Chapter 1
Hardware Overview

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1.1   T3300SL Features

The Toshiba T3300SL is one of the lightest and most advanced portable computers available. Utilizing advanced technology and high speed components, the T3300SL offers excellent display legibility, battery operation, and IBM PC/AT compatibility.

The T3300SL system unit consists of the following features:

❑   An 80386SL-25 32-bit microprocessor, operating at 25MHz, 12.5MHz or 6.25MHz.

❑   Standard Random Access Memory (RAM) capacity is 2MB. Optional 2, 4, 6 or 16MB expansion cards can be installed, thus expanding RAM memory to a maximum of 18MB.

❑   An optional 80387SX-25 Numeric Data Processor (NDP) can be installed in the built-in socket located on the bottom of the T3300SL.

❑   A high resolution, fully adjustable Liquid Crystal Display (LCD) is composed of 640 horizontal and 480 vertical pixels and displays 25 lines of standard text 80 characters wide. The LCD displays 32 levels of gray (at a resolution of 320 x 200) and supports the High Resolution Graphics Subsystem (HRGS), including VGA functions.

❑   The 3.5-inch internal Floppy Disk Drive (FDD) supports both 1.44MB Double-sided, High-density, Double-track (2HD) and 720KB Double-sided, Double-density, Double-track (2DD) floppy disk.

❑   The integrated 2.5-inch 80 or 120MB Hard Disk Drive (HDD) provides nonvolatile storage for software and data.

❑   An 82/84-key keyboard has full-sized keys, a numeric keypad overlay, cursor, and page control. The keyboard supports software that uses the industry standard 101/102-key keyboard.

❑   The universal auto-sensing AC adapter supplies power to operate the T3300SL and recharge its batteries. It can operate from a range of 100 to 240 volts. Optional power cords support various countries' AC outlet configurations.

❑   A PS/2 mouse connector is located on the right side of the T3300SL.

❑   A Personal Computer Memory Card International Association (PCMCIA) standard release 2.0 slot allows you to install a Toshiba card modem or an industry standard card in the T3300SL.

❑   Serial devices can be connected to the T3300SL's standard 9-pin RS-232-C serial port.

❑ One selectable Centronics-compatible parallel port allows the T3300SL to interface with optional parallel devices.

❑ The Toshiba AutoResume feature stores the T3300SL's data in backup RAM when the power is turned off.

❑ The Real Time Clock (RTC) IC chip and battery continuously update the date and time and keep the system configuration even when the T3300SL power is off.

The T3300SL Personal Computer is shown in Figure 1-1. Its system configuration is shown in Figure 1-2.
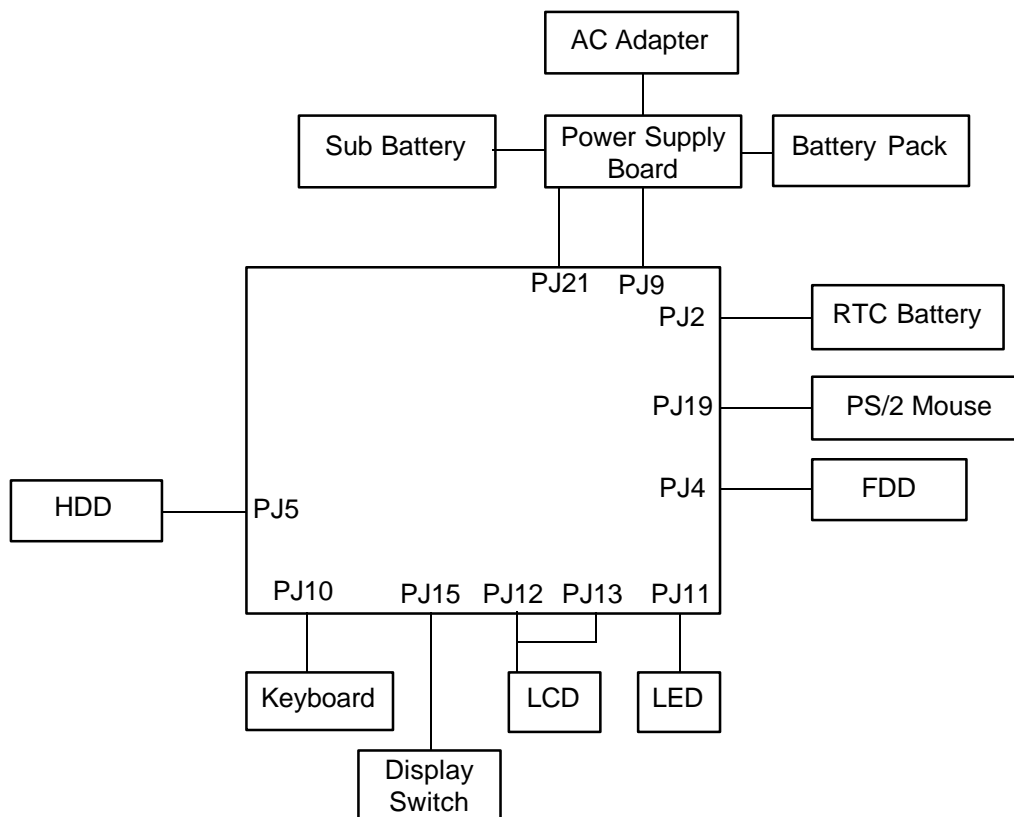
Figure 1-1 T3300SL personal computer

Figure 1-2 System unit configuration

1.2   The System Unit Block Diagram

Figure 1-3 is a block diagram of T3300SL system unit.

Figure 1-3 Block diagram

The T3300SL system board diagrammed in Figure 1-3 is composed of the following major components:

❑ 80386SL-25 CPU

❑ Socket for an optional 80387SX-25 Numeric Data Processor (NDP)

❑ 82360SL ISA peripheral I/O chip contains the following components:

Two Direct Memory Access Controllers (DMACs):	82C37A
Two Programmable Interrupt Controllers (PICs):	82C59A
Two Programmable Interval Timers (PITs):	82C54
(T3300SL uses one PIT)	
Two Serial Input/Ouput Controllers (SIOs):	16C450
(T3300SL uses one SIO)	
One Real Time Clock (RTC):	146818AF

❑ Super Integration (SI), T9920, which stores the following components:

One Floppy Disk Controller (FDC):	TC8565
One Variable Frequency Oscillator (VFO):	TC8568

❑ Keyboard Controller (KBC): M37452M4

❑ Power Supply Controller (PSC): U47C660

❑ Memory:

Standard RAM:	2MB
BIOS ROM:	128KB (96KB are used)
	BIOS ROM contains the Initial Reliability Test (IRT), the system's Basic Input/Output System (BIOS), and the video BIOS.
Video RAM:	256KB
Cache memory:	64KB

Optional memory cards can expand the memory to a maximum of 18MB.

❑ IC card controller gate array: GA-ICCNT (144-pin)

❑ Refresh controller gate array: GA-REFCNT (44-pin)

❑ VGA display controller (WD90C21): PVGA1F (132-pin)

❏   The following Oscillators (OSCs):

        50.0MHz OSC (X1) and 16.0MHz OSC (X2) are used for the CPU.
        14.7456MHz OSC (X3) is used for the COM.
        14.31818MHz OSC (X4) is used for the KBC.
        24MHz OSC (X5) is used for the FDC and VFO.
        32.768KHz OSC (X6) is used for the RTC.
        44.9MHz OSC (X7), 28.322MHz OSC (X8), and 25.175MHz OSC (X9) are used for the
        video.

See Appendix A for the locations of the oscillators on the system board.

1.3   3.5-inch Floppy Disk Drive

The T3300SL 3.5-inch Floppy Disk Drive (FDD) is a thin, high performance, reliable drive that supports 720KB (formatted) 2DD and 1.44MB (formatted) 3.5-inch floppy diskettes.

The T3300SL FDD is shown in Figure 1-4. Specifications for the FDD are described in Table 1-1.

Figure 1-4 3.5-inch FDD

Table 1-1 3.5-inch FDD specifications

Item	2-Mbyte mode	1-Mbyte mode
Storage capacity (Kbyte)		
Unformatted	2,000	1,000
Formatted	1,440	720
Number of heads	2	2
Number of cylinders	80	80
Access time (ms)		
Track to track	3	3
Average	94	94
Head settling time	15	15
Recording track density (tpi)	135	135
Data transfer rate (Kbps)	500	250
Rotation speed (rpm)	300	300
Recording method	Modified Frequency Modulation (MFM)	

1.4   2.5-inch Hard Disk Drive

The 80MB or 120MB (formatted) Hard Disk Drive (HDD) is a random access, nonvolatile storage device. It is equipped with a non-removal 2.5-inch magnetic disk and mini-Winchester type magnetic heads.

The T3300SL 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

Item	80MB		120MB
	JDE2085M	MK2024FC	MK2124FC
Storage capacity Formatted (MB)	85.68	86.0	130.1
Number of disks	2	2	2
Data heads	4	4	4
Data surfaces	4	4	4
Tracks per surface	791(+2)	977	934
Sectors per track	35(+1)	43(+3)	55(+1)
Bytes per sector	512	512	512

Access time (ms)
   Track to track
   Average
   Maximum
	9
	25
	47
		5
		19
		40
			5
			17
			36

Rotation speed (rpm)	3,118	3,200	3,200
Data transfer rate (MB/S) To/from media	5.0M	5.0M	6.5M
Interleave	1:1	1:1	1:1
Recording method	1-7 RLL	1-7 RLL	1-7 RLL

*   Run Length Limited

1.5   Keyboard

The 82-key (USA) or 84-key (European) keyboard is mounted on the system unit. The keyboard is connected to the keyboard controller on the system board through a 19-pin flat cable. The keyboard is shown in Figure 1-6.

See Appendix E for optional keyboard configurations.

Figure 1-6 Keyboard

1.6 Sidelit Liquid Crystal Display

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

1.6.1 LCD Module

The T3300SL sidelit LCD supports 640x480 pixels with the High Resolution Graphics Subsystem (HRGS) and a 32 levels of gray (at a resolution of 320 x 200). The HRGS includes the functions of the Video Graphics Array (VGA).

The LCD receives vertical and horizontal synchronizing signals, 8-bit data signals (4-bit upper data signal, 4-bit lower data signal), and shift clock for data transmission from the PVGA1F Video Controller. All signals are CMOS-level compatible.

The sidelit LCD is shown in Figure 1-7. Specifications for the LCD are described in Table 1-3.

Figure 1-7 Sidelit LCD

Table 1-3 Sidelit LCD specifications

Item		Specifications
Number of dots	(dots)	640 x 480
Dot dimension	(mm)	0.24(W) x 0.24 (H)
Dot pitch	(mm)	0.27 (W) x 0.27 (H)
Display area	(mm)	196.0 (W) x 147.06 (H)
Contrast		15:1 (typ.)
FL current	(mA)	4.0 to 6.0
FL frequency	(KHz)	35 to 43

1.6.2 FL Inverter Board

The FL inverter board supplies the high frequency current needed to illuminate the LCD's fluorescent lamp.

The specifications for the FL inverter board are described in Table 1-4.

Table 1-4 FL inverter board specifications

Item			Specifications
Input	Voltage	(VDC)	11- 26
	Power	(W)	2.8 (Max.)
Output	Voltage	(VAC)	1100 (r.m.s.)
	Current	(mA)	5.5 (r.m.s.)
	Frequency	(KHz)	44
	Bounds of current	(mA)	2.5 - 5.5

1.7 Power Supply Board

The power supply board supplies five voltages to the system board. The power supply board has one microprocessor which operates at 500KHz.

The power supply board contains the following functions:

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

❑　　Detects DC output and circuit malfunctions.

❑　　Controls the LED indicator panel and speaker.

❑　　Turns the battery charging system on and off and detects a fully charged battery.

❑　　Determines if the power can be turned on and off.

❑　　Provides more accurate detection of a low battery.

❑　　Calculates the remaining battery capacity.

The power supply board is shown in Figure 1-8 and the output ratings are specified in Table 1-5.

Figure 1-8 Power supply board

Table 1-5 Power supply board output rating

Item		DC voltage (V)	Regulation Tolerance (%)	Maximum Current (mA)
System logic, FDD, HDC, HDD	(VCC)	+5	±5	2,600
Backup RAM	(RAMV)	+4.7	±5	950
RS-232-C	(VDD)	+12	±5	75
RS-232-C	(VEE)	-9	±15	60
Sidelit LCD	(DSPV)	+12 to +18.9		200

Chapter 2
Troubleshooting Procedures

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2.1　T3300SL Troubleshooting

This chapter describes how to determine if a Field Replaceable Unit (FRU) in the T3300SL is causing the computer to malfunction. The FRUs covered are:

- ❏　Power supply board

- ❏　System board

- ❏　Floppy Disk Drive

- ❏　Hard Disk Drive

- ❏　Keyboard

- ❏　Display

The following tools are necessary for implementing the T3300SL troubleshooting procedures.

- ❏　T3300SL Diagnostics Disk

- ❏　Phillips head screwdriver (2mm)

- ❏　Toshiba MS-DOS system disk

- ❏　2DD or 2HD formatted work disk for the floppy disk drive testing

- ❏　Cleaning disk kit for the floppy disk drive troubleshooting

- ❏　Printer port LED

- ❏　RS-232-C wraparound connector

- ❏　Printer wraparound connector

- ❏　Multimeter

- ❏　External 5.25-inch floppy disk drive

- ❏　External CRT

2.2   Troubleshooting Flowchart

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

❑   Verify with the customer that **Toshiba** MS-DOS is loaded on the computer. Other non-Toshiba operating systems will cause the computer to malfunction.

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

❑   Make sure the floppy disk drive is empty.

NOTE: If you forget the password and cannot start up the computer, 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.

START

Insert the Toshiba MS-DOS diskette into the FDD.

Turn the Power Switch ON and wait 5 Seconds.

Does the POWER INDICATOR illuminate?
NO → Perform Power Supply Board Troubleshooting Procedures in Section 2.3.

YES

Is an Error Message displayed?
YES → Perform System Board Troubleshooting Procedures in Section 2.4.

NO

Is the `MEMORY TEST XXXXKB` message displayed?
NO → Perform Display Troubleshooting Procedures in Section 2.8.

YES

Does the `MEMORY TEST XXXKB` message proceed from 0KB to 640KB?
NO → Perform System Board Troubleshooting Procedures in Section 2.4.

YES

① 1

Figure 2-1 Troubleshooting flowchart

①

If the `Password =` prompt is displayed, type in the user password and press **Enter.**

Is Toshiba MS-DOS being loaded? — **NO** → Perform Floppy Disk Drive Troubleshooting Procedures in Section 2.5.

YES

Insert the ASP Diagnostics diskette into the FDD, type **A:TESTCE33**, and press **ENTER**.

Do typed characters appear correctly? — **NO** → Perform Keyboard Troubleshooting Procedures in Section 2.7.

YES

Connect wraparound connectors. Execute the Running Test several times.

Is an error detected by the Running Test? — **YES** → After confirming which test has detected an error, perform the appropriate troubleshooting procedures.

NO

System is normal.

END

Figure 2-1 Troubleshooting flowchart (continued)

If the Diagnostic Program does not detect any errors, the problem may be an intermittent one. Execute the Running Test program several times to isolate the problem.

After confirming which diagnostic test detected an error by checking the Log Utilities function, 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 Board Troubleshooting Procedures

The T3300SL's power supply board controls many functions and components in the T3300SL. To determine if the power supply board is functioning properly, start with Procedure 1 and continue with the other procedures as instructed.

> Procedure 1:　AC Adapter Check
>
> Procedure 2:　Battery Indicator Function Check
>
> Procedure 3:　Power Supply Board Connection Check

Procedure 1　　AC Adapter Check

The T3300SL's AC adapter converts AC power to DC power and contains a charging circuit which charges T3300SL's batteries. The adapter connects to the **DC IN 18V** connector on the back of the computer. When the AC adapter is connected and the T3300SL and the power is turned off, the AC adapter charges the batteries.

The indicator panel displays the charge status of the battery pack and whether or not the AC adapter is connected and supplying power. The indicator labeled **Battery** glows amber when the AC adapter is charging the battery pack.

If the **Battery** indicator does not light, the AC adapter is not supplying power to the T3300SL or the computer is turned off.

When the **Battery** indicator is red, the AC adapter is connected and supplying power to the T3300SL.

If the indicator is flashing red, the AC adapter's voltage supply is abnormal or the power supply is not functioning properly.

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

Check 1　　Make sure the AC adapter's cable is firmly plugged into the **DC IN 18V** connector on the back of the computer.

Check 2　　If the **Battery** indicator is flashing red, its voltage output is abnormal. Connect a new AC adapter and turn the T3300SL 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 Procedure 2.

Procedure 2   Battery Indicator Function Check

When a power supply problem occurs, the **Battery** indicator shows the 4-bit status by blinking at various speeds corresponding to the type of problem.

The battery indicator lights for two seconds at first, and then blinks on for one second (indicating a binary 1) or a half second (indicating a binary 0) at half-second intervals from bit 0 to bit 3 sequentially.

For example, the following timing chart shows the error status 5h (0101). Read the timing chart from right to left to determine the correct hexadecimal value.
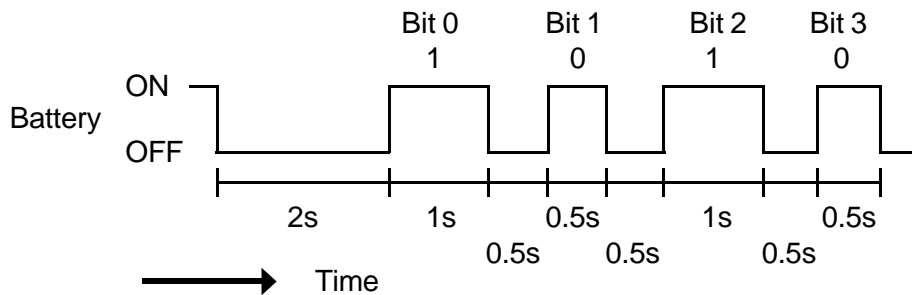
The power supply error statuses and their meanings are described in Table 2-1.

When the **Battery** indicator blinks at random, the AC adapter or charging circuit may be damaged. In this case, replace the AC adapter with a new one.

Table 2-1 Power supply error statuses

| Status	Meaning
1h	Over voltage of AC adapter output voltage (more than +18V±5%)
2h	Abnormal temperature in the system (less than -20°C or more than 70°C)
3h	Abnormal charging (The system cannot stop charging.)
4h	Over current of charging current
5h	Abnormal charging voltage
6h	Abnormal battery voltage
7h	Abnormal VCC (+5) voltage
8h	Abnormal RAMV (+5V for DRAM) voltage
9h	VEE (-9V) is shorted
Ah	VDD (+12V) is shorted
Bh	DSPV (+12V to +18V for FL) is shorted
Ch	Desk Station IV was turned off before the T3300SL
Dh	Battery terminal is shorted
Eh	Under voltage of AC adapter output voltage (less than +18V±5%)
Fh	Under current of charging current

After investigating the **Battery** indicator, start with Check 1 below.

Check 1   If the **Battery** indicator displays error status 1h, 4h, 5h, Eh, or Fh, replace the AC adapter with a new one. If the same problem still appears, perform Procedure 3.

Check 2   If the **Battery** indicator displays error status 6h or Dh, replace the battery pack with a new one. If the same problem still appears, perform Procedure 3.

Check 3   If the **Battery** indicator displays error status Ch, remove the T3300SL from the Desk Station IV. Turn the T3300SL on. It should operate normally.

Check 4   If the **Battery** indicator displays error status 2h, place the T3300SL in an environment between -20°C and 70°C until the T3300SL is at the ambient temperature. Repeat the steps which caused the T3300SL to operate abnormally. If the same problem still appears, perform Procedure 3.

Check 5   If the **Battery** indicator displays error status 3h, 7h, 8h, 9h, Ah, or Bh, perform Procedure 3.

Procedure 3   Power Supply Board Connection Check

The power supply board is connected to other components by various cables. These cable connectors can become disconnected from the power supply board, thus causing the T3300SL to malfunction. To check these connections, it is necessary to disassemble the T3300SL. Refer to Chapter 4, *Replacement Procedures,* for more information about how to disassemble the T3300SL. Then perform Check 1.

Check 1   The following cable connections connect the power supply board to other components. Make sure these connections are secure and that none of the cable are pinched or damaged.
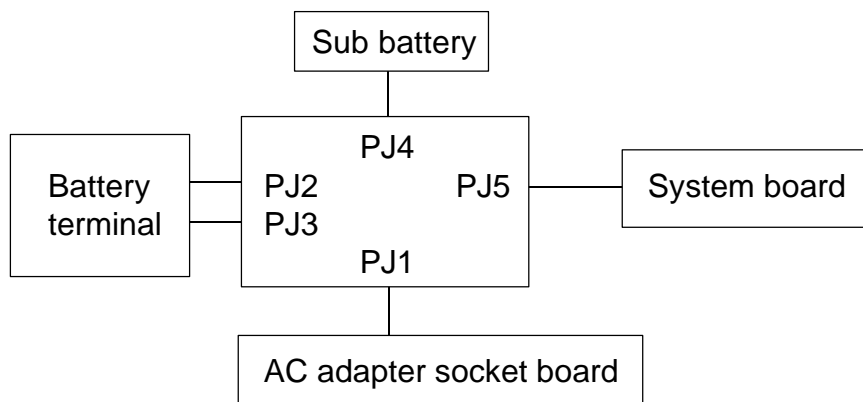
If any of these connections are loose, firmly secure them. Replace any broken or damaged cables. Execute the procedures that were causing the T3300SL to malfunction. If the computer still does not function properly, perform Check 2.

Check 2   The **Battery** indicator status lets you know when a unit should be replaced. Refer to the following table.

Condition	Battery Indicator	Replacement Unit
1	1h, 4h, 5h, Eh, Fh	AC adapter
2	6h, Dh	Battery pack
3	2h, 3h, 7h, 8h, 9h, Ah, Bh	Power supply board

If condition 1 or 2 remains after replacement of the indicated unit, then replace the power supply board.

If condition 3 remains after replacing the power supply board, then replace the system board.

2.4   System Board Troubleshooting Procedures

To determine if the system board is defective or not functioning properly, perform the following procedures beginning with Procedure 1 and continuing with the other procedures as instructed.

      Procedure 1: Message Check

      Procedure 2: Printer Port LED Check

      Procedure 3: Diagnostic Test Program Execution 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 displayed, perform Check 1. If not, go to Procedure 2. If MS-DOS is properly loaded, go to Procedure 3.

Check 1   If the following error message is displayed on the screen for one second, the external FDD is not connected, even though the external FDD/PRT option in the SETUP program is set to FDD A. Set the external FDD/PRT option to FDD B or PRT, or connect the external FDD and restart the system. If any other error message appears, perform Check 2.

```
                *** FDD A is not installed ***
```

Check 2   If one of the following error messages is displayed on the screen, press any 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 one or the data is lost.

         If you press any 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 3.

```
   (a)    *** Error in CMOS.  Bad HDD type ***
          Check system.  Then press any key ......

   (b)    *** Error in CMOS.  Bad battery ***
          Check system.  Then press any key ......
```

(c)   `*** Error in CMOS.  Bad check sum ***`
        `Check system.   Then press any key ......`

(d)   `*** Error in CMOS.  Bad memory configuration ***`
        `Check system.   Then press any key ......`

(e)   `*** Error in CMOS.  Bad time function ***`
        `Check system.   Then press any key ......`

Check 3   If one of the following error messages is displayed on the screen, press any key as the message instructs.

The error message (a) appears when data stored in RAM under the resume function is lost because the battery has discharged.

The error message (b) appears when an error is detected during the read test of the hard RAM or the data in the hard RAM is lost because the battery has discharged.

If any other message appears, perform Check 4.

(a)   `WARNING:  RESUME FAILURE.`
       `PRESS ANY KEY TO CONTINUE.`

(b)   `WARNING:  DATA IN HARD RAM WAS LOST.`
       `YOU MUST FORMAT HARD RAM BEFORE USE.`
       `PRESS ANY KEY TO CONTINUE.`

Check 4   The IRT tests the system board. When the IRT detects an error, the system stops or
the error message appears. Refer to the messages in Table 2-2 to determine which test
item failed.

If one of the following (a) through (s) error messages is displayed, replace the system
board.

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

If the (u) or (v) error message is displayed, go to the HDD Troubleshooting Proce-
dures in Section 2.6.

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

If none of these error message appear, go to Procedure 2.

  (a)   **CPU ERROR**
  (b)   **SYSTEM ROM CHECK SUM ERROR**
  (c)   **PIT ERROR**
  (d)   **MEMORY REFRESH ERROR**
  (e)   **TIMER CH.2 OUT ERROR**
  (f)   **FIRST 64KB MEMORY ERROR**
  (g)   **FIRST 64KB MEMORY PARITY ERROR**
  (h)   **VRAM ERROR**
  (i)   **KBC ERROR**
  (j)   **SYSTEM MEMORY ERROR**
  (k)   **SYSTEM MEMORY PARITY ERROR**
  (l)   **EXTENDED MEMORY ERROR**
  (m)   **EXTENDED MEMORY PARITY ERROR**
  (n)   **DMA PAGE REGISTER ERROR**
  (o)   **DMAC #x ERROR**
  (p)   **PIT #x ERROR**
  (q)   **FDC ERROR**
  (r)   **RTC UPDATE ERROR**
  (s)   **TIMER INTERRUPT ERROR**
  (t)   **KEYBOARD ERROR**
  (u)   **HDC ERROR**
  (v)   **HDD #x ERROR**
  (w)   **NO FDD ERROR**

Procedure 2   Printer Port LED Check

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

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

Figure 2-2 Printer port LED

To use the printer port LED, follow these steps:

1.   Turn off the T3300SL's power.

2.   Plug the printer port LED into the T3300SL's **PRT/FDD** connector.

3.   Turn on the T3300SL's power.

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

Figure 2-3 Reading the printer port LED

5.   Convert the status from binary to hexadecimal notation.

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

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

Table 2-2 Printer port LED error codes

Printer Port LED Indication		Error Codes	Test Item	Contents of the Test
A	B			
○○○○	○○○●	*01h	CPU self test check	Checks the result of the CPU self test.
○○○○	○○●○	02h	SL microprocessor test	386SL/82360SL initialization
○○○○	○○●●	*03h	CPU register test	Write/read test of the register in the CPU, Flag test
○○○○	○●○○	*04h	ROM checksum test	Checks the ROM checksum.
○○○○	○●○●	*05h	PIT test	Checks if the counter value of channel 0 in the PIT changes or not.
○○○○	○●●○	06h	PIT initialization	Initializes channels 0, 1, and 2 in the PIT.
○○○○	○●●●	*07h	PIT's function check	Checks if the refresh status of the port 61h changes or not. Checks if the output status of the port 61h's channel 2.
○○○○	●○○○	08h	Initialization of the memory configuration	Checks and sets the memory configuration.
○○○○	●○○●	*09h	First 64K memory test	First 64KB memory write/read test Parity error check
○○○●	○○○○	10h	Particular H/W initialization	Sets the display device. CMOS check, ROM, RAM copy Connects/disconnects the MPDS.
○○○●	○○○●	11h	Vector table initialization	Initializes the vector table.
○○○●	○○●○	12h	RTC test	This test is not performed here, but in test No. 10.
○○○●	○○●●	13h	RTC initialization	Checks the bad battery status and bad checksum status. Initializes the control registers A and B.
○○○●	○●○○	14h	PIC initialization	Initializes the PIC #1 and #2.
○○○●	○●○●	15h	Display initialization	Checks if the system has MDA and CGA or not, and then initializes them. Initializes the extended display I/O (C0003h call). VRAM test of the MDA, CGA, and extended display I/O.
○○○●	○●●○	*16h	KBC test	KBC initialization (AAh) command D1h command (parameter 03) 60h command (parameter 54)
○○○●	○●●●	17h	System memory test	Write/read test of the system memory Parity error check
○○○●	●○○○	18h	Extended memory test	Extended memory write/read test Parity error check
○○○●	●○○●	*19h	DMA page register test	Write/read test of channels 2, 3, 1, 0, 6, 7, and 5 in the DMA page register
○○●○	○○○○	*20h	DMAC test	Write/read test of the DMAC #1 and #2
○○●○	○○○●	21h	DMAC initialization	Initializes the DMAC #1 and #2, and DMA page register.
○○●○	○○●○	*22h	PIC test	Write/read test of PIC mask register #1 and #2
○○●○	○○●●	*23h	SCC initialization	SCC initialization (FFh) command ADh command
○○●○	○●○○	*24h	KBC initialization	D1h command (parameter 01) 66h command (parameter 55) F2h command AEh command
○○●○	○●○●	25h	Mouse initialization	Mouse initialization (FFh) command A7h command

● = On
○ = Off

Table 2-2 Printer port LED error codes (continued)

Printer Port LED Indication		Error Codes	Test Item	Contents of the test
A	**B**			
○○●○	○●●○	26h	HDD initialization	Checks if the HDD is connector or not. Initializes the HDC.
○○●○	○●●●	27h	FDD initialization	Checks if the external FDD is connected or not. Initializes the FDC.
○○●○	●○○○	28h	Printer investigation	Checks the printer port.
○○●○	●○○●	29h	SIO initialization	Checks if the SIO functions properly or not.
○●○○	○○○○	30h	Timer initialization	Checks the RTC's year, month, and day. Timer count set for INT 08h. Checks if the timer interruption functions properly or not.
○●○○	○○○●	31h	NDP initialization	Checks if the NDP is installed or not.
○●○○	○○●○	32h	Extended ROM initialization	Checks if the extended ROM is installed or not. Initializes the extended ROM.
○●○○	○○●●	33h	SETUP startup check	Checks if the SETUP starts up properly or not.
○●○○	○●○○	34h	Boot/load	Boots and loads the operating system.

● = On
○ = Off

> **NOTE:** If an error condition is detected by the IRT test, the printer port LED displays an error code after the IRT test finishes. For example, when the printer port LED displays 16h and halts, the IRT test has already completed the KBC test. In this instance, the IRT indicates an error with the system memory test. Error codes marked with an asterisk (*) indicate that the IRT test aborts after the printer port LED outputs the error code.

Check 1   If the following error codes are displayed, replace the system board with a new one.

```
FFh, 00h, 01h, 02h, 05h, 06h, 07h, 0Ah, 0Dh, 15h, 16h, 18h,
1Fh, 22h, 25h, 30h, 40h, 41h, 42h, 4Ah, 70h, 80h, 90h, A0h,
A6h
```

Check 2   If error code 54h is displayed, go to the Keyboard Troubleshooting Procedures in Section 2.7.

Check 3   If error code 5Ah is displayed, make sure the mouse cable is connected to the system board. If it is, replace the system board with a new one.

Check 4   If error code 60h is displayed, go to the HDD Troubleshooting Procedures in Section 2.6.

Check 5   If error code 65h is displayed, go to the FDD Troubleshooting Procedures in Section 2.5.

Procedure 3   Diagnostic Test Program Execution Check

Execute the following tests from the Diagnostic Test Menu. Refer to Chapter 3, *Tests and Diagnostics,* for detailed instructions 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 (if an NDP is installed)

If an error is detected during these tests, replace the system board with a new one.

2.5 Floppy Disk Drive Troubleshooting Procedures

This section describes how to determine if the T3300SL's internal 3.5-inch floppy disk drive is functioning properly. Perform the procedures below starting with Procedure 1 and continuing with the other procedures as instructed.

      Procedure 1:   FDD Head Cleaning Check

      Procedure 2:   External 5.25-inch FDD Check

      Procedure 3:   Diagnostic Test Program Execution Check

      Procedure 4:   Connector Check and Replacement Check

Procedure 1   **FDD Head Cleaning Check**

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

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

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

Procedure 2   **Internal and External FDD Check**

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

Check 1   Connect the external 5.25-inch FDD to the **PRT/FDD** port and make sure it functions properly. If it does, perform Check 2. If it doesn't, perform Check 4.

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

Check 2   Disassemble the system unit and make sure the internal FDD cable is properly connected to PJ4 on the system board. If it is, perform Check 3.

Check 3   Replace the internal FDD with a new one. If the problem still exists, perform Check

4.

Check 4   Replace the system board with a new one.

Procedure 3   Diagnostic Test Program Execution Check

The Floppy Disk Drive Diagnostic Test program is stored on the T3300SL Diagnostic Disk. After loading Toshiba MS-DOS, run the diagnostic program (TESTCE33). Refer to Chapter 3, *Tests and Diagnostics*, for more information about the diagnostic 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 diagnostic test, go to Check 1.

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

Table 2-3   Floppy disk drive error codes and statuses

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

```
Write protected
```

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

Procedure 4   Connector Check and Replacement Check

The 3.5-inch Floppy Disk Drive is connected to the system unit by the FDD cable. This cable may be disconnected from the system unit or damaged. Disassemble the T3300SL following the steps described in Chapter 4, *Replacement Procedures,* and perform the following checks.

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

                        FDD cable   System board

           If this cable is disconnected, connect it to the system unit and perform Procedure 3 again. 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 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 Procedures

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 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 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 T3300SL's HDD is not functioning 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 appear, 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 when ready.

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 trans-
           ferred to the HDD. Restart the T3300SL. If the error message still appears, perform
           Check 4.

           System transferred

Check 4   The HDD is connected to the system board through an HDD flexible cable. This cable
           can become disconnected or damaged. Disassemble the T3300SL as described in
           Chapter 4, *Replacement Procedures.* If the HDD is not connected, connect it to the

system board and return to Procedure 1. If the HDD is firmly connected to the system board, perform Procedure 3.

Procedure 3   Format Check

The T3300SL's HDD is formatted using the low level (physical) format program and the MS-DOS FORMAT program. To format the HDD, start with Check 1 below and perform the other checks as instructed.

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

Format complete

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

Check 2   Using the T3300SL 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 Diagnostic Program, go to Procedure 4.

Procedure 4   Diagnostic Test Program Execution Check

The HDD test program is stored in the T3300SL Diagnostic 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 codes and statuses

Code	Status
01h	Bad command
02h	Bad address mark
04h	Record not found
05h	HDC not reset
07h	Drive not initialize
09h	DMA boundary error
0Ah	Bad sector error
0Bh	Bad track error
10h	ECC error
11h	ECC recover enable
20h	HDC error
40h	Seek error
80h	Time out error
AAh	Drive not ready
BBh	Undefined
CCh	Write fault
E0h	Status error
F0h	Not sense error (HW. code = FF)

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 system board with a new one following the instructions in Chapter 4, *Replacement Procedures.*

2.7   KeyboardTroubleshooting Procedures

To determine if the T3300SL's keyboard is functioning properly, perform the following procedures. Start with Procedure 1 and continue with the other procedures as instructed.

    Procedure 1:   Diagnostic Test Program Execution Check

    Procedure 2:   Connector and Replacement Check

Procedure 1   Diagnostic Test Program Execution Check

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

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

Procedure 2   Connector and Replacement Check

The keyboard is connected to the system board by a 19-pin flat cable. This cable may be disconnected or damaged. Disassemble the T3300SL 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   PJ10   System board

            If this cable is damaged, replace it with a new one, or firmly connect it if it is disconnected. 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 about how to replace the system board.

2.8 Display Troubleshooting Procedures

This section describes how to determine if the T3300SL's display is functioning properly. Start with Procedure 1 and continue with the other procedures as instructed. The procedures described in this section are:

Procedure 1: Brightness and Contrast Volume Check

Procedure 2: External CRT Check

Procedure 3: Diagnostic Test Program Execution Check

Procedure 4: Connector Check

Procedure 5: Replacement Check

Procedure 1   Brightness and Contrast Volume Check

The brightness and contrast dials are on the right side of the display unit. Use these dials to adjust the display screen.

If the brightness or contrast does not change when you adjust them, go to Procedure 2.

Procedure 2   External CRT Check

Connect the external CRT to T3300SL's RGB port, then cold boot the computer. The computer automatically detects the external CRT.

If the external CRT works correctly, the internal LCD display may be damaged. Go to Procedure 4.

If the external CRT appears to have the same problem as the internal LCD, the display controller may be damaged. Go to Procedure 3.

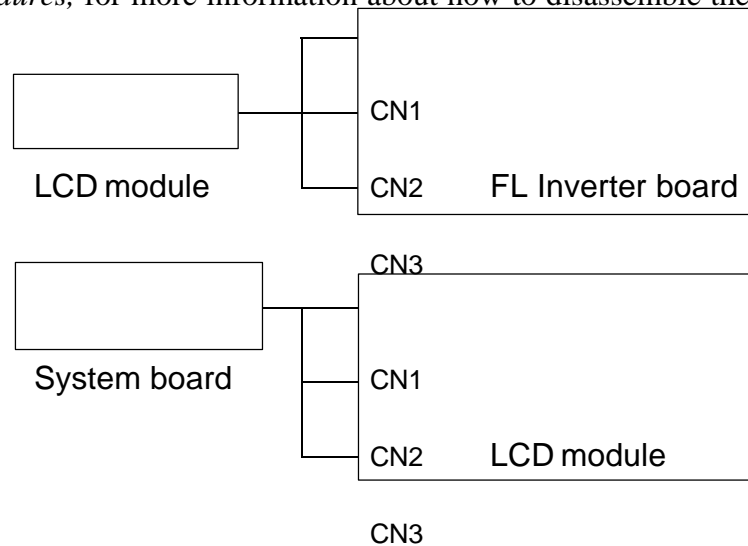## Procedure 3   Diagnostic Test Program Execution Check

The Display Test program is stored on the T3300SL Diagnostic Disk. This program checks the display controller on the system board. After loading Toshiba MS-DOS, run the Diagnostic Program (TESTCE33). Refer to Chapter 3, *Tests and Diagnostics,* for detailed instructions about this test.

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

Procedure 4   Connector Check

The display unit has an LCD module and FL inverter board. The LCD module and FL inverter board are connected by three cables. The LCD module and system board are connected by three signal cables 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 T3300SL.

```
    ┌───────────┐        ┌─────────────────────┐
    │           │────────│  CN1                │
    │           │        │                     │
    └───────────┘        │  CN2   FL Inverter board
     LCD module          └─────────────────────┘

                          CN3
    ┌───────────┐        ┌─────────────────────┐
    │           │────────│                     │
    │           │        │  CN1                │
    └───────────┘        │                     │
     System board        │  CN2    LCD module  │
                         └─────────────────────┘
                          CN3
```

If any of these cables are not connected, firmly reconnect them and perform Procedures 1 and 2 again. If the problem still exists, perform Procedure 5.

Procedure 5   Replacement Check

The 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 T3300SL and then perform the following checks.

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

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

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

Check 4   The system board may be damaged. Replace the system board with a new one and test the display again.

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Chapter 3
Tests and Diagnostics

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Contents

Tables

3.1   Diagnostic Program

This chapter explains how to use the T3300SL's Diagnostic Program (TESTCE33) to test the functions of the T3300SL's hardware modules. The Diagnostic Program is stored on the T3300SL Diagnostic Disk. The Diagnostics Program consists of 18 programs that are divided into the Service Program Module (DIAGNOSTICS MENU) and the Test Program Module (DIAGNOSTIC TEST MENU).

The Service Program Module consists of the following eight functions:

1.   DIAGNOSTIC TEST
2.   HARD DISK FORMAT
3.   HEAD CLEANING
4.   LOG UTILITIES
5.   RUNNING TEST
6.   FDD UTILITIES
7.   SYSTEM CONFIGURATION
8.   SETUP

The Test Program Module contains the following ten functional tests. These are all located within the Diagnostic Test function of the Service Program Module.

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

To execute the T3300SL Diagnostic Program you will need the following equipment to perform some of the tests:

❏   T3300SL Diagnostic Disk
❏   Formatted working disk for the floppy disk drive test
❏   Cleaning disk kit to clean the floppy disk drive heads
❏   Printer wraparound connector for the printer wrap-around test
❏   RS-232-C wraparound connector for the RS-232-C port wraparound test

The following sections detail the tests within the Diagnostic Test function of the Service Program Module. Refer to Sections 3.16 through 3.22 for detailed information on the remaining seven Service Program Module functions.

3.2 Executing the T3300SL Diagnostic Program

Toshiba MS-DOS is required to run the T3300SL Diagnostic Program. To start the program follow these steps:

1. Turn on the T3300SL and allow the computer to boot. Insert the T3300SL Diagnostic Disk in the T3300SL's internal floppy disk drive.

2. At the system prompt change to drive A, type **TESTCE33**, and press **Enter**.

The DIAGNOSTICS MENU will appear as shown below.

```
TOSHIBA personal computer T3300SL DIAGNOSTICS
version x.xx (c) copyright TOSHIBA Corp. 1991

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

PRESS [0] - [9] KEY
```

*NOTE: To terminate a subtest in progress, press **Ctrl + Break**. If a test has not been executed, press **Ctrl + C**. Both key combinations return the display to the appropriate subtest menu.*

3.   To execute the Diagnostic Test function from the DIAGNOSTICS MENU, type **1** and press
      Enter. The following DIAGNOSTIC TEST MENU will appear:

```
TOSHIBA personal computer T3300SL DIAGNOSTICS
version x.xx (c) copyright TOSHIBA Corp. 1991

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

PRESS [1] - [99] KEY
```

Refer to Sections 3.4 through 3.13 for detailed descriptions of Diagnostic Tests 1 through 10.
Test menu option 88 sets the floppy disk drive and hard disk drive error retry count. Option
99 exits the DIAGNOSTIC TEST MENU and returns the display to the DIAGNOSTICS
MENU.

4.   Select the test number you want to execute and press **Enter**. A test-specific display will
      appear. For example, the following display shows the System Test which appears when you
      type **1** and press **Enter**.

```
SYSTEM TEST                      xxxxxxx
                                 T3300SL 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
99 - Exit to DIAGNOSTIC TEST MENU

SELECT SUB-TEST NUMBER ?
```

*NOTE: The menu displayed by your T3300SL may be slightly different from the one shown
above.*

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

		TEST LOOP (1:YES/2:NO) ?

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

	Selecting **NO** returns the display to the subtest menu after the test is complete.

6.	Type **1** or **2** for the Test Loop prompt and press **Enter**. The following message will appear.

		ERROR STOP (1:YES/2:NO) ?

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

		**ERROR STATUS NAME			[[HALT OPERATION]]**

						1: Test End
						2: Continue
						3: Retry

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

	Selecting **NO** displays the error status, increases the error counter by one, and resumes the test.

7.	Type **1** or **2** for the Error Stop prompt and press **Enter** to execute the subtest chosen from the subtest menu.

	Table 3-1 in Section 3.3 lists the subtests available for each test on the DIAGNOSTIC TEST MENU. Table 3-3 in Section 3.14 describes the error code and error status for each potential error.

3.3   Subtest Names

Table 3-1 lists the subtests for each test program in the Test Program Module (DIAGNOSTIC TEST MENU).

Table 3-1 Subtest names

Test No.	Test name	Subtest No.	Subtest name
1	SYSTEM	01	ROM checksum
		02	HW status
2	MEMORY	01	RAM constant data
		02	RAM address pattern data
		03	RAM refresh
		04	Protected mode
		05	Memory module
		06	Backup memory
		07	Hard-RAM
		08	Cache memory
		09	PCMCIA memory
3	KEYBOARD	01	Pressed key display (82/84)
		02	Pressed key code display
4	DISPLAY	01	VRAM read/write
		02	Character attributes
		03	Character set
		04	80*25/30 Character display
		05	300*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
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
7	ASYNC	01	Wraparound (board)
		02	Board (#1) <=> board (#2)
		03	Point to point (send)
		04	Point to point (receive)
		05	Card modem loopback (2400 BPS)
		06	Interrupt test (IRQ 4, 3, 5)

Table 3-1 Subtest names (continued)

Test No.	Test name	Subtest No.	Subtest name
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

3.4   System Test

To execute the System Test, type **1** from the DIAGNOSTIC TEST MENU, press **Enter**, and follow the directions displayed on the screen. Select the number corresponding to the subtest you want to execute and press **Enter**.

Subtest 01   ROM checksum

This subtest tests the T3300SL's system board from address F0000h - FFFFFh (64KB).

Subtest 02   HW status

NOTE: Select **No** *for the* **Test Loop** *prompt when selecting this subtest. Also, the program runs for several minutes before returning you to the subtest menu.*

This subtest reads and displays the T3300SL's hardware status as shown below.

```
                76543210
 H/W status =   10001000

    Bit7 —                 =
    Bit6 — CPU clock      = 25MHZ
    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 subtest menu.

Table 3-2 T3300SL hardware bit status

Bit	HW status	1	0
7	Reserved	–	–
6	CPU clock speed	6MHz	25MHz
5	Media type	2DD	2HD
4	FDD type	1MB	2MB
3	Reserved	–	–
2	Drive A/B	A	B
1	External FDD	ON	OFF
0	Internal FDD	2DD	2HD

3.5 Memory Test

To execute the Memory Test, type **2** from the DIAGNOSTIC TEST MENU, press **Enter**, and follow the directions displayed on the screen. Type the number corresponding to the subtest you want to execute and press **Enter**.

Subtest 01   RAM Constant Data

This subtest writes constant data FFFFh, AAAAh, 5555h, 0101h, and 0000h to conventional memory (0 to 640KB). The constant data is then read from conventional memory and compared to the original data.

Subtest 02   RAM Address Pattern Data

This subtest writes address pattern data created by the eXclusive-ORing (XORing), to the address segment and address offset in conventional memory (0 to 640KB). The address pattern data is then read from conventional memory and compared to the original data.

Subtest 03   RAM Refresh (Real Mode)

This subtest writes a 256-byte unit of constant data (AAAAh and 5555h) to conventional memory (0 to 640KB). This data is then read from conventional memory and compared to the original data.

> *NOTE: The size of the data being read and written to conventional memory causes a short delay between the write and read operations.*

Subtest 04   Protected Mode

This subtest writes constant data FFh, AAh, 55h, 00h and address data to extended memory (addressed 100000h to the maximum address). The data is then read from extended memory and compared to the original data.

Subtest 05   Memory Module

This subtest is the same as Subtest 04, and is used to test an optional memory card. Memory modules for the T3300SL are available in 2MB, 4MB, 6MB, and 16MB capacities.

When you select Subtest 05 the following message appears.

Extended memory size (1:2 MB,2:4 MB,3:6 MB,4:16 MB) ?

Select the number that corresponds to the memory card size installed in the T3300SL.

Subtest 06   Backup Memory

This subtest writes constant data 0000h, 5555h, AAAAh, and FFFFh to memory from address C8000h to CFFFFh. The data is then read and compared to the original data.

Subtest 07   Hard-RAM

This subtest writes a word unit of constant data 0000h, 5555h, AAAAh, and FFFFh to memory from address C8000h to CFFFFh. The data is then read and compared to the original data. This subtest also executes the paging test for page data.

Subtest 08   Cache Memory

This subtest observes the cache bit access time and cache miss access time, and then compares them.

Subtest 09   PCMCIA Memory

This subtest makes the PCMCIA window (D0000h to DFFFFh) in 64KB increments, and performs the PCMCIA memory paging test.

This subtest writes data (FFh, AAh, 55h, 00h) to the PCMCIA memory. Then it reads the data written to PCMCIA memory and compares it with the original data.

3.6   Keyboard Test

To execute the Keyboard Test, type **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 T3300SL's keyboard actions. Type the number corresponding to the subtest you want to execute and press **Enter**.

Subtest 01   Pressed Key Display (82/84)

NOTE: *The Num Lock key 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 "*" (asterisk) character. Holding a key down enables the auto-repeat function which causes the key's display character to blink.

```
KEYBOARD TEST     IN PROGRESS     301000

        ■■■■■■■■■■■■ ■■
        ■■■■■■■■■■■ ■■
        ■■■■■■■■■■■■ ■■
        ■ ■■■■■■■■■■ ■■
        ■ ■■■■■■■■■ ■ ■■
        ■■ ■■  ■  ■■■■■■■
[Print:Alt+SysReq , Pause:Ctrl+Break]
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 video mode when pressed. The scan codes, character codes, and key top names are listed in Appendix D.

```
 KEYBOARD TEST      IN PROGRESS      302000

                   Scan code        =

                   Character code   =

                   Keytop           =

 Ins Lock    Caps Lock    Num Lock      Scroll Lock

 Alt         Ctrl         Left Shift   Right Shift

 PRESS [ENTER] KEY
```

3.7 Display Test

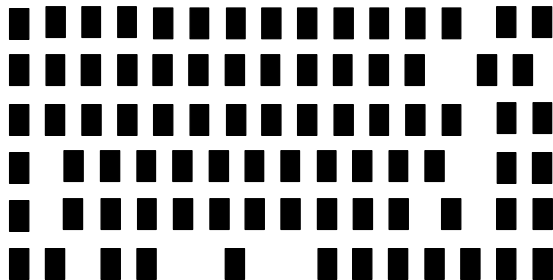To execute the Display Test, type **4** from the DIAGNOSTIC TEST MENU, press **Enter**, and follow the directions displayed on the screen. The Display Test contains ten subtests that test the T3300SL's display in various modes. Type the number corresponding to the subtest you want to execute and press **Enter**.

Subtest 01   VRAM Read/Write

This subtest writes constant data FFFFh, AAAAh, 5555, 0000h and address data to video RAM (256KB). This data is then read from the video RAM and compared to the original data.

Subtest 02   Character Attributes Mode 1 and 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 levels of gray) 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.
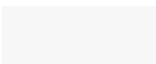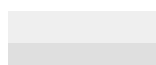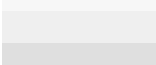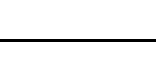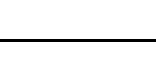
```
CHARACTER ATTRIBUTES

  NEXT LINE SHOWS NORMAL DISPLAY.
      NNNNNNNNNNNNNNNNNNNNNNNNNNNNNNN

  NEXT LINE SHOWS  INTENSIFIED DISPLAY.
      IIIIIIIIIIIIIIIIIIIIIIIIIIIIII

  NEXT LINE SHOWS REVERSE DISPLAY.
     RRRRRRRRRRRRRRRRRRRRRRRRRRRRRRR

  NEXT LINE SHOWS BLINKING DISPLAY
      BBBBBBBBBBBBBBBBBBBBBBBBBBBBBB

                              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 levels of gray for 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
```

Subtest 03   Character Set

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

```
CHARACTER SET IN 40*25

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

```
   PRESS [ENTER] KEY
```

Subtest 04   80x25/30 Character Display Mode 12

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

```
80*XX CHARACTER DISPLAY
0123456789012345678901234567890123456789012345678901234567890123456789012345 67
  !"#$%&'()*+,-./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{|}~•
3456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~•Ç
456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~•Çü
PRESS [ENTER] KEY
```

Subtest 05   320x200 Graphics Display Mode 4 and D

This subtest displays the following two color sets for the color display in the 320x200 dots graphics mode 4 and D as shown below.

```
320*200 GRAPHICS DISPLAY
COLOR SET X : [X]
        GREEN       RED      YELLOW
        CYAN      MAGENTA     WHITE
```



```
PRESS [ENTER] KEY
```

Subtest 06   640x200 Graphics Display Mode 6 and E

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

```
640*200 GRAPHICS DISPLAY : [X]
          EVEN DOTS      ODD DOTS      ALL DOTS
          DRIVEN         DRIVEN        DRIVEN
```
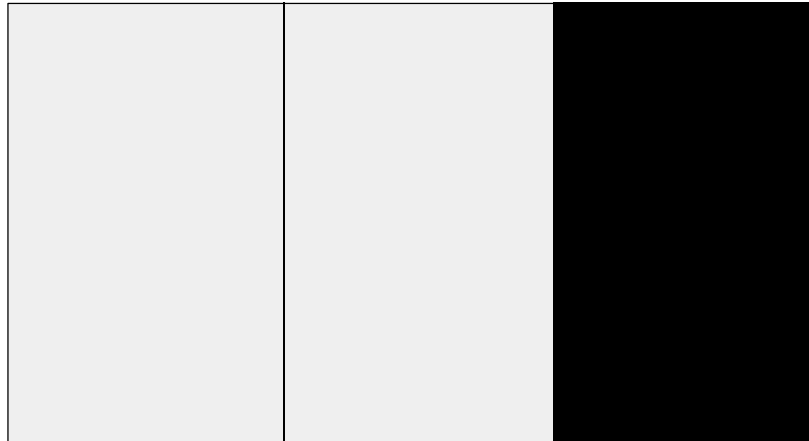


```
   PRESS [ENTER] KEY
```

Subtest 07   640x350/400/480 Graphics Display Mode 10, 12, and 74

This subtest displays the even dots, odd dots, and all dots blocks in the 640x350 and 640x480 dots graphics mode 10, 12, and 74 (PDC mode only) as shown below.

```
640*XXX GRAPHICS DISPLAY : [XX]
          EVEN DOTS      ODD DOTS       ALL DOTS
          DRIVEN         DRIVEN         DRIVEN
```



```
PRESS [ENTER] KEY
```

Subtest 08   Display Page

This subtest confirms that the pages can be changed in order from page 0 through page 7 in the 40x25 character mode.

```
DISPLAY PAGE 0

0000000000000000000000000000000000000000
0                                        0
0                                        0
0                                        0
0                                        0
0                                        0
0                                        0
0                                        0
0                                        0
0                                        0
0                                        0
0                                        0
0000000000000000000000000000000000000000
```
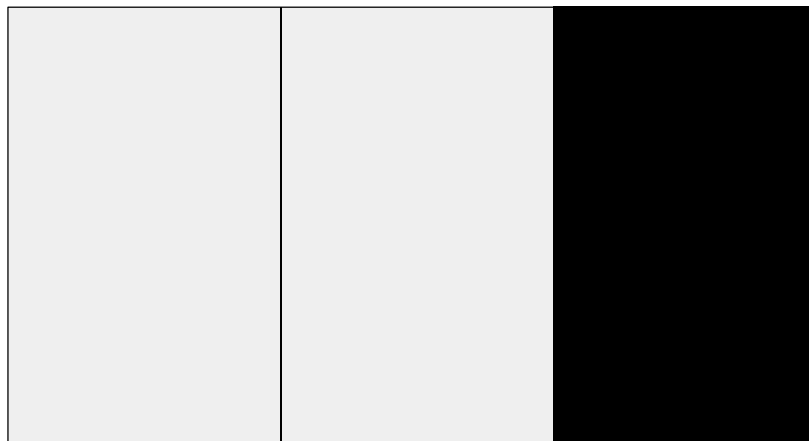
Subtest 09   H Pattern Display/Border Color

This subtest displays 2,000 H characters on the entire screen as shown below.

```
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
```

Pressing **Enter** displays the following message:

```
Setting the CRT (1:Yes/2:No)
```

If an external CRT display is connected to the T3300SL, type **1** to display the following message:

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

Press **Enter** to execute the border color test.

Subtest 10   LED/DAC Pallet

This subtest checks the LED Speed, Caps Lock, and Num Lock key operations by writing 2Ah/15h data to 6 bits of 256x3 (RGB). This data is then read and compared to the original data.

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

    (1) Press [ Fn + Pgdn ] key !...Speed   (red)
    (2) Press [ Fn + Pgup ] key !...Speed   (green)
    (3) Press [ Caps Lock ] key !...Caps    (on/off)
    (4) Press [ Num lock  ] key !...Num     (on/off)
    (3) Press [ Fn        ] key !...Overlay (on/off)

 PRESS [ENTER] KEY
```

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

```
[Processor latch test] =
Processor latchtest (1:256 times, 2:endless) ?
```

3.8 Floppy Disk Test

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

To execute the Floppy Disk Test, type **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 T3300SL's internal floppy disk drive. The following messages will appear after selecting the Floppy Disk Test from the DIAGNOSTIC TEST MENU. Answer each of the following questions with an appropriate response to execute the test.

1.   Select the 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 at 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 each subtest.

```
        FLOPPY DISK                                 XXXXXXXX

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

The first three digits in the **ADDRESS** number indicate 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 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): Track 0 to 39.

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

The start track is specified when the Floppy Disk Drive Test is selected from the DIAGNOSTIC TEST MENU. Refer to step 3 at the beginning of this section to set the start track.

Subtest 02   Sequential Read/Write

This subtest continuously writes data pattern B5ADADh to all the specified tracks selected in Subtest 01. 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 Subtest 01. 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, type **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 printer output connected to the T3300SL. 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.

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

The following message will appear when the Printer Test is selected.

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

The printer I/O port address is specified by the **xxxxh** number. The T3300SL 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[\]^_`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
```

Subtest 02   Function

This subtest 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
 !"#$%&'()*+,./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmn
opqrstuvwxyz{|}~
```

Subtest 03   Wraparound

NOTE: To execute this subtest a printer wraparound connector must be connected to the T3300SL's printer port. The printer wraparound connector (34M741986G01) wiring diagram is described in Appendix F.

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, type **7** from the DIAGNOSTIC TEST MENU, press **Enter**, and follow the directions displayed on the screen. The ASYNC Test contains six subtests that test the T3300SL's asynchronous communication functions. Type the number corresponding to the subtest you want to execute and press **Enter**.

Subtests 01 through 04 require the following data format:

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

The following message will appear 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.

The T3300SL supports three serial port channels. Select the serial port channel number and press **Enter** to execute the selected subtest.

Subtest 01   Wraparound (board)

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

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

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

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

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

Subtest 03   Point to Point (Send)

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

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

Subtest 04   Point to Point (Receive)

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

Subtest 05   Card Modem Loopback (2400 BPS)

> *NOTE:* *To execute this subtest, a built-in modem must be installed.*

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

When you select the channel number of the serial port and press **Enter**, the following message appears.

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

Select the baud rate for the serial port and press **Enter** to execute this subtest.

Subtest 06   Interrupt Test IRQ 4, 3 and 5

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

3.11 Hard Disk Test

To execute the Hard Disk Test, type **8** from the DIAGNOSTIC TEST MENU, press **Enter**, and follow the directions displayed on the screen. The Hard Disk Test contains ten subtests that test the T3300SL 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 partition the hard disk. 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. Type **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. Type **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. Type **1** or **2** and press **Enter**.

---

6.   The Hard Disk Test will appear after you respond to the Detail Status prompt. Select the
      number for 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: xxxxx         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 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 the worst pattern data (shown below) to a cylinder,
              then reads the data while moving from cylinder to cylinder.

              Worst pattern data:
                   B5ADADh, 4A5252h, EB6DB6h, 149249h
                   63B63Bh, 9C49C4h, 2DB6DBh, D24924h

Subtest 05   Write/Read/Compare (CE)

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

Subtest 06   Write Specified Address

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

Subtest 07   Read Specified Address

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

Subtest 08   ECC Circuit

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

Subtest 09   Sequential Write

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

Subtest 10   W-R-C Specified Address

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

3.12 Real Timer Test

To execute the Real Timer Test, type **8** from the DIAGNOSTIC TEST MENU, press **Enter**, and follow the directions on the screen. The Real Timer Test contains three subtests that test the T3300SL's real timer functions. Type the number corresponding to the subtest you want to execute and press **Enter**.

Subtest 01   Real Time

A new date and time can be inputted 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 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 military format). After pressing **Enter** the display returns to the Real Timer Test menu.

Subtest 02   Backup Memory

This subtest performs the following backup memory checks:

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

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

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:

    (month, day, year, hour, minute, and second)

3.13 Numeric Data Processor Test

> **NOTE:** *To execute this test, a math co-processor (NDP) must be mounted on the system board.*

Subtest 01   NDP test

This subtest checks the following functions of the numeric data processor:

- ❏ Control word

- ❏ Status word

- ❏ Bus

- ❏ Addition

- ❏ Multiplication

3.14 Error Codes 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

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
	1B	H-RAM Mapping Error
	1C	H-RAM Read/Write Error
	20	No PCMCIA Card
	2A	PCMCIA Card Different
	2B	PCMCIA Mapping Error
	2C	PCMCIA Write/Read Error
	DD	Cache Memory Error
FDD	01	Bad Command
	02	Address Mark Not Found
	03	Write Protected
	04	Record Not Found
	06	Media Removed
	08	DMA Overrun Error
	09	DMA Boundary Error
	10	CRC Error
	20	FDC Error
	40	Seek Error
	60	FDD Not Drive
	80	Time Out Error
	EE	Write Buffer Error
PRINTER	01	Time Out
	08	Fault
	10	Select Line
	20	Out Of Paper
	40	Power Off
	80	Busy Line

Table 3-3 Error codes and error status names (continued)

Device name	Error code	Error status name
ASYNC	01	DSR On Time Out
	02	CTS On Time Out
	04	RX-ENABLE Time Out
	08	TX-BUFFER Full Time Out
	10	Parity Error
	20	Framing Error
	40	Overrun Error
	80	Line Status Error
	88	Modem Status Error
	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
	07	Drive Not Initialized
	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
	CC	Write Fault
	E0	Status Error
NDP	01	No CO-PROCESSOR
	02	Control Word Error
	03	Status Word Error
	04	Bus Error
	05	Addition Error
	06	Multiple Error

3.15 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 and the last four digits are not used.

The HDC 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 HDC 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 to transfer data. "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 comand was terminated with some error.

Table 3-5 HDC error register contents

Bit	Name	Description
7	BBK (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	TK09
	(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.

3.16 Hard Disk Format

This command executes the hard disk formatting command. 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 function 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.

3.16.1 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, execute the Bad track CHECK option to display a list of bad tracks on the HDD.

Table 3-6 Hard disk formatting sequence

Item	Description	
	80MB	**120MB**
Sector sequences	1	1
Cylinders	0 to 1,096	0 to 1,154
Heads	0 to 3	0 to 3
Sectors	1 to 39	1 to 56
Sector length (bps)	512	512

2. Good track FORMAT

This option formats a specified cylinder and track as a good track. If a good track is format-ted 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 completed. If an error other than a bad track is detected, the program is automatically terminated.

3.16.2 Operations

CAUTION: After the HDD has been formatted, execute the Toshiba MS-DOS FDISK com-mand 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.

---

1. Select the Hard Disk Format function by typing **2** and pressing **Enter** from the DIAGNOS-TICS MENU. The following message appears.

```
DIAGNOSTICS - HARD DISK FORMAT : Vx.xx

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

Press [NUMBER] key ?
```

2. All track FORMAT option

(1) Selecting the All track FORMAT option displays the following message.

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

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

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

(3) Select an interleave number (usually 1) and press **Enter**. The following message will appear.

> **Unlock Format select (1:no,2:yes) ?**

(4) Select whether or not the HDD has an unlock format and press **Enter**. If the computer contains a JVC HDD, select **YES**. If the computer contains a Conner HDD, select **NO**.

The following message will appear.

> **[HDD TYPE] : CYLINDER = xxxx**
> **[HDD TYPE] : HEAD   = xx**
> **[HDD TYPE] : SECTOR = xx**
>
> **[WARNING : Current DISK data will be**
> **   completely destroyed]**
>
> **Press [Bad track number (CCCCHH)] key ?**

(5) Enter the cylinder and head number of the bad tracks on the HDD and press **Enter**. The cylinder number is represented by **CCCC** and **HH** is the head number. If the HDD does not have any bad tracks, press **Enter**. The **[[cylinder, head = xxxx xx]]** message will appear and all the cylinders in the hard disk will be formatted and checked.

(6) After formatting the hard disk, execute the verify check program by pressing **Enter**. When the verify check program is completed, the following message will appear.

> **Format complete**

(7) Press **Enter** to return to the Hard Disk Format menu.

3. Good track FORMAT or Bad track FORMAT option

(1) When the Good track FORMAT or Bad track FORMAT option is selected, the following message will appear.

> **Drive number select (1:#1,2:#2) ?**

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

> **Interleave number (1/1-8) ?**

(3)   Select an interleave number (usually 1) and press **Enter**. The following message will appear.

```
[ HDD TYPE ] : CYLINDER = xxxx
[ HDD TYPE ] : HEAD     = xx
[ HDD TYPE ] : SECTOR   = xx

Press [Track number (CCCCHH) key ?
```

(4)   Type the four-digit track number and press **Enter**. The first three digits indicate the cylinder and the last digit indicates the head number. This formats either good tracks or bad tracks as selected.

NOTE: This program can format only one track per operation. Repeat the operation as many times as necessary to format several good tracks or bad tracks.

---

(5)   After a track on the hard disk has been formatted, the following message will be displayed.

```
Format complete
```

(6)   Press **Enter** to return to the Hard Disk Format menu.

4.   Bad track CHECK option

(1)   When this option is selected, the following message will appear.

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

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

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

(3)   Select an interleave number (usually 1) and press **Enter**. The following message is displayed, and the bad tracks on the hard disk are checked.

```
[ HDD TYPE ] : CYLINDER = xxxx
[ HDD TYPE ] : HEAD     = xx
[ HDD TYPE ] : SECTOR   = xx

[[cylinder, head = xxxx xx]]
```

(4)   After checking the bad tracks on the hard disk, the following message will appear.

```
Format complete
```

(5)   Press **Enter** to return to the Hard Disk Format menu.

3.17 Head Cleaning

3.17.1 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 execute this function.

3.17.2 Operations

1.   Select the Head Cleaning function by typing **4** from the DIAGNOSTICS MENU and pressing **Enter**. The following message is displayed.

```
DIAGNOSTICS - FLOPPY DISK HEAD CLEANING : Vx.xx

Mount cleaning disk(s) on drive(s).
Press any key when ready.
```

2.   Remove the Diagnostic 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 DIAGNOSTICS MENU when the function is completed.

3.18 Log Utilities

3.18.1 Program 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])

3.18.2 Operations

1.   Select the Log Utilities function by typing **5** and pressing **Enter** from the DIAGNOSTICS MENU. Error information will now be logged into RAM or on the floppy disk. The error information is displayed in the following format.

```
     XXXXX ERRORS
CNT TS-NAME PASS   STS   ADDR   WD RD HSTS [ERROR 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 with the following number keys.

    Number
    Key   Function
    1   Scrolls the display to the next page.
    2   Scrolls the display to the previous page.
    3   Returns to the DIAGNOSTICS MENU .
    4   Erases all error log information in RAM.
    5   Outputs the error log information to a printer.
    6   Reads the log information from a floppy disk.
    7   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, this is not added to the error count.

3.19 Running Test

3.19.1 Function Description

This function automatically executes the following tests in sequence:

      1.   System Test (Subtest number 01)
      2.   Memory Test (Subtest number 01, 02, 03, 04, 06, 07)
      3.   Display Test (Subtest number 01 to 08)
      4.   Floppy Disk Drive Test (Subtest number 02)
      5.   Printer Test (Subtest number 03)
      6.   ASYNC Test (Subtest number 01)
      7.   Hard Disk Test (Subtest number 01, 05)
      8.   Real Timer Test (Subtest number 02)

The system automatically detects the number of floppy disk drives connected to the T3300SL for the Floppy Disk Drive Test.

3.19.2 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 Diagnostic Disk from the floppy disk drive and insert the work disk.

2.   Select the Running Test by typing **6** from the DIAGNOSTICS MENU and pressing **Enter**. The following message will be displayed.

        Printer wrap around test (Y/N) ?

      Selecting **Yes** executes the printer wraparound test. A printer wraparound connector must be connected to the **PRT/FDD** port on the back of the T3300SL to properly execute this test.

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

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

      Selecting **Yes** executes the ASYNC wraparound test. An RS-232-C wraparound connector must be connected to the **SERIAL A** port on the back of the T3300SL to properly execute this test.

4.   Type **Y** or **N** and press **Enter** to start the test.

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

3.20 Floppy Disk Drive Utilities

3.20.1 Function Description

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

1.   FORMAT

> *CAUTION:* *This option is only for testing the floppy disk drive. The option is different than the MS-DOS FORMAT command.*

This program can format a 5.25- or 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 option copies a source floppy disk to a target floppy disk.

3.   DUMP

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

3.20.2 Operations

1.   Select the Floppy Disk Drive Utilities function by typing **7** from the DIAGNOSTICS MENU and pressing **Enter**. The following message is displayed.

```
[ FDD UTILITIES ]

    1 : FORMAT
    2 : COPY
    3 : DUMP
    9 : EXIT TO DIAGNOSTICS MENU

PRESS [1] - [9] KEY
```

2. FORMAT option

   (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 and press **Enter** to display the following message.

         Type select (0:2DD-2DD,1:2D1-2D,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 x:
         Press any key when ready.

   (4)   Remove the Diagnostic 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)   If you select **Yes**, the display will repeat the message in step (3) above. If you select **No**, the display returns to the DIAGNOSTICS MENU.

3. COPY option

   (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)   Select a media/drive type number. A message similar to the one below will be displayed.

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

(3)   Remove the Diagnostic 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 in 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 in step (1) will be displayed again. If you type **2**, the display returns to the DIAGNOSTICS MENU.

4.   DUMP option

(1)   When DUMP is selected, the following message appears.

```
DIAGNOSTICS—HARD DISK & FLOPPY DISK DUMP : Vx.xx
Format type select (0:2DD-2DD,1:2D-2D,2:2D -2HD,3:2HD-2HD)?
```

(2)   Select a format type number and then type the number. If **3** is selected, the display will go to the message in step (5) below.

```
0:      Displays a dump list for a floppy disk (2DD).
1:      Displays a dump list for a floppy disk (2D).
2:      Displays a dump list for a floppy disk (2HD).
3:      Displays a dump list for a hard disk.
```

(3)   If **0**, **1**, or **2** is selected, the following message will appear.

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

(4)   Select an FDD drive number and the following message will appear.

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

(5)   Remove the Diagnostic Disk from the FDD and insert the source disk. Press any key
       and the following message will appear.

```
── Max. address ──
     [Track ] = xxxx
     [ Head ] = xx
     [Sector] = xx
     Track number ??
```

(6)   Type the track number and press **Enter**. The following message will appear.

```
Head  number ?
```

(7)   Type the head number and press **Enter**. The following message will appear.

```
Sector number ??
```

(8)   Type the sector number and press **Enter**. The specified dump list will be displayed.

(9)   After a dump list appears on the screen, the following message will appear.

```
Press number key (1:up,2:down,3:end) ?
```

       1:   Displays the next sector dump.
       2:   Displays a previous sector dump.
       3:   Displays the following message.

```
Another dump (1:Yes/2:No) ?
```

(10)   If you type **1**, the display will return to the message shown in step (1) above. If you
       type **2**, the display will return to the DIAGNOSTICS MENU.

3.21 System Configuration

3.21.1 Function Description

The System Configuration function contains the following configuration information for the T3300SL:

- BIOS ROM version
- Base memory size
- Display mode
- Number of floppy disk drives
- Number of ASYNC ports
- Number of hard disk drives
- Number of printer ports
- Co-processor
- Extended memory size

3.21.2 Operations

Select the System Configuration function by typing **8** from the DIAGNOSTICS MENU and pressing **Enter**. A system configuration screen similar to the one shown below will be displayed.

```
SYSTEM CONFIGURATION :

     * - BIOS ROM VERSION = Vx.xx
     * - 640KB MEMORY
     * - COLOR/GRAPH(80 Column)
     * - 1 FLOPPY DISK DRIVE(S)
     * - 1 ASYNC ADAPTER
     * - 1 HARD DISK DRIVE(S)
     * - 1 PRINTER ADAPTER
     * - 0 MATH CO-PROCESSOR
     * - xxxxxKB EXTENDED MEMORY

PRESS [ENTER] KEY ?
```

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

3.22 SETUP

3.22.1 Function Description

This function displays the current system setup information as listed below.

MEMORY
        Total
        Base
        Shadow BIOS ROM
        Extended memory
        Hard RAM

DISPLAY
        Display adapter
        LCD display mode
        LCD gray scale level

HARD DISK
        Capacity

POWER ON PASSWORD

TIME & DATE

COM/PRT/FDD
        Serial port
        Card modem
        External FDD/PRT
        Printer port type

OTHERS
        Resume mode
        Battery Save Mode
        Processing speed
        Cache
        Popup
        Speaker
        Battery alarm
        Panel power on/off
        Alarm power on

BATTERY SAVE OPTIONS
> CPU super sleep mode
> HDD auto off
> FDD auto off
> Display auto off
> System auto off
> LCD brightness

3.22.2 Accessing the SETUP

Select the SETUP function by typing **0** from the DIAGNOSTICS MENU and pressing **Enter**. A display similar to the following will appear.

```
                            T3300SL SETUP
    ┌──────── MEMORY ────────┐        ┌──────── COM/PRT/FDD ────────┐
    │ Total          =  2048KB │      │ Serial Port      = COM1(IRQ4/3F8H) │
    │ Base           =   640KB │      │ Card Modem       = COM2(IRQ3/2F8H) │
    │ Shadow BIOS ROM =   128KB │     │                                │
    │ Extended       =  1280KB │      │ External FDD/PRT  = Printer     │
    │ Hard RAM       =     0KB │      │ Printer Port Type = Output      │
    └────────────────────────┘        └────────────────────────────┘

    ┌──────── DISPLAY ────────┐        ┌──────── OTHERS ────────┐
    │ Display Adaptor   = VGA Compatible │ Resume Mode       = Boot      │
    │                                │   │ Battery Save Mode = Long Life │
    │ LCD Display Mode   = Color     │   │ Processing Speed  = High      │
    │ LCD Gray Scale Level= Normal 32 Levels │ Cache     = Enable    │
    │                                │   │ Popup             = Enable    │
    ┌──────── HARD DISK ────────┐    │   │ Speaker           = On        │
    │ Capacity          = 80MB  │    │   │ Battery Alarm     = On        │
    └────────────────────────┘      │   │ Panel Power On/Off = Disable  │
    ┌──── POWER ON PASSWORD ────┐    │   │ Alarm Power On    = Disable   │
    │ Not Registered            │    │   └────────────────────────────┘
    └────────────────────────┘
    ┌──────── TIME & DATE ────────┐
    │ 15:05:16,   Thu May 07, 1992 │
    └────────────────────────────┘

    ↑↓→ : Select items, Space,BkSp : Changes values,
    ESC : Exit without saving, Home : Set default values, End : Save and reboot
```

This display is an example of the setup options as they currently may be stored in memory. The display you see may be different from the one above. The available setup options for the display are dependent on the value selected for "Display Adapter."

Notice that selecting the type of diskette drive is not an option. The T3300SL automatically determines what type of internal diskette drive is installed. Also, you don't have to run the SETUP function to use an external 5.25-inch diskette drive.

Press **ESC** if the setup options displayed accurately reflect your hardware configuration and no changes are necessary. The following message is displayed.

Exit Without Saving? (Y/N)

Press **Y** and the system returns to the DIAGNOSTICS MENU.

3.22.3 Changing SETUP Values

The SETUP values can be changed automatically to their default settings or manually to user-selected settings.

Automatic Reset

Follow these steps to set all the SETUP options to their default settings.

1.   Press **Home**. This instructs the program to reset all the options to their default settings.

        The program calculates how much base and extended memory your T3300SL has based on whether or not you have an expansion memory card installed.

        The T3300SL SETUP menu displays the new values.

2.   Confirm that the new SETUP values are correct. To change any option(s), go to the next section, **Manual Reset**.

3.   If the new values are correct, go to step 4 of the **Manual Reset** section below.

Manual Reset

Follow these steps to change any SETUP option(s) manually.

> *NOTE: The cursor, shown as a reverse video bar, indicates which option is presently selected for change.*

1.   Use the arrow keys or **Enter** to move the cursor between options. You can also select each option group by pressing the character on the keyboard corresponding to the first character of the heading for each option group. For example, if you press **D**, the cursor moves to the top of the DISPLAY option group.

2.   When the option you want to change is highlighted, press the **Spacebar** and/or **Backspace** keys to display the alternate values.

3.   When you finish making changes, press **End** to record the new values in the configuration memory.

4.   The SETUP menu displays the following message.

```
        Save Settings And Reboot? (Y/N)
```

5.   Review your changes. If you need to make more alterations, press **N** and return to step 1 above.

6.   If the new values are correct and the following message is displayed, proceed to step 7.
        Otherwise, proceed to step 8.

               Insert Password Disk if necessary

        The above message appears when the Power On Password option has been enabled.

7.   Insert a diskette into drive A. This diskette will become the Password Service Disk that can
        be used to start up the computer without entering the password.

> *NOTE: The contents of the diskette will be erased when the Password Service Disk is cre-
> ated. You can insert either a formatted or unformatted diskette for this procedure.*

8.   Press **Y** to save the SETUP changes. If you inserted a diskette for the Password Service
        Disk procedure, the SETUP function will now create the disk. When the procedure is com-
        pleted, the following message is displayed.

        Remove the Password Service Disk and Press any key.

        Remove the Password Service Disk and press any key. The diskette should be stored in a
        safe place.

9.   The new SETUP values are now recorded into CMOS memory and the system reboots.

3.22.4 SETUP Option Descriptions

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

MEMORY

This group of options displays the configuration of the memory installed in the T3300SL. Certain
options allow you to configure the memory you install in the T3300SL.

        TOTAL

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

        BASE

        This field displays the amount of base (conventional) memory, 640KB, which is automati-
        cally calculated by the computer.

SHADOW BIOS ROM

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

EXTENDED MEMORY

This field displays the amount of extended memory the T3300SL has available. The amount of memory allocated to extended memory depends on the size of the Hard RAM.

HARD RAM

Use this option to create a Hard RAM disk in the T3300SL's memory. To configure the Hard RAM, you can choose the size of the Hard RAM in 512KB increments. The amount of memory you can allocate for the Hard RAM depends on the size of the extended memory installed in the T3300SL.

DISPLAY

This group of options helps you configure the T3300SL's display.

DISPLAY ADAPTER

Use this option to choose the display adapter.

VGA compatible	Chooses the internal adapter for the VGA display. This is the default setting.
Not used	Chooses an external adapter installed in the Desk Station IV.

LCD DISPLAY MODE

Use this option to set the T3300SL's display mode.

Color	Selects the 80x25 text or 640x480 graphics modes. This option also affects a color monitor attached to the RGB port. This is the default setting.
Monochrome	Selects the monochrome mode and simulates 64 levels of gray with the LCD's 32 levels of gray. This is also used when you attach a VGA monochrome monitor to the RGB port.

LCD GRAY SCALE LEVEL

This option lets you switch between 16 and 32 levels of gray and uses normal or reverse video. This option also appears in the Pop-up Window. The options are:

Normal 16 levels	Displays black text on a white background with 16 levels of gray.
Reverse 16 levels	Displays white text on a black background with 16 levels of gray.
Normal 32 levels	Displays black text on a white background with 32 levels of gray. This is the default setting.
Reverse 32 levels	Displays white text on a black background with 32 levels of gray.

HARD DISK

This option displays the size and type of hard disk installed in the T3300SL.

POWER ON PASSWORD

This option allows you to enable or disable the password required for the T3300SL to power on and allow access to the C prompt.

If the Power On Password option has not been enabled, the SETUP function displays the following message:

Not Registered

HOW TO ENABLE THE PASSWORD

To enable the Power On Password option, follow these steps.

NOTE: When typing the password, you can use either capital letters or small letters.

---

1.   Highlight the **Not Registered** setting in the Power On Password option.

2.   Press the **Spacebar** or **Backspace** key to display the following prompt.

Password =

3. Enter a password consisting of up to ten characters. The character string you enter is displayed as a string of asterisks. For example, if you enter a password consisting of four characters, the display is shown as:

`Password = ****`

NOTE: If you press **Enter** *before entering the password,* `Not Registered` *will appear on the display.*

---

4. Press **Enter**. The following message appears allowing you verify the password.

`Verify Password =`

5. Re-enter the same character string you just entered and press **Enter**. If the two character strings match, the password is registered and the display changes to:

`Registered`

If they do not match, the following message appears along with a beep indicating you must repeat steps 1 through 4.

`Entry Error!`

HOW TO DISABLE THE PASSWORD

To disable the Power On Password option, follow these steps:

1. Highlight the `Registered` setting in the Power On Password option.

2. Press the **Spacebar** or **Backspace** key to display the following prompt.

`Password =`

3. Enter the currently registered password. The character string you enter is displayed as a string of asterisks.

`Password = ****`

NOTE: If you press **Enter** *before entering the password,* `Registered` *will appear on the display.*

4.	Press **Enter**. If the character string you entered matches the registered password, the password option is reset and the display changes to:

	Not Registered

	If the character strings do not match, the following message appears along with a beep indicating you must repeat steps 1 through 4.

	Entry Error!

5.	To enable a new password, follow the procedure outlined under the above section, HOW TO ENABLE THE PASSWORD.

MAKING A PASSWORD SERVICE DISK

The T3300SL provides a special feature that uses the Password Service Disk to unlock the password. To create the Password Service Disk, prepare a formatted 3.5-inch 2DD floppy disk (any data on the disk will be erased) and follow the steps below.

1.	Enable the Power On Password option as described above.

2.	 Insert the 3.5-inch 2DD floppy disk into drive A.

3.	Press **End** and the following message appears.

	Save settings and reboot? (Y/N)
	Insert Password Service Disk if necessary.

4.	Press **Y**. The computer writes the password data to the floppy disk. When the procedure is completed, the following message is displayed.

	Remove the Password Disk, then press any key.

5.	When the drive indicator lights are off, remove the floppy disk.

6.	Remove the disk and press any key. The new SETUP values are now recorded in CMOS memory and the system reboots. The disk should be stored in a safe place.

TIME & DATE

Use this option to change the system date and time stored by the calendar clock timer.

COM/PRT/FDD

This group of options allows you to set the serial and parallel ports and the built-in modem.

SERIAL PORT

This option allows you to select either COM1 or COM2 for the serial port.

COM1 (IRQ4/3F8h)   Assigns COM1 to the serial port. This is the default setting.

COM2 (IRQ3/2F8h)   Assigns COM2 to the serial port.

Not Used   Disables the serial port. You can now install an optional card in one of the expansion slots without any conflict with the COM level of the serial port.

CARD MODEM

This option allows you to select either COM1 or COM2 for the card modem port.

COM1 (IRQ4/3F8h)   Assigns COM1 to the card modem port.

COM2 (IRQ3/2F8h)   Assigns COM2 to the card modem port. This is the default setting.

Not Used   Disables the card modem port. You can now install an optional card in one of the expansion slots without any conflict with the COM level of the card modem port.

NOTE: You can assign a COM level only once. For example, the Serial Port and Card Modem options cannot both be assigned to **COM1**.

CARD MODEM POWER

If a card modem is installed in the T3300SL, this option appears. It assigns power to the modem.

ON   Supplies power to the card modem.

OFF   Turns the power off to the card modem.

Use this option to save battery power when you are not using the modem.

EXTERNAL FDD/PRT

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

Printer	Configures the parallel port for output to a printer. The internal FDD becomes drive A. This is the default setting.
FDD A	Configures the port for output and input with an external floppy disk drive and assigns the external drive as A. By default the internal drive becomes drive B.
FDD B	Configures the port for output and input with an external floppy disk drive and assigns the external drive as B. By default the internal drive becomes drive A.

PRINTER PORT TYPE

When the **PRT/FDD** port is set for output to the Printer (as opposed to the external floppy disk drive), this option lets you change the printer port from output only (the default) to receive input as well as output. Do not change this setting if you're connecting the T3300SL to a printer. You would change this option only if you're connecting the computer to a device that requires a bidirectional parallel signal.

Output	Activates unidirectional operation. This is the default setting.
Bi-directional	Activates bidirectional operation.

OTHERS

Whether or not you need to configure the T3300SL with these options depends primarily on the type of software or peripherals you use.

RESUME MODE

This option enables and disables the AutoResume feature. You can also set this option using the Pop-up Window.

Boot	Enables the boot mode by disabling the AutoResume feature. This is the default setting.
Resume	Enables the AutoResume feature.

BATTERY SAVE MODE

This option is used to select the battery save mode. You can also set this option using the Pop-up Window.

When the AC adapter is connected to the T3300SL, this option uses the **Normal Life** setting even if you have the option set to **Long Life** or **User Setting**. The default setting is **Long Life** when the T3300SL uses battery power.

Long Life and **Normal Life** — Selects a preset set of battery save values suitable for either Long or Normal battery life operation. Selecting this option displays a window of BATTERY SAVE OPTIONS, like the one shown here. The values in this window cannot be changed and are for informational purposes only.

Battery Save Options	Long Life	Normal Life
CPU super sleep mode	Enable	Disable
HDD auto off	03 Min.	Disable
FDD auto off	Enable	Disable
Display auto off	03 Min.	Disable
System auto off	30 Min.	Disable
LCD brightness	Semi-Bright	Bright

User Setting — Selecting this option allows you to choose the available battery save values on the BATTERY SAVE OPTIONS window.

PROCESSING SPEED

This option determines the operating speed of the processor. Unless your software runs better under a slower speed, set this option to the default.

High — Selects the processor speed of 25MHz with optimized routines to maximize performance. This is the default setting.

Normal — Selects the normal CPU speed of 12.5MHz.

Low — Selects the low CPU speed of 6.25MHz.

CACHE

This option enables and disables the CPU cache.

Enable — CPU cache is enabled. This is the default setting.

Disable — CPU cache is disabled.

POP-UP

Use this option to enable or disable the Pop-up window.

Enable   Allows access to the Pop-up Window. This is the default setting.

Disable   Disables the Pop-up Window.

SPEAKER

This option enables and disables software use of the system speaker. This option also appears in the Pop-up Window.

On   Enables software use of the system speaker. This is the default setting.

Off   Disables software use of the system speaker. The self-test alarm is also disables, but all other system alarms are unaffected.

BATTERY ALARM

This option enables and disables the low battery or system auto off alarm. This option also appears in the Pop-up Window.

On   Enables the alarm. This is the default setting.

Off   Disables the alarm.

PANEL POWER ON/OFF

Use this option to enable or disable the automatic system power on/off function. This function automatically turns off the computer when the T3300SL's display panel is closed and then turns on the computer when the display panel is opened.

This option also appears in the Pop-up Window.

When the system is set to boot mode, this function is automatically disabled.

Enable   Enables the system automatic power off when the display panel is closed. This is the default setting.

Disable   Disables the system automatic power off when the display panel is closed.

ALARM POWER ON

Use this option to boot the T3300SL automatically at a predetermined time. Press the up and/or down arrow keys to switch between the hours and minutes. With the hours or minutes high-lighted, set the time you want the computer to start by pressing either the **Spacebar** key (as-cending time) or the **Backspace** key (descending time). The seconds cannot be set.

Once the computer turns on at the time you set, this option is automatically set to **Disable**. To start the computer automatically again, you will have to reset the time.

This option also appears in the Pop-up Window.

BATTERY SAVE OPTIONS

CPU SUPER SLEEP MODE

Use this option to enable or disable the CPU sleep mode. The sleep mode processing speed depends on the processing speed selected in the SETUP program's Processing Speed option as shown below:

Processing speed	Sleep speed
High (25MHz) or Normal (12.5MHz)	6.25MHz
Low (6.25MHz)	3.125MHz

When the AC adapter is connected to the computer and a wall outlet, this function is automatically disabled.

Enable   Enables the CPU sleep mode. The computer will automatically shift to an operating speed of 6.25MHz or 3.125MHz when the processor is idle. This is the default setting.

Disable   Disables the CPU sleep mode.

HDD AUTO OFF

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

When the AC adapter is connected to the computer and a wall outlet, this function is automatically disabled.

Disable   Disables the HDD automatic power off. This is the default setting.

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

FDD AUTO OFF

Use this option to enable or disable the FDD automatic power off function.

When the AC adapter is connected to the computer and a wall unit, this function is automatically disabled.

Enable   Enables the FDD automatic power off.

Disable   Disables the FDD automatic power off.

DISPLAY AUTO OFF

Use this option to disable or set the duration of the display automatic power off function. This function causes the T3300SL to turn the sidelight off if you don't use the computer for the specified period of time.

When the AC adapter is connected to the computer and a wall outlet, this function is automatically disabled.

Disable	Disables the display automatic power off. This is the default setting.
xx Min.	Automatically turns off power to the sidelit LCD panel if the computer is not used for the specified duration. The duration (**xx**) can be set to 1, 3, 5, 10, 15, 20, or 30 minutes.
Always OFF	Turns off power to the sidelit LCD display's fluorescent lamp. This value is not displayed if the AC adapter is connected.

SYSTEM AUTO OFF

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

When the AC adapter is connected to the computer and a wall outlet, this function is automatically disabled.

Disable	Disables the system automatic power off.
xx Min.	Automatically turns off power to the computer if it is not used for the specified duration. The duration (**xx**) can be set to 30 or 60 minutes.

LCD BRIGHTNESS

This option lets you select the brightness level for the LCD.

When the AC adapter is connected to the computer and a wall outlet, this option is automatically is set to Bright.

Bright	The maximum brightness level will be used by the LCD.
Semi-Bright	A slightly lower brightness level will be used by the LCD.

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Chapter 4
Replacement Procedures

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Contents

Figures

4.1   General

This chapter explains how to disassemble and assemble the T3300SL to replace the Field Replace-able Units (FRUs). It is not always necessary to remove all the FRUs in order to replace one. The chart below is a guide to which FRUs need to be removed so you can replace the one that is causing the T3300SL to operate abnormally. Always start by removing the AC adapter and battery pack, then follow the disassembly lines on the chart to the FRU you are removing.

```
┌──────────────────┐                              ┌────────────────────┐
│  Battery Pack    │──────────────────────────────│  LCD Module        │
└──────────────────┘                              │                    │
         │                                         │  FL Inverter Board │
    ┌────┴─────────────────────────────────┐      └────────────────────┘
    │    Memory Card and Card Modem         │                 │
    │                                       │                 │
    │    Bottom Cover                       │                 │
    │                                       │                 │
    │    Battery Terminal Assembly          │                 │
    │                                       │                 │
    │    Hard Disk Drive and Battery        │                 │
    │    Pack Assembly                      │                 │
    │                                       │      ┌────────────────────┐
    │    Communication Ports ───────────────┼──────│  LCD Display Cables│
    │                                       │      └────────────────────┘
    │    System Board                       │
    │          Top Half                     │      ┌────────────────────┐
    │          Floppy Disk Drive ───────────┼──────│  LED Board         │
    │          Bottom Half                  │      └────────────────────┘
    │                                       │
    │    Power Supply Board                 │
    │                                       │
    │    Keyboard                           │
    └───────────────────────────────────────┘
```
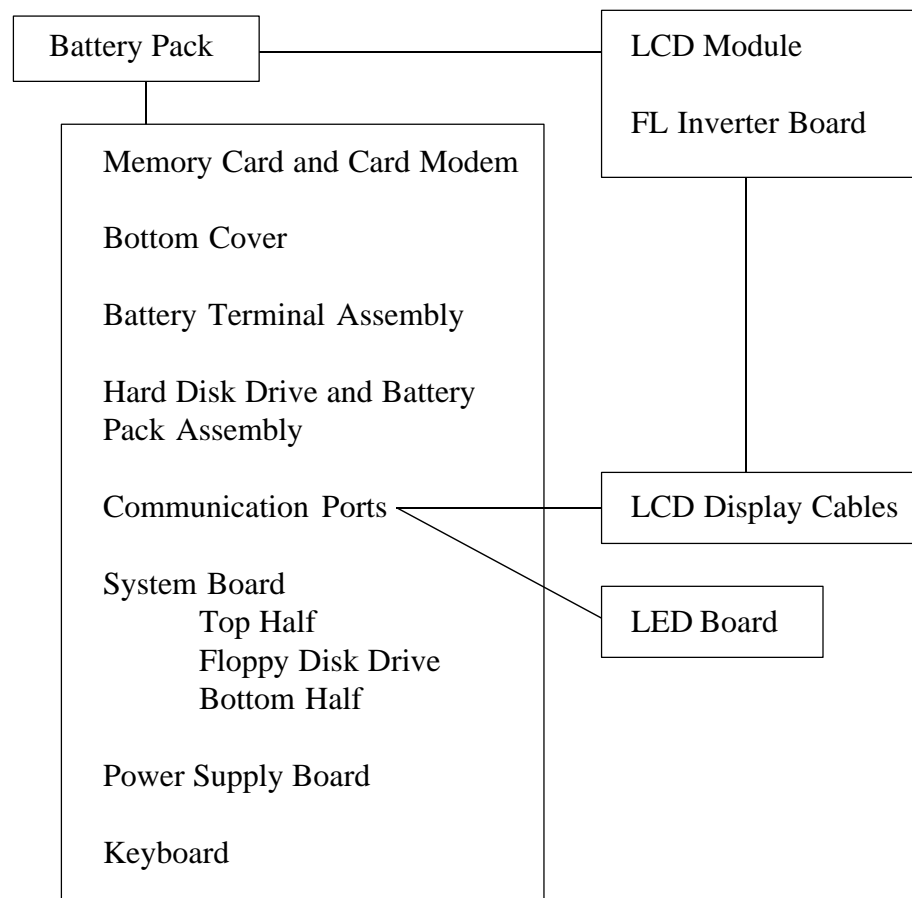
CAUTION: The T3300SL is assembled with zinc-coated screws and nickel chrome-plated screws. The zinc-coated screws are yellow and are used only inside the T3300SL. The nickel chrome-plated screws are used throughout the computer; however, only M2x5 nickel chrome-plated screws are used internally in the T3300SL.

4.1.1 Before You Begin

Review the procedures in this section and familiarize yourself with the steps required to disassemble and assemble the T3300SL. Begin each procedure by removing the AC adapter and the battery pack as instructed in Section 4.2, *Battery Pack,* and remember the following points:

1.   Do not disassemble the T3300SL unless it is operating abnormally.

2.   Use only the correct and approved tools.

3.   Make sure the working environment is free of the following elements whether you are using or storing the T3300SL:

 ❑   Dust and contaminates
 ❑   Static electricity
 ❑   Extreme heat, cold, or humidity

4.   Make sure the FRU you are replacing is causing the T3300SL to operate abnormally by performing the necessary diagnostic tests described in Chapter 3 of 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 T3300SL.

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

7.   You will remove and replace many screws when you disassemble the T3300SL. When you remove screws, make sure they are placed in a safe place and identified with the correct parts.

8.   When reassembling the T3300SL, make sure you use the correct screws to secure the various pieces in place. Screw sizes are shown in the corresponding Figures.

9.   The T3300SL contains many sharp edges and corners, so be careful not to injure yourself.

10.   After you have replaced an FRU, make sure the T3300SL is functioning properly by performing the appropriate diagnostic test on the FRU you have fixed or replaced.

4.1.2 Disassembly Procedures

The T3300SL has two basic types of cable connectors:

 ❑   Pressure Plate Connectors
 ❑   Normal Pin Connectors

To disconnect a cable from a Pressure Plate Connector, release the tabs on both sides of the plastic connector and slide the cable out of the connector.

To connect a cable to a Pressure Plate Connector, make sure the tabs of the Pressure Plate Connector are fully extended. Insert the flexible cable, silver side up into the connector. Secure the cable in place by pressing down on the tabs so they are flush with the sides of the connector. Gently pull on the cable to make sure the cable is secure. If the cable comes out of the connector, connect it again making sure the tabs of the connector are fully extended when you insert the cable.

The Normal Pin Connectors are used to connect the remaining cables. These cables can be connected and disconnected from the connectors by simply pulling them apart and pushing them together.

4.1.3 Reassembly Procedures

After you have disassembled the T3300SL and fixed or replaced the FRU, you will need to reassemble the T3300SL. While assembling the T3300SL remember the following general points:

❑ Take your time and make sure you follow the reassembly instructions closely. Most problems arise when you get in a hurry to reassemble the T3300SL.

❑ Make sure all cables and connectors are securely fastened. The T3300SL uses many flexible cables. The flexible cables all have one side that is silver. Always make sure you connect these cables with the silver side facing up.

❑ Before securing replaced parts, make sure the cables will not be pinched by screws or other parts during reassembly.

❑ Make sure all latches and pressure plate connectors are locked into place.

❑ Be sure to use the correct screws to secure the various parts. Screw sizes are listed in the corresponding Figures.

❑ Make sure you replace all the screws that were removed during disassembly.

❑ After installing an FRU in the T3300SL confirm that the FRU and the T3300SL are functioning properly.

4.1.4   Tools and Equipment

The use of ElectroStatic Discharge (ESD) equipment is very important to your safety and the safety of those around you. Proper use of ESD devices will increase the success rate of your repairs and lower the cost of damaged or destroyed parts and FRUs. The following equipment is necessary to disassemble and reassemble the T3300SL:

- One 2mm Phillips-head screwdriver to remove and replace screws

- One 3mm Phillips-head screwdriver to remove and replace the ground screw

- Tweezers to lift out screws that you cannot grasp with your fingers

- One System Board Support Block (85mm x 120mm x 300mm/3¼"h x 4¾"d x 12"w) This block must be composed of anti-static foam.

- One LCD Support Block (30mm x 200mm x 300mm/1¼"h x 8"d x 12"w) This block must be composed of anti-static foam.

- ESD mats for the floor and table you are working on

- ESD wrist strap or heel grounder

- Anti-static carpeting and flooring

- Air ionizers in highly static sensitive areas

4.2   Battery Pack

The battery pack is always the first FRU you should remove when you disassemble the T3300SL. This is done as a safety precaution so you do not get an electric shock as you are disassembling or reassembling the computer.

4.2.1   Removing the Battery Pack

1.   Turn off the power to the T3300SL. Disconnect the AC adapter and all external cables connected to the T3300SL.

2.   Facing the right side of the computer, push up and hold the **battery cover release lever** as you slide the **battery pack cover** toward the back of the computer. Remove the battery pack cover to expose the battery pack (Figure 4-1).

Figure 4-1 Removing the battery pack cover

3.   Firmly grasp the **battery pack pull tab** and pull the **battery pack** out far enough so that you can grasp the battery pack. Then pull the battery pack out of the computer (Figure 4-2).

Figure 4-2 Removing the battery pack

4.2.2 Installing the Battery Pack

> ***WARNING:*** *Inserting the battery pack incorrectly can short circuit the battery and the T3300SL, thus permanently damaging the T3300SL and the battery pack.*

1. Make sure the arrow on the **battery pack** is pointing up. Then align the battery pack with the battery pack slot in the T3300SL.

2. Slide the **battery pack** into the battery slot until it is flush with the side of the T3300SL case (Figure 4-2).

3. Place the **battery pack cover** in place and secure its latch (Figure 4-1).

4.3   Optional Memory and Card Modem

4.3.1   Removing the Optional Memory Card and Card Modem

1.   Turn off the power to the T3300SL. Disconnect the AC adapter and all external cables connected to the T3300SL.

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

3.   Open the display panel if it is closed.

4.   Turn the computer so its left side is facing you.

5.   Remove the **expansion memory card slot cover** to expose the **memory card slot** (Figure 4-3).

Figure 4-3 Removing the memory card slot cover

6. Grasp the **memory card pull tab** and pull it out until you can easily grasp the **memory card**. Pull the memory card out of the T3300SL (Figure 4-4). Slide the pull tab back into the T3300SL.

<div style="border:1px solid">

CAUTION: Do not touch the connecting edge of the memory card. Debris or grease in the connector may cause memory access problems.

</div>

Figure 4-4 Removing the memory card

7. Turn the computer so its right side is facing you.

8. Remove the **card modem slot cover** to expose the card modem slot (Figure 4-5).

Figure 4-5 Removing the card modem slot cover

9. Grasp the card modem pull tab and pull it out of the computer until you can easily grasp the card modem.

10. Grasp the card modem and pull it out of the T3300SL. Slide the pull tab back into the T3300SL.

<div style="border:1px solid">

CAUTION: Do not touch the connecting edge of the memory card. Debris or grease in the connector may cause memory access problems.

</div>

4.3.2   Installing the Memory Card and Card Modem

1.   Turn off the power to the T3300SL. Disconnect the AC adapter and all external cables connected to the T3300SL.

2.   Open the display panel if it is closed.

3.   Turn the computer so its left side is facing you.

4.   If necessary, remove the **expansion memory card slot cover** to expose the **memory card slot** (Figure 4-3).

5.   Gently pull the **memory card pull tab** out of the memory card slot until it stops.

6.   Orient the **memory card** face down, with its connecting edge facing the computer. Carefully insert the card into the memory card slot. Make sure the card is snugly connected in the T3300SL (Figure 4-4).

NOTE: If the memory card does not fit properly or jams as you try to install it, try to pull it out of the computer and repeat steps 5 and 6. If the card will not come out of the T3300SL, follow the instructions in Section 4.8, Communication Ports Bracket. After step 7 in Section 4.8, you should be able to remove the jammed card.

---

7.   Replace the **memory card slot cover** over the **memory card slot** (Figure 4-3).

8.   Turn the computer so its right side is facing you.

9.   If necessary, remove the **card modem slot cover** to expose the card modem slot (Figure 4-5).

10.   Gently pull the card modem pull tab out of the card modem slot until it stops.

11.   Orient the card modem face down, with its connecting edge facing the computer. Carefully insert the card into the card modem slot. Make sure the card is snugly connected.

NOTE: If the card modem does not fit properly or jams as you try to install it, try to pull it out of the computer and repeat steps 5 and 6. If the card will not come out of the T3300SL, follow the instructions in Section 4.8, Communication Ports Bracket. After step 7 in Section 4.8, you should be able to remove the jammed card.

---

12.   Replace the **card modem slot cover** over the **card modem slot** (Figure 4-5).

4.4 Bottom Cover

4.4.1 Removing the Bottom Cover

1.   Turn off the power to the T3300SL. Disconnect the AC adapter and all external cables connected to the T3300SL.

2.   Remove the battery pack, memory card, and card modem as instructed in Sections 4.2 and 4.3.

3.   Close the LCD display if it is open.

4.   Remove the **PS/2 mouse cover**, the **keypad connector cover**, the **communication ports cover**, and the **EXP connector cover** (Figure 4-6).

Figure 4-6 Removing the port covers

5.   Turn the T3300SL over with its front facing you and remove the **nine M2x6 screws** and the **one M2x8 screw** securing the **bottom cover** and the **math coprocessor cover** to the computer (Figure 4-7).

Figure 4-7 Removing the ten bottom cover screws

6.   Release the **two latches** on the front of the T3300SL, the **one side latch** on the side of the top cover, and the **one latch** on the back of the **bottom cover**. Separate the bottom cover from the computer (Figure 4-8).

Figure 4-8 Removing the bottom cover

7.   Remove the tape securing the PS/2 mouse cable to the sub battery. Then disconnect the sub battery cable from PJ4 on the power supply board. Carefully remove the sub battery from the computer.

> *Note: Review the routing of the sub battery cable before you disconnect it. It is very important to route this cable correctly when you reassemble the computer.*

4.4.2 Installing the Bottom Cover

1. Connect the sub battery cable to PJ4 on the power supply board. Then position the battery beneath the PS/2 mouse cable so that the battery is flush with the posts.

2. Position all the wires so that they are not pinched by the sub battery. Then secure the PS/2 mouse cable to the battery with tape (Figure 4-9).

Figure 4-9 Installing the sub battery tape

3. Place the bottom cover over the computer, adjusting it as necessary to align the screw holes and seams.

> *CAUTION: When installing the bottom cover on the computer, push the FDD cover in with your finger so that the cover does not jam when you secure the bottom cover.*

4. Make sure the **two front latches** and **one back latch** snap into place (Figure 4-8).

5. Place the **math coprocessor cover** into position and secure the **bottom cover** to the computer with the **one M2x8 screw** and the **nine M2x6 screws** (Figure 4-7).

6. Install all the port covers (Figure 4-6).

4.5 Battery Terminal Assembly

4.5.1 Removing the Battery Terminal Assembly

1. Turn off the power to the T3300SL. Disconnect the AC adapter and all external cables connected to the T3300SL.

2. Remove the bottom cover as instructed in Section 4.4.

3. Turn the computer so that its back is facing you. Then remove the **tape** securing the **battery terminal cables** and **HDD cable** (Figure 4-10).

4. Disconnect the **battery terminal cables** from **PJ2** and **PJ3** on the power supply board (FMSPSx) (Figure 4-10).

5. Remove the **two M2x6 screws** securing the **battery terminal assembly** to the battery pack case. Slide the battery terminal cables under the flexible HDD cable. Lift the battery terminal assembly out of the computer (Figure 4-10).

Figure 4-10 Removing the battery terminal assembly

4.5.2   Installing the Battery Terminal Assembly

> *NOTE: The battery terminal assembly is the last item to be installed before installing the bottom cover on the T3300SL.*

1.   Route the **battery terminal cables** under the flexible **HDD cable**. Connect the cables to **PJ2** and **PJ3** on the power supply board (Figure 4-10).

2.   Place the **battery terminal assembly** at the end of the battery pack case just in front of the HDD. Align the two screw holes on the battery pack case with the battery terminal assembly. Secure the battery terminal assembly with the **two M2x6 screws** (Figure 4-10).

3.   Secure the **HDD cable** and **battery terminal cables** with **tape** (Figure 4-11).
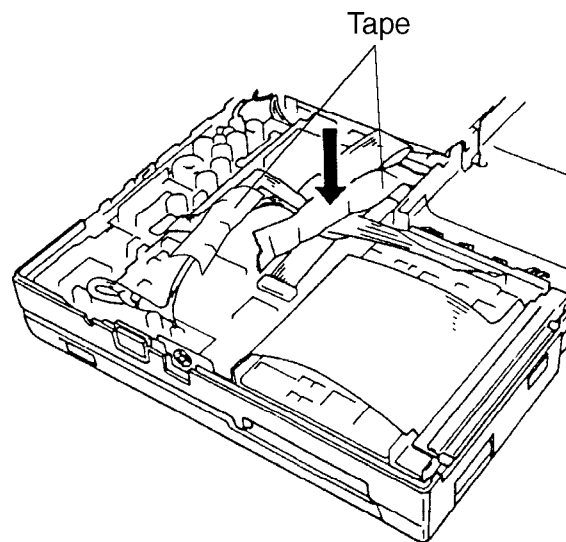
Figure 4-11 Taping the HDD and Battery Terminal Assembly cables

4.   Secure the **PS/2 mouse cable** and **RTC battery cable** to the edge of the FDD with tape.

4.6   Hard Disk Drive and Battery Pack Case

4.6.1   Removing the Hard Disk Drive and Battery Pack Case

1.   Turn off the power to the T3300SL. Disconnect the AC adapter and all external cables connected to the T3300SL.

2.   Remove the battery terminal assembly as instructed in Section 4.5.

3.   Disconnect the **HDD cable** from the HDD (Figure 4-12).
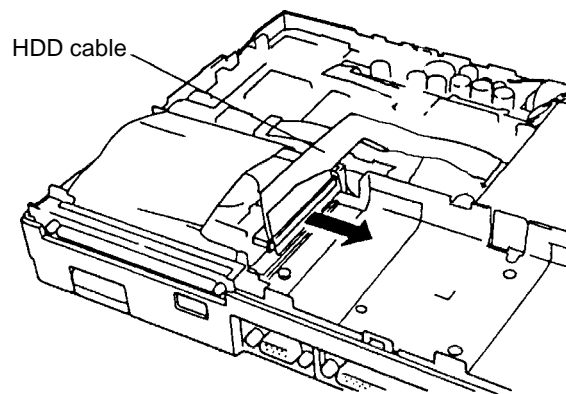
Figure 4-12   Disconnecting the flexible HDD cable

4.   Remove the **single M2x4 screw** securing the **150-pin expansion port**. Slide the 150-pin expansion port to the right to release it from its **latch**. Lift the port up and gently lay it on the system board (Figure 4-13).

Figure 4-13   Disconnecting the 150-pin expansion port

5. Remove the **single M2x4 screw** securing the HDD and **battery pack case assembly support bracket** on the right side of the computer. Then remove the support bracket (Figure 4-14).

Figure 4-14 Removing the battery pack case assembly support

6. Remove the **four M2x6 screws** securing the battery case and the **single M2x6 screw** from the HDD bracket (Figure 4-15).

Figure 4-15 Removing the HDD bracket and battery case screws

7. Gently lift the battery case and HDD out of the computer.

8. Remove the **four M2.5x4 special screws** (JDE2085M JVC drive) or **four M3x4 special screws** (MK2024FC/MK2124FC Toshiba drive) securing the **HDD** to the **bracket**. Separate the HDD from the bracket (Figure 4-16).

Figure 4-16 Removing the HDD from the HDD bracket

4.6.2 Installing the Hard Disk Drive and Battery Pack Case

NOTE: Before installing the Hard Disk Drive and battery pack case, make sure all the cables, screws and card holders are installed correctly.

1. Secure the **HDD** in the **bracket** with the **four M2.5x4 special screws** (JDE2085M JVC drive) or **four M3x4 special screws** (MK2024FC/MK2124FC Conner drive) (Figure 4-16).

2. Place the HDD and battery pack assembly in the T3300SL and align the screw holes in the battery pack case area.

3. Secure the HDD and battery pack assembly in place with the **five M2x6 screws** (Figure 4-15).

4. Connect the flexible HDD cable to the HDD.

5. Place the **150-pin expansion port** over the HDD. Slide the 150-pin expansion port to the left to secure its **latch**. Secure the 150-pin expansion port in place with the **single M2x4 screw** (Figure 4-13).

6. Place the **battery pack case assembly support bracket** in position and secure it with the **single M2x4 screw** (Figure 4-14). Make sure the edge of the bracket closest to the communication ports bracket is positioned beneath the plastic edge of the battery pack case.

4.7   Communication Ports Bracket

4.7.1   Removing the Communication Ports Bracket

1.   Turn off the power to the T3300SL. Disconnect the AC adapter and all external cables connected to the computer.

2.   Remove the HDD and battery pack case assembly as instructed in Section 4.6.

3.   Reposition the 150-pin expansion port away from the system board.

4.   Disconnect the **AC adapter socket flexible cable** from pressure plate connector **PJ21** on the system board and **PJ1** on the power supply board. Remove the **single M2x4 screw** securing the **AC adapter socket** to the **communication ports bracket** (Figure 4-17).

5.   Slide the AC adapter socket out of the cutout on the communication ports bracket, being careful not to damage the HDD cable, and remove the AC adapter socket and its cable (Figure 4-17).

CAUTION: Be careful when removing the AC adapter socket and cable from the computer. They may easily tangle with the HDD cable.

Figure 4-17 Removing the AC adapter socket

6. Reposition the expansion port over the system board. Then remove the **two M2x4 screws** securing the communication ports bracket to the computer (Figure 4-18).

7. Remove the **four M2x5 screws** securing the card modem and memory card connectors (Figure 4-18).

Figure 4-18 Unsecuring the card modem and memory card holders

8. Gently force the top cover away from the **communication ports bracket**. Lift and rotate the communication ports bracket out the computer in the direction of the arrow shown in Figure 4-19.

Figure 4-19 Removing the communication ports bracket

9. Lift up the **memory** and **card modem holders** (Figure 4-20).

Figure 4-20 Removing the holders

4.7.2 Installing the Communication Ports Bracket

1. Connect the **AC adapter socket flexible cable** to **PJ1** on the power supply and **PJ21** on the system board. Align the **AC adapter socket** on the **communication ports bracket**. One side of the board fits into the cutout on the bracket. Secure the AC adapter socket in place with the **single M2x4 screw** (Figure 4-17).

2. Before installing the communication ports bracket, make sure the **display panel shut-off switch cable** and **display cable** are routed correctly and will not be pinched by the communication ports bracket (Figure 4-21).

Figure 4-21 Display panel shut-off switch and display cable routing

3.   Gently pull the top cover to allow the communication ports bracket to slide into place (Figure 4-19). Align the right side of the bracket (as you are facing the back of the computer) with the alignment pin and secure the bracket with the **single M2x4 screw** on the inside hole. Secure the left side of the bracket with the **single M2x4 screw** just below the AC adapter socket (Figure 4-18).

4.   Install the **memory card holder** (marked G2) and **card modem holder** (marked G1) (Figure 4-20).

5.   Secure the memory and modem ports with the **four M2x5 screws** (Figure 4-18).

4.8 System Board, LED Board, and Floppy Disk Drive

4.8.1 Removing the System Board, LED Board, and Floppy Disk Drive

1. Turn off the power to the T3300SL. Disconnect the AC adapter and all external cables connected to the computer.

2. Remove the communication ports bracket as instructed in Section 4.7.

3. Reposition the 150-pin expansion port away from the system board. Then remove the **four top M2x4 screws** securing the system board to the computer (Figure 4-22).

Figure 4-22 Removing the top system board screws

4. Place the system board support block behind the computer. Gently lift up the top half of the system board containing the communication ports bracket to expose the bottom half of the system board (Figure 4-22). Lay the top half of the system board onto the support block.

> *CAUTION: Do not bend the system board flexible cables beyond 90°.*

5.   Remove the tape securing the PS/2 mouse cable and RTC battery cable to the FDD. Then disconnect the **floppy disk drive cable** from **PJ4** and the **RTC battery cable** from **PJ2** (Figure 4-23). Remove the RTC battery from the computer.

6.   Gently lift the FDD cable to expose the PS/2 mouse pressure plate connector. Then disconnect the **PS/2 mouse cable** from **PJ19** on the system board (Figure 4-23). Remove the PS/2 mouse connector and cable from the computer.

> *NOTE: Review the routing of the PS/2 mouse cable before you disconnect it. It is very important to route this cable the same way when you reassemble the computer.*

Figure 4-23 Disconnecting the cables

7.   Remove the tape and disconnect the **LED cable** from **PJ11** (Figure 4-25).

8.   Peel the **LED board** away from the top cover. An adhesive coating on the LED board is used to secure the LED board to the top cover (Figure 4-24).

Figure 4-24 Removing the LED board

9.   Remove the tape and disconnect the **display cables** from **PJ12** and **PJ13** and the **display panel shut-off switch cable** from **PJ15** on the system board (Figure 4-25).

10.   Remove the tape securing the **keyboard cable** and disconnect the keyboard cable from pressure plate connector **PJ10** on the system board (Figure 4-25).

Figure 4-25 Removing the cables connected to the system board

11.   Remove the **four M2.5x4 special screws** securing the floppy disk drive (Figure 4-26).

NOTE: It may be necessary to place the top portion of the system board back into the computer so that you can remove the two FDD screws located near the back of the computer.

Figure 4-26 Removing the floppy disk drive

12.   Reposition the system board onto the system support block. Then lift the FDD and remove
        it from the keyboard base.

---

*CAUTION: Be careful not to damage the catch hook on the keyboard base as you remove
the FDD.*

---

13.   Remove the **four M2x4 screws** securing the bottom half of the system board (Figure 4-27).
        Gently lift the system board out of the computer and disconnect the system board from the
        power supply board at PJ9 on the system board. Rest the system board on the system board
        support block.

Figure 4-27 Removing the bottom system board screws

4.8.2   Installing the System Board, LED Board, and Floppy Disk Drive

1.   Slide the system board into position making sure there are no cables or screws underneath
        it.

2.   Make sure the power supply board is positioned on its guide pin on the right side of the
        power supply board.

3.   Connect the system board to the power supply board at PJ9 on the system board.

4.   Secure the system board in place with the **four M2x4 screws** (Figure 4-27).

5.   If necessary, pull the protective covering from the new LED board. Then place the LED board
        into position by aligning it with the guide pins and lightly press the board into position.

*CAUTION: Thin file transistors (TFTs) are located throughout the LED board. Only
handle the board by its edges to avoid damaging the TFTs.*

6.   Connect the **keyboard cable** to pressure plate connector **PJ10** on the system board. Connect the **LED cable** to **PJ11**, the **display cables** to **PJ12** and **PJ13**, and the **display panel shut-off switch** to **PJ15** on the system board (Figure 4-25).

7.   Replace the **tape** over the keyboard cable, LED cable, and display cables (Figure 4-28).
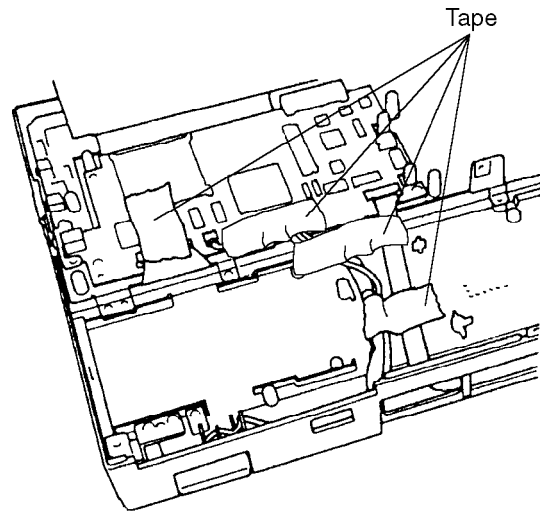
Figure 4-28 Applying the tape on the system board cables

8.   Connect the **RTC battery cable** to **PJ2** on the system board. Connect the **PS/2 mouse cable** to **PJ19** on the system board (Figure 4-23).

9.   Place the RTC battery in the slot in front of the floppy disk drive bracket. Then route the PS/2 mouse cable on top of the connector and on top of the RTC battery as you place the mouse connector into the slot on the side of the computer. Make sure both cables are clear

of all screw holes.

10.   Place the floppy disk drive in its bracket. Make sure the FDD is underneath the **catch hook** on the **keyboard base** (Figure 4-29).

11.   Make sure the RTC battery cable and PS/2 mouse cable are routed correctly and are not trapped beneath the FDD before continuing.

12.   Secure the floppy disk drive in place with the **four M2.5x4 special screws** (Figure 4-26).

Figure 4-29 Installing the floppy disk drive

13.   Lower the top half of the system board into place and secure it in place with the **four M2x4**

screws (Figure 4-22).

4.9   Power Supply Board

4.9.1   Removing the Power Supply Board

1.   Turn off the power to the T3300SL. Disconnect the AC adapter and all external cables connected to the computer.

2.   Remove the FDD and system board as instructed in Section 4.8.

NOTE: It is not necessary to remove the LED board in order to remove the power supply board. Simply disconnect the LED board from PJ11 on the system board before removing the system board.

3.   Lift the **power supply board** out of the T3300SL (Figure 4-30).
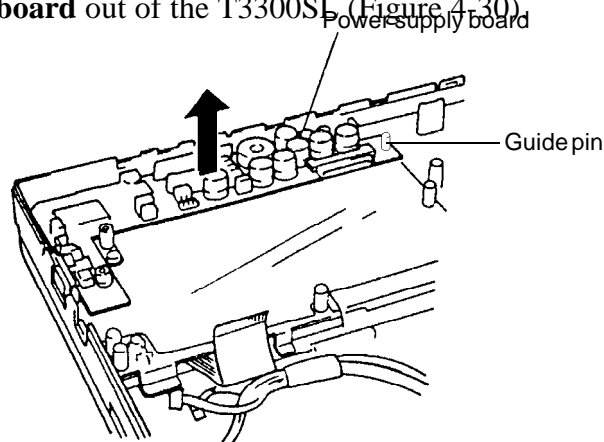
Figure 4-30 Removing the power supply board

4.9.2   Installing the Power Supply Board

1.   Place the **power supply board** in the T3300SL (Figure 4-30).

2.   Align the board with the **guide pin** on the keyboard base (Figure 4-30).

4.10 Keyboard

4.10.1 Removing the Keyboard

1.   Turn off the power to the T3300SL. Disconnect the AC adapter and all external cables connected to the computer.

2.   Remove the power supply board as instructed in Section 4.9.

3.   Remove the **five M2x4 screws** securing the **keyboard base** to the top cover (Figure 4-31).

4.   Remove the keyboard base from the computer (Figure 4-31). It may be necessary to separate the **mylar shielding** from the keyboard base and/or the keyboard.

Figure 4-31 Removing the keyboard screws

5.   Release the **two latches** securing the keyboard. Then lift the keyboard out of the computer (Figure 4-32).

Figure 4-32 Removing the keyboard

4.10.2 Installing the Keyboard

1.   Place the keyboard in the T3300SL and snap the **two latches** into place (Figure 4-32).

2.   Place the **keyboard base** into place and secure it with the **five M2x4 screws** (Figure 4-31).

3.   Secure the mylar shielding to the keyboard base and/or keyboard.

NOTE: The metal plate that provides support for the PS/2 mouse cable should be positioned in the left back corner of the keyboard base. The screw hole should align with the screw hole on the vertical support for the FDD.

4.11   Liquid Crystal Display Module

4.11.1 Removing the Display Mask, FL Inverter Board, LCD Module, and Back Cover

1.   Turn off the power to the T3300SL. Disconnect the AC adapter and all external cables
        connected to the T3300SL.

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

3.   Place the T3300SL in front of you as if you were going to use it and the open the display.

4.   Remove the **two rubber cushions** on the top of the display module, and the **two rubber
        seals** from the bottom of the display module to expose the screws securing the display
        mask. Remove the **two M2.5x6 screws** securing the bottom of the display mask and the
        two M2x6 screws securing the top of the display mask (Figure 4-33).

Figure 4-33 Removing the rubber cushions, seals, and display mask screws

5.   **Eleven plastic latches** secure the **display mask** to the **back cover** of the LCD module. To release these latches, start with the top three latches first and work your way around the mask until all eleven latches are released. Gently separate the display mask from the back cover (Figure 4-34).

Figure 4-34 Releasing the eleven latches on the display mask

CAUTION: Before removing the display mask from the T3300SL, make sure the display panel is opened to an angle of more than 90° to prevent breakage of the display hinge supports on the mask (Figure 4-34).

6.   To remove the **FL inverter board**, remove the **two M2x6 screws** at the top and bottom of the FL inverter board. Release the mylar shielding attached to the bottom of the mylar shielding that covers the FL inverter board (Figure 4-35).

7.   Gently rotate the FL inverter board toward the LCD display to expose the three cables connecting the FL inverter board to the LCD display. Disconnect the cables from **CN1**, **CN2**, and **CN3** to remove the FL inverter board from the T3300SL (Figure 4-35).

Figure 4-35 Removing the FL inverter board

8. Remove the **three M2x6 screws** and **one washer** securing the LCD display in place (Figure 4-36).

NOTE: A washer is used with the lower left screw. This washer must be installed at re-assembly.

Figure 4-36 Removing the LCD module screws

9. Release the mylar shielding on the left side of the LCD module. Lift the LCD module up and rotate it to the left and disconnect the **three display cables** from **CN1**, **CN2**, and **CN3** on the left side of the LCD (Figure 4-37).

Figure 4-37 Disconnecting the LCD display cables

10.   To remove the **back cover**, pull the **display cable** positioned along the bottom edge of the
       back cover away from the cover. Release the mylar tab from the right display hinge
       (Figure 4-38).

11.   Remove the **one M2.5x6 screw** and the **two M2x4 screws** from the display support hinges
       (Figure 4-38).
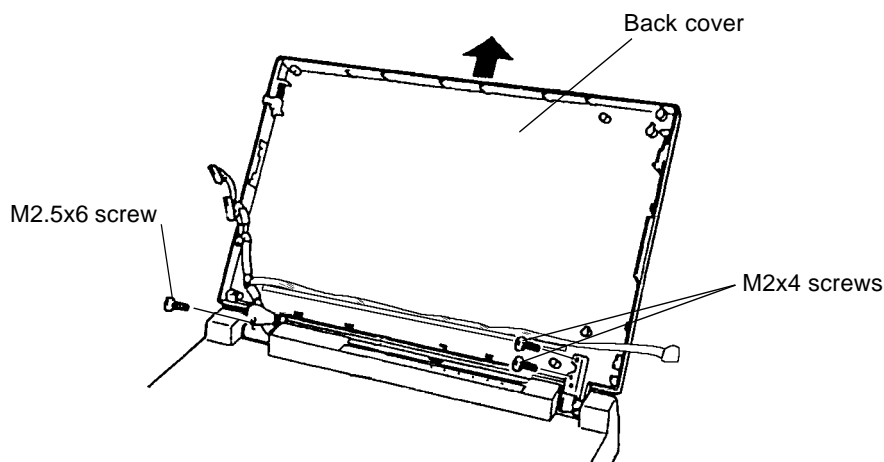
Figure 4-38 Removing the back cover of the LCD module

*CAUTION: Be careful removing the **back cover**! It may be necessary to rotate the cover
slightly so that you do not damage the bottom portion of the cover over the hinges.*

4.11.2 Installing the Back Cover, LCD Module, FL Inverter Board, and Display Mask

1.   Position the back cover, making sure that the mylar tab is not pinched between the right
      display hinge and the cover (Figure 4-38). Secure the mylar tab between the two screw
      holes.

*CAUTION: Before firmly securing the back cover screws, make sure the display cables are
not pinched by the hinges or the screws securing the back cover.*

2.   Secure the **back cover** with the **two M2x4 screws** and **one M2.5x6 screw** (Figure 4-38).

3.   Route the **display cable** in the **ridge** along the bottom of the back cover. Then gently press the mylar shielding to secure the cable in place (Figure 4-39).

Figure 4-39 LCD cable routing

4.   Connect the **display cables** on the left side of the display to **CN1**, **CN2**, and **CN3** on the LCD (Figure 4-37).

5.   Place the LCD module in the back cover. Position and secure the mylar shielding over the LCD cables on the left side of the LCD module. Secure the module in place with the **three M2x6 screws** and **one washer** (Figure 4-36.).

NOTE: The washer should be installed with the lower left screw.

---

6.   Connect the FL inverter cables to **CN1**, **CN2**, and **CN3** on the **FL inverter board** (Figure 4-35). Rotate the board into position, making sure the volume and contrast knobs pass through the cutouts in the back cover. Then attach the adhesive mylar tab to the bottom of the FL inverter board shielding. Secure the FL inverter board in place with the **two M2x6 screws** (Figure 4-35).

7.   Align the display mask over the LCD display panel. Be careful not to damage the lower portion of the mask that covers the hinges.

8.   Snap the **eleven latches** on the **display mask** in place. Check to make sure the seam between the display mask and **back cover** is evenly seated around the display (Figure 4-34).

9.   Secure the display mask in place with the **two M2.5x6 bottom screws** and **two M2x6 top screws**. Then cover the screws with the **rubber cushions** at the top of the display and the **rubber seals** at the bottom of the display.

4.12 LCD Display Cables

4.12.1 Removing the LCD Display Cable

1.   Remove the LCD module and back cover as instructed in Section 4.12.

2.   Remove the communication ports bracket as instructed in Section 4.7.

3.   Remove the **two M2x4 screws** from the left side of the computer that secure the **LCD display cable cover** (Figure 4-40).

Figure 4-40 Removing the LCD display cable cover

4.   Remove the **two M2.5x4 screws** and remove the display panel shut-off switch and hinge (Figure 4-41).

Figure 4-41 Removing the display panel hinge with the display panel shut-off switch

5.   To remove the **display panel shut-off switch**, remove the **single M2x8 screw** securing the switch to the hinge (Figure 4-42).

Figure 4-42 Removing the display panel shut-off switch

6.   Slide the **LCD display cable** out through the top of the T3300SL (Figure 4-43).

Figure 4-43 Removing the LCD display cable

4.12.2 Installing the LCD Display Cable

1.   Slide the **LCD display cable** in through the top of the T3300SL (Figure 4-43).

2.   Secure the **display panel shut-off switch** to the **display panel hinge** with the **single M2x8 screw** (Figure 4-42).

3.   Install the hinge and **display panel shut-off switch** with the **two M2.5x4 screws** (Figure 4-41).

4.   Place the **LCD display cable cover** over the display cables (Figure 4-44).

Figure 4-44 Installing the LCD display cable cover

5.   Secure the **LCD display cable cover** with the **two M2x4 screws** (Figure 4-40).

Appendices

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Contents

Tables

Figures

Appendix A   System Board Layout

A.1   System Board (ICs)
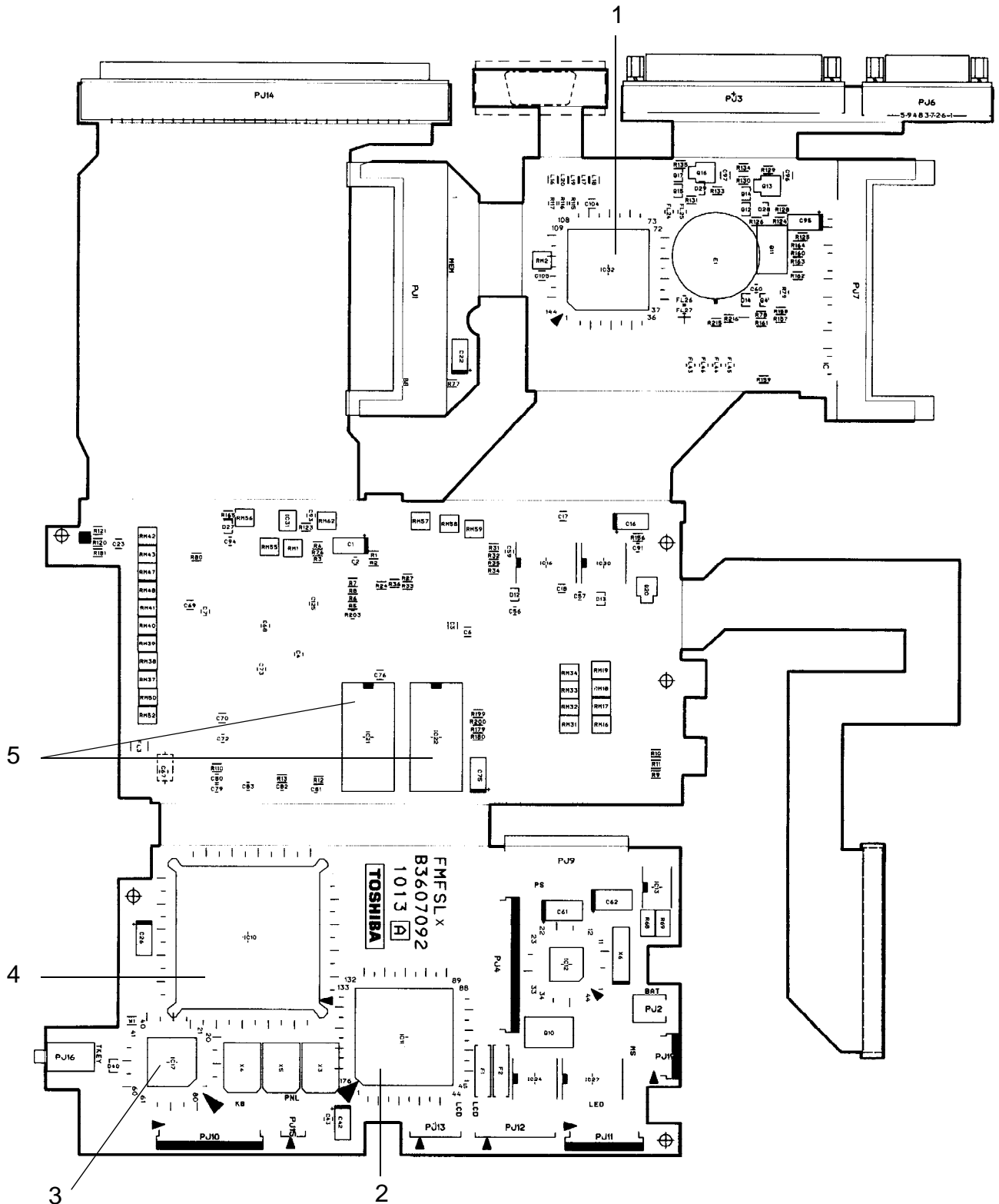
Figure A-1 System board (ICs) (front)
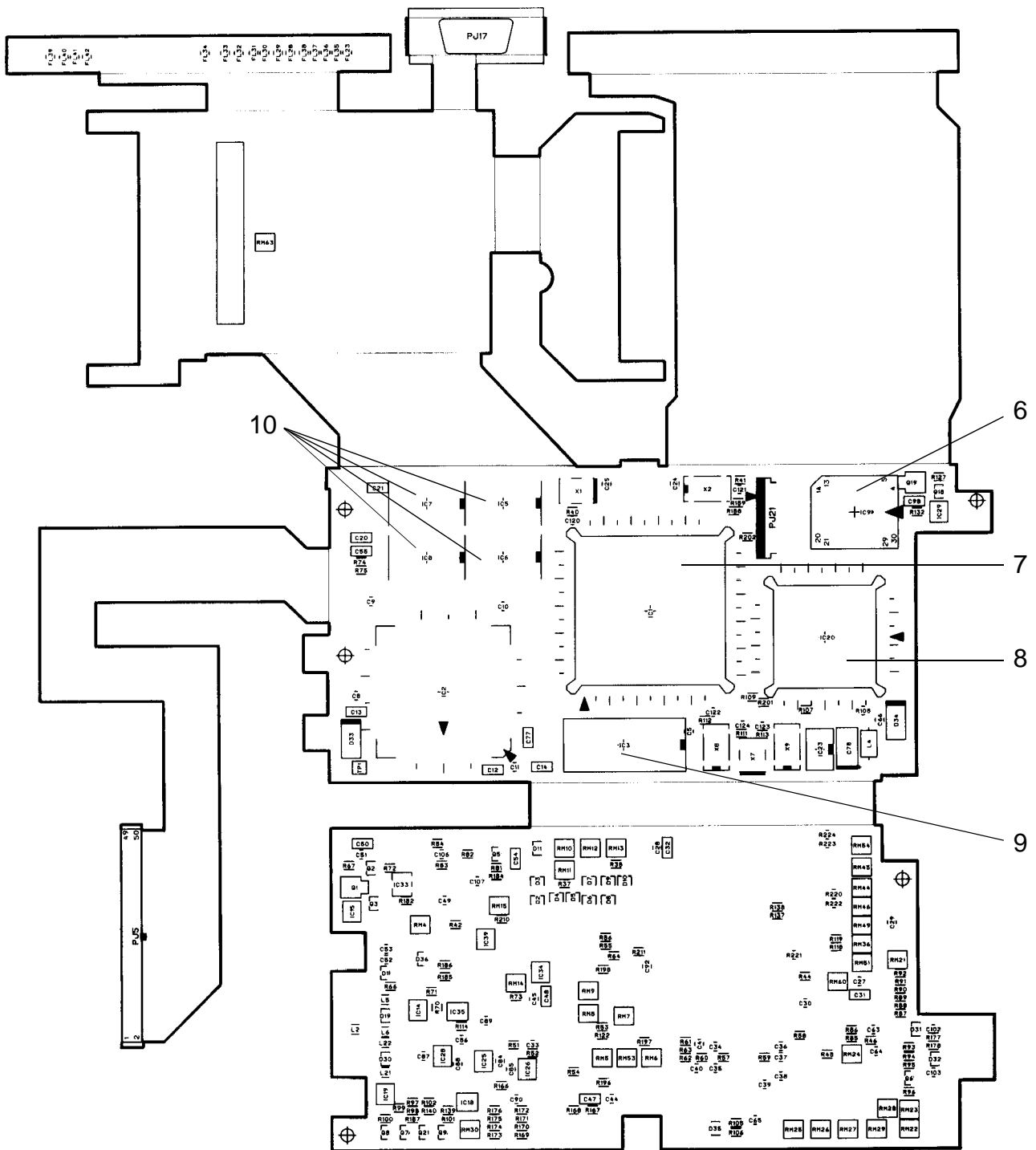
Figure A-2 System board (ICs) (back)

Table A-1 ICs on the system board

Callout	Number	Name
1	IC32	IC card controller gate array
2	IC11	Super integration (SI) T9920
3	IC17	Keyboard controller
4	IC10	80360SL
5	IC21, IC22	Video RAM
6	IC9	BIOS ROM
7	IC1	Central processing unit (80386SL)
8	IC20	PVGA1F
9	IC3	Cache memory
10	IC5, IC6, IC7, IC8	System memory

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A.2   System Board (Connectors)
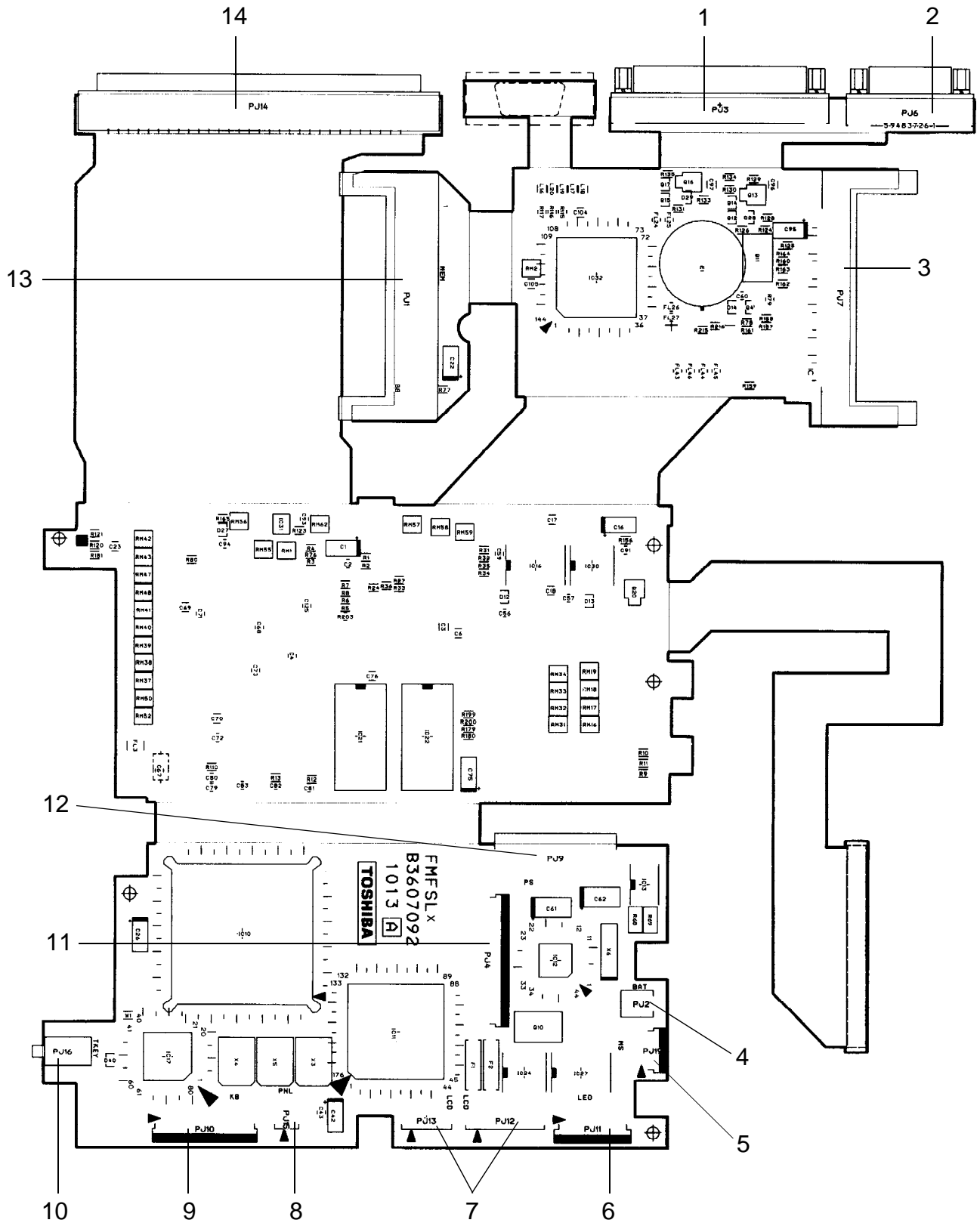
Figure A-3 System board (connectors) (front)
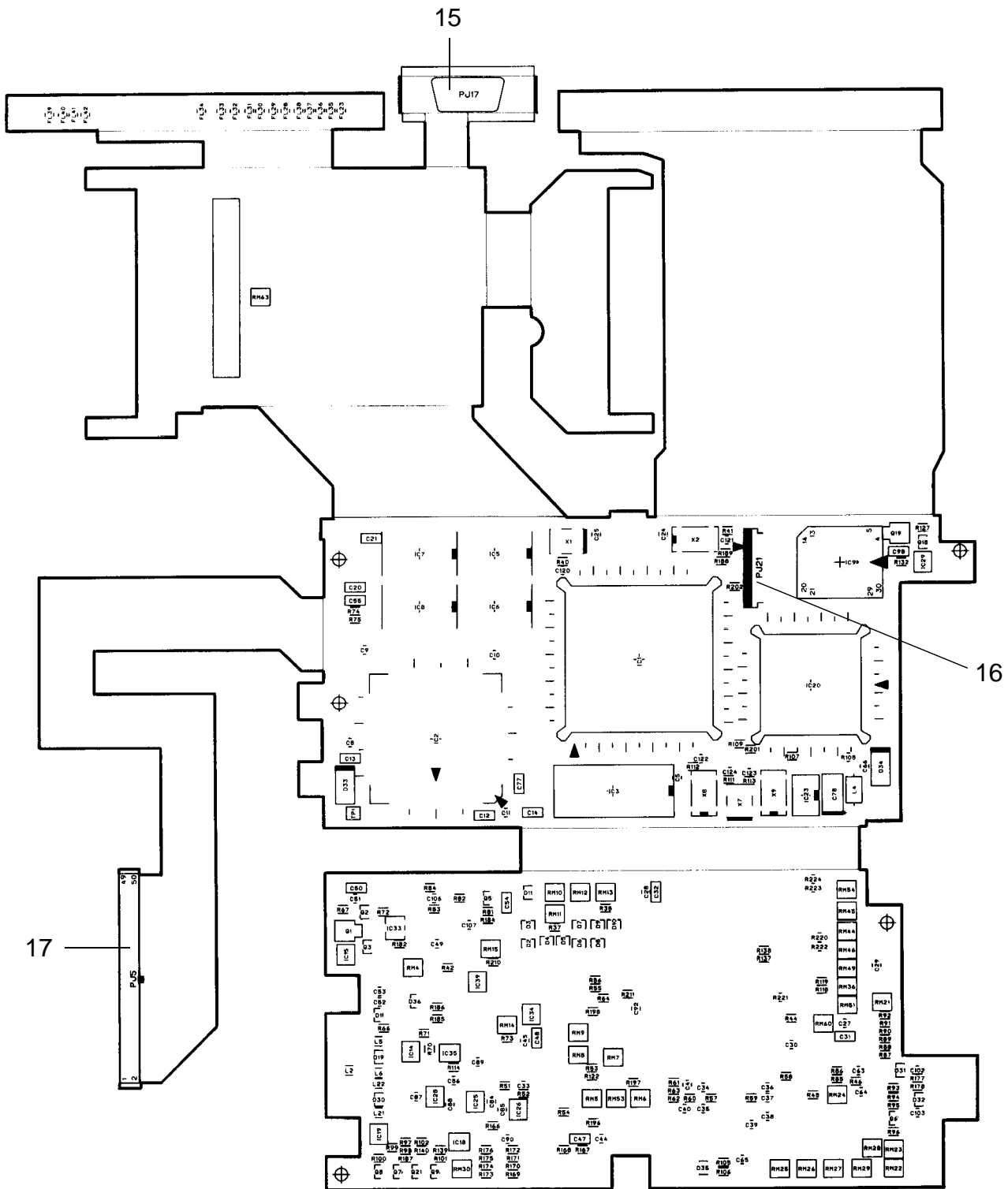
Figure A-4 System board (connectors) (back)

Table A-2 Connectors on the system board

Callout	Number	Name
1	PJ3	PRT/FDD port connector
2	PJ6	COMMS port
3	PJ7	Card modem connector
4	PJ2	Sub battery connector
5	PJ19	PS/2 mouse connector
6	PJ11	LED connector
7	PJ12, PJ13	Display connectors
8	PJ15	Display panel shut-off connector
9	PJ10	Keyboard connector
10	PJ16	Tenkey port
11	PJ4	Internal FDD connector
12	PJ9	Power supply connector
13	PJ1	Expansion memory connector
14	PJ14	Expansion port
15	PJ17	RGB port
16	PJ21	AC adapter select connector
17	PJ5	HDD connector

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A.3   System Board (Oscillators)
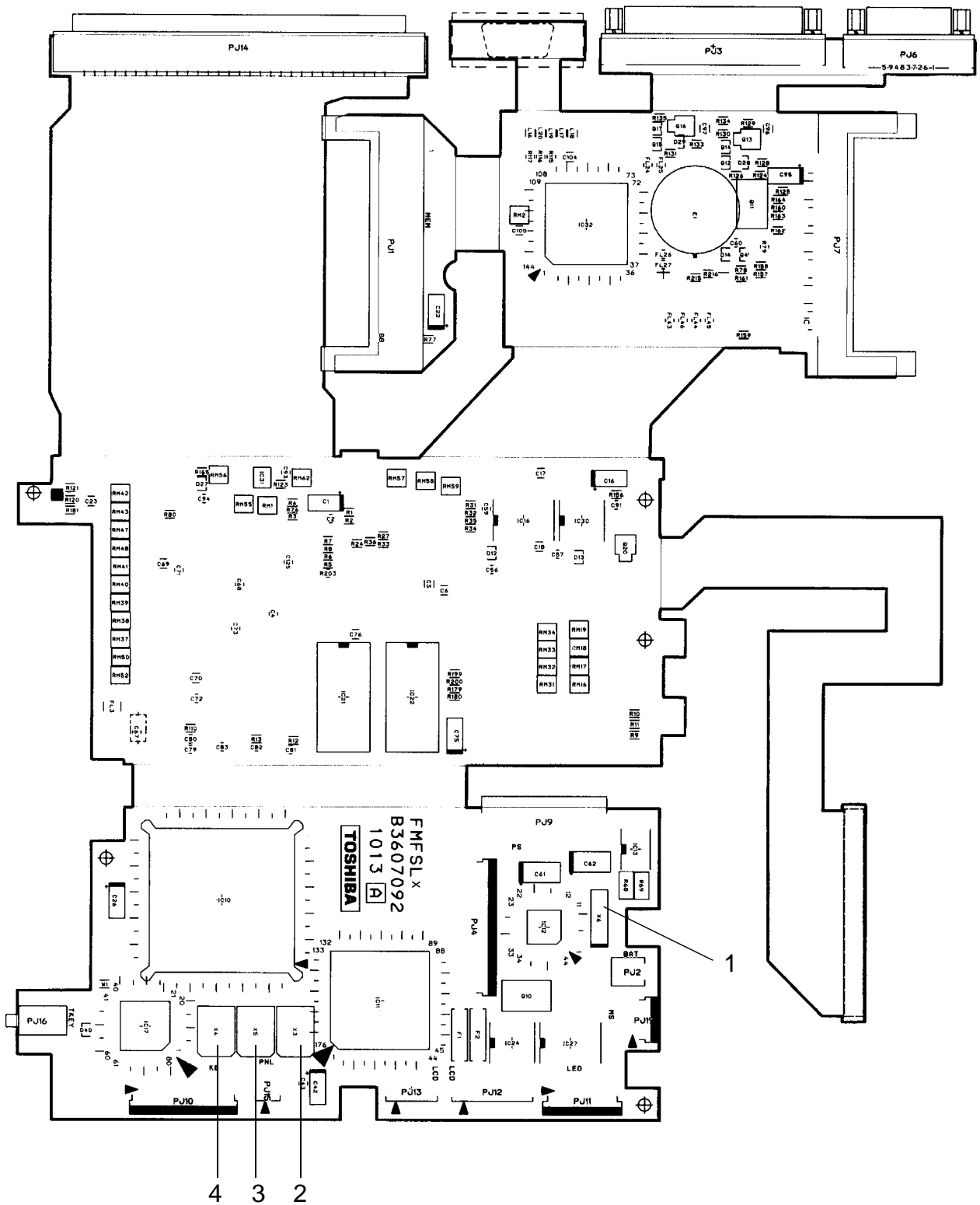
Figure A-5   System board (oscillators) (front)
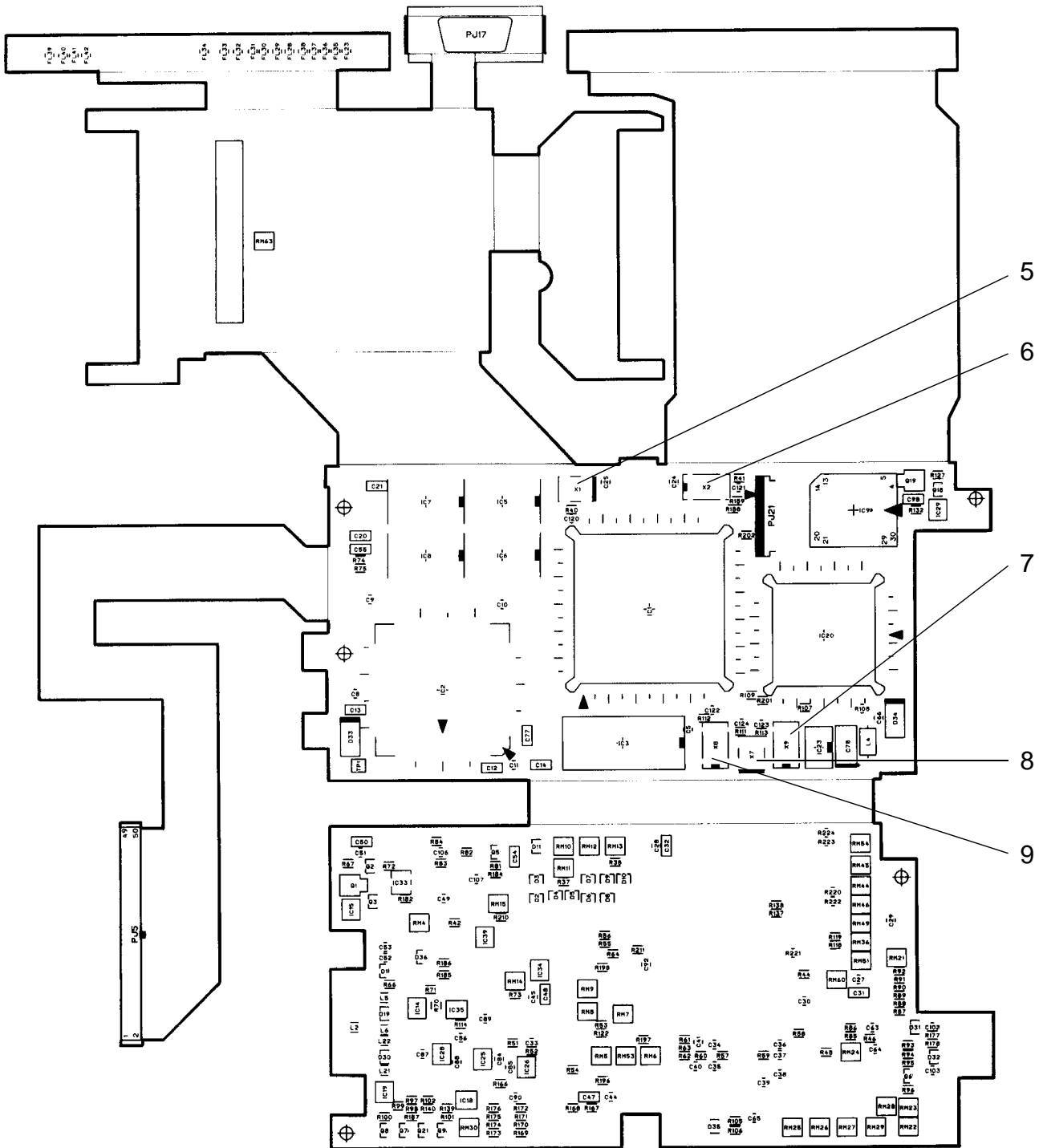
Figure A-6 System board (oscillators) (back)

Table A-3 Oscillators on the system board

Callout	Number	Name
1	X6	32.768KHz for real time clock
2	X3	14.7456MHz for COM
3	X5	24MHz for floppy disk controller and variable frequency oscillator
4	X4	14.31818MHz for keyboard controller
5	X1	50.0MHz for CPU
6	X2	16.0MHz for CPU
7	X9	25.175MHz for video
8	X7	44.9MHz for video
9	X8	28.322MHz for video

Appendix B   Pin Assignment

B.1   PJ1 EXP MEM Connector

Table B-1 EXP MEM connector pin assignment (88-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	GND		45	GND	
02	MD00;100	I/O	46	MD00;100	I/O
03	MD01;100	I/O	47	MD01;100	I/O
04	MD02;100	I/O	48	MD02;100	I/O
05	MD03;100	I/O	49	MD03;100	I/O
06	MD04;100	I/O	50	MD04;100	I/O
07	MD05;100	I/O	51	MD05;100	I/O
08	MD06;100	I/O	52	MD06;100	I/O
09	RAMV		53	MD07;100	I/O
10	MD07;100	I/O	54	GND	
11	(N/C)		55	MEMWEH;001	O
12	GND		56	GND	
13	MA00;101	O	57	MA01;101	O
14	MA02;101	O	58	MA03;101	O
15	N/C		59	MA05;101	O
16	MA04;101	O	60	MA07;101	O
17	(N/C)		61	MA09;101	O
18	MA06;101	O	62	GND	
19	MA08;101	O	63	GND	
20	MA10;101	O	64	GND	
21	GND		65	RAS3;001	O
22	RAS2;001	O	66	CASL1;001	O
23	CASL2;001	O	67	GND	
24	CASH2;001	O	68	CASH1;001	O
25	N/C		69	RAMV	
26	RAS1;001	O	70	MEMWEL;001	O
27	(N/C)		71	DRMST1;100	I
28	DRMST2;100	I	72	DRMST3;100	I
29	DRMST4;100	I	73	GND	
30	DRMST6;100	I	74	DRMST5;100	I
31	CASL3;000	O	75	DRMST7;100	I
32	CASH3;000	O	76	DRMST8;100	I
33	GND		77	(N/C)	
34	MD08;100	I/O	78	(N/C)	
35	(N/C)		79	GND	
36	MD09;100	I/O	80	MD08;100	I/O
37	RAMV		81	MD09;100	I/O
38	MD10;100	I/O	82	MD10;100	I/O
39	MD11;100	I/O	83	MD11;100	I/O
40	MD12;100	I/O	84	MD12;100	I/O
41	MD13;100	I/O	85	MD13;100	I/O
42	MD14;100	I/O	86	MD14;100	I/O
43	MD15;100	I/O	87	MD15;100	I/O
44	GND		88	GND	

B.2 PJ2 Real Time Clock Connector

Table B-2 RTC connector pin assignment (2-pin)

Pin	Signal	I/O	Pin	Signal	I/O
1	3.6V	I	2	GND	

B.3 PJ3 External PRT/FDD Port Connector

Table B-3 External PRT/FDD connector pin assignment (25-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	STROB;000	I/O	14	AUTFD;000	O
02	PDB00;100	I/O	15	ERROR;000	I/O
03	PD01;100	I/O	16	PINT;000	O
04	PD02;100	I/O	17	SLIN;000	O
05	PD03;100	I/O	18	GND	
06	PD04;100	I/O	19	GND	
07	PD05;100	I/O	20	GND	
08	PD06;100	I/O	21	GND	
09	PD07;100	I/O	22	GND	
10	ACK;000	I/O	23	GND	
11	BUSY;100	I/O	24	GND	
12	PE;110	I/O	25	GND	
13	SELCT;100	I/O	---	---	---

B.4 PJ4 Internal Floppy Disk Drive Pin Connector

Table B-4 Internal floppy disk drive connector pin assignment (25-pin)

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

B.5   PJ5 Hard Disk Drive I/F Connector

Table B-5   Hard disk drive I/F connector pin assignment (50-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	(N/C)		26	VCC	
02	(N/C)		27	(N/C)	
03	(N/C)		28	GND	
04	(N/C)		29	IOWR;000	O
05	(N/C)		30	GND	
06	(N/C)		31	IORD;000	O
07	RESET;000	O	32	GND	
08	GND		33	(N/C)	
09	SD07;102	I/O	34	(N/C)	
10	SD08;102	I/O	35	PHIRDY;100	I
11	SD06;102	I/O	36	GND	
12	SD09;102	I/O	37	IRO14;100	I
13	SD05;102	I/O	38	HDIO15	I
14	SD10;102	I/O	39	SA01;100	O
15	SD04;102	I/O	40	(N/C)	
16	SD11;102	I/O	41	SA00;100	O
17	SD03;102	I/O	42	SA02;100	O
18	SD12;102	I/O	43	HDC0C5;000	O
19	SD02;102	I/O	44	HDC1C5;000	O
20	SD13;102	I/O	45	DRVSL;000	I
21	SD01;102	I/O	46	GND	
22	SD14;102	I/O	47	VCC	
23	SD00;102	I/O	48	VCC	
24	SD15;102	I/O	49	GND	
25	GND		50	VCC	

B.6   PJ6 Serial I/F Connector

Table B-6   Serial I/F connector pin assignment (9-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	DCD1;100	I	06	DSR1;000	I
02	RD1;000	I	07	RTS1;000	
03	SD1;100		08	CTS1;100	
04	DTR1;000		09	RI1;100	
05	GND		---	---	---

B.7 PJ7 Card Modem Connector

Table B-7 Card modem connector pin assignment (68-pin)

Pin	Signal	I/O	Pin	Signal	I/O
1	GND		35	GND	
2	PCD03;100	I/O	36	CD1;000	I
3	PCD04;100	I/O	37	PCD11;100	I/O
4	PCD05;100	I/O	38	PCD12;100	I/O
5	PCD06;100	I/O	39	PCD13;100	I/O
6	PCD07;100	I/O	40	PCD14;100	I/O
7	CE1;000	O	41	PCD15;100	I/O
8	CAD10;100	O	42	CE2;000	O
9	OE;000	O	43	(N/C)	
10	CAD11;100	O	44	IOR;000	O
11	CAD09;100	O	45	IOW;000	O
12	CAD05;100	O	46	CAD17;100	O
13	CAD13;100	O	47	CAD18;100	O
14	CAD14;100	O	48	CAD19;100	O
15	WE;000	O	49	CAD20;100	O
16	BSY;000	I	50	CAD21;100	O
17	MCVCC		51	MCVCC	
18	MCVPP1		52	MCVPP2	
19	CAD16;100	O	53	CAD22;100	O
20	CAD15;100	O	54	CAD23;100	O
21	CAD12;100	O	55	CAD24;100	O
22	CAD07;100	O	56	CAD25;100	O
23	CAD06;100	O	57	(N/C)	
24	CAD05;100	O	58	CRESET;100	O
25	CAD04;100	O	59	WAIT;000	I
26	CAD03;100	O	60	INPACK;000	I
27	CAD02;100	O	61	REG;000	O
28	CAD01;100	O	62	BVD2;100	I
29	CAD00;100	O	63	BVD1;100	I
30	PCD00;100	I/O	64	PCD06;100	I/O
31	PCD01;100	I/O	65	PCD09;100	I/O
32	PCD02;100	I/O	66	PCD10;100	I/O
33	WP;000	I	67	CD2;000	I
34	GND		68	GND	

B.8　PJ9 Power Supply I/F Connector

Table B-8　Power supply I/F connector pin assignment (30-pin)

Pin	Signal	I/O	Pin	Signal	I/O
1	GND		16	BEEP;000	I
2	RAMV	I	17	CPCNF;100	I
3	RAMV	I	18	PNLOFF;012	I
4	RAMV	I	19	PSRD;100	I
5	VCC		20	PSSD;100	O
6	VCC		21	ADPCNT;100	O
7	VCC		22	CBLON;000	I
8	GND		23	GND	
9	-9V	I	24	DSPV	I
10	12V	I	25	DSPV	I
11	GND		26	GND	
12	CHG;100	I	27	SRTBN	I
13	LB;100	I	28	SUSSTA;100	I
14	GND		29	PSBUSY;000	I
15	PCLR;001	I	30	LOBAT;100	I

B.9　PJ10 Keyboard I/F Connector

Table B-9　Keyboard I/F connector pin assignment (19-pin)

Pin	Signal	I/O	Pin	Signal	I/O
1	KBOT00;001	O	11	KBOT03;001	O
2	KBRT6;100	I	12	KBOT04;001	O
3	KBRT0;100	I	13	KBOT05;001	O
4	KBRT2;100	I	14	KBOT06;001	O
5	KBRT3;100	I	15	KBOT08;001	O
6	KBRT1;100	I	16	KBOT02;001	O
7	KBRT7;100	I	17	KBOT07;001	O
8	KBRT5;100	I	18	KBOT09;001	O
9	KBRT4;100	I	19	KBOT10;001	O
10	KBOT01;001	O	---	---	---

B.10　PJ11 LED Connector

Table B-10　LED connector pin assignment (11-pin)

Pin	Signal	I/O	Pin	Signal	I/O
1	CHG;100	O	7	CAPLED;100	O
2	LB;100	O	8	GND	
3	DRVSL;000	O	9	VCC	
4	ALED;100	O	10	GND	
5	OVERLED;100	O	11	GND	
6	NUMLED;100	O	---	---	---

B.11 PJ12 LCD Connector

Table B-11 LCD connector pin assignment (12-pin)

Pin	Signal	I/O	Pin	Signal	I/O
1	GND		7	SUD3;120	O
2	SCLK;110	I	8	SLD0;120	O
3	GND		9	SLD1;120	O
4	SUD0;120	O	10	SLD2;120	O
5	SUD1;120	O	11	SLD3;120	O
6	SUD2;120	O	12	GND	

B.12 PJ13 LCD Connector

Table B-12 LCD connector pin assignment (6-pin)

Pin	Signal	I/O	Pin	Signal	I/O
1	GND		4	GND	
2	LP;020	O	5	DSPV	O
3	FP;020	O	6	CBLON;000	O

B.13   PJ14 Expansion Connector

Table B-13 Expansion connector pin assignment (150-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	DCIN	I	42	SD01;101	I/O
02	DCIN	I	43	SD02;101	I/O
03	DCIN	I	44	SD03;101	I/O
04	DCIN	I	45	GND	
05	CURNT	I	46	SD04;101	I/O
06	CURNT	I	47	SD05;101	I/O
07	CURNT	I	48	SD06;101	I/O
08	CURNT	I	49	SD07;101	I/O
09	ADPCN;100	I	50	SMEW;001	O
10	GND		51	SMER;001	O
11	RVCC	O	52	GND	
12	GND		53	IOWR;001	I/O
13	CPCNF;100	O	54	IORD;001	I/O
14	MDMSL;001	O	55	TC;101	
15	COMCLK;101	O	56	BALE;101	O
16	MIRQ;001	I	57	RESET;101	O
17	SPKTON;001	I	58	DACK1;001	O
18	GND		59	IRQ9;101	I
19	SA00;101	O	60	GND	
20	SA01;101	O	61	(N/C)	
21	SA02;101	O	62	IOCLK;101	O
22	SA03;101	O	63	IRQ5;101	I
23	SA04;101	O	64	DRQ3;101	I
24	SA05;101	O	65	DACK3;001	O
25	SA06;101	O	66	AEN;101	O
26	SA07;101	O	67	DRQ1;101	I
27	GND		68	IOCRDY;101	I
28	SA08;101	O	69	GND	
29	SA09;101	O	70	IRQ10;101	I
30	SA10;101	O	71	IRQ14;101	I
31	SA11;101	O	72	SD08;101	I/O
32	SA12;101	O	73	SD09;101	I/O
33	SA13;101	O	74	IRQ11;101	I
34	SA14;101	O	75	SD10;101	I/O
35	SA15;101	O	76	SD11;101	I/O
36	GND		77	SD12;101	I/O
37	SA16;101	O	78	IRQ12;101	I
38	SA17;101	O	79	GND	
39	SA18;101	O	80	SD13;101	I/O
40	SA19;101	O	81	SD14;101	I/O
41	SD00;101	I/O	82	IRQ5;101	I

Pin	Signal	I/O	Pin	Signal	I/O
83	SD15;101	I/O	117	EKBDAT;100	I/O
84	LA22;101	I/O	118	EKBCLK;100	I/O
85	LA23;101	I/O	119	TENKEY;100	I/O
86	DRQ2;101	I	120	MDUSED;100	I/O
87	LA21;101	I/O	121	MDSECK;100	I/O
88	LA19;101	I/O	122	GND	
89	LA20;101	I/O	123	STROB;000	O
90	DACK6;001	O	124	PDB00;100	I/O
91	GND		125	PDB01;100	I/O
92	REFMD;001	O	126	PDB02;100	I/O
93	LA18;101	I	127	PDB03;100	I/O
94	MASTER;001	I	128	PDB04;100	I/O
95	LA17;101	I	129	PDB05;100	I/O
96	SBHE;001	I/O	130	PDB06;100	I/O
97	IOCHCK;001	I	131	PDB07;100	I/O
98	MMCS16;001	I	132	ACK;000	I
99	GND		133	BUSY;100	I
100	IOCS16;001	I	134	PE;100	I
101	DACK2;001	O	135	SELCT;100	I
102	DRQ6;101	I	136	AUTFD;000	O
103	DRQ5;101	I	137	ERROR;000	I
104	DACK5;001	O	138	PINT;000	O
105	MERD;001	I/O	139	SLIN;000	O
106	IRQ4;101	I	140	GND	
107	MEWR;001	I/O	141	SD1;000	O
108	IRQ7;101	I	142	DTR1;100	O
109	GND		143	RTS1;100	O
110	RED;101	O	144	DCD1;100	I
111	LGREN;101	O	145	RD1;000	I
112	BLUE;101	O	146	DSR1;100	I
113	GND		147	CTS1;100	I
114	PHSYNC;100	O	148	RI1;100	I
115	PVSYNC;100	O	149	GND	
116	GND		150	GND	

B.14 PJ15 Display Switch Connector

Table B-14 Display switch connector pin assignment (2-pin)

Pin	Signal	I/O	Pin	Signal	I/O
1	PNLOFF;001	I	2	GND	

B.15 PJ16 Ten-Key Connector

Table B-15 Ten-key pin assignment (3-pin)

Pin	Signal	I/O	Pin	Signal	I/O
1	GND		3	(N/C)	
2	TENKEY;100	I	---	---	---

B.16   PJ17 CRT I/F Connector

Table B-16 CRT I/F connector pin assignment (15-pin)

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

B.17   PJ19 PS/2 Mouse Connector

Table B-17 PS/2 mouse connector pin assignment (4-pin)

Pin	Signal	I/O	Pin	Signal	I/O
1	MOUSDT;100	I	3	VCC	
2	GND		4	MOUSCK;100	I

B.18   PJ21 Power Supply I/F Connector

Table B-18 Power supply I/F connector pin assignment (11-pin)

Pin	Signal	I/O	Pin	Signal	I/O
1	DCIN	I	7	CURNT	I
2	DCIN	I	8	ADPCNT;100	I
3	GND		9	GND	
4	GND		10	GND	
5	CURNT	I	11	GND	
6	CURNT	I	---	---	---

Appendix C   ASCII Character Codes

Table C-1 ASCII character 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	Ξ
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	╖	╪	╫	ϒ	≈
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	╝	╟	▬	φ	n
D	♪	↔	-	=	M	]	m	}	ì	¥	¡	╜	═	█	φ	2
E	♫	▲	.	>	N	^	n	~	Ä	Pt	«	╛	╬	█	∈	∎
F	☼	▼	/	?	O	_	o	⌂	Å	ƒ	»	┐	═	▬	∩	BLANK FF

Appendix D   Keyboard Scan/Character Codes

Table D-1 Scan codes (set 1 and set 2)

Cap No.	Keytop	Code set 1		Code set 2		Note
		Make	**Break**	**Make**	**Break**	
01	` ~	29	A9	0E	F0 0E	
02	1 !	02	82	16	F0 16	
03	2 @	03	83	1E	F0 1E	
04	3 #	04	84	26	F0 26	
05	4 $	05	85	25	F0 25	
06	5 %	06	86	2E	F0 2E	
07	6 ^	07	87	36	F0 36	
08	7 &	08	88	3D	F0 3D	*2
09	8 *	09	89	3E	F0 3E	*2
10	9 (	0A	8A	46	F0 46	*2
11	0)	0B	8B	45	F0 45	
12	- _	0C	8C	4E	F0 4E	
13	= +	0D	8D	55	F0 55	
15	BkSp	0E	8E	66	F0 66	
16	Tab	0F	8F	0D	F0 0D	
17	Q	10	90	15	F0 15	
18	W	11	91	1D	F0 1D	
19	E	12	92	24	F0 24	
20	R	13	93	2D	F0 2D	
21	T	14	94	2C	F0 2C	
22	Y	15	95	35	F0 35	
23	U	16	96	3C	F0 3C	*2
24	I	17	97	43	F0 43	*2
25	O	18	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		Code set 2		Note
		Make	**Break**	**Make**	**Break**	
41	' "	28	A8	52	F0 52	
43	Enter	1C	9C	5A	F0 5A	
44	Shift (L)	2A	AA	12	F0 12	
45	No. 102 key	56	D6	61	F0 61	
46	Z	2C	AC	1A	F0 1A	
47	X	2D	AD	22	F0 22	
48	C	2E	AE	21	F0 21	
49	V	2F	AF	2A	F0 2A	
50	B	30	B0	32	F0 32	
51	N	31	B1	31	F0 31	
52	M	32	B2	3A	F0 3A	*2
53	, <	33	B3	41	F0 41	*2
54	. >	34	B4	49	F0 49	*2
55	/ ?	35	B5	4A	F0 4A	*2
57	Shift (R)	36	B6	59	F0 59	
58	Ctrl	1D	9D	14	F0 14	*3
60	Alt (L)	38	B8	11	F0 11	*3
61	Space	39	B9	29	F0 29	
62	Alt (R)	E0 38	E0 B8	E0 11	E0 F0 11	
75	Ins	E0 52	E0 D2	E0 70	E0 F0 70	*1
76	Del	E0 53	E0 D3	E0 71	E0 F0 71	*1
79	←	E0 4B	E0 CB	E0 6B	E0 F0 6B	*1
80	Home	E0 47	E0 C7	E0 6C	E0 F0 6C	*1
81	End	E0 4F	E0 CF	E0 69	E0 F0 69	*1
83	↑	E0 48	E0 C8	E0 75	E0 F0 75	*1
84	↓	E0 50	E0 D0	E0 72	E0 F0 72	*1
85	PgUp	E0 49	E0 C9	E0 7D	E0 F0 7D	*1
86	PgDn	E0 51	E0 D1	E0 7A	E0 F0 7A	*1
89	→	E0 4D	E0 CD	E0 74	E0 F0 74	*1
110	Esc	01	81	76	F0 76	

Table D-1 Scan codes (set 1 and set 2) (continued)

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

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

Table D-2 Scan codes with Shift key

Cap No.	Keytop	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 AA 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 the scan codes with the left Shift key. In case of a combination with the right Shift key, scan codes will change as indicated 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 D-3 Scan codes in Numlock mode

Cap No.	Keytop	Code set 1		Code set 2	
		Make	Break	Make	Break
75	Ins	E0 2A E0 52	E0 D2 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 D-4 Scan codes with Fn key

Cap No.	Keytop	Code set 1		Code set 2	
		Make	Break	Make	Break
43	ENT	E0 1C	E0 9C	E0 5A	E0 F0 5A
58	CTRL	E0 1D	E0 9D	E0 14	E0 F0 14
60	LALT	E0 38	E0 B8	E0 11	E0 F0 11
122	NUML	45	C5	77	F0 77
123	SCRL	46	C6	7E	F0 7E

Table D-5 Scan codes in overlay mode

Cap No.	Keytop	Code set 1		Code set 2	
		Make	Break	Make	Break
08	7 (7)	47	C7	6C	F0 6C
09	8 (8)	48	C8	75	F0 75
10	9 (9)	49	C9	7D	F0 7D
11	0 (≠)	37	B7	7C	F0 7C
23	U (4)	4B	CB	6B	F0 6B
24	I (5)	4C	CC	73	F0 73
25	O (6)	4D	CD	74	F0 74
26	P (-)	4A	CA	7B	F0 7B
37	J (1)	4F	CF	69	F0 69
38	K (2)	50	D0	72	F0 72
39	L (3)	51	D1	7A	F0 7A
40	; (+)	4E	CE	79	F0 79
52	M (0)	52	D2	70	F0 70
53	, (,)	33	B3	41	F0 41
54	(.)	53	D3	71	F0 71
55	/ (/)	E0 35	E0 B5	40 4A	E0 F0 4A

Table D-6 Scan codes with Ctrl key

Key Top	Shift	Code set 1		Code set 2	
		Make	Break	Make	Break
Prt Sc	Common	E0 2A E0 37	E0 B7 E0 AA	E0 12 E0 7C	E0 F0 7C E0 F0 12
	Ctrl*	E0 37	E0 B7	E0 7C	E0 F0 7C
	Shift*	E0 37	E0 B7	E0 7C	E0 F0 7C
	Alt*	54	D4	84	F0 B4

Table D-7 Scan codes with Alt key

Key Top	Shift	Code set 1	Code set 2
		Make	Make
Pause	Common	E1 ID 45 E1 SD C5	E1 14 77 E1 F0 14 F0 77
	Ctrl*	E0 46 E0 C6	E0 7E E0 F0 7E

*   This key generates only make codes.

Appendix E   Keyboard Layouts

E.1   USA Keyboard

Figure E-1 USA keyboard

E.2   UK Keyboard

Figure E-2 UK keyboard

E.3   German Keyboard

Figure E-3 German keyboard

E.4   French Keyboard

Figure E-4 French keyboard

E.5   Spanish Keyboard

Figure E-5 Spanish keyboard

E.6   Italian Keyboard

Figure E-6 Italian keyboard

E.7   Scandinavian (DK, NO, SW) Keyboard

Figure E-7 Scandinavian (DK, NO, SW) keyboard

E.8   Swiss (French/German) Keyboard

Figure E-8 Swiss (French/German) keyboard

E.9   Canadian Keyboard

Figure E-9 Canadian keyboard

E.10   Keycap Number Keyboard

Figure E-10 Keycap number keyboard

Appendix F   Wiring Diagrams
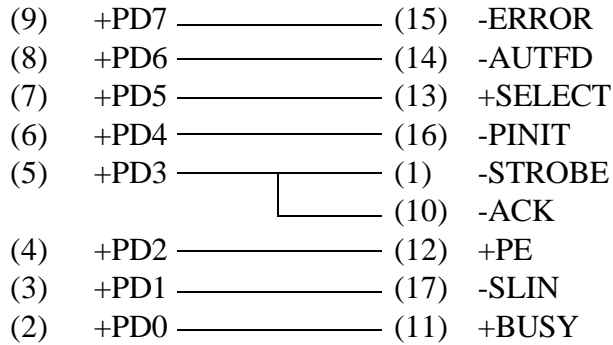
F.1   Printer Wraparound Connector

```
(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 F-1 Printer wraparound connecter

F.2   RS-232-C Wraparound Connector

```
(3)   TD    ——————————— (2)    RD
(7)   RTS   ——————┐       (8)    CTS
                 └——————— (1)    CD
(4)   DTR   ——————┐       (6)    DSR
                 └——————— (9)    RI
```
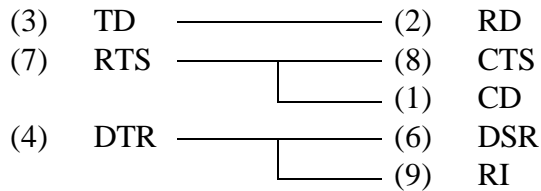
Figure F-2 RS-232-C wraparound connecter

F.3   RS-232-C 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    ——————┘
```
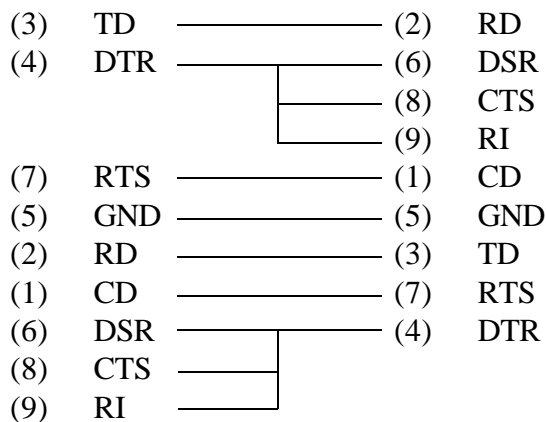
Figure F-3 RS-232-C direct cable (9-pin to 9-pin)

F.4   RS-232-C 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   ──────┘
```
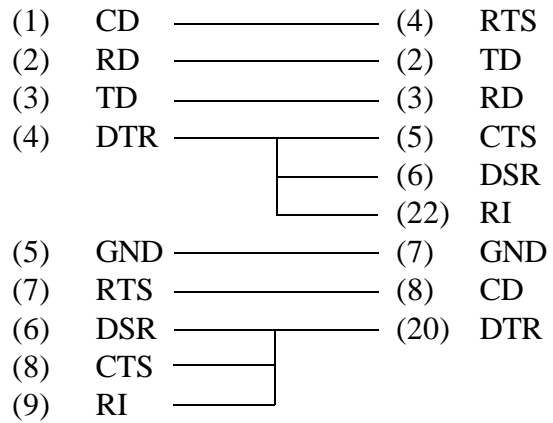
Figure F-4 RS-232-C direct cable (9-pin to 25-pin)

T3300SL NOTES

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