1.1 Desk Station IV Features

The Toshiba Desk Station IV is connected to portable personal computers to expand their interface capability through the use of expansion cards and industry standard 5 1/4" devices installed in the Desk Station IV's expansion bay.

The Desk Station IV contains a 16-bit bus to access both half-length or full-length 8-bit cards and full-length 16-bit cards. The Desk Station IV has the following ports:

- One parallel port
- One external 5 1/4" port
- One RGB port
- One serial port
- One PS/2 mouse port
- One PS/2 keyboard port

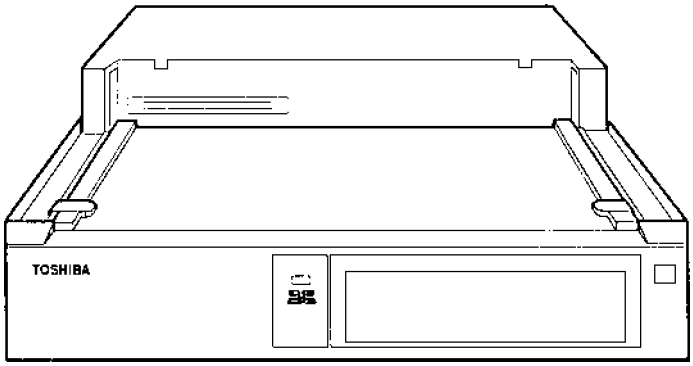


Figure 1-1 The Desk Station IV

1.2 System Unit Block Diagram

Figure 1-2 is a block diagram of the Desk Station IV

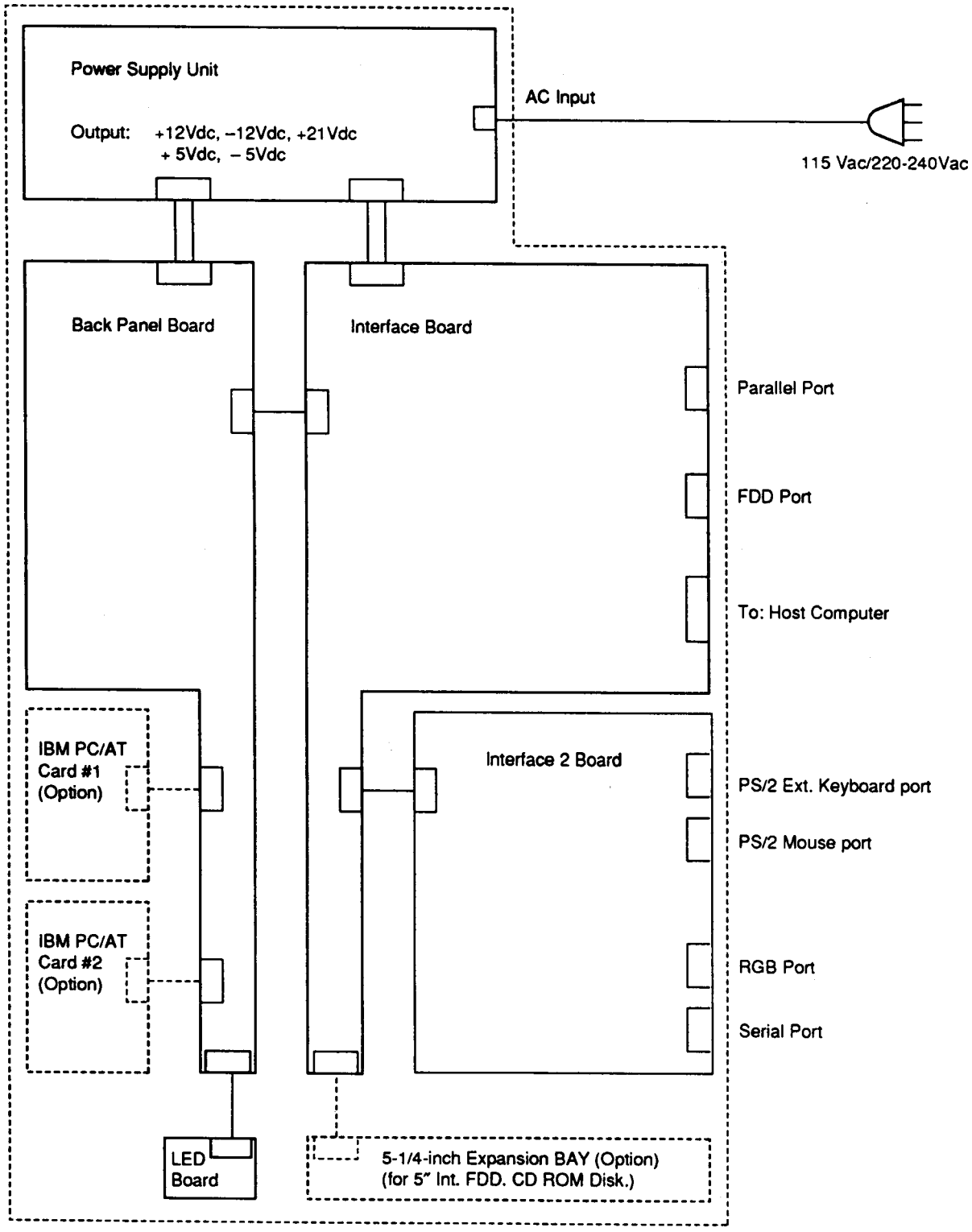


Figure 1-2 System Unit Block Diagram

1.3 Interface Board Block Diagram

Figure 1-3 is a block diagram of the interface board (PCB FDPSY1).

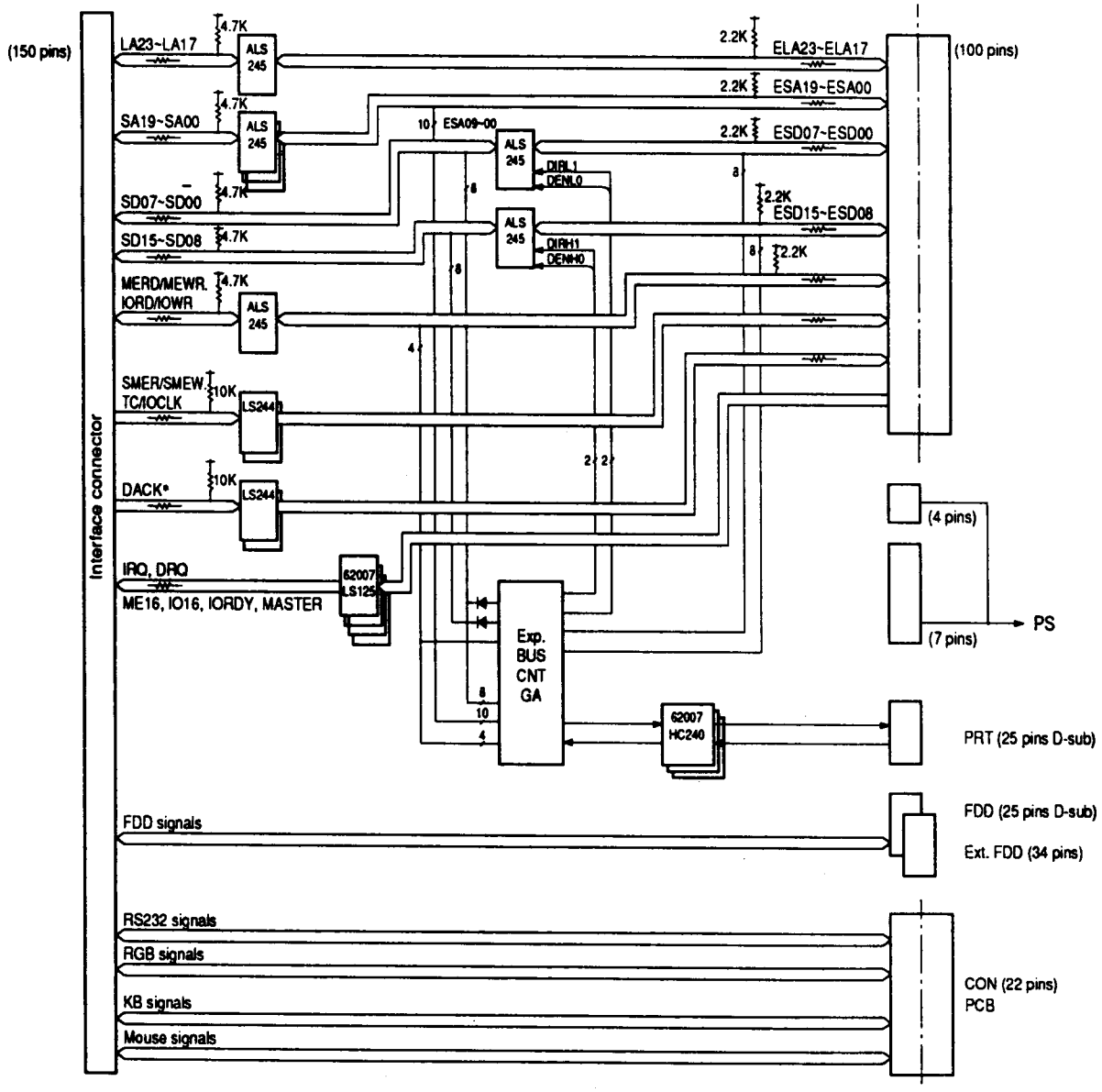


Figure 1-3 Interface Board Block Diagram

The major components of the interface board are as follows:

- Oscillator: OSC (x1)

  14.31818 MHz

- Gate array

  Expansion bus controller gate array: EXP.BUS CNT-GA (100-pin)

  The gate array manages bus controlling operations between the system and the expansion slots, and it controls the printer port of the DeskStation IV.

- Configuration switch

  The DeskStation IV has one configuration switch located on the DeskStation IV's back.

  By default, the switch is set to on. If you use the DeskStation IV with the T3300SL, T4500 series or T4600 series, set the switch to off.

- Jumpers

  The DeskStation IV has three jumpers located near the back edge of the system board.

Setting PJ13

If 5 1/4" internal FDD supports:	Jumper setting
Mode/Density select	PJ13 Short
No Mode/Density select	PJ13 Open

Setting PJ11 and PJ12

Drive type:	Signal name	Jumper setting
1.2 MB	Disk change PJ12	PJ11 Short 1-2 Short
360 KB	Ready PJ12	PJ11 Open 2-3 Short

1.4 Power Supply

1. AC input

Voltage:	115/220 to 240 V
Current:	2.8/1.8 A

2. DC output

Constant voltage for operation:	21 V 1.9 A (max.)
Constant current for operation:	1.9 A

1.5 Expansion Slots

The Desk Station IV has two IBM AT-compatible slots and one industry-standard 5 1/4" drive bay.

1.5.1 Physical Dimensions

(1) Expansion slots

Maximum size of AT (or XT) card

First slot: 25.4x339x122 mm (1.0"x13.3"x4.8")
Second slot: 20.3x339x122 mm (.8"x13.3"x4.8")

(2) 5 1/4" expansion bay

Maximum device size is 43x208x150 mm (1.7"x8.2"x5.9").

1.5.2 Maximum Power Capacity

Table 1-1 summarizes the power available to the expansion slots and the 5 1/4" drive bay:

Table 1-1 Desk Station IV Power Supply Capabilities

Volts DC	Continuous Amps	Peak Amps
+5 (+5%/–5%)	7.5	8.0
–5 (+10%/–10%)	0.4	
+12 (+5%/–5%)	2.9	5.9
–12 (+10%/–10%)	0.6	

1.5.3 Unsupported Signals

The Desk Station IV supplies all the signals required by most expansion cards. In rare cases, an expansion card may need a signal not supported by the Desk Station IV. Table 1-2 lists unsupported signals:

Table 1-2 Unsupported Expansion Slot Signals

Signal	Pin Number	Description
0WS	B08	0 wait state
DRQ0	D09	DMA ReQuest channel 0
DRQ7	D15	DMA ReQuest channel 7
–DACK0	D08	DMA ACKnowledge channel 0
–DACK7	D14	DMA ACKnowledge channel 7
IRQ15	D06	Interrupt ReQuest level 15

The signals and pin assignments for IBM PC compatible expansion slots are illustrated in Subsection 1.5.4 titled “Pin Assignments.”

1.5.4 Pin Assignments

The expansion slot is illustrated in Figure 1-4, and pin assignments are listed in Table 1-3.

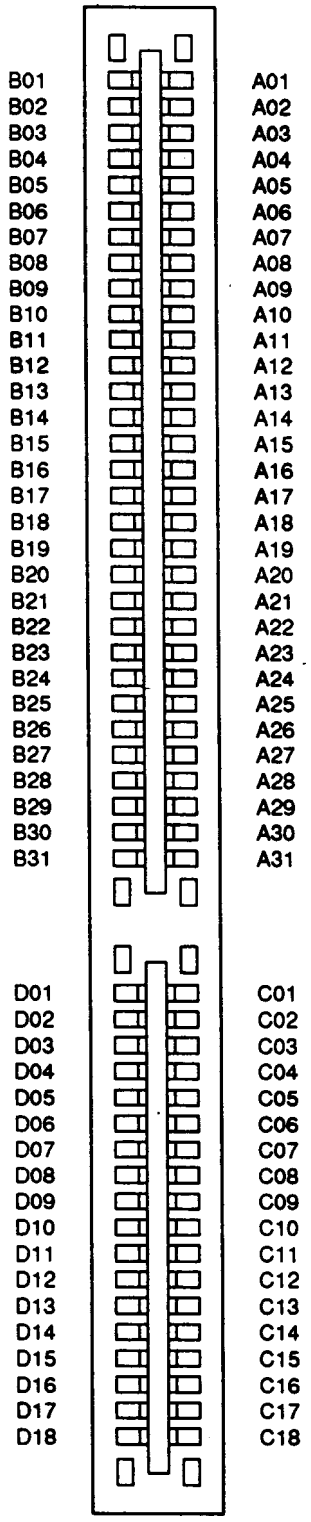


Figure 1-4 Expansion Connector

Table 1-3 Pin Assignments

Pin Number	Signal Name	I/O	Pin Number	Signal Name	I/O
A1	–IOCHCK	I	B1	GND	–
A2	SD07	I/O	B2	RESET	O
A3	SD06	I/O	B3	+5 VDC	–
A4	SD05	I/O	B4	IRQ9	I
A5	SD04	I/O	B5	–5 VDC	–
A6	SD03	I/O	B6	DRQ2	I
A7	SD02	I/O	B7	–12 VDC	–
A8	SD01	I/O	B8	(OWS)	I
A9	SD00	I/O	B9	+12 VDC	–
A10	–IOCHRDY	I	B10	GND	–
A11	AEN	O	B11	–SMEMW	O
A12	SA19	I/O	B12	–SMEMR	O
A13	SA18	I/O	B13	–IOW	I/O
A14	SA17	I/O	B14	–IOR	I/O
A15	SA16	I/O	B15	–DACK3	O
A16	SA15	I/O	B16	DRQ3	I
A17	SA14	I/O	B17	–DACK1	O
A18	SA13	I/O	B18	DRQ1	I
A19	SA12	I/O	B19	REFRESH	I/O
A20	SA11	I/O	B20	SYSCLK	O
A21	SA10	I/O	B21	IRQ7	I
A22	SA09	I/O	B22	IRQ6	I
A23	SA08	I/O	B23	IRQ5	I
A24	SA07	I/O	B24	IRQ4	I
A25	SA06	I/O	B25	IRQ3	I
A26	SA05	I/O	B26	–DACK2	O
A27	SA04	I/O	B27	T/C	O
A28	SA03	I/O	B28	BALE	O
A29	SA02	I/O	B29	+5 VDC	–
A30	SA01	I/O	B30	OSC	O
A31	SA00	I/O	B31	GND	–
C1	SBHE	I/O	D1	–MEMCS16	I
C2	LA23	I/O	D2	–IOCS16	I
C3	LA22	I/O	D3	IRQ10	I
C4	LA21	I/O	D4	IRQ11	I
C5	LA20	I/O	D5	IRQ12	I
C6	LA19	I/O	D6	(IRQ15)	I
C7	LA18	I/O	D7	IRQ14	I
C8	LA17	I/O	D8	(–DACK0)	O
C9	–MEMR	I/O	D9	(DRQ0)	I
C10	–MEMW	I/O	D10	–DACK5	O
C11	SD08	I/O	D11	DRQ5	I
C12	SD09	I/O	D12	–DACK6	O
C13	SD10	I/O	D13	DRQ6	I
C14	SD11	I/O	D14	(–DACK7)	O
C15	SD12	I/O	D15	(DRQ7)	I
C16	SD13	I/O	D16	+5 VDC	Power
C17	SD14	I/O	D17	–MASTER	I
C18	SD15	I/O	D18	GND	Ground

Chapter 1

Hardware Overview

Contents

Figures

Tables

2.1 Desk Station IV Troubleshooting

This chapter describes how to determine if a Field Replaceable Unit (FRU) in the Desk Station IV is not functioning properly. The FRU's covered are:

- ❑ Power supply board
- ❑ Interface board (PCB FDPSY2)
- ❑ Back panel board (PCB FDPBP2)
- ❑ LED board (PCB FDPLE2)

The following tools are required to perform the Desk Station IV troubleshooting steps:

1. Desk Station IV diagnostics disk
2. Phillips head screwdriver
3. Tweezers (to pick up screws that you cannot grasp with your fingers)
4. printer wraparound connector (F31PRT)
5. RS-232-C wraparound connector
6. Wraparound board (FDSTS3)
7. Computer system that can be connected to the Desk Station IV
8. IBM PS/2 keyboard
9. PS/2 mouse
10. External 5 1/4" floppy disk drive
11. 5 1/4" 2D or 2HD formatted work disk (for FDD testing)
12. Multimeter

2.2 Troubleshooting Flowchart

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

(1) Remove all optional equipment from the Desk Station IV.

(2) Connect a personal computer to the Desk Station IV.

> ***NOTE:*** *Refer to the Desk Station IV User's Manual for instructions on how to connect the computer to the Desk Station IV.*

(3) Connect the wraparound board to the expansion slot, the printer wraparound connector to the printer port, and the RS-232-C wraparound connector to the serial port on the Desk Station IV.

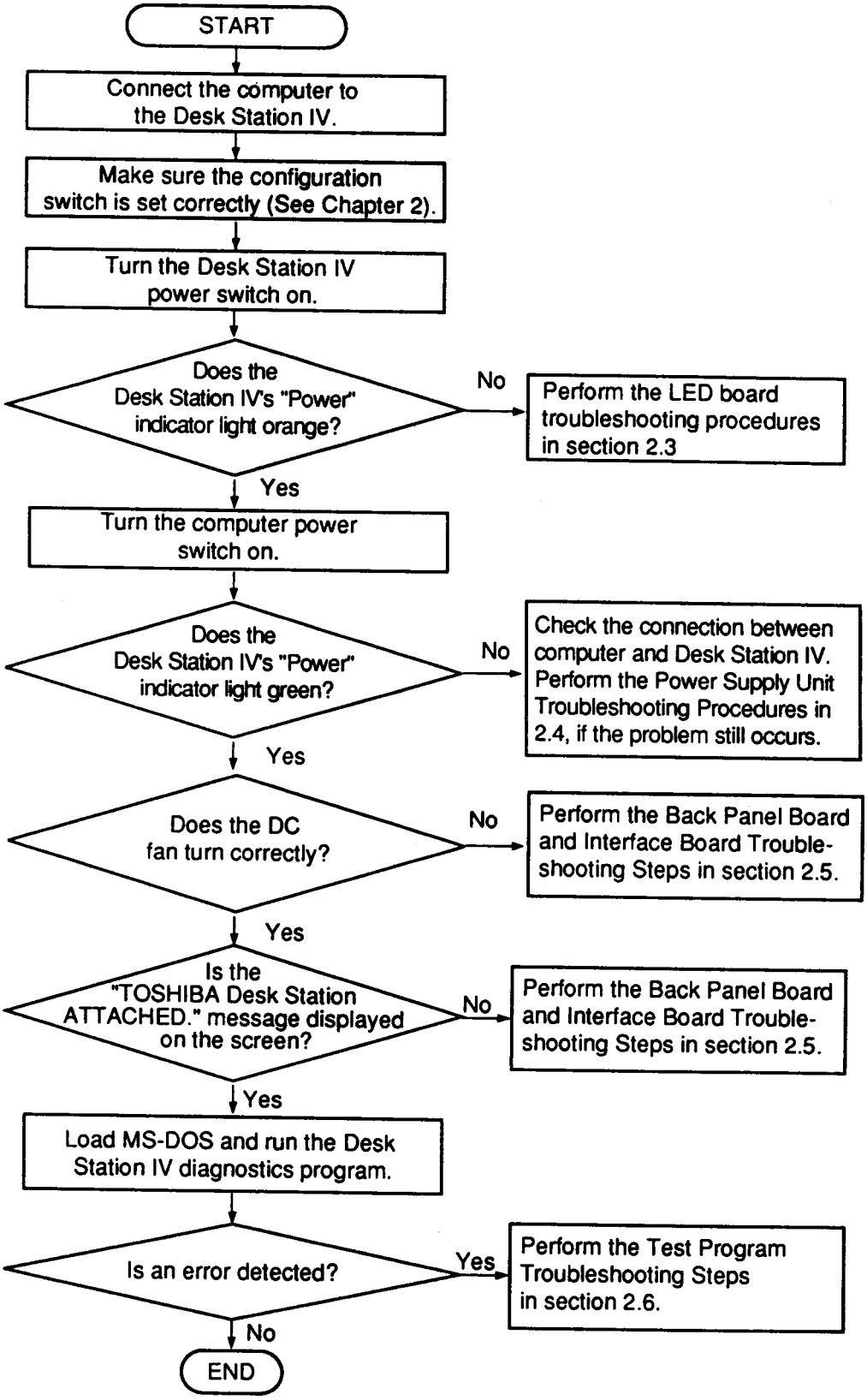


Figure 2-1 Troubleshooting Flowchart

2.3 LED Board Troubleshooting Procedures

This section describes how to determine if the LED board is defective. Start with Procedure 1 and continue with other procedures as instructed. The procedures described in this section are:

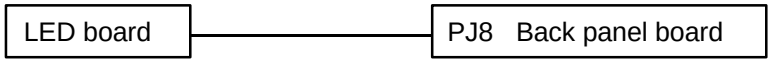
Procedure 1: Connector checklist

Procedure 2: Circuit checklist

Procedure 1 Connector checklist

The LED board is connected to the back panel board (PCB FDPBP2) by a cable. This cable may be disconnected. Open the top cover of the Desk Station IV to check the connection. Disassembly procedures are described in Chapter 4, *Replacement Procedures*.

Check 1 Make sure the LED cable is connected to the back panel board correctly as shown below:



If this cable is disconnected, connect it. Restart the system. If the problem still occurs, perform Check 2.

Check 2 The LED board may be damaged. Replace it with a new one.

Disassembly procedures are described in Chapter 4, *Replacement Procedures*. Restart the system. If the problem still occurs, perform Procedure 2.

Procedure 2 Circuit checklist

There may be problems with the circuit connecting the power supply through the LED board. Perform the power supply unit troubleshooting procedures described in Section 2.4.

2.4 Power Supply Unit Troubleshooting Procedures

This section describes how to determine if the power supply unit is defective. Start with Procedure 1 and continue with the other procedures as instructed. The procedures described in this section are:

Procedure 1: AC cord checklist

Procedure 2: Power supply connector checklist

Procedure 3: Power supply output voltage checklist

Procedure 4: Power supply unit replacement checklist

Procedure 1 AC cord checklist

Power is supplied to the DeskStation IV from a wall outlet through the AC cord.

Check 1 Make sure the AC cord is firmly plugged into the AC IN socket on the back of the DeskStation IV.

Check 2 Unplug the AC cord from the DeskStation IV. Check the AC cord output voltage with a multimeter.

If output voltage is normal, perform Procedure 2.

If output voltage is abnormal, perform Check 3.

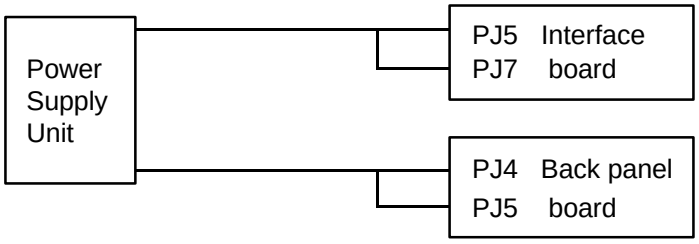
Check 3 Replace the AC cord with a new one. Perform Check 2 again.

If the problem still exists, perform Procedure 2.

Procedure 2 Power supply connector checklist

The DeskStation IV power supply supplies voltage to the interface board (PCB FDPSY2) and the back panel board (PCB FDPBP2) through the power supply cables.

Check 1 Make sure the four power supply cables are connected to the interface board (PCB FDPSY2) and back panel board (PCB FDPBP2) as shown below:



If these cables are disconnected, connect them. Restart the system.

If the problem still exists, perform Check 2.

Check 2 The four power supply cables may be damaged. Perform Procedure 3.

Procedure 3 Power supply output voltage checklist

Table 2-1 shows the DeskStation IV power supply output voltage specifications:

Table 2-1 Power Supply Specifications

Board Name	PJ Number	Pin No.	Signal Name
Interface board	PJ5	1	DC IN
		2	Ground
		3	CURNT
		4	Ground
	PJ7	1	RVCC
		2	RGND
		3	Ground
		4	CPCNF1
		5	ADPCNT1
		6	Ground
		7	PCCONN0
Back panel board	PJ4	1	–5 V
		2	Ground
		3	–12 V
		4	Ground
	PJ5	1	+5 V
		2	+5 V
		3	Ground
		4	Not connected
		5	+12 V
		6	Ground

Check 1 Check the output voltage of each cable.

> ***NOTE:*** *To check the output voltage, a computer must be connected to the DeskStation IV and both must be turned on.*

If the output voltage is normal, another cable may be damaged.

If the output voltage is abnormal, perform Procedure 4.

Procedure 4 Power supply unit replacement checklist

The power supply unit may be damaged. Replace the unit following the procedures described in Chapter 4, *Replacement Procedures*.

If the problem still exists, the back panel board or interface board may be damaged. Perform the Back Panel Board and Interface Board Troubleshooting Procedures listed in Section 2.6.

2.5 DC Fan Troubleshooting Procedures

This section describes how to determine if the DC fan is defective. Start with Procedure 1 and continue with other procedures as instructed. The procedures described in this section are:

Procedure 1: Connector checklist

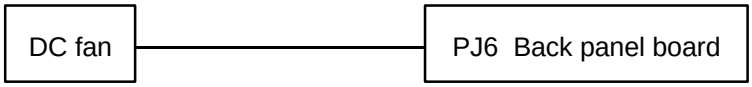
Procedure 2: Circuit checklist

> ***NOTE:*** *To operate the DC fan, a computer must be connected to the Desk Station IV, and both must be turned on.*

Procedure 1 Connector checklist

The DC fan is connected to the back panel board (PCB FDPBP2) by a cable. This cable may be disconnected. Open the top cover of the Desk Station IV to check this connection. Disassembly procedures are described in Chapter 4, *Replacement Procedures*.

Check 1 Make sure the fan cable is connected to the back panel board correctly as shown below:



If this cable is disconnected, connect it. Restart the system. If the problem still occurs, perform Check 2.

Check 2 The DC fan may be damaged. Replace it with a new one.

Disassembly procedures are described in Chapter 4. After replacing the fan, restart the system. If the problem still occurs, perform Procedure 2.

Procedure 2 Circuit checklist

There may be problems with the circuit connecting the power supply and DC fan. Perform the power supply unit troubleshooting procedures described in Section 2.4.

2.6 Back Panel Board and Interface Board Troubleshooting Procedures

This section describes how to determine if the back panel board (PCB FDPBP2) or interface card (PCB FDPSY2) is defective. Start with Procedure 1 and continue with other procedures as instructed. The procedures described in this section are:

Procedure 1:	Connections between the computer and the Desk Station IV checklist
Procedure 2:	Connector and replacement checklist

Procedure 1 Connections between the computer and the Desk Station IV checklist

The message, "TOSHIBA Desk Station ATTACHED," will not appear on the computer display if the Desk Station IV is not connected to the system correctly. If this message does not appear, check the following item.

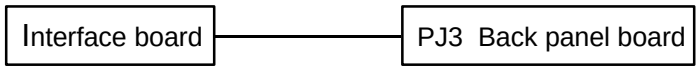
Check 1 Check the expansion bus connector and make sure it is connected correctly. Restart the system.

If the system still does not function properly perform Procedure 2.

Procedure 2 Connector and replacement checklist

The interface board is connected to the back panel board by a socket. This socket may be disconnected from the back panel board (PCB FDPBP2). Open the top cover of the Desk Station IV to check this connection. Disassembly procedures are described in Chapter 4, *Replacement Procedures*.

Check 1 Make sure the interface board is connected to the back panel board correctly as shown below:



If this socket is disconnected, connect it. Restart the system. If the problem still occurs, perform Check 2.

Check 2 The interface card (PCB FDPSY2) or back panel board (PCB FDPBP2) may be damaged.

Replace the interface card with a new one, and restart the system.

If the problem still exists, the back panel board may be damaged. Replace it with a new one.

2.7 Test Program Troubleshooting Procedures

This section describes how to determine which part is defective when an error is detected on one of the items in the test program. Test program operation is described in Chapter 3.

If an error is detected on the Printer Test, perform Procedure 1. If an error is detected on the Serial Port Test, perform Procedure 2. If an error is detected on the Expansion Test, perform Procedure 3. If an error is detected on the FDD Test, perform Procedure 4. If an error is detected on the Keyboard/Mouse test, perform Procedure 5.

Procedure 1: Printer test checklist

Procedure 2: Serial port checklist

Procedure 3: Expansion test checklist

Procedure 4: FDD test checklist

Procedure 5: Keyboard/mouse test checklist

Procedure 1 Printer test checklist

Perform this procedure when an error is detected on Subtests 01 (Ripple pattern), 02 (Function), and 03 (Wraparound) of the printer test.

Check 1 Make sure the printer and wraparound connector are connected to the Desk Station IV correctly. If the errors still occur, perform Check 2.

Check 2 The interface boards may be damaged. Replace the interface board 1 (PCB FDPSY2) with a new one. Disassembly procedures are described in Chapter 4. If the error still occurs, perform Check 3.

Check 3 The back panel board (PCB FDPBP2) may be damaged. Replace it with a new one. Disassembly procedures are described in Chapter 4. If the error still occurs, perform Check 4.

Check 4 The interface cable may be damaged. Replace it with a new one. Disassembly procedures are described in Chapter 4.

Procedure 2 Serial port checklist

Perform this procedure when an error is detected on Subtest 01 (Serial port wraparound) of the Serial Port Test.

Check 1 Make sure the RS-232-C wraparound connector is connected to the Desk Station IV correctly. If the error still occurs, perform Check 2.

Check 2 Ensure that the computer setup program is properly set. Perform the test program again. If the error still occurs, perform Check 3.

Check 3 The interface boards may be damaged. Replace the interface board 1 (PCB FDPSY2) with a new one. Disassembly procedures are described in Chapter 4. If the error still occurs, perform Check 4.

Check 4 The back panel board (PCB FDPBP2) may be damaged. Replace it with a new one. Disassembly procedures are described in Chapter 4. If the error still occurs, perform Check 5.

Check 5 The interface cable may be damaged. Replace it with a new one. Disassembly procedures are described in Chapter 4.

Procedure 3 Expansion test checklist

Perform this procedure when an error is detected during the Expansion Test.

> ***NOTE:*** *If you must disassemble the unit, refer to Chapter 4 for disassembly and reassembly instructions.*

Check 1 Make sure the wraparound board is connected to the Desk Station IV correctly. Connect it if it is not connected. If the error still occurs, perform Check 2.

Check 2 Make sure the interface cable is connected correctly. Connect it if it is not connected. If the error still occurs, perform Check 3.

Check 3 Make sure the back panel board (PCB FDPBP2) is connected correctly. Connect it if it is not connected. If the error still occurs, perform Check 4.

Check 4 The interface board may be damaged. Replace the interface board (PCB FDPSY2) with a new one. If the error still occurs, perform Check 5.

Check 5 The back panel board (PCB FDPBP2) may be damaged. Replace it with a new one. If the error still occurs, perform Check 6.

Check 6 The interface cable may be damaged. Replace it with a new one.

Procedure 4 FDD test checklist

When an error is detected during the FDD Test, **and an external 5-1/4-inch FDD is connected to the FDD port**, perform the following procedure.

Check 1 Make sure the FDD cable is connected to the 5-1/4-inch FDD and Desk Station IV's FDD port correctly. If the error still occurs, perform Check 2.

Check 2 Make sure you turn on the Desk Station IV after you turn on the external 5-1/4-inch FDD. If the error still occurs, perform Check 3.

Check 3 The interface board may be damaged. Replace the interface board (PCB FDPSY2) with a new one. Disassembly procedures are described in Chapter 4. If the error still occurs, perform Check 4.

Check 4 The 150-pin interface cable may be damaged. Replace it with a new one. Disassembly procedures are described in Chapter 4.

When an error is detected during the FDD Test, **and a 5-1/4-inch FDD is connected to the 5-1/4-inch drive bay**, perform the following procedures.

> ***NOTE:*** *If you must disassemble the unit, refer to Chapter 4 for disassembly and reassembly instructions.*

Check 1 Ensure that the jumper strap (PJ11, PJ12, and PJ13) on the interface board is set as follows. If the error still occurs, perform Check 2.

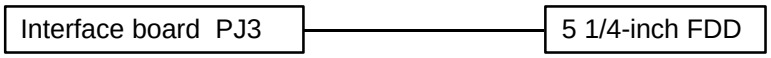
Setting PJ13

If 5 1/4" internal FDD supports:	Jumper Setting
Mode/Density select	PJ13 Short
No Mode/Density select	PJ13 Open

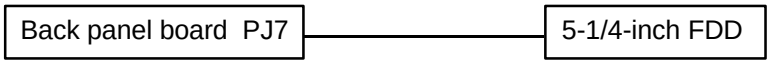
Setting PJ11 and PJ12

Drive Type:	Signal Name	Jumper Setting
1.2 MB	Disk change	PJ11 Short PJ12 1-2 Short
360 KB	Ready	PJ11 Open PJ12 2-3 Short

Check 2 Make sure the FDD signal cable is connected between the 5-1/4-inch FDD and the interface board (PJ3) as shown below. If the error still occurs, perform Check 3



Check 3 Ensure that the FDD power cable is connected between the 5-1/4-inch FDD and the back panel board (PJ7) as shown below. If the error still occurs, perform Check 4.



Check 4 The interface board may be damaged. Replace it with a new one. If the error still occurs, perform Check 5.

Check 5 The 150-pin interface cable may be damaged. Replace it with a new one. If the error still occurs, the 5-1/4-inch FDD may be defective.

Procedure 5 Keyboard/mouse test checklist

Perform this procedure when an error is detected during the Keyboard (mouse) Test.

Check 1 Verify that the external keyboard cable or PS/2 mouse cable is connected to the DeskStation IV correctly. If the error still occurs, perform Check 2.

Check 2 Make sure you turn on the DeskStation IV after you connect the external keyboard or PS/2 mouse. If the error still occurs, perform Check 3.

Check 3 The interface board may be damaged. Replace it with a new one. Disassembly procedures are described in Chapter 4. If the error still occurs, perform Check 4.

Check 4 The 150-pin interface cable may be damaged. Replace it with a new one. Disassembly procedures are described in Chapter 4.

Chapter 2

Troubleshooting Procedures

Contents

Figures

Tables

3.1 General

The DeskStation IV test program is used to check the signal lines between the computer and DeskStation IV's slots. It is also used to check the data lines and control lines in the serial port and parallel port.

The following items are necessary to execute the test and diagnostic programs.

1. DeskStation IV diagnostics disk

2. Printer wraparound connector (F31PRT)
   (For printer wraparound test)

3. RS-232-C wraparound connector
   (For ASYNC wraparound test)

4. Wraparound board (FDSTS3)

5. A computer system which can be connected to the DeskStation IV

6. Printer
   (For printer function test and print shift character testing)

7. The external floppy disk drive and a 2HD or 2D formatted working disk
   (for FDD testing)

8. An external PS/2 101/102-key keyboard

9. A PS/2 mouse

3.2 Operations

1. Connect a computer to the Desk Station IV.

> ***NOTE:*** *Refer to the Desk Station IV User's Manual for more information about how to connect a computer to the Desk Station IV.*

2. Turn on the Desk Station IV first, then the computer.

3. Confirm that the following message displays until the computer's self test is completed:

```
TOSHIBA Desk Station ATTACHED
```

4. After running MS-DOS, insert the diagnostics disk in the computer's floppy disk drive.

5. Type in **A>DESKS4** and press **Enter**.

6. The main menu appears as shown below:

```
TOSHIBA personal computer [Desk Station IV] DIAGNOSTICS
Version *.** (C) Copyright TOSHIBA Corp. 19**

DIAGNOSTICS MENU :

  1 - DIAGNOSTIC TEST
  5 - LOG UTILITIES
  9 - EXIT TO MS-DOS


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

   1: DIAGNOSTIC TEST
   Press **1** to access the test menu.

   5: LOG UTILITIES
   Press **5** to access the error log utilities menu. Refer to Section 3.9 for more information about the log utilities.

   9: EXIT TO MS-DOS
   Press **9** to return to the MS-DOS prompt.

7. Type in **1** to select the diagnostic test, and press **Enter**. The following menu appears:

```
TOSHIBA personal computer [Desk Station IV] DIAGNOSTICS
Version *.** (C) Copyright TOSHIBA Corp. 19**

DIAGNOSTIC TEST MENU :

  1 - PRINTER
  2 - SERIAL PORT
  3 - EXPANSION
  4 - FDD
  5 - KEYBOARD
 99 - EXIT TO DIAGNOSTICS MENU




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

1 to 5: PRINTER, SERIAL PORT, EXPANSION, FDD, KEYBOARD
Pressing **1**, **2**, **3**, **4**, or **5** calls up the printer, serial port, expansion, FDD, or keyboard test menus.

99: EXIT TO DIAGNOSTICS MENU
Press **99** to return to the diagnostics menu.

Table 3-1 lists the subtests of each test program. Each subtest is described in Sections 3.3 to 3.7.

Table 3-1 Subtest Names

No.	Subtest Name	Subtest No.	Subtest Item
1	PRINTER	01 02 03	Ripple pattern Function Wraparound
2	SERIAL PORT	01	Serial port wraparound
3	EXPANSION	01	IBM card-slot wraparound
4	FDD	01	Test
5	KEYBOARD	01 02	Test Mouse check

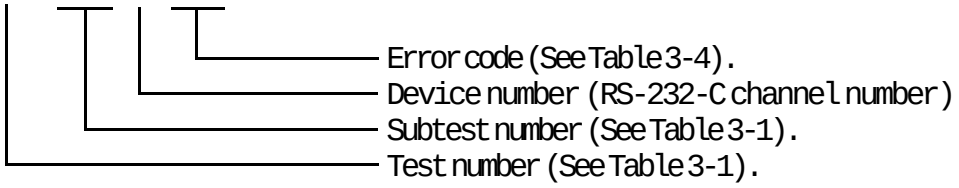
8 After typing in a test number (1 to 5) from the test select menu and pressing **Enter**, a subtest menu appears. The screen shown below appears when you type **1** and press **Enter**.

```
PRINTER TEST     TSSDSS
                   Desk Station IV DIAGNOSTIC V*.**
                   [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 - Ripple pattern
02 - Function
03 - Wraparound
99 - Exit to DIAGNOSTIC TEST MENU

SELECT SUB-TEST NUMBER ?
```

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

Displayed information is broken down in the following order:

(1) T S S D S S



(2) SUB-TEST: Subtest number

(3) PASS COUNT: Number of passes executed

(4) ERROR COUNT: Number of errors

(5) WRITE DATA: Data output during the test

(6) READ DATA: Test response data

(7) ADDRESS: The subtest number of the EXPANSION test.

(8) STATUS: The first number indicates the device number. The second and third numbers indicate the error status.

9. Select a subtest by typing in the test number, and pressing **Enter**. The following message appears:

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

   1:YES: Each time a test cycle ends, it increments the pass counter by one and repeats the test cycle.

   2:NO: At the end of a test cycle, the test execution is terminated and returns to the subtest menu.

10. Type in **1** or **2**, and press **Enter**. The following message appears:

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

    1:YES: When an error occurs, the error status will appear and execution of the test program will stop. The operation guide shown below will appear on the right side of the display screen.

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

    1: Test end
    Terminates test program execution and returns to the subtest menu.

    2: Continue
    Continues the test and proceeds to the next step.

    3: Retry
    Executes the error step by step.

    Error messages are described in Section 3.8.

    2:NO: When an error occurs, the error status will appear, the error counter will increase by one, and the test will go to the next test.

11. Type in **1** or **2**, and press **Enter**. The test program is executed.

3.3 Printer Test

> ***CAUTION:*** *A printer (IBM compatible) must be connected to the system in order to execute subtests 01 and 02.*

3.3.1 Contents

Subtest 01 Ripple pattern

Character codes 20H to 7EH are printed line by line while shifting one character to the right at the beginning of each new line as shown below.

```
  !"#$%&'()*+,-./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

The following print functions are tested:

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

The following is a sample of the function test:

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

Subtest 03 Wraparound

The data control and status lines are checked with the printer wraparound connector.

> ***NOTE:*** *A printer wraparound connector is necessary for executing this test. A wiring diagram of the printer wraparound connector is shown in Section 3.10.*

3.3.2 Operations

1. When you select Subtest 01, 02, or 03, the following message will appear:

   ```
   Select the channel number ( 1 - 3 ) ?
   ```

   Type the printer channel number, and press **Enter** to execute the subtest.

3.4 Serial Port Test

3.4.1 Contents

Subtest 01 Serial port wraparound

A data send/receive test is performed with the wraparound connector. Set up of the communication mode is as follows:

asynchronous, 9600BPS, data 8 bit + parity (even),
1 stop bit, data = 20H-7EH code

> ***NOTE:*** *The RS-232-C wraparound connector must be connected to the COMM5 port to execute this test. The wiring diagram for the RS-232-C wraparound connector is shown in Section 3.10.*

3.4.2 Operations

1. When you select Subtest 01, the following message appears:

   ```
   Select the channel number (1/2/3) ?
   ```

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

3.5 Expansion Test

3.5.1 Contents

Subtest 01 IBM card-slot wraparound (16-bus)

> ***NOTE:*** *A wraparound board (FDSTS3) must be connected to the IBM slot to execute this test.*

The IBM AT-slot (16-bit bus) is checked with a wraparound board. The following table lists the tests in the order they are performed.

Table 3-2 Expansion Tests

No.	Test Item
01	Clock test (Each signal of OSC, SYSC, BALE, REFM)
02	Interrupt test (IRQ7 to 3, NMI, IRQ14, IRQ12 to 9)
03	DMA#1 test (Channel 1 to 3, TC status)
04	Data bus test (0000H to FFFFH)
05	Address bus test (D000H:0000 to FFFFH)
06	IORDY test (Read value of 304H checks xCH)
07	IOCS16 test (Counts compare)
08	MASTER test (Read/write check)
09	DMA#2 test (Word transfer to channel 5 and 6, T/C status)
10	Power line test (–12, –5, +12 V)
11	A16-23 test (MEMCS16 at 380000H and 340000H, address line)

3.5.2 Operations

1. During the test, the following message will appear and a beep sound will be emitted from the speaker.

```
Press [Enter] key?
```

2. If you select `1:YES` at the TEST LOOP question:

   The PASS COUNT will increase by one each time you press **Enter**, and the speaker will continue beeping. To stop the beep, press **Ctrl**+**Break**.

   If you select `2:NO` at the TEST LOOP question:

   When you press **Enter**, the speaker will stop beeping and the subtest menu will appear. Table 3-3 shows the defective contents of the expansion test.

Table 3-3 Defective Contents

Sub#	Address	Good	Bad	Defective Contents
01	0 00 01	78/D8	xx	OSC, SYSC, SIOC, BALE, REFM
02	0 00 02 0 00 02	FA F8	xx	8259#1 (IRQ7, 6, 5, 4, 3, NMI) 8259#2 (IRQ14, 12, 11, 10, 9)
03	(ch, #) 00 03	nn		DMA#1, Channel #1 to 3 nn=FF, AA, 55, 00, EE, 99, 44, 00
04	0 00 04	00-FF	xx	Data line (8-bit)
05	D aa aa	bb	bb	Address line (A15 to 0) aaaa = test address, bbbb = read data
06	0 00 06	0C	0x	IORDY
07	0 00 07	ff	ss	IOCS16 (ff<ss) ff = first data, ss = second data
08	0 00 08	nn	xx	MASTER (nn = FF, AA, 55, 00)
09	0 00 09	nn	xx	DMA#2, Channel #5, 6 nn = FFFF, AAAA, 5555, 0000, EEEE, 9999, 4444, 0000
12	0 00 12	A0/40	X0	–12 V, –5 V, +12 V
13	0 00 13	00 01 nn	X0 xx xx	38xxxx 34xxxx Address line test (nn = A16 to 23)

nn: Test data
ff: First data
ss: Second data

Good: Write data
Bad: Read data

3.6 FDD Test

3.6.1 Contents

Subtest 01 Test

This test checks the external 5-1/4-inch floppy disk drive connected to the Desk Station IV FDD port, and the 5-1/4-inch floppy disk drive installed in the 5-1/4-inch drive bay.

The test writes data to one sector and then reads the data and compares it with the original data on a 2D or 2HD floppy disk.

***NOTE**: To execute this test, the external 5-1/4-inch FDD must be connected to the Desk Station IV and a 5-1/4-inch floppy disk (2D or 2HD) must be inserted in the drive.*

***CAUTION**: If both the external 5-1/4-inch FDD and the 5-1/4-inch FDD in the drive bay are connected to the Desk Station IV, neither FDD will operate.*

The external 5-1/4-inch FDD and the 5-1/4-inch FDD in the 5-1/4-inch drive bay can be assigned to drive A or B by using the external FDD/PRT option in the computer's setup program as follows:

External FDD/PRT (in the Setup program)	Desk Station IV FDD
Printer	Drive B
FDD B	Drive B
FDD A	Drive A

3.6.2 Operations

1. If you connect a 2HD type drive:

   When you select Subtest 01, the following message will appear :

   ```
   Select media ! (1:2D, 2:2HD)?
   ```

   Type in the appropriate number for the type of disk in the FDD, and press **Enter** to execute the subtest.

2. If you connect a 2D type drive:

   Select Subtest 01 to execute the subtest. (The message above doesn't appear.)

3.7 Keyboard Test

Caution: An external keyboard must be connected to the DeskStation IV in order to execute this test.

3.7.1 Contents

Subtest 01 Test

This test checks the functions of an external 101/102-key keyboard attached to the unit. A test of the following 10 keys is performed in order.

[F1], [TAB], f, ,, /, [F12], e, b, [Del], [Home]

Subtest 02 Mouse check

Caution: A PS/2 mouse must be connected to perform this test.

This test checks the functions of a PS/2 mouse connected to the DeskStation IV.

3.8 Error Messages

The diagnostic program displays error messages when an error occurs during the execution of each test item. The message contains useful information such as the data used for the test and the test address. Refer to Table 3-4 below for a listing of error statuses and error codes.

Table 3-4 Error Status Code List

Device Name	Error Code	Error Status
Common	FF	Data compare error
Printer	01	Time-out error
	08	Fault error
	10	Select line
	20	Paper end
	40	Not connect PRINTER
	80	Busy line
Serial port	01	[DSR ON] Time-out error
	02	[CTS ON] Time-out error
	04	[RX READY] Time-out error
	08	[TX FULL] Time-out error
	10	Parity error
	20	Framing error
	40	Overrun error
	80	Line status error
	88	Modem status error
Expansion bus	01	Clock signal error
	02	8259#1 Interrupt error
	03	8259#2 Interrupt error
	04	DMA (8-bit transfer) error
	05	Data line (bit 7..0) error
	06	Data line (bit 15 ..8) error
	07	Address line (A15..0) error
	08	I/O CH READY line error
	09	I/O CS16 line error
	0A	MASTER line error
	0B	DMAC (16-bit transfer) error
	0C	Serial I/O CS line error
	0D	There is no test card.
	0E	Address line (A23..16) error
	0F	MEM CS16 line error
	10	Incompatible machine type
FDD	01	FDD-BAD command error
	02	FDD-ADDRESS mark not found
	03	FDD-WRITE protected
	04	FDD-DMA overrun error
	08	FDD-DMA boundary error
	09	FDD-CRC error
	10	FDD-FDC error
	20	FDD-SEEK error
	40	FDD-TIME-OUT error
	80	FDD-NOT DRIVE error
	06	FDD-MEDIA removed
	EE	FDD-WRITE buffer error
Keyboard	03	PS/2-Interface error

3.9 Log Utilities

This program logs error information generated while a test is in progress, and stores it in RAM.

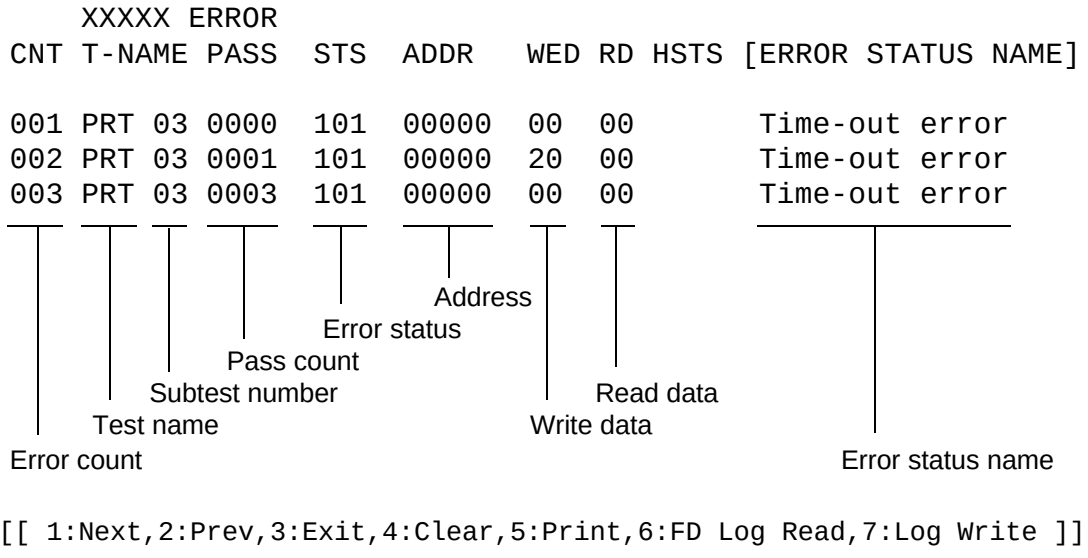
If the POWER switch is turned off, the error information will be lost. The error information itself is displayed as follows:

1. Error count (CNT)
2. Test name (TS)
3. Subtest number (NAME)
4. Pass count (PASS)
5. Error status (STS)
6. Memory address/step number (ADDRESS)
7. Write data (WD)
8. Read data (RD)
9. Error status name

This program can store data on a floppy disk or send the error information to a printer.

3.9.1 Operations

1. After pressing **5** and pressing **Enter** in the main menu, the error information logged in RAM or on the floppy disk is displayed as shown below.



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

2. The information displayed on the screen can be manipulated with the following key operations:

   The **1** key scrolls the display to the next page.
   The **2** key scrolls the display to the previous page.
   The **3** key returns the display to the main menu.
   The **4** key erases all error information logged in RAM.
   The **5** key outputs error information logged to a printer.
   The **6** key reads information logged from a floppy disk.
   The **7** key writes information logged 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. This is not added to the error count.

3.10 Wraparound Connector Wiring Diagram

1. Printer wraparound connector (34M741986G01)

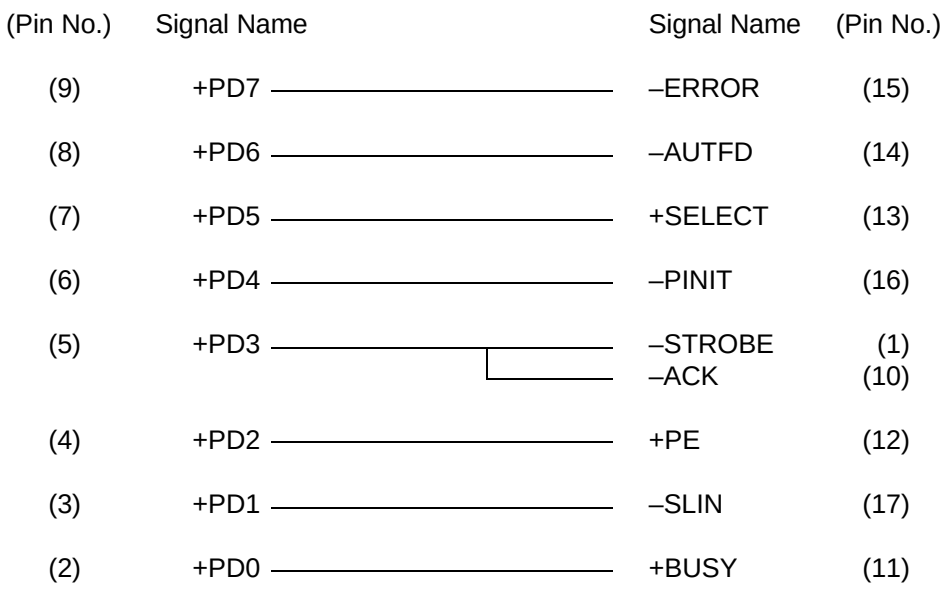


Figure 3-1 Printer Wraparound Connector

2. RS-232-C wraparound connector (34M741621G01)

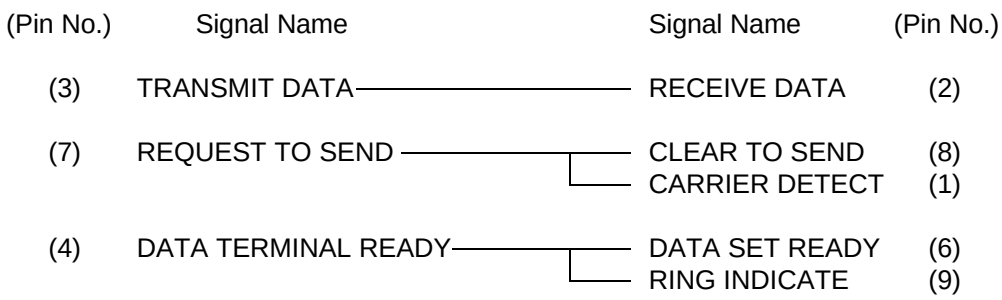


Figure 3-2 RS-232-C Wraparound Connector

Chapter 3

Tests and Diagnostics

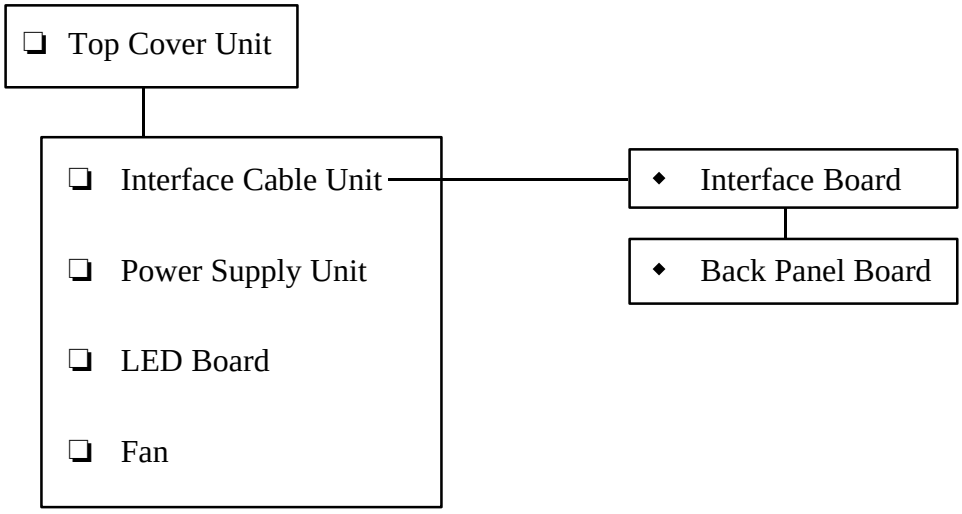
Contents

Figures

Tables

4.1 General

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



Before You Begin

Look over the procedures in this section before you begin disassembling the Desk Station IV. Familiarize yourself with the disassembly and reassembly steps. Begin each procedure by removing the AC cord**.**

1. Do not disassemble the Desk Station IV unless it is operating abnormally.
2. Use only the correct and approved tools.
3. Make sure the working environment is free from the following elements whether you are using or storing the Desk Station IV:

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

4. Make sure the FRU you are replacing is causing the abnormal operation by performing the necessary diagnostics tests described in this manual.
5. Do not perform any operations that are not necessary and use only the described procedures for disassembling and installing FRUs in the Desk Station IV.
6. After removing parts from the Desk Station IV, store them in a safe place 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 Desk Station IV. When you remove screws, make sure they are stored in a safe place and identified with the correct parts.

8. When reassembling the Desk Station IV make sure you use the correct screws to secure the various pieces in place. Screw sizes are listed in the corresponding figures

9. After replacing an FRU, perform the appropriate FRU test to ensure the Desk Station IV (DS4) is functioning properly.

WARNING: *The Desk Station IV contains many sharp edges and corners, so be careful not to injure yourself.*

Assembly Procedures

Upon repairing the Desk Station IV, reassemble the unit and remember the following general points:

- ❑ Take your time, making sure you follow the instructions closely. Most problems arise when you are hurried.
- ❑ Make sure all cables and connectors are securely fastened.
- ❑ Before securing the FRU or other parts, make sure that no cables will be pinched by screws or the FRU.
- ❑ Check that all latches are closed securely.
- ❑ **Using the correct screws**, secure all FRUs.

CAUTION: *Using the wrong screw can damage the screw threads or the screw head, or prevent proper seating of an FRU.*

After installation, confirm that the FRU and the Desk Station IV are functioning properly.

Tools and Equipment

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

- ❑ One M3 Phillips-head screwdriver to remove and replace screws.
- ❑ Tweezers, to lift out screws that you cannot grasp with your fingers.
- ❑ ESD mats for the floor and the table you are working on.
- ❑ An ESD wrist strap or heel grounder.
- ❑ Anti-static carpeting or flooring.
- ❑ Air ionizers in highly static-sensitive areas.

4.2 Top Cover Unit and Back Cover

Removing the Top Cover and Back Cover

To remove the top cover and back cover, follow the steps below and refer to Figures 4-1 through 4-4.

1. Turn off the power to the Desk Station IV. Disconnect the computer, power cord, and all external cables connected to the Desk Station IV.

2. Remove the **two M3x6 silver screws** on the **side cover** (Figure 4-1).

3. Slide the **side cover** to the back of the unit until it stops (about 1 cm) and place the side cover aside (Figure 4-1).

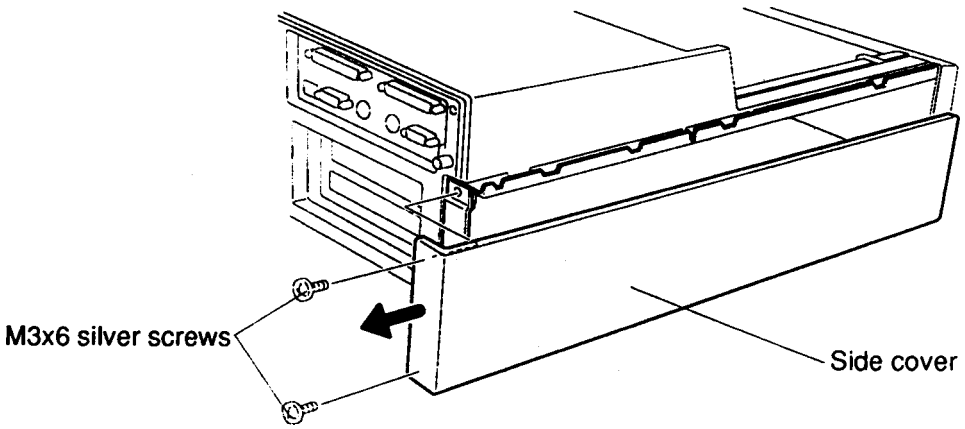


Figure 4-1 Removing the Side Cover

4. Remove the **two M3x4 silver screws** from the side of the Desk Station chassis (Figure 4-2).

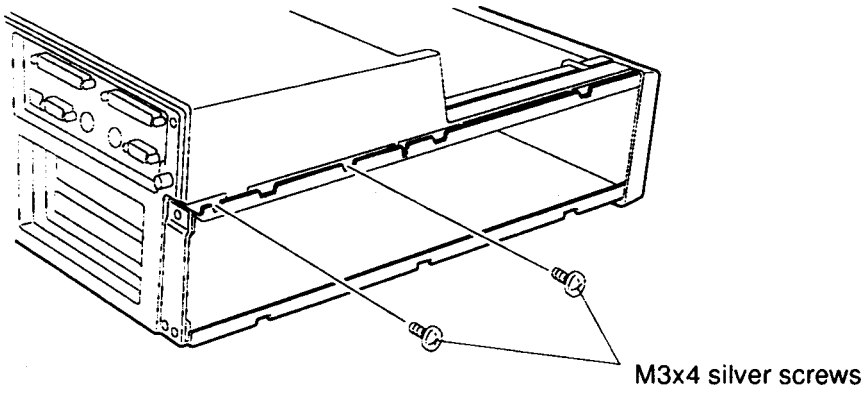


Figure 4-2 Removing Two Screws

5. Remove the **two M3x6 silver screws** to remove the **top cover unit** (Figure 4-3).

6. Slide the **top cover unit** forward about 3 cm (or 1 inch) so that the latches on the side of the chassis and cover are open. Lift the top cover unit off the chassis (Figure 4-3).

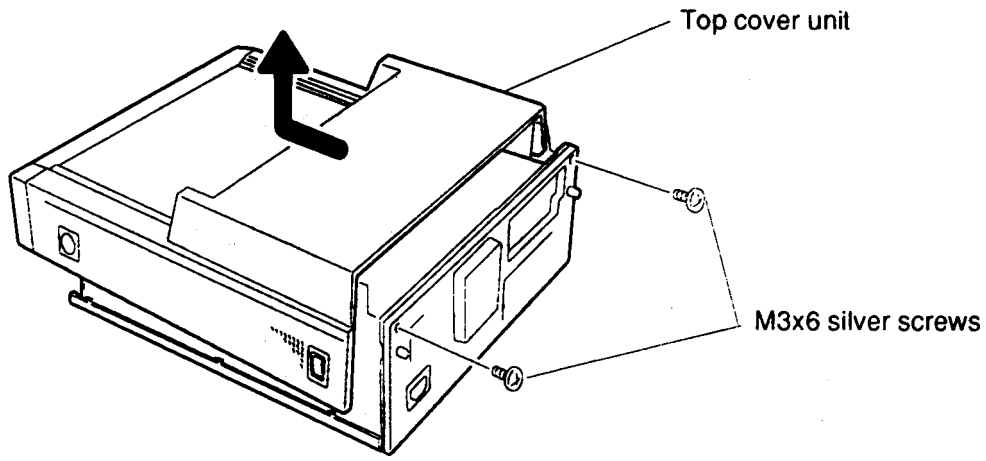


Figure 4-3 Removing the Top Cover Unit

7. Remove the **three M3x6 silver screws** to remove the **back cover** (Figure 4-4).

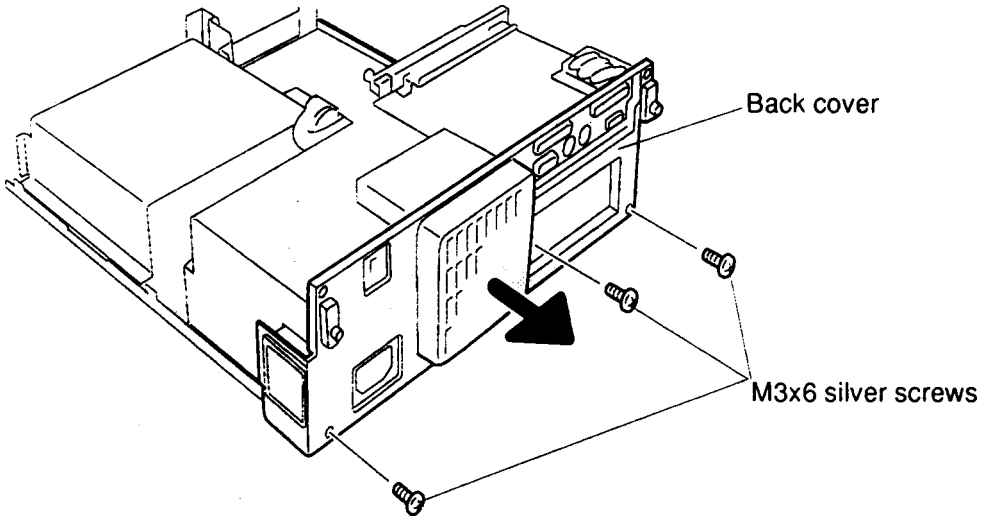


Figure 4-4 Removing the Back Cover

Installing the Top Cover Unit and Back Cover

To install the top cover unit, follow the steps below and refer to Figures 4-1 through 4-5.

1. Secure the **back cover** with **three M3x6 silver screws** (Figure 4-4).

2. Set the **top cover unit** on the chassis, and slide it into place so the latches fasten securely (Figure 4-3).

> ***CAUTION:*** *Watch for cables that may catch on the top cover unit. Use care when sliding the cover into place.*

3. Secure the **top cover unit** with **two M3x6 silver screws** (Figure 4-3).

4. Secure the **two M3x4 silver screws** on the side of the Desk Station IV chassis (Figure 4-2).

5. Align the **six latches** on the **side cover** with **six notches** on the chassis (Figure 4-5).

6. Slide the **side cover** to the front and secure it in place with **two M3x6 silver screws** as shown in Figure 4-5.

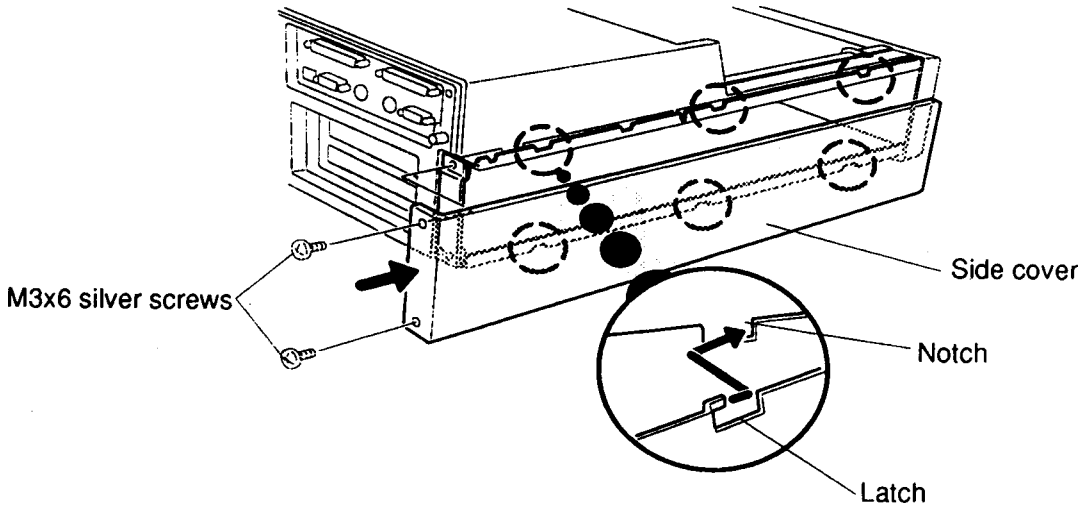


Figure 4-5 Attaching the Side Cover

4.3 Interface Cable Unit

Removing the Interface Cable Unit

To remove the interface cable unit, follow the steps below and refer to Figures 4-6 and 4-7.

1. Turn off the power to the Desk Station. Disconnect the computer, power cord, and all external cables connected to the unit.

2. Remove the top cover unit as described in Section 4.2.

3. Remove the **four M3x6 screws** to remove the **interface cable cover bracket.** Note the brass spacers on two of the screws (Figure 4-6).

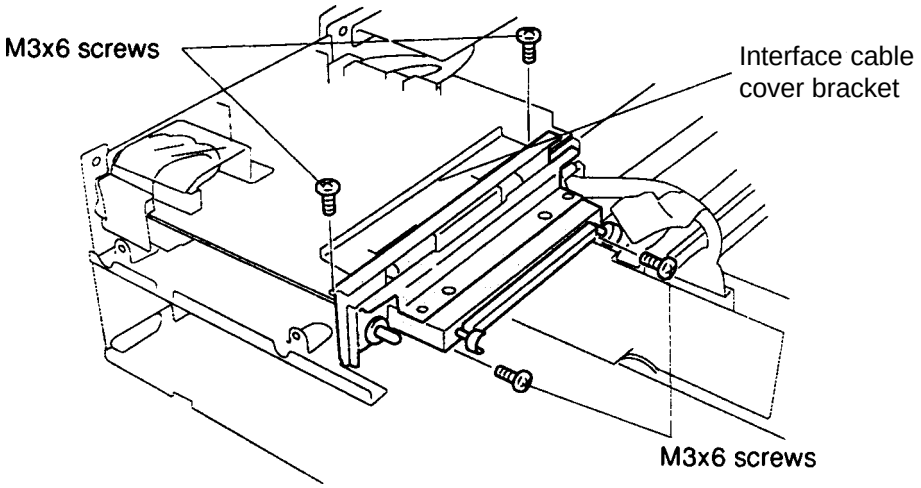


Figure 4-6 Removing the Interface Cable Cover Bracket

4. Carefully disconnect the **interface cable** from **PJ1** on the **interface board** (PCB FDPSY2) (Figure 4-7).

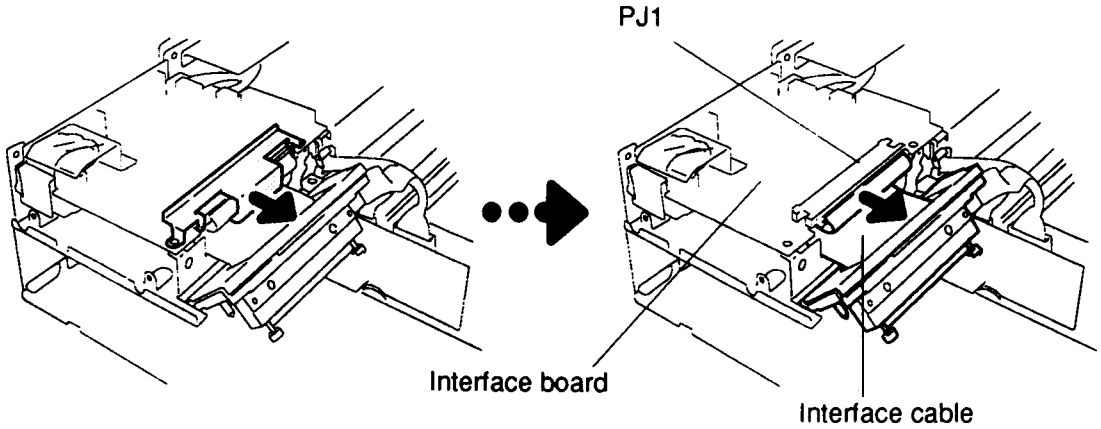


Figure 4-7 Removing the Interface Cable

Installing the Interface Cable Unit

To install the interface cable unit, follow the steps below and refer to Figures 4-6 and 4-7.

1. Be sure to insert the **cable** through the hole in the **interface cable cover bracket** and put it between the **interface board** and the **interface board bracket**.

2. Connect the **interface cable** to **PJ1** interface board (Figure 4-7).

3. Place the **interface cable cover bracket**, then secure the **interface cable unit** with **four M3x6 screws** (Figure 4-6).

4. Install the **top cover unit** as described in Section 4.2.

4.4 Interface Board

Removing the Interface Board

To remove the interface board, follow the steps below and refer to Figure 4-8.

1. Turn off the power to the unit. Disconnect the computer, power cord, and all external cables connected to the Desk Station.

2. Remove the top cover unit, back cover, and interface cable unit as described in Sections 4.2 and 4.3.

3. Disconnect the **two power supply cables** from **PJ5** and **PJ7** on the **interface board** (PCB FDPSY2) (Figure 4-8).

4. Remove the **three M3x4 silver screws** from the back of the Desk Station IV, and the **interface board** from **back panel board** (Figure 4-8).

5. Lift straight up (Figure 4-8).

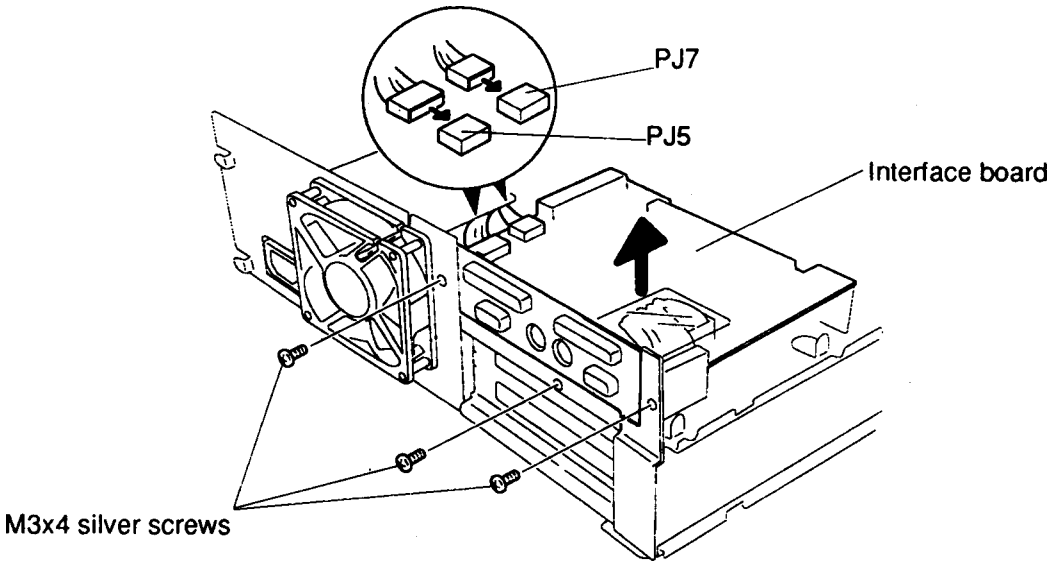


Figure 4-8 Removing the Interface Board

Installing the Interface Board

To install the interface board, follow the steps below and refer to Figure 4-8.

1. Place the **interface board** on the **interface board bracket**, then connect the **interface board** to the **back panel board** (Figure 4-8).

2. Secure the **interface board** with **three M3x4 silver screws** (Figure 4-8).

3. Connect the **two power supply cables** to the **PJ5** and **PJ7** on the interface board (Figure 4-8).

4. Install the interface cable unit, back cover, and top cover unit as described in Sections 4.3 and 4.2.

4.5 Back Panel Board

Removing the Back Panel Board

To remove the back panel board, follow the steps below and refer to Figures 4-9 and 4-10.

1. Turn off the power to the Desk Station IV. Disconnect the computer, power cord, and all external cables connected to the unit.

2. Remove the top cover unit, back cover, interface cable unit, and interface board as described in Sections 4.2, 4.3, and 4.4.

3. Remove the **four M3x4 silver screws** to remove the **interface board bracket** (Figure 4-9).

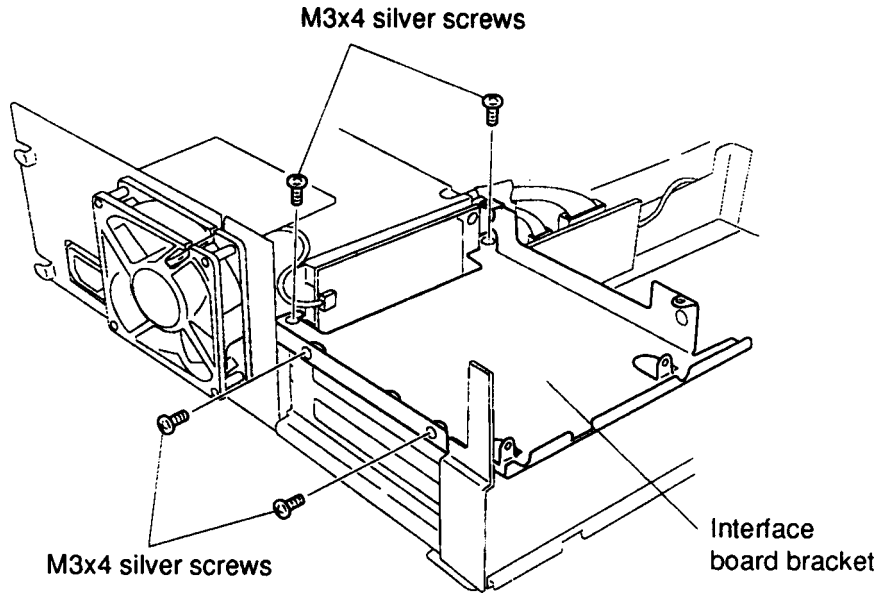


Figure 4-9 Removing the Interface Board Bracket

4. Disconnect the **power supply cables** from **PJ4** and **PJ5**, and the **fan cable** from **PJ6** on the back panel board (PCB FDPBP2), and **LED cable** from **PJ8** (Figure 4-10).

5. Remove the **three M3x4 silver screws** to remove the **back panel board** (Figure 4-10).

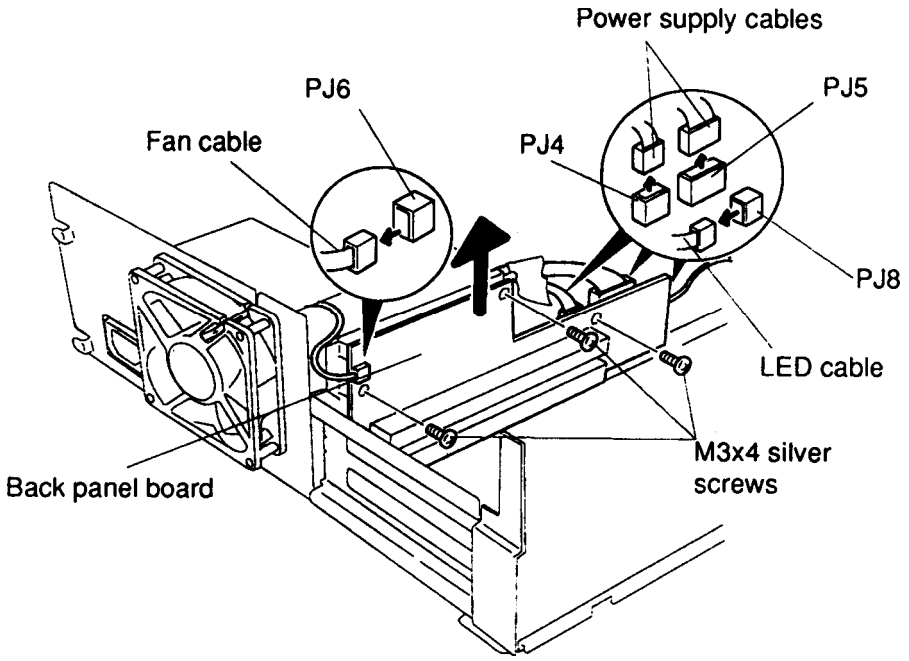


Figure 4-10 Removing the Back Panel Board

Installing the Back Panel Board

To install the back panel board, follow the steps below and refer to Figures 4-9 and 4-10.

1. Place the **back panel board** on the bottom cover. Be sure the back panel board fits into the **slits** on the bottom cover.

2. Secure the **back panel board** with **three M3x4 silver screws** to the backpanel

3. Connect the **two power supply cables** to **PJ4** and **PJ5**, the **fan cable** to **PJ6** on the back panel board, and the **LED cable** to **PJ8**.

4. Set the **interface board bracket**, then secure it with **four M3x4 silver screws**.

5. Install the interface board, interface cable unit, back cover, and top cover unit as described in Sections 4.4, 4.3, and 4.2.

4.6 Power Supply Unit

Removing the Power Supply Unit

To remove the power supply unit, follow the steps below and refer to Figures 4-11 and 4-12.

1. Turn off the power to the unit. Disconnect the computer, power cord, and all external cables connected to the Desk Station IV.

2. Remove the top cover unit and back cover as described in Section 4.2.

3. Disconnect the **power supply cables** from **PJ5** and **PJ7** on the **interface board** (PCB FDPSY2).

4. Remove the **two M3x4 silver screws** from the back of the unit (Figure 4-11).

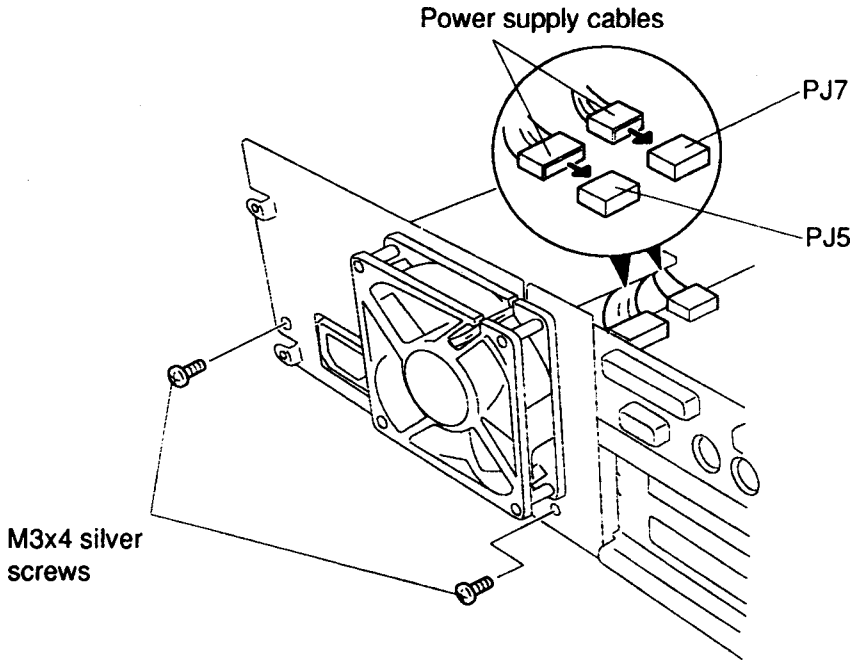


Figure 4-11 Removing the Cables from the Interface Board

5. Disconnect the power supply cable from **PJ4** and **PJ5** on the **back panel board** (PCB FDPBP2) (Figure 4-12).

6. Remove the **two M3x4 silver screws** from the front of the **power supply unit** (Figure 4-12).

7. Carefully lift out the power supply unit.

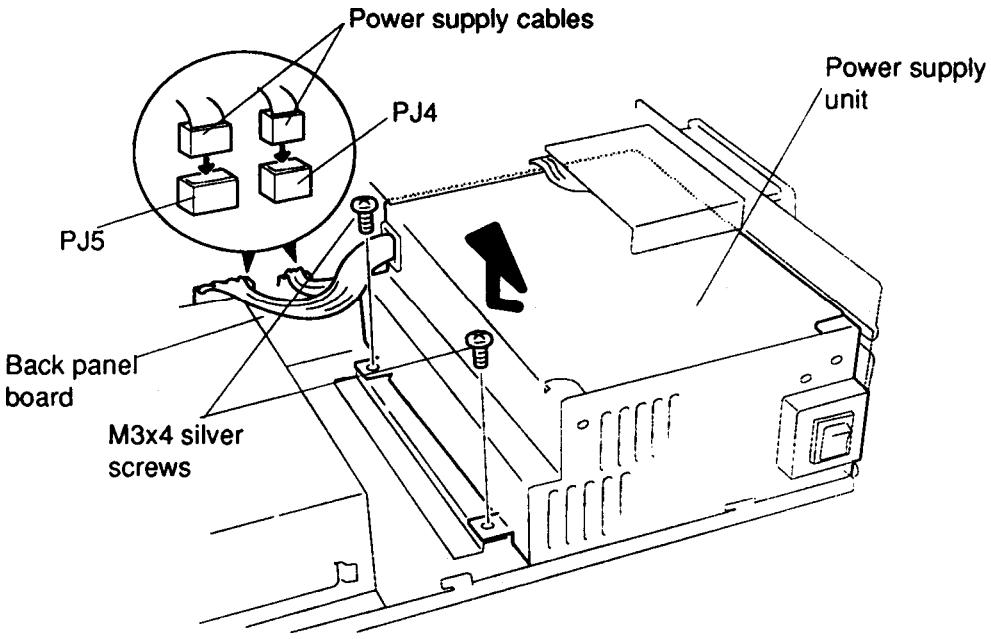


Figure 4-12 Removing the Cables from the Back Panel Board

Installing the Power Supply Unit

To install the power supply unit, follow the steps below and refer to Figures 4-11 and 4-12.

1. Place the **power supply unit** on the bottom cover of the DS4 (Figure 4-12).

2. Secure the **two M3x4 silver screws** on the front of the power supply unit (Figure 4-12).

3. Secure the **two M3x4 silver screws** on the back of the DS4 (Figure 4-11).

4. Connect the **four power supply cables** on the back panel board (**PJ4, PJ5**) and the interface board (**PJ5, PJ7**) (Figures 4-12, 4-11).

5. Install the back cover and top cover unit as described in Section 4.2.

4.7 Fan

Removing the Fan

To remove the fan, follow the steps below and refer to Figure 4-13.

1. Turn off the power to the Desk Station. Disconnect the computer, power cord, and all external cables connected to the unit.

2. Remove the top cover unit, back cover, interface cable unit, and interface board as described in Sections 4.2, 4.3, and 4.4.

3. Disconnect the **fan cable** from **PJ6** on the **back panel board** (Figure 4-13).

4. Remove the **four M3x25 screws** on the fan to remove the fan. Note that the safety plate will also come loose (Figure 4-13).

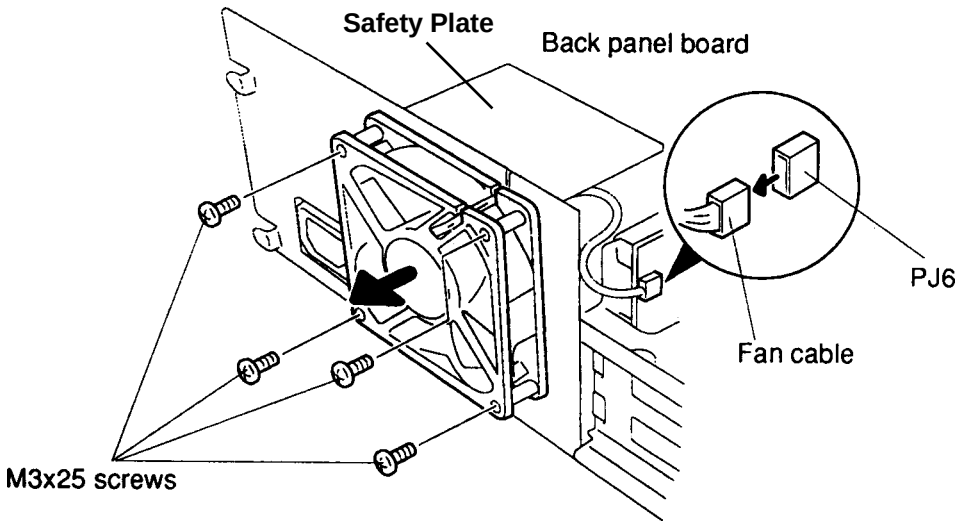


Figure 4-13 Removing the Fan

Installing the Fan

To install the fan, follow the steps below and refer to Figure 4-13.

1. Secure the fan with **four M3x25 screws** and connect the **fan cable** to **PJ6** on the **back panel board** (Figure 4-13).

2. Install the interface board, interface cable unit, back cover, and top cover unit as described in Sections 4.4, 4.3, and 4.2.

4.8 LED Board

Removing the LED Board

To remove the LED board, follow the steps below and refer to Figure 4-14.

1. Turn off the power to the unit. Disconnect the computer, power cord, and all external cables connected to the unit.
2. Remove the top cover unit as described in Section 4.2.
3. Disconnect the **LED cable** from **PJ8 back panel board** (Figure 4-14).
4. Remove the **M3x4 silver screw** to remove the LED board (Figure 4-14).

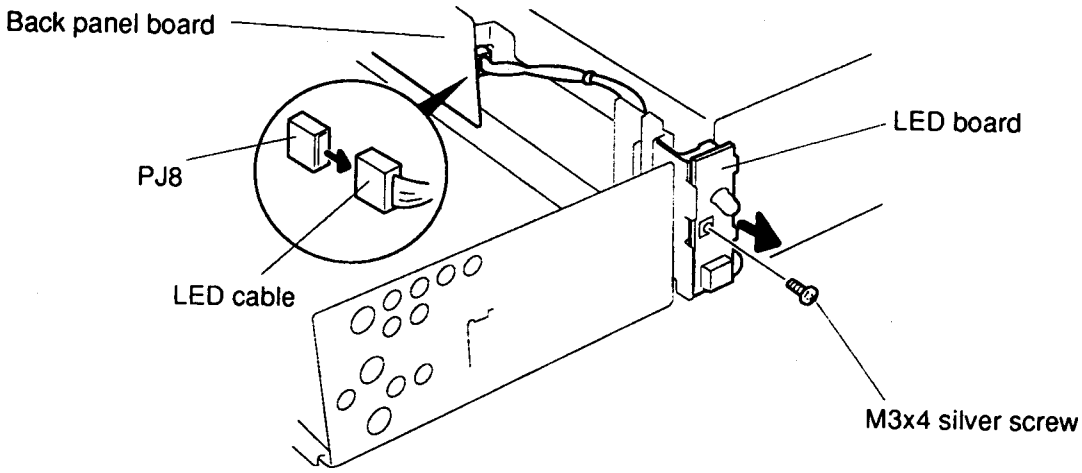


Figure 4-14 Removing the LED Board

Installing the LED Board

To install the LED board, follow the steps below and refer to Figure 4-14.

1. Secure the **LED board** with the **M3x4 screw** (Figure 4-14).
2. Connect the **LED cable** to **PJ8** on the back panel board. Ensure the LED is facing up as shown (Figure 4-14).
3. Install the top cover unit as described in Section 4.2.

Chapter 4

Replacement Procedures

Contents

Figures

Appendix A System Board Layout

A.1 System Board (Front)

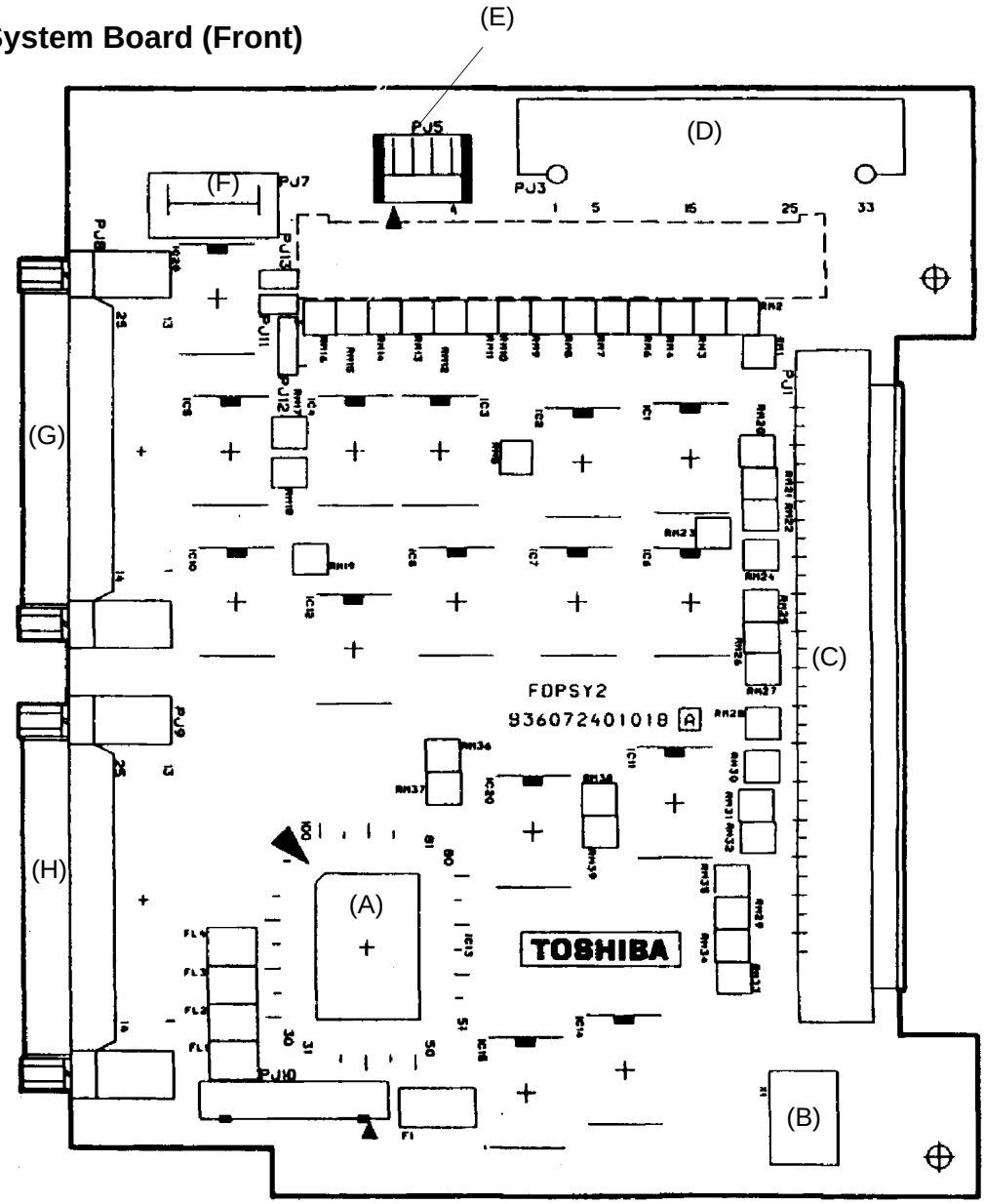


Figure A-1 System Board (Front)

Symbol	Description
(A)	EXP BUS CONT GA (Expansion bus controller gate array)
(B)	X1 oscillator 14.31818 MHz
(C)	PJ1 system connector
(D)	PJ3 internal 5-1/4-inch FDD connector
(E)	PJ5 power supply connector
(F)	PJ7 power supply connector
(G)	PJ8 PRT connector
(H)	PJ9 FDD connector

Appendix B Pin Assignments

B.1 PJ1 Expansion Bus I/F Connector (150-Pin)

Table B-1 Expansion Bus I/F Connector Pin Assignments (150-pin) (1/2)

Pin	Signal	I/O	Pin	Signal	I/O
1	GND	–	36	GND	–
2	GND	–	37	(PCCONN)	I
3	CTS1	O	38	PHSYNC	I
4	RI1	O	39	LGREN	I
5	RD1	O	40	BLUE	I
6	DSR1	O	41	GND	–
7	RTS1	I	42	RED	I
8	DCD1	O	43	MEWR	I/O
9	SD1	I	44	IRQ7	O
10	DTR1	I	45	MERD	I/O
11	SLIN (STEP)	I/O	46	IRQ4	O
12	GND	–	47	DRQ5	O
13	ERROR (SIDSL)	I	48	DACK5	I
14	PINT (DIRC)	I	49	DACK2	I
15	SELECT (WREN)	I	50	DRQ6	O
16	AUTFD (LOWD)	I	51	GND	–
17	BUSY (MOTON)	I	52	IOCS16	O
18	PE (WRDAT)	I	53	IOCHCK	O
19	N.C.	–	54	MMCS16	O
20	ACK (FDSEL)	I	55	LA17	I/O
21	N.C.	–	56	SBHE	I/O
22	N.C.	–	57	LA18	I/O
23	PDB03 (RDDAT)	O	58	MASTER	O
24	PDB04 (DCHG)	O	59	GND	–
25	PDB01 (TR0)	O	60	REFMD	I/O
26	PDB02 (WPRT)	O	61	LA20	I/O
27	STROB (FRDY)	O	62	DACK6	I
28	PDB00 (INDX)	O	63	LA21	I/O
29	MUSECK	I/O	64	LA19	I/O
30	GND	–	65	LA23	I/O
31	N.C.	–	66	DRQ2	O
32	MOUSED	I/O	67	SD15	I/O
33	EKBDAT	I/O	68	LA22	I/O
34	EKBCLK	I/O	69	SD14	I/O
35	PVSYNC	I	70	IRQ6	O

Table B-1 Expansion Bus I/F Connector Pin Assignment (150-pin) (2/2)

Pin	Signal	I/O	Pin	Signal	I/O
71	GND	–	111	SA18	I/O
72	SD13	I/O	112	SA19	I/O
73	SD12	I/O	113	SA16	I/O
74	IRQ12	O	114	SA17	I/O
75	SD10	I/O	115	SA15	I/O
76	SD11	I/O	116	GND	–
77	SD09	I/O	117	SA13	I/O
78	IRQ11	O	118	SA14	I/O
79	IRQ14	O	119	SA11	I/O
80	SD08	I/O	120	SA12	I/O
81	GND	–	121	SA09	I/O
82	IRQ10	O	122	SA10	I/O
83	DRQ1	O	123	GND	–
84	IOCRDY	O	124	SA08	I/O
85	DACK3	I	125	SA06	I/O
86	AEN	I	126	SA07	I/O
87	IRQ5	O	127	SA04	I/O
88	DRQ3	O	128	SA05	I/O
89	N.C.	–	129	SA02	I/O
90	IOCLK	I	130	SA03	I/O
91	IRQ9	O	131	SA00	I/O
92	GND	–	132	SA01	I/O
93	RESET	I	133	N.C.	–
94	DACK1	I	134	GND	–
95	TC	I	135	N.C.	–
96	BALE	I	136	MIRQ	O
97	IOWR	I/O	137	CPCNF	O
98	IORD	I/O	138	N.C.	–
99	SMER	I	139	RVCC	I
100	GND	–	140	RGND	O
101	SD07	I/O	141	ADPCNT	I
102	SMEW	I	142	GND	–
103	SD05	I/O	143	CURNT	O
104	SD06	I/O	144	CURNT	O
105	GND	–	145	CURNT	O
106	SD04	I/O	146	CURNT	O
107	SD02	I/O	147	DCIN	O
108	SD03	I/O	148	DCIN	O
109	SD00	I/O	149	DCIN	O
110	SD01	I/O	150	DCIN	O

B.2 PJ1 IBM Slot 1 Connector (104-Pin)

Table B-2 IBM Slot 1 Connector Pin Assignment (104-pin)

Pin	Signal	I/O	Pin	Signal	I/O
1	ESD151	I/O	53	ESA051	I/O
2	GND	–	54	EDACK20	O
3	ESD141	I/O	55	ESA061	I/O
4	IMSTR0	I	56	EIRQ31	I
5	ESD131	I/O	57	ESA071	I/O
6	VCC	–	58	EIRQ41	I
7	ESD121	I/O	59	ESA081	I/O
8	N.C.	–	60	EIRQ51	I
9	ESD111	I/O	61	ESA091	I/O
10	N.C.	–	62	EIRQ61	I
11	ESD101	I/O	63	ESA101	I/O
12	EDRQ61	I	64	EIRQ71	I
13	ESD091	I/O	65	ESA111	I/O
14	EDACK60	O	66	ECLK1	O
15	ESD081	I/O	67	ESA121	I/O
16	EDRQ51	I	68	EREFMD0	I/O
17	EMEMWR0	I/O	69	ESA131	I/O
18	EDACK50	O	70	EDRQ11	I
19	EMEMRD0	I/O	71	ESA141	I/O
20	N.C.	–	72	EDACK10	O
21	ELA171	I/O	73	ESA151	I/O
22	N.C.	–	74	EDRQ31	I
23	FLA181	I/O	75	ESA161	I/O
24	EIRQ141	I	76	EDACK30	O
25	ELA191	I/O	77	ESA171	I/O
26	N.C.	–	78	EIORD0	I/O
27	ELA201	I/O	79	ESA181	I/O
28	EIRQ121	I	80	EIOWR0	I/O
29	ELA211	I/O	81	ESA191	I/O
30	EIRQ111	I	82	ESMER0	O
31	ELA221	I/O	83	EAEN1	O
32	EIRQ101	I	84	ESMEW0	O
33	ELA231	I/O	85	EIORDY1	I
34	EICSI60	I	86	GND	–
35	ESBHE0	I/O	87	ESD001	I/O
36	EMCS160	I	88	P12V	–
37	N.C.	–	89	ESD011	I/O
38	N.C.	–	90	N.C.	–
39	N.C.	–	91	ESD021	I/O
40	N.C.	–	92	M12V	–
41	N.C.	–	93	ESD031	I/O
42	N.C.	–	94	EDRQ21	I
43	ESA001	I/O	95	ESD041	I/O
44	GND	–	96	M5V	–
45	ESA011	I/O	97	ESD051	I/O
46	EOSC1	O	98	EIRQ91	I
47	ESA021	I/O	99	ESD061	I/O
48	GND	–	100	GND	–
49	ESA031	I/O	101	ESD071	I/O
50	EBALE1	O	102	ERESET1	O
51	ESA041	I/O	103	EIOCHK0	I
52	ETCI	O	104	GND	–

B.3 PJ2 IBM Slot 2 Connector (104-Pin)

Table B-3 IBM Slot 2 Connector Pin Assignment (104-pin)

Pin	Signal	I/O	Pin	Signal	I/O
1	ESD151	I/O	53	ESA051	I/O
2	GND	–	54	EDACK20	O
3	ESD141	I/O	55	ESA061	I/O
4	IMSTR0	I	56	EIRQ31	I
5	ESD131	I/O	57	ESA071	I/O
6	VCC	–	58	EIRQ41	I
7	ESDQ1	I/O	59	ESA081	I/O
8	N.C.	–	60	EIRQ51	I
9	ESD111	I/O	61	ESA091	I/O
10	N.C.	–	62	EIRQ61	I
11	ESD101	I/O	63	ESA101	I/O
12	EDRQ61	I	64	EIRQ71	I
13	ESD091	I/O	65	ESA111	I/O
14	EDACK60	O	66	ECLK1	O
15	ESD081	I/O	67	ESA121	I/O
16	EDRQ51	I	68	EREFMD0	I/O
17	EMEMWR0	I/O	69	ESA131	I/O
18	EDACK50	O	70	EDRQ11	I
19	EMEMRD0	I/O	71	ESA141	I/O
20	N.C.	–	72	EDACK10	O
21	ELA171	I/O	73	ESA151	I/O
22	N.C.	–	74	EDRQ31	I
23	ELA181	I/O	75	ESA161	I/O
24	EIRQ141	I	76	EDACK30	O
25	ELA191	I/O	77	ESA171	I/O
26	N.C.	–	78	EIORD0	I/O
27	ELA201	I/O	79	ESA181	I/O
28	EIRQ121	I	80	EIOWR0	I/O
29	ELA211	I/O	81	ESA191	I/O
30	EIRQ111	I	82	ESMER0	O
31	ELA221	I/O	83	EAEN1	O
32	EIRQ101	I	84	ESMEW0	O
33	ELA231	I/O	85	EIORDY1	I
34	EICSI60	I	86	GND	–
35	ESBHE0	I/O	87	ESD001	I/O
36	EMCS160	I	88	P12V	–
37	N.C.	–	89	ESD011	I/O
38	N.C.	–	90	N.C.	–
39	N.C.	–	91	ESD021	I/O
40	N.C.	–	92	E12V	–
41	N.C.	–	93	ESD031	I/O
42	N.C.	–	94	EDRQ21	I
43	ESA001	I/O	95	ESD041	I/O
44	GND	–	96	M5V	–
45	ESA011	I/O	97	ESD051	I/O
46	EOSC1	O	98	EIRQ91	I
47	ESA021	I/O	99	ESD061	I/O
48	GND	–	100	GND	–
49	ESA031	I/O	101	ESD071	I/O
50	EBALE1	O	102	ERESET1	O
51	ESA041	I/O	103	EIOCHK0	I
52	ETC1	O	104	GND	–

B.4 PJ3 Expansion FDD Connector (34-Pin)

Table B-4 Expansion FDD Connector Pin Assignment (34-pin)

Pin	Signal	I/O	Pin	Signal	I/O
1	GND	–	18	DIR0	O
2	DCHG0	I	19	GND	–
3	GND	–	20	STEP0	O
4	N.C.	–	21	GND	–
5	GND	–	22	WDATA0	O
6	N.C.	–	23	GND	–
7	GND	–	24	WREN0	O
8	INDX0	I	25	GND	–
9	GND	–	26	TR00	I
10	FDSEL0	O	27	GND	–
11	GND	–	28	WPRT0	I
12	N.C.	–	29	GND	–
13	GND	–	30	RDDAT0	I
14	N.C.		31	GND	–
15	GND	–	32	SIDSL0	O
16	MOTON0	O	33	GND	–
17	GND	–	34	FRDY0	I

B.5 PJ4 Back Panel System Connector (100-Pin)

Table B-5 Back Panel System Connector Pin Assignment (100-pin)

Pin	Signal	I/O	Pin	Signal	I/O
1	ESD151	I/O	51	ESA041	I/O
2	IMSTR0	I	52	EIRQ51	I
3	ESDI31	I/O	53	GND	–
4	ESD141	I/O	54	ESA081	I/O
5	GND	–	55	ETC1	O
6	ESD121	I/O	56	EIRQ61	I
7	EDRQ61	I	57	GND	–
8	ESD111	I/O	58	ESA091	I/O
9	GND	–	59	ESA191	I/O
10	ESD101	I/O	60	EIRQ71	I
11	ESD091	I/O	61	GND	–
12	EDACK60	O	62	ESA101	I/O
13	GND	–	63	ESMER0	O
14	EDRQ51	I	64	ECLK1	O
15	EDACK50	O	65	EAEN1	O
16	ESD081	I/O	66	ESA111	I/O
17	EMEMRD0	I/O	67	ESMEW0	O
18	EMEMWR0	I/O	68	EREFMD0	I/O
19	ELA181	I/O	69	GND	–
20	ELA171	I/O	70	ESA121	I/O
21	GND	–	71	EIORDY1	I
22	EIRQ141	I	72	EDRQ11	I
23	ELA231	I/O	73	VCC	–
24	ELAI91	I/O	74	ESA131	I/O
25	GND	–	75	ESD001	I/O
26	EIRQ121	I	76	EDACK10	O
27	ESBHE0	I/O	77	GND	–
28	ELA201	I/O	78	ESA141	I/O
29	GND	–	79	ESD011	I/O
30	EIRQ111	I	80	EDRQ31	I
31	EMCS160	I	81	ESD021	I/O
32	ELA211	I/O	82	ESA151	I/O
33	ESA001	I/O	83	ESD031	I/O
34	EIRQ101	I	84	EDACK30	O
35	ESA011	I/O	85	GND	–
36	ELA221	I/O	86	ESA161	I/O
37	GND	–	87	LORON1	O
38	EICS160	I	88	EIORD0	I/O
39	EOSC1	O	89	LGRON1	O
40	EDACK20	O	90	ESA171	I/O
41	GND	–	91	ESD041	I/O
42	ESA051	I/O	92	EIOWR0	I/O
43	ESA021	I/O	93	GND	–
44	EIRQ31	I	94	ESA181	I/O
45	GND	–	95	EIRQ91	I
46	ESA061	I/O	96	ERESET1	O
47	ESA031	I/O	97	ESD061	I/O
48	EIRQ41	I	98	EIOCHK0	I
49	EBALE1	O	99	ESD051	I/O
50	ESA071	I/O	100	ESD071	I/O

B.6 PJ4 System Connector (100-Pin)

Table B-6 System Connector Pin Assignment (100-pin)

Pin	Signal	I/O	Pin	Signal	I/O
1	ESD151	I/O	51	ESA041	I/O
2	IMSTR0	O	52	EIRQ51	O
3	ESD131	I/O	53	GND	–
4	ESD141	I/O	54	ESA081	I/O
5	GND	–	55	ETC1	I
6	ESD121	I/O	56	EIRQ61	O
7	EDRQ61	O	57	GND	–
8	ESD111	I/O	58	ESA091	I/O
9	GND	–	59	ESA191	I/O
10	ESD101	I/O	60	EIRQ71	O
11	ESD091	I/O	61	GND	–
12	EDACK60	I	62	ESA101	I/O
13	GND	–	63	ESMER0	I
14	EDRQ51	O	64	ECLK1	I
15	EDACK50	I	65	EAEN1	I
16	ESD081	I/O	66	ESA111	I/O
17	EMEMRD0	I/O	67	ESMEW0	I
18	EMEMWR0	I/O	68	EREFMD0	I/O
19	ELA181	I/O	69	GND	–
20	ELA171	I/O	70	ESA121	I/O
21	GND	–	71	EIORDY1	O
22	EIRQ141	O	72	EDRQ11	O
23	ELA231	I/O	73	VCC	–
24	ELA191	I/O	74	ESA131	I/O
25	GND	–	75	ESD001	I/O
26	EIRQ121	O	76	EDACK10	I
27	ESBHE0	I/O	77	GND	–
28	ELA201	I/O	78	ESA141	I/O
29	GND	–	79	ESD011	I/O
30	EIRQ111	O	80	EDRQ31	O
31	EMCS160	O	81	ESD021	I/O
32	ELA211	I/O	82	ESA151	I/O
33	ESA001	I/O	83	ESD031	I/O
34	EIRQ101	O	84	EDACK30	I
35	ESA011	I/O	85	GND	–
36	ELA221	I/O	86	ESA161	I/O
37	GND	–	87	LORON1	O
38	EICS160	O	88	EIORD0	I/O
39	EOCS1	I	89	LGRON1	O
40	EDACK20	I	90	ESA171	I/O
41	GND	–	91	ESD041	I/O
42	ESA051	I/O	92	EIOWR0	I/O
43	ESA021	I/O	93	GND	–
44	EIRQ31	O	94	ESA181	I/O
45	GND	–	95	EIRQ91	O
46	ESA061	I/O	96	ERESET1	I
47	ESA031	I/O	97	ESD061	I/O
48	EIRQ41	O	98	EIOCHK0	O
49	EBALE1	I	99	ESD051	I/O
50	ESA071	I/O	100	ESD071	I/O

B.7 PJ5 PS Connector (4-Pin)

Table B-7 PS Connector Pin Assignment (4-pin)

Pin	Signal	I/O	Pin	Signal	I/O
1	DCIN	I	3	CURNT	I
2	GND	–	4	GND	–

B.8 PJ7 PS Connector (7-Pin)

Table B-8 PS Connector Pin Assignment (7-pin)

Pin	Signal	I/O	Pin	Signal	I/O
1	RVCC	–	5	ADPCNT1	I
2	RGND	–	6	GND	–
3	GND	–	7	PCCONN0	I
4	CPCNF1	I			

B.9 PJ8 PRT Connector (25-Pin)

Table B-9 PRT Connector Pin Assignment (25-pin)

Pin	Signal	I/O	Pin	Signal	I/O
1	STROB0	O	14	AUTFD0	O
2	PD01	I/O	15	ERROR0	I
3	PD11	I/O	16	PINT0	O
4	PD21	I/O	17	SLIN0	O
5	PD31	I/O	18	GND	–
6	PD41	I/O	19	GND	–
7	PD51	I/O	20	GND	–
8	PD61	I/O	21	GND	–
9	PD71	I/O	22	GND	–
10	ACK0	I	23	GND	–
11	BUSY1	I	24	GND	–
12	PE1	I	25	GND	–
13	SELECT1	I			

B.10 PJ9 FDD Connector (25-Pin)

Table B-10 FDD Connector Pin Assignment (25-pin)

Pin	Signal	I/O	Pin	Signal	I/O
1	FRDY0	I	14	LOWD0	O
2	INDX0	I	15	SIDSL0	O
3	TR00	I	16	DIR0	O
4	WPRT0	I	17	STEP0	O
5	RDDAT0	I	18	GND	–
6	DCHG0	I	19	GND	–
7	GND	–	20	GND	–
8	GND	–	21	GND	–
9	GND	–	22	GND	–
10	FDSEL0	O	23	GND	–
11	MOTON0	O	24	GND	–
12	WDATA0	O	25	GND	–
13	WREN0	O			

B.11 PJ4 PS Connector (4-Pin)

Table B-11 PS Connector Pin Assignment (4-pin)

Pin	Signal	I/O	Pin	Signal	I/O
1	M5V (–5V)	–	3	M12V (–12V)	–
2	GND	–	4	GND	–

B.12 PJ5 PS Connector (6-Pin)

Table B-12 PS Connector Pin Assignment (6-pin)

Pin	Signal	I/O	Pin	Signal	I/O
1	VCC	–	4	GND	–
2	VCC	–	5	P12V	–
3	GND	–	6	GND	-

B.13 PJ6 Fan Connector (2-Pin)

Table B-13 Fan Connector Pin Assignment (2-pin)

Pin	Signal	I/O	Pin	Signal	I/O
1	P12V (+12V)	–	2	GND	–

B.14 PJ7 Internal FDD Power Connector (4-Pin)

Table B-14 Internal FDD Power Connector Pin Assignment (4-pin)

Pin	Signal	I/O	Pin	Signal	I/O
1	P12V (+12V)	–	3	GND	–
2	GND	–	4	VCC	–

B.15 PJ101 Serial I/F Connector (9-Pin)

Table B-15 Serial I/F Connector Pin Assignment (9-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	DCD1;100	I	06	DSR1;100	I
02	RD1;000	I	07	RTS1;111	O
03	SD1;011	O	08	CTS1;100	I
04	DTR1;111	O	09	RI1;100	I
05	GND	–			

B.16 PJ102 CRT I/F Connector (15-Pin)

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 PJ103 External Keyboard I/F Connector (6-Pin)

Table B-17 External Keyboard I/F Connector (6-Pin)

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

B.18 PJ104 PS/2 Mouse Connector (6-Pin)

Table B-18 PS/2 Mouse Connector Pin Assignment (6-pin)

Pin	Signal	I/O	Pin	Signal	I/O
01	MOUSDT;101	I/O	04	VCC	–
02	N/C	–	05	MOUSCK;101	I/O
03	GND	–	06	N/C	–

Appendices

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Appendix C 5 1/4" Device Cabling

C.1 Routing the 5 1/4" Device Cable

When installing a 5 1/4" device in the expansion bay, be sure the cable does not obstruct the air flow of the cooling fan. Follow the steps below to route the cable.

1. When installing the device, route the cable through the expansion bay and out the back.

2. An insulator has been applied on the top of the disk drive frame. Lift up the insulator and lay the cable on top of the frame. Fold the cable so that it lays flat against the frame as shown in Figure C-1.

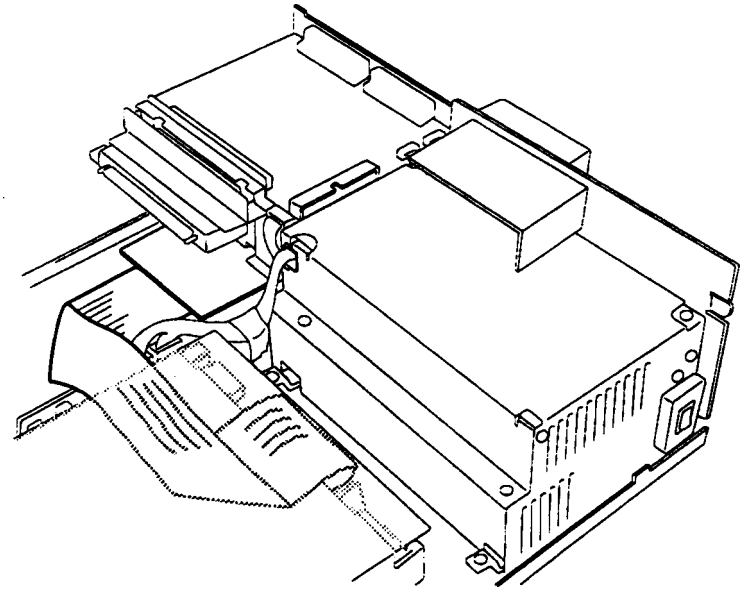

Figure C-1 Routing the 5 1/4" Device Cable

3. Lay the insulator on top of the cable and connect the cable to the AT slot.

> ***NOTE:*** *Be sure the cable lies flat and that it is under the insulator.*