.3 Power Supply Troubleshooting

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

Procedure 1: Power LED Indicator Check

Procedure 2: Battery LED Indicator Check

Procedure 3: PCB Replacement Check

Procedure 1 Power LED Indicator Check

The AC adapter converts AC to DC power and contains a charging circuit for charging the batteries. The adapter connects to the Power socket connector on the back side of the computer. When the AC adapter is connected and power is off, the AC adapter charges the batteries.

The Power LED displays whether or not the AC adapter is connected and supplying power.

- ❑ When the Power LED is green, the AC adapter is connected and supplying power to the computer.
- ❑ If the Power LED does not light, the AC adapter is not supplying power to the computer or the AC adapter is not attached to the computer, go to Check 1.
- ❑ If the Power LED is flashing orange, the AC adapter voltage supply is abnormal or the power supply is not functioning properly, go to Check 2.

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

- Check 1 Make sure the correct AC adapter cable is firmly plugged into the Power socket on the back of the computer.
- Check 2 If the Power LED flashes orange when the AC adapter is connected, its voltage output is abnormal. Connect a new AC adapter and turn the computer on again to verify the indicator condition. If the problem still exists, perform Check 3.
- Check 3 The battery pack may be malfunctioning. Replace the battery pack with a new one and turn the computer on again. If the problem persists, perform Check 4.
- Check 4 Place the computer in an environment between -20°C and 70°C until at ambient temperature. Repeat the steps which caused abnormal operation. If the same problem persists, perform Procedure 3.

Procedure 2 Battery LED Indicator Check

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

- If the Battery LED indicator glows green, the AC adapter is connected and the battery is fully charged.
- If the Battery LED indicator glows orange, the AC adapter is connected and the battery is being charged.
- If the Battery LED indicator does not glow, go to Check 1.

Check 1 Make sure the AC adapter cable and AC cord are firmly plugged into the Power socket and wall outlet. If connected correctly, go to Check 2.

Check 2 Make sure the battery pack is installed correctly. Go to Check 3 if it is.

Check 3 Remove the battery pack and check that the battery terminal is clean and not bent.

- If the terminal appears dirty, clean gently with a cotton swab dipped in alcohol.
- If the terminal looks bent or damaged, replace the upper system board.
- If the battery terminal is clean and not bent, go to Check 4.

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

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

Procedure 3 PCB Replacement Check

The power supply is mounted on the upper system board. The upper system board may be damaged. Disassemble the computer following the steps described in Chapter 4, *Replacement Procedures*, then perform the following checks.

- Check 1 Replace the upper system board with a new one and restart the system. If the problem still exists, go to Check 2.

- Check 2 Replace the lower system board with a new one and restart the system. If the problem persists, other FRUs may be damaged.

2.4 System Board Troubleshooting

This section describes how to determine if the system board is defective or not functioning properly. Start with Procedure 1 and continue as instructed. The procedures provided 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 power is turned on while the space bar is held down, the system performs the Initial Reliability Test (IRT) resident in BIOS ROM. IRT tests and initializes each IC on the system board.

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

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

Tapping the display or pressing the **F1** key as instructed causes the SETUP menu to appear. If error message (b) appears often when power is turned on, replace the RTC battery. If any other error message is displayed, perform Check 2.

- (a) *** Error in CMOS. Bad HDD type ***
Check system. Then tap any point on the screen with the stylus or press [F1] key.
- (b) *** Error in CMOS. Bad battery ***
Check system. Then tap any point on the screen with the stylus or press [F1] key.
- (c) *** Error in CMOS. Bad check sum ***
Check system. Then tap any point on the screen with the stylus or press [F1] key.
- (d) *** Error in CMOS. Bad memory configuration ***
Check system. Then tap any point on the screen with the stylus or press [F1] key.
- (e) *** Error in CMOS. Bad time function ***
Check system. Then tap any point on the screen with the stylus or press [F1] key.

Check 2 If the following error message is displayed, tap the display or press any key as the message instructs.

```
WARNING: RESUME FAILURE.  
TAP ANY POINT ON SCREEN WITH STYLUS PEN OR PRESS  
ANY KEY TO CONTINUE.
```

The error message appears when data stored in RAM under the resume function is lost because the battery is discharged or the system board is damaged. Go to Procedure 2.

If any other message appears, perform Check 3.

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

- If one of the following error messages; (1) through (17), (19), (20), (25) or (26), is displayed, replace the system board.
- If error message (18) is displayed, go to the Keyboard Troubleshooting Procedures in Section 2.7.
- If error message (21) or (22) is displayed, go to the HDD Troubleshooting Procedures in Section 2.6.
- If error message (23) or (24) is displayed, go to the FDD Troubleshooting Procedures in Section 2.5.

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

Procedure 2 Printer Port LED Check on Boot Mode

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

NOTE: When performing this check, the Power-up Mode option in the SETUP program must be set to boot mode.

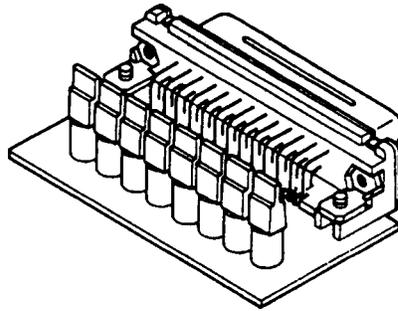


Figure 2-2 Printer Port LED

To use the printer port LED, follow these steps:

1. Turn on the computer's power, then set to boot mode.
2. Turn off the computer's power.
3. Connect the parallel cable (standard equipment) to the PRT port.
4. Plug the printer port LED into the computer's parallel cable.
5. Connect the external keyboard to the KB port.
6. Hold down the space bar and turn on the computer's power.
7. Read the LED status from left to right.
8. Convert the status from binary to hexadecimal notation.
9. If final LED status is FFh (normal status), go to Procedure 3.
10. If final LED status matches any of the test status values in Table 2-1, perform Check 1.

NOTE: If an error condition is detected by the IRT, the printer port LED displays an error code after the IRT ends. For example, when the printer port LED displays 1F and halts, the IRT has already completed display initialization. In this instance, the IRT indicated an error was detected during system memory test.

Table 2-1 Printer Port LED Boot Mode Error Status (1/2)

Error status	Test item	Message
01H 02H 03H 04H 05H 06H 07H 08H 09H	System test Test start PIT test end SM-RAM stack enable CMOS test end KBC initialization, self-test-skip-request-test and tablet initialization end DRAM size test end System BIOS ROM/RAM copy end Display control end Test end	-
0AH*	First 64KB memory test	FIRST 64KB MEMORY ERROR
0BH**	System memory initialization	-
0CH	System initialization	-
0DH	Interrupt vector initialization	-
18H	PIC initialization	-
1FH	Display initialization	CRTC ERROR
		VRAM ERROR READ DATA = XXXXXXXXXH WRITE DATA = XXXXXXXXXH
25H	System memory test	SYSTEM MEMORY ERROR
		ADDRESS = XXXXXXXXXH READ DATA = XXXXXXXXXH WRITE DATA = XXXXXXXXXH
		SYSTEM MEMORY PARITY ERROR ADDRESS = XXXX0000H - XXXXFFFFH
30H (Error) 33H (Normal)	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
41H*	DMAC test	DMAC #1 ERROR READ DATA = XXXXH WRITE DATA = XXXXH
		DMAC #2 ERROR READ DATA = XXXXH WRITE DATA = XXXXH
42H	DMAC initialization	-

Table 2-1 Printer Port LED Boot Mode Error Status (2/2)

Error status	Test item	Message
4AH*	PIC test	PIC #1 ERROR READ DATA = XXH WRITE DATA = XXH
		PIC #2 ERROR READ DATA = XXH WRITE DATA = XXH
50H	Mouse initialization	-
55H	KBC initialization	KBC ERROR
5AH	Boot password1 (checks for access right)	-
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	-
C0H	Boot password2 (checks for no access right)	-
FEH	Pre-boot setup	-
FFH	Expansion system ROM	-

NOTES:

* These error codes are not displayed on hot boot mode.

** This error code is not displayed on cold boot mode.

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

01h, 02h, 03h, 04h, 05h, 06h, 07h, 08h, 09h, 0Ah, 0Bh, 0Ch, 0Dh, 18h, 1Fh,
25h, 30h, 33h, 40h, 41h, 42h, 4Ah, 50h, 55h, 5Ah, 60h, 65h, 70h, 80h, 90h,
A0h, A6h, C0h, FEh

Check 2 If error code **5Ah** is displayed, go to the HDD Troubleshooting Procedures in Section 2.6.

Check 3 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 IRT and test status by turning lights on and off as an eight-digit binary value for resume mode.

NOTE: When performing this check, the Power-up option in the SETUP program must be set to resume mode.

To use the printer port LED, follow these steps:

1. Turn on the computer's power, then set to resume mode.
2. Turn off the computer's power.
3. Connect the parallel cable (standard equipment) to the PRT port.
4. Plug the printer port LED into the parallel cable.
5. Connect the external keyboard to the KB port.
6. Turn on the computer's power.
7. Read the LED status from left to right.
8. Convert the status from binary to hexadecimal notation.
9. If final LED status is FFh (normal status), go to Procedure 3.
10. If final LED status matches any of the test status values in Table 2-2, perform Check 1.

Table 2-2 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 (Card modem will be removed while 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 the tests.

1. System test
2. Memory test
3. Printer test
4. ASYNC test
5. Real Timer test
6. PCMCIA test
7. Tablet test
8. NDP test

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

Procedure 5 Connection and Replacement Check

The system board(s) may be disconnected or damaged. Disassemble the computer 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 connection, perform the following checks.

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

FFH (first), 01H, 04H, 06H, 07H, 08H, 0BH, 0CH, 0DH, 18H, 30H, 33H, 40H, 41H, 42H, 4AH, 50H, 5AH, 60H, 65H, 70H, 80H, 90H, A0H, C0H, FEH

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

02H, 03H, 05H, 09H, 0AH, 1FH, 55H, A6H

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

00H, F0H, F1H, F2H, F6H, FAH, FDH

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

F4H, F5H, F7H, F8H, F9H, FBH, FEH

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

System test
NDP test
Printer test
Async test
PCMCIA test

If any of the following diagnostic tests detects an error, go to Check 2.

Memory test
Real Timer test
Tablet 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 computer's optional external 3.5-inch floppy disk drive is functioning properly. If the test program can be loaded, go to Procedure 3. Otherwise, perform the steps below starting with Procedure 1 and continue as required.

Procedure 1: Functioning External FDD Check

Procedure 2: FDD Connection Check

Procedure 3: Diagnostic Test Program Execution Check

Procedure 1 Functioning External FDD Check

Connect a functioning external 3.5-inch FDD to the computer's FDD port. Check the FDD operation. If the FDD is operating properly, the user's FDD is malfunctioning. If the FDD does not operate properly, go to Procedure 2.

Procedure 2 FDD Connection Check

Make sure the external 3.5-inch FDD cable is firmly connected to the FDD port. If this cable is disconnected, connect it to the FDD port. If the FDD is not functioning properly, replace the upper system board with a new one and re-start the system. If the problem still exists, replace the lower system board.

Procedure 3 Diagnostic Test Program Execution Check

The FDD Diagnostic Test program is stored on the T200/T200CS Diagnostics Disk. Run the diagnostic program. Refer to Chapter 3, *Tests and Diagnostics*, for more information about the diagnostics test procedures.

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

Table 2-3 Floppy Disk Drive Error Code and Status

Code	Status
01h	Bad command
02h	Address mark not found
03h	Write protected
04h	Record not found
06h	Media removed
08h	DMA overrun error
09h	DMA boundary error
10h	CRC error
20h	FDC error
40h	Seek error
60h	FDD not drive error
80h	Time out error
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 Replace the upper system board with a new one and re-start the system. If the problem still exists, replace the lower system board.

2.6 Hard Disk Drive Troubleshooting

To determine if the HDD is functioning properly, perform the procedures below starting with Procedure 1 and continue as instructed.

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

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

Procedure 1 Partition Check

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

- Check 1 Type **C:** and press **Enter**. Go to Check 2 if the drive will not change to C. Go to Procedure 2 if the drive changes to C.
- 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 HDD does not function properly, some of the following error messages may appear on the display. Start with Check 1 below and perform other checks as instructed.

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

HDC ERROR
(After 5 seconds this message will disappear.)

or

HDD #0 ERROR
(After 5 seconds this message will disappear.)

or

HDD #1 ERROR
(After 5 seconds this message will disappear.)

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

Insert system disk in drive
Press any key when ready

or

Non-System disk or disk error
Replace and press any key

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

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

System transferred

Check 4 The HDD is connected to the system board. Disassemble the computer as described in Chapter 4, *Replacement Procedures*. If the HDD is disconnected, reattach it to the system board and return to Procedure 1. If the HDD is firmly connected to the system board, perform Procedure 3.

Procedure 3 Format Check

The 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 other steps as required.

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

```
Format complete
```

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

- Check 2 Using the T200/T200CS Diagnostic Disk, format the HDD with a low-level format option. Refer to Chapter 3, *Tests and Diagnostics*, for more information about the diagnostic program.

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

```
Format complete
```

If the HDD cannot be formatted using the Test and Diagnostic program, go to Procedure 4.

Procedure 4 Diagnostic Test Program Execution Check

The HDD test program is stored on the T200/T200CS Diagnostics Disk. Perform all of the HDD tests in the Hard Disk Drive Test. Refer to Chapter 3, *Tests and Diagnostics*, for more information about the HDD test program.

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

Table 2-4 Hard Disk Drive Error Code and Status

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

Check 1 Replace the HDD unit following the instructions in Chapter 4, *Replacement Procedures*. If the HDD is still not functioning properly, perform Check 2.

Check 2 Replace the lower system board following the instructions in Chapter 4, *Replacement Procedures*. If the problem still exists, replace the upper system board.

2.7 Keyboard Troubleshooting

To determine if the keyboard is functioning properly, perform the following procedures. Start with Procedure 1 and continue as instructed.

- Procedure 1: Functioning Keyboard Check
- Procedure 2: External Keyboard Connection Check
- Procedure 3: Diagnostic Test Program Execution Check

Procedure 1 Functioning Keyboard Check

Connect a functioning keyboard to the computer's KB port. Check the keyboard's functions. If the keyboard is functioning properly, the user's keyboard is malfunctioning. If the keyboard is not functioning properly, go to Procedure 2.

Procedure 2 External Keyboard Connection Check

Make sure the external keyboard cable is firmly connected to the KB port. If this cable is disconnected or loose, connect it to the KB port. If the external keyboard still does not function properly, go to Procedure 3.

Procedure 3 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, replace the upper system board with a new one and re-start the system. If the problem still exists, replace the lower system board.

2.8 Display Troubleshooting

This section describes how to determine if the display is functioning properly. Start with Procedure 1 and continue as instructed.

Procedure 1: Brightness and Contrast Control Check

Procedure 2: External CRT Check

Procedure 3: Diagnostic Test Program Execution Check

Procedure 4: Connector Check

Procedure 5: Replacement Check

Use the checklist below to determine which procedure to begin with:

- Display is dark
: Go to Procedure 1

- Backlight does not light.
Characters are not displayed.
Abnormal lines are displayed.
Some pixels do not light.
If the backlight lights but no characters are displayed.
: Go to Procedure 4

- Any other problem.
: Go to Procedure 3

Procedure 1 Brightness and Contrast Control Check

Change the brightness and contrast by tapping the adjust point of the display with the stylus. If the brightness and contrast do not change, go to Procedure 4.

Procedure 2 External CRT Check

Connect the external CRT to the computer's external monitor port, then boot the computer.

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 T200/T200CS Diagnostic Disk. This program checks the display controller on the system board. After loading Toshiba MS-DOS, run the Diagnostic Program. Refer to Chapter 3, *Tests and Diagnostics*, for details.

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

Procedure 4 Connector Check

The display system has an LCD panel, FL unit, tablet, and FL inverter board. These components are connected to the system board.

Disassemble the display unit and check the cable connections shown in Figures 2-3 and 2-4. Refer to Chapter 4, *Replacement Procedures*, for more information about how to disassemble the computer.

If any of these cables is not connected, firmly re-connect it and repeat Procedures 1, 2, and 3. If the problem still exists, perform Procedure 5.

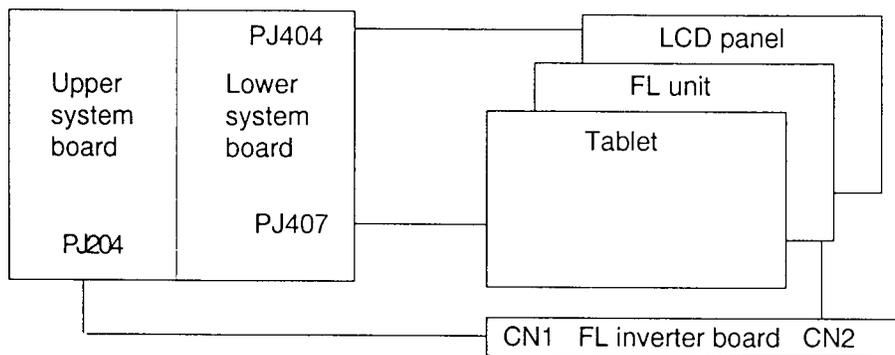


Figure 2-3 T200 Display Connection

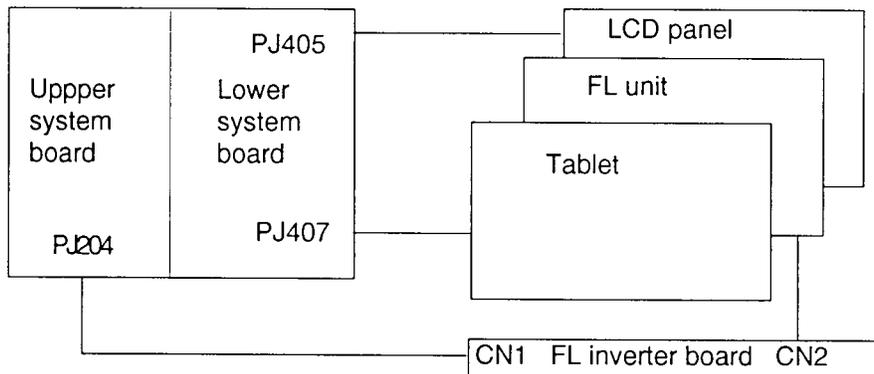


Figure 2-4 T200CS Display Connection

Procedure 5 Replacement Check

The FL inverter board, display module, and system board are connected to the display circuits. Any of these components may be damaged. Refer to Chapter 4, *Replacement Procedures*, for disassembly instructions and then perform the following checks:

- If the FL does not light, perform Check 1.
- If characters are not displayed clearly, perform Check 1.
- If some screen functions do not operate properly, perform Check 1.

Check 1 Replace the display module and test the display again. If the problem persists, perform Check 2.

Check 2 Replace the FL inverter board and test the display again. If the problem persists, perform Check 3.

Check 3 Replace the display cable and test the display again. If the problem persists, perform Check 4.

Check 4 The upper system board may be damaged. Replace the upper system board and test the display again. If the problem persists, perform Check 5.

Check 5 The lower system board may be damaged. Replace the lower system board.

2.9 Tablet Troubleshooting

To determine if the tablet is functioning properly, perform the following procedures. Before diagnosing the tablet, however, try using it. If the writing does not feel right, replace the stylus tip. If it still has trouble, start with Procedure 1.

Procedure 1: Diagnostic Test Program Execution Check

Procedure 2: Connector and Replacement Check

Procedure 1 Diagnostic Test Program Execution Check

Execute the Tablet Test of 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.

Procedure 2: Connector and Replacement Check

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

- Check 1 Make sure the tablet cable is not damaged and is connected to the lower system board. If this cable is damaged, replace it with a new one. If the cable is disconnected, firmly re-connect it. Perform Procedure 1 again. If the tablet is still not functioning properly, perform Check 2.
- Check 2 The tablet may be damaged. Replace the tablet with a new one. Refer to Chapter 4, *Replacement Procedures*, for more information. If the tablet is still not functioning properly, perform Check 3.
- Check 3 The lower system board may be damaged. Replace the lower system board. Refer to the instructions in Chapter 4, *Replacement Procedures* for more information. If the tablet is still not functioning, replace the upper system board.

3.1 The Diagnostic Test

This chapter explains how to use the T200/T200CS's Diagnostic Test program to test hardware module functions. The Diagnostics Test Program is stored on the Diagnostic Disk. The Diagnostic Test consists of 20 programs grouped into the Service Program Module (DIAGNOSTICS MENU) and Test Program Module (DIAGNOSTIC TESTS).

The DIAGNOSTICS MENU consists of the following eight functions:

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

The DIAGNOSTIC TESTS menu contains the following twelve functional tests:

- SYSTEM TEST
- MEMORY TEST
- KEYBOARD TEST
- DISPLAY TEST
- FLOPPY DISK TEST
- PRINTER TEST
- ASYNC TEST
- HARD DISK TEST
- REAL TIMER TEST
- PCMCIA TEST
- TABLET TEST
- NDP TEST

The following equipment is needed to perform some test programs.

- T200/T200CS Diagnostics Disk (all tests)
- Optional external 3.5-inch FDD
- Formatted working disk for the floppy disk drive test
- Cleaning kit to clean floppy disk drive heads (Head Cleaning)
- Printer wraparound connector for the printer wraparound (Printer) test
- RS-232C wraparound connector for the RS-232C port wraparound (ASYNC) test
- Parallel cable for the printer wraparound (Printer) test
- External PS/2 type keyboard (Keyboard test)
- PCMCIA wraparound connector for the I/O card (PCMCIA) test
- Stylus

The following sections detail DIAGNOSTIC TESTS menu tests. Refer to sections 3.18 through 3.24 for detailed information on the other Service Program Module functions.

3.2 Executing the Diagnostic Test

To start the Diagnostic Test Program follow the steps below. The Diagnostic Test Program can be executed with either the stylus or an optional keyboard.

1. Connect an optional 3.5-inch floppy disk drive.
2. Connect an external keyboard (Keyboard Test), RS-232C wraparound connector (Async Test), parallel cable (Printer Test), PCMCIA wraparound connector (PCMCIA Test), and printer wraparound connector (Printer Test) to each port.
3. Insert the Diagnostic disk and turn on the computer.
4. A cross-hair cursor will appear. Tap the cursor or press **Enter**.

The following menu will appear:

```
TOSHIBA Personal Computer XXXXX   DIAGNOSTICS
Version 1.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
```

```
Break Break
```

```
0   A
1   B
2   C
3   D
4   E
5   F
6
7   Up-Aw
8   Dn-Aw
9   R-Aw
R   L-Aw
BS  Esc
```

```
Enter Enter
```

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

NOTES:

- To use the stylus, tap the appropriate number or command in the menu at right. "Up-Aw" is up arrow, "Dn-Aw" is down arrow, "R-Aw" is right arrow, "L-Aw" is left arrow, "Esc" is escape and "BS" is back space.
- To use a keyboard, set the highlight bar to the desired test, and press **Enter**.
- To exit the menu, tap or press **Esc**. If a test program is in progress, tap "Break" or press **Ctrl+Break** to exit the test program.

5. To execute the DIAGNOSTIC TEST MENU from the DIAGNOSTICS MENU, move the highlight bar to **1**, then tap or press **Enter**. The following DIAGNOSTIC TEST MENU will appear:

```
TOSHIBA Personal Computer XXXXX    DIAGNOSTICS
Version 1.XX (C) Copyright TOSHIBA Corp. 19XX
```

```
DIAGNOSTICS TEST MENU :
```

```

1 - SYSTEM TEST
2 - MEMORY FORMAT
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 - PCMCIA TEST
11  TABLET TEST
12 - NDP TEST
88 - ERROR RETRY COUNT SET   : ( FDD & HDD )
99 - EXIT TO DIAGNOSTICS MENU
```

```
Break Break
```

```
0      A
```

```
1      B
```

```
2      C
```

```
3      D
```

```
4      E
```

```
5      F
```

```
6
```

```
7      Up-Aw
```

```
8      Dn-Aw
```

```
9      R-Aw
```

```
R      L-Aw
```

```
BS     Esc
```

```
Enter Enter
```

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

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

6. Move the highlight bar to the option you want to execute and tap or press **Enter**. When you select SYSTEM TEST, the following message will appear:

```

SYSTEM TEST                                TTSSDSS

SUB TEST   : XX
PASS COUNT : XXXXX   ERROR COUNT: XXXXX
WRITE DATA : XX     READ DATA  : XX
ADDRESS    : XXXXX   STATUS      : XXX
              error status name

SUB-TEST MENU :

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

```

Break	Break
0	A
1	B
2	C
3	D
4	E
5	F
6	
7	Up-Aw
8	Dn-Aw
9	R-Aw
R	L-Aw
BS	Esc
Enter	Enter

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

7. Move the highlight bar to the desired option from the subtest menu and tap or press **Enter**. The following message will appear:

```
TEST LOOP :  YES  NO
```

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

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

8. After making the Test Loop selection, the following message will appear:

```
ERROR STOP :  YES  NO
```

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

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

These three selections have the following functions:

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

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

9. Move the highlight bar to the desired option and tap or press **Enter**.

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

3.3 Subtest Names

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

Table 3-1 Subtest Names (1/2)

No.	Test name	Subtest No.	Subtest item
1	SYSTEM	01	ROM checksum
		02	H/W status
		03	Version check
2	MEMORY	01	RAM constant data
		02	RAM address pattern data
		03	RAM refresh
		04	Protected mode
		05	Memory module
		06	Backup memory
		07	Cache memory
3	KEYBOARD	01	Pressed key code display
4	DISPLAY	01	VRAM read/write
		02	Character attributes
		03	Character set
		04	80x25/30 Character display
		05	320x200 Graphics display
		06	640x200 Graphics display
		07	640x350/400/480 Graphics display
		08	Display page
		09	"H" pattern display/Border color
		10	DAC pallet
		11	VGA color graphics display
5	FDD	01	Sequential read
		02	Sequential read/write
		03	Random address/data
		04	Write specified address
		05	Read specified address
6	PRINTER	01	Ripple pattern
		02	Function
		03	Wraparound

Table 3-1 Subtest Names (2/2)

No.	Test name	Subtest No.	Subtest item
7	ASYNC	01	Wraparound (board)
		02	Board (#1) <=> board (#2)
		03	Point to point (send)
		04	Point to point (receive)
		05	Interrupt test
8	HDD	01	Sequential read
		02	Address uniqueness
		03	Random address/data
		04	Cross talk & peak shift
		05	Write/read/compare (CE)
		06	Write specified address
		07	Read specified address
		08	ECC circuit
		09	Sequential write
		10	W-R-C specified address
9	REAL TIMER	01	Real time
		02	Backup memory
		03	Real time carry
10	PCMCIA	01	I/O card test (PCMCIA)
11	TABLET	01	TABLET ADJUST
		02	9POINT test
		03	CURSOR MOVING test
		04	WRITE DOT test
12	NDP	01	NDP test

3.4 System Test

To execute the System Test, select **1** from the DIAGNOSTIC TESTS menu and tap or press **Enter**. The system test contains three subtests. Select a subtest and tap or press **Enter**.

Subtest 01 ROM checksum

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

Subtest 02 H/W status

This test reads and displays hardware status as shown below:

```

              76543210
H/W status = 10001000

Bit7      ...                =
Bit6      ... CPU clock      = 40MHz
Bit5      ... Notch signal   = 2HD
Bit4      ... FDD type       = 2MB
Bit3      ...                =
Bit2      ... Drive A/B      = Ext. = B
Bit1      ... External FDD   = OFF
Bit0      ... Internal FDD   = 2HD
  
```

Table 3-2 lists hardware bit status for each bit tested. Press **Enter** to return to the Subtest Menu.

Table 3-2 Hardware Bit Status

Bit	H/W status	1	0
7	Reserved	—	—
6	CPU clock speed	20 MHz	40 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 versions for the following items:

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

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

```
ROM-BIOS           = V1.00 : OK V1.10
ROM(BOOT)          = V1.00 : OK V1.00
KBC Version        = V1.26 : NG V1.00
PS Micom Version  = V1.35 : OK V1.35
```

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 | |

Reference data Current data

3.5 Memory Test

To execute the Memory Test, select **2** from the DIAGNOSTIC TESTS menu and tap or press **Enter**. Select a subtest to execute and tap or press **Enter**.

Subtest 01 RAM constant data (real mode)

This subtest writes constant data to conventional memory (0 to 640 KB), then reads the new data and compares the result with original data.

Constant data is FFFFh, AAAAh, 5555h, and 0000h.

Subtest 02 RAM address pattern data (real mode)

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

Subtest 03 RAM refresh (real mode)

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

Constant data is AAAAh and 5555h.

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

Subtest 04 Protected mode

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

Subtest 05 Memory module

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

This subtest functions the same as subtest 04 but is used for testing an optional memory card. Memory module capacity is 2, 4, 8, or 16 MB.

After selecting subtest 05, the following message will appear:

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

Select the number corresponding to the installed memory card.

Subtest 06 Backup Memory

This subtest writes constant data to memory from address C8000h to CFFFFh, then reads new data and compares the result with original data.

Constant data is 0000h, 5555h, AAAAh, and FFFFh.

Subtest 07 Cache memory

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

Number of miss hit < Number of hit → OK

Number of miss hit ≥ Number of hit → Fail

3.6 Keyboard Test

To execute the Keyboard Test, select **3** from the DIAGNOSTIC TESTS menu, tap or press **Enter**, and follow the directions displayed on the screen. Subtest 01 tests keyboard actions. Tap or press **Enter** to select the subtest.

Subtest 01 Pressed key code display

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

```
KEYBOARD TEST  IN PROGRESS  301000

          Scan code      =
          Character code  =
          Keytop          =

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

PRESS [Enter] KEY
```

3.7 Display Test

To execute the Display Test, select **4** from the DIAGNOSTIC TESTS menu and tap or press **Enter**. Eleven subtests test the display in various modes. Select a subtest and tap or press **Enter**.

NOTE: *In the Display Test, the screen does not display "Break" or "Enter." Tap the upper right corner of the screen to enter "Break" or the lower right corner to enter "Enter."*

Subtest 01 VRAM Read/Write

This subtest writes constant data FFFFh, AAAAh, 5555h, 0000h and address data to video RAM (1MB). (CGA (B8000H ~ BFFFFH: 32KB) and VGA (A0000H ~ AFFFFH:64KB*4*4)). This data is then read from the video RAM and compared to original data.

Subtest 02 Character Attributes (mode 1, 13h)

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

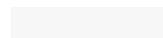
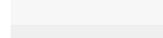
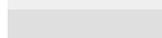
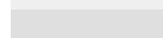
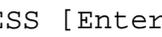
CHARACTER ATTRIBUTES

NEXT LINE SHOWS NORMAL DISPLAY.
NN

NEXT LINE SHOWS INTENSIFIED DISPLAY.
II

NEXT LINE SHOWS REVERSE DISPLAY.
RR

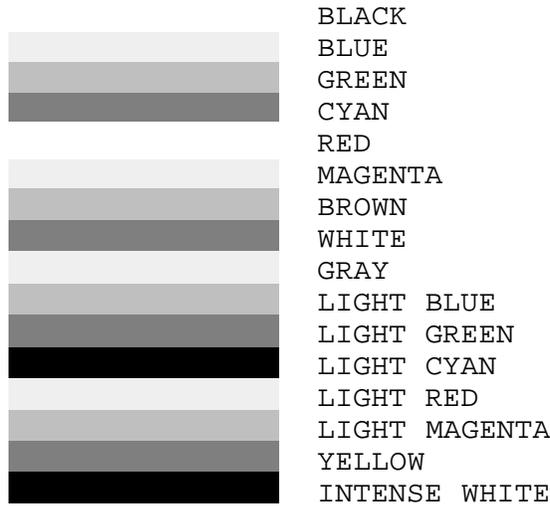
NEXT LINE SHOWS BLINKING DISPLAY
BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBB

		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

Pressing **Enter** causes 16 colors or gray scales of mode 13h to appear in the 320x200 graphics mode as shown below:

320*200 GRAPHICS DISPLAY [13]



PRESS [Enter] KEY

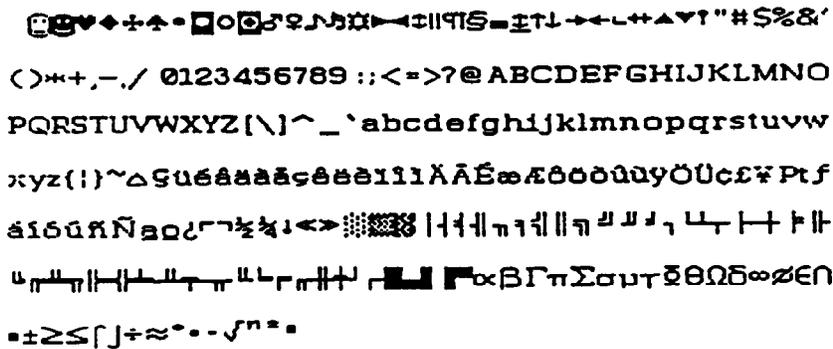
Pressing **Enter** toggles between the two displays.

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

Subtest 03 Character Set

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

CHARACTER SET IN 40*25



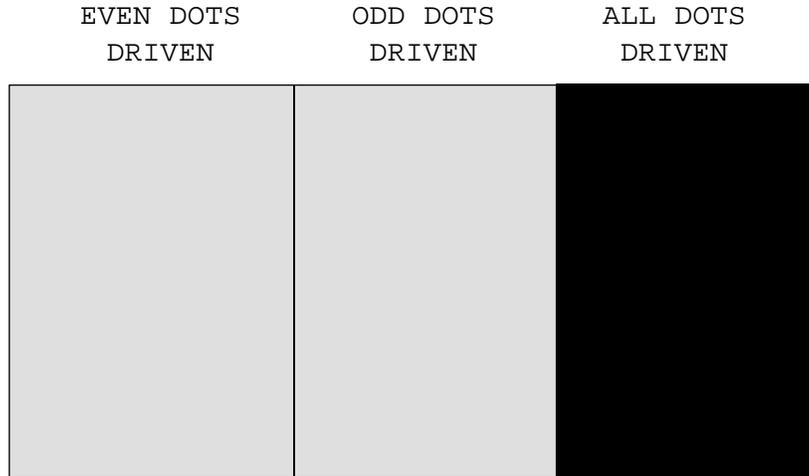
PRESS [Enter] KEY

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

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

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

640*200 GRAPHICS DISPLAY : [x]



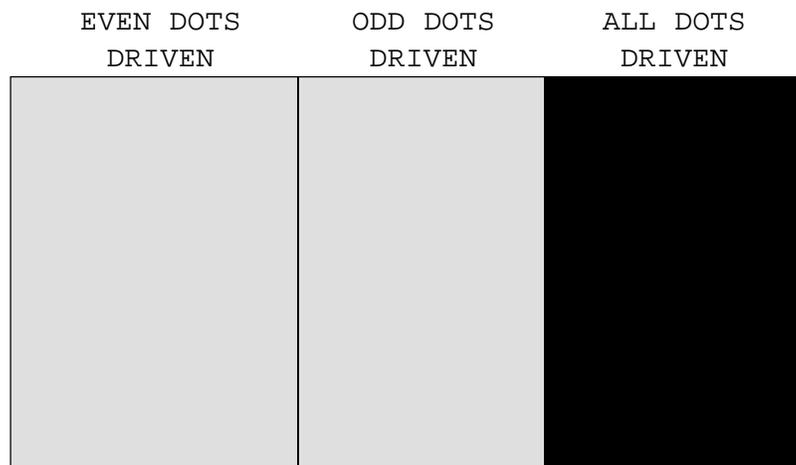
PRESS [ENTER] KEY

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

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

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

640*XXX GRAPHICS DISPLAY



PRESS [ENTER] KEY

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

Subtest 10 DAC Pallet

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

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

```
[ Processor latch test        ]
```

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

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

Subtest 11 VGA color graphics display

This subtest displays eight screens. The first screen shows many colors (mode 13) at once. The next three display 64 shades (mode 13) of red, green, and blue successively. Next, a single screen displays many colors (mode 5F). The last three display 256 shades of red, green and blue.

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

3.8 Floppy Disk Test

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

To execute the Floppy Disk Test, select **5** from the DIAGNOSTIC TESTS menu, tap or press **Enter**, and follow the directions displayed on the screen. Five subtests test the internal floppy disk drive. The following messages will appear after the Floppy Disk Test is selected. Answer each question with an appropriate response to execute the test.

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

Test drive number select : **FDD#1** FDD#2 FDD1&2

2. Select the media type of the floppy disk to be tested, and tap or press **Enter**.

Media in drive #X mode : **2DD** 2D, 2D-2HD 2HD

3. Select the track to start the test on and tap or press **Enter**. Tapping or pressing **Enter** alone sets the start track to zero.

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

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

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

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

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

Subtest 01 Sequential Read

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

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

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

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

Subtest 02 Sequential Read/Write

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

Subtest 03 Random Address/Data

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

Subtest 04 Write Specified Address

This subtest writes specified data to a specified track, head, and address. When this subtest is selected, the following prompts appear on the screen in succession.

```
TEST DATA  ??  
TRACK NO    ??  
HEAD NO     ??
```

Subtest 05 Read Specified Address

This subtest reads data from a specified track, head, and address. When this subtest is selected, the following prompts appear on the screen in succession.

```
TRACK NO    ??  
HEAD NO     ?
```

3.9 Printer Test

To execute the Printer Test, select **6** from the DIAGNOSTIC TESTS menu, tap or press **Enter**, and follow the directions displayed on the screen. Three subtests test printer output.

***NOTE:** An IBM-compatible printer with a parallel cable must be connected to the system to execute this test.*

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

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

The printer I/O port address is specified by the XXXXh number. The T200/T200CS supports three printer channels. Select the appropriate printer channel number, and tap or press **Enter** to execute a subtest.

Subtest 01 Ripple Pattern

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

```
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN[ ]^_`abcdefghijklmnop
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN[ ]^_`abcdefghijklmnop
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN[ ]^_`abcdefghijklmnopq
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN[ ]^_`abcdefghijklmnopqr
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN[ ]^_`abcdefghijklmnopqrs
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN[ ]^_`abcdefghijklmnopqrst
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN[ ]^_`abcdefghijklmnoprstu
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN[ ]^_`abcdefghijklmnoprstuv
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN[ ]^_`abcdefghijklmnoprstuvw
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN[ ]^_`abcdefghijklmnoprstuvwx
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN[ ]^_`abcdefghijklmnoprstuvwxy
```

Subtest 02 Function

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

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

This subtest prints the various print types shown below:

```
PRINTER TEST
1.       THIS LINE SHOWS NORMAL PRINT.
2.       THIS LINE SHOWS DOUBLE-WIDTH PRINT.
3.       THIS LINE SHOWS COMPRESSED PRINT.
4.       THIS LINE SHOWS EMPHASIZED PRINT.
5.       THIS LINE SHOWS DOUBLE-STRIKE PRINT.
6.       ALL CHARACTERS PRINT
          !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN
          OPQRSTUVWXYZ[\]^_`abcdefghijklmnopq
          rstuvwxyz{|}~
```

Subtest 03 Wraparound

NOTE: To execute this subtest, a printer wraparound connector with a parallel cable must be connected to the computer printer port. The printer wraparound connector (34M741986G01) wiring diagram is shown in Appendix F.

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

3.10 Async Test

To execute the Async Test, select **7** from the DIAGNOSTIC TESTS menu, tap or press **Enter**, and follow the directions displayed on the screen. Five subtests test asynchronous communication functions. Move the highlight bar to a subtest and press **Enter**.

Subtests 01 through 04 require the following data format:

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

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

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

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

Subtest 01 Wraparound (board)

NOTE: An RS-232C wraparound connector(34M741621G01) must be connected to the RS-232C port by a parallel cable to execute this subtest. The wraparound connector wiring diagram is shown in Appendix F.

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

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

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

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

Subtest 03 Point to point (Send)

NOTE: *To execute this subtest, two machines must be connected by a parallel cable to the RS-232C ports. One machine should be set as "send" (subtest 03) and the other as "receive" (subtest 04). The wiring diagram for the RS-232C direct cable is shown in Appendix F.*

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

Subtest 04 Point to point (Receive)

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

Subtest 05 Interrupt Test

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

3.11 Hard Disk Test

To execute the Hard Disk Test, select **8** from the DIAGNOSTIC TESTS menu, tap or press **Enter**, and follow the directions displayed on the screen. Ten subtests test the HDD functions. The following messages will appear after the hard disk test is selected. Answer each question with an appropriate response.

***CAUTION:** The contents of the hard disk will be erased when subtest 02, 03, 04, 05, 06, 08, 09, or 10 is executed. Before running the test, transfer the contents of the hard disk to a floppy disk(s).*

After the hard disk test is completed, set the partition. Refer to the customer's operating system documentation for details on partitioning the disk .

1. When the hard disk test is selected, the following message will appear:

Test drive number select : **HDD#1** HDD#2 HDD1&2

2. Select the HDD number to be tested and tap or press **Enter**. The following message will appear:

HDC F/W error retry : **YES** NO

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

Data compare error dump : **NO** YES

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

Detail status display : **NO** YES

5. This message is used to select HDD status for display or non-display. The HDD status is described in section 3.17. Select **1** or **2** and tap or press **Enter**.

6. The Hard Disk Test message will appear after a response to the Detail Status prompt. Select a subtest to execute and tap or press **Enter**. The following message will appear during each subtest.

```
HARD DISK TEST      XXXXXXXX

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

The first three digits of the ADDRESS indicate the cylinder being tested, the fourth digit 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 HDD tracks starting at 0. When all tracks have been read, the test starts at the last track and reads sequentially back to track 0.

Subtest 02 Address Uniqueness

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

- Forward sequential
- Reverse sequential
- Random

Subtest 03 Random Address/Data

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

Subtest 04 Cross Talk & Peak Shift

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

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

Subtest 05 Write /read/compare (CE)

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

Subtest 06 Write specified address

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

Subtest 07 Read specified address

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

Subtest 08 ECC circuit

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

Subtest 09 Sequential write

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

Subtest 10 W-R-C specified address

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

3.12 Real Timer Test

To execute the Real Timer Test, select **9** from the DIAGNOSTIC TESTS menu, tap or press **Enter**, and follow the directions on the screen. Three subtests test the real timer functions. Select a subtest and tap or press **Enter**.

Subtest 01 Real Time

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

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

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

```
Enter new date:
```

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

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

```
Enter new time :
```

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

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

Subtest 02 Backup Memory

This subtest performs the following backup memory check:

```
Writes 1-bit of “on” data to address 01h through 80h
Writes 1-bit of “off” data to address FEh through 7Fh
Writes the data pattern AAh through 55h to the RTC 50-byte memory
(address 0Eh to 7Fh)
```

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

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

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

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

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

Pressing **Enter** displays the following

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

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

Press **Ctrl + Break** to exit.

3.13 PCMCIA Test

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

Subtest 01 I/O Card Test (PCMCIA)

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

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

This subtest is executed in the following order:

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

3.14 Tablet Test

To execute the Tablet Test, select **11** from the DIAGNOSTIC TEST MENU, and tap or press **Enter**. The tablet test contains four subtests that test the computer's tablet functions.

Subtest 01 TABLET ADJUST

This test displays the coordinates of the screen matrix when the pen is tapped on the screen and a key on the optional keyboard is pressed simultaneously. After testing coordinates, press **Enter** to display a cross-hair cursor. Tap the cursor at the center to complete the test.

Subtest 02 9 POINT test

This test checks the screen matrix addresses. Nine cross-hair cursors appear. Tap each cursor. If the tapped position corresponds to the cursor coordinate, the cursor disappears. When all cursors are cleared, the test is over.

Subtest 03 CURSOR MOVING test

This test checks the address and the stylus's switch. A cross-hair cursor appears. Tap and move the cursor. The cursor's address will appear on the right side of the display. The stylus switch's on/off status is also displayed.

Subtest 04 WRITE DOT test

This test draws a line. Tap and move the stylus on the screen to draw a line.

3.15 NDP Test

To execute the NDP test, select **12** from the DIAGNOSTIC TEST MENU, and tap or press **Enter**. The NDP test contains one subtest that tests the computer's NDP functions.

Subtest 01	NDP		
<p>This test checks the following functions of NDP:</p> <ul style="list-style-type: none"><input type="checkbox"/> Control word<input type="checkbox"/> Status word<input type="checkbox"/> Bus<input type="checkbox"/> Addition<input type="checkbox"/> Multiplication <p>Press Ctrl + Break to exit.</p>			

3.16 Error Codes and Error Status Names

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

<i>Table 3-3 Error Codes and Error Status Names (1/2)</i>		
Device name	Error code	Error status name
(COMMON)	FF	Data Compare Error
SYSTEM	01	ROM Checksum Error
Memory	01	Parity Error
	02	Protected Mode Not Changed
	14	Memory Read/Write Error
	DD	Cache Memory Error
Keyboard	02	IPS Interface Error
	03	Interface Error
	04	Retransmit 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
ASYNC	01	DSR Off Time Out
	02	CTS Off 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	

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

Device name	Error code	Error status name
HDD	01	Bad Command Error
	02	Address Mark Not Found
	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	
EE	Access Time Out Error	
NDP	01	No CO-PROCESSOR
	02	Control Word Error
	03	Status Word Error
	04	Bus Error
	05	Addition Error
	06	Multiply Error
PCMCIA	C1	Address Line Error
	C2	REG# Line Error
	C3	CE#1 Line Error
	C4	CE#2 Line Error
	C5	Data Line Error
	C6	Wait Line Error
	C7	BSY# Line Error
	C8	BVD1 Line Error
	CD	No PCMCIA
TABLET	01	Tablet I/F Error

3.17 Hard Disk Test Detail Status

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

```
HDC status = XXXXXXXX
```

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

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

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

Table 3-4 Hard Disk Controller Status Register Contents

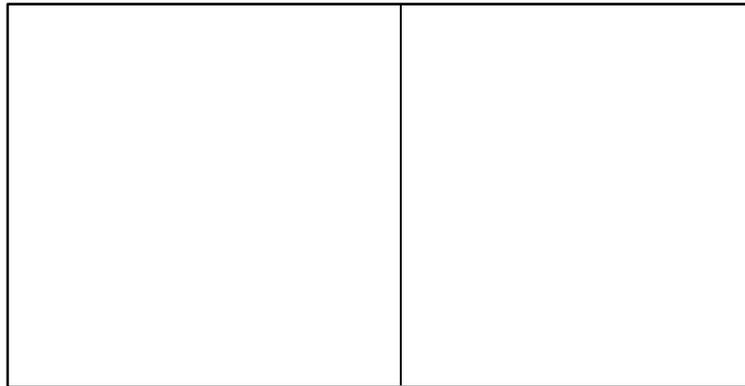
Bit	Name	Description
7	BSY (Busy)	"0" --- HDC is busy. "1" --- HDC is ready.
6	DRDY (Drive ready)	"0" --- Hard disk drive is not ready to accept any command. "1" --- Hard disk drive is ready.

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

Table 3-5 Error Register Contents

Bit	Name	Description
-----	------	-------------

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



3.18 Hard Disk Format

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

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

CAUTION: *The hard disk will be erased when this program is executed. Before executing, transfer hard disk contents onto a floppy disk(s).*

3.18.1 Function Description

1. All track FORMAT

This option performs a low-level format of all hard disk tracks as listed in Table 3-6 below.

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

Table 3-6 Hard Disk Formatting Sequence

Items	80 MB (ZA1094)
Sector sequences	1:1
Cylinders	0 to 2749
Heads	0 to 2
Sectors	1 to 20
Sector length (bps)	512

2. Good track FORMAT

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

3. Bad track FORMAT

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

4. Bad track CHECK

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

3.18.2 Operations

***CAUTION:** After the hard disk is formatted, set the partition. Refer to the customer's operating system documentation for details on partitioning the disk.*

Select **2** from the DIAGNOSTIC MENU and tap or press **Enter** to display the following menu:

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

  1 - All track FORMAT
  2 - Good track FORMAT
  3 - Bad track FORMAT
  4 - Bad track CHECK
  9 - Exit to DIAGNOSTICS MENU
```

1. All track FORMAT

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

```
[All track FORMAT]

Drive      :      #1 = HDD          #2 = Non
Cylinder   :      XXXX
```

Head : XX
Sector : XX

<<< Model name = >>>

The following prompts display at the bottom of the screen in succession:

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

- (a) Select a drive number and tap or press **Enter**. The following message appears:

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

- (b) Select an interleave number (1 ~ 8) and tap or press **Enter**. Tab or press **Enter** only to select **1**.
- (c) Bad Track Register

Next, the Bad Track Register prompt appears. Enter the bad track cylinder and head numbers and tap or press **Enter**. If there are no bad tracks, tap or press **Enter** only to execute All Track Format as described in Item (d) 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 to format.

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

- (d) All Track Format

All tracks are formatted as good tracks except those registered as bad tracks in Item (c) above, or identified as bad tracks in the Track Verification function described in Item (e) below.

- (e) Track Verification

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

2. Good track FORMAT

If a good track has been erroneously formatted as a bad track, use this subtest to reformat it as a good track. Enter the drive, interleave, cylinder, and head numbers as indicated in the screen prompt shown below.

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

Tap or press **Enter** to return to the Hard Disk Format menu.

3. Bad track FORMAT

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

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

Tap or press **Enter** to return to the Hard Disk Format menu.

4. Bad track CHECK

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

```
Drive number select (1:#1, 2:#2) ?
Bad tracks are displayed in the format shown below.
  [[cylinder, head = 0123 03]]
```

Tap or press **Enter** to return to the Hard Disk Format menu.

3.19 Head Cleaning

3.19.1 Function Description

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

3.19.2 Operations

1. Select **4** from the DIAGNOSTIC MENU and tap or press **Enter** to display the following messages:

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

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

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

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

2. Error information on the screen can be manipulated by the following number keys:
 - 1 scrolls the display to the next page.
 - 2 scrolls the display to the previous page.
 - 3 returns to the Diagnostic Menu.
 - 4 erases all error log information in RAM.
 - 5 outputs the error log information to a printer.
 - 6 reads log information from a floppy disk.
 - 7 writes log information to a floppy disk.

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

3.22 Floppy Disk Drive Utilities

3.22.1 Function Description

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

1. FORMAT

***NOTE:** This program is only for testing a floppy disk drive. The option is different from the operating system's **FORMAT** command.*

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

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

2. COPY

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

3. DUMP

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

3.22.2 Operations

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

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

2. FORMAT program

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

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

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

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

- (c) Select a media/drive type number and press **Enter** to display a message similar to the one below:

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

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

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

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

```
Format start
```

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

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

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

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

3. COPY program

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

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

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

```
Insert source disk into drive A:  
Tap Enter key when ready.
```

- (c) Remove the Diagnostics Disk from the FDD, insert the source disk, and tap **Enter** or press any key. The following message indicates the program has started.

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

Copy start

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

Insert target disk into drive A:

Tap Enter key when ready.

- (d) Remove the source disk from the FDD, insert a formatted work disk, and tap **Enter** or press any key. The `[[track, head = XXX X]]` message will appear and copying to the target disk will begin. If data cannot all be copied in one operation, the message from step (b) is displayed again. After the floppy disk has been copied, the following message will appear:

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

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

4. DUMP program

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

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

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

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

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

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

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

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

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

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

Track number ??

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

3.23 System Configuration

3.23.1 Function Description

The System Configuration program contains the following information:

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

3.23.2 Operations

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

```
SYSTEM CONFIGURATION :  
  
* - BIOS ROM VERSION = VX.XX  
* - BOOT ROM VERSION = VX.XX  
* - 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  
* - 1 MATH CO-PROCESSOR
```

Press [Enter] Key

Tap or press **Enter** to return to the DIAGNOSTIC MENU.

3.24 Setup

3.24.1 Function Description

This program displays current system setup information as listed below:

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

2. Display
 - (a) Display Adapter
 - (b) LCD Display Mode
 - (c) LCD Gray Scale Level (T200 only)
 - (d) Power On Display

3. COM/PCMCIA/PRT
 - (a) Serial Port
 - (b) PC Card Slot 1
 - (c) PC Card Slot 2
 - (d) Printer Port Type

4. Hard Disk

5. Battery
 - (a) Battery Save Mode
 - (b) Remaining Capacity

6. Password

7. Others
 - (a) Power-up Mode
 - (b) CPU Cache
 - (c) Processing Speed
 - (d) Speaker Volume
 - (e) Alarm Power On
 - (f) Boot Priority

8. Battery Save Options
 - (a) CPU Sleep Mode
 - (b) Display Auto Off
 - (c) HDD Auto Off
 - (d) System Auto Off
 - (e) LCD Brightness

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

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

The Factory Preset Configuration

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

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

SETUP Options

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

1. Memory

This group lists values for computer memory.

(a) Total

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

(b) Base

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

(c) Extended Memory

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

(d) Shadow BIOS ROM

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

2. Display

These options provide configuration display data.

(a) Display Adapter

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

(b) LCD Display Mode

This option is not configurable.

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

Monochrome Selects monochrome mode. This is also used when a VGA monochrome monitor is attached to the external display port. Note that some software is displayed best in monochrome mode.

NOTE: *The LCD Display Mode is automatically set to conform to the CRT being used and cannot be changed.*

(c) LCD Gray Scale Level (T200 only)

Use this option, which appears in SETUP, to switch between normal and reverse video on the T200. It does not appear on the T200CS. The options are:

Normal 16 levels Displays black text on a white background with 16 shades of gray.

Reverse 16 levels Displays white text on a black background with 16 shades of gray.

(d) Power On Display

This option is used to select the display when booting up or starting from resume mode.

Internal/External Uses the internal LCD if an external CRT is not connected and uses an external CRT if one is connected.

Simultaneous Uses both the internal LCD and an external CRT if one is connected.

3. COM/PCMCIA/PRT

This option controls settings for serial and parallel ports and the PC card slot.

(a) Serial Port

Use this option to set the COM level, COM1 or COM2, for the serial port and PC Card slot. 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	(PCMCIA default)
Not Used			(Disables port)

NOTE: If the Serial Port COM level is set to the same level as the PC Card COM setting, the PC Card COM setting automatically changes from COM1 to COM2.

(b) PC Card Slot 1

Use this option to select PC Card slot usage:

PCMCIA Choose this selection when a PCMCIA card is installed.
(This is the default.)

Others Choose this selection when a Toshiba card modem is installed.

NOTE: Only one PC Card Slot can be set to Others. For example, if PC Card Slot 1 is set to Others and you also set PC Card Slot 2 to Others, PC Card Slot 1 automatically changes to PCMCIA.

When *Others* is chosen, use the sub-window shown below to control the modem COM Port and power.

COM Port = COM2 (IRQ3 / 2F8H)
Power = On

Use the COM Port option to select the interrupt (IRQ)/COM level for the Toshiba card modem: COM 1 or COM2 (default).

NOTE: If you change the PC Card COM setting to the same as the Serial Port COM setting, the Serial Port COM setting changes to Not Used.

Use the *Power* option to turn the power to the modem on or off.

When the *PC Card Slot 1* option is set to *Others*, the *Power* option is displayed in the sub-window. The *Power* option indicates the setting in CMOS.

(c) PC Card Slot 2

Use this option to select PC Card slot usage:

Printer Choose this selection when a PCMCIA card is installed.
(This is the default.)

Others Choose this selection when a Toshiba card modem
is installed.

When *Others* is chosen, use the sub-window shown below to control the modem COM Port and power.

COM Port = COM2 (IRQ3 / 2F8H)
Power = On

Use the COM Port option to select the interrupt (IRQ)/COM level for the Toshiba card modem: COM 1 or COM2 (default).

Use the *Power* option to turn the power to the modem on or off.

When the *PC Card Slot 1* option is set to *Others*, the *Power* option is displayed in the sub-window. The *Power* option indicates the setting in CMOS.

(d) Printer Port Type

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

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

Bi-directional Activates bi-directional operation.

4. Hard Disk

This option enables or disables the HDD.

80 MB The hard disk can be accessed. Disk capacity is automatically displayed and cannot be changed.

No Drive The hard disk cannot be accessed.

5. Battery

(a) Battery Save Mode

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

Full Power The following shows full power settings.

CPU Sleep Mode	=	Disabled
Display Auto Off	=	Disabled (T200) 30 Min. (T200CS)
HDD Auto Off	=	Disabled
System Auto Off	=	Disabled
LCD Brightness	=	Bright

Low Power The following shows low power settings.

CPU Sleep Mode	=	Enabled
Display Auto Off	=	03 Min.
HDD Auto Off	=	03 Min.
System Auto Off	=	30 Min. (Auto Re - sume Mode) Disabled (Boot Mode)
LCD Brightness	=	Semi-bright

NOTE: *The System Auto Off message does not appear in boot mode.*

User Setting Use this option to set battery save parameters on the sub-window, *BATTERY SAVE OPTIONS*. If selected, the automatic setting feature (Long Life or Normal Life) is disabled and the user-preferred parameters become effective. The default setting in the sub-windows depends on the *Battery Save Mode: Full Power or Low Power*. For details, see *Battery Save Options* later in this section.

(b) Remaining Capacity

To indicate approximately how much power is left in the battery pack, a horizontal bar graph between "E" and "F" represents the amount of charge.

E Empty

F Full

??? Remaining charge is unknown because the battery has been removed and replaced.

N/A Battery pack is not installed.

6. Password

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

Registered The password has been registered.

Not registered The password has not been registered.

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

7. Others

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

(a) Power-up Mode

Use this option to choose between AutoResume and boot mode.

Boot Turns on boot mode. (This is the default.)

Resume Turns on the AutoResume feature.

(b) CPU Cache

Use this feature to enable or disable the CPU cache.

Enabled Enables the CPU cache. (This is the default.)

Disabled Disables CPU cache.

(c) Processing Speed

This feature changes the CPU processing speed.

High The CPU operates at 40 MHz. (This is the default.)

Low The CPU operates at half-speed.

(d) Speaker Volume

This option disables or sets the speaker. Setting this option to off disables the computer sound function for alarms as well as for application programs.

On Enables software use of the speaker.

Off Disables software use of the speaker.

When the speaker setting is set to On, a sub-window is displayed for enabling or disabling certain speaker functions.

System Speaker	=	Enabled
Low Battery Alarm	=	Enabled

Enabled Enables the feature.

Disabled Disables the feature.

(e) Alarm Power On

Use this option to set the time for the system to turn on automatically. This option can be set to expected transmission times for periods of personal absence. The option does not automatically turn off the system.

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

Disabled Disables the alarm.

(f) Boot Priority

This option selects disk drive priority for boot up.

FDD → HDD The computer looks for bootable files first on the FDD, then on the HDD. (This is the default.)

HDD → FDD The computer looks for bootable files first on the HDD, then on the FDD. (This is the default.)

8. Battery Save Options

(a) CPU Sleep Mode

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

Enabled Enables sleep mode.

Disabled Disables sleep mode.

(b) Display Auto Off

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

Disabled Disables display automatic power-off.

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

Always OFF Turns off the power to the LCD panel illumination. This option appears only on the T200.

(c) HDD Auto Off

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

Disabled Disables HDD automatic power-off.

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

(d) System Auto Off

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

Disabled Disables system automatic power-off.

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

(e) LCD Brightness

Use this option to set the LCD brightness level.

Bright Full brightness for maximum visibility.

Semi-bright Less than full brightness for saving power.

4.1 General

This section explains how to disassemble the computer and replace Field Replaceable Units (FRUs). It may not be necessary to remove all the FRUs in order to replace one. The list below shows the order in which FRUs should be removed. Always start by removing the battery pack, then proceed to the FRU you think is causing the computer to operate improperly.

- Battery pack
- Optional Memory Card
- Optional PCMCIA Card
- Hard Disk Drive
- Back Cover
- Upper System Board, Backup Battery & RTC Battery
- Lower System Board
- FL Inverter Board
- Tablet
- Display module

Before You Begin

Look over the procedures in this section before you begin disassembling the computer. 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 computer 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 using or storing the computer:
 - Dust and contaminants
 - Static electricity
 - Extreme heat, cold and humidity
4. Make sure the FRU you are replacing is causing the abnormal operation by performing the necessary diagnostics tests described in this manual.
5. Do not perform any operations that are not necessary and use only the described procedures for disassembling and installing FRUs in the computer.
6. After removing parts from the computer, place them in a safe place away from the computer so they will not be damaged and do not interfere with your work.
7. You will remove and replace many screws when you disassemble the computer. When you remove screws, make sure they are placed in a safe place and identified with the correct parts.

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

Disassembly Procedures

The computer has two basic types of cable connectors:

- Pressure Plate Connectors
- Normal Pin Connectors

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

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

Assembly Procedures

The computer must be re-assembled after disassembly and repair. While assembling the computer, remember the following:

- Take your time, making sure you follow the instructions closely. Most problems arise when you get in a hurry assembling the computer.
- 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, FRUs or other parts.
- Check that all latches are closed securely.
- Make sure the correct screws are used to secure all FRUs. Using the wrong screw can either damage the threads or the screw head, and may prevent proper seating of an FRU.

After installing an FRU in the computer 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 computer:

- One M2 Phillips-head screwdriver to remove and replace M1 and M2 screws.
- Tweezers, to lift out screws that you cannot grasp with your fingers.
- ESD mats for the floor and the table you are working on.
- An ESD wrist strap or heel grounder.
- Anti-static carpeting or flooring.
- Air ionizers in highly static sensitive areas.

4.2 The Battery Pack

Removing the Battery Pack

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

1. Turn off the power to the computer. Disconnect the AC adapter, power cord and all external cables connected to the computer.
2. Turn the computer upside down.
3. Slide open the **cover** to the battery latch and press the **release button** until it clicks. The battery will pop out slightly (Figure 4-1).
4. There is a second safety latch that holds the **battery pack** after the **release button** is pressed. To clear the second latch, insert your fingers in the gap between the computer and the **battery pack** and push carefully with one hand until the **battery pack** is free (Figure 4-1).
5. Firmly grasp the **battery pack** and pull it out (Figure 4-1).

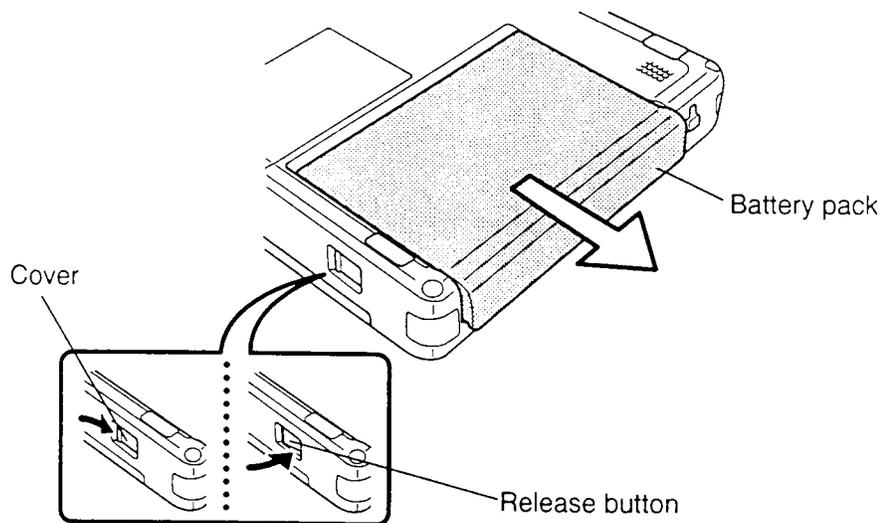


Figure 4-1 Removing the Battery Pack

Installing the Battery Pack

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

To install the computer's battery pack, follow the steps below and refer to Figure 4-1:

1. Gently slide the **battery pack** into the battery slot .
2. Push the **battery pack** in until it locks into place (Figure 4-1).

4.3 Optional Memory Card

Removing the Optional Memory Card

To remove an optional memory card from the computer, follow the steps below and refer to Figure 4-2.

1. Turn off the power to the computer. 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 **expansion slot cover**.
4. Grasp the **plastic tab** and pull it so the card comes partially out of the computer (Figure 4-2).
5. Grasp the **card** and pull it out of the computer (Figure 4-2).

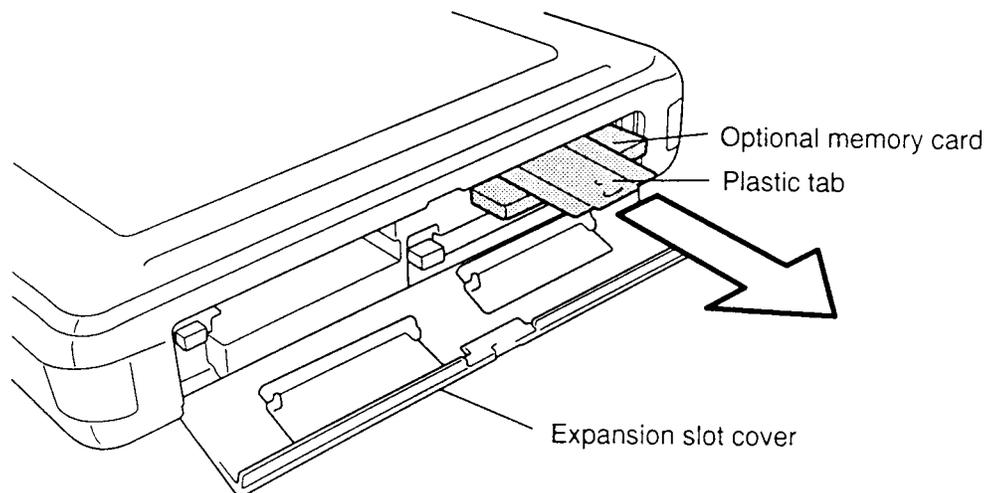


Figure 4-2 Removing the Optional Memory Card

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 the Optional Memory Card

To install an optional memory card in the computer, follow the steps below and refer to Figure 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 4-2).
2. Close the **expansion slot cover**.
3. Install the battery pack as described in section 4.2. The computer automatically configures all additional memory.

4.4 Optional PCMCIA Card

Removing the Optional PCMCIA Card

To remove an optional PCMCIA card from the computer, follow the steps below and refer to Figure 4-3.

1. Turn off the power to the computer. 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 **expansion slot cover**.
4. Press the **eject button** of the optional PCMCIA card slot 1 and the optional PCMCIA card will pop partially out (Figure 4-3).
5. Grasp the **card** and pull it out of the computer (Figure 4-3).
6. Press the **eject button** of the optional PCMCIA card slot 2 and the optional PCMCIA card will pop partially out (Figure 4-3).
7. Grasp the **card** and pull it out of the computer (Figure 4-3).

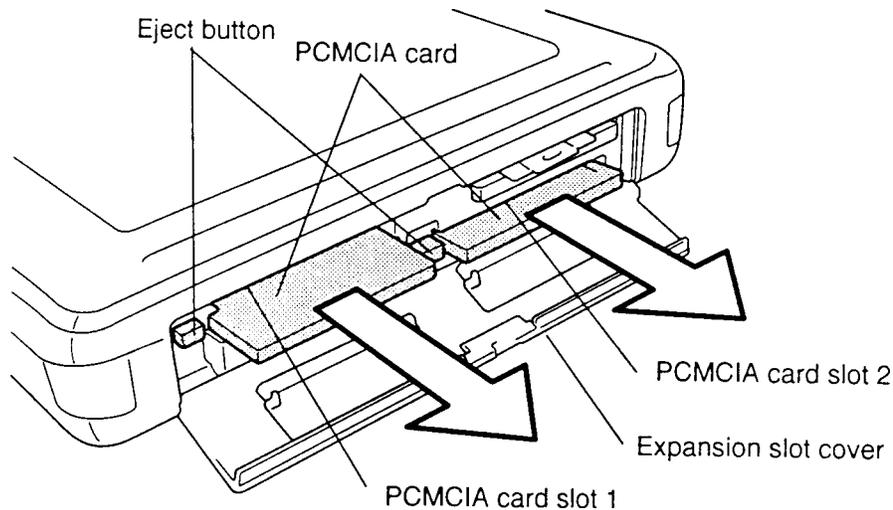


Figure 4-3 Removing the Optional PCMCIA Card

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

Installing the Optional PCMCIA Card

To install an optional PCMCIA card in the computer, follow the steps below and refer to Figure 4-3.

1. 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 4-3).
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. 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 4-3).
4. 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.
5. Close the **expansion card cover**.
6. Install the battery pack as described in section 4.2.

4.5 Hard Disk Drive

Removing the Hard Disk Drive

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

1. Turn off the power to the computer. Disconnect the AC adapter, power cord and all external cables connected to the computer.
2. Remove the battery pack, optional memory card, and optional PCMCIA cards as described in sections 4.2, 4.3 and 4.4.
3. Remove the **one M2.5x6 screw** from the **HDD cover** (Figure 4-4).

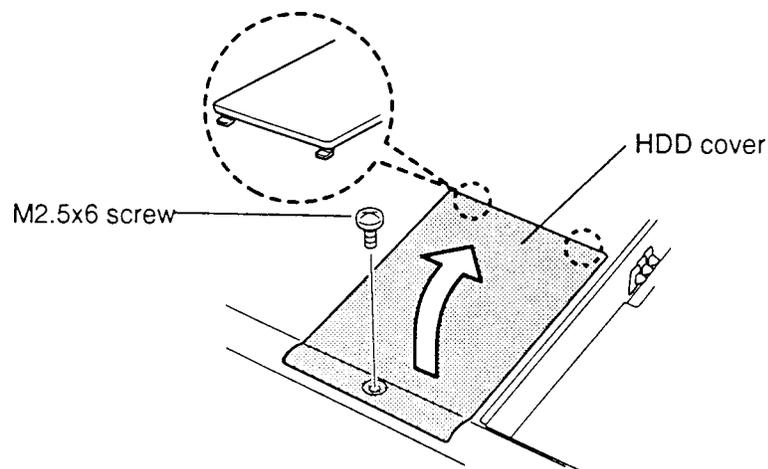


Figure 4-4 Removing the HDD Cover

NOTE: The HDD cover is held in place by one screw and two latches. Be careful to rotate the cover out as indicated in Figure 4-4 when removing it, and engage the latches first, then rotate it into place when seating it.

- Carefully rotate the **HDD cover** out of its seating and gently disconnect the **RTC battery** from the **HDD cover** (Figure 4-5).

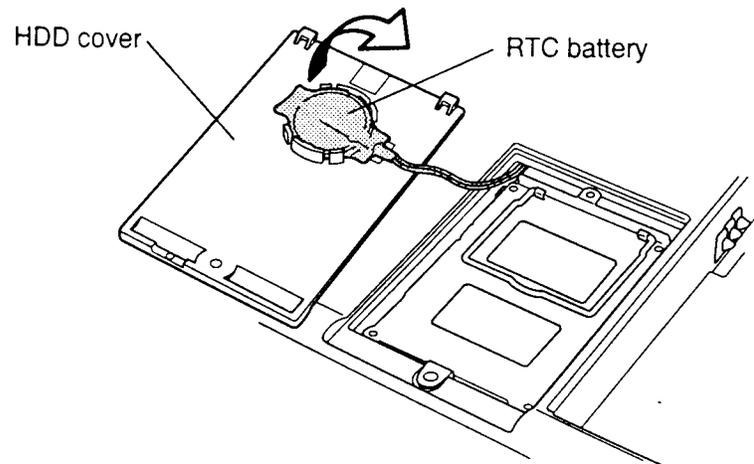


Figure 4-5 Disconnecting the RTC Battery

- Lift up and pull on the **HDD handle** to disconnect the **HDD connector** (Figure 4-6).

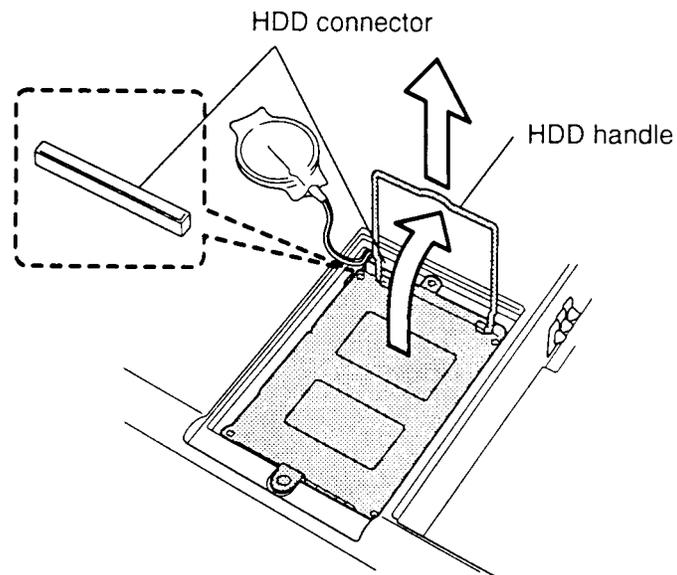


Figure 4-6 Removing the HDD with Bracket

6. Remove the **four flat-head M1.6x4 silver screws** securing the **bracket** to the HDD and slip off the **bracket** (Figure 4-7).

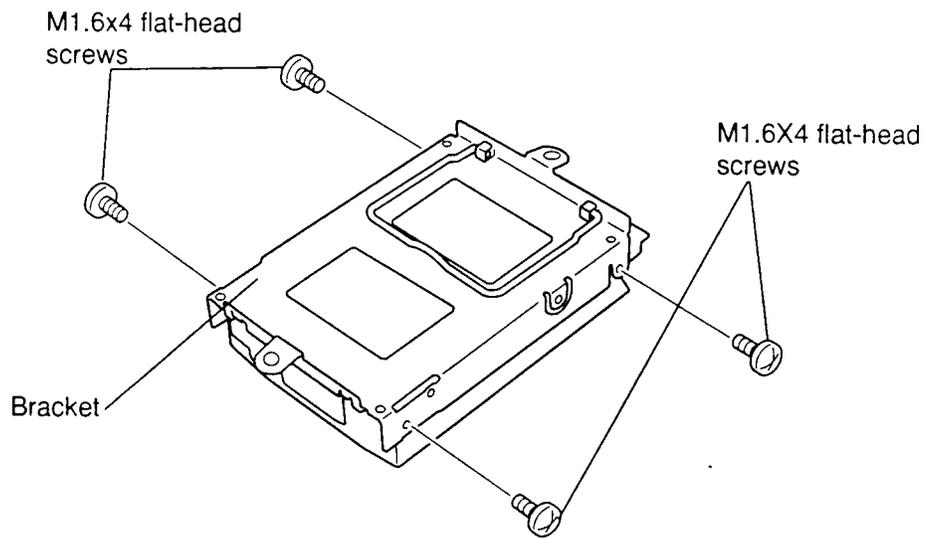


Figure 4-7 Removing the HDD

Installing the Hard Disk Drive

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

1. Secure the bracket with the **four flat-head M1.6x4 silver screws** (Figure 4-7).
2. Place the **HDD** on the HDD slot. Make sure the **HDD connector** connects to the system board **PJ408** correctly as shown in Figure 4-6.
3. Connect the **RTC battery** to the **HDD cover** (Figure 4-5).
4. Replace the **HDD cover** and secure it with the **one M2.5x6 screw** (Figure 4-4).
5. Install the optional PCMCIA card, optional memory card, and battery pack as described in sections 4.2, 4.3 and 4.4.

4.6 Back Cover

Removing the Back Cover

To remove the computer's back cover, follow the steps below and refer to Figure 4-8.

1. Turn off the power to the computer. 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 as described in sections 4.2, 4.3, 4.4 and 4.5.
3. Remove the **four M2.5x30 screws** and **one M2.5x10 screw** (Figure 4-8).

NOTES: 1. The terminals for the battery extend outside the back cover, so be careful not to damage them when removing the cover.
2. The latches tightly secure the back cover. To release them, firmly press on the back cover above each latch as you pry it free.
3. When removing the cover, you will need to press in the eject button of the optional PCMCIA card 2.

4. Pull the cover to release the **seven latches** connecting it to the computer (Figure 4-8).

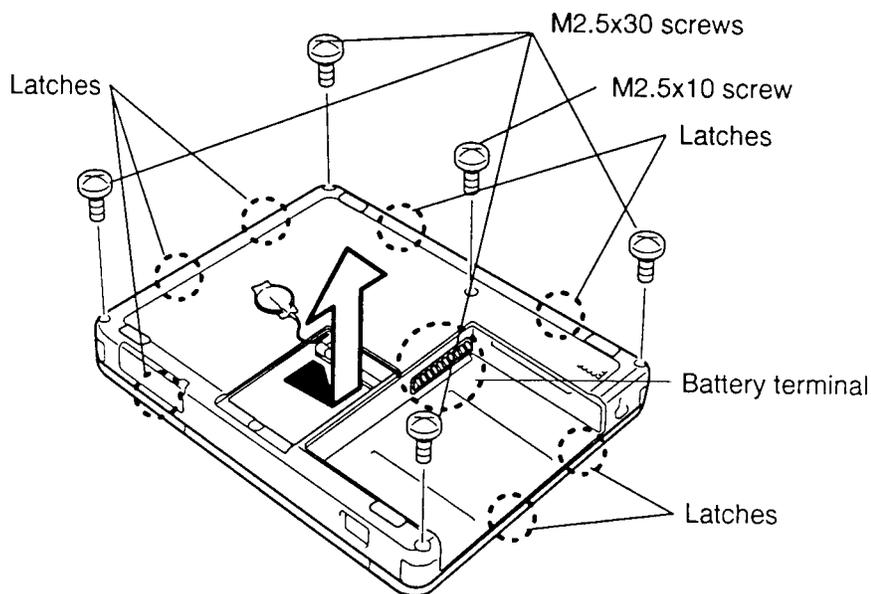


Figure 4-8 Removing the Back Cover

Installing the Back Cover

To install the computer's back cover, follow the steps below and refer to Figure 4-8.

1. Set the back cover in place and press to secure the **seven latches** (Figure 4-8). Be sure to carefully fit the cover over the battery terminal.
2. Make sure the guide tubes are aligned and seated, then secure the **four M2.5x30 screws** and **M2.5x10 screw** (Figure 4-8).
3. Install the HDD, optional PCMCIA card, optional memory card, and battery pack as described in sections 4.2, 4.3, 4.4, and 4.5.

NOTE: When installing the cover, you will need to press in the eject button of the optional PCMCIA card 2.

4.7 Upper System Board • Backup Battery • RTC Battery

Removing the Upper System Board, Backup Battery and RTC Battery

CAUTION: RTC memory data will be erased when the RTC battery connector is disconnected. Before removing the RTC battery, memorize the information.

To remove the computer's upper system board, backup battery, and RTC battery, follow the steps below and refer to Figures 4-9 and 4-10.

1. Turn off the power to the computer. 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, HDD, and back cover as described in sections 4.2, 4.3, 4.4, 4.5 and 4.6.
3. Peel back the protective tape and reflect the insulator away, then disconnect the **backup battery cable** from **PJ203**, and lift out the **backup battery** (Figure 4-9).
4. Reflect the insulator away, then disconnect the **RTC battery cable** from **PJ403**, and lift out the **RTC battery** (Figure 4-9).
5. Disconnect the **battery release switch cable** from **PJ10** (Figure 4-9).

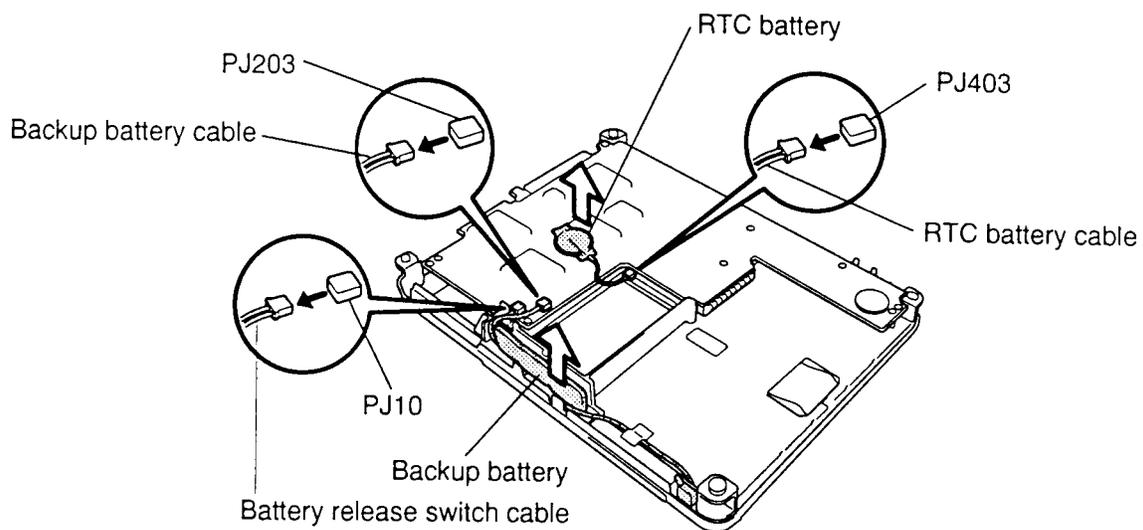


Figure 4-9 Removing the Backup Battery and RTC Battery

6. Remove the **six brass M2.5x4 screws** securing the upper system board (Figure 4-10).
7. Carefully rotate the upper system board out of its seating and disconnect the **FL inverter board cable** from **PJ204** (Figure 4-10).

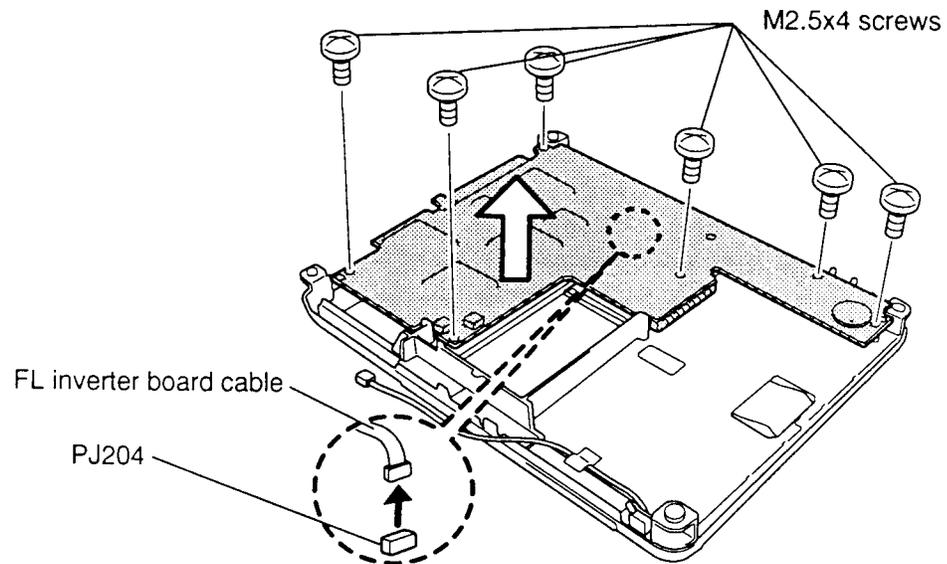


Figure 4-10 Removing the Upper System Board

Installing the Upper System Board, Backup Battery and RTC Battery

To install the computer's upper system board, backup battery and RTC battery, follow the steps below and refer to Figures 4-9 and 4-10.

1. Connect the **FL inverter board cable** to **PJ204** (Figure 4-10).
2. Place the upper system board on the lower system board (Figure 4-10).
3. Align the **connector (PJ1)**, then press the **upper system board** to connect them.

NOTE: Make sure the **upper system board** is not attached to the lower system board components. Refer to Figure 4-11.

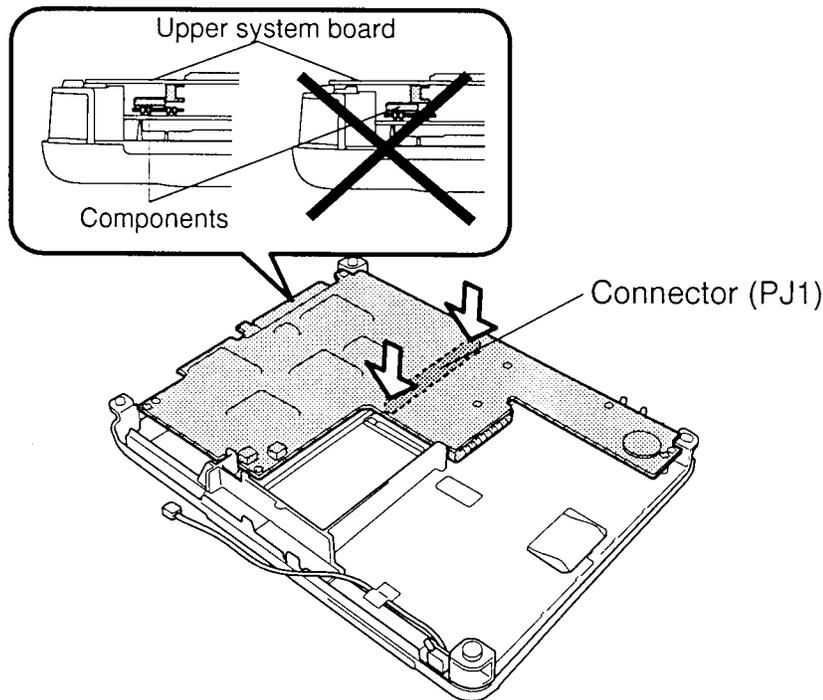


Figure 4-11 Installing the Upper System Board

4. Secure the **six M2.5x4 screws** on the upper system board (Figure 4-10).
5. Reflect the insulator away, then connect the **RTC battery cable** to **PJ403** (Figure 4-9).
6. Connect the **backup battery cable** to **PJ203** (Figure 4-9) and replace the protective tape.
7. Connect the **battery release switch cable** to **PJ10** (Figure 4-9).
8. Install the back cover, HDD, optional PCMCIA card, optional memory card, and battery pack as described in sections 4.2, 4.3, 4.4, 4.5 and 4.6.

4.8 T200 Lower System Board

Removing the T200 Lower System Board

To remove the T200's lower system board, follow the steps below and refer to Figures 4-12 and 4-13.

1. Turn off the power to the computer. 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, HDD, back cover, upper system board, backup battery and RTC battery as described in sections 4.2, 4.3, 4.4 ,4.5, 4.6 and 4.7.
3. Remove the insulator, then remove the **three M2.5x4 screws** securing the **lower system board** (Figure 4-12).

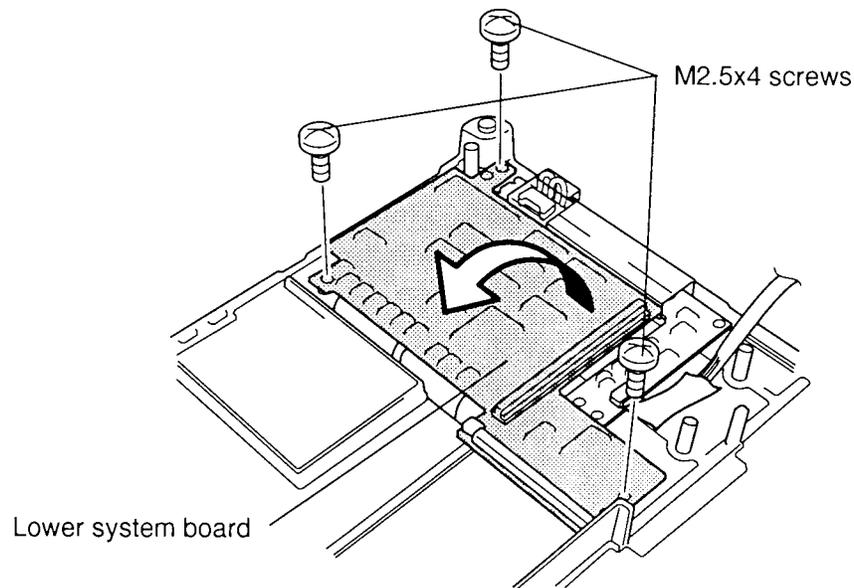


Figure 4-12 Removing the T200 Lower System Board

- Carefully rotate the lower system board out of its seating and disconnect the **tablet cable** from **PJ407** and the **display cable** from **PJ404** (Figure 4-13).

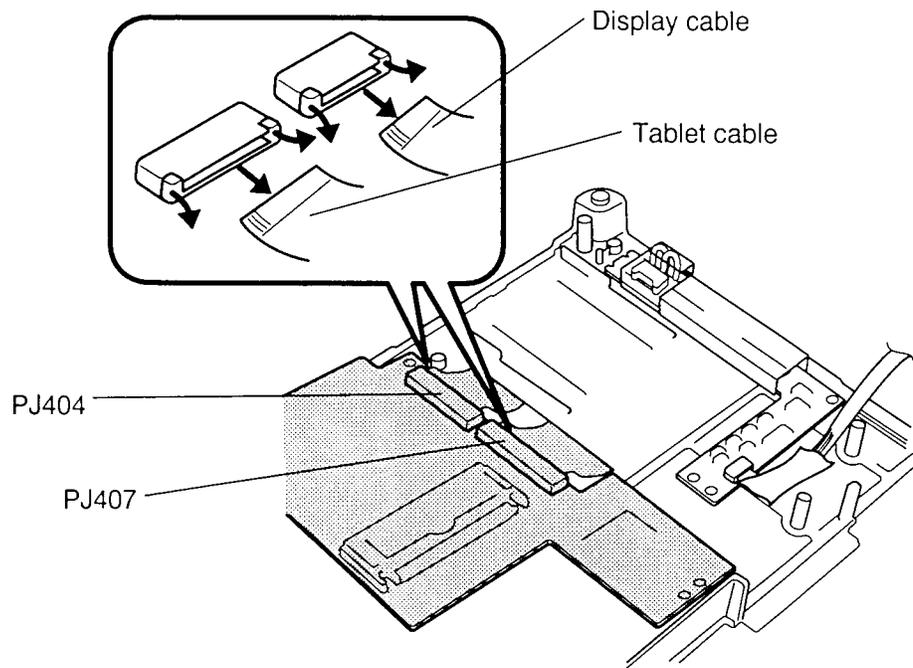


Figure 4-13 Disconnecting the Tablet Cable and Display Cable

Installing the T200 Lower System Board

To install the T200's lower system board, follow the steps below and refer to Figures 4-12 and 4-13.

1. Connect the **tablet cable** to **PJ407** (Figure 4-13).
2. Connect the **display cable** to **PJ404** and carefully rotate the system board (Figure 4-13).
3. Place the lower system board on the base frame (Figure 4-12).
4. Secure the **three M2.5x4 screws** on the lower system board (Figure 4-12), then replace the insulator.
5. Install the upper system board, backup battery, RTC battery, back cover, HDD, optional PCMCIA card, optional memory card, and battery pack as described in sections 4.2, 4.3, 4.4, 4.5 4.6 and 4.7.

4.9 T200CS Lower System Board

Removing the T200CS Lower System Board

To remove the T200CS's lower system board, follow the steps below and refer to Figures 4-14 and 4-15.

1. Turn off the power to the computer. 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, HDD, back cover, upper system board, backup battery, and RTC battery as described in sections 4.2, 4.3, 4.4, 4.5, 4.6 and 4.7.
3. Remove the black insulator, then disconnect the **display cable** from **PJ405** (Figure 4-14).
4. Peel back the white tape, then remove the **three M2.5x4 screws** securing the lower system board (Figure 4-14).

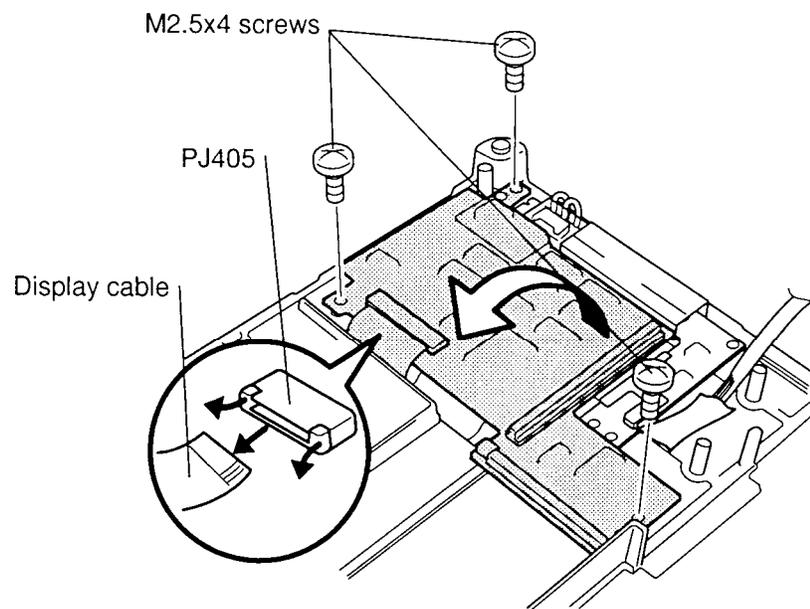


Figure 4-14 Removing the T200CS Lower System Board

5. Carefully rotate the lower system board out of its seating and disconnect the **tablet cable** from **PJ407** (Figure 4-15).

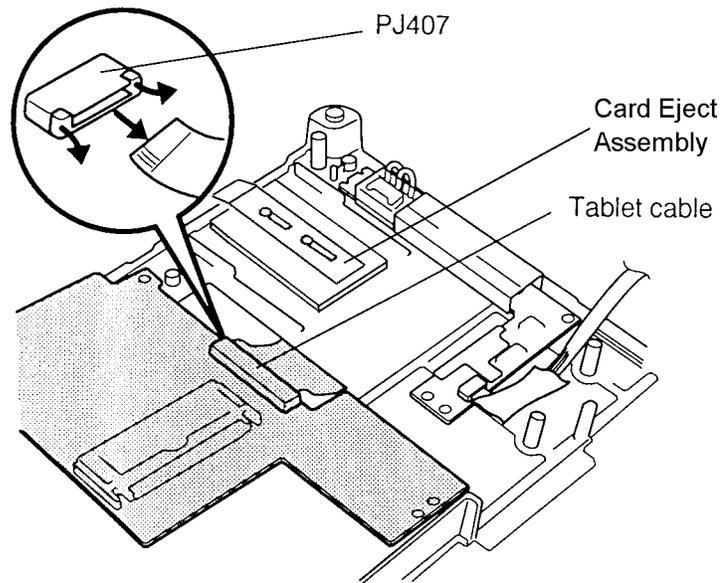


Figure 4-15 Disconnecting the Tablet Cable

Installing the T200CS Lower System Board

To install the T200CS's lower system board, follow the steps below and refer to Figures 4-14 and 4-15.

1. Place the card eject assembly into the middle frame, then connect the **tablet cable** to **PJ407** and carefully rotate the lower system board (Figure 4-15).
2. Connect the **display cable** to **PJ405** (Figure 4-14), and replace the black insulator over the display cable.
3. Place the lower system board on the base frame (Figure 4-14).
4. Secure the **three M2.5x4 screws** on the lower system board (Figure 4-14).
5. Install the upper system board, backup battery, RTC battery, back cover, HDD, optional PCMCIA card, optional memory card, and battery pack as described in sections 4.2, 4.3, 4.4, 4.5 4.6 and 4.7.

4.10 FL Inverter Board

Removing the FL Inverter Board

To remove the computer's FL inverter board, follow the steps below and refer to Figure 4-16.

1. Turn off the power to the computer. 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, HDD, back cover, upper system board, backup battery and RTC battery as described in sections 4.2, 4.3, 4.4 ,4.5, 4.6 and 4.7.
3. Remove the **tape** and disconnect the **FL inverter cable** from **CN1** and the **FL cable** from CN2 (Figure 4-16).
4. Remove the **three M2.5x4** screws securing the **FL inverter board** and lift out the **FL inverter board** (Figure 4-16).

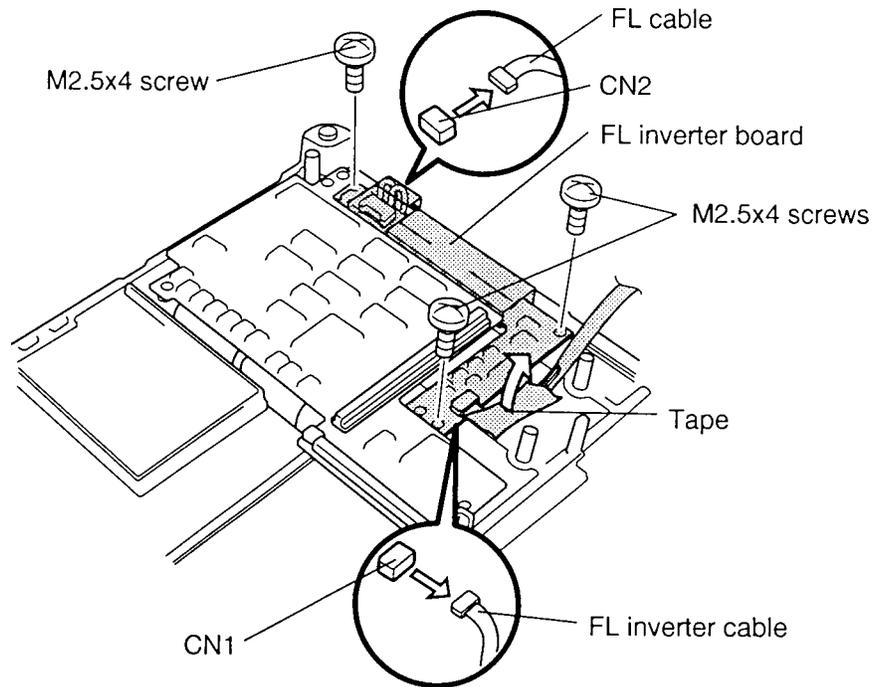


Figure 4-16 Removing the FL Inverter Board

Installing the FL inverter Board

To install the computer's FL inverter board, follow the steps below and refer to Figure 4-16.

NOTE: *The T200 and T200 CS FL inverter boards are different. Check the part number before installing the new FL inverter board.*

T200 FL inverter board: P000196850

T200 CS FL inverter board: P000195520

1. Connect the **FL inverter cable** to **CN1** on the **FL inverter board** and the **FL cable** to **CN2** (Figure 4-16).
2. Replace the **FL inverter board** and secure it with the **three M2.5x4 screws** (Figure 4-16).
3. Install the lower system board, upper system board, backup battery, RTC battery, back cover, HDD, optional PCMCIA card, optional memory card, and battery pack as described in sections 4.2, 4.3, 4.4, 4.5, 4.6 and 4.7.

4.11 T200 Tablet

CAUTION: When you handle the tablet, don't bend it. If the tablet is bent more than 120 mm, it will be permanently misshaped.

WARNING: If you touch the sealed board of the tablet, it may become tarnished and performance may be affected. The edge of the sealed board is sharp, so it is advisable to wear gloves when handling it.

Removing the T200 Tablet

To remove the T200's tablet, follow the steps below and refer to Figures 4-17 through 4-19.

1. Turn off the power to the computer. 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, HDD, back cover, upper system board, backup battery, RTC battery, lower system board, and FL inverter board as described in sections 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, and 4.10.
3. Remove the **two M2.5x4 screws** securing the **middle frame** (Figure 4-17).
4. Note the position of the battery push spring, then unsnap the **four latches** securing the **middle frame** to the display module, and carefully lift off the **middle frame** (Figure 4-17).

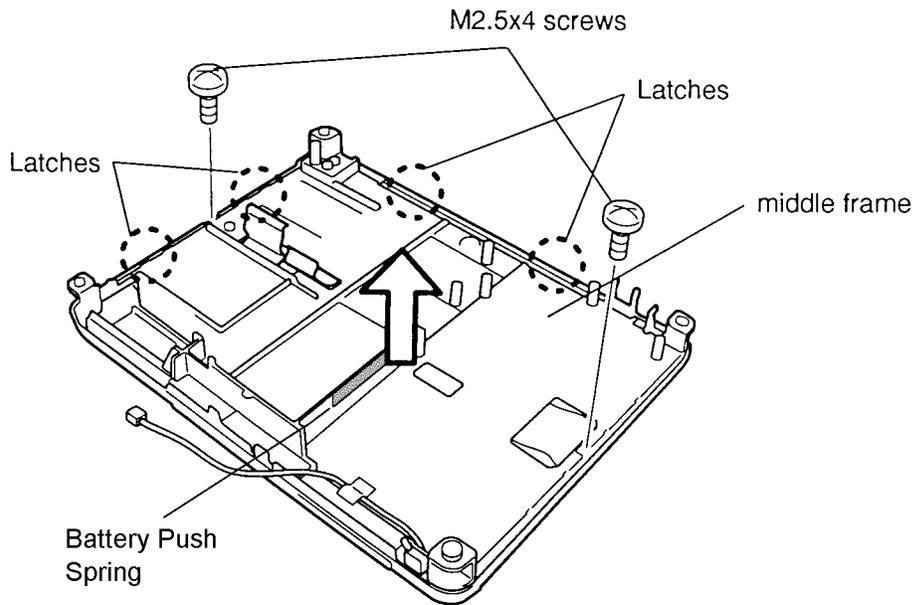


Figure 4-17 Removing the T200 Base Frame

5. Remove the **tablet cover** (Figure 4-18).

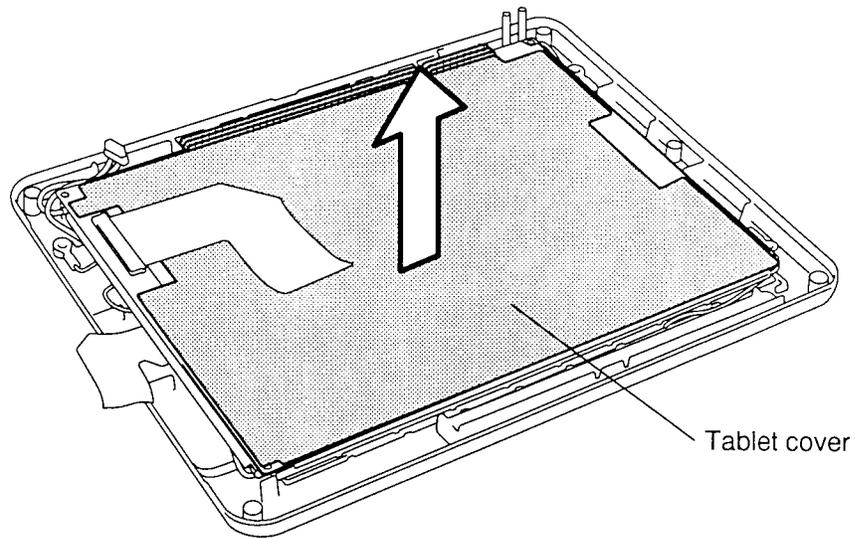


Figure 4-18 Removing the T200 Tablet Cover

6. Remove the **tablet** (Figure 4-19)

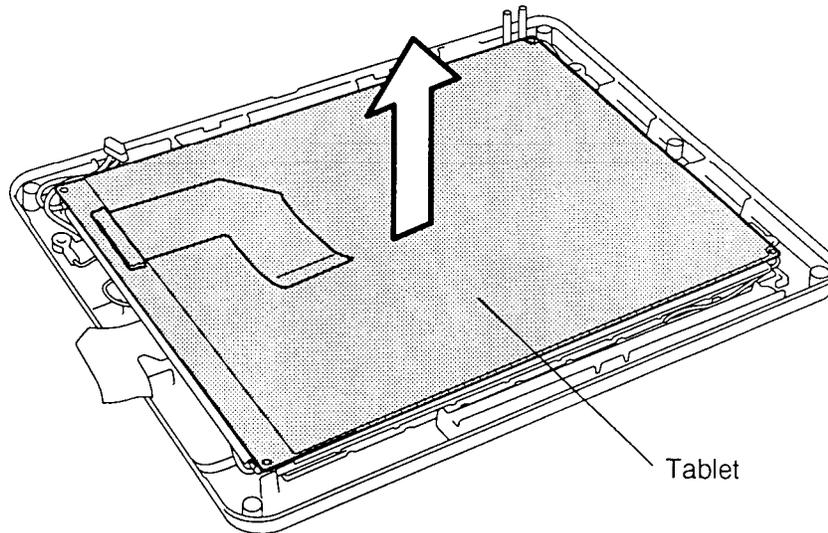


Figure 4-19 Removing the T200 Tablet

Installing the T200 Tablet

To install the computer's tablet, follow the steps below and refer to Figures 4-17 through 4-19.

1. Place the **tablet** on the LCD panel (Figure 4-19), and **tablet cover** on the **tablet** (Figure 4-18). When you seat the **tablet**, align the holes at each corner with the corresponding posts on the LCD module.
2. Place the **middle frame** on the display module and make sure that the cabling is covered, then snap the **four latches** into place (Figure 4-17).
3. Secure the **middle frame** with the **two 2.5x4 screws** (Figure 4-17).
4. Install the FL inverter board, lower system board, upper system board, backup battery, RTC battery, back cover, HDD, optional PCMCIA card, optional memory card, and battery pack as described in sections 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, and 4.10.

4.12 T200CS Tablet

CAUTION: When you handle the tablet, don't bend it. If the tablet is bent more than 120 mm, it will be permanently misshaped.

WARNING: If you touch the sealed board of the tablet, it may become tarnished and performance may be affected. The edge of the sealed board is sharp, so it is advisable to wear gloves when handling it.

Removing the T200CS Tablet

To remove the T200CS's tablet, follow the steps below and refer to Figures 4-20 through 4-22.

1. Turn off the power to the computer. 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, HDD, back cover, upper system board, backup battery, RTC battery, lower system board, and FL inverter board as described in sections 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, and 4.10.
3. Remove the **two M2.5x4 screws** securing the **middle frame** (Figure 4-20).
4. Note the position of the battery push spring, then unsnap the **four latches** securing the **middle frame** to the display module and carefully lift off the **middle frame** (Figure 4-20).

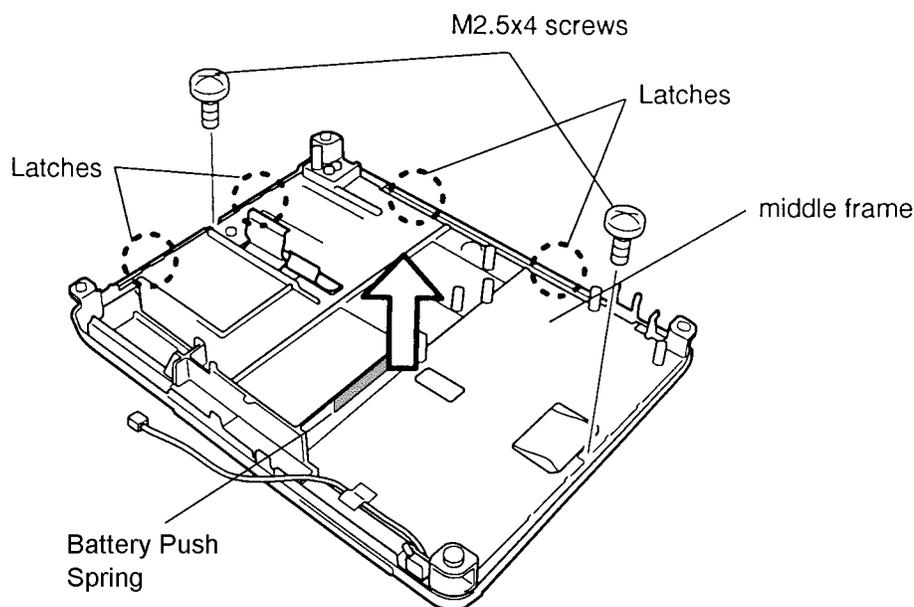


Figure 4-20 Removing the T200CS Base Frame

5. Lift up the **display cable** and lift the **tablet cover** out of the display module (Figure 4-21).

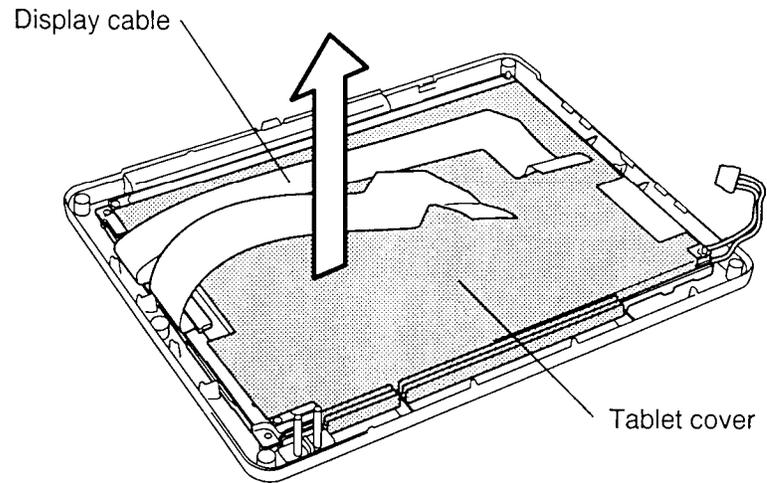


Figure 4-21 Removing the T200CS Tablet Cover

6. Lift the tablet off the two guide posts and remove it (Figure 4-22).

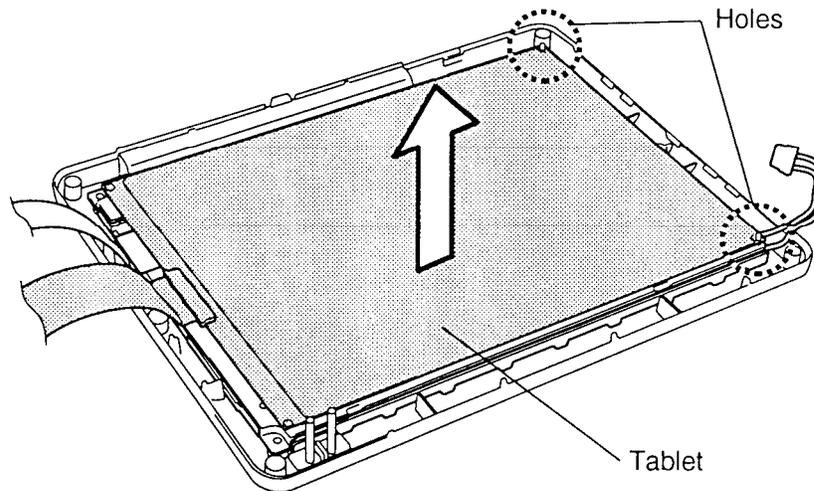


Figure 4-22 Removing the T200CS Tablet

Installing the T200CS Tablet

To install the computer's tablet, follow the steps below and refer to Figures 4-20 through 4-22.

1. Place the **tablet** on the display module. When you seat the **tablet**, align the holes at each corner with the corresponding posts on the LCD module (Figure 4-22).
2. Lift the cables up and out of the way, then place the **tablet cover** on the **tablet** (Figure 4-21).
3. Place the **middle frame** on the display module, making sure the cabling is covered, then snap the **four latches** into place (Figure 4-20).
4. Secure the **middle frame** with the **two M2.5x4 screws** (Figure 4-20).
5. Install the FL inverter board, lower system board, upper system board, backup battery, RTC battery, back cover, HDD, optional PCMCIA card, optional memory card, and battery pack as described in sections 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9 and 4.10.

4.13 T200 Display Module

Removing the T200 Display Module

To remove the T200's display module, follow the steps below and refer to Figure 4-23.

1. Turn off the power to the computer. Disconnect the AC adapter, and all external cables connected to the computer.
2. Remove the battery pack, optional memory card, optional PCMCIA cards, HDD, back cover, upper system board, backup battery, RTC battery, lower system board, FL inverter board, and tablet as described in sections 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.10 and 4.11.
3. Remove the display module from the display mask (Figure 4-23).

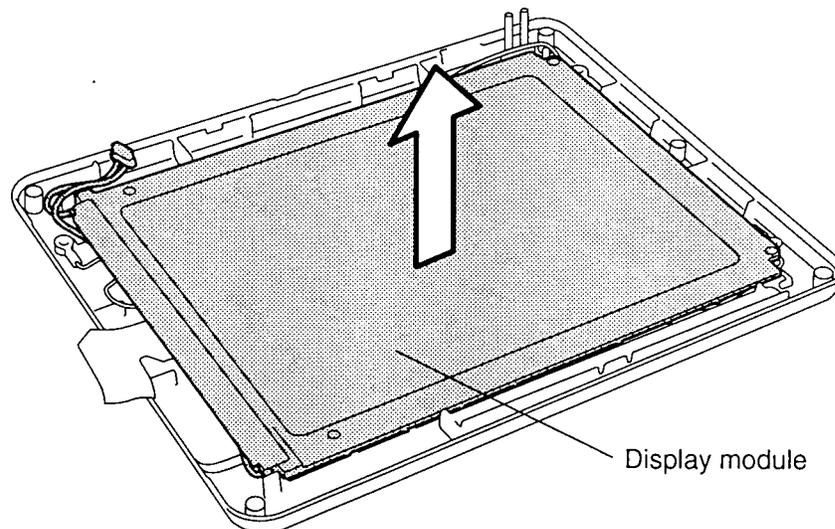


Figure 4-23 Removing the T200 Display Module

Installing the T200 Display Module

To install the T200's display module, follow the steps below and refer to Figure 4-23.

1. Place the display module on the display mask (Figure 4-23).
2. Install the tablet, FL inverter board, lower system board, upper system board, backup battery, RTC battery, back cover, HDD, optional PCMCIA card, optional memory card, and battery pack as described in sections 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.10, and 4.11.

4.14 T200CS Display Module

Removing the T200CS Display Module

To remove the T200CS's display module, follow the steps below.

1. Turn off the power to the computer. Disconnect the AC adapter, and all external cables connected to the computer.
2. Remove the battery pack, optional memory card, optional PCMCIA cards, HDD, back cover, upper system board, backup battery, RTC battery, lower system board, FL inverter board, and tablet as described in sections 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.10 and 4.11.
3. Disconnect the display cable from the display module.

Installing the T200CS Display Module

To install the T200CS's display module, follow the steps below.

1. Connect the display cable to the display module.
2. Install the tablet, FL inverter board, lower system board, upper system board, backup battery, RTC battery, back cover, HDD, optional PCMCIA card, optional memory card, and battery pack as described in sections 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10 and 4.11.

4.15 T200 FL

Removing the T200 FL

To remove the T200's FL, follow the steps below and refer to Figure 4-24.

1. Turn off the power to the computer. Disconnect the AC adapter, and all external cables connected to the computer.
2. Remove the battery pack, optional memory card, optional PCMCIA cards, HDD, back cover, upper system board, backup battery, RTC battery, lower system board, FL inverter board, and tablet as described in sections 4.2 through 4.8, 4.10, and 4.11.
3. Carefully lift out the FL unit from the display module.
4. Remove the **two M2x2.5 flat screws** securing the **FL cover** (Figure 4-24).
5. Unlatch the four latches to remove the FL.

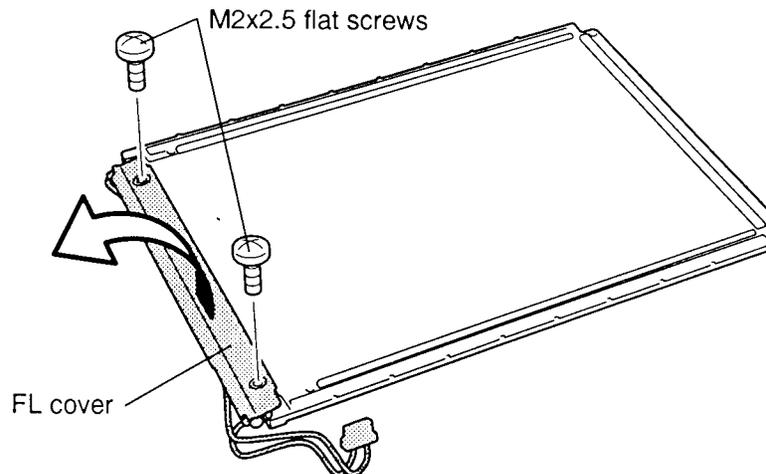


Figure 4-24 Removing the T200 FL

Installing the T200 FL

To install the T200's FL, follow the steps below and refer to Figure 4-24.

1. Snap in the four latches of the FL cover to the FL unit.
2. Secure the **FL cover** with **two M2x2.5 flat screws** (Figure 4-24).
3. Place the FL unit on the LCD panel.
4. Install the tablet, FL inverter board, lower system board, upper system board, backup battery, RTC battery, back cover, HDD, optional PCMCIA card, optional memory card, and battery pack as described in sections 4.2 through 4.8, 4.10, and 4.11.

4.16 T200CS FL

Removing the T200CS FL

To remove the T200CS's FL, follow the steps below and refer to Figures 4-25 through 4-27.

1. Turn off the power to the computer. Disconnect the AC adapter, and all external cables connected to the computer.
2. Remove the battery pack, optional memory card, optional PCMCIA cards, HDD, back cover, upper system board, backup battery, RTC battery, lower system board, FL inverter board, and tablet as described in sections 4.2 through 4.7, 4.9, 4.10 and 4.12.
3. Remove the **four M2.5x4 screws** securing the **FL unit** and **LCD panel** to the LCD cover (Figure 4-25).

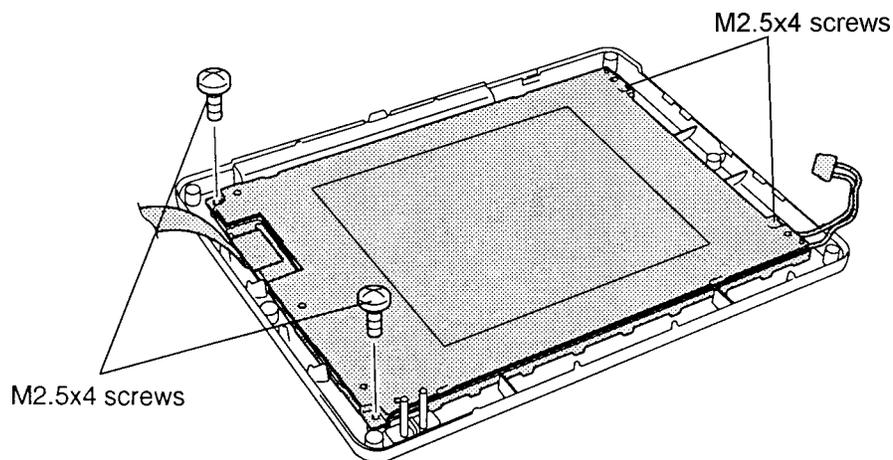


Figure 4-25 Removing the Four Screws

4. Remove the **six M2x2 flat screws** securing the **FL unit cover** (Figure 4-26).

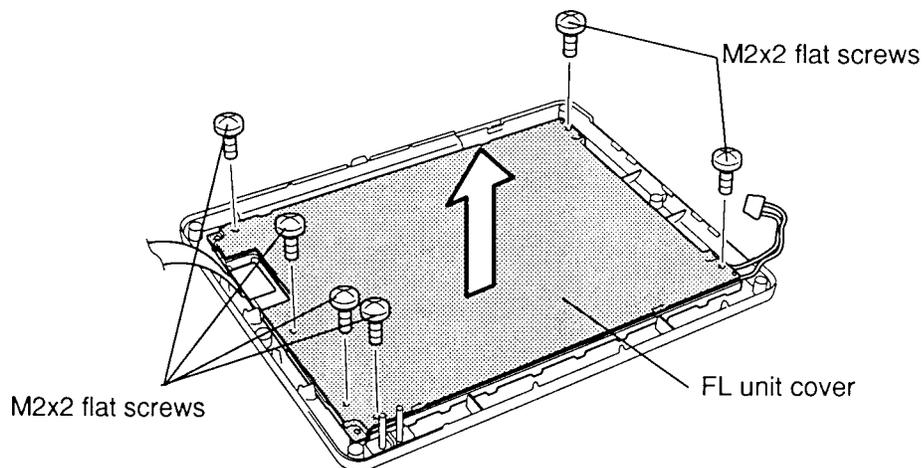


Figure 4-26 Removing the FL Unit Cover

5. Remove the **FL unit cover** and **tape** securing the reflective sheet.
6. Lift up the **reflective sheet** covering the LCD panel (Figure 4-27).

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

7. Lift out the **FL** (Figure 4-27).

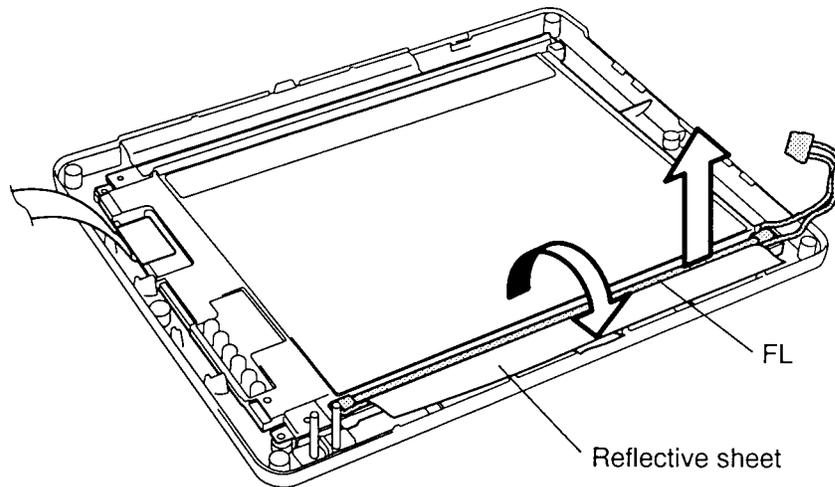


Figure 4-27 Removing the T200CS FL

Installing the T200CS FL

To install the T200CS's FL, follow the steps below and refer to Figures 4-25 through 4-27.

1. Place the **FL** on the **FL unit** and cover the FL using a **reflective sheet** (Figure 4-27).
2. Secure the **reflective sheet** with **tape**.
3. Place the **FL unit cover** and secure it with **six M2x2 flat screws** (Figure 4-26).
4. Secure the **FL unit** with **four M2.5x4 screws** (Figure 4-25).
5. Install the tablet, FL inverter board, lower system board, upper system board, backup battery, RTC battery, back cover, HDD, optional PCMCIA card, optional memory card, and battery pack as described in sections 4.2 through 4.10, and 4.12.

4.17 Stylus Tip

Removing the Stylus Tip

If the stylus's tip becomes worn or damaged, it may be necessary to change the plastic tip. To remove the tip, follow the step below and refer to Figure 4-28.

1. Remove the **tip** and pull it out. Use the tweezers.

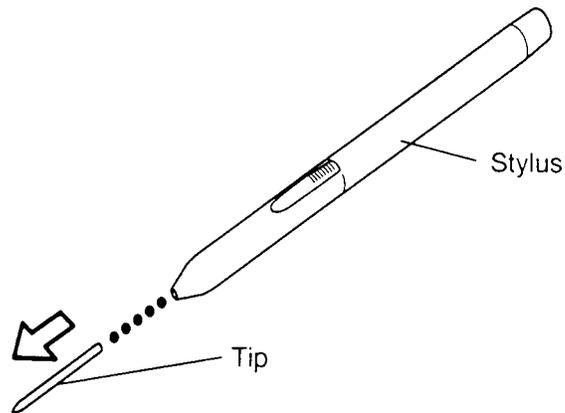


Figure 4-28 Removing the Tip

Installing the Tip

To install the stylus's tip, follow the step below and refer to Figure 4-28.

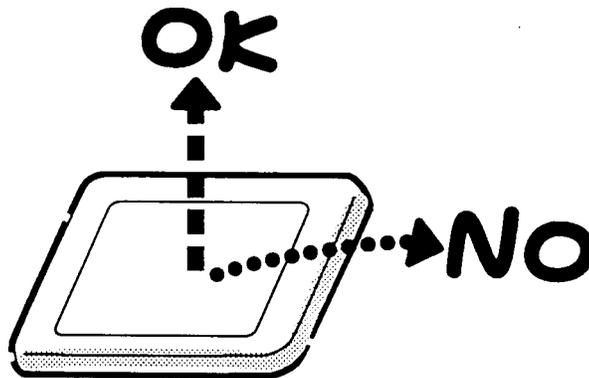
1. Insert the new **tip** and push gently to fully seat it.

Appendix A Handling the LCD Module

Precautions for handling the computer's LCD module

The LCD module can be easily damaged during assembly or disassembly. Observe the following precautions when handling:

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.



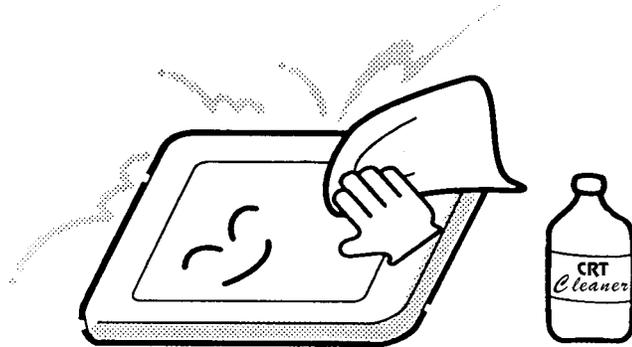
2. Carefully align the holes at the four corners of the LCD module with corresponding holes in the cover before securing with screws. Do not force the module into place, stress can affect its performance.

The polarized surface of the panel scars easily, handle carefully.

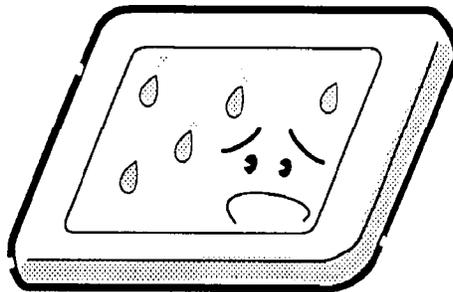


3. If the panel surface gets dirty, wipe it with cotton or a soft cloth. If it is still dirty, breathe on the surface to create a light condensate and wipe again.

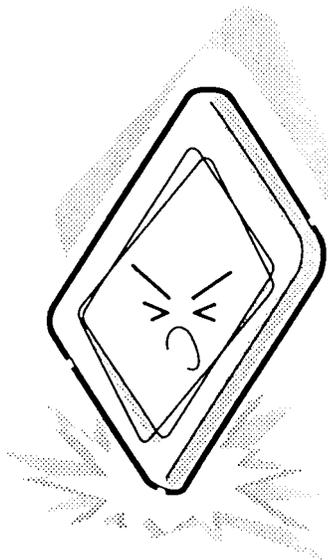
If the surface is very dirty, we recommend a CRT cleaning agent. Apply the agent to a cloth and then wipe the surface. Do not apply cleanser directly to the panel.



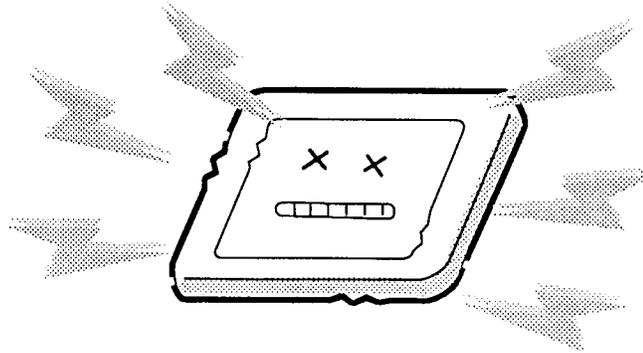
4. Water or other liquids left on the surface for a long period can change the screen tint or stain the screen. Be sure to quickly wipe off any liquid.



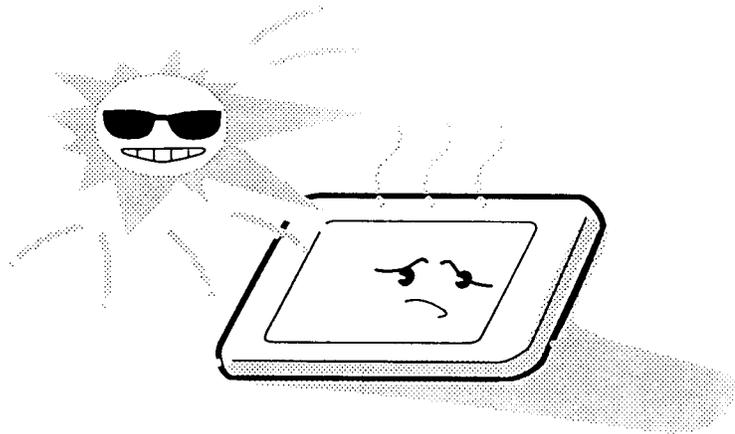
5. Do not drop or strike the LCD module with a hard object, glass used in the panel could break or crack.



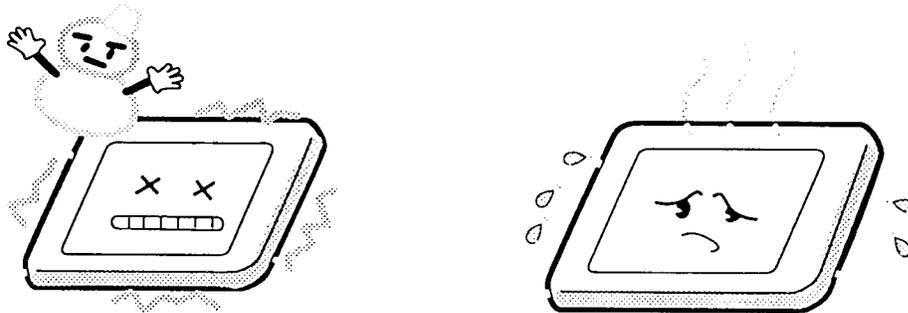
6. Wear a wrist or ankle ground when handling the module to prevent electrostatic discharge damage to the CMOS-LSI circuits.



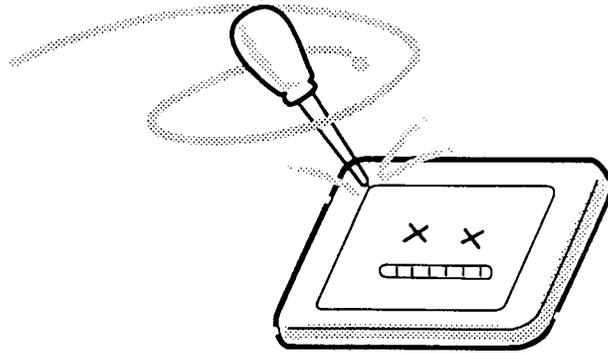
7. Do not expose the module to direct sunlight or strong ultraviolet rays for long periods.



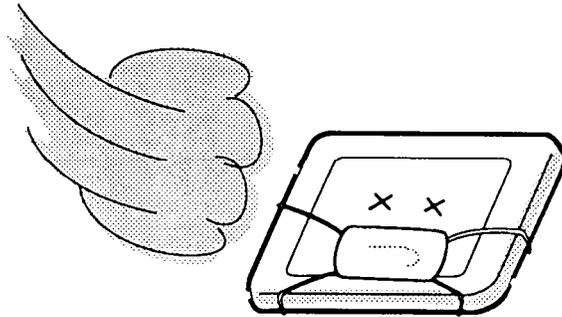
8. Do not store the module at temperatures below specifications. Cold can cause liquid crystals to freeze, lose their elasticity, or otherwise suffer damage.



9. Do not disassemble the LCD module except as instructed in Chapter 4. Disassembly beyond the instructions in this manual can cause malfunctions.



10. If transporting the module, do not use packing materials that contain epoxy resin (amine) or silicon glue (alcohol or oxime). These materials can release gas that can damage panel polarization.



Appendix B Board Layout

B.1 Upper System Board (FOGSD2)

Figure B-1 Upper System Board FOGSD2 (Front)

Figure B-2 Upper System Board FOGSD2 (Back)

Table B-1 Upper ICs and Connectors on the System Board (Front)

Mark	Number	Name
(A)	IC10	Video controller (WD90C24A)
(B)	IC12, 13	Video RAM
(C)	IC16	SMI controller gate array
(D)	PJ1	Joint connector
(E)	PJ2	PRT connector
(F)	PJ3	FDD connector
(G)	PJ4	Serial connector
(H)	PJ5	PS/2 keyboard connector
(I)	PJ6	External display connector
(J)	PJ7	72-pin Expansion connector
(K)	PJ8	PCMCIA slot 2 connector
(L)	PJ9	PCMCIA slot 1 connector
(M)	PJ201	DC IN connector
(N)	PJ202	Main battery connector
(O)	PJ204	FL inverter connector

Table B-2 Upper ICs and Connectors on the System Board (Back)

Mark	Number	Name
(A)	IC1	CPU 486DX2
(B)	IC2	System controller gate array
(C)	IC3	Clock generator
(D)	IC4	Super integration (T9901)
(E)	IC5	BIOS ROM
(F)	IC7	KBC
(G)	IC19	PCMCIA controller gate array
(H)	PJ10	Battery release switch connector
(I)	PJ203	Backup battery connector

B.2 Lower System Board (FOGSU2)

Figure B-3 Lower System Board FOGSU2 (Front)

Figure B-4 Lower System Board FOGSU2 (Back)

Table B-3 Lower ICs and Connectors on the System Board (Front)

Mark	Number	Name
(A)	IC401 to IC408	System memory
(B)	IC412	RTC
(C)	PJ401	Joint connector
(D)	PJ403	RTC battery connector
(E)	PJ405	T200CS display connector
(F)	PJ408	HDD connector

Table B-4 Lower ICs and Connectors on the System Board (Back)

Mark	Number	Name
(A)	PJ402	Memory card connector
(B)	PJ404	T200 display connector
(C)	PJ407	Tablet connector

Appendix C Pin Assignments

C.1 PJ1 (PJ401) Joint Connector (140-Pin)

Table C-1 Joint Connector Pin Assignment (140-Pin) (1/2)

Pin	Signal	I/O	Pin	Signal	I/O
01	GND	–	41	D21;110	I/O
02	GND	–	42	D22;110	I/O
03	GND	–	43	D23;110	I/O
04	3RAMV	–	44	D24;110	I/O
05	3RAMV	–	45	D25;110	I/O
06	3RAMV	–	46	D26;110	I/O
07	3RAMV	–	47	D27;110	I/O
08	MA00;110	O	48	D28;110	I/O
09	MA01;110	O	49	D29;110	I/O
10	MA02;110	O	50	D30;110	I/O
11	MA03;110	O	51	D31;110	I/O
12	MA04;110	O	52	RASY0;010	O
13	MA05;110	O	53	RAS0;010	O
14	MA06;110	O	54	RAS1;010	O
15	MA07;110	O	55	CAS0;010	O
16	MA08;110	O	56	CAS1;010	O
17	MA09;110	O	57	CAS2;010	O
18	MA10;110	O	58	CAS3;010	O
19	D00;110	I/O	59	MWE1;010	O
20	D01;110	I/O	60	MWE2;010	O
21	D02;110	I/O	61	GND	–
22	D03;110	I/O	62	SD00;100	I/O
23	D04;110	I/O	63	SD01;100	I/O
24	D05;110	I/O	64	SD02;100	I/O
25	D06;110	I/O	65	SD03;100	I/O
26	D07;110	I/O	66	SD04;100	I/O
27	D08;110	I/O	67	SD05;100	I/O
28	D09;110	I/O	68	SD06;100	I/O
29	D10;110	I/O	69	SD07;100	I/O
30	D11;110	I/O	70	SD08;100	I/O
31	D12;110	I/O	71	SD09;100	I/O
32	D13;110	I/O	72	SD10;100	I/O
33	D14;110	I/O	73	SD11;100	I/O
34	D15;110	I/O	74	SD12;100	I/O
35	D16;110	I/O	75	SD13;100	I/O
36	D17;110	I/O	76	SD14;100	I/O
37	D18;110	I/O	77	SD15;100	I/O
38	D19;110	I/O	78	SA00;100	I/O
39	GND	–	79	SA01;100	I/O
40	D20;110	I/O	80	SA02;100	I/O

Table C-1 Joint Connector Pin Assignment (140-Pin) (2/2)

Pin	Signal	I/O	Pin	Signal	I/O
81	IORD;010	O	111	CDU2;110	O
82	IOWR;010	O	112	CDU3;110	O
83	IOCRDY;100	I	113	CDU4;110	O
84	IOCS16;000	I	114	CDU5;110	O
85	IRQ14;100	I	115	CDU6;110	O
86	RESET;000	O	116	CDU7;110	O
87	HDC0CS;000	O	117	LPF;110	O
88	HDC1CS;000	O	118	FPF;110	O
89	GND	-	119	MLCLK;110	O
90	SIN;100	I	120	CLCLK;110	O
91	SOUT;100	O	121	GND	-
92	CTS2;000	I	122	FLTEN;000	O
93	GND	-	123	PNEL0;100	O
94	RTCSBY;000	O	124	CNTBEN;000	O
95	RTCWR;000	O	125	CNTRST;000	O
96	RTCAS;100	O	126	TF0;100	O
97	RTCDS;000	O	127	TF1;100	O
98	IRQ8;000	I	128	TF2;100	O
99	C32KHZ;000	O	129	TLCH;100	O
100	GND	-	130	VCC	-
101	LD0;110	O	131	VCC	-
102	LD1;110	O	132	VCC	-
103	LD2;110	O	133	VCC	-
104	LD3;110	O	134	VCC	-
105	UD0;110	O	135	GND	-
106	UD1;110	O	136	GND	-
107	UD2;110	O	137	GND	-
108	UD3;110	O	138	GND	-
109	CDU0;110	O	139	GND	-
110	CDU1;110	O	140	GND	-

C.2 PJ2 PRT Connector (25-Pin)

Table C-2 PRT Connector Pin Assignment (25-Pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	STROB;010	O	14	AUTFD;010	O
02	PD0;110	I/O	15	ERROR;000	I
03	PD1;110	I/O	16	PINT;010	O
04	PD2;110	I/O	17	SLIN;010	O
05	PD3;110	I/O	18	GND	–
06	PD4;110	I/O	19	GND	–
07	PD5;110	I/O	20	GND	–
08	PD6;110	I/O	21	GND	–
09	PD7;110	I/O	22	GND	–
10	ACK;000	I	23	GND	–
11	BUSY;100	I	24	GND	–
12	PE;100	I	25	GND	–
13	SELCT;100	O			

C.3 PJ3 FDD Connector (26-Pin)

Table C-3 FDD Connector Pin Assignment (26-Pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	FVCC201	–	14	IFSTEP;010	O
02	IFINOX;000	I	15	GND	–
03	FVCC201	–	16	IFWDAT;010	O
04	FVCC201	O	17	GND	–
05	FVCC201	–	18	IFWEN;010	O
06	DSKCHG;000	I	19	GND	–
07	IFDASL;010	–	20	IFTRKO;000	I
08	IFRADY;000	I	21	GND	–
09	IFHMED;000	I	22	IFWPRD;000	I
10	IFAMON;010	O	23	GND	–
11	IFLOD1;010	O	24	IFRDAT;000	I
12	IFDIRC;010	O	25	GND	–
13	IFLOD2;010	O	26	IFSSEL;010	O

C.4 PJ4 Serial Connector (9-Pin)

Table C-4 Serial Connector Pin Assignment (9-Pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	DCD1;100	I	06	DSR1;100	I
02	RXD1;000	I	07	RTS1;100	O
03	TXD1;000	O	08	CTS1;100	I
04	DTR1;100	O	09	RI1;100	I
05	GND	—			

C.5 PJ5 PS/2 Keyboard Connector (6-Pin)

Table C-5 PS/2 Keyboard Connector Pin Assignment (6-Pin)

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

C.6 PJ6 External Display Connector (15-Pin)

Table C-6 External Display Connector Pin Assignment (15-Pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	ARED;110	O	09	N/C	—
02	AGREEN;110	O	10	GND	—
03	ABLUE;110	O	11	N/C	—
04	N/C	—	12	N/C	—
05	GND	—	13	CHSYNC;120	O
06	GND	—	14	CVSYNC;120	O
07	GND	—	15	N/C	—
08	GND	—			

C.7 PJ7 72-pin Expansion Connector (72-Pin)

Table C-7 72-Pin Expansion Connector Pin Assignment (72-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	AGREEN;110	O	37	VCC	–
02	ABLUE;110	O	38	CVSYNC;120	O
03	ARED;110	O	39	PD1;100	I/O
04	AUTFD;000	I/O	40	VCC	–
05	PD5;100	I/O	41	PD3;100	I/O
06	PINT;000	I/O	42	PD6;100	I/O
07	PE;110	I/O	43	ACK;010	I/O
08	ERROR;010	I/O	44	IFWDAT;000	O
09	IFDASL;000	O	45	IFSTEP;000	O
10	DSKCHG;010	I	46	IFWPRO;010	I
11	IFRDAT;010	O	47	IFL0D2;000	–
12	IFLD01;000	O	48	GND	–
13	IFAMON;000	O	49	GND	–
14	MOUSCK;120	I/O	50	GND	–
15	RKBCLK;100	I/O	51	RTS1;110	O
16	CTS1;110	I	52	VCC	–
17	DSR1;110	I	53	DCINP	I
18	DCINP	I	54	DCINP	I
19	DCINP	I	55	DCINP	I
20	DCINP	I	56	GND	–
21	RXD1;010	I	57	TXD1;010	O
22	DTR1;110	O	58	RI1;110	I
23	DCD1;110	I	59	MOUSDT;100	I/O
24	GND	–	60	GND	–
25	RKBDAT;100	I/O	61	PRCHEK;000	I/O
26	IFWEN;000	O	62	IHMED;000	I
27	IFRADY;010	I	63	IFDIRC;000	O
28	IFINDX;010	I	64	IFSSEL;000	O
29	SELCT;110	I/O	65	IFTRK0;010	I
30	SLIN;000	I/O	66	BUSY;110	I/O
31	GND	–	67	PD7;100	I/O
32	PD2;100	I/O	68	PD4;100	I/O
33	PD0;100	I/O	69	VCC	–
34	STROB;000	I/O	70	VCC	–
35	GND	–	71	CHSYNC;120	O
36	VCC	–	72	VCC	–

C.8 PJ8 PCMCIA Slot 2 Connector (68-Pin)

Table C-8 PCMCIA Slot 2 Connector Pin Assignment (68-Pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	GND	—	35	GND	—
02	PCD03A;100	I/O	36	CD1A;000	I
03	PCD04A;100	I/O	37	PCD11A;100	I/O
04	PCD05A;100	I/O	38	PCD12A;100	I/O
05	PCD06A;100	I/O	39	PCD13A;100	I/O
06	PCD07A;100	I/O	40	PCD14A;100	I/O
07	CE1A;000	O	41	PCD15A;100	I/O
08	CAD10A;100	O	42	CE2A;000	O
09	OEA;000	O	43	N/C	—
10	CAD11A;100	O	44	IORA;000	O
11	CAD09A;100	O	45	IOWA;000	O
12	CAD08A;100	O	46	CAD17A;100	O
13	CAD13A;100	O	47	CAD18A;100	O
14	CAD14A;100	O	48	CAD19A;100	O
15	WEA;000	O	49	CAD20A;100	O
16	BSYA;000	I	50	CAD21A;100	O
17	MCVCCA	—	51	MCVCCA	—
18	MCVPP1A	—	52	MCVPP2A	—
19	CAD16A;100	O	53	CAD22A;100	O
20	CAD15A;100	O	54	CAD23A;100	O
21	CAD12A;100	O	55	CAD24A;100	O
22	CAD07A;100	O	56	CAD25A;100	O
23	CAD06A;100	O	57	N/C	—
24	CAD05A;100	O	58	CRSETA;100	O
25	CAD04A;100	O	59	WAITA;000	I
26	CAD03A;100	O	60	INPCKA;000	I
27	CAD02A;100	O	61	REGA;000	O
28	CAD01A;100	O	62	BVD2A;100	I
29	CAD00A;100	O	63	BVD1A;100	I
30	PCD00A;100	I/O	64	PCD08A;100	I/O
31	PCD01A;100	I/O	65	PCD09A;100	I/O
32	PCD02A;100	I/O	66	PCD10A;100	I/O
33	WPA;000	I	67	CD2A;000	I
34	GND	—	68	GND	—

C.9 PJ9 PCMCIA Slot 1 Connector (68-Pin)

Table C-9 PCMCIA Slot 1 Connector Pin Assignment (68-Pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	GND	—	35	GND	—
02	PCD03B;100	I/O	36	CD1B;000	I
03	PCD04B;100	I/O	37	PCD11B;100	I/O
04	PCD05B;100	I/O	38	PCD12B;100	I/O
05	PCD06B;100	I/O	39	PCD13B;100	I/O
06	PCD07B;100	I/O	40	PCD14B;100	I/O
07	CE1B;000	O	41	PCD15B;100	I/O
08	CAD10B;100	O	42	CE2B;000	O
09	OEB;000	O	43	N/C	—
10	CAD11B;100	O	44	IORB;000	O
11	CAD09B;100	O	45	IOWB;000	O
12	CAD08B;100	O	46	CAD17B;100	O
13	CAD13B;100	O	47	CAD18B;100	O
14	CAD14B;100	O	48	CAD19B;100	O
15	WEB;000	O	49	CAD20B;100	O
16	BSYB;000	I	50	CAD21B;100	O
17	MCVCCB	—	51	MCVCCB	—
18	MCVPP1B	—	52	MCVPP2B	—
19	CAD16B;100	O	53	CAD22B;100	O
20	CAD15B;100	O	54	CAD23B;100	O
21	CAD12B;100	O	55	CAD24B;100	O
22	CAD07B;100	O	56	CAD25B;100	O
23	CAD06B;100	O	57	N/C	—
24	CAD05B;100	O	58	CRSETB;100	O
25	CAD04B;100	O	59	WAITB;000	I
26	CAD03B;100	O	60	INPCKB;000	I
27	CAD02B;100	O	61	REGB;000	O
28	CAD01B;100	O	62	BVD2B;100	I
29	CAD00B;100	O	63	BVD1B;100	I
30	PCD00B;100	I/O	64	PCD08B;100	I/O
31	PCD01B;100	I/O	65	PCD09B;100	I/O
32	PCD02B;100	I/O	66	PCD10B;100	I/O
33	WPB;000	I	67	CD2B;000	I
34	GND	—	68	GND	—

C.10 PJ10 Battery Release Switch Connector (3-Pin)

Table C-10 Battery Release Switch Connector Pin Assignment (3-Pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	N/C	–	03	GND	–
02	PRSMI;000	–			

C.11 PJ201 DC IN Connector (3-Pin)

Table C-11 DC IN Connector Pin Assignment (3-Pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	DCP	–	03	DCM	–
02	DCM	–			

C.12 PJ202 Main Battery Connector (10-Pin)

Table C-12 Main Battery Connector Pin Assignment (10-Pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	(+)	–	06	MBRD	–
02	TH	–	07	u-VSS	–
03	DC	–	08	OV	–
04	u-VCC	–	09	THG	–
05	MBSD	–	10	(-)	–

C.13 PJ203 Backup Battery Connector (2-Pin)

Table C-13 Backup Battery Connector Pin Assignment (2-Pin)

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

C.14 PJ204 FL Inverter Connector (6-Pin)

Table C-14 FL Inverter Connector Pin Assignment (6-Pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	VCC	–	04	BRTNH	O
02	VCC	–	05	GND	–
03	FLON	O	06	GND	–

C.15 PJ402 Memory Card Connector (88-Pin)

Table C-15 Memory Card Connector Pin Assignment (88-Pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	GND	—	45	GND	—
02	D00	I/O	46	D018	I/O
03	D01	I/O	47	D019	I/O
04	D02	I/O	48	D020	I/O
05	D03	I/O	49	D021	I/O
06	D04	I/O	50	D022	I/O
07	D05	I/O	51	D023	I/O
08	D06	I/O	52	D024	I/O
09	VCC5	—	53	D025	I/O
10	D07	I/O	54	D026	—
11	VCC3	—	55	RFU	O
12	D08	—	56	GND	—
13	A0	O	57	A1	O
14	A2	O	58	A3	O
15	VCC5	—	59	A5	O
16	A4	O	60	A7	O
17	VCC3	—	61	A9	O
18	A6	O	62	A11	—
19	A8	O	63	GND	—
20	A10	O	64	A13	—
21	A12	—	65	RAS1	O
22	RAS0	O	66	CAS2	O
23	CAS0	O	67	GND	—
24	CAS1	O	68	CAS3	O
25	VCC3	—	69	RAS3	O
26	RAS2	—	70	WE	O
27	VCC5	—	71	PD1	I/O
28	PD2	I/O	72	PD3	I/O
29	PD4	I/O	73	GND	—
30	PD6	I/O	74	PD5	I/O
31	RFU	O	75	PD7	I/O
32	RFU	O	76	PD8	I/O
33	D017	—	77	RFU	O
34	D09	I/O	78	RFU	O
35	VCC3	—	79	D035	—
36	D010	I/O	80	D027	I/O
37	VCC5	—	81	D028	I/O
38	D011	I/O	82	D029	I/O
39	D012	I/O	83	D030	I/O
40	D013	I/O	84	D031	I/O
41	D014	I/O	85	D032	I/O
42	D015	I/O	86	D033	I/O
43	D016	I/O	87	D034	I/O
44	GND	—	88	GND	—

C.16 PJ403 RTC Battery Connector (3-Pin)

Table C-16 RTC Battery Connector Pin Assignment (3-Pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	RTCBAT	–	03	GND	–
02	N/C	–			

C.17 PJ404 T200 Display Connector (23-Pin)

Table C-17 T200 Display Connector Pin Assignment (23-Pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	V5	I	13	UD0	O
02	V4	I	14	V0	O
03	V3	I	15	VEE	–
04	V2	I	16	VSS	–
05	V1	I	17	VDD	–
06	LD3	O	18	DOFF	O
07	LD2	O	19	VSS	–
08	LD1	O	20	CP2	O
09	LD0	O	21	VSS	–
10	UD3	O	22	CP1	O
11	UD2	O	23	S	O
12	UD1	O			

C.18 PJ405 T200CS Display Connector (30-Pin)

Table C-18 T200CS Display Connector Pin Assignment (30-Pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	VEE	–	16	VCC	–
02	GND	–	17	VCC	–
03	DISP	O	18	UD2;140	O
04	FPF;140	O	19	UD3;140	O
05	LPF;140	O	20	GND	–
06	CLCLK;140	O	21	CDU0;140	O
07	GND	–	22	CDU1;140	O
08	LD0;140	O	23	CDU2;140	O
09	LD1;140	O	24	CDU3;140	O
10	LD2;140	O	25	GND	–
11	LD3;140	O	26	CDU4;140	O
12	GND	–	27	CDU5;140	O
13	UD0;140	O	28	CDU6;140	O
14	UD1;140	O	29	CDU7;140	O
15	VCC	–	30	GND	–

C.19 PJ407 Tablet Connector (30-Pin)

Table C-19 T200CS Tablet Connector Pin Assignment (30-Pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	TCN00;100	I/O	16	TCN15;100	I/O
02	TCN01;100	I/O	17	TCN16;100	I/O
03	TCN02;100	I/O	18	TCN17;100	I/O
04	TCN03;100	I/O	19	TCN18;100	I/O
05	TCN04;100	I/O	20	TCN19;100	I/O
06	TCN05;100	I/O	21	TCN20;100	I/O
07	TCN06;100	I/O	22	TCN21;100	I/O
08	TCN07;100	I/O	23	TCN07;100	I/O
09	TCN08;100	I/O	24	TCN23;100	I/O
10	TCN09;100	I/O	25	TCN24;100	I/O
11	TCN10;100	I/O	26	TCN25;100	I/O
12	TCN11;100	I/O	27	TCN26;100	I/O
13	TCN12;100	I/O	28	TCN27;100	I/O
14	TCN13;100	I/O	29	TCN28;100	I/O
15	TCN14;100	I/O	30	TCN29;100	I/O

C.20 PJ408 HDD Connector (50-Pin)

Table C-20 HDD Connector Pin Assignment (50-Pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	N/C	–	26	N/C	–
02	N/C	–	27	N/C	–
03	N/C	–	28	GND	–
04	N/C	–	29	IOWR;000	O
05	N/C	–	30	GND	–
06	N/C	–	31	IORD;000	O
07	RESET;000	O	32	GND	–
08	GND	–	33	IOCRDY;100	I
09	HSD07;100	I/O	34	N/C	–
10	HSD08;100	I/O	35	N/C	–
11	HSD06;100	I/O	36	GND	–
12	HSD09;100	I/O	37	IRQ14;100	I
13	HSD05;100	I/O	38	IOCS16;000	O
14	HSD10;100	I/O	39	SA01;100	O
15	HSD04;100	I/O	40	N/C	–
16	HSD11;100	I/O	41	SA00;100	O
17	HSD03;100	I/O	42	SA02;100	O
18	HSD12;100	I/O	43	HDC0CS;000	O
19	HSD02;100	I/O	44	HDC1CS;000	O
20	HSD13;100	I/O	45	N/C	–
21	HSD01;100	I/O	46	GND	–
22	HSD14;100	I/O	47	VCC	–
23	HSD00;100	I/O	48	VCC	–
24	HSD15;100	I/O	49	GND	–
25	GND	–	50	N/C	–

Appendix D USA Display Codes

Table D-1 USA Display Codes

HEXA DECIMAL VALUE	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	BLANK (NULL)	▶	BLANK (SPACE)	0	@	P	'	p	Ç	É	á	⋮	⌌	⌌	α	≡
1	☺	◀	!	1	A	Q	a	q	ü	æ	í	⋮	⌌	⌌	β	±
2	☹	↑	"	2	B	R	b	r	é	Æ	ó	⋮	⌌	⌌	Γ	∞
3	♥	!!	#	3	C	S	c	s	â	ô	ú	⋮	⌌	⌌	π	∞
4	♠	¶	\$	4	D	T	d	t	ä	ö	ñ	⋮	⌌	⌌	Σ	∫
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	⋮	⌌	⌌	σ	∫
6	♠	—	&	6	F	V	f	v	ð	û	ä	⋮	⌌	⌌	μ	÷
7	•	↓	'	7	G	W	g	w	ç	ù	ö	⋮	⌌	⌌	τ	≈
8	●	↑	(	8	H	X	h	x	ê	ÿ	ï	⋮	⌌	⌌	ø	°
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	⋮	⌌	⌌	8	π
D	♪	↔	—	=	M	]	m	}	ì	¥	ì	⋮	⌌	⌌	φ	²
E	♪	▲	•	>	N	^	n	~	Ä	P†	«	⋮	⌌	⌌	∩	■
F	⚙	▼	/	?	O	—	o	Δ	Å	f	»	⋮	⌌	⌌	∩	■

Appendix E Keyboard Scan/Character Codes

Table E-1 Scan Codes (Set 1 and Set 2) (1/3)

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

Table E-1 Scan Codes (Set 1 and Set 2) (2/3)

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

Table E-1 Scan Codes (Set 1 and Set 2) (3/3)

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

Notes:

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

Table E-2 Scan Codes with Left Shift Key

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

NOTE: Table E-2 shows scan codes with the left **Shift** key. In combination with the right **Shift** key, scan codes are changed as listed below.

	With left Shift	With right Shift
Set 1	E0 AA _____	E0 B6
	E0 2A _____	E0 36
Set 2	E0 F0 12 _____	E0 F0 59
	E0 12 _____	E0 59

Table E-3 Scan Codes in Numlock Mode

Cap No.	Key top	Code set 1		Code set 2	
		Make	Break	Make	Break
75	INS	E0 2A E0 52	E0 02 E0 AA	E0 12 E0 70	E0 F0 70 E0 F0 12
76	DEL	E0 2A E0 53	E0 D3 E0 AA	E0 12 E0 71	E0 F0 71 E0 F0 12
79	←	E0 2A E0 4B	E0 CB E0 AA	E0 12 E0 6B	E0 F0 6B E0 F0 12
80	Home	E0 2A E0 47	E0 C7 E0 AA	E0 12 E0 6C	E0 F0 6C E0 F0 12
81	End	E0 2A E0 4F	E0 CF E0 AA	E0 12 E0 69	E0 F0 69 E0 F0 12
83	↑	E0 2A E0 48	E0 C8 E0 AA	E0 12 E0 75	E0 F0 75 E0 F0 12
84	↓	E0 2A E0 50	E0 D0 E0 AA	E0 12 E0 72	E0 F0 72 E0 F0 12
85	PgUp	E0 2A E0 49	E0 C9 E0 AA	E0 12 E0 7D	E0 F0 7D E0 F0 12
86	PgDn	E0 2A E0 51	E0 D1 E0 AA	E0 12 E0 7A	E0 F0 7A E0 F0 12
89	→	E0 2A E0 4D	E0 CD E0 AA	E0 12 E0 74	E0 F0 74 E0 F0 12

Table E-4 Scan Codes with Fn Key

Cap No.	Keypop	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.	Keypop	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 Wiring Diagrams

F.1 Printer Wraparound Connector

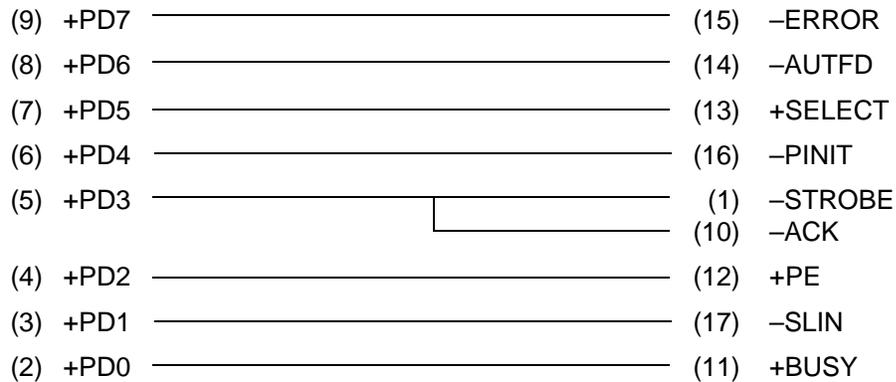


Figure F-1 Printer Wraparound Connector

F.2 RS-232C Wraparound Connector

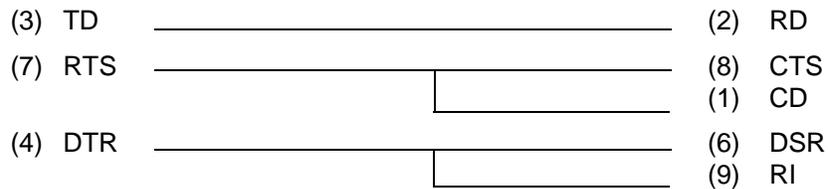


Figure F-2 RS-232C Wraparound Connector

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

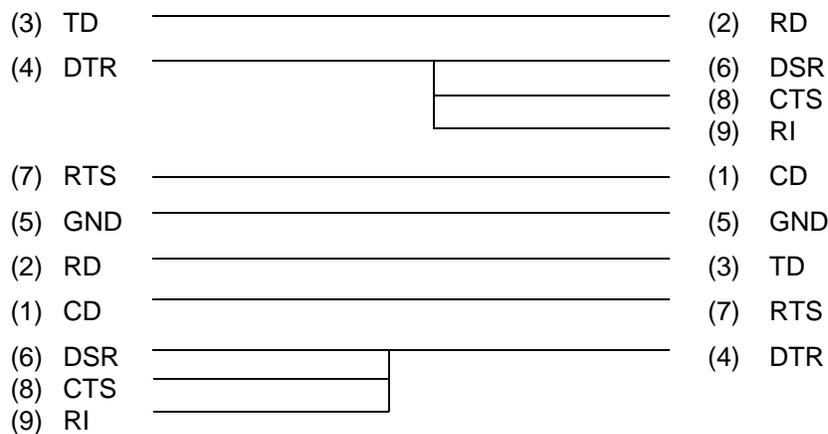


Figure F-3 RS-232C Direct Cable (9-pin to 9-pin)

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

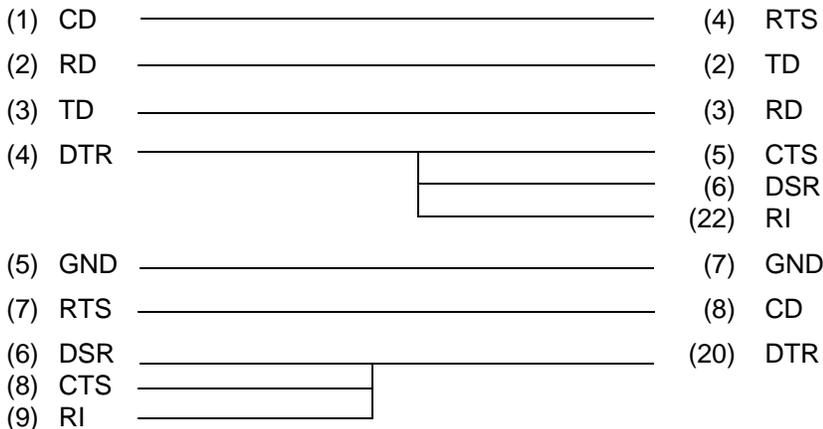


Figure F-4 RS-232C Direct Cable (9-pin to 25-pin)

Appendix G Deleting the Password

This Appendix explains how to delete the user password. When you troubleshoot a system, if there is a problem with the password or if the password is forgotten, you must delete it.

Tools

To delete the password, the following tools are required:

- A printer wraparound connector
- A parallel cable (standard equipment)

Deleting the Password

1. Set the system to Boot Mode.
2. Turn off the power to the computer.
3. Connect the parallel cable to the PRT port.
4. Connect the printer wraparound connector to the parallel cable.
5. Turn on the power to the computer. When the OS is loaded, the password is automatically removed.
6. Remove the printer wraparound connector and parallel cable.

Appendix H BIOS Rewrite Procedures

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

Tools

To rewrite the BIOS, the following tool is required:

- BIOS rewrite disk for the T200/T200CS

Rewriting the BIOS

Follow the procedures below to perform the BIOS rewrite program.

1. Set the system to Boot Mode.
2. Turn off the power to the computer.
3. Remove any external cables and PCMCIA card.
4. Connect the external 3.5-inch FDD and external keyboard to the computer.
5. Insert the BIOS rewrite disk into the FDD.
6. Turn on the power to the computer.
7. Check the BIOS version message when it is displayed. If the BIOS version is correct, press **Y**.
8. When the BIOS re-writing is finished and the system speaker beeps three times, remove the BIOS re-writing disk and press the reset switch to re-start the system.