1.1　Features

The Toshiba T3600CT is one of the lightest and most advanced portable computers available. Utilizing advanced technology and high-speed components, the T3600CT offers excellent display legibility, battery operation and IBM PC/AT compatibility. The T3600CT system unit consists of the following features:

❑ Microprocessor

The T3600CT uses an SL Enhanced Intel 486DX2-50 microprocessor that operates at 50 MHz, 3.3 Volts.

❑ Cache memory

The T3600CT has an 8 KB cache memory which is stored in the i486DX2 microprocessor.

❑ Disk storage

The T3600CT has an internal 250 Megabyte (MB) Hard Disk Drive (HDD) with an average access time of 15 milliseconds.   A 3.5-inch external Floppy Disk Drive (FDD) supports 2HD floppy disks (1.44 MB) and 2DD floppy disks (720 KB).

❑ Memory

The T3600CT comes standard with 8 MB of CMOS Random Access Memory (RAM) 3.3 Volts. This includes 640 KB of conventional memory and 7,360 KB of extended memory which can be utilized as expanded memory compatible with the Lotus/Intel/ Microsoft Expanded Memory Specifications (LIM-EMS).

❑ TFT color LCD

A high-resolution, Thin Film Transistor (TFT) full-color LCD displays 640 x 480 pixels. The T3600CT internal display controller supports VGA functions for internal display and Super VGA (SVGA) for external display.

❑ Keyboard

An easy-to-use 82/84-key keyboard provides a numeric keypad overlay for fast numeric data entry or for cursor and page control. The computer's keyboard supports software that uses a 101- or 102-key enhanced keyboard.

❑ Batteries

The T3600CT has three different batteries: a main battery, a backup battery, and a Real Time Clock (RTC) battery.

❑ Personal Computer Memory Card International Association (PCMCIA) card slot

The T3600CT has one PCMCIA slot, which enables you to install an MiNC Toshiba card modem or other industry standard PCMCIA release 2.01 card.

❑ Parallel port

The T3600CT has one Centronics compatible parallel interface port.

❑ RS-232C port

The T3600CT has one 9-pin serial interface port.

❑ 3.5-inch external FDD port

The T3600CT has one 3.5-inch external FDD port.

❑ Port replicator port

The T3600CT has one port replicator port which enables connection of an optional port replicator or external monitor adapter. The port replicator allows connection of a PS/2 mouse, PS/2 keyboard, external monitor, printer, DC IN, serial I/O and 3.5-inch FDD.

❑ Memory module slot

The T3600CT has one Toshiba optional memory module slot, which enables you to install a Toshiba optional memory module.

❑ Accupoint

The T3600CT has a pointer control stick, located in the center of the keyboard.

The T3600CT Personal Computer is shown in Figure 1-1. T3600CT system configuration is shown in Figure 1-2.
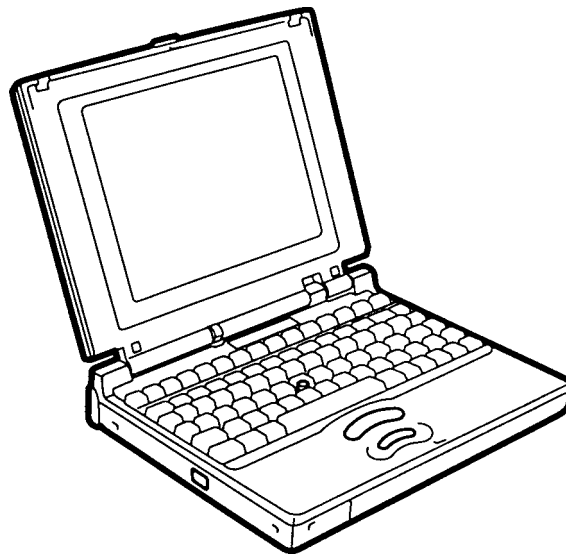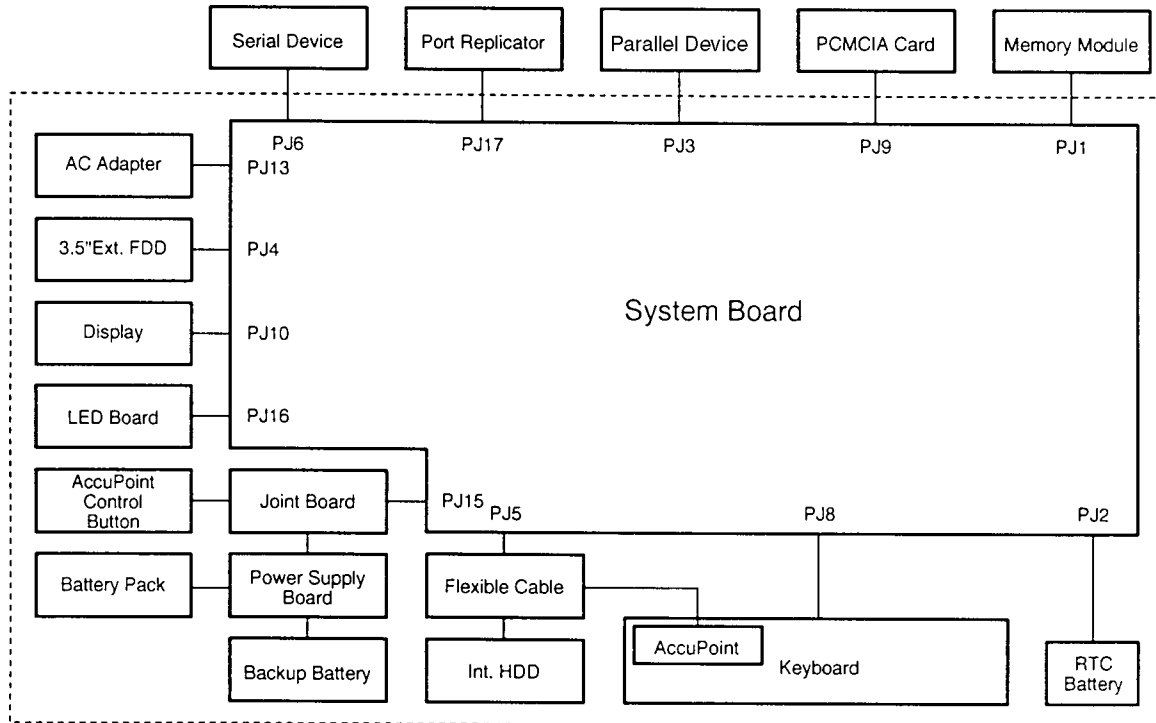

Figure 1-1 T3600CT Personal Computer

Figure 1-2 T3600CT System Unit Configuration

1.2   System Unit Block Diagram

Figure 1-3 is a block diagram of the T3600CT system unit.

+5V: Vcc   5V operation
R5V: RAMV   5V operation
M5V: Power supply   5V operation
         microprocessor
+3V: Vcc   3V operation
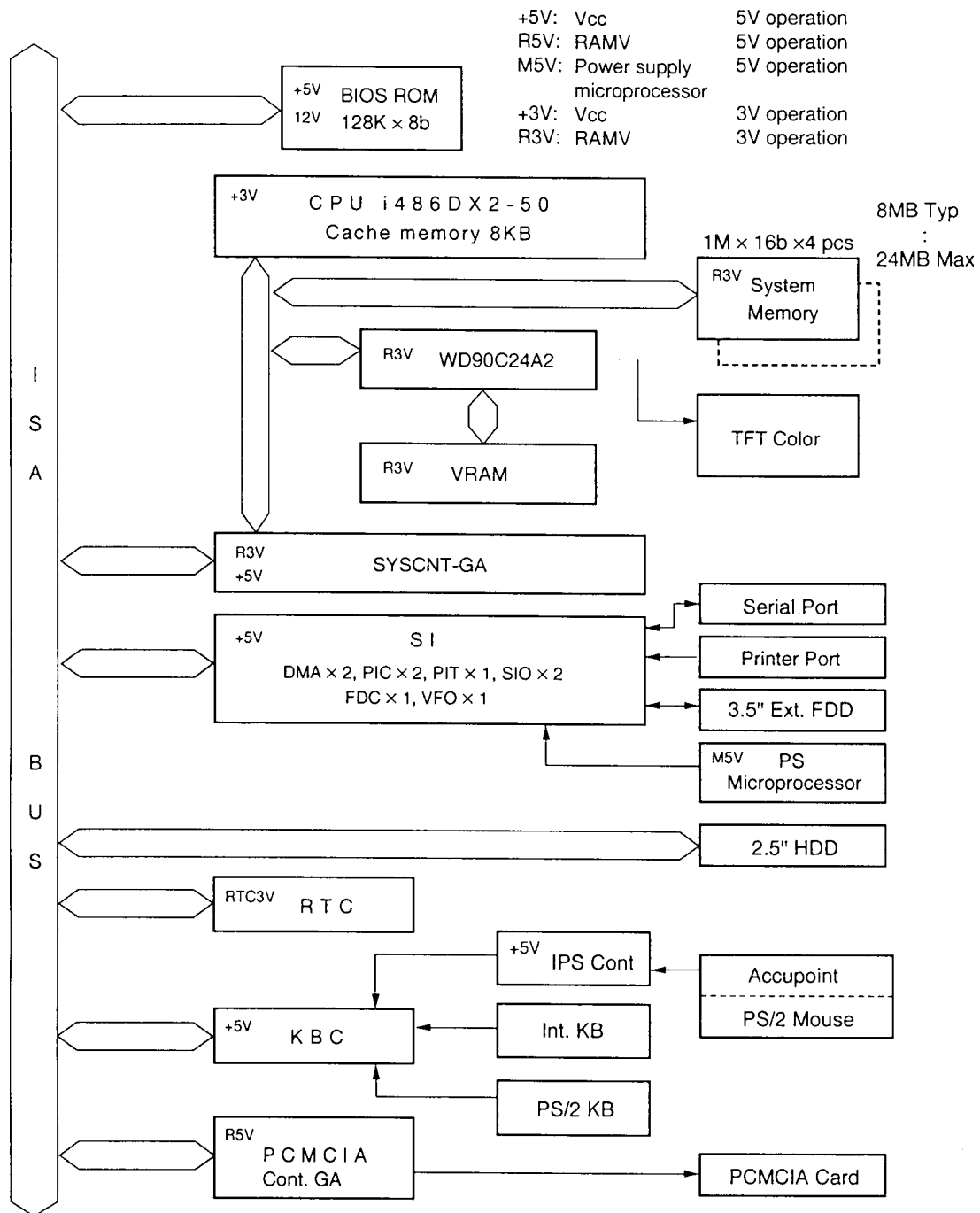R3V: RAMV   3V operation

Figure 1-3 T3600CT System Board Block Diagram

The T3600CT system board is composed of the following major components:

❏ An i486DX2-50 CPU

❏ One super integration (SI), which stores the following components:

- Two Direct Memory Access Controllers (DMACs)   8237 equivalent
- Two Programmable Interrupt Controllers (PICs)   8259 equivalent
- Two Serial Input/Output Controllers (SIOs)   16450 equivalent
  (One SIO is not used.)
- One Programmable Interval Timer (PIT)   8254 equivalent
- One Floppy Disk Controller (FDC)   TC8565 equivalent
- One Variable Frequency Oscillator (VFO)   TC8568 equivalent
- One I/O port decoder
- One SIO port controller
- One printer port controller
- One FDD controller
- One speaker controller
- One power communication controller

❏ A Real Time Clock (RTC)

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

OSC (X2) generates 32.768 KHz for RTC.

❏ A Keyboard Controller (KBC)

One M38802M4 chip is used.
This KBC includes the keyboard scan controller and keyboard interface controller.
The KBC controls the internal keyboard, accupoint, external keyboard, PS/2 mouse.

❏ Memory:

Standard RAM:	8 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:	1 MB

Optional memory cards expand memory to a maximum of 24 MB.

❏ VGA display controller (WD90C24A2)

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

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

- 25 MHz for the CPU
- 14.7456 MHz for the COM
- 24 MHz for the FDC and VFO
- 16 MHz is used for System Controller GA
- 14.31818 MHz is used for SI

❑ Gate Array

System Controller Gate Array

This gate array has the following functions:

- Data Bus driver
  - CPU data <==> ISA data
- Address Bus driver
  - CPU address <==> ISA address
  - Address generation by DMA page reg.
  - Refresh address generation
- CPU controller
  - CPU cycle controller
  - CPU address decode
  - VL bus access controller
- DRAM Mapper
  - DRAM mapping
- ISA controller
  - SYCLK, DMCLK generation
  - ISA cycle controller
  - DMA support controller
  - External master support controller
  - Refresh controller
  - A20 controller
  - RTC controller
- Clock/Reset/Suspend controller
  - CPU clock controller
  - STPCLK# and INTR/NMI/SMI# adjustment
  - SMI controller
  - Current pass-through controller
  - Suspend/resume sequence
  - Reset generation
- DRAM controller
  - Timing signal generation for DRAM
  - Cache controller
  - DRAM address controller

PCMCIA Controller Gate Array

This gate array has the following functions:

- Memory Card controller
    - PCMCIA memory card controller
    - Toshiba modem controller
- Internal Communication controller
    - KBC, main CPU communication register file
    - KBC interrupt controller
- Others
    - KBC communication controller
    - Contrast adjust, speaker volume adjust PWM controller

1.3 3.5-inch External Floppy Disk Drive

The T3600CT 3.5-inch external 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 T3600CT FDD is shown in Figure 1-4. The specifications for the FDD are described in Table 1-1.
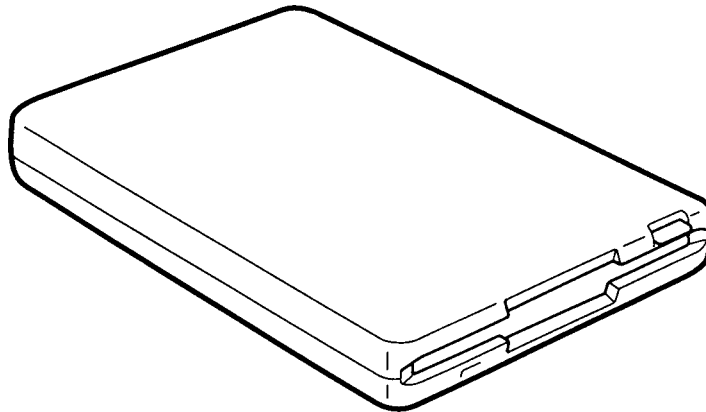
Figure 1-4 3.5-inch External FDD

Table 1-1 3.5-inch External FDD Specifications

Item	2-MB Mode	1-MB Mode
Storage capacity (KB) 　　Unformatted 　　Formatted	 2,000 1,440	 1,000 720
Number of heads	2	2
Number of cylinders	80	80
Access time (ms) 　　Track to track 　　Average 　　Head settling time	 3 181 15	 3 181 15
Recording track density (tpi)	135	135
Data transfer rate (Kbps)	500	250
Rotation speed (rpm)	300	300
Recording method	Modified Frequency Modulation (MFM)	

1.4   2.5-inch Hard Disk Drive

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

T3600CT supports a 250 MB HDD.

The T3600CT HDD is shown in Figure 1-5. Specifications for the HDD are described in Table 1-2.
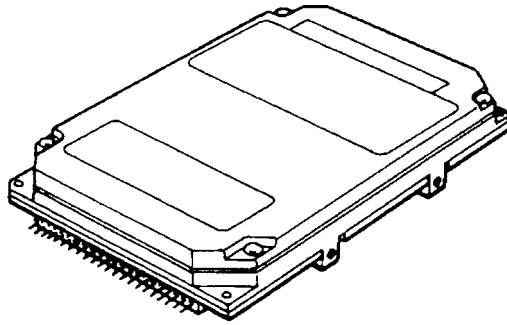
Figure 1-5 2.5-inch HDD

Table 1-2 2.5-inch HDD Specifications

Items	(MK1724FCV)
Storage capacity (MB) Formatted	262.0
Number of disks	2
Data heads	4
Data surfaces	4
Tracks per surface	1,920
Bytes per sector	512
Access time (ms) Track to track Average Maximum	3 13 25
Rotation speed (rpm)	4,000
Data transfer rate (bps) To/from media	8.9 to 31.6M
Interleave	1:1
Recording method	1-7 RLL

1.5 Keyboard

The 82-(USA) or 84-(European) key keyboard is mounted on the T3600CT's system unit. The keyboard is connected to the keyboard controller on the system board through a 25-pin flat cable. The T3600CT pointer control stick, located in the center of the keyboard, provides convenient control of the cursor without requiring desk space for a mouse. The keyboard is shown in Figure 1-6.

See Appendix E for optional keyboard configurations.
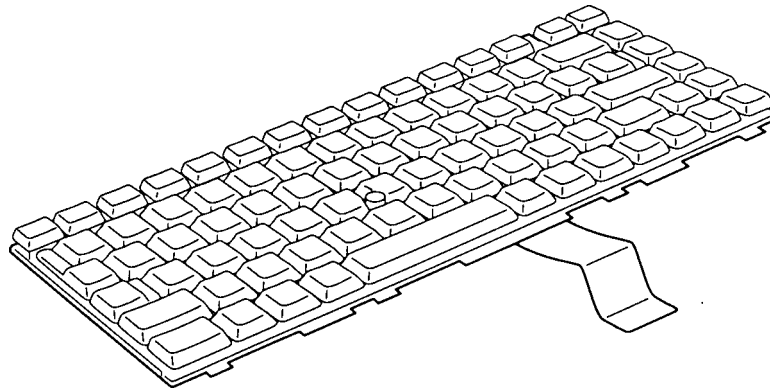
Figure 1-6 Keyboard

1.6 TFT Color LCD

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

1.6.1 LCD Module

The T3600CT TFT color LCD supports 640x480 pixels with an internal display controller and 256K colors for graphics and characters. This controller includes the functions of Video Graphics Array (VGA) and Super VGA (SVGA) for external display.

The T3600CT's LCD receives 9-bit data signals, data enable signals, and shift clock for data transmission. All signals are CMOS-level compatible.

The TFT LCD is shown in Figure 1-7. The specifications for the LCD are described in Table 1-3.
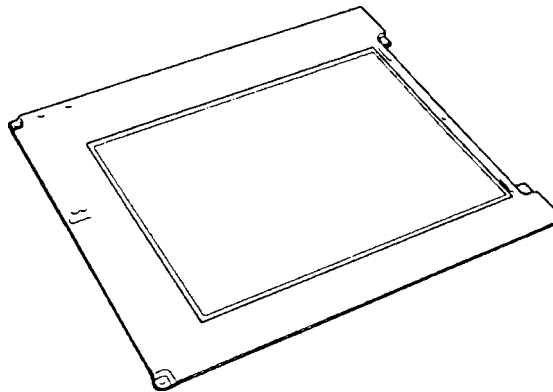
Figure 1-7 TFT Color LCD

Table 1-3 TFT Color LCD Specifications

Item		Specifications
Number of dots	(dots)	640 x 480
Dot pitch	(mm)	0.249 (W) x 0.249 (H)
Display area	(mm)	159.36 (W) x 119.52 (H)
Contrast		55:1 (minimum)
FL current	(mA)	5.0
FL frequency	(KHz)	33

1.6.2   Fluorescent Lamp (FL) Inverter Board

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

Table 1-4 FL Inverter Board Specifications

Item			Specifications
Input	Voltage	(VDC)	10
	Power	(W)	3
Output	Voltage	(VAC)	1,100 (r.m.s)
	Current	(mA)	5.0
	Frequency	(KHz)	44

1.7 Power Supply

The power supply supplies five kinds of voltages to the T3600CT system board. The T3600CT power supply has one microprocessor and it operates at 500 KHz. It contains the following functions:

1.   Determines if the AC adapter or battery is connected to the computer.

2.   Detects DC output and circuit malfunctions.

3.   Controls the LED 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 1-5.

Table 1-5 Power Supply Output Rating

Use for	Name	DC Voltage (V)	Regulation Tolerance (%)	Maximum Current (mA)	Ripple (mV)
System logic, FDD, HDD,	VCC	+5	±5	1,400	100
Display	DSPV	+10.8/+15	±5	260	150
RS-232C, Flash ROM	P+12V	+12	±5	70	240
CPU, RAM	B3V	+3.3	±5	1,170	60
RS-232C	N-9V	-9	15	15	180

1.8 Batteries

The T3600CT has three types of batteries:

❑ Main battery pack

❑ Backup battery

❑ Real Time Clock (RTC) battery

The battery specifications are listed in Table 1-6.

Table 1-6 Battery Specifications

Battery Name	Material	Output Voltage	Capacity
Main battery	Lithium-Ion	10.8 V	3,300 mAH
Backup battery	Nickel Metal Hydride	1.2 V	1,200 mAH
RTC battery	Lithium-Vanadium	3.0 V	50 mAH

1.8.1   Main Battery

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

❑ **Battery Indicator**

The Battery indicator is located on the front side of the T3600CT. The indicator shows the status of the removable battery pack, power supply and AC adapter.

The status of each can be determined by color:

Orange   The battery is being charged. (AC adapter is attached.)

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

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

❍   The battery is extremely hot. Allow the computer and the battery to reach room temperature before attempting to charge the battery.

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

❍   The AC adapter is not receiving power.

1.8.2 Battery Charging Control

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

❏ **Quick Battery Charge**

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

Table 1-7 Time Required for Main Battery Charges

Charge	Charging Time
Quick charge (power off)	About 3.5 hours
Trickle 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 automatically changes quick charge to trickle charge.

1.8.3   Backup Battery

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

> AC adapter > Main battery > Backup battery

The backup battery is charged by the main battery or AC adapter when the system is powered on. Table 1-8 shows the charging time and data preservation period of the backup battery.

Table 1-8 Backup Battery Charging/Data Preservation Time

Backup Battery		Time
Charging Time	Power On	3 H
	Power Off (with AC Adapter)	Doesn't charge
	Power Off (Without AC Adapter)	Doesn't charge
Data preservation period (full charge)		8 H

1.8.4   RTC Battery

The RTC battery provides power to keep the current date, time and other setup information in memory while the computer is turned off. Table 1-9 shows the charging time and data preservation period of the RTC battery.

Table 1-9 RTC Battery Charging/Data Preservation Time

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

2.1 Troubleshooting

Chapter 2 describes how to determine if a Field Replaceable Unit (FRU) in the T3600CT is causing the computer to malfunction. The FRUs covered are:

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

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

The following tools are necessary for implementing the troubleshooting procedures:

1. A T3600CT Diagnostics Disk
2. A Phillips head screwdriver (2 mm)
3. A Toshiba MS-DOS system disk(s)
4. A 2DD or 2HD formatted work disk for floppy disk drive testing
5. A cleaning kit for floppy disk drive troubleshooting
6. A printer port LED
7. An RS-232C wraparound connector
8. A printer wraparound connector
9. A multimeter
10. An external monitor adapter
11. An external monitor

2.2 Troubleshooting Flowchart

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

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

❑ Verify with the customer that Toshiba MS-DOS is installed on the hard disk. Non-Toshiba operating systems can cause the computer to malfunction.

❑ Make sure all optional equipment is disconnected from the computer.

❑ Make sure the floppy disk drive is empty.
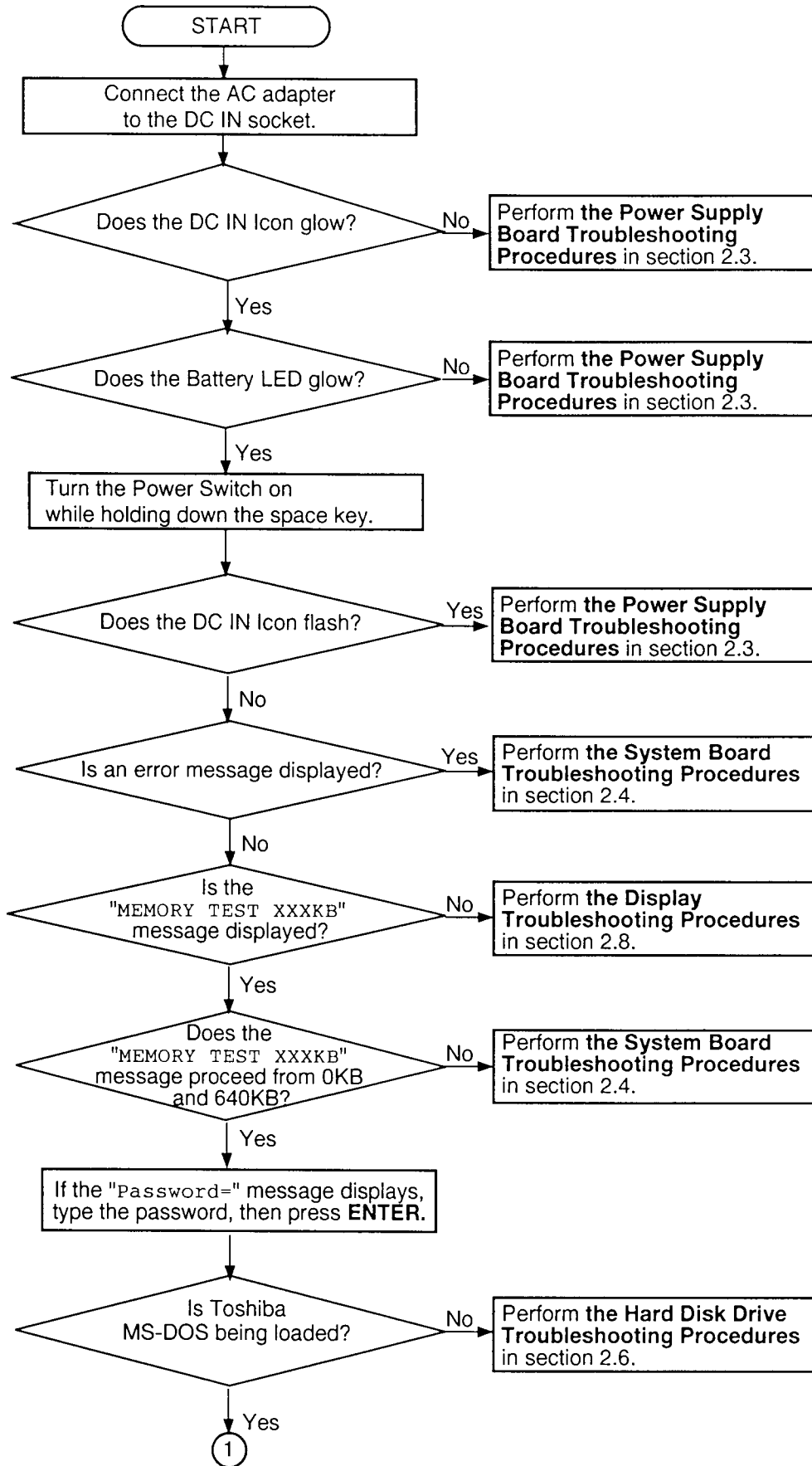
Figure 2-1 Troubleshooting Flowchart (1/2)
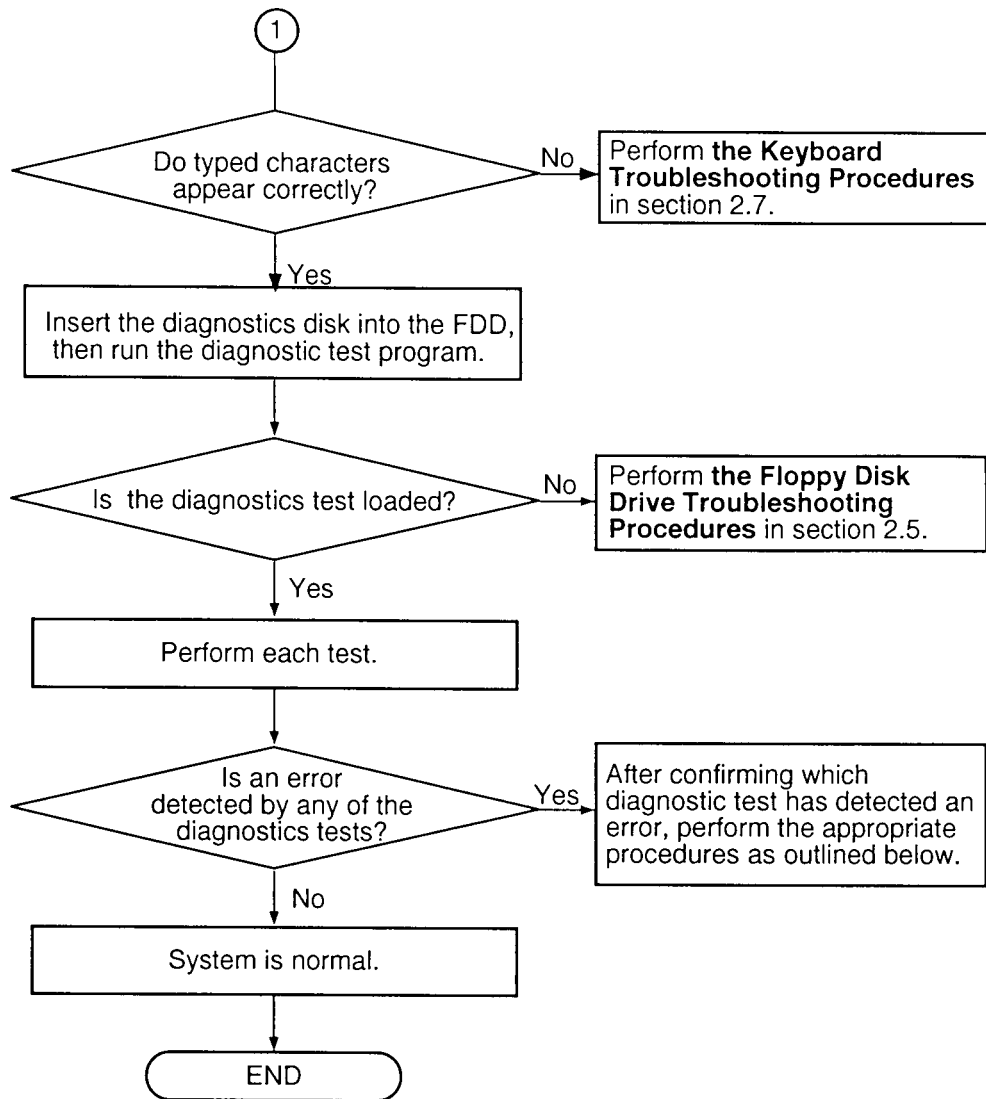
Figure 2-1 Troubleshooting Flowchart (2/2)

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

1. If an error is detected on the system test, memory test, display test, ASYNC test,
    printer test, or real timer test, perform the system board troubleshooting
    procedures in Section 2.4.

2. If an error is detected on the keyboard test, perform the keyboard troubleshooting
    procedures in Section 2.7.

3. If an error is detected on the floppy disk test, perform the floppy disk drive
    troubleshooting procedures in Section 2.5.

4. If an error is detected on the hard disk test, perform the hard disk drive
    troubleshooting procedures in Section 2.6.

2.3   Power Supply Troubleshooting

The T3600CT's power supply controls many functions and components in the T3600CT. To determine if the power supply is functioning properly, start with Procedure 1 and continue with the other procedures as instructed. The procedures described in this section are:

Procedure 1:   DC IN Icon Indicator Check

Procedure 2:   Battery LED Indicator Check

Procedure 3:   Connection and Replacement Check

Procedure 1   DC IN Icon Indicator Check

The T3600CT's AC adapter converts AC power to DC power and contains a charging circuit which charges the T3600CT's batteries. The adapter connects to the DC IN socket connector on the back side of the computer. When the AC adapter is connected to the T3600CT and the power is turned off, the AC adapter charges the batteries.

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

When the DC IN icon is green, the AC adapter is connected and supplying power to the T3600CT.

If the DC IN icon does not light, the AC adapter is not supplying power to the T3600CT or the AC adapter is not attached to the T3600CT, go to Check 1.

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

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

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

Check 2   If the DC IN icon flashes orange when the AC adapter is connected, its voltage output is abnormal. Connect a new AC adapter and turn the T3600CT on again to verify the indicator condition.

Check 3   The battery pack may be malfunctioning. Replace the battery pack with a new one and turn the computer on again. If the problem still exists, perform Check 4.

Check 4   Place the T3600CT in an environment between –20°C and 70°C until the T3600CT is at the ambient temperature. Repeat the steps which caused the T3600CT to operate abnormally. If the same problem still appears, perform Procedure 3.

Procedure 2 Battery LED Indicator Check

The Battery LED indicator shows the battery charging status. The Battery LED, identified by a battery icon on the front of the computer, glows umber 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 umber, the AC adapter is connected and the battery is being charged.

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

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

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

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

If the terminal appears dirty, clean it gently with a cotton swab dipped in alcohol.

If the terminal looks bent or damaged, replace the 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   Connection and Replacement Check

The power supply board is connected to the system board through the joint board. This connection may be disconnected from the system board or damaged. Disassemble the T3600CT following the steps described in Chapter 4, *Replacement Procedures* and perform the following checks.

Check 1   Make sure the power supply board, joint board, and system board are firmly connected to each connector.

```
+---------------------+      +-------------+                    +--------------+
| Power Supply Board  |------| Joint Board |--------------------| System Board |
+---------------------+      +-------------+                    +--------------+
                                                                       |
                                                                +--------------+
                                                                |  AC Adapter  |
                                                                +--------------+
```
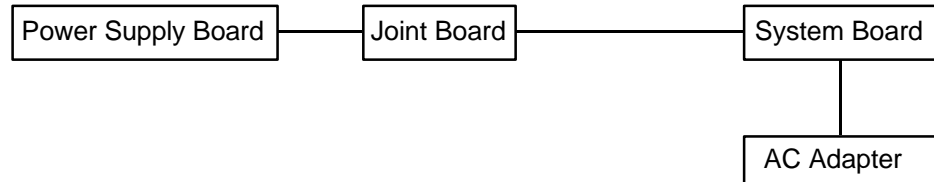
If any of these boards are disconnected, reconnect them and repeat Procedure 3. If the system still does not function properly, perform Check 2.

Check 2   The power supply board may be defective or damaged. Replace the power supply board with a new one following the steps in Chapter 4, *Replacement Procedures*. If the system is still not functioning properly, perform Check 3.

Check 3   Replace the system board with a new one and restart the system. If the problem still exists, go to Check 4.

Check 4   Replace the joint board with a new one and restart the system. If the problem still exists, other FRUs may be damaged.

2.4 System Board Troubleshooting

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

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

Procedure 1　Message Check

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

❑　If an error message is shown on the display, perform Check 1.

❑　If there is no error message, go to Procedure 2.

❑　If Toshiba MS-DOS is properly loaded, go to Procedure 3.

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

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

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

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

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

If any other message appears, perform Check 3.

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

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

If one of the following error messages (1) through (17), (19), (20), (25) or (26) is
displayed, replace the system board.

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

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

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

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

Procedure 2   Printer Port LED Check on Boot Mode

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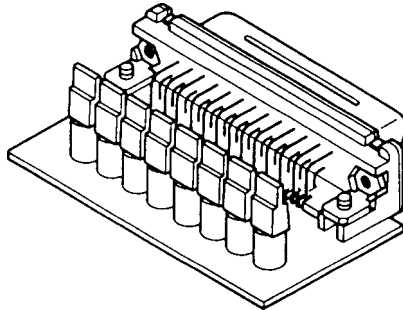
Figure 2-2 Printer Port LED

To use the printer port LED follow these steps:

1. Turn on the power to the T3600CT, then set to boot mode.

2. Turn off the power to the T3600CT.

3. Plug the printer port LED into the T3600CT printer connector.

4. Hold down the space bar and turn on the T3600CT.

5. Read the LED status from left to right as you are facing the back of the computer.

6. Convert the status from binary to hexadecimal notation.

7. If the final LED status is FFh (normal status), go to Procedure 3.

8. If the final LED status matches any of the test status values in Table 2-1, perform Check 1.

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

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

Error Status	Test Item	Message
01H	Pre-init for warm start test	–
05H	PIT test	`TIMER CH.2 OUT ERROR`

		`PIT ERROR`
		`READ DATA  = XXH`
		`WRITE DATA = XXH`

06H	PIT initialization	–
07H	PIT function test	`MEMORY REFRESH ERROR`
0AH	First 64KB memory test	`FIRST 64KB MEMORY ERROR`
0BH	System memory initialization	–
0DH	Interrupt vector initialization	–

15H	RTC test	`RTC ERROR`
		`READ DATA  = XXH`
		`WRITE DATA = XXH`

16H	CMOS RAM test	`****Error in CMOS.  Bad battery****`
		`****Error in CMOS.  Bad check sum****`
		`****Error in CMOS.  Bad configuration****`
		`****Error in CMOS.  Bad memory size****`
		`****Error in CMOS.  Bad HDD type****`
		`****Error in CMOS.  Bad time function****`
		`Check system.  Then press [F1] key`

18H	PIC initialization	–
1FH	Display initialization	`CRTC ERROR`

		`VRAM ERROR`
		`READ DATA  = XXXXXXXXH`
		`WRITE DATA = XXXXXXXXH`

22H	KBC test	`KBC ERROR`
25H	System memory test	`SYSTEM MEMORY ERROR`

		`ADDRESS    = XXXXXXXXH`
		`READ DATA  = XXXXXXXXH`
		`WRITE DATA = XXXXXXXXH`

		`SYSTEM MEMORY PARITY ERROR` `ADDRESS = XXXX0000H – XXXXFFFFH`
30H	Extended memory test	`EXTENDED MEMORY ERROR`

		`ADDRESS    = XXXXXXXXH`
		`READ DATA  = XXXXXXXXH`
		`WRITE DATA = XXXXXXXXH`

		`EXTENDED MEMORY PARITY ERROR` `ADDRESS = XXXX0000H – XXXXFFFFH`

40H	DMA page register test	`DMA PAGE REGISTER ERROR`
		`READ DATA  = XXH`
		`WRITE DATA = XXH`

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

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

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

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

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

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

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

Procedure 3   Printer Port LED Check on Resume Mode

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

To use the printer port LED follow these steps:

1. Turn the unit on, then set to resume mode.

2. Turn the unit off.

3. Plug the printer port LED into the T3600CT printer connector.

4. Turn the unit on.

5. Read the LED status from left to right as you face the back of the computer.

6. Convert the status from binary to hexadecimal notation.

7. If the final LED status is FFh (normal status), go to Procedure 4.

8. If the final LED status matches any of the test status values in Table 2-2, go to Procedure 5.

Table 2-2   Printer Port LED Resume Mode Error Status

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

Procedure 4   Diagnostic Test Program Execution Check

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

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

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

Procedure 5   Replacement Check

The system board may be damaged. Disassemble the T3600CT following the steps described in Chapter 4, *Replacement Procedures*, and perform the following check:

Check 1   Replace the system board with new one. If the problem still exists, other FRUs may be damaged.

2.5 Floppy Disk Drive Troubleshooting

This section describes how to determine if the T3600CT 3.5-inch external floppy disk drive is functioning properly. If the 3.5-inch external FDD is not connected to the T3600CT, connect it and perform the steps below starting with Procedure 1 and continuing with the other procedures as required.

Procedure 1:   FDD Head Cleaning Check

Procedure 2:   Diagnostic Test Program Check

Procedure 3:   Connector Check and Replacement Check

Procedure 1   FDD Head Cleaning Check

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

After loading Toshiba MS-DOS, run the Diagnostic Program and then clean the FDD heads using the cleaning kit. If the FDD still does not function properly after cleaning, go to Procedure 2.

If the test program cannot be executed on the T3600CT, go to Procedure 3.

Procedure 2   Diagnostic Test Program Execution Check

The Floppy Disk Drive Diagnostic Test program is stored on the T3600CT Diagnostics Disk. After loading Toshiba MS-DOS, run the diagnostic program. Refer to Chapter 3, *Tests and Diagnostics*, for more information about the diagnostics test procedures.

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

Table 2-3 Floppy Disk Drive Error Code and Status

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

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

```
Write protected
```

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

Procedure 3   Connector Check and Replacement Check

The 3.5-inch Floppy Disk Drive is connected to the system board by the FDD cable. This cable may be disconnected from the system board or damaged. Perform the following checks:

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

```
┌──────────────────────┐                ┌──────────────┐
│ 3.5-inch External FDD │────────────────│ System Board │
└──────────────────────┘                └──────────────┘
```
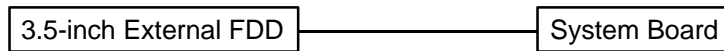
If this cable is disconnected, connect it to the system unit and repeat Procedure 2. If the FDD is still not functioning properly, perform Check 2.

Check 2   The FDD or its cable may be defective or damaged. Replace the FDD and cable with a new one. If the FDD is still not functioning properly, perform Check 3.

Check 3   Replace the system board with a new one following the steps in Chapter 4, *Replacement Procedures*.

2.6   Hard Disk Drive Troubleshooting

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

Procedure 1:   Partition Check

Procedure 2:   Message Check

Procedure 3:   Format Check

Procedure 4:   Diagnostic Test Program Execution Check

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

Procedure 1   Partition Check

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

Check 1   Type **C:** and press **Enter**. If you cannot change to drive C, go to Check 2. If you can change to drive C, go to Procedure 2.

Check 2   Type **FDISK** and press **Enter**. Choose Display Partition Information from the FDISK menu. If drive C is listed, go to Check 3. If drive C is not listed, return to the FDISK menu and choose the option to create a DOS partition on drive C. Then recheck the system. If the problem still exists, go to Procedure 2.

Check 3   If drive C is listed as active in the FDISK menu, go to Check 4. If drive C is not listed as active, return to the FDISK menu and choose the option to set the active partition for drive C. Then recheck the system. If the problem still exists, go to Procedure 2.

Check 4   Remove the system disk from the FDD and cold boot the computer. If the problem still exists, go to Procedure 2. Otherwise, the HDD is operating normally.

Procedure 2   Message Check

When the T3600CT HDD does not function properly, some of the following error messages may appear on the display. Start with Check 1 below and perform the other checks as instructed.

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

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

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

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

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

If the following message appears on the display, the system program has been transferred to the HDD. Restart the T3600CT. If the error message still appears, perform Check 4.

```
System transferred
```

Check 4   The HDD is connected to the system board through the flexible cable. This connection can become disconnected or damaged. Disassemble the T3600CT as described in Chapter 4, *Replacement Procedures*. If the HDD is not connected to the flexible cable, connect it to the flexible cable and return to Procedure 1. If the flexible cable is not connected to the system board, connect it to the system board and return to Procedure 1. If the HDD and flexible cable are firmly connected to the system board, perform Procedure 3.
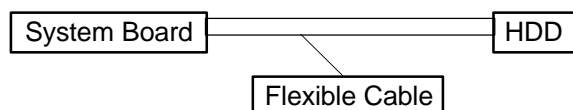
Procedure 3   Format Check

The T3600CT HDD is formatted using the low level format program and the MS-DOS FORMAT program. To format the HDD, start with Check 1 below and perform the other steps as required.

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

```
Format complete
```

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

Check 2   Using the T3600CT Diagnostic Disk, format the HDD with a low level format option. Refer to Chapter 3, *Tests and Diagnostics* for more information about the diagnostic program.

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

```
Format complete
```

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

Procedure 4   Diagnostic Test Program Execution Check

The HDD test program is stored in the T3600CT Diagnostics Disk. Perform all of the HDD tests in the Hard Disk Drive Test. Refer to Chapter 3, *Tests and Diagnostics*, for more information about the HDD test program.

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

Table 2-4 Hard Disk Drive Error Code and Status

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

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

Check 2   Replace the flexible cable with a new one following the instructions in Chapter 4, *Replacement Procedures*. If the HDD is still not functioning properly, replace the system board.

2.7 Keyboard Troubleshooting

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

Procedure 1:   Diagnostic Test Program Execution Check

Procedure 2:   Connector and Replacement Check

Procedure 1   Diagnostic Test Program Execution Check

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

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

Procedure 2   Connector and Replacement Check

The keyboard is connected to the system board by a 19-pin flat cable. This cable may be disconnected or damaged. Disassemble the T3600CT as described in Chapter 4, *Replacement Procedures*, and perform the following checks:

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

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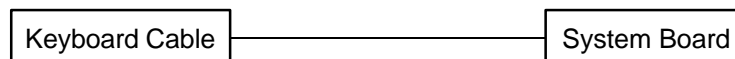
If this cable is damaged, replace the keyboard with a new one. If the cable is disconnected, firmly connect it. Perform Procedure 1 again. If the keyboard is still not functioning properly, perform Check 2.

Check 2   The keyboard controller on the system board may be damaged. Replace the system board with a new one. Refer to Chapter 4, *Replacement Procedures* for more information.

2.8   Display Troubleshooting

This section describes how to determine if the T3600CT display is functioning properly. Start with Procedure 1 and continue with the other procedures as instructed.

Procedure 1:   External Monitor Check

Procedure 2:   Diagnostic Test Program Execution Check

Procedure 3:   Connector Check

Procedure 4:   Replacement Check

Procedure 1   External Monitor Check

Connect the external monitor adapter to the port replicator port and the external monitor to the external monitor adapter, then boot the computer. The computer automatically detects the external monitor even if Resume mode is enabled.

If the external monitor works correctly, the internal LCD display may be damaged. Go to Procedure 3.

If the external monitor appears to have the same problem as the internal LCD, the display controller may be damaged. Go to Procedure 2.

Procedure 2   Diagnostic Test Program Execution Check

The Display Test program is stored on the T3600CT 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 3. If an error is not detected, the display is functioning properly.

Procedure 3   Connector Check

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

Disassemble the display unit and check the following cable connections. Refer to Chapter 4, *Replacement Procedures*, for more information about how to disassemble the computer.
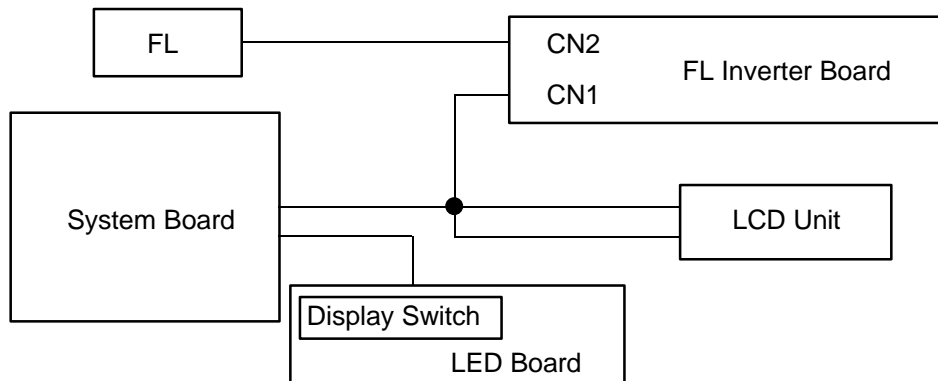
Figure 2-3 Display Connection

If any of these cables are not connected, firmly reconnect them and repeat Procedures 1 and 2. If the problem still exists, perform Procedure 4.

Procedure 4   Replacement Check

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

If the FL does not light, perform Check 1.

If characters are not displayed clearly, perform Check 3.

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

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

Check 1   Replace the FL unit with a new one and test the display again. If the problem still exists, perform Check 2.

Check 2   Replace the FL inverter board with a new one and test the display again. If the problem still exists, perform Check 3.

Check 3   Replace the LCD module with a new one and test the display again. If the problem still exists, perform Check 4.

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

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

Check 6   The system board may be damaged. Replace the system board with a new one.

3.1   The Diagnostic Test

This chapter explains how to use the T3600CT's Diagnostic Test Program (TESTCE36) to test the functions of the T3600CT's hardware modules. The Diagnostics Test Program is stored on the T3600CT Diagnostic Disk. The Diagnostics Test Program consists of 19 programs that are grouped into the Service Program Module (DIAGNOSTICS MENU) and the Test Program Module (DIAGNOSTIC TEST MENU).

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 TEST MENU contains the following eleven functional tests. These are all located within the DIAGNOSTIC TEST function of the DIAGNOSTICS MENU.
- ❏ SYSTEM TEST
- ❏ MEMORY TEST
- ❏ KEYBOARD TEST
- ❏ DISPLAY TEST
- ❏ FLOPPY DISK TEST
- ❏ PRINTER TEST
- ❏ ASYNC TEST
- ❏ HARD DISK TEST
- ❏ REAL TIMER TEST
- ❏ NDP TEST
- ❏ PCMCIA TEST

You will need the following equipment to perform some of the T3600CT Diagnostic Test Programs.
- ❏ The T3600CT Diagnostics Disk (all tests)
- ❏ A formatted working disk for the floppy disk drive test (all tests)
- ❏ 3.5-inch 2HD/2DD disk for 3.5-inch external FDD
- ❏ A cleaning kit to clean the floppy disk drive heads (Head Cleaning)
- ❏ A PCMCIA wraparound connector for the I/O card test (PCMCIA test)
- ❏ A printer wraparound connector for the printer wraparound test (Printer test)
- ❏ An RS-232C wraparound connector for the RS-232C port wraparound test (ASYNC test)

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

3.2 Executing the Diagnostic Test

Toshiba MS-DOS is required to run the T3600CT Diagnostic Test Program. To start the Diagnostic Test Program follow these steps:

1. Turn on the computer, and allow the computer to boot. Insert the T3600CT Diagnostics disk in the computer's internal floppy disk drive.

2. At the system prompt, change to drive A and type **TESTCE36**, and press **Enter**.

The following menu will appear:

```
TOSHIBA personal computer T3600CT DIAGNOSTICS
version X.XX (c) copyright TOSHIBA Corp. 19XX

DIAGNOSTICS MENU :

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


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

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

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

```
        TOSHIBA personal computer T3600CT DIAGNOSTICS
        version X.XX (c) copyright TOSHIBA Corp. 19XX
        DIAGNOSTIC TEST MENU :

         1 - SYSTEM TEST
         2 - MEMORY TEST
         3 - KEYBOARD TEST
         4 - DISPLAY TEST
         5 - FLOPPY DISK TEST
         6 - PRINTER TEST
         7 - ASYNC TEST
         8 - HARD DISK TEST
         9 - REAL TIMER TEST
        10 - NDP TEST
        11 - PCMCIA TEST

        88 - FDD & HDD ERROR RETRY COUNT SET
        99 - EXIT TO DIAGNOSTICS MENU


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

Refer to sections 3.4 through 3.14 for detailed descriptions of each Diagnostic
Test 1 through 11. Function 88 sets the floppy disk drive and hard disk drive error
retry count. Function 99 exits the submenus of the DIAGNOSTIC TEST MENU
and returns to the DIAGNOSTICS MENU.

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

```
 SYSTEM TEST      XXXXXXX
                              ┌─────────────────────────────────┐
                              │ T3600CT DIAGNOSTIC TEST VX.XX    │
                              │ [Ctrl]+[Break]  ;  test end      │
                              │ [Ctrl]+[C]      ;  key stop      │
                              └─────────────────────────────────┘

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

 SUB-TEST MENU :

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


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

┌──┐
│ *NOTE: The menu displayed by your T3600CT may be slightly different from the one* │
│ *shown above.* │
└──┘

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

    ```
    TEST LOOP        : YES
    ```

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

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

6. The following message will appear:

    ```
    ERROR STOP       : YES
    ```

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

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

    ```
    ERROR STATUS NAME     [[ HALT OPERATION ]]

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

    These three selections have the following functions:

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

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

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

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

3.3   Subtest Names

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

Table 3-1 Subtest Names (1/2)

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

Table 3-1 Subtest Names (2/2)

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

3.4 System Test

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

Subtest 01   ROM checksum

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

Subtest 02   H/W status

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

```
                76543210
H/W status = 10001000

   Bit7 —                  =
   Bit6 — CPU clock        = 50MHz
   Bit5 — Notch signal     = 2HD
   Bit4 — FDD type         = 2MB
   Bit3 —                  =
   Bit2 — Drive A/B        = Ext.=B
   Bit1 — External FDD     = OFF
   Bit0 — Internal FDD     = 2HD
```

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

Table 3-2 Hardware Bit Status

Bit	H/W Status	1	0
7	Reserved	—	—
6	CPU clock speed	25 MHz	50 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 5.25-inch FDD	ON	OFF
0	3.5-inch external FDD	2DD	2HD

Subtest 03   Version check

This subtest checks the version of the following four items:

❑   BIOS ROM
❑   BOOT ROM
❑   KBC version
❑   PS microprocessor version

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

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

Reference data

Current data

3.5   Memory Test

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

Subtest 01   RAM constant data (real mode)

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

Subtest 02   RAM address pattern data (real mode)

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

Subtest 03   RAM refresh (real mode)

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

The constant data is AAAAh and 5555h.

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

Subtest 04   Protected mode

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

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

Subtest 05   Memory module

<table>
<tr><td>

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

</td></tr>
</table>

This subtest functions the same as Subtest 04, except it is used for testing an optional memory card. Memory module capacity is 2 MB, 4 MB, 8 MB, and 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 that corresponds to the memory card installed in the T3600CT.

Subtest 06   Cache memory

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

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

3.6   Keyboard Test

To execute the Keyboard Test, select **3** from the DIAGNOSTIC TEST MENU, press **Enter**
and follow the directions displayed on the screen. The Keyboard test contains two subtests
that test the T3600CT's keyboard actions. Move the highlight bar to the subtest you want to
execute and press **Enter**.

Subtest 01   Pressed key display (82/84)

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

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

```
KEYBOARD TEST  IN PROGRESS  301000
```



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


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

Subtest 02   Pressed key code display

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

```
KEYBOARD TEST  IN PROGRESS  302000

          Scan code  =
          Character code =
          Keytop    =

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

PRESS [Enter] KEY
```

Subtest 03   PS/2 mouse connect check

NOTE: To execute the PS/2 mouse connect check, a PS/2 mouse must be connected to the optional port replicator.

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

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

```
   KBD - MOUSE INTERFACE ERROR

                               [[ HALT OPERATION ]]

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

Subtest 04   Pointing Stick Check

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

This subtest checks function of the pointing stick.

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

3.7 Display Test

To execute the Display Test, select **4** from the DIAGNOSTIC TEST MENU, press **Enter** and follow the directions displayed on the screen. The Display test contains eleven subtests that test the T3600CT's display in various modes. Move the highlight bar to the subtest you want to execute and press **Enter**.

Subtest 01   VRAM Read/Write

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

Subtest 02   Character Attributes (mode 1, 13h)

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

```
CHARACTER ATTRIBUTES

   NEXT LINE SHOWS NORMAL DISPLAY.
    NNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNN

   NEXT LINE SHOWS INTENSIFIED DISPLAY.
    IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII

   NEXT LINE SHOWS REVERSE DISPLAY.
    RRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRR

   NEXT LINE SHOWS BLINKING DISPLAY
    BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBB


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

      PRESS [Enter] KEY
```

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

```
320*200  GRAPHICS  DISPLAY  [  13  ]
                               BLACK
                               BLUE
                               GREEN
                               CYAN
                               RED
                               MAGENTA
                               BROWN
                               WHITE
                               GRAY
                               LIGHT  BLUE
                               LIGHT  GREEN
                               LIGHT  CYAN
                               LIGHT  RED
                               LIGHT  MAGENTA
                               YELLOW
                               INTENSE  WHITE

   PRESS  [Enter]  KEY
```

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

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

Subtest 03   Character Set

In this subtest, the character set (addressed 00h to FFh) is displayed in the
40*25 character mode as shown below.

```
CHARACTER SET IN 40*25

  ☺☻♥♦♣♠•◘○◙♂♀♪♫☼►◄↕‼¶§▬↨↑↓→←∟↔▲▼!"#$%&'
()*+,-./ 0123456789 :;<=>?@ ABCDEFGHIJKLMNO
PQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvw
xyz{|}~⌂ÇüéâäàåçêëèïîìÄÅÉæÆôöòûùÿÖÜ¢£¥₧ƒ
áíóúñÑªº¿⌐¬½¼¡«»░▒▓│┤╡╢╖╕╣║╗╝╜╛┐└┴┬├─┼╞╟
╚╔╩╦╠═╬╧╨╤╥╙╘╒╓╫╪┘┌█▄▌▐▀αßΓπΣσµτΦΘΩδ∞φε∩
≡±≥≤⌠⌡÷≈°∙·√ⁿ²■
```

```
Press [Enter] KEY
```

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

Subtest 04   80x25/30 Character Display (mode 3, 12)

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

```
80*XX CHARACTER DISPLAY

01234567890123456789012345678901234567890123456789012345678901234567
 !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklm
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmn
"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmno
#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnop
$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopq
%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqr
&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrs
'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrst
()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstu
)*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuv
*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvw
+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwx
,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxy
-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz
./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{
/0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|
0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}
123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~
23456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~D
3456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~DÇ
456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~DÇü

PRESS [ENTER] KEY
```

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

Subtest 05   320x200 Character Display (mode 4,D)

This subtest displays two color sets for the color display in 320¥200 dot graphics mode 4 and D. One example is shown below:

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

        GREEN        RED       BROWN
        CYAN       MAGENTA     WHITE
```



```
PRESS  [ENTER]  KEY
```

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

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

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

```
640*200  GRAPHICS  DISPLAY  :  [X]

            EVEN  DOTS        ODD  DOTS        ALL  DOTS
             DRIVEN           DRIVEN           DRIVEN
```



```
PRESS  [Enter]  KEY
```

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

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

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

```
640*XXX  GRAPHICS  DISPLAY

            EVEN  DOTS        ODD  DOTS        ALL  DOTS
             DRIVEN           DRIVEN           DRIVEN
```



```
PRESS  [Enter]  KEY
```

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

Subtest 08   Display Page

This subtest confirms that the pages can be changed in order from page 0 through page 7 in 40*25 character mode.

```
DISPLAY PAGE 0

OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
O                                      O
O                                      O
O                                      O
O                                      O
O                                      O
O                                      O
O                                      O
O                                      O
O                                      O
O                                      O
O                                      O
OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
```

Pressing **Ctrl + Break** exits this subtest, after completion of the test, and returns to the DISPLAY TEST menu.

Subtest 09   H Pattern Display/Border Color

This subtest displays 2000 H characters on the entire screen, as shown below.

```
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
```

Pressing **Enter** displays the following message:

```
Setting the color CRT (1:yes/2:no)
```

If an external CRT display is connected to the T3600CT, choose **1** to display the following message:

```
[Border color test (7 times press [Enter] key]
```

Press **Enter** to execute the border color test.
To exit this subtest and return to the DISPLAY TEST menu, press **Ctrl + Break.**

Subtest 10   LED/DAC Pallet

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

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

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

PRESS [Enter] KEY
```

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

After pressing **Enter**, it writes the '2A' and '15' data to 6 bit of 256∞3 (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   TFT color display

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

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

3.8 Floppy Disk Test

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

To execute the Floppy Disk Test, select **5** from the DIAGNOSTIC TEST MENU, press **Enter** and follow the directions displayed on the screen. The Floppy Disk test contains five subtests that test the T3600CT's external floppy disk drive. The following messages will appear after selecting the Floppy Disk Test from the DIAGNOSTIC TEST MENU. Answer each question with an appropriate response to execute the test.

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

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

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

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

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

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

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

        FLOPPY DISK   XXXXXXX

                                   ┌──────────────────────────────────┐
                                   │ T3600CT DIAGNOSTIC TEST VX.XX   │
                                   │ [Ctrl]+[Break] ; test end   │
                                   │ [Ctrl]+[C] ; key stop   │
                                   └──────────────────────────────────┘

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

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

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

Subtest 01   Sequential Read

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

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

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

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

Subtest 02   Sequential Read/Write

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

Subtest 03   Random Address/Data

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

Subtest 04   Write Specified Address

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

Subtest 05   Read Specified Address

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

3.9 Printer Test

To execute the Printer Test, select **6** from the DIAGNOSTIC TEST MENU, press **Enter** and follow the directions displayed on the screen. The Printer Test contains three subtests that test the output of the printer connected to the T3600CT. The following messages will appear after selecting the Printer Test from the DIAGNOSTIC TEST MENU. Answer each of the following questions with an appropriate response to execute the test.

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

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

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

The printer I/O port address is specified by the XXXXh number. The T3600CT supports three printer channels. Select the printer channel number, and press **Enter** to execute the selected subtest.

Subtest 01   Ripple Pattern

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

```
 !"#$%£'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmno
!"#$%£'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnop
"#$%£'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopq
#$%£'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqr
$%£'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrs
%£'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrst
£'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstu
'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuv
()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvw
)*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwx
*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxy
```

Subtest 02   Function

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

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

This subtests prints the various print types shown below:

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

Subtest 03   Wraparound

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

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

3.10 Async Test

To execute the Async Test, select **7** from the DIAGNOSTIC TEST MENU, press **Enter** and follow the directions displayed on the screen. The async test contains five subtests that test the T3600CT's asynchronous communication functions. Move the highlight bar to the subtest you want to execute and press **Enter**.

Subtests 01 through 04 require the following data format:

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

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

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

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

Subtest 01   Wraparound (board)

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

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

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

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

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

Subtest 03   Point to point (Send)

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

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

Subtest 04   Point to point (Receive)

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

Subtest 05   Interrupt Test

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

3.11 Hard Disk Test

To execute the Hard Disk Test, select **8** from the DIAGNOSTIC TEST MENU. Press **Enter,** and follow the directions displayed on the screen. The hard disk test contains 10 subtests that test the T3600CT hard disk drive functions. The following messages will appear after selecting the hard disk test from the DIAGNOSTIC TEST MENU. Answer each of the following questions with an appropriate response to execute the test:

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

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

---

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

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

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

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

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

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

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

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

5.   This message is used to select whether or not the HDD status is displayed on the screen. The HDD status is described in Section 3.15. Select **1** or **2** and press **Enter**.

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

```
HARD DISK TEST      XXXXXXX

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

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

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

Subtest 01   Sequential Read

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

Subtest 02   Address Uniqueness

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

• Forward sequential
• Reverse sequential
• Random

Subtest 03   Random Address/Data

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

Subtest 04   Cross Talk & Peak Shift

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

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

Subtest 05   Write/read/compare (CE)

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

Subtest 06   Write specified address

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

Subtest 07   Read specified address

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

Subtest 08   ECC circuit

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

Subtest 09   Sequential write

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

Subtest 10   W-R-C specified address

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

3.12 Real Timer Test

To execute the Real Timer Test, select **9** from the DIAGNOSTIC TEST MENU, press **Enter** and follow the directions on the screen. The real timer test contains three subtests that test the T3600CT's real timer functions. Move the highlight bar to the subtest you want to execute and press **Enter**.

Subtest 01   Real Time

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

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

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

            Enter new date:

      PRESS [ENTER] KEY TO EXIT TEST
```

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

```
      Enter new time :
```

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

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

Subtest 02   Backup Memory

This subtest performs the following backup memory check:

        Writes 1-bit of "on" data to address 01h through 80h
        Writes 1-bit of "off" data to address FEh through 7Fh
        Writes the data pattern AAh through 55h to the RTC 50-byte memory (address 0Eh to 3Fh)

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

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

Subtest 03   Real Time Carry

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

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

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

Pressing **Enter** displays the following

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


  PRESS [Enter] KEY TO EXIT TEST
```

Press **Ctrl** + **Break** to exit.

3.13 NDP Test

To execute the NDP test, select **10** from the DIAGNOSTICS TEST MENU, press **Enter**
and follow the directions on the screen. The NDP test contains one subtest that tests the
T3600CT's NDP functions.

Subtest 01   NDP

This test checks the following function of NDP:

❑ Control word
❑ Status word
❑ Bus
❑ Addition
❑ Multiplication

Press **Ctrl** + **Break** to exit.

3.14 PCMCIA Test

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

Subtest 01   I/O Card Test (PCMCIA)

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

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

This subtest is executed in the following order:

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

3.15 Error Code and Error Status Names

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

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

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

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

Device Name	Error Code	Error Status Name
ASYNC	10	Parity Error
	20	Framing Error
	40	Overrun Error
	80	Line Status Error
	88	Modem Status Error
	33	No Carrier (Card Modem)
	34	Error (Card Modem)
	36	No Dial Tone (Card Modem)
HDD	01	Bad Command Error
	02	Bad Address Mark Error
	04	Record Not Found
	05	HDC Not Reset Error
	07	Drive Not Initialized
	08	HDC 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

3.16 Hard Disk Test Detail Status

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

```
HDC status = XXXXXXXX
```

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

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

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

Table 3-4 Hard Disk Controller Status Register Contents

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

Table 3-5 Error Register Contents

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

3.17 Hard Disk Format

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

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

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

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

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

3.17.1 Function Description

1. All track FORMAT

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

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

Table 3-6 Hard Disk Formatting Sequence

Items	(MK1724FCV)
Sector sequences	1
Cylinders	0 to 842
Heads	0 to 16
Sectors	1 to 38
Sector length (bps)	512

2.   Good track FORMAT

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

3.   Bad track FORMAT

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

4.   Bad track CHECK

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

3.17.2   Operations

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

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

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

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

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

1.   All track FORMAT

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

```
[All track FORMAT]

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

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

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

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

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

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

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

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

(3)   Select whether the disk has an unlock format.

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

---

(4)   Bad track register

Next, the Bad Track register prompt will appear as shown below. Enter the cylinder and head numbers of bad tracks and press **Enter**. Note that if there are no bad tracks, pressing **Enter** alone is the same as executing All Track Format described in item (5) below.

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

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

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

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

(5)   All track format

All tracks are formatted as good tracks except those registered as bad tracks in item (4) above or those identified as bad tracks in track verification described in item (6) below.

(6)   Track verification

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

2. Good track FORMAT

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

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

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

3. Bad track FORMAT

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

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

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

4. Bad track CHECK

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

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

Bad tracks will be displayed in the format shown below.

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

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

3.18 Head Cleaning

3.18.1   Function Description

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

3.18.2   Operations

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

        DIAGNOSTICS - FLOPPY DISK HEAD CLEANING : VX.XX

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

        Press any key when ready.

2. Remove the Diagnostics Disk from the FDD. Then insert the cleaning disk and press **Enter**.

3. When the cleaning start message appears, the FDD head cleaning has begun.

4. The display automatically returns to the DIAGNOSTIC MENU when the program is completed.

3.19 Log Utilities

3.19.1　Function Description

This function logs error information generated while a test is in progress and stores the results in RAM. This function can store data on a floppy disk or output the data to a printer. If the power switch is turned off, the error information will be lost. The error information is displayed in the following order:

 1. Error count (CNT)
 2. Test name (TS-NAME)
 3. Subtest number (TS-NAME)
 4. Pass count (PASS)
 5. Error status (STS)
 6. FDD/HDD or memory address (ADDR)
 7. Write data (WD)
 8. Read data (RD)
 9. HDC status (HSTS)
 10. Error status name (ERROR STATUS NAME)

3.19.2　Operations

1. Selecting **5** and pressing **Enter** in the DIAGNOSTIC MENU, logs error information into RAM or onto a floppy disk. The error information is displayed in the following format:

```
     XXXXX ERRORS
CNT TS-NAME  PASS STS  ADDR  WD RD HSTS   [STATUS NAME]

001 FDD   02 0000 103 00001 00 00        FDD - WRITE PROTECTED
001 FDD   01 0000 180 00001 00 00        FDD - TIME OUT ERROR
```

```
                      Address
                 Error status
            Pass count              HDC status
       Subtest number          Read data
     Test name              Write data
Error count                             Error status name
```

`[[1:Next,2:Prev,3:Exit,4:Clear,5:Print,6:FD Log Read,7:FD Log Write]]`

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

   The **1** key scrolls the display to the next page.
   The **2** key scrolls the display to the previous page.
   The **3** key returns to the Diagnostic Menu.
   The **4** key erases all error log information in RAM.
   The **5** key outputs the error log information to a printer.
   The **6** key reads the log information from a floppy disk.
   The **7** key writes the log information to a floppy disk.

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

3.20 Running Test

3.20.1   Function Description

This function automatically executes the following tests in sequence:

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

The system automatically detects the number of floppy disk drives connected to the T3600CT for the FDD test.

3.20.2   Operations

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

1. Remove the diagnostics disk from the floppy disk drive and insert the work disk.

2. Select **6** from the Diagnostic Menu and press **Enter,** the following message will be displayed:

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

   Selecting **Y (yes)** executes the printer wraparound test. A printer wraparound connector must be connected to the **PRT** port on the back of the T3600CT to properly execute this test.

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

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

   Selecting **Y (yes)** executes the ASYNC wraparound test. An RS-232C wraparound connector must be connected to the **serial port** on the back of the T3600CT to properly execute this test.

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

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

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

3.21 Floppy Disk Drive Utilities

3.21.1   Function Description

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

    1.   FORMAT

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

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

        (1)   2D: Double-sided, double-density, 48/67.5 TPI, MFM mode, 512 bytes, 9 sectors/track.

        (2)   2DD: Double-sided, double-density, double-track, 96/135 TPI, MFM mode, 512 bytes, 9 sectors/track.

        (3)   2HD: Double-sided, high-density, double-track, 96/135 TPI, MFM mode, 512 bytes, 18 sectors/track.

    2.   COPY

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

    3.   DUMP

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

3.21.2   Operations

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

```
    [ FDD UTILITIES ]

        1 - FORMAT
        2 - COPY
        3 - DUMP
        9 - EXIT TO DIAGNOSTICS MENU
```

2. FORMAT program

   (1)   Selecting FORMAT displays the following message:

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

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

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

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

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

   ```
   Warning : Disk data will be destroyed.

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

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

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

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

   Format start

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

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

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

   (5)   Typing **1**, displays the message from Step (3) above. Typing **2** returns the test to the DIAGNOSTIC MENU.

3. COPY program

   (1)   When COPY is selected, the following message appears:

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

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

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

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

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

Copy start

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

(4) Remove the source disk from the FDD, insert a formatted work disk and press any key. The [[track, head = XXX X]] message will appear and start copying to the target disk. When the amount of data is too large to be copied in one operation, the message from step 2 is displayed again. After the floppy disk has been copied, the following message will appear:

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

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

4. DUMP program

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

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

(2) Select a format type number. If **2** is selected, the display will go to Step (5).

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

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

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

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

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

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

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

     Track  number ??
```

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

3.22 System Configuration

3.22.1 Function Description

The System Configuration program contains the following configuration information for the T3600CT:

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

3.22.2 Operations

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

```
        SYSTEM CONFIGURATION :

          * - BIOS ROM VERSION = VX.XX
          * - BOOT ROM VERSION = VX.XX
          * - KBC VERSION = VX.XX
          * - PS MICOM VERSION = VX.XX
          * - 639KB MEMORY
          * - 1 FLOPPY DISK DRIVE(S)
          * - 1 ASYNC ADAPTER
          * - 1 HARD DISK DRIVE(S)
          * - 1 PRINTER ADAPTER
          * - XXXXXKB EXTENDED MEMORY
          * - MAIN PROCESSOR = XXXX
          * - 1 CO-PROCESSOR

        Press [Enter] Key
```

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

3.23 SETUP

3.23.1 Function Description

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

1. Memory
    - (1) Total
    - (2) Base
    - (3) Extended Memory
    - (4) Shadow BIOS ROM

2. Display
    - (1) Display Adapter
    - (2) LCD Display Mode
    - (3) LCD Display Colors
    - (4) Power On Display

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

4. Hard Disk

5. Power on Password

6. Others
    - (1) Power-up Mode
    - (2) CPU Cache
    - (3) Processing Speed
    - (4) Battery Save Mode
    - (5) Speaker Volume
    - (6) Panel Power On/Off
    - (7) Alarm Power On
    - (8) Keyboard
    - (9) Pointing Devices
    - (10) Hot key
    - (11) Boot Priority

7. Battery Save Options
    - (1) CPU Sleep Mode
    - (2) Display Auto Off
    - (3) HDD Auto Off
    - (4) System Auto Off
    - (5) LCD Brightness

3.23.2 Accessing the SETUP Program

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

```
                                    System Setup      BIOS version  = x.xx
      ┌─────── MEMORY ───────┐      ┌─────── HARD DISK ───────┐
      │ Total          =  8192 KB │      │ Capacity           =  240MB │
      │ Base           =   640 KB │      └─────────────────────────────┘
      │ Extended       =  7360 KB │      ┌──── POWER ON PASSWORD ────┐
      │ Shadow BIOS ROM =  192 KB │      │ Not Registered              │
      └───────────────────────┘      └─────────────────────────────┘


      ┌─────── DISPLAY ───────┐      ┌─────── OTHERS ───────┐
      │ Display Adapter  = VGA compatible │  Power-up Mode      = Resume    │
      │ LCD Display Mode  = Color │  CPU Cache          = Enabled   │
      │ LCD Display Colors = 226K Colors │ Processing Speed   = High      │
      │ Power On Display  = Internal/External │ Battery Save Mode  = Full Power │
      └───────────────────────┘  Speaker Volume     = High      │
                                   Panel Power On/Off  = Enabled   │
      ┌──── COM/PCMIA/PRT ────┐  Alarm Power On     = Disabled  │
      │ Serial Port      = COM1(IRQ4/3F8H) │ Keyboard           = Layout/Fn │
      │ PC Card Slot     = PCMCIA │ Pointing Devices   = Auto-selected │
      │ Printer Port Type = Output │ Hot key            = Enabled   │
      └───────────────────────┘  Boot Priority      = Disabled  │
                                  └─────────────────────────────┘

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

Moving Within the SETUP Menu and Changing Values

1. Press → and ← to move between the two columns. Press ↑ and ↓ to move between items in a column.

2. Press either the **spacebar** or **BkSp** to change the value.

Accepting Changes and Exiting the SETUP Window

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

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

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

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

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

   The changes you made will cause the system to reboot.

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

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

---

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

The Factory Preset Configuration

When you access SETUP, the current configuration is displayed.

1. To show the factory preset configuration, press **Home**.

2. To accept the default settings, press **End** and then press **Y**.

SETUP Options

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

1. Memory

This group lists values for the computer's memory.

(1) Total

This field displays the total amount of memory installed and is automatically calculated by the computer. You cannot change this value.

(2) Base

This field displays the amount of base (conventional) memory, **640 KB** and is automatically calculated by the computer. You cannot change this value.

(3) Extended Memory

This field displays the amount of extended memory the computer has available. You cannot change this value.

(4) Shadow BIOS ROM

The SETUP program displays 128 KB of RAM, which is reserved for the Shadow BIOS ROM. The value cannot be changed.

---

2. Display

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

(1) Display Adapter

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

(2) LCD Display Mode

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

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

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

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

---

(3) LCD Display Colors

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

226K colors   Displays 256 colors out of 226K colors.

4096 colors   Displays 256 colors out of 4096 colors.

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

---

(4) Power On Display

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

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

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

---

3. COM/PCMCIA/PRT

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

(1) Serial Port

This option allows you 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)

If the COM level for the Serial Port is set to the same level as the Toshiba card modem, the card modem's COM level is automatically reset to **Not Used.**

(2) PC Card Slot

This option enables you to select how the PC Card slot is used:

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

Others : Choose this selection when you have installed a Toshiba card modem.

When you choose **Others,** the subwindow below appears to let you control the modem's 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 **COM Port** option is set to **Others,** the **Power** option is displayed in the subwindow. The **Power** option indicates the setting in CMOS.

(3) 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 hard disk drive.

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

No Drive   You cannot access the hard disk.

5. Power On Password

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

Registered   The password has been registered.

Not registered   The password has not been registered.

For details on setting the power on password refer to your T3600CT User's Manual.

6. Others

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

(1) Power-up Modes

This option let you choose between AutoResume and boot mode. You can also set this option using the Pop-up Window.

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

Resume   Turns on the AutoResume feature.

NOTE: AutoResume does not work with the enhanced mode of Microsoft Windows unless the WRESUME driver is loaded.

---

(2) CPU Cache

Use this feature to enable or disable the CPU cache.

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

Disabled   Disables the CPU cache.

(3) Processing Speed

This feature changes the CPU processing speed.

High   CPU operates at 50 MHz. (This is the default.)

Low   CPU operates at half speed.

(4) Battery Save Mode

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

Full Power   The following shows full power setting.

```
CPU Sleep Mode    =   Disabled
Display Auto Off  =   30 Min.
HDD Auto Off      =   Disabled
System Auto Off   =   Disabled
LCD Brightness    =   Bright
```

Low Power   The following shows low power setting.

```
CPU Sleep Mode    =   Enabled
Display Auto Off  =   03 Min.
HDD Auto Off      =   03 Min.
System Auto Off   =   30 Min.
LCD Brightness    =   Semi-bright
```

NOTE: In boot mode, the System Auto Off message does not appear.

User Setting   This option, allows you to set the battery save parameters on the sub-window, **BATTERY SAVE OPTIONS**. When you select this, 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* below.

(5) Speaker Volume

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

Off   Disables software use of the speaker.
Low   Sets the volume of the speaker to low.
Medium   Sets the volume of the speaker to medium.
High   Sets the volume of the speaker to high.

When the speaker volume is highlighted, the subwindow is displayed to enable or disable certain speaker functions.

```
System Speaker       = Enabled
Low Battery Alarm    = Enabled
Panel Close Alarm    = Enabled
```

Enabled   Enables the feature.
Disabled   Disables the feature.

(6) Panel Power On/Off

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

Enabled   Enables the feature.

Disabled   Disables the feature. (This is the default.)

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

---

(7) Alarm Power On

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

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

Disabled   Disables the alarm.

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

---

(8) Keyboard

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

```
┌─────────────── Keyboard ───────────────┐
│ Int. Keyboard key layout        =    Normal   │
│ Ext. Keyboard "Fn" key equivalent  =    Disabled │
└─────────────────────────────────────────┘
```

Int. Keyboard layout

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

Alternative   Normal (default)
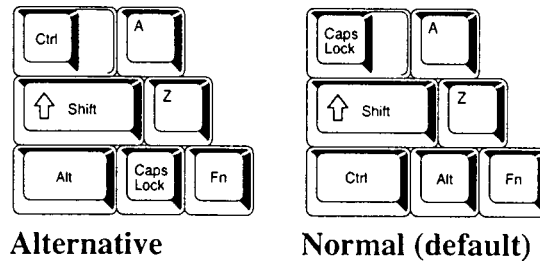
Ext. Keyboard "Fn" key equivalent

Use this option to set a key combination on an external keyboard to emulate the **Fn** key on the computer's internal keyboard. Setting an **Fn** key equivalent will enable you to use "hot keys" by pressing the set combination in place of the **Fn** key.

`Disabled`	no **Fn** key equivalnt. (This is the default.)
`Fn Equivalent`	`Left Ctrl b  + Left Alt*`
	`Right Ctrl   + Right Alt*`
	`Left Alt     + Left Shift`
	`Right Alt    + Right Shift`
	`Left Alt     + Caps Lock`

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

(9) Pointing Devices

This option enables or disables the Accupoint.

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

Auto selected The Accupoint is disabled when a PS/2 mouse or serial mouse is connected, otherwise the Accupoint is enabled. (This is the default.)

(10) Hot key

This option enables or disables the hot keys.

Enabled Enables the hot keys. (This is the default.)

Disabled Disables the hot keys.

(11) Boot Priority

This option selects the disk drive priority for boot up.

FDD→ **HDD**   Computer looks for bootable files first on the FDD and next on the HDD. (This is the default.)

HDD→ **FDD**   Computer looks for bootable files first on the HDD and next on the FDD.

You can reverse the order by holding down the **F10** key while the computer is booting. This procedure alternates the setup setting.

7. Battery Save Options

(1) CPU Sleep Mode

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

Enabled   Enables sleep mode.

Disabled   Disables sleep mode.

(2) Display Auto Off

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

Disabled   Disables display automatic power off.

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

(3) HDD Auto Off

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

Disabled   Disables HDD automatic power off.

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

(4) System Auto Off

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

Disabled   Disables system automatic power off.

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

(5) LCD Brightness

Use this option to set the level of LCD brightness.

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 T3600CT and replace Field Replaceable Units (FRUs). It may not be necessary to remove all the FRUs in order to replace one. The chart below is a guide to which FRUs need to be removed in order to remove others. Always start by removing the battery pack, then follow the lines on the chart to determine which FRU you must remove next in order to repair the one you think is causing the T3600CT to operate improperly.

```
┌─────────────────────────┐
│ ❏   Battery Pack        │
└─────────────────────────┘
            │
  ┌─────────────────────────────────┐
  │  ❏   Optional Memory Card       │
  │  ❏   Optional PCMCIA Card       │
  │  ❏   Keyboard                   │      ┌──────────────┐
  │  ❏   Top Cover ─────────────────┼──────│  LED Board   │
  │  ❏   Hard Disk Drive            │      └──────────────┘
  │  ❏   RTC Battery, Backup battery│
  │  ❏   Accupoint Control Button   │
  │  ❏   System Board               │
  │  ❏   Power Supply Board         │
  │  ❏   FL Inverter Board          │      ┌──────────────┐
  │  ❏   TFT Color LCD Display ─────┼──────│  FL Unit     │
  └─────────────────────────────────┘      └──────────────┘
```
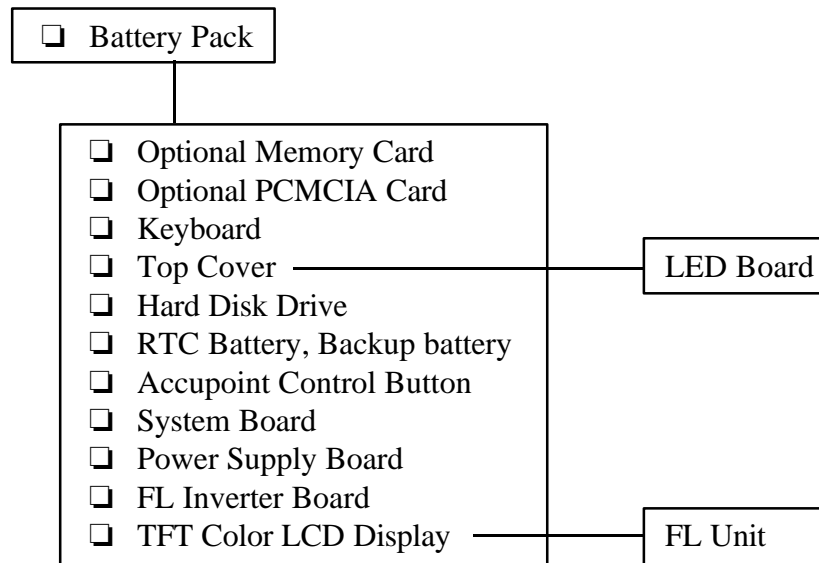
Before You Begin

Look over the procedures in this section before you begin disassembling the T3600CT. 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 T3600CT unless it is operating abnormally.

2. Use only the correct and approved tools.

3. Make sure the working environment is free from the following elements whether you are using or storing the T3600CT:

   ❏   Dust and contaminates
   ❏   Static electricity
   ❏   Extreme heat, cold and humidity

4. Make sure the FRU you are replacing is causing the abnormal operation by performing the necessary diagnostics tests described in this manual.

5. Do not perform any operations that are not necessary and use only the described procedures for disassembling and installing FRUs in the T3600CT.

6.   After removing parts from the computer, place them in a safe place away from the computer so they will not be damaged and will not interfere with your work.

7.   You will remove and replace many screws when you disassemble the T3600CT. When you remove screws, make sure they are placed in a safe place and identified with the correct parts.

8.   When assembling the T3600CT make sure you use the correct screws to secure the various pieces in place. Screw sizes are listed in the corresponding figures.

9.   The T3600CT contains many sharp edges and corners, so be careful not to injure yourself.

10.   After you have replaced an FRU make sure the T3600CT is functioning properly by performing the appropriate test on the FRU you have fixed or replaced.

Disassembly Procedures

The T3600CT has two basic types of cable connectors:

❏ Pressure Plate Connectors
❏ Normal Pin Connectors

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

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

Assembly Procedures

After you have disassembled the T3600CT and fixed or repaired the problem that was causing the T3600CT to operate abnormally, you will need to reassemble the T3600CT.

While assembling the T3600CT, remember the following general points:

❑   Take your time, making sure you follow the instructions closely. Most problems arise when you get in a hurry assembling the T3600CT.

❑   Make sure all cables and connectors are securely fastened.

❑   Before securing the FRU or other parts, make sure that no cables will be pinched by screws or the FRU.

❑   Check that all latches are closed securely in place.

❑   Make sure all the correct screws are used to secure all FRUs. Using the wrong screw can either damage the threads on the screw or the head of the screw. And may prevent proper seating of an FRU.

After installing an FRU in the T3600CT confirm that the FRU and the T3600CT 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 T3600CT:

❑   One M2 Phillips screwdriver to remove and replace screws.

❑   Tweezers, to lift out screws that you cannot grasp with your fingers.

❑   ESD mats for the floor and the table you are working on.

❑   An ESD wrist strap or heel grounder.

❑   Anti-static carpeting or flooring.

❑   Air ionizers in highly static sensitive areas.

4.2   The Battery Pack

Removing the Battery Pack

To remove the T3600CT battery pack, follow the steps below and refer to Figures 4-1 and 4-2.

1.   Turn off the power to the T3600CT. Disconnect the AC adapter, power cord and all external cables connected to the T3600CT.

2.   Close the display if it is open.

3.   Turn the computer upside down.

4.   Slide the **battery lock** to free the **battery release latch**, then slide the battery release latch to pop the battery out slightly to the left (Figure 4-1).
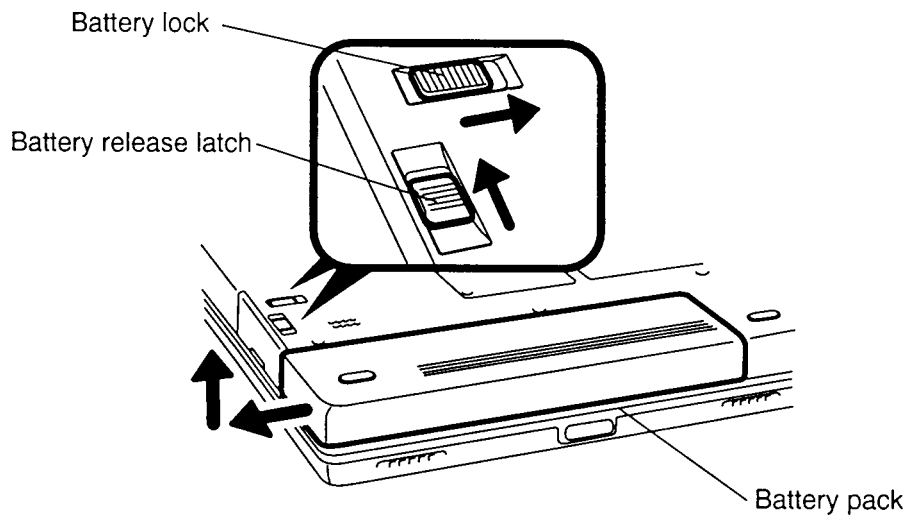
Figure 4-1 Unlocking the Battery Pack

5.   A slight gap will open between the right end of the battery pack and the computer. With your left hand, slip your fingers into the gap and pull the battery pack to the left until it stops (about 1 cm or half an inch).

6.   Grasp the left end of the battery pack and lift it up to remove it (Figure 4-2).
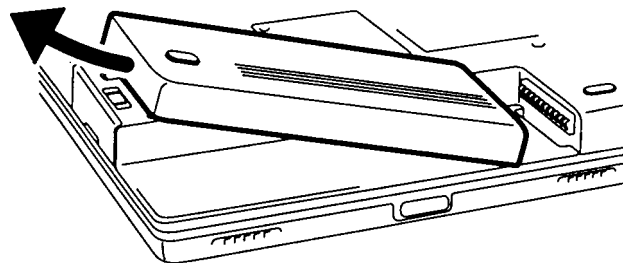
Figure 4-2 Lifting Out the Battery Pack

Installing the Battery Pack

To install the T3600CT battery pack, follow the steps below and refer to Figures 4-1 and 4-2:

1. Place the right end of the battery pack about halfway between the LCD release latch and the battery pack terminal.

2. Slide the battery pack to the right until it clips onto the computer. There will still be a gap between the right end of the battery pack and the battery terminals on the computer (Figure 4-2).

3. Gently press down on the center of the battery pack and at the same time push it to the right. When the battery is nearly seated, you will feel slight resistance. Press the battery in carefully until you feel it click into place, then lock the battery lock (Figure 4-1).

4.3   Optional Memory Module

Removing an Optional Memory Module

To remove an optional memory module from the T3600CT, follow the steps below and refer to Figures 4-3 and 4-4.

1. Turn off the power to the T3600CT. Disconnect the AC adapter, power cord and all external cables connected to the T3600CT.

2. Remove the battery pack as described in Section 4.2.

3. Turn the computer upside down.

4. Remove **two M2.5x4 screws** securing the **memory module socket cover** (Figure 4-3).

5. Slide your fingernail or a thin object under the notch on the cover and rotate the cover up to remove it. Two latches hold the cover in place on the side away from the screws (Figure 4-3).
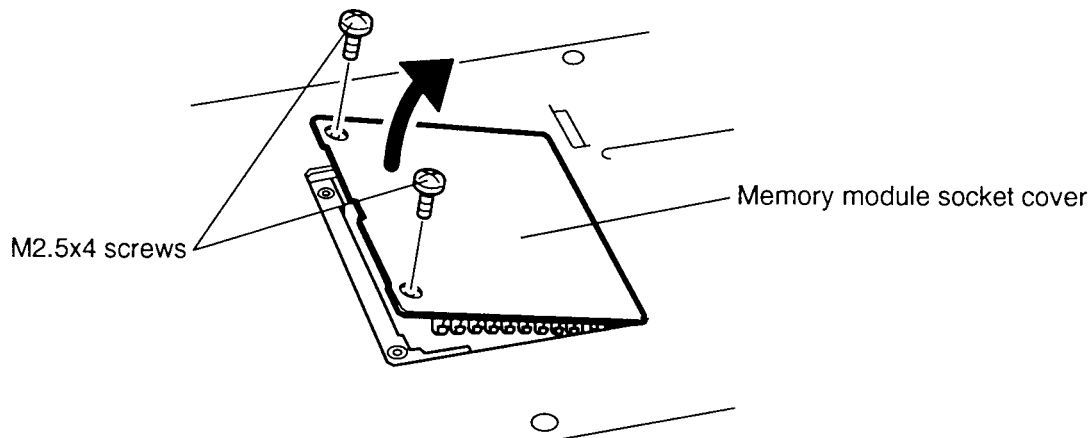
Figure 4-3 Removing the Memory Module Socket Cover

6. **Two latches** on each side of the module hold it in place. Press these to the outside to release the module. The side of the module away from the connectors will spring up (Figure 4-4).
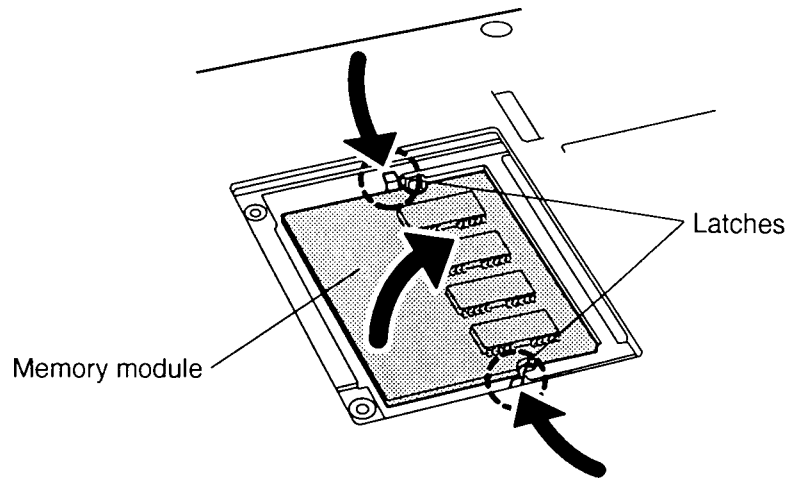
Figure 4-4 Removing the Memory Module

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

Installing an Optional Memory Module

To install an optional memory module in the T3600CT, follow the steps below and refer to Figures 4-3 through 4-5.

1. Insert the **memory module**, connectors first, into the computer's connectors. Note the **notch** at the corner of the module. This **notch** should be on the right as you insert the connectors (Figure 4-5).
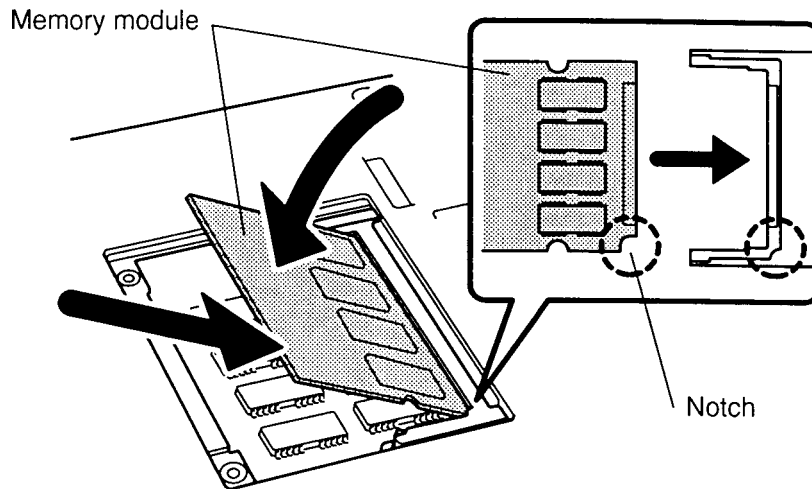
Figure 4-5 Inserting the Memory Module

2. The module is held up by springs in the computer's socket. Gently push the module into place until two latches close over each side (Figure 4-4).

3. Fit the socket cover's latches into place and seat the cover (Figure 4-3).

4. Secure the **two M2.5x4 screws** (Figure 4-3).

5. Install the battery pack as described in Section 4.2.

6. The T3600CT automatically configures all additional memory as extended memory.

4.4 Optional PCMCIA Card

Removing an Optional PCMCIA Card

To remove an optional PCMCIA card from the T3600CT, follow the steps below and refer to Figure 4-6.

1. Turn off the power to the T3600CT. Disconnect the AC adapter, power cord and all external cables connected to the T3600CT.

2. Remove the battery pack as described in Section 4.2.

3. Snap off the **cover** to the PCMCIA slot (Figure 4-6).

4. Press the **eject button** to pop the card out slightly (Figure 4-6).
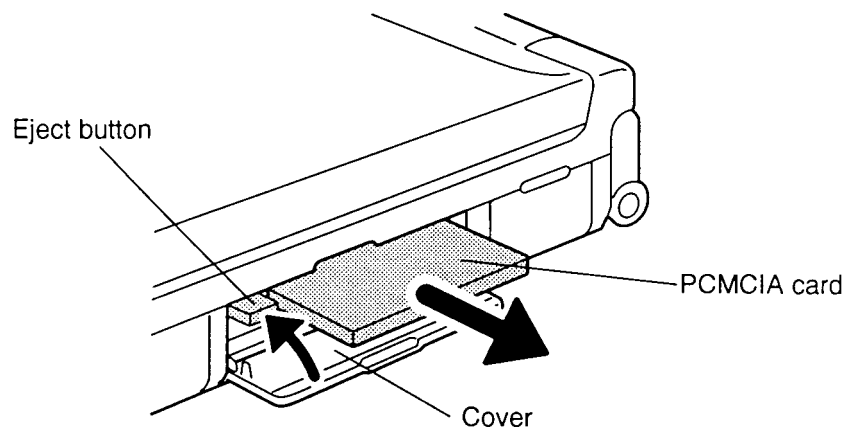
Figure 4-6 Removing the PCMCIA Card

Installing an Optional PCMCIA Card

To install an optional PCMCIA card in the T3600CT, follow the steps below and refer to Figure 4-7:

1. To install a **PCMCIA card**, carefully insert the card, making sure the card is right side up and the contact surface is inserted first.

2. When the card is almost fully seated, you will feel some resistance. Press gently to assure a firm connection, but do not force the card into position. (Figure 4-7).
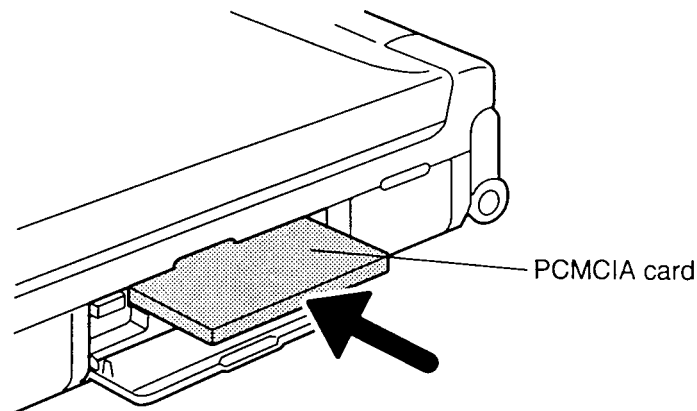
Figure 4-7 Installing the Optional PCMCIA Card

3. Install the battery pack as described in Section 4.2.

4.5 Keyboard

Removing the Keyboard

To remove the T3600CT's keyboard, follow the steps below and refer to Figures 4-8 through 4-11.

1. Turn off the power to the T3600CT. 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 card as described in Sections 4.2, 4.3, and 4.4.

3. Open the display if it closed.

4. Use a thin metal tool to unlatch **12 latches** that secure the **keyboard cover** (Figure 4-8).
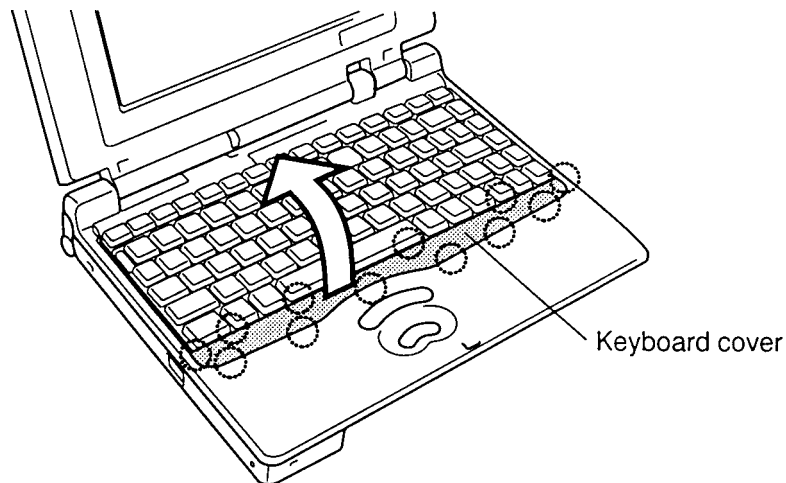
Figure 4-8 Unlatching the Keyboard Cover

5. Remove **three M2x4 brass screws** in front of the keyboard (Figure 4-9).
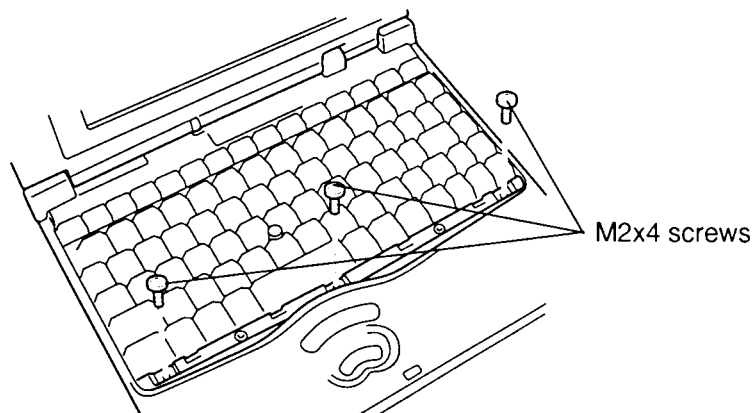
Figure 4-9 Removing the Keyboard Screws

6. Insert the thin metal tool between keyboard and top cover to lift up the keyboard. (Figure 4-10). Lift up slightly so tongues at the back of the keyboard clear corresponding holes on the top cover. Do not remove the keyboard cable.
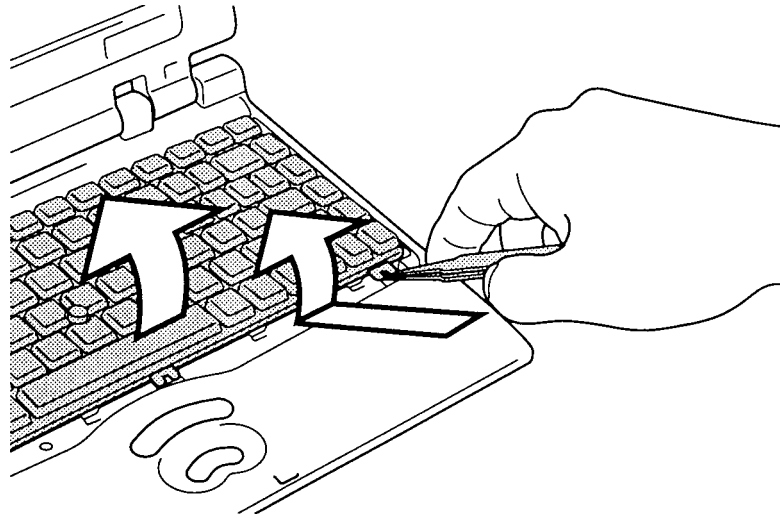
Figure 4-10 Lifting Up the Keyboard

7. Disconnect the **AccuPoint cable** from **PJ503**, **keyboard cable** from **PJ8** (Figure 4-11). If you continue disassembly, disconnect the **LED cable** from **PJ16** and the **display cable** from **PJ10** (Figure 4-11).
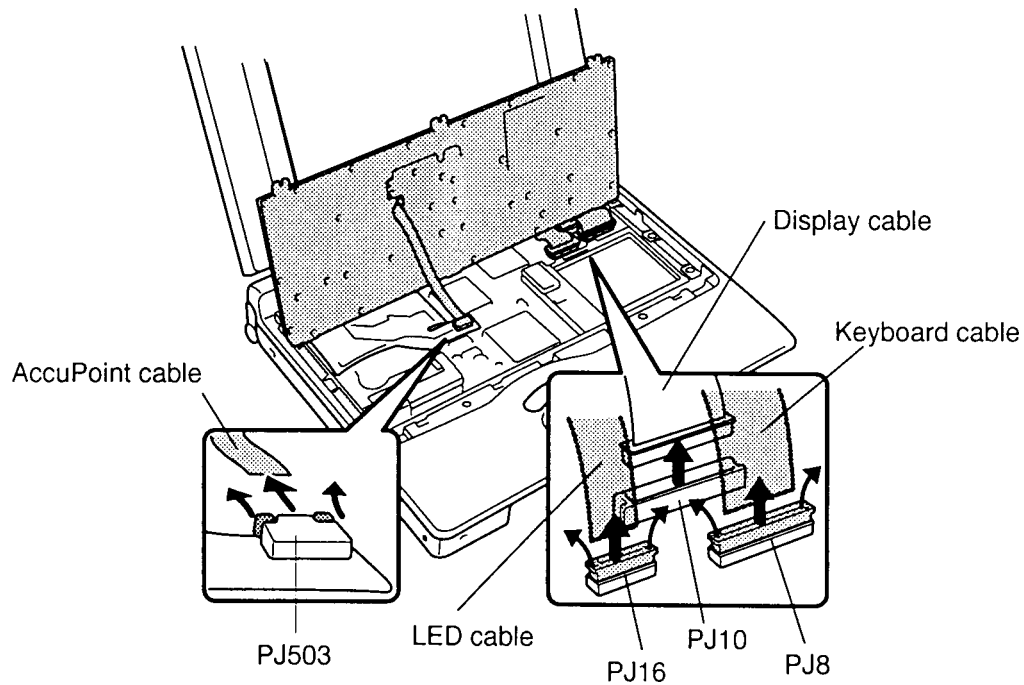
Figure 4-11 Removing the Keyboard

8. Lift out the keyboard.

Installing the keyboard

To install the T3600CT's keyboard, follow the steps below and refer to Figures 4-8 through 4-11.

1. If you removed the LED and display cable, connect the **LED cable** to **PJ16** and **display cable** to **PJ10** (Figure 4-11).

2. Connect the **AccuPoint cable** to **PJ503** and **keyboard cable** to **PJ8** (Figure 4-11).

3. Replace the keyboard. Fit tongues on the back of the keyboard into corresponding holes on the top cover and lay the keyboard in place.

4. Secure **three M2x4 brass screws** in front of the keyboard (Figure 4-9).

5. Seat the **keyboard cover** and press firmly to secure the **12 latches** (Figure 4-8).

6. Replace the optional PCMCIA card, optional memory card and battery pack as described in Sections 4.4, 4.3, and 4.2.

4.6 Top Cover

Removing the Top Cover

To remove the T3600CT's top cover, follow the steps below and refer to Figures 4-12 through 4-14.

1. Turn off the power to the T3600CT. Disconnect the AC adapter, power cord and all external cables connected to the computer.

2. Remove the battery pack, optional memory card, optional PCMCIA card and keyboard as described in Sections 4.2, 4.3, 4.4 and 4.5.

3. Close the display and turn the computer upside down.

4. Remove **seven M2x8 silver screws** from the bottom of the computer and **two M2x4 brass screws** from the battery seating area. These screws secure the **top cover** to the bottom cover, (Figure 4-12).
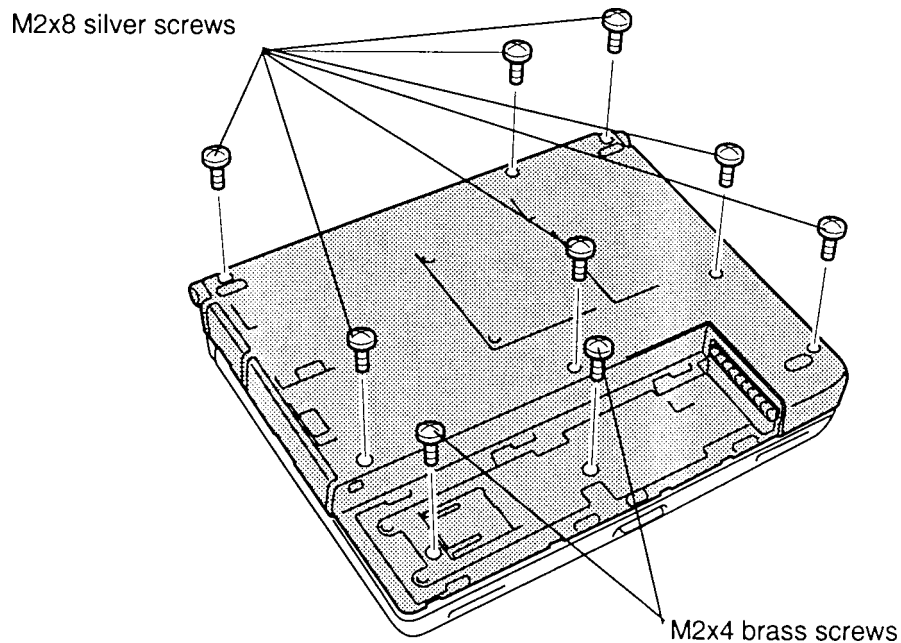
Figure 4-12 Removing the Bottom Cover Screws

5. Turn the computer back over and open the display panel. **Nine latches** secure the **top cover** at the base cover (Figure 4-13).
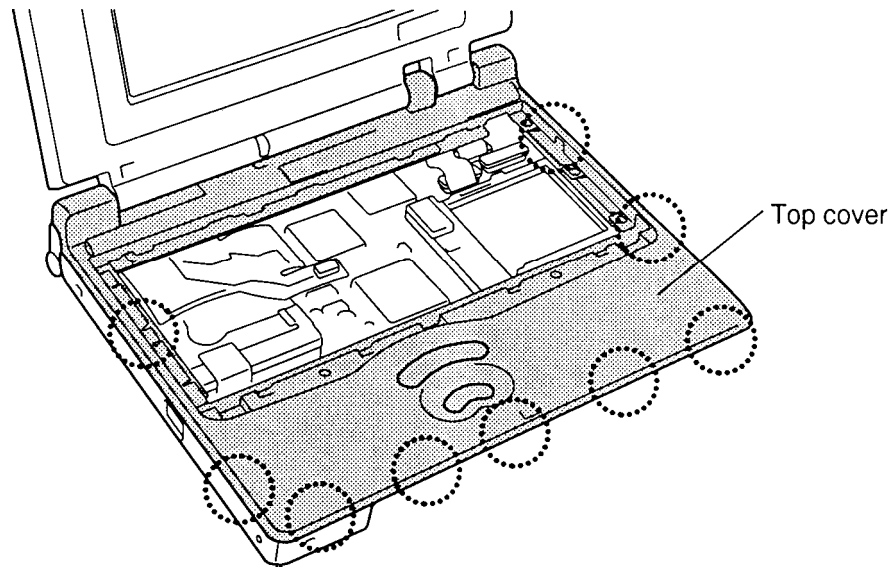
Top cover

Figure 4-13 Top Cover's Nine Latches

6. Unlatch the **nine latches** from the base cover. (Figure 4-14).
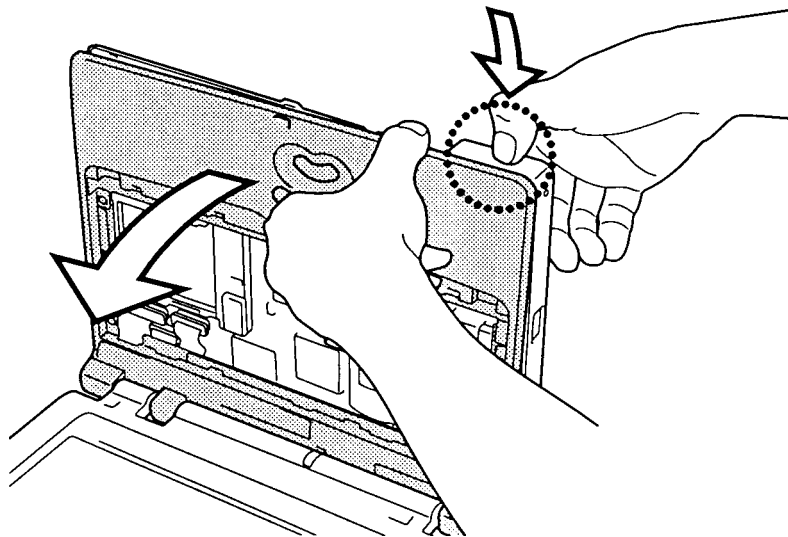
Figure 4-14 Separating the Top Cover

Installing the Top Cover

To install the T3600CT's top cover, follow the steps below and refer to Figures 4-12 through 4-14:

1. Set the top cover in place and snap in the nine latches. (Figures 4-13 and 4-14).

2. Close the display and turn the computer upside down.

3. Secure the top cover with the **seven M2x8 silver screws** and **two M2x4 brass screws** (Figure 4-12).

4. Replace the keyboard, optional PCMCIA card, optional memory card and battery pack as described in Sections 4.5, 4.4, 4.3, and 4.2.

4.7   Hard Disk Drive

Removing the Hard Disk Drive

To remove the T3600CT's hard disk drive, follow the steps below and refer to Figures 4-15 through 4-17.

1. Turn off the power to the T3600CT. Disconnect the AC adapter, power cord and all external cables connected to the computer.

2. Remove the battery pack, optional memory card, optional PCMCIA card, keyboard and top cover as described in Sections 4.2, 4.3, 4.4, 4.5, and 4.6.

3. Remove the **one M2.5x6 brass screw** securing the HDD bracket to the computer (Figure 4-15).

4. Disconnect the **HDD flexible cable** from **PJ5** on the system board. (Figure 4-15).

5. Lift out the HDD (Figure 4-15).
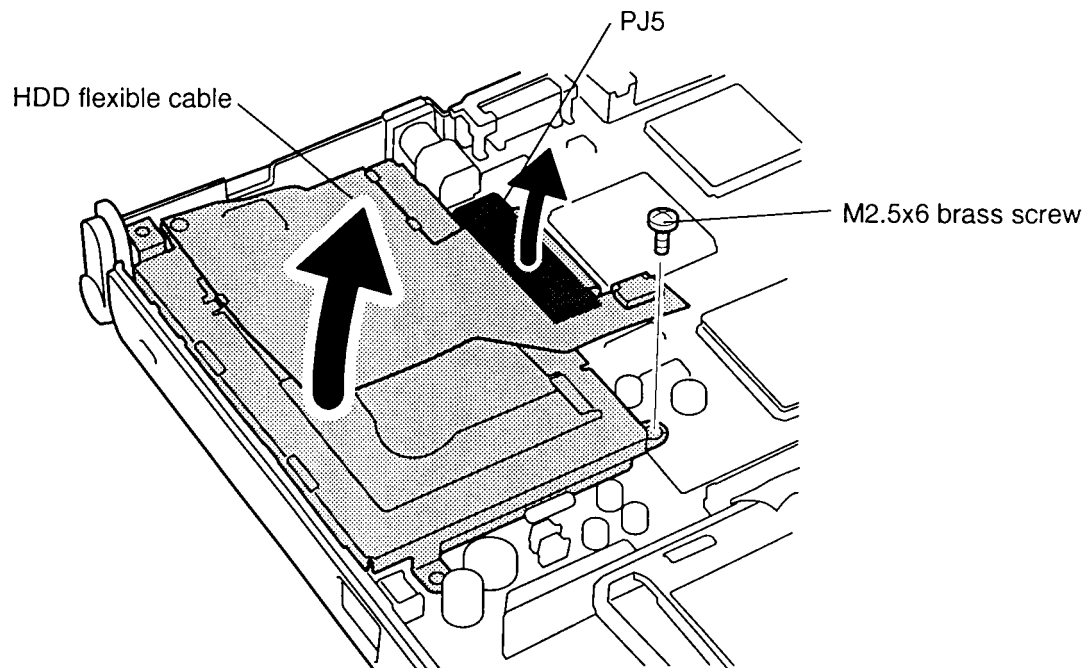
Figure 4-15 Removing the HDD with Bracket

6. Remove the **one M2x4 brass screw** securing the flexible cable to the HDD (Figure 4-16).

7. Disconnect the **flexible cable** from the HDD (Figure 4-16).

8. Slip the flexible cable out of three small latches on the **HDD bracket** to remove the HDD.
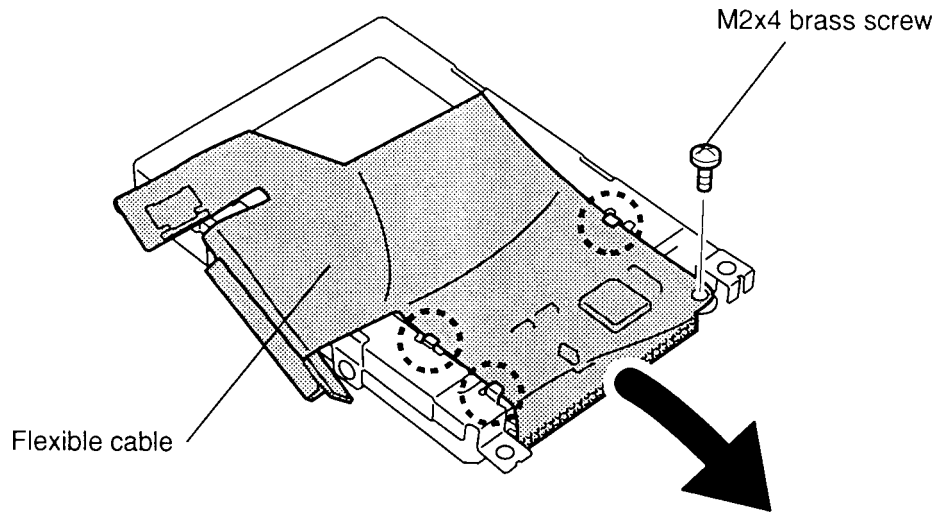
Figure 4-16 Removing the HDD Flexible Cable

9. Remove the **three M3x4 flat-head screws** securing the **bracket** to the HDD (Figure 4-17).

10. Remove the bracket.
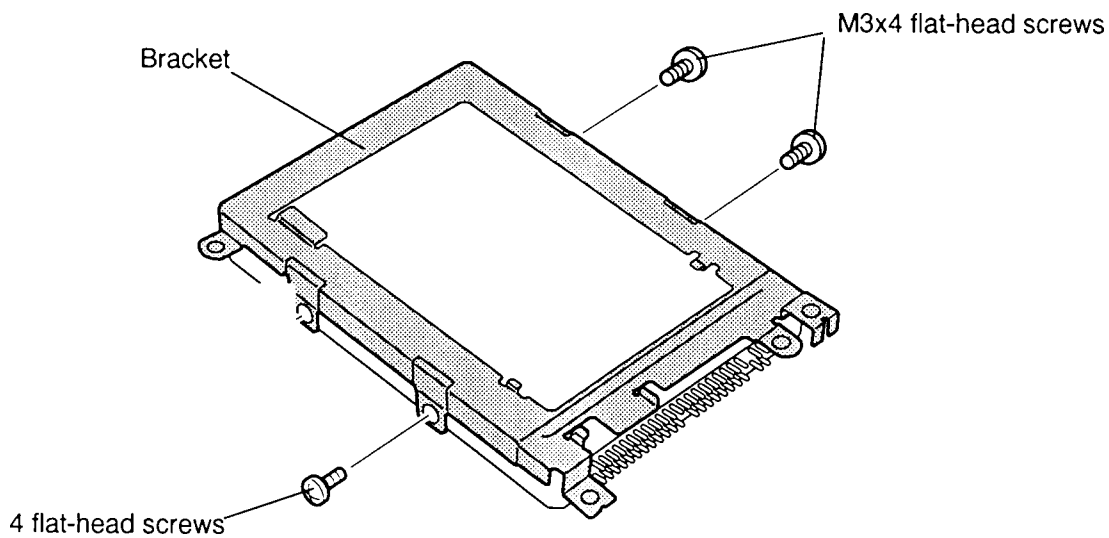
Figure 4-17 Removing the HDD

Installing the Hard Disk Drive

To install the T3600CT's hard disk drive, follow the steps below and refer to Figures 4-15 through 4-17.

1. Seat the HDD in its bracket (Figure 4-17).

2. Secure the HDD to the bracket with the **three M3x4 flat-head screws** (Figure 4-17).

3. Fit the flexible cable under three small latches on the **HDD bracket** (Figure 4-16).

4. Connect the **HDD flexible cable** to the HDD (Figure 4-16).

5. Secure the flexible cable with the **one M2x4 brass screw** (Figure 4-16).

6. Seat the HDD into the bottom cover (Figure 4-15).

7. Connect the **HDD flexible cable** to **PJ5** on the system board (Figure 4-15).

8. Secure the HDD with the **one M2.5x6 brass screw** (Figure 4-15).

9. Replace the top cover, keyboard, optional PCMCIA card, optional memory card and battery pack as described in Sections 4.6, 4.5, 4.4, 4.3, and 4.2.

4.8 RTC and Backup Batteries

Removing the RTC and Backup Batteries

To remove the T3600CT's RTC and backup batteries, follow the steps below and refer to Figure 4-18.

1. Turn off the power to the T3600CT. Disconnect the AC adapter, power cord and all external cables connected to the computer.

2. Remove the battery pack, optional memory card, optional PCMCIA card, keyboard and top cover as described in Sections 4.2, 4.3, 4.4, 4.5 and 4.6.

3. Peel off the **tape** securing the **RTC battery cable** (Figure 4-18).

4. Disconnect the **RTC battery cable** from **PJ2** on the system board (Figure 4-18).

5. Slide the **RTC battery** free of the brackets holding it in place to remove the battery (Figure 4-18).

6. Disconnect the **backup battery cable** from **PJ1** on the power supply board and lift out the battery (Figure 4-18).
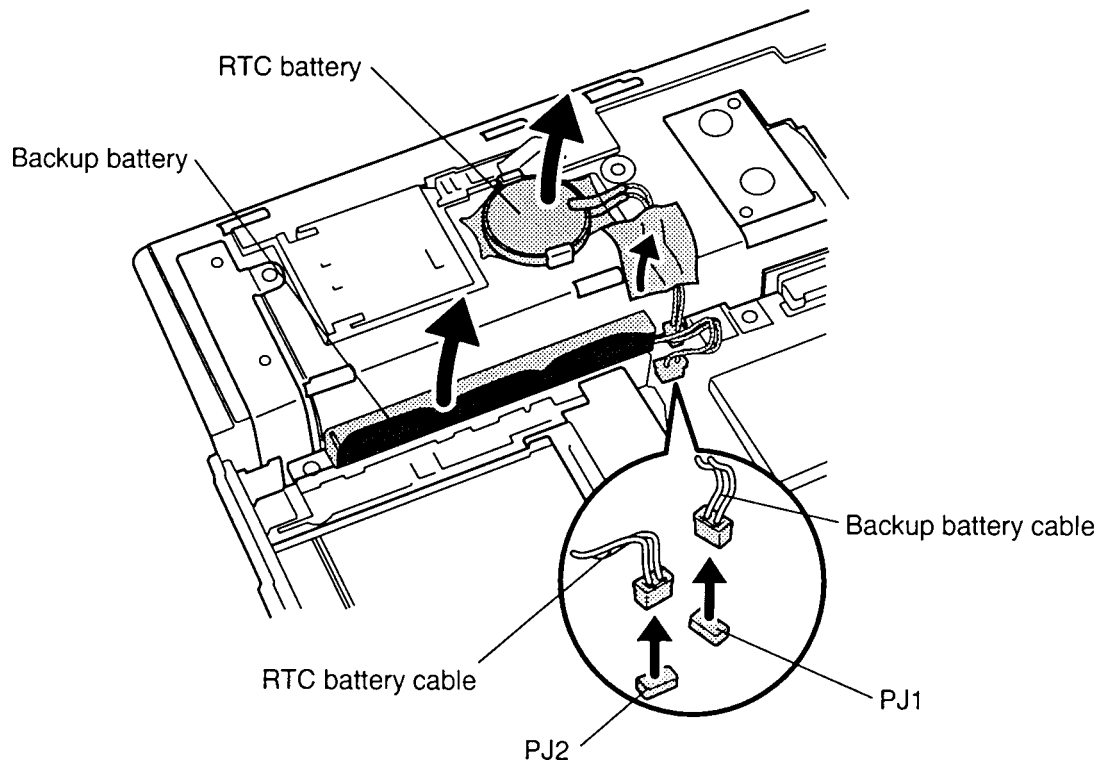

Figure 4-18 Removing the RTC and Backup Battery

Installing the RTC and Back-up Batteries

To install the T3600CT's RTC and backup batteries, follow the steps below and refer to Figure 4-18.

1. Connect the **backup battery cable** to **PJ1** on the power supply board and lift out the battery (Figure 4-18).

2. Slide the **RTC battery** under the brackets on the bottom cover (Figure 4-18).

3. Connect the **RTC battery cable** to **PJ2** on the system board (Figure 4-18).

4. Secure the the **RTC battery cable** with **tape** (Figure 4-18)

5. Seat the **backup battery** in the bottom cover and connect its **cable** to **PJ1** on the power supply board (Figure 4-18).

6. Replace the top cover, keyboard, optional PCMCIA card, optional memory card and battery pack as described in Sections 4.6, 4.5, 4.4, 4.3 and 4.2.

4.9 AccuPoint Control Button

Removing the AccuPoint Control Button

To remove the T3600CT's AccuPoint control button, follow the steps below and refer to Figure 4-19.

1. Turn off the power to the T3600CT. Disconnect the AC adapter, power cord and all external cables connected to the computer.

2. Remove the battery pack, optional memory card, optional PCMCIA card, keyboard, top cover as described in Sections 4.2, 4.3, 4.4, 4.5 and 4.6.

3. Peel off the **tape** securing the **AccuPoint control button** (Figure 4-19).

4. Disconnect the **cable** from **PJ801** on the power supply/system joint board (Figure 4-19).

5. Slide the **control button** free of latches on the bottom cover to remove it (Figure 4-19).
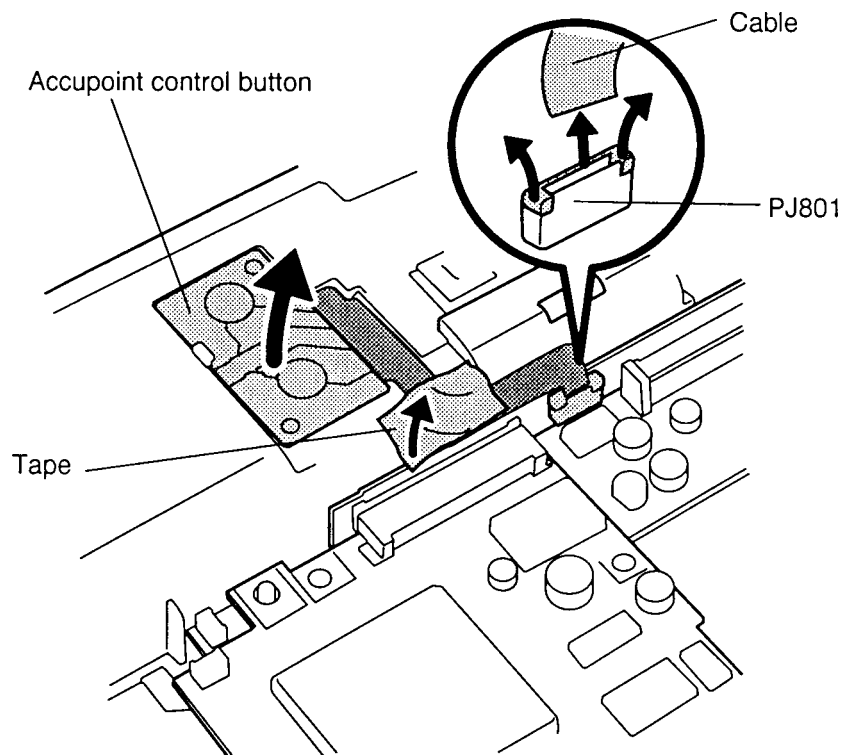
Figure 4-19 Removing the AccuPoint Control Button

Installing the AccuPoint Control Button

To install the T3600CT's AccuPoint control button, follow the steps below and refer to Figure 4-19.

1. Slide the **control button** under its latches on the bottom cover (Figure 4-19).

2. Connect the **cable** to **PJ801**on the **power supply/system joint board** (Figure 4-19).

3. Secure the **AccuPoint control button** with **tape** (Figure 4-19).

4. Replace the top cover, keyboard, optional PCMCIA card, optional memory card and battery pack as described in Sections 4.6, 4.5, 4.4, 4.3, and 4.2.
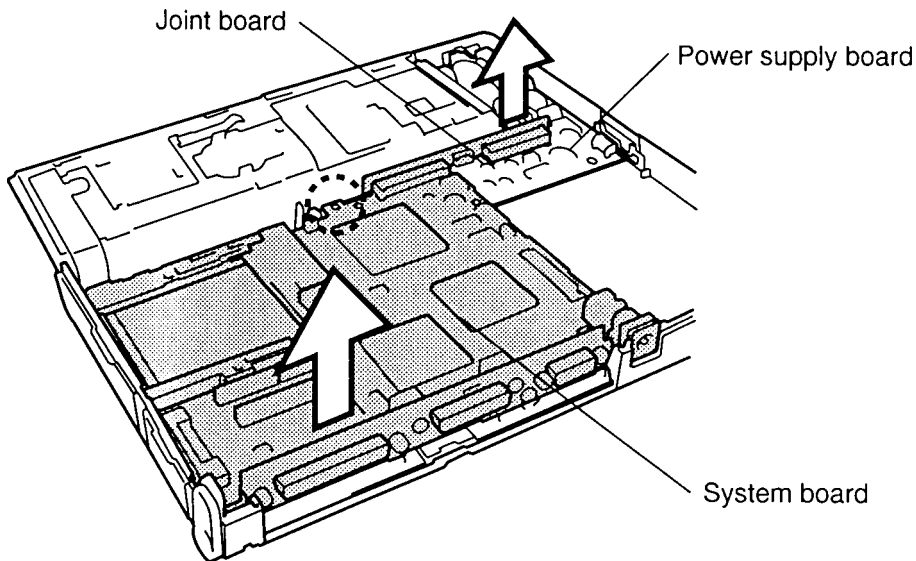
4.10 System Board

Removing the System Board

To remove the T3600CT's system board, follow the steps below and refer to Figures 4-20 and 4-21.

1. Turn off the power to the T3600CT. Disconnect the AC adapter, power cord and all external cables connected to the computer.

2. Remove the battery pack, optional memory card, optional PCMCIA card, keyboard, top cover, hard disk drive and RTC and back-up batteries as described in Sections 4.2, 4.3, 4.4, 4.5, 4.6, 4.7 and 4.8.

3. Disconnect the **joint board** from **power supply board** and lift up the **system board** with power supply board slightly (Figure 4-20).

NOTE: Be careful with the PCMCIA card eject button. You may have to open the PCMCIA slot cover for the button to clear the bottom cover. Also be careful with the tongues for screws to secure the board to the bottom cover.

Figure 4-20 Removing the System Board with Joint Board

4. Remove the joint board from system board (Figure 4-21).
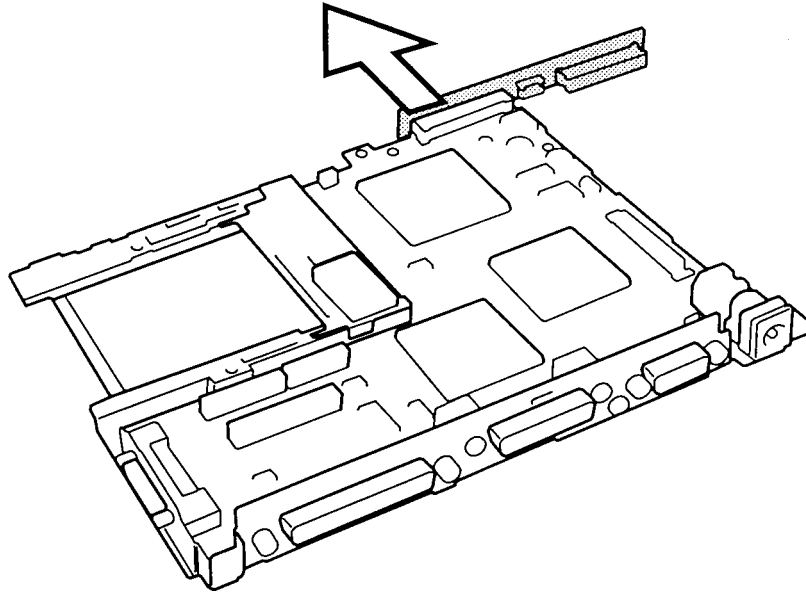
Figure 4-21 Removing the System Board

Installing the System Board

To install the T3600CT's system board, follow the steps below and refer to Figures 4-20 and 4-21.

1. Connect the **joint board** to the **system board** (Figure 4-21).

2. Lay the **system board** with joint board into the back cover (Figure 4-20).

NOTE: Be careful with the PCMCIA card eject button. You may have to open the PCMCIA slot cover for the button to clear the bottom cover. Also be sure to match the tongues for screws on the system board with their corresponding holes on the bottom cover.
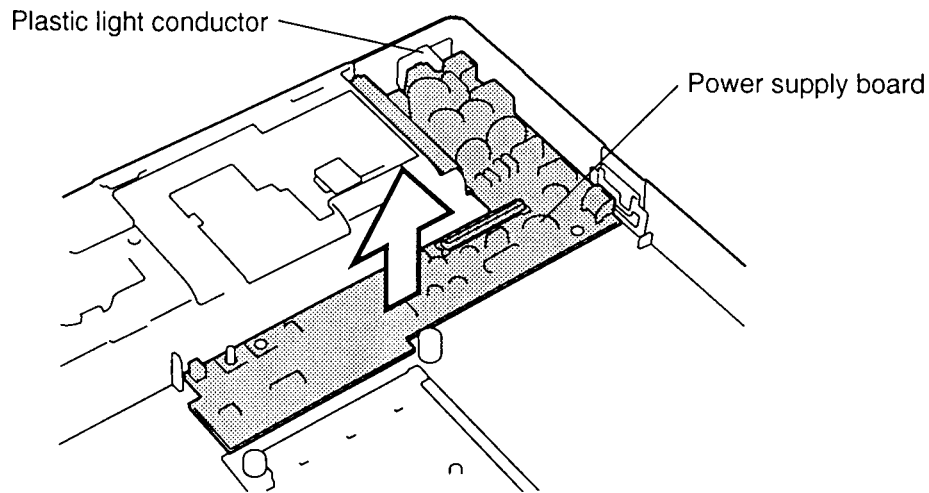
3. Connect the **joint board** to **power supply board** (Figure 4-21).

4. Replace the RTC and backup batteries, hard disk drive, top cover, keybaord, optional PCMCIA card, optional memory card and battery pack as described in Sections 4.8, 4.7, 4.6, 4.5, 4.4, 4.3, and 4.2.

4.11 Power Supply Board

Removing the Power Supply Board

To remove the T3600CT's power supply board, follow the steps below and refer to Figure 4-22.

1. Turn off the power to the T3600CT. Disconnect the AC adapter, power cord and all external cables connected to the computer.

2. Remove the battery pack, optional memory card, optional PCMCIA card, keyboard, top cover, hard disk drive, RTC and back-up batteries, AccuPoint control button and system 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. Lift out the **power supply board**, being careful to clear the **plastic light conductor** for the battery LED (Figure 4-22).

Figure 4-22 Removing the Power Supply Board

Installing the Power Supply Board

To install the T3600CT's power supply board, follow the steps below and refer to Figure 4-22.

1. Lay the **power supply board** into the bottom cover, being careful to clear the **plastic light conductor** for the battery LED (Figure 4-22).

2. Replace the system board, AccuPoint control button, RTC and back-up batteries, hard disk drive, top cover, keyboard, optional PCMCIA card, optional memory card and battery pack as described in Sections 4.10, 4.9, 4.8, 4.7, 4.6, 4.5, 4.4, 4.3, and 4.2.

4.12 LED Board

Removing the LED Board

To remove the T3600CT's LED board, follow the steps below and refer to Figure 4-23.

1. Turn off the power to the T3600CT. Disconnect the AC adapter, power cord and all external cables connected to the computer.

2. Remove the battery pack, optional memory card, optional PCMCIA card, keyboard, top cover as described in Sections 4.2, 4.3, 4.4, 4.5 and 4.6.

3. Remove **two M2.5x4 brass screws** securing the **LED board** (Figure 4-23).

4. Pull up gently on the **metal tab** covering the **LED board** to release **two latches** securing the tab.

5. Pull out the LED board.

M2.5x4 brass screws
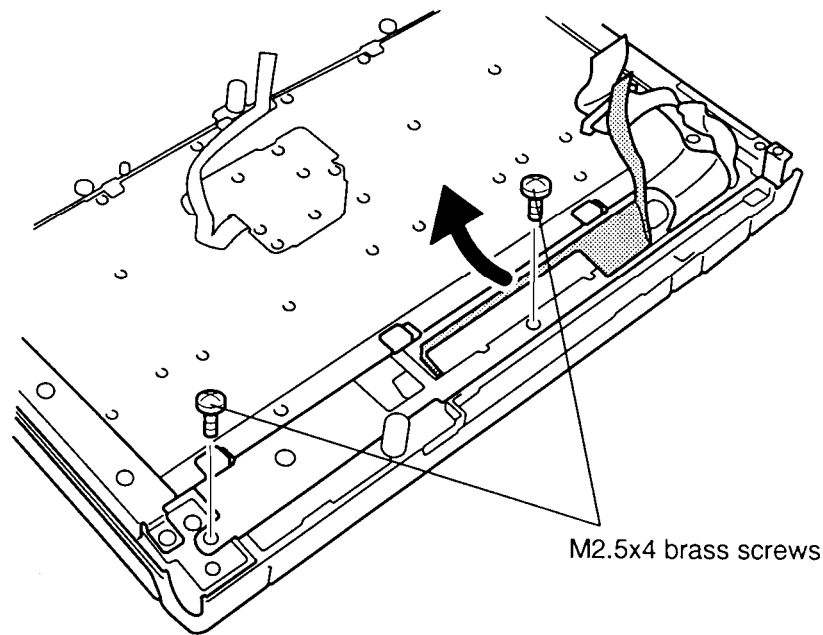
Figure 4-23 Removing the LED Board

Installing the LED Board

To install the T3600CT's LED board, follow the steps below and refer to Figure 4-23.

1. Seat the **LED board** under the metal tab (Figure 4-23).

2. Press the **tab** gently to secure the **two latches** (Figure 4-23).

3. Secure **two M2.5x4 brass screw** holding the LED board (Figure 4-23).

4. Replace the top cover, keyboard, optional PCMCIA card, optional memory card and battery pack as described in Sections 4.6, 4.5, 4.4, 4.3, and 4.2.

4.13 Display Mask

Removing the Display Mask

To remove the T3600CT's display mask, follow the steps below and refer to Figure 4-24.

1. Turn off the power to the T3600CT. 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. Remove **two rubber seals** from the display hinges and **two rubber pads** from the top of corners of the display to expose screws securing the display mask (Figure 4-24).

4. Remove **two brass M2.5x6 screws** at the bottom corners of the display mask, and **two brass M2.6x6 screws** at the top two corners (Figure 4-24).

5. Slip your fingers between the display's cover and the display mask and pull out gently to release **one latch** at the center.

6. Continue around the plactic cover to release **two more latches** at the top, **four latches** on each side and **five latches** at the bottom (Figure 4-24).
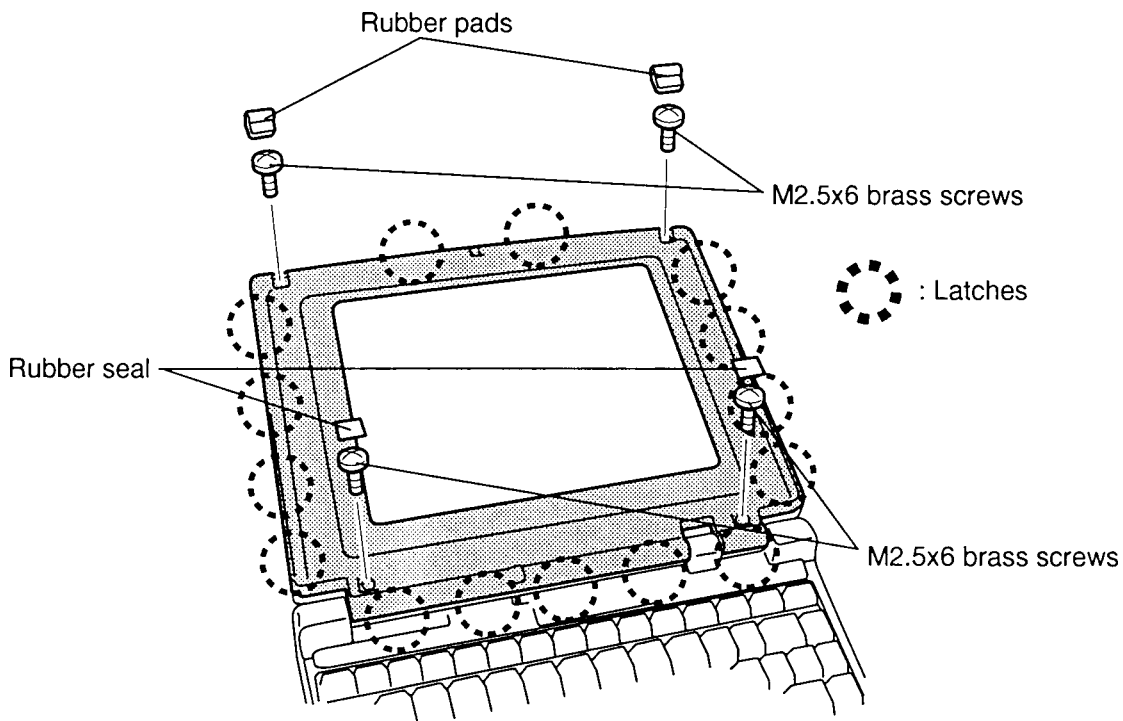
Figure 4-24 Removing the Display Mask

Installing the Display Mask

To install the T3600CT's display mask, follow the steps below and refer to Figure 4-24.

1. Set the **display mask** in place and press firmly to secure the latches. Start at the bottom **five latches** and work your way around the sides (**four latches** on each side) and, finally, secure the **three latches** at the top (Figure 4-24).

2. Secure **four brass M2.5x6 screws**, one at each corner of the display cover (Figure 4-24).

3. Replace the **two rubber pads** and **two rubber seals** covering screws at the top two corners and hinges (Figure 4-24).

4. Replace the battery pack as described in Section 4.2.

4.14 FL Inverter Board

Removing the FL Inverter Board

To remove the T3600CT's FL inverter board, follow the steps below and refer to Figure 4-25.

1. Turn off the power to the T3600CT. Disconnect the AC adapter, power cord and all external cables connected to the computer.

2. Remove the battery pack and display mask as described in Sections 4.2 and 4.13.

3. Remove **two brass M2.5x4 screws** from the **FL inverter board** (Figure 4-25).

4. Turn over the board and disconnect the **FL inverter cable** from **CN1** and the **FL cable** from **CN2** (Figure 4-25).
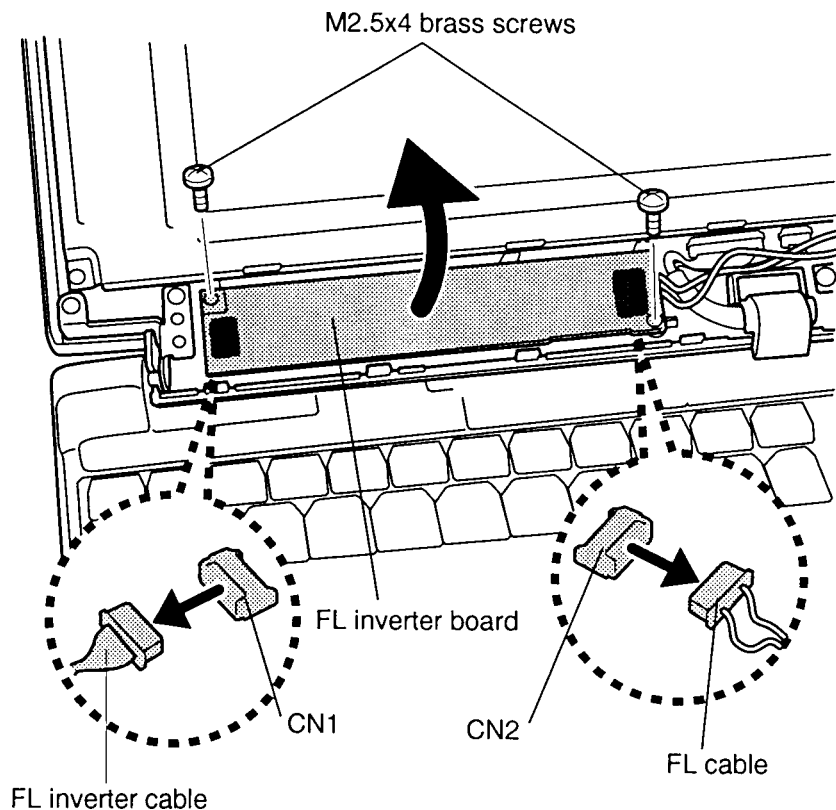
Figure 4-25 Removing the FL Inverter Board

Installing the FL Inverter Board

To install the T3600CT's FL inverter board, follow the steps below and refer to Figure 4-25.

1. Turn over the board and connect the **FL inverter cable** from **CN1** and the **FL cable** from **CN2** (Figure 4-25).

2. Secure **two brass M2.5x4 screws** holding the **FL inverter board** (Figure 4-25).

3. Replace the display mask and battery pack as described in Sections 4.13 and 4.2.

4.15 TFT Color Display Module

Removing the TFT Color Display Module

To remove the T3600CT's TFT color display module, follow the steps below and refer to Figures 4-26 and 4-27.

1. Turn off the power to the T3600CT. Disconnect the AC adapter, power cord and all external cables connected to the computer.

2. Remove the battery pack, display mask, and FL inverter board as described in Sections 4.2, 4.13 and 4.14.

3. Remove **four brass M2.5x6 screws** at each corner of the display module. The screw at the bottom right corner also secures the **ground cable** (Figure 4-26).

4. Rotate the **display module** out of the cover from left to right (Figure 4-26).
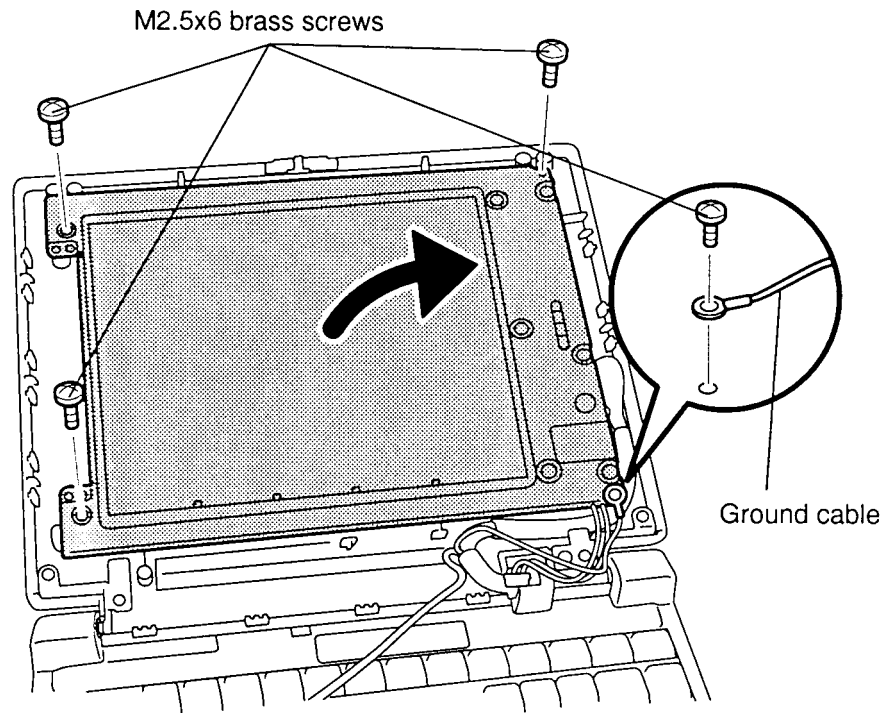
Figure 4-26 Removing the Display Module Screws

5.   Disconnet the **display cable** from the **display module** (Figure 4-27).
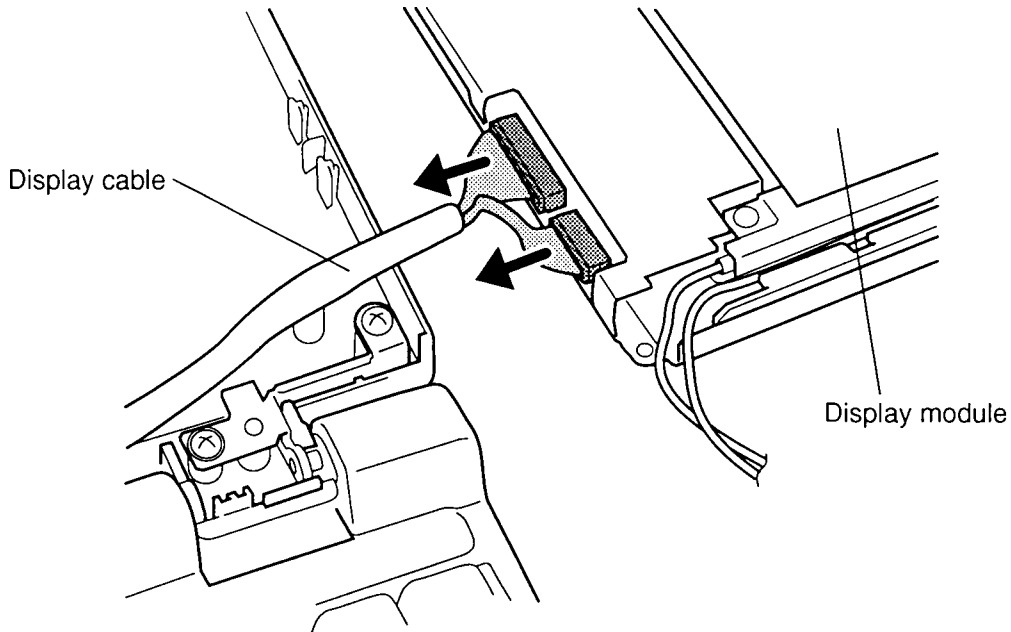
Figure 4-27 Removing the LCD Module

Installing the TFT Color Display Module

To install the T3600CT's TFT color display module, follow the steps below and refer to Figures 4-26 through 4-27.

1.   Connect the **display cable** to the **display module** (Figure 4-27).

2.   Seat the **display module** in the display cover and secure **four brass M2.5x6 screws**, one at each corner of the panel (Figure 4-26).

NOTE: Be sure to secure the ground cable with the screw at the bottom right corner.

3.   Replace the FL inverter board, display mask and battery pack as described in Sections 4.14, 4.13, and 4.2.

4.16 Fluorescent Lamp (FL)

Removing the FL

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

To remove the T3600CT's FL, follow the steps below and refer to Figures 4-28 through 4-30.

1. Turn off the power to the T3600CT. Disconnect the AC adapter, power cord and all external cables connected to the computer.

2. Remove the battery pack, display mask, FL inverter board, display module as described in Sections 4.2, 4.13, 4.14, and 4.15.

3. Place the **LCD module** face down and remove the **four screws** (Figure 4-28).

4. Unsnap the **latches** securing the **LCD frame** to the LCD module (Figure 4-28).

CAUTION: *When you remove the LCD frame, eight hybright ICs will be exposed at the top/bottom of the LCD module. Use extreme care not to touch or jar these ICs.*
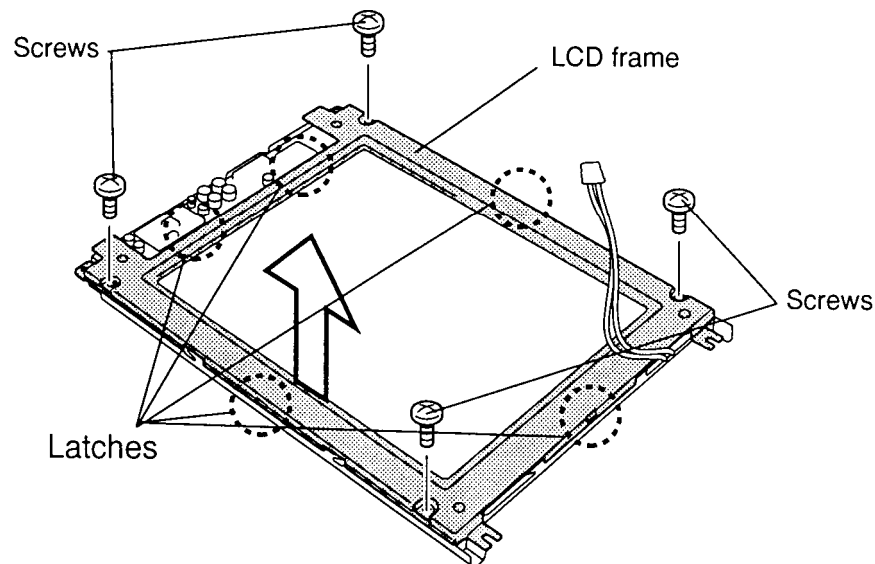
Figure 4-28 Removing the LCD Module Screws

5. Push the **four latches** to remove the **FL cover** and remove it (Figure 4-29).
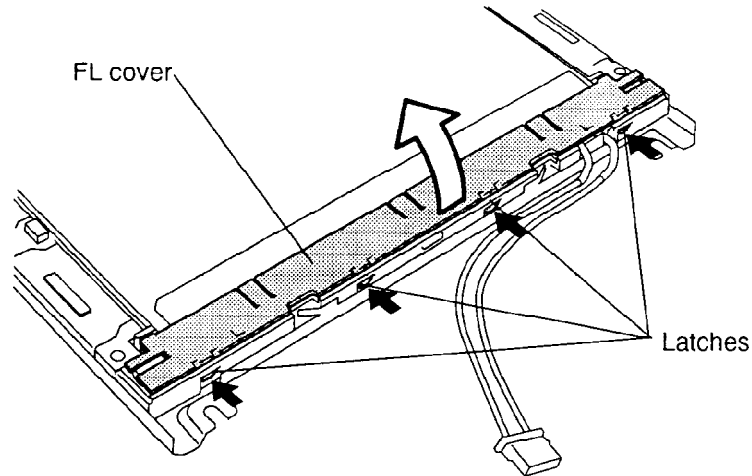
Figure 4-29 Removing the FL Cover

6. Hold up the **plastic cover** shielding the **fluorescent lamp** (FL) and lift the **FL cable** to remove the FL (Figure 4-30).
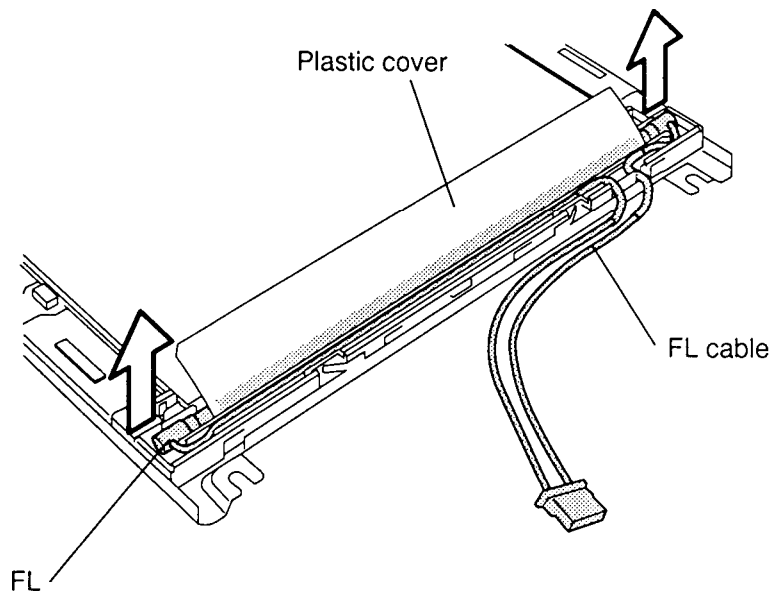
Figure 4-30 Removing the FL

Installing the FL

To install the T3600CT's FL, follow the steps below and refer to Figures 4-28 through 4-30.

1. Lay the **FL** with **FL cable** in the frame of the LCD module.

2. Lay the **FL cover** and snap in the **four latches** to LCD module.

CAUTION: When you secure the four screws, be careful not to secure them too tight.

---

3. Replace the display module, FL inverter board, display mask and battery pack as described in Sections 4.15, 4.14, 4.13, and 4.2.

Appendix A   Handling the LCD Module

Precautions for Handling the T3600CT LCD Module

The T3600CT's LCD module can be easily damaged during assembly or disassembly. Observe the following precautions when handling the LCD module:

1. When installing the LCD module in the LCD cover, be sure to seat it so that it is properly aligned and maximum visibility of the display is maintained.
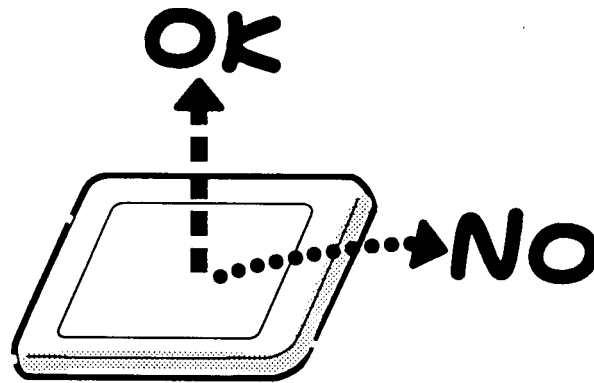
2. Be careful to align the holes at the four corners of the LCD module with the corresponding holes in the LCD cover before securing the module with screws. Do not force the module into place, because stress can affect its performance.

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

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

   If the surface is very dirty, we recommend a CRT cleaning agent. Apply the agent to a cloth and then wipe the panel's surface. Do not apply cleanser directly to the panel.
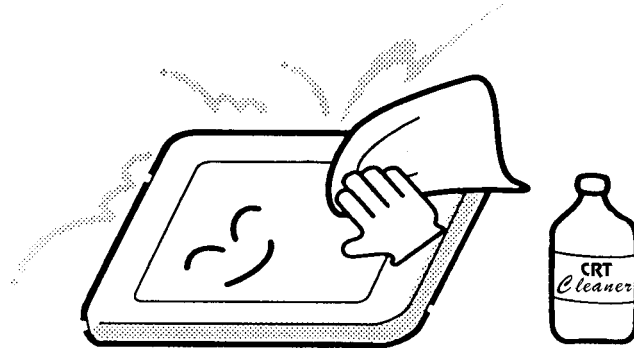
4. If water or other liquid is left on the panel's surface for a long period, it can change the screen's tint or stain it. Be sure to quickly wipe off any liquid.
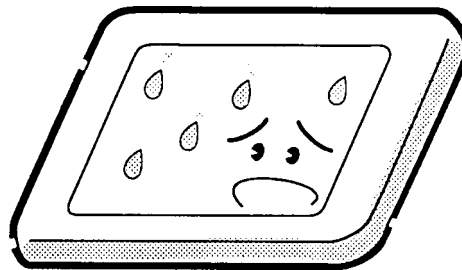
5. Glass is used in the panel, so be careful not to drop it or let it strike a hard object, which could cause breakage or cracks.
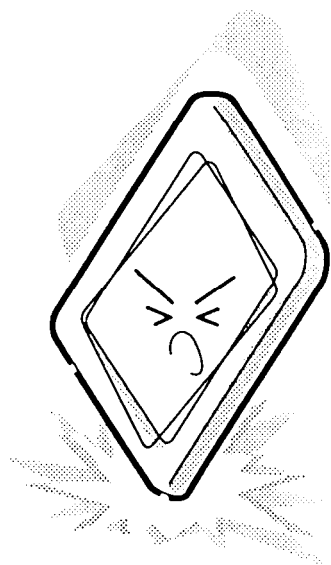
6. CMOS-LSI circuits are used in the module, so guard against damage from electrostatic discharge. Be sure to wear a wrist or ankle ground when handling the module.
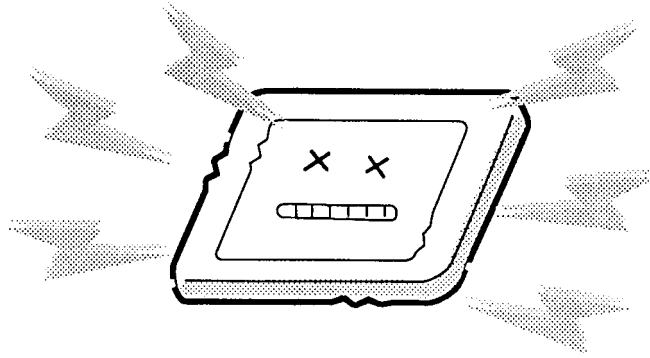
7. Do not expose the module to direct sunlight or strong ultraviolet rays for long periods.
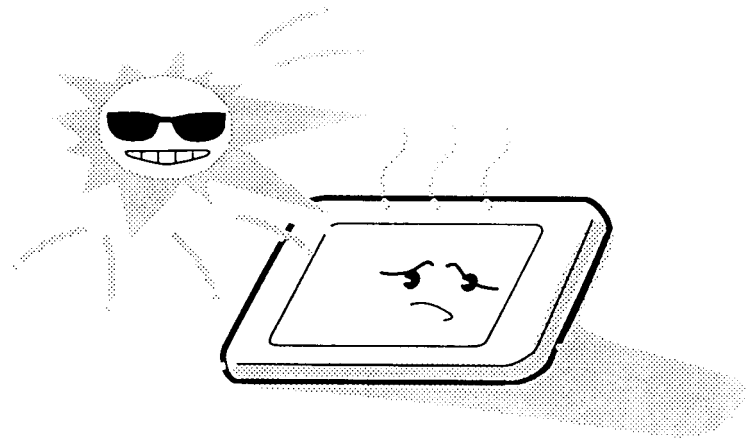
8. Do not store the module at temperatures below specifications. Cold can cause the liquid crystals to freeze, lose their elasticity or otherwise suffer damage.
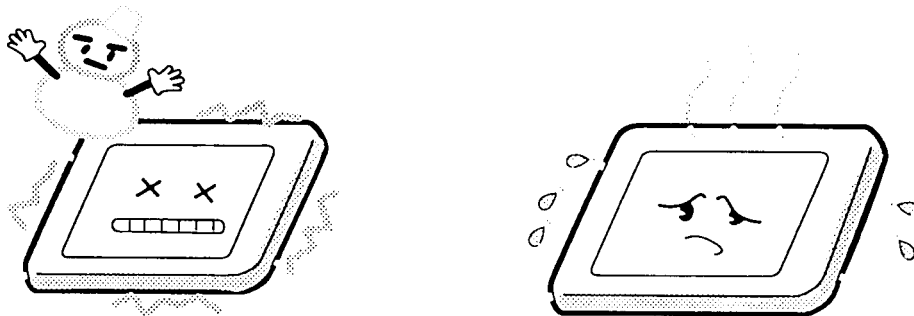
9. Do not disassemble the LCD module. Disassembly can cause malfunctions.
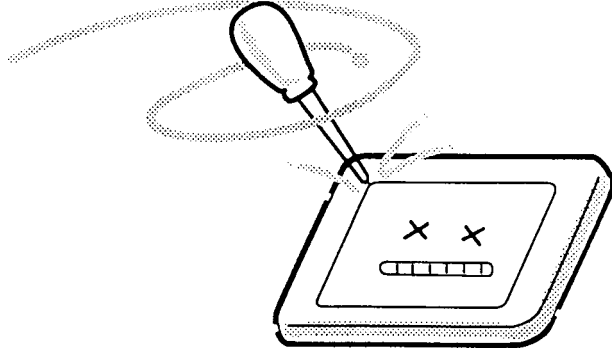
10. If you transport the module, do not use packing material that contains epoxy resin (amine) or silicon glue (alcohol or oxime). These materials can release gas that can damage the panels' polarization.
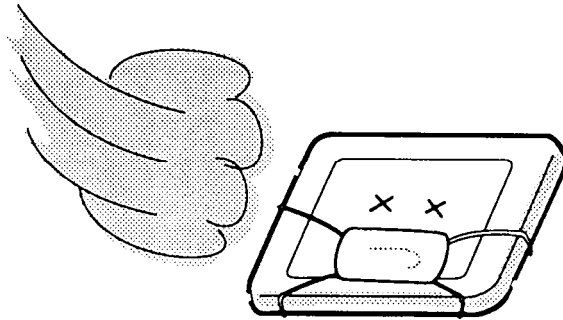
Appendix B   Board Layout

B.1   System Board Front View
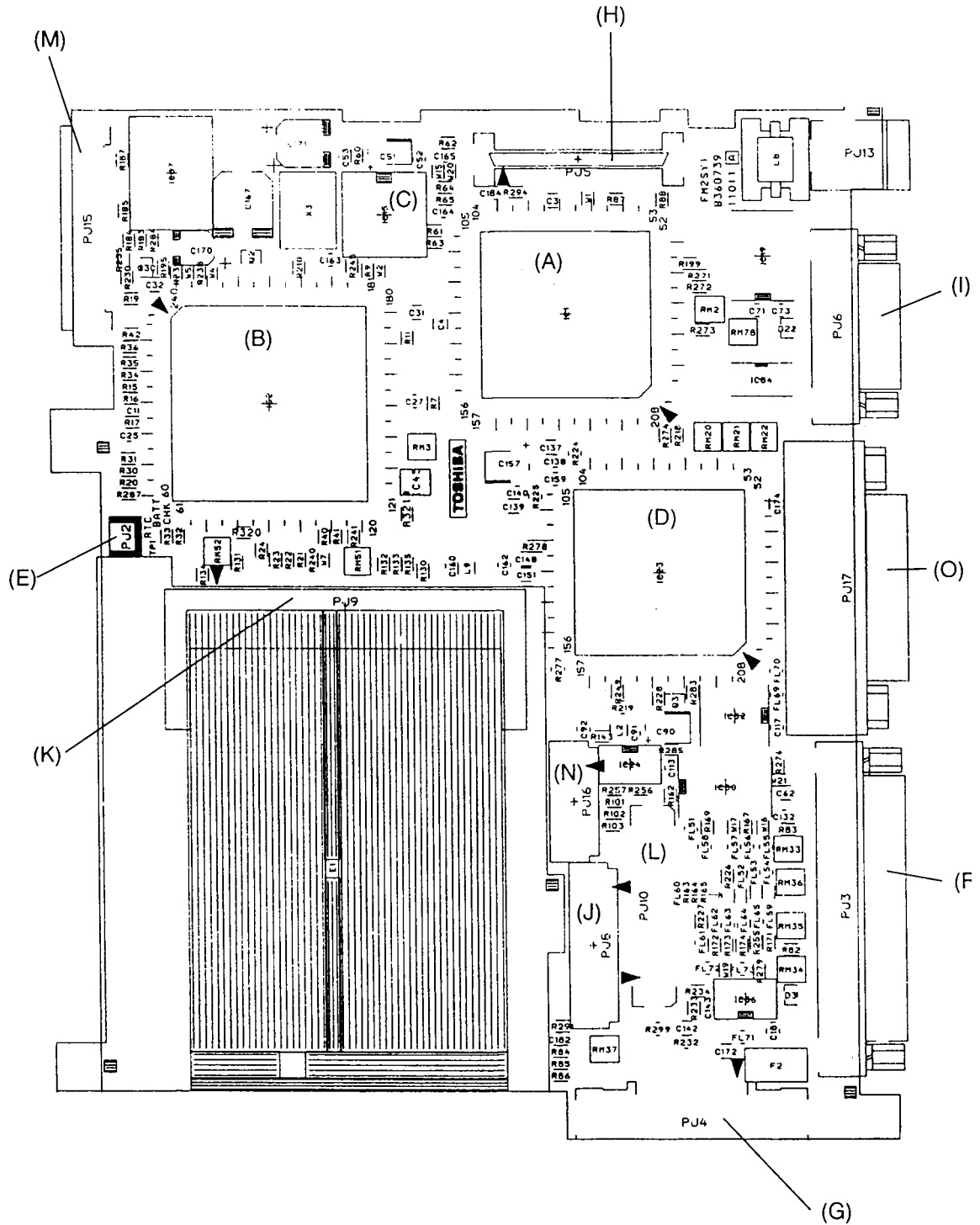
Figure B-1 Board Layout (Front)

B.2 System Board Back View
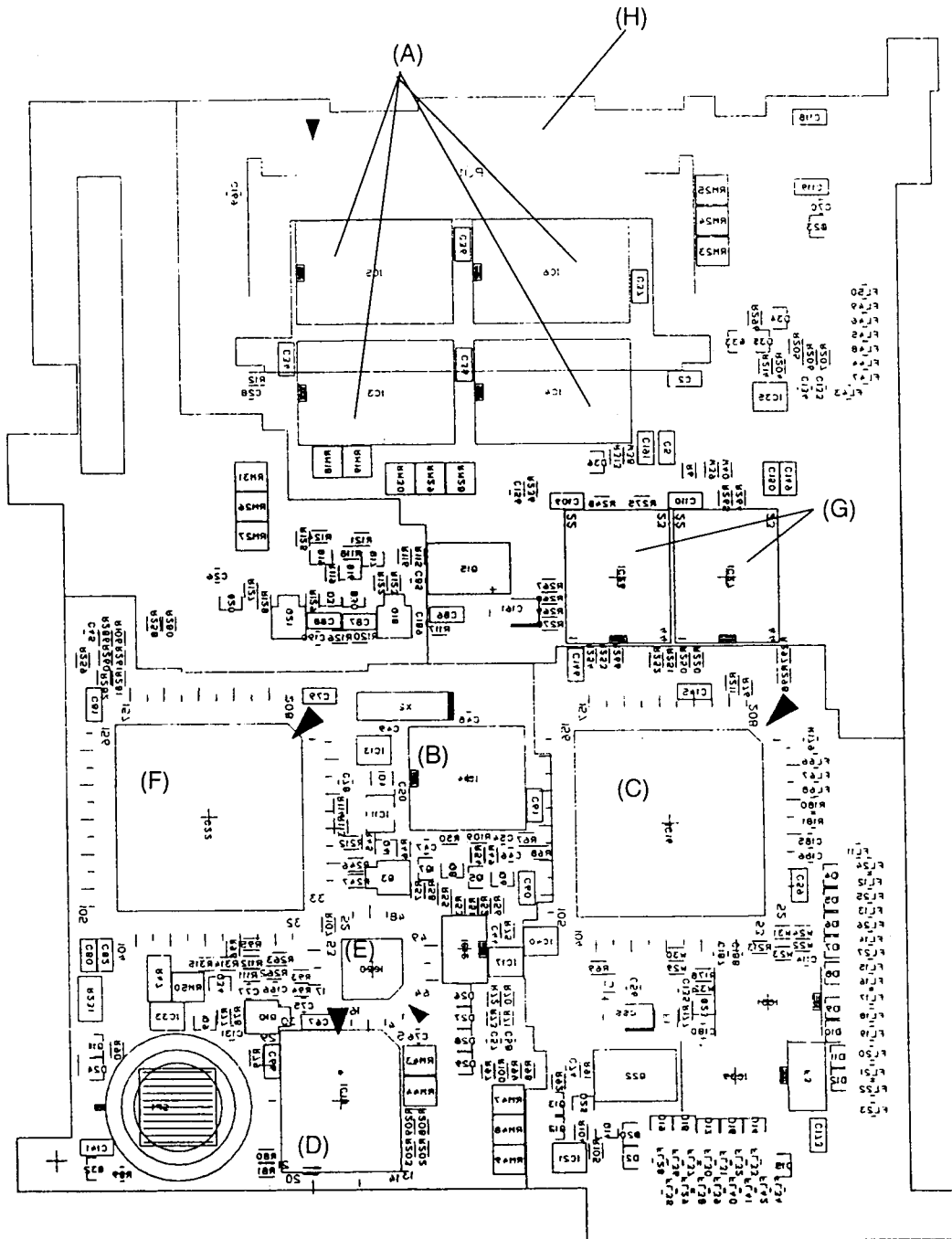
Figure B-2 Board Layout (Back)

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

Mark	Number	Name
(A)	IC1	CPU SL Enhanced Intel 486DX2
(B)	IC2	System Controller Gate Array
(C)	IC15	Clock Generator
(D)	IC23	Display Controller (WD90C24A2)
(E)	PJ2	RTC Battery Connector
(F)	PJ3	Printer Connector
(G)	PJ4	3.5-inch External FDD Connector
(H)	PJ5	HDD Connector
(I)	PJ6	Serial I/F Connector
(J)	PJ8	Keyboard Connector
(K)	PJ9	PCMCIA Connector
(L)	PJ10	Internal LCD Connector
(M)	PJ15	Power Supply Board Joint Connector
(N)	PJ16	LED Connector
(O)	PJ17	Port Replicator Connector

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

Mark	Number	Name
(A)	IC3 to IC6	System Memory
(B)	IC14	Real Time Clock
(C)	IC16	SI
(D)	IC18	BIOS ROM
(E)	IC 20	Keyboard Controller
(F)	IC 22	PCMCIA Controller Gate Array
(G)	IC 26, IC27	Video RAM
(H)	PJ1	Memory Module Connector

Appendix C   Pin Assignments

C.1   PJ1 Memory Slot Connectors (72-Pin)

Table C-1 Memory Slot Connector Pin Assignment (72-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	GND	–	37	MD16;100	O
02	MD00;100	I/O	38	MD17;100	O
03	MD01;100	I/O	39	GND	–
04	MD02;100	I/O	40	CAS0;010	O
05	MD03;100	I/O	41	CAS2;010	O
06	MD04;100	I/O	42	CAS3;010	O
07	MD05;100	I/O	43	CAS1;010	O
08	MD06;100	I/O	44	RAS2;010	O
09	MD07;100	I/O	45	RAS4;010	O
10	B3V	–	46	GND	–
11	NC	–	47	MWE2;010	O
12	MA00;110	O	48	GND	–
13	MA01;110	O	49	MD18;100	I/O
14	MA02;110	O	50	MD19;100	I/O
15	MA03;110	O	51	MD20;100	I/O
16	MA04;110	O	52	MD21;100	I/O
17	MA05;110	O	53	MD22;100	I/O
18	MA06;110	O	54	MD23;100	I/O
19	MA10;110	O	55	NC	–
20	NC	–	56	MD24;100	I/O
21	MD08;100	O	57	MD25;100	I/O
22	MD09;100	O	58	MD26;100	I/O
23	MD10;100	O	59	MD28;100	I/O
24	MD11;100	O	60	MD27;100	I/O
25	MD12;100	O	61	B3V	–
26	MD13;100	O	62	MD29;100	I/O
27	MD14;100	O	63	MD30;100	I/O
28	MA07;110	O	64	MD31;100	I/O
29	MA11;110	O	65	NC	–
30	B3V	–	66	NC	–
31	MA08;110	O	67	NC	–
32	MA09;110	O	68	NC	–
33	RAS5;010	O	69	NC	–
34	RAS3;010	O	70	NC	–
35	MD15;100	O	71	NC	–
36	NC	–	72	NC	I/O

C.2   PJ2 RTC Connectors (3-Pin)

Table C-2 RTC Connector Pin Assignment (3-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	RTCBAT	–	03	GND	–
02	NC	–			

C.3   PJ3 Printer Connectors (25-Pin)

Table C-3 Printer Connector Pin Assignment (25-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	STROB;000	I/O	14	AUTFD;000	I/O
02	PDB00;100	I/O	15	ERROR;000	I/O
03	PDB01;100	I/O	16	PINT;000	I/O
04	PDB02;100	I/O	17	SLIN;000	I/O
05	PDB03;100	I/O	18	GND	–
06	PDB04;100	I/O	19	GND	–
07	PDB05;100	I/O	20	GND	–
08	PDB06;100	I/O	21	GND	–
09	PDB07;100	I/O	22	GND	–
10	ACK;000	I/O	23	GND	–
11	BUSY;100	I/O	24	GND	–
12	PE;100	I/O	25	GND	–
13	SELCT;100	I/O			

C.4   PJ4 External 3.5-Inch FDD Connectors (26-Pin)

Table C-4 External 3.5-inch FDD Connector Pin Assignment (26-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	VCC	–	14	IFSTEP;010	O
02	IFINDX;000	I	15	GND	–
03	VCC	–	16	IFWDAT;010	O
04	IFDASL;010	O	17	GND	–
05	VCC	–	18	IFWEN;010	O
06	DSKCHG;000	I	19	GND	–
07	VCC	–	20	IFTRK0;000	I
08	IFRADY;000	I	21	GND	–
09	IFHMED;000	I	22	IFWPRO;000	I
10	IFAMON;010	O	23	GND	–
11	IFLOD1;010	O	24	IFRDAT;000	I
12	IFDIRC;010	O	25	GND	–
13	GND	–	26	IFSSEL;010	O

C.5 PJ5 Internal HDD Connectors (50-Pin)

Table C-5 Internal HDD Connector Pin Assignment (50-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	RESET;000	I	26	GND	–
02	GND	–	27	IRQ14;100	O
03	SD07;100	I/O	28	IOCS16;000	O
04	SD08;100	I/O	29	SA01;100	I
05	SD06;100	I/O	30	IPSSEL;100	I
06	SD09;100	I/O	31	SA00;100	I
07	SD05;100	I/O	32	SA02;100	I
08	SD10;100	I/O	33	HDCS0;000	I
09	SD04;100	I/O	34	IHDCS1;000	I
10	SD11;100	I/O	35	HDDLED;000	O
11	SD03;100	I/O	36	GND	–
12	SD12;100	I/O	37	VCC	–
13	SD02;100	I/O	38	VCC	–
14	SD13;100	I/O	39	GND	–
15	SD01;100	I/O	40	ATSLCT;100	I
16	SD14;100	I/O	41	VCC	–
17	SD00;100	I/O	42	IPSCLK;110	I
18	SD15;100	I/O	43	IPSDAT;100	O
19	GND	–	44	GND	–
20	GND	–	45	MOUSDT;100	I/O
21	IOWR	I	46	MOUSCK;120	I/O
22	GND	–	47	GND	–
23	IORD	I	48	IPSSWL;000	I
24	GND	–	49	IPSSWR;000	I
25	IOCRDY	O	50	GND	–

C.6 PJ6 Serial I/F Connectors (9-Pin)

Table C-6 Serial I/F Connector Pin Assignment (9-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	DCD1;100	I	06	DSR1;100	I
02	RD1;000	I	07	RTS1;100	O
03	SD1;000	O	08	CTS1;100	I
04	DTR1;100	O	09	RI1;100	I
05	GND	–			

C.7　PJ8 KB I/F Connectors (19-Pin)

Table C-7　KB I/F Connector Pin Assignment (19-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	KBOT00;001	O	11	KBRT7;100	I
02	KBOT01;010	O	12	KBOT03;010	O
03	KBOT02;010	O	13	KBOT04;010	O
04	KBRT0;100	I	14	KBOT05;010	O
05	KBRT1;100	I	15	KBOT06;010	O
06	KBRT2;100	I	16	KBOT07;010	O
07	KBRT3;100	I	17	KBOT08;010	O
08	KBRT4;100	I	18	KBOT09;010	O
09	KBRT5;100	I	19	KBOT10;010	O
10	KBRT6;100	I			

C.8　PJ9 PC Card Slot Connectors (68-Pin)

Table C-8　PC Card Slot Connector Pin Assignment (68-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	GND	–	35	GND	–
02	PCD03;100	I/O	36	PCCD1;000	I
03	PCD04;100	I/O	37	PCD11;100	I/O
04	PCD05;100	I/O	38	PCD12;100	I/O
05	PCD06;100	I/O	39	PCD13;100	I/O
06	PCD07;100	I/O	40	PCD14;100	I/O
07	PCCE1;000	O	41	PCD15;100	I/O
08	PCA10;100	O	42	PCCE2;000	O
09	PCOE;000	O	43	NC	–
10	PCA11;100	O	44	PCIOR;000	O
11	PCA09;100	O	45	PCIOW;000	O
12	PCA08;100	O	46	PCA17;100	O
13	PCA13;100	O	47	PCA18;100	O
14	PCA14;100	O	48	PCA19;100	O
15	PCWE;000	O	49	PCA20;100	O
16	PCBSY;000	I	50	PCA21;100	O
17	MCVCC	–	51	MCVCC	–
18	MCVPP1	–	52	MCVPP2	–
19	PCA16;100	O	53	PCA22;100	O
20	PCA15;100	O	54	PCA23;100	O
21	PCA12;100	O	55	PCA24;100	O
22	PCA07;100	O	56	PCA25;100	O
23	PCA06;100	O	57	NC	–
24	PCA05;100	O	58	PCRST;100	O
25	PCA04;100	O	59	PCWAIT;000	I
26	PCA03;100	O	60	PCINPK;000	I
27	PCA02;100	O	61	PCREG;000	O
28	PCA01;100	O	62	PCBVD2;100	I
29	PCA00;100	O	63	PCBVD1;100	I
30	PCD00;100	I/O	64	PCD08;100	I/O
31	PCD01;100	I/O	65	PCD09;100	I/O
32	PCD02;100	I/O	66	PCD10;100	I/O
33	PCWP;000	I	67	PCCD2;000	I
34	GND	–	68	GND	–

C.9   PJ10 LCD Connectors (40-Pin)

Table C-9 LCD Connector 1 Pin Assignment (40-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	DSPV	–	21	GND	–
02	DSPV	–	22	STN6;130	O
03	GND	–	23	GND	–
04	GND	–	24	STN7;130	O
05	BRIGHT;100	O	25	GND	–
06	CNTRST;130	O	26	STN2;130	O
07	PNEL0;100	I/O	27	GND	–
08	SCLKL;140	O	28	STN1;130	O
09	GND	–	29	GND	–
10	BD3;130	O	30	STN0;130	O
11	GND	–	31	GND	–
12	BD0;130	O	32	SCLKU;140	O
13	GND	–	33	GND	–
14	BD1;130	O	34	FP;130	O
15	GND	–	35	RESET;015	O
16	BD2;130	O	36	ENDATA;130	O
17	GND	–	37	STN3;130	O
18	STN5;130	O	38	LP;130	O
19	GND	–	39	LCDV	–
20	STN4;130	O	40	LCDV	–

C.10   PJ13 DC IN Connectors (3-Pin)

Table C-10 DC IN Connector Pin Assignment (3-pin)

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

C.11   PJ15 Power Supply Interface Connectors (50-Pin)

Table C-11 Power Supply Interface Connector Pin Assignment (50-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	GND	–	26	PNLOFF;041	I
02	GND	–	27	CDCGRN;100	O
03	DCIN	I	28	PCLR;000	O
04	DCIN	I	29	CDCORG;100	O
05	DCIN	I	30	PSSD;100	O
06	DCIN	I	31	GND	–
07	DCIN	I	32	PSRD;100	O
08	GND	–	33	GND	–
09	GND	–	34	PCV	O
10	B3V	O	35	PCV	O
11	B3V	O	36	GND	–
12	B3V	O	37	VCC	O
13	GND	–	38	VCC	O
14	GND	–	39	VCC	O
15	CPU3V	O	40	VCC	O
16	CPU3V	O	41	VCC	O
17	GND	–	42	GND	–
18	ENVCC	O	43	DSPV	O
19	GND	–	44	DSPV	O
20	SRBTN;000	O	45	GND	–
21	SUSSTA;011	I	46	P+12V	I
22	LOWBAT;100	O	47	CMHDON;000	O
23	PSSMI;000	O	48	N-9V	I
24	PSBUSY;000	O	49	IPSSWL;000	O
25	PSBEEP;000	O	50	IPSSWR;000	O

C.12   PJ16 LED ICON Connectors (12-Pin)

Table C-12 LED Icon Connector Pin Assignment (12-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	PNLOFF;000	I	07	CHGSP;120	I
02	GND	–	08	CKHRQ;100	I
03	GND	–	09	HDDLED;130	I
04	GND	–	10	CAPLED;110	I
05	CDCORG;110	I	11	ARWLED;110	I
06	CDCGRN;110	I	12	NUMLED;110	I

C.13   PJ17 Port Replicator Connectors (72-Pin)

Table C-13 Port Replicator 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	GND	−
12	IFLD01;000	O	48	GND	−
13	IFAMON;000	O	49	GND	−
14	MOUSCK;120	I/O	50	GND	−
15	EXKBCK;110	I/O	51	RTS1;110	O
16	CTS1;110	I	52	VCC	−
17	DSR1;110	I	53	DCIN	I
18	DCIN	I	54	DCIN	I
19	DCIN	I	55	DCIN	I
20	DCIN	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	EXKBDT;100	I/O	61	PRCHEK;000	I/O
26	IFWEN;000	O	62	IFHMED;010	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	−

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	å	û	ª	╢	╞	╓	µ	÷
7	•	↨	'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈
8	◘	↑	(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°
9	○	↓	)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	θ	∙
A	◉	→	*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
B	♂	←	+	;	K	[	k	{	ï	¢	½	╗	╦	█	δ	√
C	♀	└	,	<	L	\	l			î	£	¼	╝	╠	▄	∞	ⁿ
D	♪	↔	–	=	M	]	m	}	ì	¥	¡	╜	═	▌	φ	²
E	♫	▲	.	>	N	∧	n	~	Ä	Pt	«	╛	╬	▐	∈	■
F	☼	▼	/	?	O	_	o	△	Å	ƒ	»	┐	╧	▀	∩	BLANK FF

Appendix E   Keyboard Scan/Character Codes

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

Cap No.	Keytop	Code Set 1 Make	Code Set 1 Break	Code Set 2 Make	Code Set 2 Break		Note
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

Cap No.	Keytop	Code Set 1 Make	Code Set 1 Break	Code Set 2 Make	Code Set 2 Break	Note
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	

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

Notes:

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

Table E-2 Scan Codes with Left Shift Key

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

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

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

Table E-3 Scan Codes in Numlock Mode

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

Table E-4 Scan Codes with Fn Key

Cap No.	Keytop	Code Set 1 Make		Code Set 1 Break		Code Set 2 Make		Code Set 2 Break		
43	ENT	E0	1C	E0	9C	E0	5A	E0	F0	5A
58	CTRL	E0	1D	E0	9D	E0	14	E0	F0	14
60	LALT	E0	38	E0	B8	E0	11	E0	F0	11
121	ARROW	05		C5		77		F0	77	
122	NUMERIC	05		C5		7E		F0	7E	

Table E-5 Scan Codes in Overlay Mode

Cap No.	Keytop		Code Set 1 Make	Code Set 1 Break	Code Set 2 Make		Code Set 2 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 Make	Code Set 1 Break	Code Set 2 Make	Code Set 2 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 Make	Code Set 2 Make
Pause	Common	E1 ID 45 E1 SD C5	E1 14 77 E1 F0 14 F0 77
	Ctrl*	E0 46 E0 C6	E0 7E E0 F0 7E

*: This key generates only make codes.

Appendix F   Key Layout

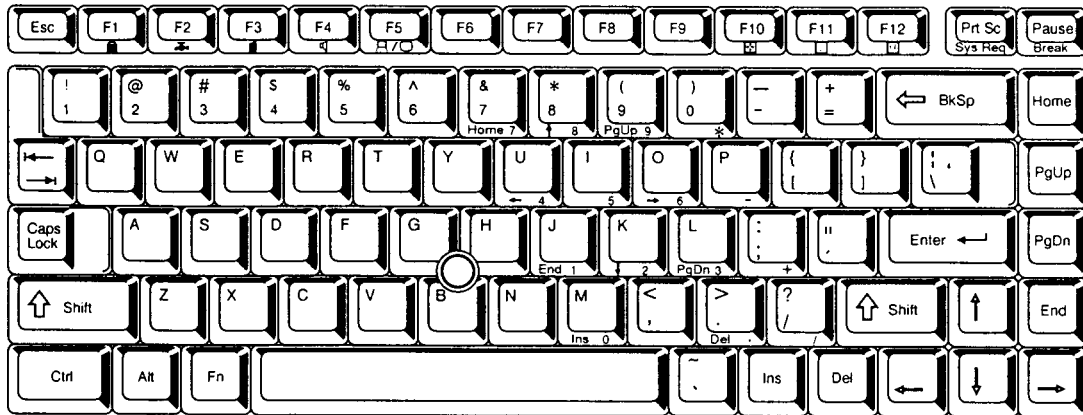## F.1   United States (US) Keyboard

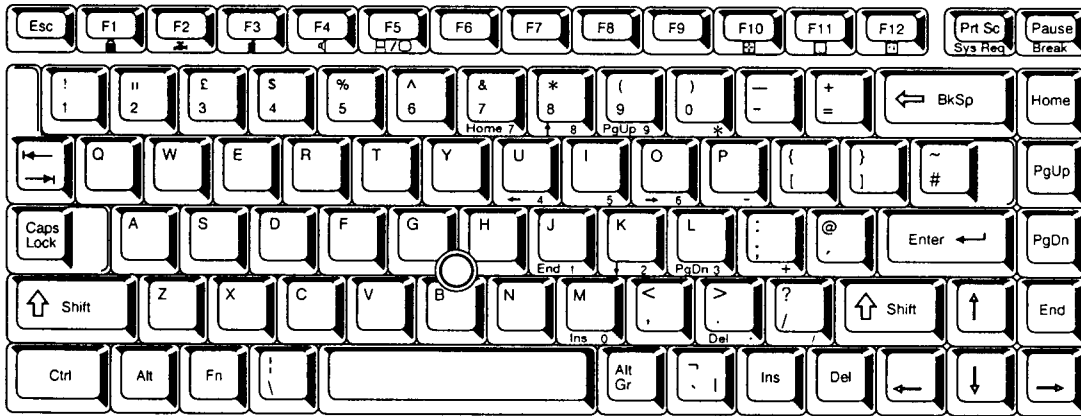*Figure F-1 US Keyboard*

F.2   United Kingdom (UK) Keyboard

Figure F-2 UK Keyboard
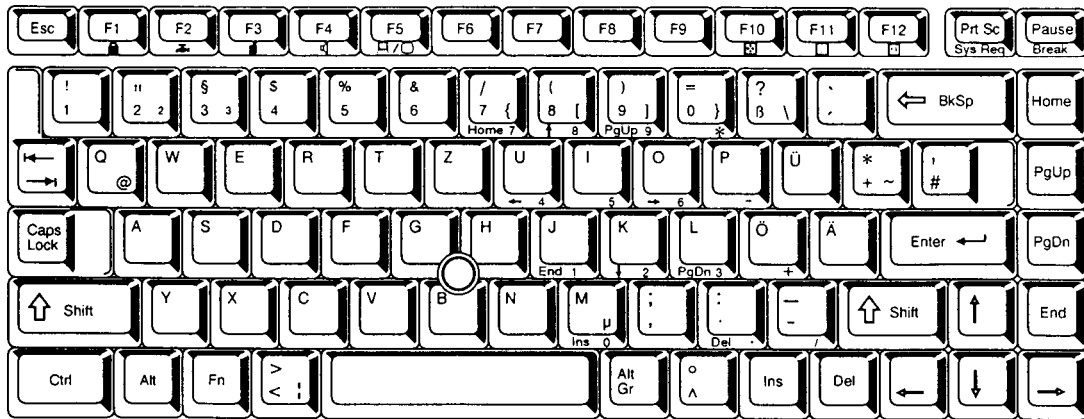
F.3 German (GR) Keyboard

Figure F-3 GR Keyboard
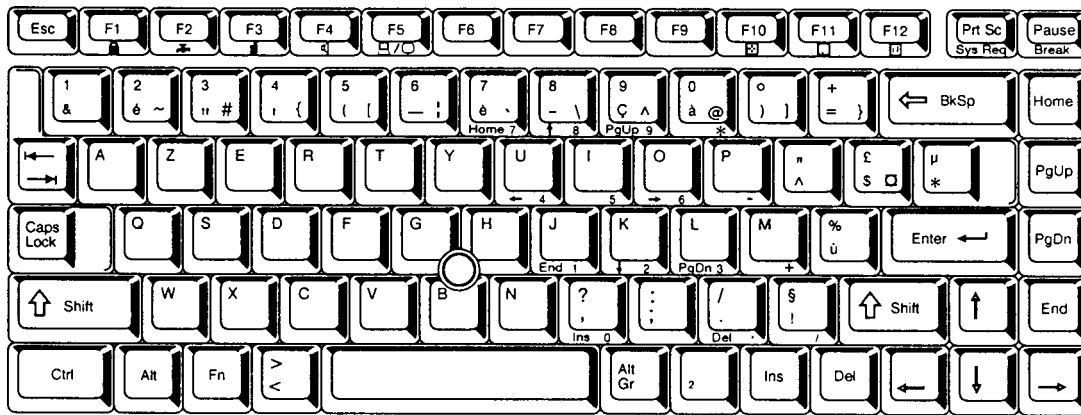
F.4 French (FR) Keyboard

Figure F-4 FR Keyboard
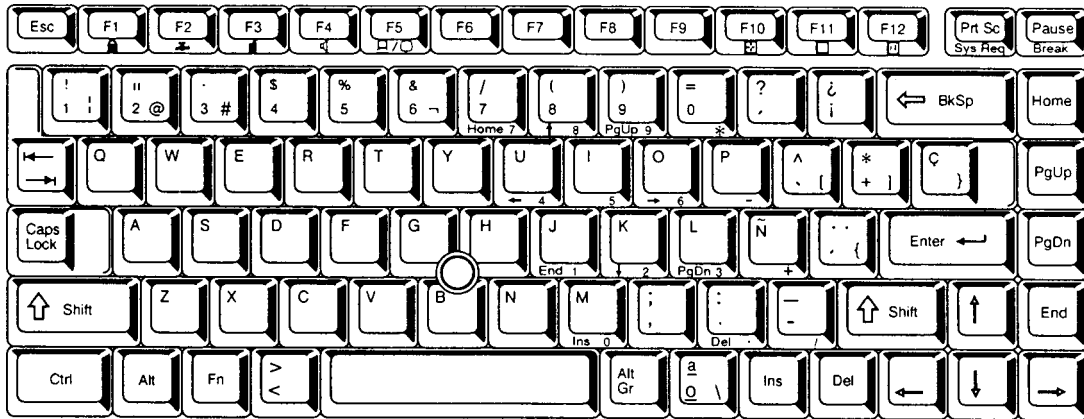
F.5   Spanish (SP) Keyboard

Figure F-5 SP Keyboard
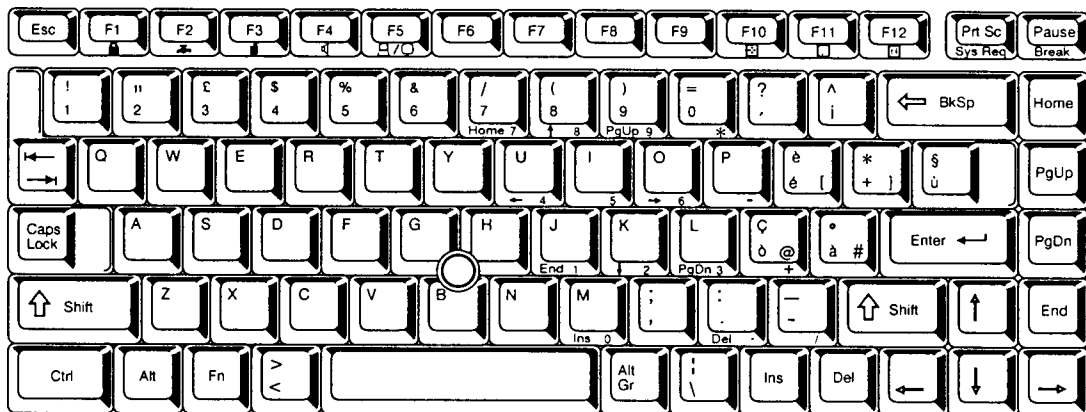
F.6   Italian (IT) Keyboard

Figure F-6 IT Keyboard
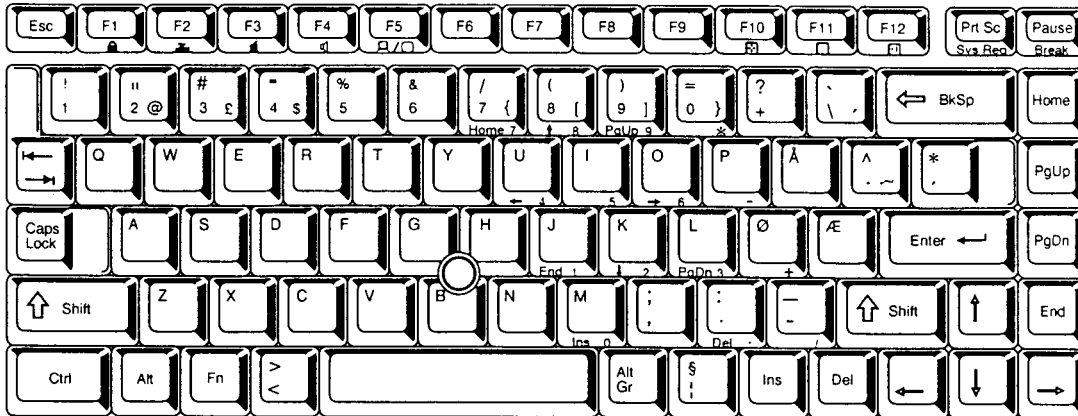
F.7 Scandinavian (SC) Keyboard

Figure F-7 SC Keyboard
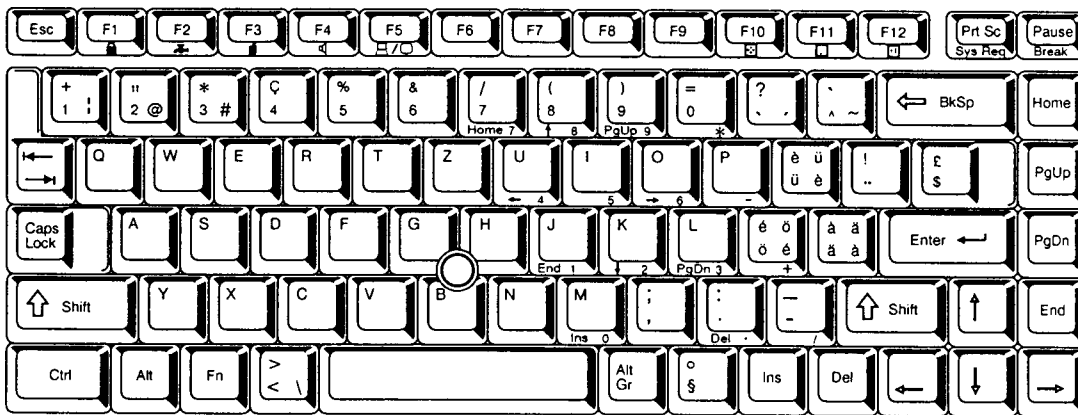
F.8 Swiss-German (SL) Keyboard

Figure F-8 SL Keyboard

F.9   Canadian (Specialized) Keyboard
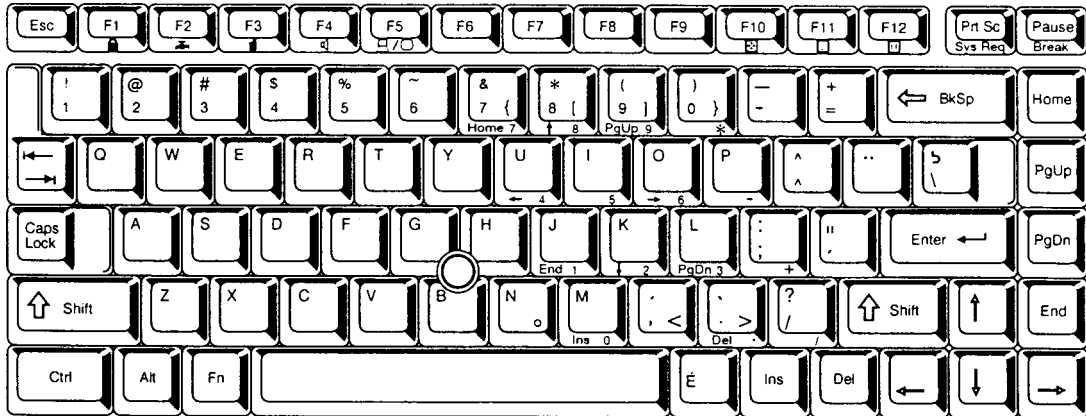

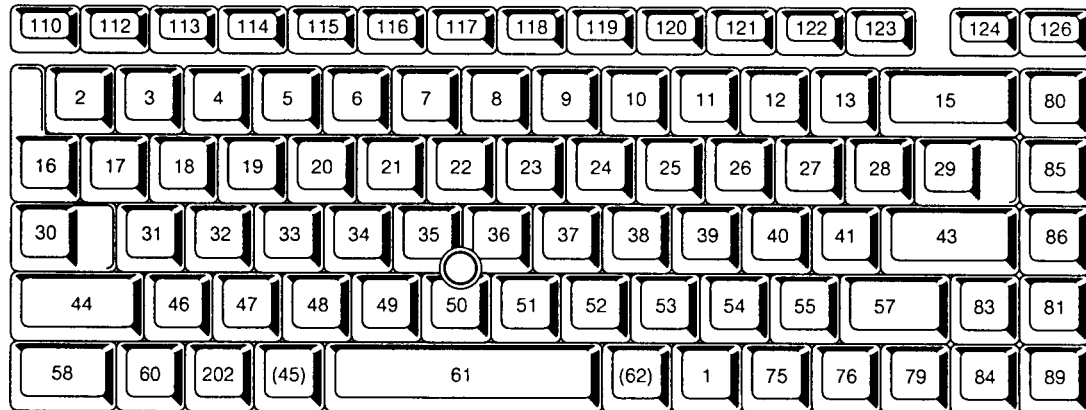*Figure F-9 Canadian Keyboard*

F.10   Keycap Number Keyboard

Figure F-10 Keycap Number Keyboard

Appendix G   Wiring Diagrams
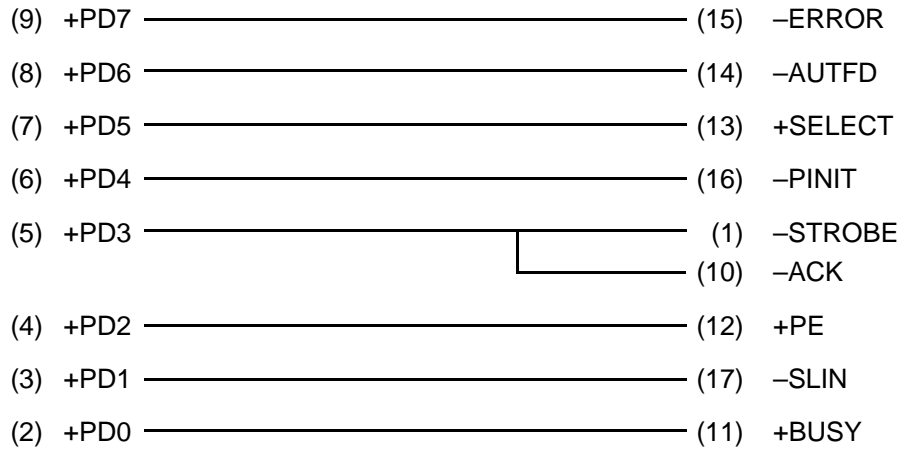
G.1   Printer Wraparound Connector

```
(9)  +PD7  ───────────────────────  (15)  −ERROR
(8)  +PD6  ───────────────────────  (14)  −AUTFD
(7)  +PD5  ───────────────────────  (13)  +SELECT
(6)  +PD4  ───────────────────────  (16)  −PINIT
(5)  +PD3  ──────────────┐           (1)  −STROBE
                         └─────────  (10)  −ACK
(4)  +PD2  ───────────────────────  (12)  +PE
(3)  +PD1  ───────────────────────  (17)  −SLIN
(2)  +PD0  ───────────────────────  (11)  +BUSY
```

Figure G-1 Printer Wraparound Connector

G.2   RS-232C Wraparound Connector

```
(3)  TD   ───────────────────────  (2)  RD
(7)  RTS  ──────────────┐           (8)  CTS
                        └─────────  (1)  CD
(4)  DTR  ──────────────┐           (6)  DSR
                        └─────────  (9)  RI
```
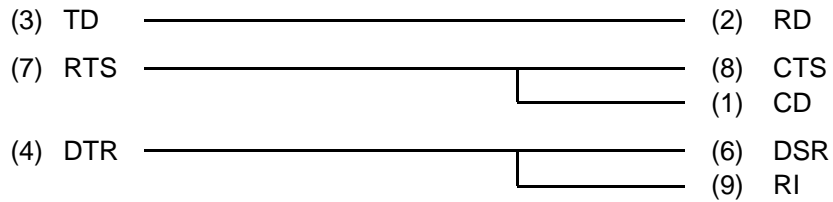
Figure G-2 RS-232C Wraparound Connector

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

```
(3)  TD   ───────────────────────  (2)  RD
(4)  DTR  ──────────────┐           (6)  DSR
                        ├─────────  (8)  CTS
                        └─────────  (9)  RI
(7)  RTS  ───────────────────────  (1)  CD
(5)  GND  ───────────────────────  (5)  GND
(2)  RD   ───────────────────────  (3)  TD
(1)  CD   ───────────────────────  (7)  RTS
(6)  DSR  ──────┐                   (4)  DTR
(8)  CTS  ──────┤
(9)  RI   ──────┘
```
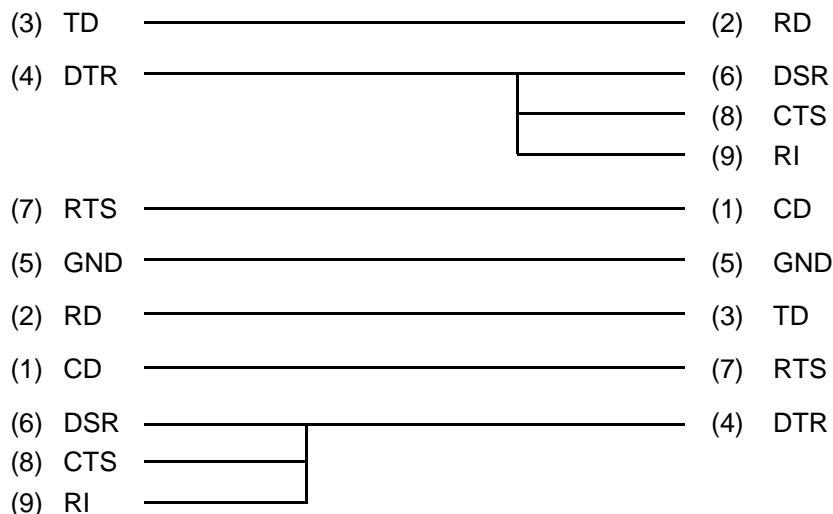
Figure G-3 RS-232C Direct Cable (9-Pin To 9-Pin)

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

```
(1)  CD    ─────────────────────────  (4)  RTS

(2)  RD    ─────────────────────────  (2)  TD

(3)  TD    ─────────────────────────  (3)  RD

(4)  DTR   ──────────────────┐        (5)  CTS
                             ├─────── (6)  DSR
                             └─────── (22) RI

(5)  GND   ─────────────────────────  (7)  GND

(7)  RTS   ─────────────────────────  (8)  CD

(6)  DSR   ──────────┐                 (20) DTR
(8)  CTS   ──────┐   │
(9)  RI    ──────┴───┘
```
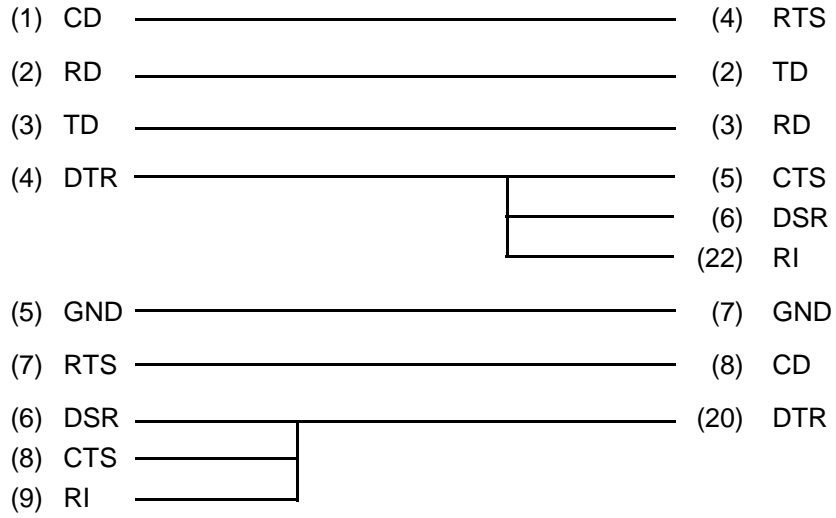
Figure G-4 RS-232C Direct Cable (9-Pin To 25-Pin)

Appendix H   BIOS Rewrite Procedures

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

Tools

To rewrite the BIOS, you need the following tool:

❏ BIOS rewriting disk for T3600CT

Rewriting the BIOS

1. Set the system to Boot Mode.

2. Turn off the power to the T3600CT.

3. Remove the external cable and PCMCIA card.

4. Connect the external 3.5-inch floppy disk drive to the T3600CT.

5. Turn on the power while holding down the **F12** key. (Keep holding down the key until the system speaker sounds a beep.)

6. When the message is displayed, insert the BIOS rewriting disk into the FDD. Press the **Enter** key to start the BIOS rewrite program.

7. When the BIOS rewriting is finished, eject the BIOS rewriting disk and press the reset switch to restart the system.