1.1 GENERAL

Toshiba Personal Computer T5100 is a compact and light-weight portable personal computer. The T5100 is a high-performance system with special features. The CPU is the 80386-16 32-bit microprocessor. The standard memory has a capacity of two Mbytes. The HDD (hard disk drive) has a capacity of 40 Mbytes. The FDD (floppy disk drive) can support 2DD (720 Kbytes) and 2HD (1.44 Mbytes) floppy disks. The plasma display supports four levels of gray scale. The universal auto-sensing power supply is used for world-wide usage.
The T5100 system unit consists of the following functional modules;

System board/Memory board
AGS (Advanced Graphics Subsystem) board
3.5-inch floppy disk drive
3.5-inch hard disk drive
Plasma display
Keyboard
Power supply unit

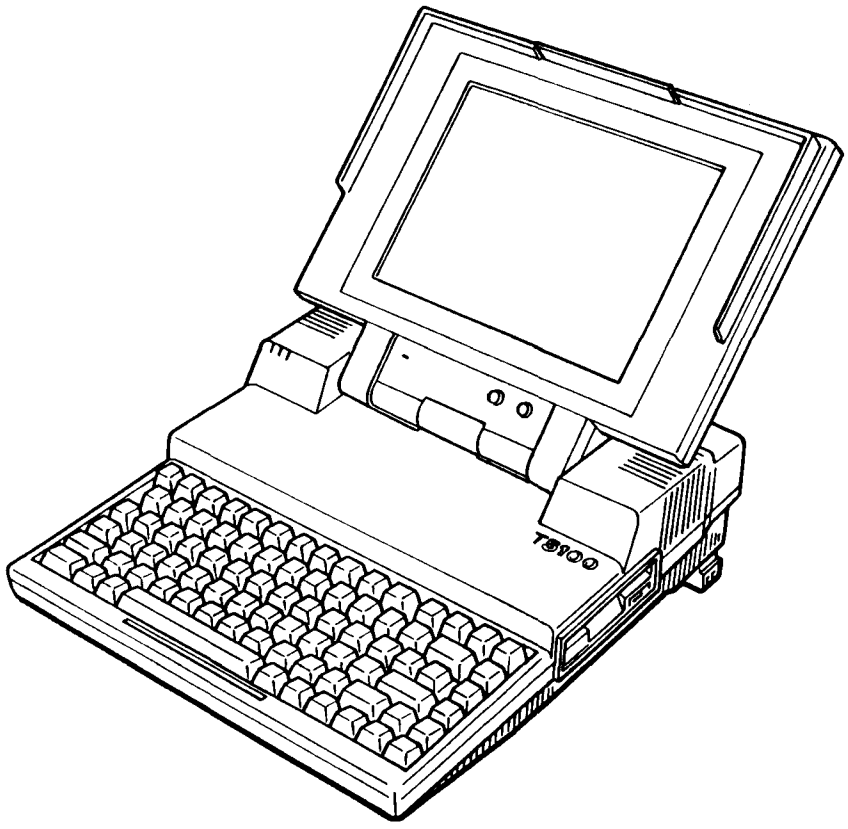


FIGURE 1-1 T5100 Personal Computer

1.2 SYSTEM UNIT

The configuration of the system unit is shown in figure 1-2.

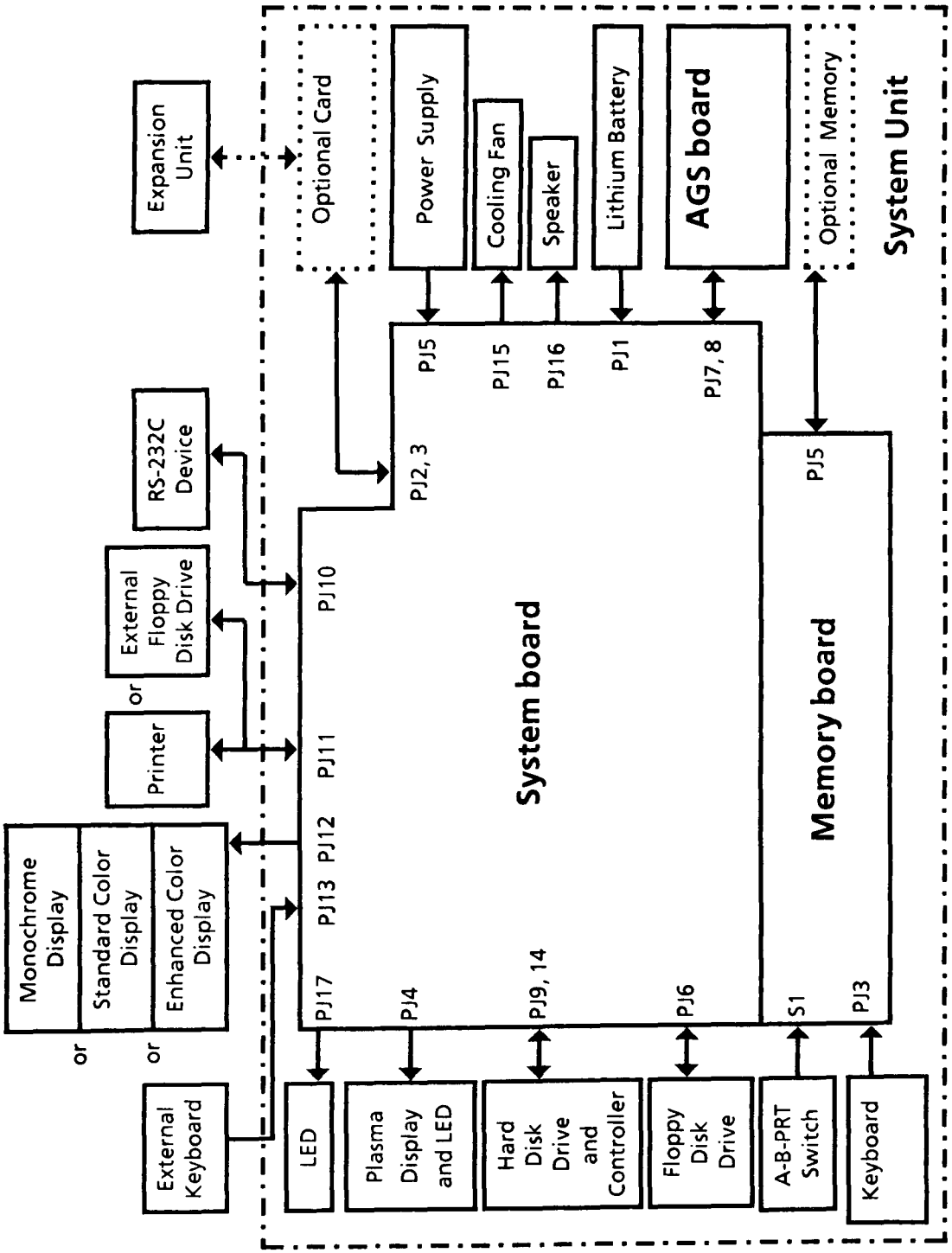


FIGURE 1-2 System Unit Configuration

The key features of the system unit are:

- A system board and, memory board connected by three flat cables.

- An AGS (Advanced Graphics Subsystem) board.

- An internal 3.5-inch FDD (floppy disk drive) supporting two media types:
  2HD (double-side, high-density, double-track)
  2DD (double-side, double-density, double-track)
  The 2HD and 2DD floppy disks can be formatted with 1.44 Mbytes and 720 Kbytes of storage capacity respectively.

- A 40-Mbyte 3.5-inch HDD (hard disk drive).

- An internal 82-key keyboard. For most applications it can be used exactly like a standard typewriter keyboard.

- An internal 640 x 400 pixel plasma display that has a four-level gray scale capability. The display quality can be adjusted by contrast and brightness controls.

- A universal auto-sensing power supply that can be used world-wide provides +5 Vdc, -9 Vdc, and +12 Vdc power to all the components in the system unit, including the option cards. For the plasma display, the power supply provides the regulated +205 and +5 Vdc power. The power supply's ventilation fan is driven by +12 Vdc.

- A lithium battery that keeps the date and time even when the system unit power is off.

- A parallel printer (or floppy disk drive), RGB (Red/Green/Blue) direct drive CRT (Cathode Ray Tube) display, and RS-232C device connectors, located on the system unit's rear panel.
  The parallel printer connector can be used to connect an external FDD unit by changing the A-B-PRT switch.

1.3 SYSTEM BOARD

Figure 1-3 shows the block diagram of the system board.

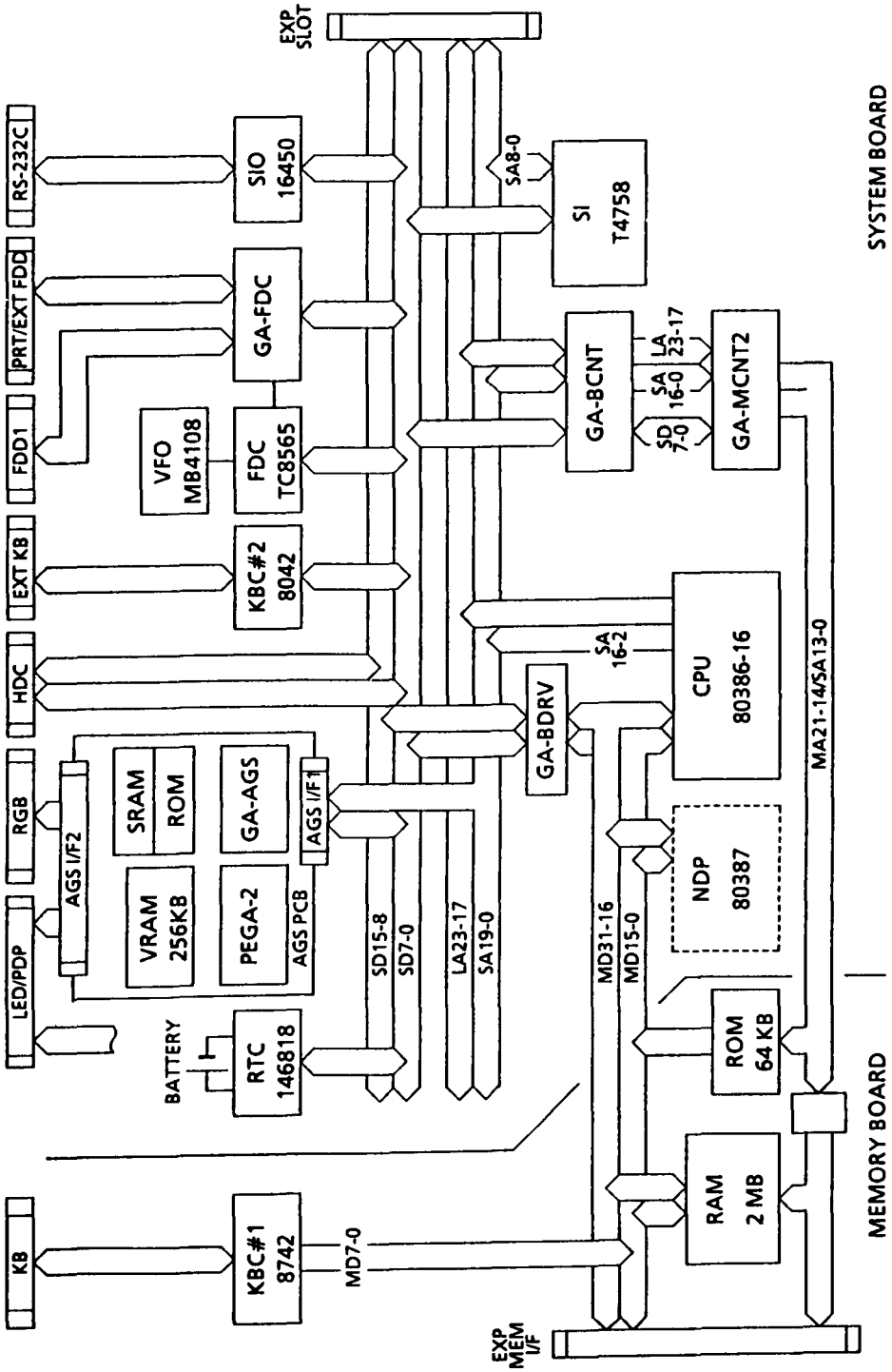


FIGURE 1-3 Block Diagram

System board and memory board are composed of the following components:

System board

- Central processing unit: CPU (80386-16)
  The CPU is a 32-bit microprocessor operated at 16 MHz clock speed.

- Numeric data processor socket for the 80387 (optional).

- Real time clock: RTC (MC146818)
  The RTC continuously keeps the date and time powered by lithium battery.

- Serial input output: SIO (NS16450)
  The SIO controls the RS232C port.

- Variable frequency oscillator: VFO (MB4108)
  The VFO chip is used for FDD control logic.

- Super integration: SI (T4758)
  SI includes the two DMACs (8237), two PICs (8259) and one PIT (8254).

- Floppy disk controller: FDC (TC8565)

- Keyboard controller: KBC (8042)
  This keyboard controller is provided for controlling an external keyboard.

- Gate arrays:
  The following gate arrays are used in the system board. See the T5100 GATE ARRAY SPECIFICATION MANUAL for more information.
  - Bus driver gate array: BDRV-GA (100 pin)
  - Bus controller gate array: BCNT-GA (100 pin)
  - Memory controller gate array: MCNT2-GA (100 pin)
  - Floppy disk drive controller gate array: FDC-GA (100 pin)

Memory board

- Keyboard controller: KBC (8742)
  This keyboard controller is for the internal keyboard.

- Memory
  Random acsess memory : RAM 2 Mbytes
  Read only memory : ROM 64 Kbytes (system BIOS)

1.4 AGS BOARD

The AGS (Advanced Graphics Subsystem) board contains a display controller that controls the built-in plasma display, enhanced color display, standard color display, and monochrome display.
The AGS board emulates 16 colors with a four-level gray scale using the CELT (color emulation look-up table) function.
The AGS board also contains control chips and 256 Kbytes of video RAM.
The display controller has the following display control modes:

EGA (Enhanced Graphics Adaptor) mode
CGA (Color Graphics Adaptor) mode
MDA (Monochrome Display Adaptor) mode

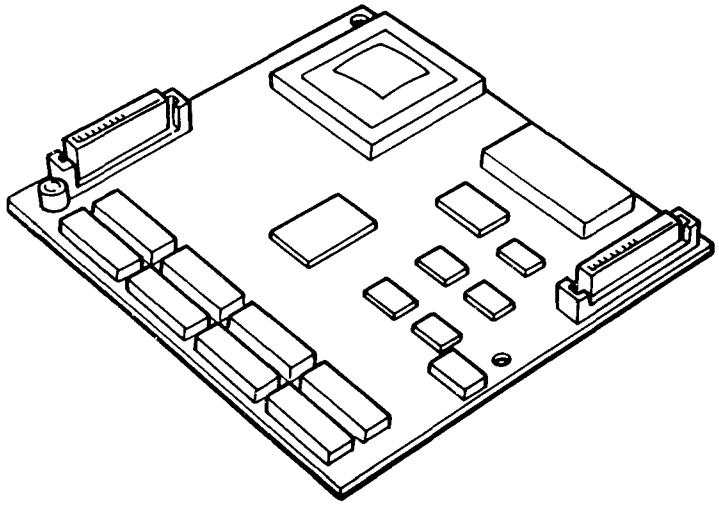


FIGURE 1-4 AGS Board

1.5 3.5-INCH FLOPPY DISK DRIVE

The 3.5-inch internal FDD (floppy disk drive) is a high performance, reliable, and thin drive that supports 720-Kbyte (formatted) 2DD and 1.44-Mbyte (formatted) 3.5-inch floppy disks.
The FDD is shown in figure 1-5 and its specifications are described in table 1-1.

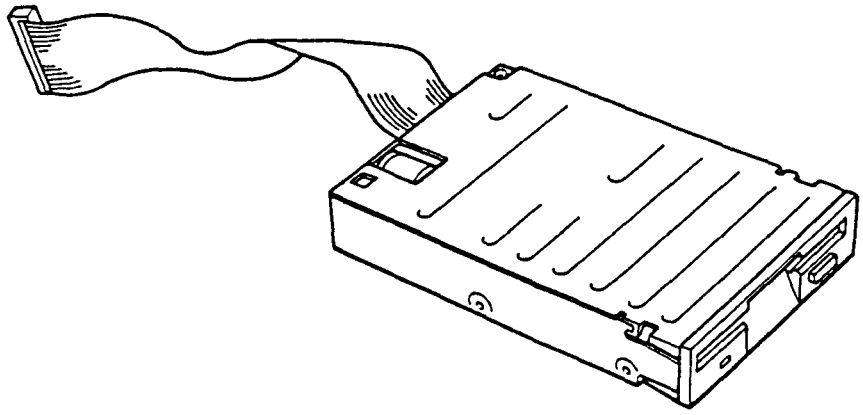


FIGURE 1-5 3.5-inch FDD

TABLE 1-1 3.5-inch FDD Specifications

ITEM	SPECIFICATIONS	
	2-Mbyte mode	1-Mbyte mode
Storage Capacity (Kbytes)		
Unformatted	2,000	1,000
Formatted	1,440	720
Number of Heads	2	2
Number of Cylinders	80	80
Access Time (ms)		
1 Track Access	3	3
Average	94	94
Head Settling Time	15	15
Recording Density (bit per inch)	17,434	8,717
Track Density (track per inch)	135	135
Data Transfer Rate (Kbytes per second)	500	250
Rotational Speed (revolutions per minute)	300	300
Recording Method	MFM (Modified Frequency Modulation)	

1.6 3.5-INCH HARD DISK DRIVE

The 40-Mbyte (formatted) HDD (hard disk drive) is a random access type storage device. It is equipped with non-removable 3.5-inch magnetic disks and mini-winchester type magnetic heads. The HDD is shown in figure 1-6 and its specifications are described in table 1-2.

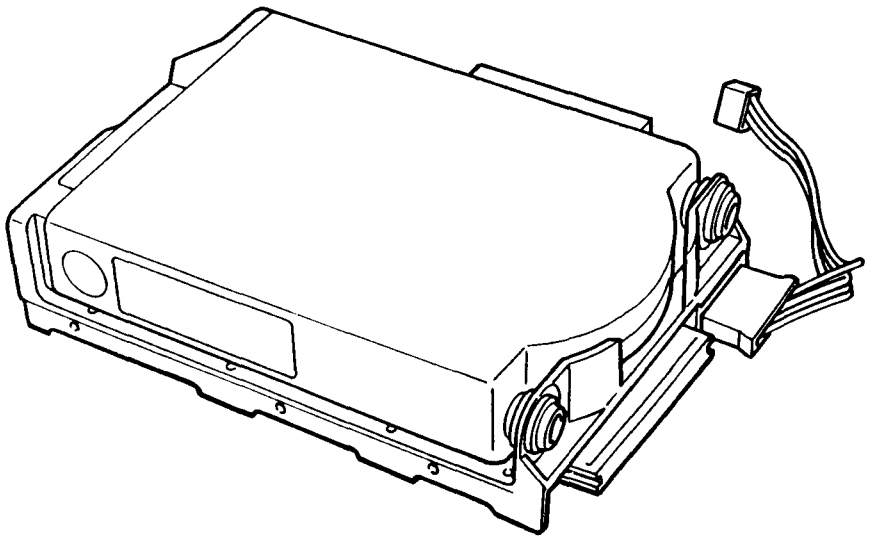


FIGURE 1-6 3.5-inch HDD

TABLE 1-2 3.5-inch HDD Specifications

ITEM	SPECIFICATGIONS
Storage Capacity (Mbytes)	
Unformatted	50.1
Formatted	40
Number of Disks	2
Number of Heads	4
Number of Cylinders	805
Track Density (tracks per inch)	1,000
Track Capacity (bytes)	
Unformatted	16,666
Formatted	13,312
Number of sectors per track (bytes per sector)	512 27 physical sectors 26 logical sectors
Access time (ms)	
Track to track	10
Average	29
Maximum	50
Disk Start Up Time (ms)	8.33
Interleave	3 : 1
Rotational speed (rpm)	3600 ± 0.1%
Data Transfer Rate (Mbytes per second)	more than 2
Start Time (s)	
Average	7
Maximum	20
Stop Time (s)	
Average	7
Maximum	20
Recording Method	2-7RLL (Run Length Limited)
Recording Density (bit per inch)	21,379
Input Voltage	+ 12V ± 5% 300mA (usually) -10% 1A (start) + 5V ± 5% 500mA
Power Consumption (watts)	
Average	6
Maximum	7

1.7 KEYBOARD

The 82-key keyboard is mounted on the system unit. The 82 keys consist of 54 standard keys, 10 function keys, 17 control keys, and Fn key.
The keyboard is a key matrix with one of the 82 keys at each vertex.
The keyboard is connected to the keyboard controller on the memory board through a 22-pin flat cable. The keyboard layout is shown in figure 1-7.

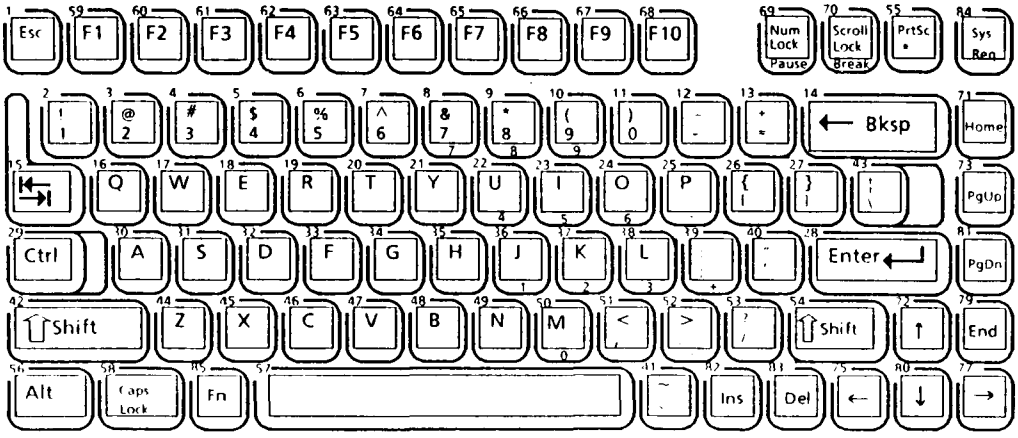


FIGURE 1-7 Keyboard

1.8 PLASMA DISPLAY

The plasma display is composed of a display panel and driver circuits. It receives vertical and horizontal synchronizing signals, four bit data signals, and shift clock for data transmission. All signals are TTL level compatible. The specifications are described in table 1-3.

The plasma display has four levels of gray scale and the display quality can be adjusted by contrast and brightness controls. The plasma display is shown in figure 1-8.

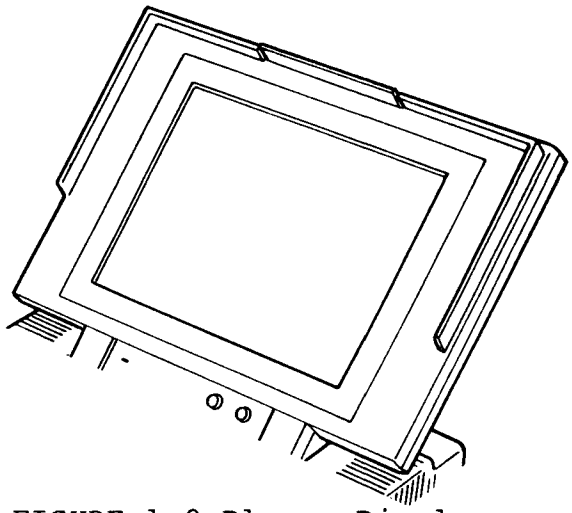


FIGURE 1-8 Plasma Display

TABLE 1-3 Plasma Display Specifications

ITEM		SPECIFICATIONS
Number of Dots	(dots)	640 x 400
Dot Dimension	(mm)	0.18 (V) x 0.16 (H)
Dot Pitch	(mm)	0.36 (V) x 0.30 (H)
Display Area	(mm)	144 (V) x 192 (H)
Contrast		approx. 1 : 10
Color		Neon-Orange
Power Requirement		+ 5 V ± 0.5 V, 0.6A + 205 ± 5 V, 160mA + 5 V ± 0.5 V, 60mA
Power Consumption	(watts)	35
MTBF (Mean Time Between Failure)	(hours)	20,000

1.9 POWER SUPPLY UNIT

The universal auto-sensing power supply can be used world-wide and supplies dc +5, +12, -9 and +205 volts to the system.
The power supply unit is housed in the system unit and it supplies the regurated power to:

1) System board
2) Memory board
3) AGS board
4) 3.5-inch Floppy disk drive
5) 3.5-inch Hard disk drive
6) External Keyboard
7) Plasma display
8) Option boards
9) Cooling fan

The above 2) through 6), 8), and one of cooling fans receive the power via the system board.
The power supply unit includes an input line filter, line fuse, cooling fan, power conversion circuitry and connectors.
Input ratings are:
115 Vac, 1.0 Amps or 220/240 Vac, 0.7 Amps
The power supply unit is shown in figure 1-9 and the output ratings are specified in table 1-4.

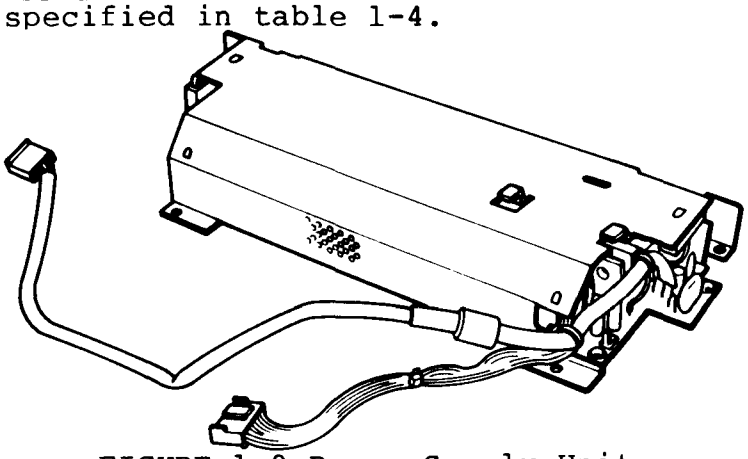


FIGURE 1-9 Power Supply Unit

TABLE 1-4 Power Supply Unit Output Rating

FUNCTION	DC VOLTAGE	MAX. CURRENT	REGURATION TOLERANCE
System board	+5 V	5.7 A	±5%
System board and Cooling Fan	+12 V	830 mA	±5%
System board	-9 V	50 mA	±15%
Plasma display	+5 V	60 mA	±10%
Plasma display	+205 V	170 mA	200 V to 210V

1.10 DIP SWITCHES

The system DIP (Dual-In-Line-Package) switches are located on the rear panel.
Table 1-5 describes the functions of the DIP switches.

TABLE 1-5 DIP Switch Functions

	Name	Setting	Description
1	Standard system memory size	ON	Disable the extended memory (above 1 Mbyte memory).
		OFF	Enable the extended memory.
2	Base memory size	ON	Set the base memory to 512 Kbytes.
		OFF	Set the base memory to 640 Kbytes.
3	Internal CRTC function	ON	Disable the internal CRT controller in the AGS board.
		OFF	Enable the internal CRT controller in the AGS board.
4	Printer port mode	ON	Printer port is set to the input mode.
		OFF	Printer port is set to the output mode.
5	Monochrome mode	ON	AGS board supports monochrome mode.
		OFF	AGS board support s color mode.
6	RS232C port setting	ON	Set the internal RS232C port to secondary and the external RS232C port to primary.
		OFF	Set the internal RS232C port to primary and the external RS232C port to secondary.

1.11 JUMPER STRAPS

1.11.1 Hard disk drive jumper straps

The hard disk drive has three jumper straps which are located on the hard disk control board.
Figure 1-10 shows location of the jumper straps and table 1-6 describes their status.

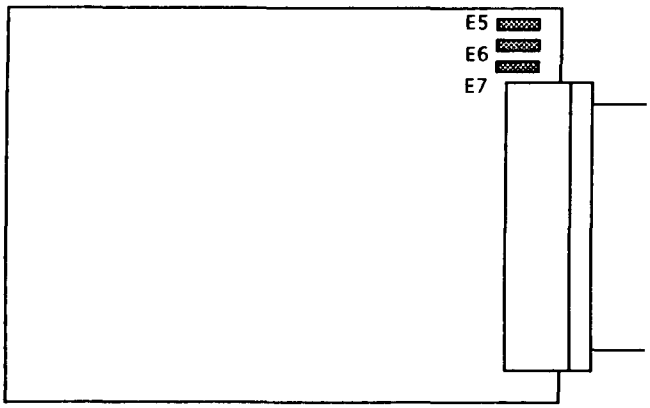


FIGURE 1-10 HDD Jumper Straps

TABLE 1-6 HDD Jumper Strap Status

	STATUS
E5	shorted
E6	open
E7	shorted

1.11.2 Plasma display jumper straps

The plasma display has four jumper straps which are located on the plasma display board.
Four jumper straps should be set as follows:

JP1 ... pin 1 and 2 shorted
JP2 ... pin 1 and 2 shorted
JP3 ... pin 2 and 3 shorted
JP4 ... pin 2 and 3 shorted

Figure 1-11 shows the location of these jumper straps and table 1-7 describes their functions.

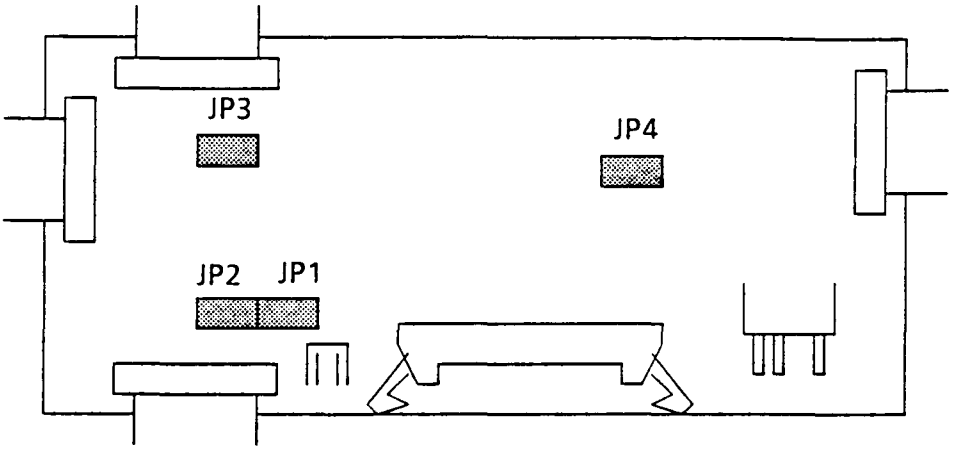


FIGURE 1-11 Plasma Display Jumper Straps

TABLE 1-7 Plasma Display Jumper Strap Functions

	Pins 1 and 2 shorted	Pins 2 and 3 shorted
JP1	The brightness adjustment is connected to the PDP board.	The brightness adjustment is not connected to the PDP board.
JP2	The contrast adjustment is connected to the PDP board.	The contrast adjustment is not connected to the PDP board.
JP3	Three-level gray scale.	Four-level gray scale.
JP4	16H (horizontal) mode.	1H (horizontal) mode.

2.1 GENERAL

The problem isolation procedures described in part 2 are used to isolate defective FRUs (field replaceable units). The FRUs covered are:

1. Power supply unit
2. System board
3. FDD
4. HDD
5. Keyboard
6. Plasma display

Detailed replacement procedures instructions are described in part 4 and test program operations are described in part 3.

The following items are necessary for implementing the problem isolation procedures.

1. T5100 diagnostics disk
2. Phillips head screwdriver
3. Blade head screwdriver
4. Tweezers
5. Work disk (for FDD testing)
6. Cleaning disk kit (for FDD testing)
7. Multimeter
8. Printer port LED

The problem isolation flowchart described in section 2.2 can be used to determine which isolation procedures are necessary to isolate a T5100 problem.

2.2 PROBLEM ISOLATION FLOWCHART

The flowchart in figure 2-1 is used as a guide for determining which FRU is defective. Please confirm the followings before performing the flowchart procedures.

1. No disk is in the FDD.
2. All optional equipments are disconnected.
3. MS-DOS has been installed in drive C before a trouble happens.

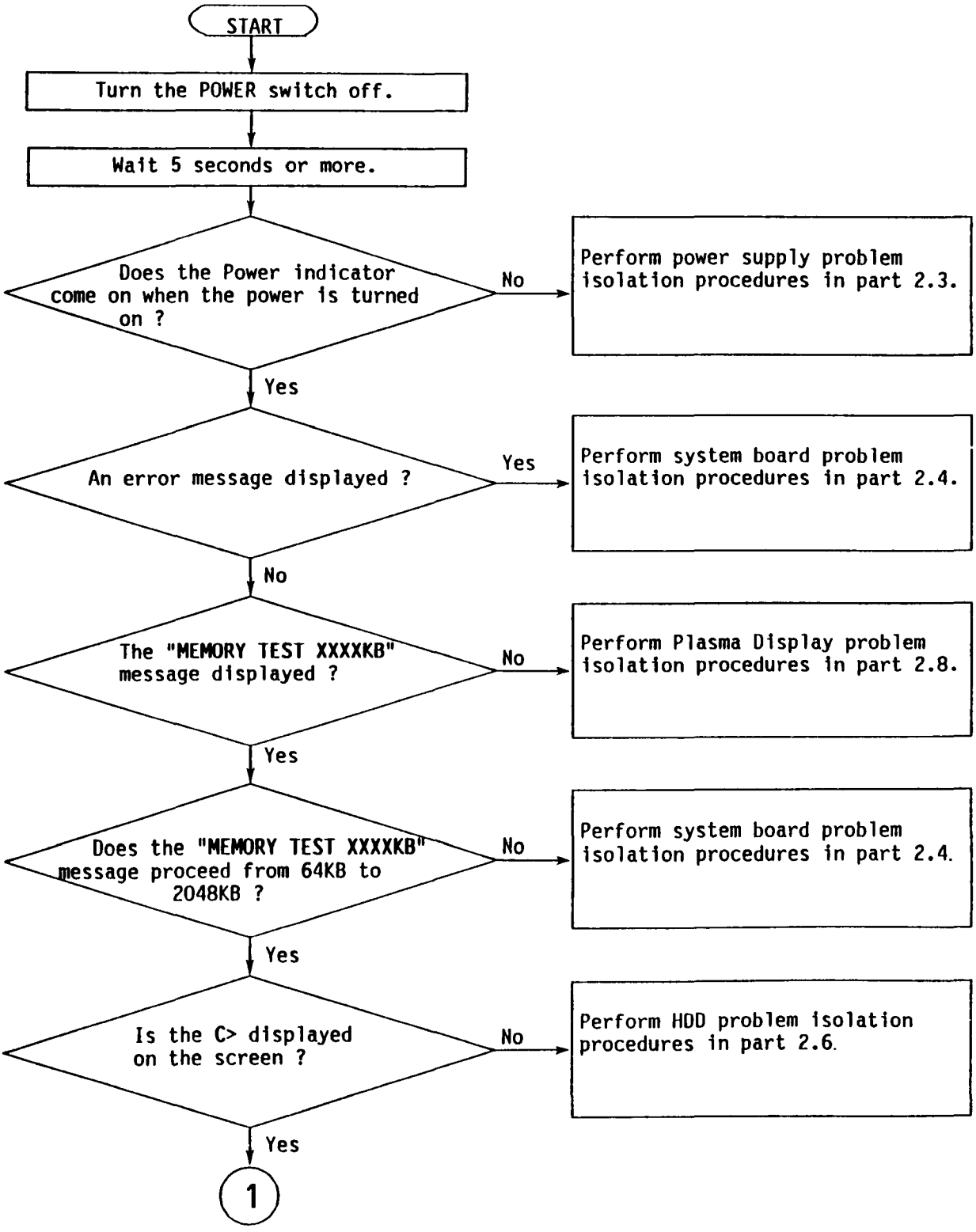


FIGURE 2-1 Problem Isolation Flowchart

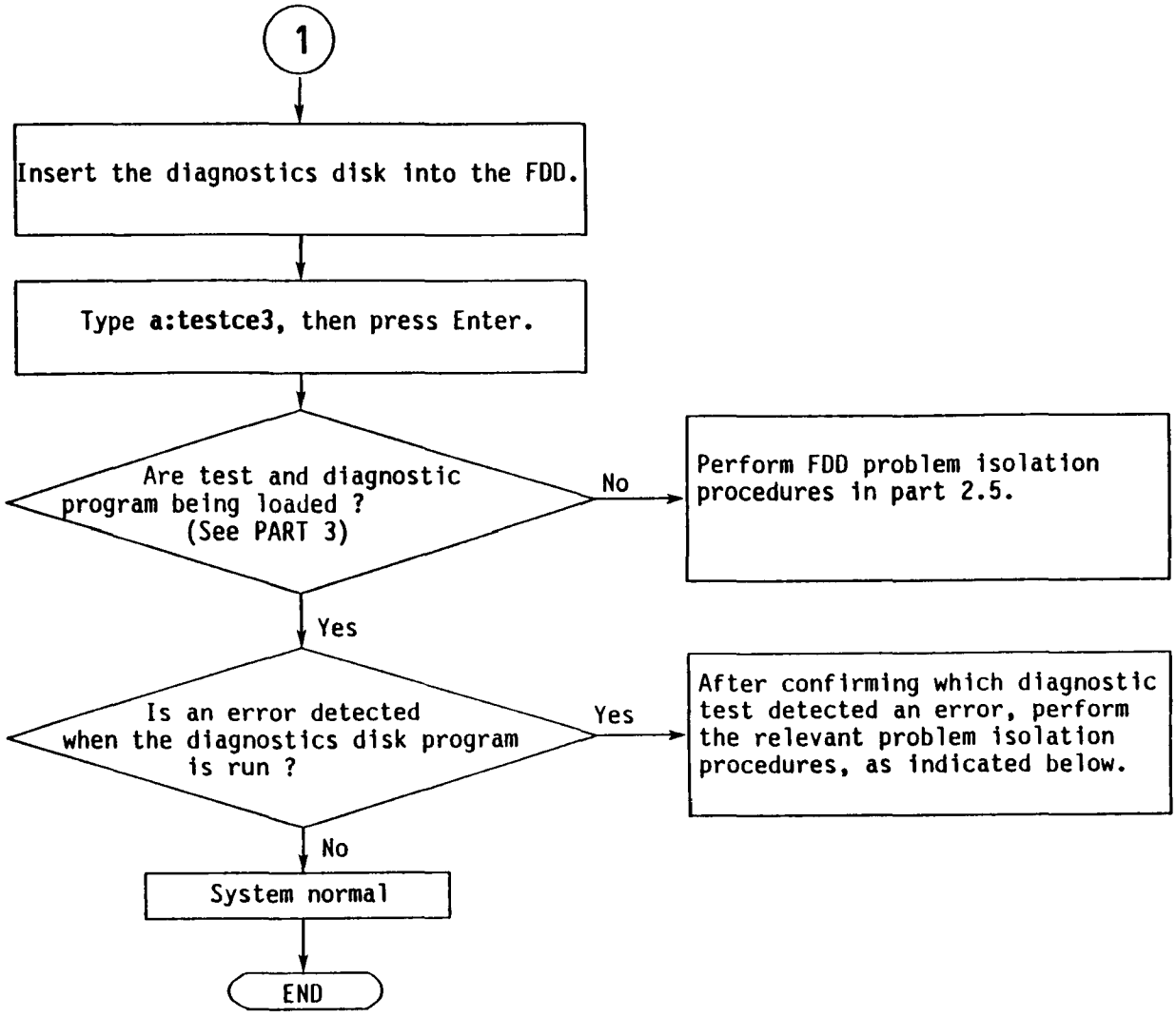


FIGURE 2-1 Problem Isolation Flowchart (continued)

1. If an error is detected on the system test, memory test, display test, or real timer test, perform the system board isolation procedures in section 2.4.

2. If an error is detected on the hard disk test, perform the HDD problem isolation procedures in section 2.6.

3. If an error is detected on the keyboard test, perform the keyboard problem isolation procedures in section 2.7.

4. If an error is detected on the floppy disk test, perform the FDD problem isolation procedures in section 2.5.

2.3 POWER SUPPLY UNIT PROBLEM ISOLATION PROCEDURES

WARNING

Dangerous high voltage is supplied to the power supply unit. Pay enough attention on handling. It takes few minutes after power off to discharge the electricity.

This section describes how to determine whether or not the power supply unit is defective. Start with PROCEDURE 1 and continue with other procedures as instructed. The procedures described in this section are:

PROCEDURE 1: Power Indicator Check

PROCEDURE 2: Connector Check

PROCEDURE 3: Output Voltage Check

PROCEDURE 4: Power Supply Unit Voltage Adjustment

PROCEDURE 5: Power Supply Unit Replacement

PROCEDURE 1

Power Indicator Check

1. Turn on the power.

2. If the power indicator (see figure 2-2.) lights, go to PROCEDURE 3.
   If the indicator does not light, check the ac power cord connection. One end of the ac power cord should be inserted the standard ac wall outlet and the other end should be connected to the AC IN jack on the back of the system unit.
   If OK, replace the ac power cord.
   After replacing the ac power cord, if the indicator lights, the original cord was probably defective. If the indicator still doesn't light, go to PROCEDURE 2.

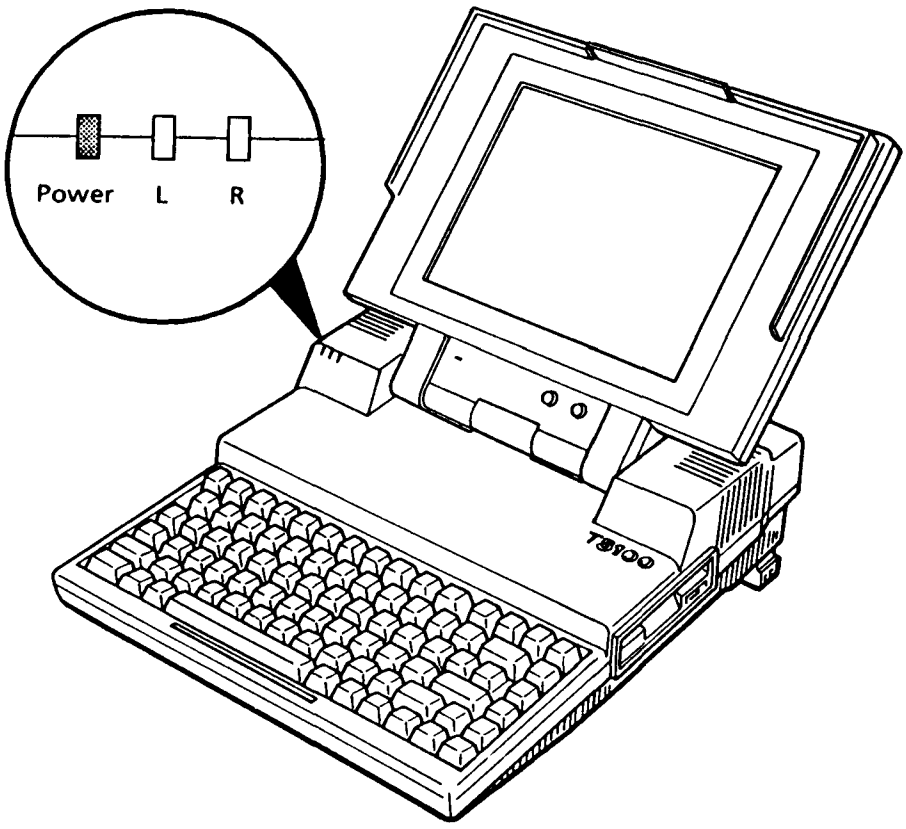


FIGURE 2-2 Power Indicator

PROCEDURE 2

Connector Check

1. Turn off the power, then unplug the ac power cord.
2. Remove the top cover. (Refer to section 4.2.)
3. Remove the power supply unit. (Refer to section 4.8.)
4. If the power supply connector (PJ 5) on the system board pictured in figure 2-3 is connected properly, go to PROCEDURE 3. If it is not connected properly, reconnect it.

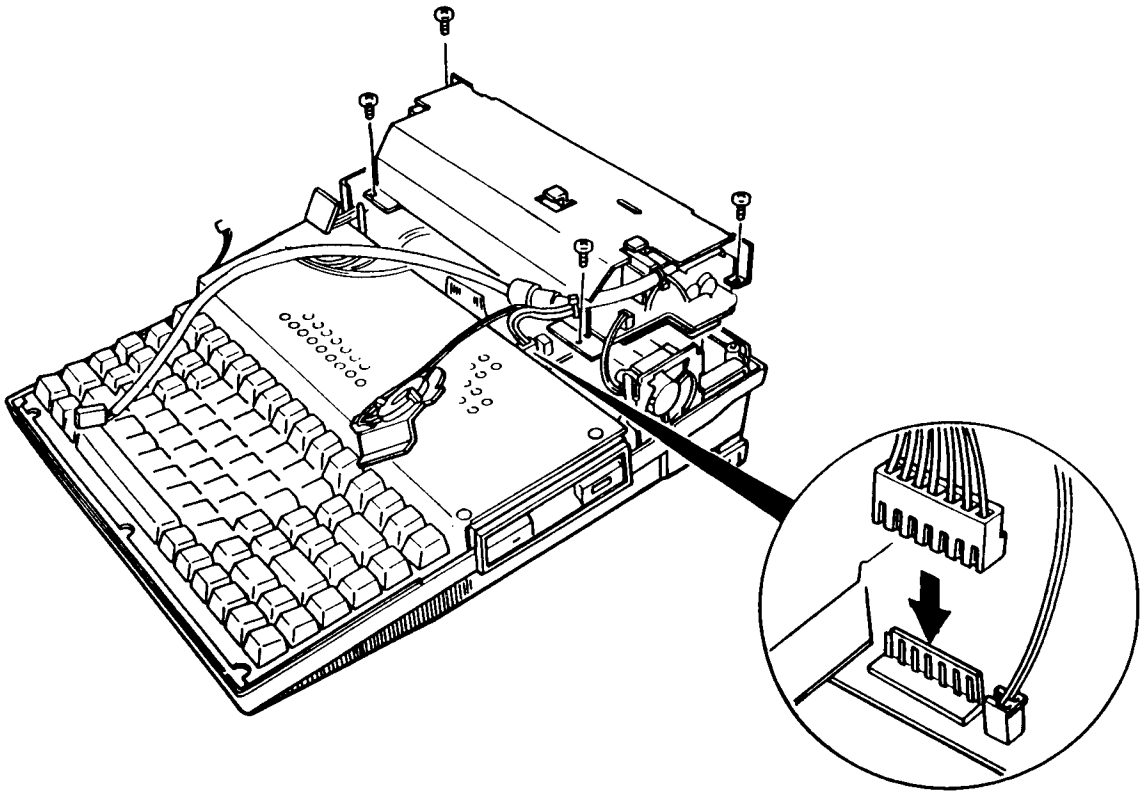


FIGURE 2-3 Power Supply Unit Connector

PROCEDURE 3

Output Voltage Check

1. Plug the ac power cord to the power supply unit, then turn on the power.

2. Use a multimeter to confirm that the output voltages for the two power supply connectors conform to the values given in table 2-1.

3. If the voltages are within the range of values given in table 2-1, the power supply unit is normal, but the system board is probably defective. Go to the system board isolation procedures in section 2.4.

4. If the +5 Vdc (+leads 6, 7) is not within the specified value, and it is less than 4.5 volts, turn off the power and disconnect the power supply connector from the system board (PJ 5). Otherwise, go to PROCEDURE 4.

5. Turn on the power and check the +5 Vdc line on the cable connector pin. If it is OK, then the system board may be bad. Try to replace the system board.

6. If the +5 Vdc is still not within the specified value, go to PROCEDURE 5.

TABLE 2-1 Power Supply Unit Output Voltages

CONNECTOR	PIN NUMBER		VOLTAGE (Vdc)		
	+ lead	-lead	Normal	Min	Max
For system board	1	2,4,5	12	11.4	12.6
	3	2,4,5	-9	-10.35	-7.65
	6	2,4,5	5	4.75	5.25
	7	2,4,5	5	4.75	5.25
For plasma display	1	3	205	200	210
	4	3	5	4.5	5.5

PROCEDURE 4

Power Supply Unit Voltage Adjustment

1. Turn off the power, then unplug the ac power cord.
2. Remove the power supply unit cover. (Refer to section 4.9.)
3. Plug the ac cord into the power supply unit, then turn on the power.
4. Use a multimeter to confirm that the output voltages for the plasma display power connector conform to the values given in table 2-2.

TABLE 2-2 VR201 Adjustment

CONNECTOR	PIN NUMBER		VOLTAGE (Vdc)	
	+ lead	- lead	Min	Max
For plasma display	1	3	+ 200	+ 210

5. If the voltage is not within the range of values given in table 2-2, adjust the VR201 screw on the power supply board using a Phillips head screwdriver.
6. Use a multimeter to confirm that the output voltages of the system board power connector comform to the values given in table 2-3.

TABLE 2-3 VR501 Adjustment

CONNECTOR	PIN NUMBER		VOLTAGE (Vdc)	
	+ lead	- lead	Min	Max
For system board	6, 7	2, 4, 5	+ 4.75	+ 5.25

7. If the voltage is not within the range of values given in table 2-3, adjust the VR501 screw on the power supply board using a Phillips head screwdriver.

PROCEDURE 5

Power Supply Unit Replacement

1. Turn off the power, then unplug the ac power cord.

2. Replace the power supply unit. (Refer to section 4.8.)

3. If normal operation is restored after replacing the power supply unit, the original power supply unit was probably defective.

4. If normal operation is not restored, another FRU is probably defective. The defective unit must be isolated and replaced.

2.4 SYSTEM BOARD PROBLEM ISOLATION PROCEDURES

> ***CAUTION***
>
> **Before carrying out any of these procedures, make sure that the FDD is empty. Performing these procedures with a floppy disk in the FDD may result in loss of data.**

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

PROCEDURE 1: Message Check

PROCEDURE 2: Beep Sound Check

PROCEDURE 3: Printer Port LED Check

PROCEDURE 4: Test Program Execution

PROCEDURE 5: System Board Replacement

NOTE: The system which has the System BIOS of version 2.00 or later version will respond in a different way than that described in this section. Error messages that may be displayed on the screen and status/error code that you can obtain from the printer port or beep sounds have been changed. Refer to Appendix E, system board problem isolation procedures for new version System BIOS.

PROCEDURE 1

Message Check

1. Turn on the power.

2. If the system is loaded normally, go to PROCEDURE 4.

3. If the following message is displayed on the screen, press the F1 key. Execute the setup operation. (see the section 3 for details.)

```
*** Error in CMOS. Bad battery ***
Check system. Then, press [F1] key ......
```

```
*** Error in CMOS. Bad check sum ***
Check system. Then, press [F1] key ......
```

```
**  Error in CMOS. Bad configuration **
Check system. Then, press [F1] key ......
```

```
*** Error in CMOS. Bad memory size ***
Check system. Then, press [F1] key ......
```

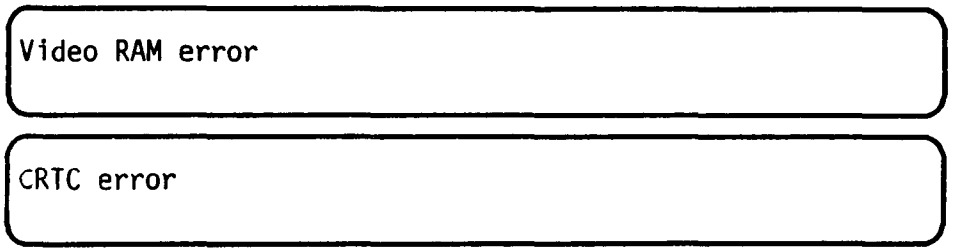
```
**  Error in CMOS. Bad time function **
Check system. Then, press [F1] key ......
```

4. If the following message is displayed on the screen, turn off the power. Wait 5 seconds or more, then turn on the power. If the following message is displayed again, go to HDD isolation procedures in section 2.6.

```
**  HDD Load error or Bad system disk **
Insert system disk in drive
Press any key when ready .....
```

```
Check system disk in drive
Press any key when ready ....
```

5. If the following message is displayed on the screen, the system may not be set up correctly. Go to the system setup menu and select the appropriate system configuration. (see the part 3 for details.) If the following message is displayed again, go to PROCEDURE 5.



6. If the following message is displayed on the screen, go to PROCEDURE 5.

***** ERROR DETECTED. ERROR CODE=**
***** ERROR ADDRESS=**
***** ERROR PATTERN=**

Exception
ADR20 failed
KBC self test error
KBC not ready_I
KBC not ready_O
ROM check sum error
RTC data bus error
RTC int. error
RTC clock error
PIT data bus error
PIT ch.2 output error
PIT clock error
PIT ch.1 output error
PIT ch.0 output error

DMAC #1 data bus error
DMAC #2 data bus error
PIC #1 data bus error
PIC #2 data bus error
MAPPER data bus error
MAPPER address error
Word / byte error (I/O)
Mem (base 64KB) data bus error
Mem size check error
Mem (64KB-) data bus error
Mem address error
LIM register error
FDC error

7. If none of the above messages are displayed and you have a printer port LED, go to PROCEDURE 3. If none of the above messages are displayed and you don't have a printer port LED, go to PROCEDURE 2.

PROCEDURE 2

Beep Sound Check

1. Turn off the power.

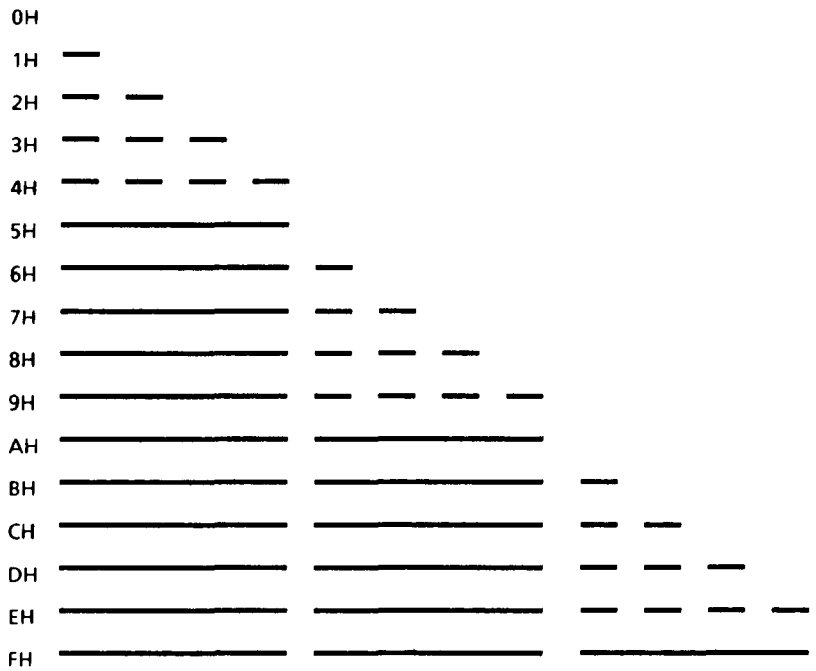
2. Wait 5 seconds or more, then turn on the power.

3. If a system error occurs, an error message is displayed and sounded with the beep sound error code. (see table 2-4.) The beep sound error code consists of a sequence of long and short beeps, representing a hexadecimal number between 0H and FH. The error message consists of two beep sound codes that are repeated three times. The beep code error message can be looked up in table 2-6.

4. If the error is given in table 2-6, go to PROCEDURE 5.

5. If the error code is not given in table 2-6, another FRU is probably defective.

TABLE 2-4 Beep Sound Error Code



PROCEDURE 3

Printer Port LED Check

1. Turn off the power.

2. Plug the printer port LED into the PRT/FDD connector on the back of the unit and set the A-B-PRT switch to PRT position.

3. While watching the printer port LED, turn on the power. The printer port LED will light when the power switch is turned on.

4. Read the final LED status from left to right as a hexadecimal value.

5. If the final LED status matches any of the error code values in the table 2-6, go to PROCEDURE 5.

6. If the final LED status is **1BH,** go to PROCEDURE 4.

TABLE 2-5 Printer Port LED Normal Status

Status	Messages
01 (H)	Initial setup of LSI start
02 (H)	Initial setup of RTC end
03 (H)	Initial setup of PIT end
04 (H)	Initial setup of DMAC(#1) end
05 (H)	Initial setup of DMAC(#2) end
06 (H)	Initial setup of PIC (#1) end
07 (H)	Initial setup of PIC (#2) end
08 (H)	Initial setup of DMA page register end
09 (H)	Initial setup of KB controller end
0A (H)	Initial setup of memory (0 - 64 KB) end
0B (H)	Initial setup of memory (64 - 640 KB) end
0C (H)	Initial setup of memory (more than 1 MB) Protect mode end
0D (H)	Initial setup of memory (more than 1 MB) Real mode end
0E (H)	Check a checksum of CMOS end
0F (H)	Check classfication of CRT end
10 (H)	Check item of CMOS end
11 (H)	Initial setup of CRT end
12 (H)	Initial setup of keyboard end
13 (H)	Initial setup of Timer end
14 (H)	Initial setup of FDD end
15 (H)	Initial setup of HDD end
16 (H)	Initial setup of NDP end
17 (H)	Initial setup of system ROM end
18 (H)	Initial setup of option ROM end
19 (H)	Initial setup of printer end
1A (H)	Initial setup of RS232C end
1B (H)	Prepare the boot end

TABLE 2-6 Printer Port LED Error Status

STATUS	DISPLAY MESSAGES	ERROR INFORMATION	PROCESS
81 H		System error	HALT
82 H		System error	HALT
83 H		System error	HALT
84 H	KBC Self test error	Keyboard controller (8742) #1 error	HALT
85 H	KBC not ready_I	Keyboard controller (8742) #1 error	HALT
86 H	KBC not ready_O	Keyboard controller (8742) #1 error	HALT
89 H	KBC not ready_I	Keyboard controller (8742) #1 error	HALT
8A H		Keyboard controller (8742) #1 error	HALT
8E H	KBC not ready_I	Keyboard controller (8742) #1 error	HALT
8F H	KBC not ready_O	Keyboard controller (8742) #1 error	HALT
91 H		CPU error	HALT
92 H		CPU error	HALT
93 H		CPU error	HALT
94 H		BIOS ROM error	HALT
95 H		CPU error	HALT
96 H	KBC #2 error	Keyboard controller (8042) #2 error	Continue
A1 H	RTC data bus error	CMOS RAM error	HALT
A2 H	RTC int. error	CMOS RAM error	HALT
A3 H	RTC clock error	CMOS RAM error	HALT
A4 H	PIT data bus error	PIT error in the SI	HALT
A5 H	PIT ch.2 output error	PIT error in the SI	HALT

TABLE 2-6 Printer Port LED Error Status (continued)

STATUS	ERROR MESSAGES	ERROR INFORMATION	PROCESS
A6 H	PIT clock error	PIT error in the SI	HALT
A7 H	PIT ch.1 output error	PIT error in the SI	HALT
A8 H	PIT ch.0 output error	PIT error in the SI	HALT
A9 H	DMAC #1 data bus error	DMAC #1 error in the SI	HALT
AA H	DMAC #2 data bus error	DMAC #2 error in the SI	HALT
AB H	PIC #1 data bus error	PIC #1 error in the SI	HALT
AD H	PIC #2 data bus error	PIC #2 error in the SI	HALT
AF H	MAPPER data bus error	BCNT-GA error	HALT
B1 H	MAPPER address error	BCNT-GA error	HALT
B2 H		BDRV-GA error	HALT
B3 H	Exception	System error	HALT
B4 H	Failed PM	System error	HALT
B5 H	KBC not ready__I	Keyboard controller (8742) error	HALT
B6 H	ADR 20 failed	Keyboard controller (8742) error	HALT
B7 H	KBC not ready__I	Keyboard controller (8742) error	HALT
B8 H		Keyboard controller (8742) error	HALT
C1 H	Mem (base 64KB) data bus error	System memory of the first 64 Kbytes error	HALT
C2 H	Mem (base 64KB) dword/word/byte error	System memory of the first 64 Kbytes error	HALT
C3 H	Mem (base 64KB) fixed data error	System memory of the first 64 Kbytes error	HALT
C4 H	Mem (base 64KB) address error	System memory of the first 64 Kbytes error	HALT
C5 H	Mem size check error	RTC error	Continue
C8 H	Mem (base 64KB) parity circuit error	System memory of the first 64 Kbytes error	HALT
C9 H	Mem (base 64KB) parity circuit error	System memory of the first 64 Kbytes error	HALT

TABLE 2-6 Printer Port LED Error Status (continued)

STATUS	ERROR MESSAGES	ERROR INFORMATION	PROCESS
CA H	Mem (base 64KB) parity circuit error	System memory of the first 64 Kbytes error	HALT
CB H	Mem (base 64KB) parity circuit error	System memory of the first 64 Kbytes error	HALT
CC H	Mem (base 64KB) parity circuit error	System memory of the first 64 Kbytes error	HALT
D1 H	Mem (64 KB -) data bus error	System memory of the above 64 Kbytes error	Continue
D2 H	Mem (64 KB -) word/byte error	System memory of the above 64 Kbytes error	Continue
D3 H	Mem (64 KB -) fixed error	System memory of the above 64 Kbytes error	Continue
D4 H	Mem (64 KB -) address error	System memory of the above 64 Kbytes error	Continue
D5 H	Mem address error	System memory of the above 64 Kbytes error	Continue
D8 H	Mem (64 KB -) parity circuit error	System memory of the above 64 Kbytes error	Continue
D9 H	Mem (64 KB -) parity circuit error	System memory of the above 64 Kbytes error	Continue
DA H	Mem (64 KB -) parity circuit error	System memory of the above 64 Kbytes error	Continue
DB H	Mem (64 KB -) parity circuit error	System memory of the above 64 Kbytes error	Continue
DC H	Mem (64 KB -) parity circuit error	System memory of the above 64 Kbytes error	Continue
DE H	LIM register error	MCNT2-GA error	Continue
DF H	LIM register error	MCNT2-GA error	Continue
E1 H	Video RAM error	VRAM error	Continue
E2 H	Video RAM error	VRAM error	Continue
E3 H	Video RAM error	VRAM error	Continue
E4 H	CRTC error	PEGA2 error	Continue
E5 H	CRTC error	PEGA2 error	Continue
E6 H	FDC error	FDC error	Continue

PROCEDURE 4

Test Program Execution

1. Execute the following tests on the Diagnostic Test Menu. (Refer to Part 3 Test and Diagnostics.)

    1. System test
    2. Memory test
    3. Keyboard test
    4. Display test
    5. Floppy disk test
    6. Hard disk test
    7. Real timer test

2. If an error is detected during the system test, memory test, display test, or real timer test, go to PROCEDURE 5.

3. If an error is detected during the floppy disk test, go to FDD problem isolation procedures in section 2.5.

4. If an error is detected during the hard disk test, go to HDD problem isolation procedures in section 2.6.

5. If an error is detected during the keyboard test, go to keyboard problem isolation procedures in section 2.7.

PROCEDURE 5

System Board Replacement

1. Replace the system board. (Refer to section 4.16.)

2. If normal operation is restored after replacing the system board, the original system board is probably defective.

3. If normal operation is not restored, another FRU is probably defective. The defective unit must be isolated and replaced.

2.5 FLOPPY DISK DRIVE PROBLEM ISOLATION PROCEDURES

This section describes how to determine whether or not the floppy disk drive is defective. Start with PROCEDURE 1 and continue with other procedures as instructed. The procedures described in this section are:

PROCEDURE 1: Test and Diagnostic Program Loading Check

PROCEDURE 2: Message Check

PROCEDURE 3: Head Cleaning

PROCEDURE 4: FDD Test Execution

PROCEDURE 5: FDD Connector Check

PROCEDURE 6: New FDD Connection

PROCEDURE 1

Test and Diagnostic Programs Loading Check

1. Turn off the power.
2. Insert the diagnostics disk into the FDD.
3. Turn on the power.
4. If loading starts normally, go to PROCEDURE 3. (See section 3.2 to determine if loading has started normally.)
5. If loading has not started normally, go to PROCEDURE 2.

PROCEDURE 2

Message Check

1. When the power switch is turned on after the diagnostics disk is inserted into the FDD, message (a), (b), or (c) shown below may appear.

(a)

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

(b)

```
Non-System disk or disk error
Replace and press any key when ready
```

(c)

```
** FDD load error or Bad system disk **
Insert system disk in drive
Press any key when ready .....
```

2. If message (a) is displayed, check that the A-B-PRT switch is set to PRT. If it is not set to PRT, set it to PRT. If it is set to PRT, go to PROCEDURE 5.

3. If message (b) or (c) is displayed, the contents of the floppy disk is damaged, or a disk other than the diagnostics disk has been inserted into the FDD. Insert a new diagnostics disk into the FDD. If loading completes, go to PROCEDURE 4. If loading does not complete, go to PROCEDURE 3.

4. If none of the above messages appears, go to PROCEDURE 5.

PROCEDURE 3

Head Cleaning

1. Turn off the power.
2. Insert the cleaning disk into the FDD.
3. Turn on the power.
4. If normal operation is restored after cleaning the head, go to PROCEDURE 4.
5. If normal operation is not restored, go to PROCEDURE 5.

PROCEDURE 4

FDD Test Execution

1. Run the floppy disk test as indicated on the diagnostic test menu.

2. If an error is generated during the floppy disk test, an error code and status will be displayed. The error codes are described in table 2-7. Go to PROCEDURE 6.

3. If no error is generated, the FDD is normal.

TABLE 2-7 FDD Error Status

CODE	STATUS
01	Bad Command
02	Address Mark Not Found
03	Write Protected
04	Record Not Found
06	Media Removed On Dual Attach Card
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 (Not Ready)
EE	Write Buffer Error

PROCEDURE 5

FDD Connector Check

1. Turn off the power, then unplug the ac power cord.
2. Remove the top cover. (Refer to section 4.2.)
3. Check that the FDD connection is secure. (Refer to figure 2-4.)
4. If the FDD cable is securely connected to the sytem board, go to PROCEDURE 6.
5. If the FDD cable is not securely connected to the system board, secure the connection.

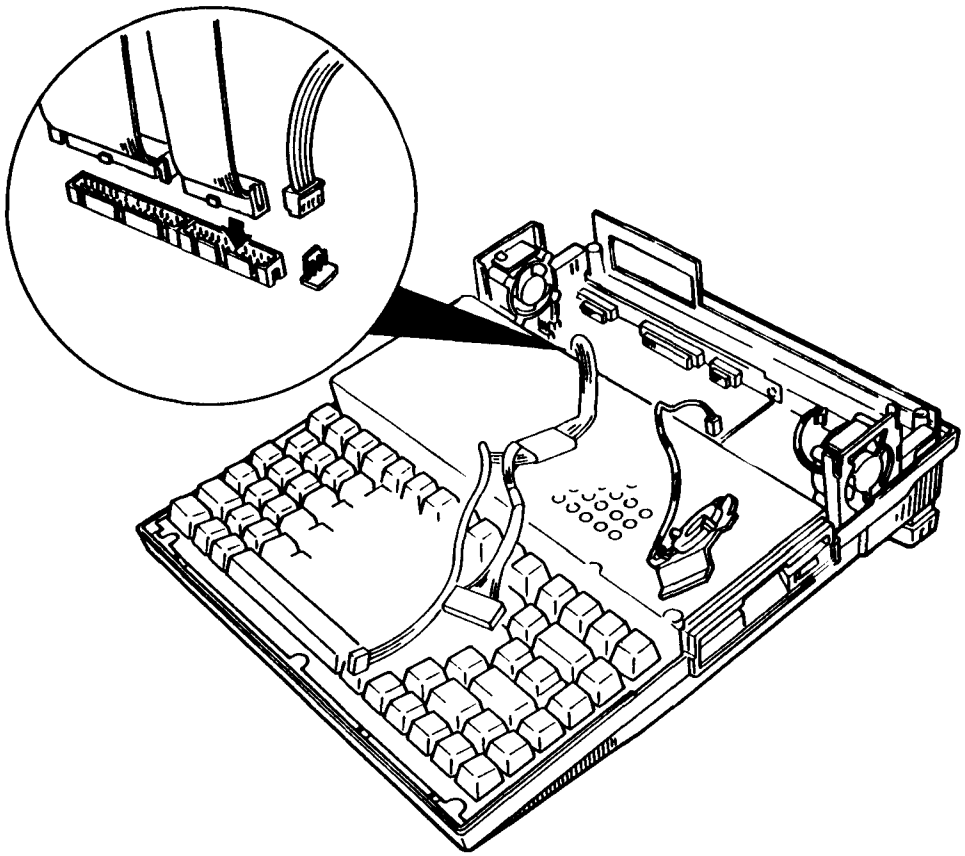


FIGURE 2-4 FDD Connector Check

PROCEDURE 6

New FDD Connection

1. Turn off the power.

2. Remove the FDD. (Refer to section 4.13.)

3. Connect a new FDD to the FDD connector without installing the new FDD. Then connecte all of the FRUs removed during FDD removal to their corresponding connectors without installing the FRUs.

4. Turn on the power.

5. If normal operation is restored, the original FDD is probably defective. Reassemble the system.

6. If normal operation is not restored, the system board is probably defective. Refer to section 2.4.

2.6 HARD DISK DRIVE PROBLEM ISOLATION PROCEDURES

This section describes how to determine whether or not the hard disk drive is defective. Start with PROCEDURE 1 and continue with other procedures as instructed. The procedures described in this section are:

PROCEDURE 1: HDD Indicator Check

PROCEDURE 2: Message Check

PROCEDURE 3: Format Execution

PROCEDURE 4: Hard Disk Test Execution

PROCEDURE 5: Connector Check

PROCEDURE 6: HDD Jumper Straps Check

PROCEDURE 7: New HDD Connection

PROCEDURE 1

HDD Indicator Check

1. Turn off the power.
2. If there is a floppy disk in the FDD, take it out.
3. Wait 5 seconds or more after turning off the power, then turn on the power.
4. If the HDD indicator (see figure 2-5) blinks briefly, then goes out, go to PROCEDURE 2. If the HDD indicator continues blinking, go to PROCEDURE 4.
5. If the HDD indicator does not light at all, go to PROCEDURE 5.

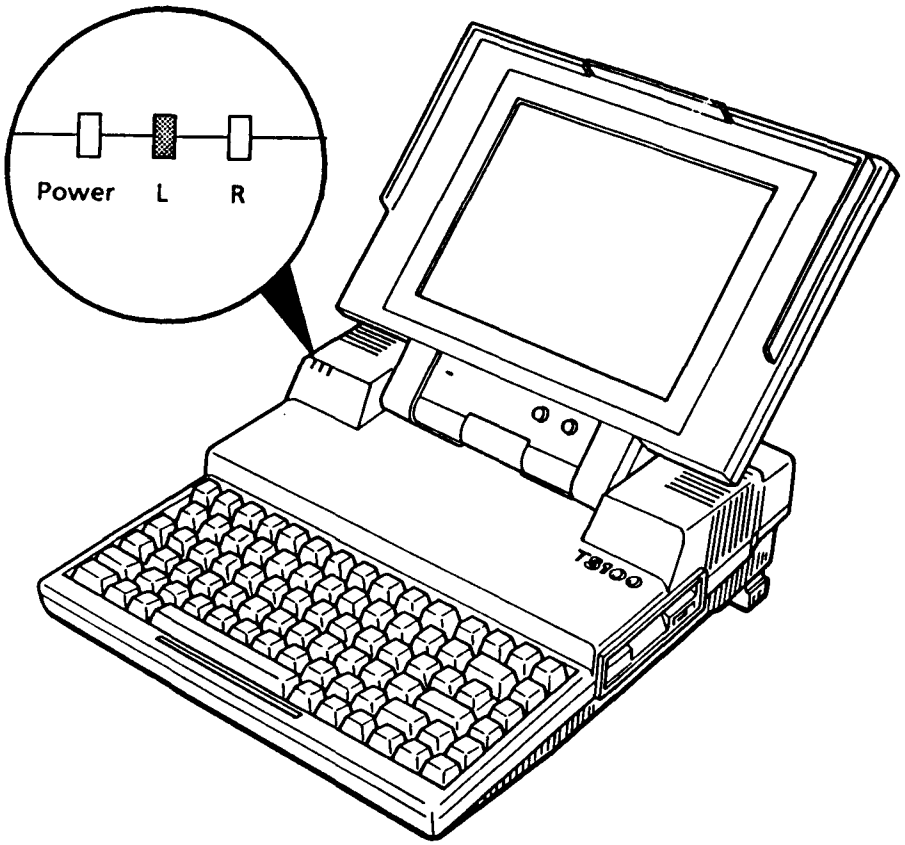


FIGURE 2-5 HDD Indicator Check

PROCEDURE 2

Message Check

1. If the operating system is loaded normally, go to PROCEDURE 4.

2. If one of the following message is displayed on the screen, go to PROCEDURE 3.

```
** HDD Load error or Bad system disk **
Insert system disk in drive
Press any key when ready .....
```

```
Check system disk in drive
Press any key when ready ....
```

PROCEDURE 3

Format Execution

CAUTION

The contents of the hard disk will be erased when the FORMAT command is run. Before running this test, transfer the contents of the hard disk to floppy disks. This can be done with the MS-DOS BACKUP command. (See the MS-DOS Manual for details.)

1. Remove the diagnostics disk from the FDD, then insert the MS-DOS system disk in.
2. Make partition of the hard disk by entering the FDISK command. (See the MS-DOS Manual for details.)
3. Format the hard disk by entering the FORMAT command. (See the MS-DOS Manual for details.) At this time use /S switch to transfer the system program.
4. If normal operation is restored, the HDD is normal.
5. If normal operation is not restored, go to PROCEDURE 6.

PROCEDURE 4

Hard Disk Test Execution

> ***CAUTION***
>
> The contents of the hard disk will be erased when the test program is run. Before running this test, transfer the contents of the hard disk to floppy disks. This can be done with the MS-DOS BACKUP command. (See the MS-DOS Manual for details.)

1. Insert the diagnostics disk into the FDD and load the test and diagnostic programs.

2. Run the hard disk test as indicated on the diagnostics test menu.

3. If an error is detected during the hard disk test, an error code and status will be displayed; go to PROCEDURE 6. The error codes are described in table 2-8.

4. If no error is generated, the HDD is normal. Enter the MS-DOS FDISK command to make partition of the hard disk. Then enter the MS-DOS FORMAT command. (See the MS-DOS Manual for details.)

TABLE 2-8 HDD Error Status

CODE	STATUS
01	Bad command error
02	Bad address mark
04	Record not found
05	HDC not reset
07	Drive not initialize
09	DMA boundary error
0A	Bad sector error
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
F0	Not sense error (HW.code = FF)

PROCEDURE 5

Connector Check

1. Turn off the power, then unplug the ac power cord.
2. Remove the top cover. (Refer to section 4.2)
3. Check that the HDC signal cable and HDD power cable are secure. (Refer to figure 2-6)
4. If both cables are securely connected to the system board, go to PROCEDURE 6.
5. If the cables are not securely connected, secure them.

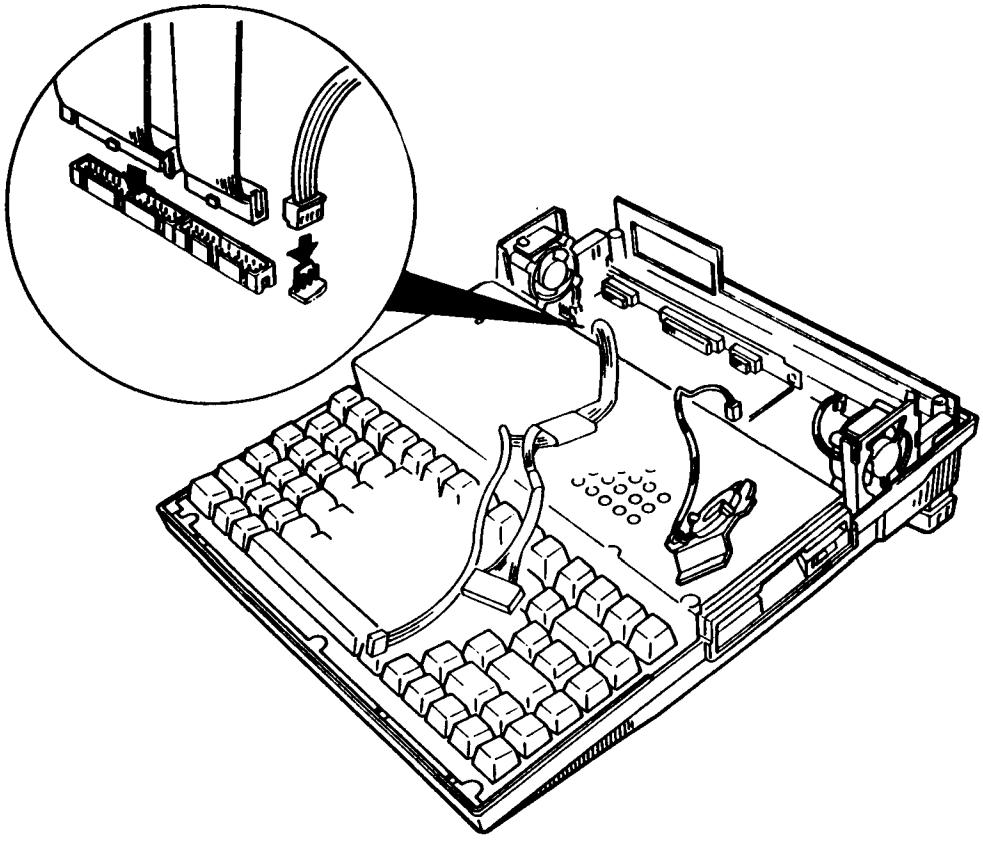


FIGURE 2-6 HDC and HDD Power Connector Check

PROCEDURE 6

HDD Jumper Straps Check

1. Remove the disk support (Refer to section 4.12.).
2. Check that the jumper straps are set correctly as shown in figure 2-7 and described in table 2-9.
3. If the jumper straps are set correctly, go to PROCEDURE 7.
4. If the jumper straps are not set correctly, set them correctly.

TABLE 2-9 HDD Jumper Straps Functions

	STATUS
E5	shorted
E6	open
E7	shorted

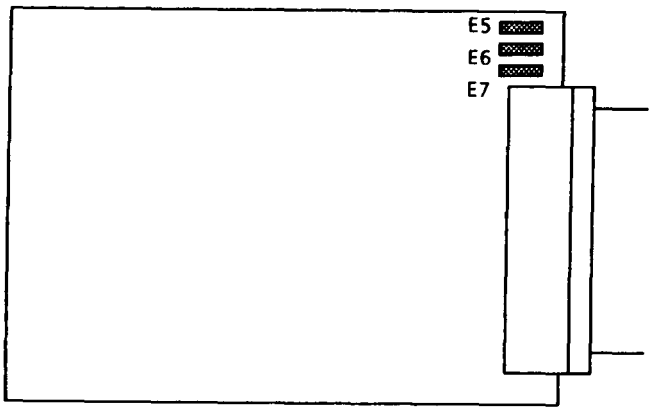


FIGURE 2-7 HDD Jumper Straps

PROCEDURE 7

New HDD Connection

1. Turn off the power.
2. Remove the HDD. (Refer to section 4.14.)
3. Connect a new HDD to the system board without installing the HDD. Then connect all the FRUs removed during HDD removal without installing the FRUs.
4. If normal operation is restored, the original HDD is probably defective. Reassemble the system.
5. If normal operation is not restored, the system board is probably defective. Refer to section 2.4.

2.7 KEYBOARD PROBLEM ISOLATION PROCEDURES

This section describes how to determine whether or not the keyboard is defective. Start with PROCEDURE 1 and continue with other procedures as instructed. The procedures described in this section are:

PROCEDURE 1: Input Check

PROCEDURE 2: Keyboard Test Execution

PROCEDURE 3: Connector Check

PROCEDURE 4: New Keyboard Connection

PROCEDURE 1

Input Check

1. Insert an MS-DOS system disk into the FDD.
2. Turn on the power.
3. When the prompt appears on the screen, press any of the white keys on the keyboard (any character or the space bar).

> ***CAUTION***
>
> **Do not type an MS-DOS acceptable command such as del and format. Such operation may erase your important program or data.**

   If the character you press appears on the screen, press Enter. Go to PROCEDURE 2.

4. If the character does not appear on the screen, go to PROCEDURE 3.

```
Toshiba Personal Computer MS-DOS Version 3.20 / (RXXXXX)

   (C) Copyright  Toshiba     Corporation 1983,1986
   (C) Copyright  Microsoft   Corporation 1981,1986

Current date is XXX  X-XX-19XX
Enter new date (mm-dd-yy) : _
Current time is X:XX:XX,XX
Enter new time : _

COMMAND Version 3.20
A> abcdefghijklmnopqrst.................
```

PROCEDURE 2

Keyboard Test Execution

1. Insert the diagnostics disk into the FDD and load the test and diagnostics programs. (Refer to section 3.)

2. Run the keyboard test as indicated on the diagnostics test menu.

3. If an error is detected during the test, go to PROCEDURE 3.

4. If no error is detected during the test, the keyboard is normal.

PROCEDURE 3

Connector Check

1. Turn off the power, then disconnect the ac power cord.
2. Lift up the top cover. (Refer to section 4.3.)
3. Lift up the keyboard and check that the keyboard cable is securely connected to the system board (Refer to figure 2-8.) If it is securely connected, go to PROCEDURE 4.
4. If it is not securely connected, secure it.

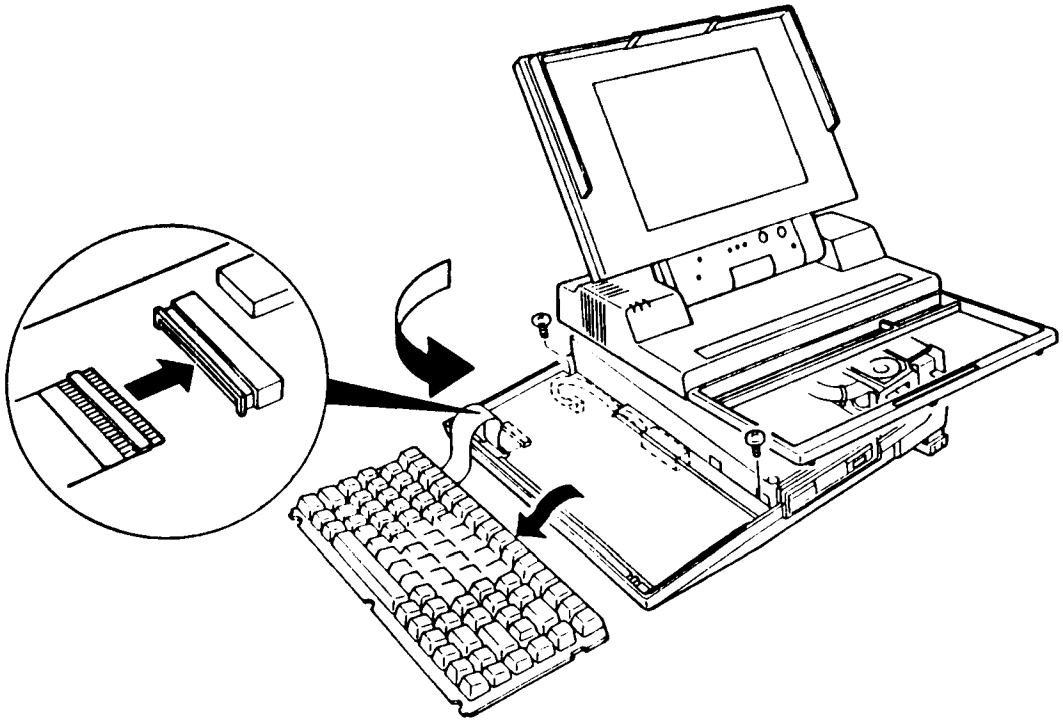


FIGURE 2-8 Keyboard Connector Check

PROCEDURE 4

New Keyboard Connection

1. Turn off the power, then unplug the ac power cord.
2. Remove the keyboard. (Refer to section 4.3.)
3. Connect a new keyboard to the sytem board without installing it.
4. If normal operation is restored after connecting the new keyboard, the original keyboard is probably defective. Install the new keyboard.
5. If normal operation is not restored, the system board is probably defective. Refer to section 2.4.

2.8 PLASMA DISPLAY PROBLEM ISOLATION PROCEDURES

This section describes how to determine whether or not the PLASMA DISPLAY is defective. Start with PROCEDURE 1 and continue with other procedures as instructed. The procedures described in this section are:

PROCEDURE 1: Display Check

PROCEDURE 2: Plasma Display Contrast and Brightness Check

PROCEDURE 3: Display Test Execution

PROCEDURE 4: PDP Connector Check

PROCEDURE 5: PDP Jumper Strap Check

PROCEFURE 6: New PDP Connection

PROCEDURE 1

Display Check

1. Turn off the power.

2. Wait 5 seconds or more and turn on the power. After turning on the power, the following message should be displayed on the upper left-hand corner of the screen:

MEMORY TEST XXXXKB

3. If the above message appears, go to PROCEDURE 2.

4. If the above message does not appear:

   (a) Check that the contrast and brightness are correctly adjusted.

   (b) Check that CRT indicator is light. If CRT indicator is light, hold the Fn key, then press the Home key.

   After performing (a) and (b), reperform steps 1 and 2. If the message in step 2 still fails to appear, go to PROCEDURE 3.

PROCEDURE 2

Plasma Display Contrast and Brightness Check

1. Turn the contrast and brightness controls back and forth (Refer to figure 2-9) to check that the screen becomes darker or brighter.

2. If the screen becomes darker or brighter, power is supplied to the PDP. Go to PROCEDURE 5.

3. If the screen does not change while turning the controls, go to PROCEDURE 4.

PROCEDURE 3

Display Test Execution

1. Insert the diagnostics disk into the FDD and run the display test as indicated on the diagnostic menu.

2. If an error is detected during the display test, the sytem board is probably defective. Refer to section 2.4.

3. If no error is generated, the plasma display is normal.

PROCEDURE 4

PDP Connector Check

WARNING

Dangerous high voltage is supplied to the plasma display panel. Pay enough attention on handling.

1. Turn off the power, then unplug the ac power cord.
2. Remove the PDP without disconnecting the cables (Refer to section 4.4.) and check that the cables are securely connected to the plasma display board (Refer to figure 2-9.)
3. If the cable is securely connected, go to PROCEDURE 6.
4. If the cable is not securely connected, secure it.

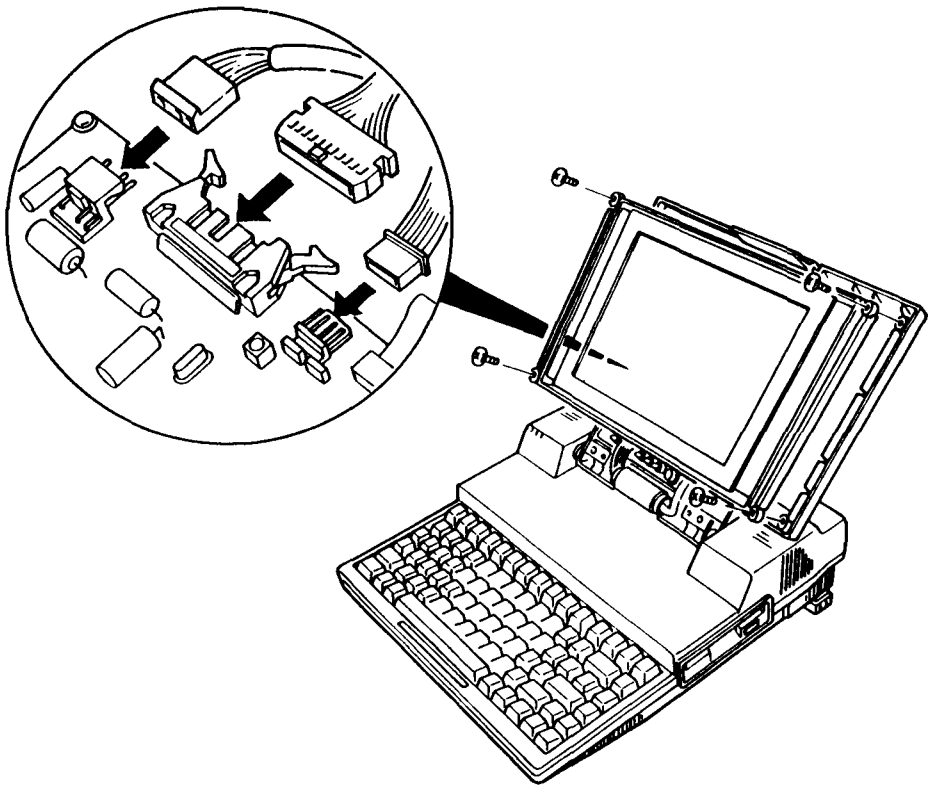


FIGURE 2-9 PDP Connector Check

PROCEDURE 5

PDP Jumper Strap Check

1. Check that the jumper straps are set correctly (as shown in the figure 2-10 and described in table 2-10.)

2. If the jumper straps are set correctly, go to PROCEDURE 6.

3. If the jumper straps are not set correctly, set them correctly.

TABLE 2-10 PDP Jumper Straps Functions

	Pins 1 and 2 shorted	Pins 2 and 3 shorted
JP1	The brightness adjustment is connected to the PDP board.	The brightness adjustment is not connected to the PDP board.
JP2	The contrast adjustment is connected to the PDP board.	The contrast adjustment is not connected to the PDP board.
JP3	Three-level gray scale.	Four-level gray scale.
JP4	16H (horizontal) mode.	1H (horizontal) mode.

PJ1 Pin 1 and 2 shorted
PJ2 Pin 1 and 2 shorted
PJ3 Pin 2 and 3 shorted
PJ4 Pin 2 and 3 shorted

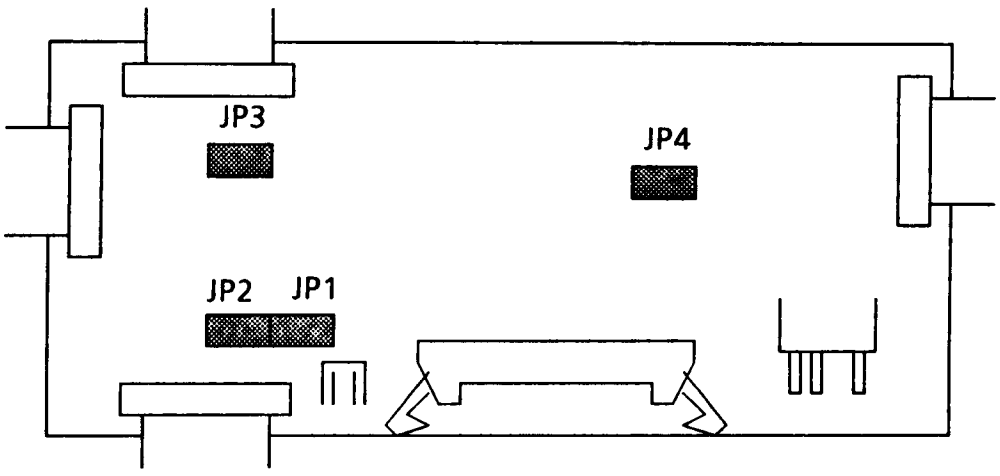


FIGURE 2-10 PDP Jumper Straps

PROCEDURE 6

New PDP Connection

1. Connect a new PDP without installing it.

2. If normal operation is restored after connecting the new PDP, the original PDP is probably defective. Reassemble the system.

3. If normal operation is not restored, the system board is probably defective. Refer to section 2.4.

3.1 GENERAL

This part explains test and diagnostics programs. That checks the functions of all hardware modules of the T5100.
There are 19 programs grouped into two modules: the service program module (DIAGNOSTICS MENU) and test program module (DIAGNOSTIC TEST MENU).
The service program module is composed of 8 tasks:

1. HARD DISK FORMAT
2. SEEK TO LANDING ZONE (HDD)
3. HEAD CLEANING
4. LOG UTILITIES
5. RUNNING TEST
6. FDD UTILITIES
7. SYSTEM CONFIGURATION
8. SETUP

The test program module is composed of 11 tests:

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

The following items are necessary for carrying out the test and diagnostic programs.

1. T5100 diagnostics disk
2. MS-DOS system disk
3. Work disk (formatted)
4. Cleaning disk kit
5. Printer wraparound connector
6. RS232C wraparound connector

Service personnel can use these programs to isolate problems by selecting the appropriate program and operation procedures described in section 3.2.

3.2 OPERATIONS

1. Insert the diagnostics disk in the floppy disk drive, then turn on the power.

2. Type in **TESTCE3,** then press Enter.

3. The following display will appear:

```
TOSHIBA personal computer T5100 DIAGNOSTICS
Version X.XX (C) copyright TOSHIBA Corp. 1987

DIAGNOSTICS  MENU :

   1 - DIAGNOSTIC TEST
   2 - HARD DISK FORMAT
   3 - SEEK TO LANDING ZONE (HDD)
   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
```

Detailed explanations of the service programs and the operations are given in parts 3.17 to 3.24.

NOTE: To stop the test program:

(1) During keyboard operation, hold down Ctrl, and press the C key.
(2) While running the test program, hold down Ctrl, and press Break.

4. Type in 1, then press Enter and the following display will appear:

```
TOSHIBA personal computer T5100 DIAGNOSTICS
version X.XX (C) copyright TOSHIBA Corp. 1987

DIAGNOSTIC TEST MENU :

    1 - SYSTEM TEST
    2 - MEMORY TEST
    3 - KEYBOARD TEST
    4 - DISPLAY TEST
    5 - FLOPPY DISK TEST
    6 - PRINTER TEST
    7 - ASYNC TEST
    8 - HARD DISK TEST
    9 - REAL TIMER TEST
   10 - NDP TEST
   11 - EXPANSION TEST
   88 - FDD & HDD ERROR RETRY COUNT SET
   99 - EXIT TO DIAGNOSTICS MENU

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

Numbers, 1 to 11 are diagnostic tests.
Number 88 is for setting the floppy disk drive and hard disk drive error retry count.
Number 99 is for returning to the DIAGNOSTIC MENU.
When selecting the floppy disk test or hard disk test, special sub-messages will appear, as described in sections 3.8 and 3.11.

5. After typing in a test number (1 to 11) of the DIAGNOSTIC TEST MENU, pressing Enter displays as follows:

```
TEST NAME                                    XXXXXXX

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
 :   :
 :   :
99 - Exit to DIAGNOSTIC TEST MENU

SELECT SUB-TEST NUMBER ? _
TEST  LOOP (1:YES/2:NO) ? _
ERROR STOP (1:YES/2:NO) ? _
```

6. Select a subtest. Type in the subtest number, then press Enter. The following message will appear:

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

NOTE: If you select KEYBOARD TEST, this message will not appear.

If you select YES (by typing in 1, then pressing Enter):
Each time a test cycle ends, it increments the pass counter by one and repeats the test cycle.
If you select NO (by typing in 2, then pressing Enter):
At the end of a test cycle, the test execution is terminated and you exit to the subtest menu.

7. Type in 1 or 2, then press Enter. The following message will appear:

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

If you select YES (by typing in 1, then pressing Enter):
When an error occurs, the error status is displayed and execution of the test program stops and the operation guide is displayed on the right side of the display screen.
If you select NO (by typing in 2, then pressing Enter):
When an error occurs, the error status is displayed then the error counter is incremented by one and you goes to the next test.

8. Type in 1 or 2, then press Enter and the test program will run. Each subtest is described in section 3.3.

9. When an error occurs during the test program, the following message will appear: (if you answer YES for ERROR STOP question,)

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) Retries the test.

The error code and error status names are described in section 3.15.

3.3 SUBTEST NAMES

Table 3-1 lists the subtest of each test program.

TABLE 3-1 Subtest Names and Execution Time

No.	TEST NAME	SUBTEST No.	SUBTEST ITEM	TIME (s)
1	SYSTEM	01	ROM checksum	
		02	HW status	
2	MEMORY	01	RAM constant data	13
		02	RAM address pattern data	4
		03	RAM refresh	8
		04	Protected mode	1-57 (*)
		05	Protected mode (2MB)	32
		06	LIM (Expansion memory)	15-39 (*)
3	KEYBOARD	01	Pressed key display	
		02	Pressed key code display	
4	DISPLAY	01	VRAM read/write	3
		02	Character attributes	
		03	Character set	
		04	80*25 Character display	
		05	Graphics display (color set 0/1)	
		06	640*200 Graphics display	
		07	640*400 Graphics display	
		08	Display page	15
		09	"H" pattern display	
		10	Special attribute test	
5	FDD	01	Sequential read	50
		02	Sequential read/write	115
		03	Random address/data	12
		04	Write specified address	1
		05	Read specified address	1

(*) It varies depending on the memory configuration.

TABLE 3-1 Subtest Names and Execution Time (Continued)

No.	TEST NAME	SUBTEST No.	SUBTEST ITEM	TIME(s)
6	PRINTER	01	Ripple pattern	110
		02	Function	15
		03	Wrapa around	1
7	ASYNC	01	Wrap around (channel - 1)	1
		02	Wrap around (channel - 2)	1
		03	Point to point (send)	1
		04	Point to point (receive)	1
		05	Card modem loopback	5
		06	Card modem on-line test	10
		07	Dial tester test	60
8	HDD	01	Sequential read	300
		02	Address uniquence	450
		03	Random address/data	15
		04	Cross talk & peak shift	450
		05	Write/read/compare(CE)	2
		06	Write specified address	1
		07	Read specified address	1
		08	ECC circuit (CE cylinder)	2
		09	Sequential write	300
			W-R-C specified address	2
9	REAL TIMER	01	Real time test	
		02	Backup memory test	1
		03	Real time carry test	
10	NDP	01	NDP test	1
11	EXPANSION UNIT	01	Box wrap around test	3
		02	Box mono video ram test	1
		03	Wrap around test (16bit bus)	

3.4 SYSTEM TEST

Subtest 01 ROM checksum

This test performs the ROM checksum test on the memory board.
(Test extent : F0000H - FFFFFH 64KB)

Subtest 02 H/W status

This test reads the system hardware status, then displays the status as shown below. Press Enter to return to the system test's SUB-TEST MENU.
Table 3-2 describes the hardware status bits.

```
            76543210
H/W status = 10001100

   Bit7 --- Display mode   = Plasma
   Bit6 --- CPU clock      = 16MHZ
   Bit5 --- Reserved       =
   Bit4 --- 2MB FDD        = 2MB
   Bit3 --- Internal FDDs  = 1
   Bit2 --- Drive A/B      = Normal
   Bit1 --- External FDD   = OFF
   Bit0 --- Internal FDD   = 2HD type
```

TABLE 3-2 Hardware Status Bit

H/W Status / Items	1	0
Display mode	Plasma	CRT
CPU clock	8MHz	16MHz
2MB FDD	1.6MB	2MB
Internal FDDs	1	2
Drive A/B	Normal	Change
External FDD	ON	OFF
Internal FDD	2DD	2HD

3.5 MEMORY TEST

Subtest 01 RAM constant data (in real mode)

This subtest writes constant data to memory, then reads and compares it with the original data. The constant data is "FFFFH," "AAAAH," "5555H," "0101H," and "0000H."

Subtest 02 RAM address pattern data (in real mode)

This subtest creates an address pattern by XORing (Exclusive-ORing) the address segment and address offset, writes the address pattern into the segment address and the offset address, then reads and compares it with the original data.

Subtest 03 RAM refresh (in real mode)

This subtest writes 256 bytes of constant data to memory, then reads and compares it with the original data. The constant data is "AAAAH" and "5555H". There is a delay between the write and the read operations.

Subtest 04 Protected mode

This subtest writes fixed data and address data to memory (addresses 20000H to 9FFFFH, and if any, 100000H to the max.) in protected mode, then reads and compares it with the original data.

Subtest 05 Protected mode for the optional memory

This subtest writes fixed data and address data to memory (addresses 200000H to 3FFFFFH) in protected mode, then reads and compares it with the original data.

Subtest 06 LIM (in real mode)

The same test as the subtest 04 is done for the expansion memory page frame addresses (D0000H to DFFFFH).

After selecting the subtest, the following message will appear.

Warning: The contents of the EMS will be destroyed
Press [Enter] key.

After pressing the Enter, the following message will appear.

[EMS port = XXXH, SET# = X, PAGE# = XXXXX]

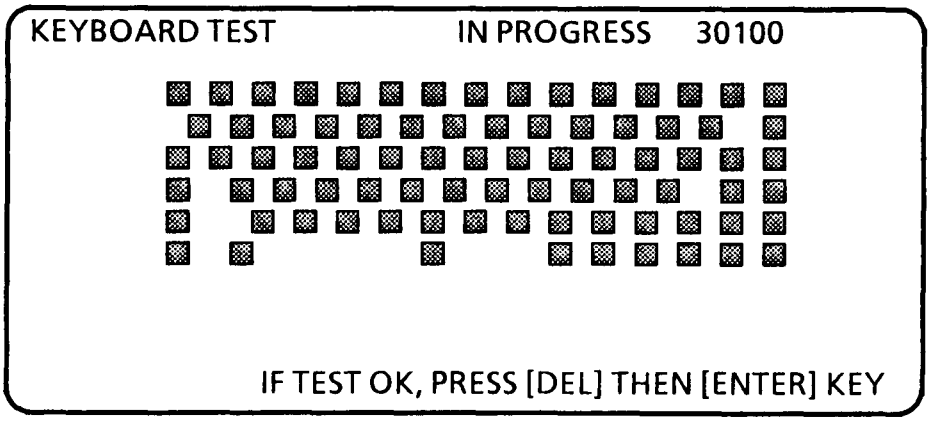
[EMS size: Block1 = XXXXXKB, Block2 = XXXXXKB]

3.6 KEYBOARD TEST

Subtest 01 Pressed key display

NOTE: Make sure the Num-lock key is off. If this key is on, the test cannot be carried out. The Fn key is not subjected to the test.

When the keyboard layout (as shown below) is drawn on the display, press any key and check that the corresponding key on the screen is changed to the character "*".
When a key is held depressed, the display will blink designating the auto-repeat function.



Subtest 02 Pressed key code display

When a key is pressed, its scan code, character code, and key top name are displayed on the screen in the format shown below.
The Ins, Caps lock, Num lock, Scroll lock, Alt, Ctrl, Left Shift, and Right Shift keys are displayed in reverse screen when pressed.
The scan codes, character codes and key top names are shown in table 3-3.

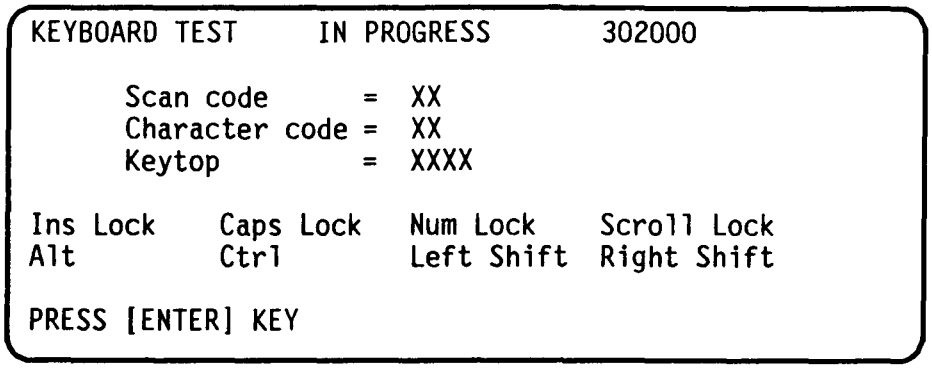


TABLE 3-3 Scan Code, Character Code, and Key Top Names

KEY TOP	SCAN CODE	CHARACTER CODE
'	29	60
1	02	31
2	03	32
3	04	33
4	05	34
5	06	35
6	07	36
7	08	37
8	09	38
9	0A	39
0	0B	30
-	0C	2D
=	0D	3D
\	2B	5C
←-	0E	08
-→	0F	09
q	10	71
w	11	77
e	12	65
r	13	72
t	14	74
y	15	79
u	16	75
i	17	69
o	18	6F
p	19	70
[	1A	5B
]	1B	5D
a	1E	61
s	1F	73
d	20	64
f	21	66
g	22	67
h	23	68
j	24	6A
k	25	6B
l	26	6C
;	27	3B

TABLE 3-3 Scan Code, Character Code, and Key Top Names
(Continued)

KEY TOP	SCAN CODE	CHARACTER CODE
,	28	27
z	2C	7A
x	2D	78
c	2E	63
v	2F	76
b	30	62
n	31	6E
m	32	6D
,	33	2C
.	34	2E
/	35	2F
Space	39	20
F2	3C	00
F4	3E	00
F6	40	00
F8	42	00
F10	44	00
F1	3B	00
F3	3D	00
F5	3F	00
F7	41	00
F9	43	00
Esc	01	1B
Home	47	00
←	4B	00
End	4F	00
Uper	48	00
Lower	50	00
Pg Up	49	00
→	4D	00
Pg Dn	51	00
Del	53	00
Sys Req	54	00
Prt Sc	37	2A

3.7 DISPLAY TEST

Subtest 01 VRAM read/write

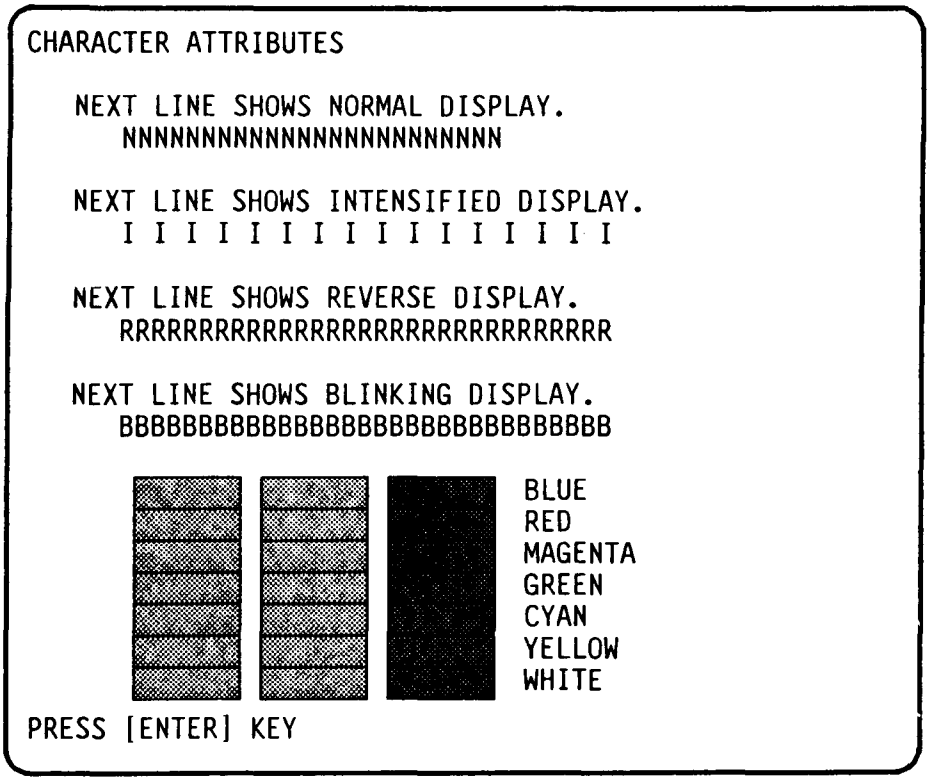
This subtest writes constant data (FFFFH, AAAAH, 5555H, 0000H) and address data to video RAM (256 Kbytes) and SRAM (2 Kbytes); it then reads the data written and compares it with the original data.

Subtest 02 Character attributes

This subtest checks:

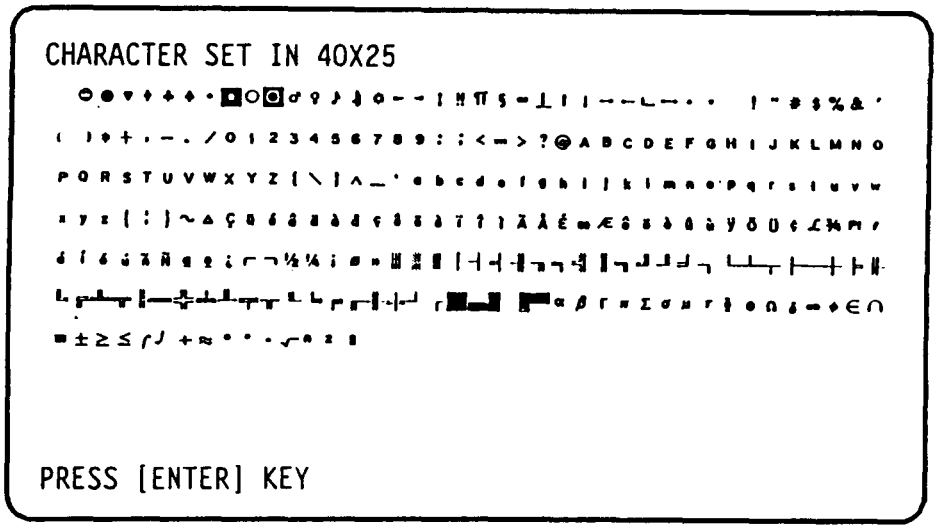
Normal Display
Intensified Display
Reverse Display
Blinking Display

For color displays, all seven colors used (blue, red, magenta, green, cyan, yellow, white) are displayed. The background and foreground colors can then be checked for brightness. The display below appears on the screen when this test is run.



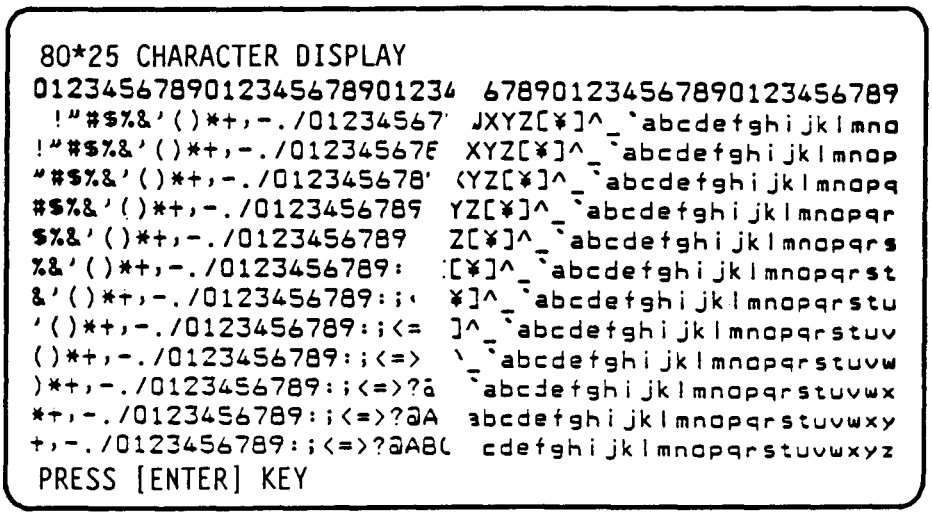
Subtest 03 Character set

In this subtest the character set of its code (00H to FFH) is displayed in the 40 x 25 character mode as shown below.



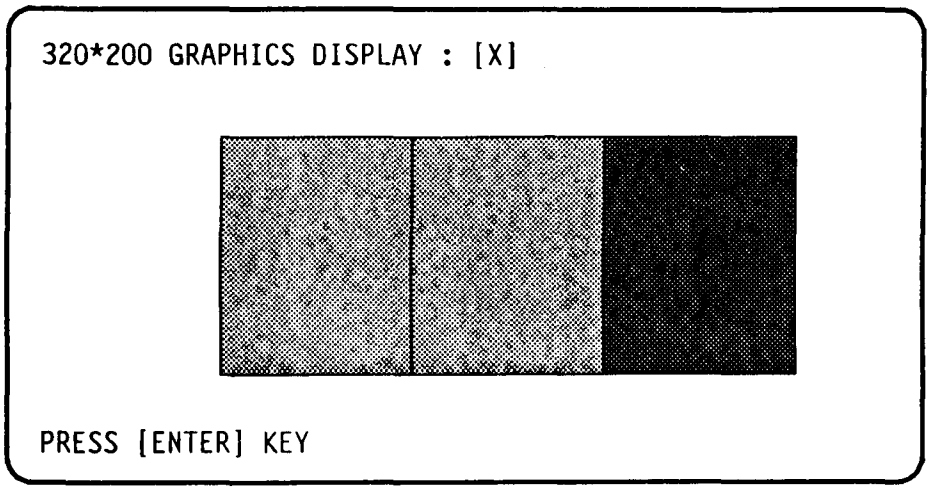
Subtest 04 80*25 Character display

In this subtest, the character string is displayed shifting one character line by line in the 80 x 25 character mode as shown below.



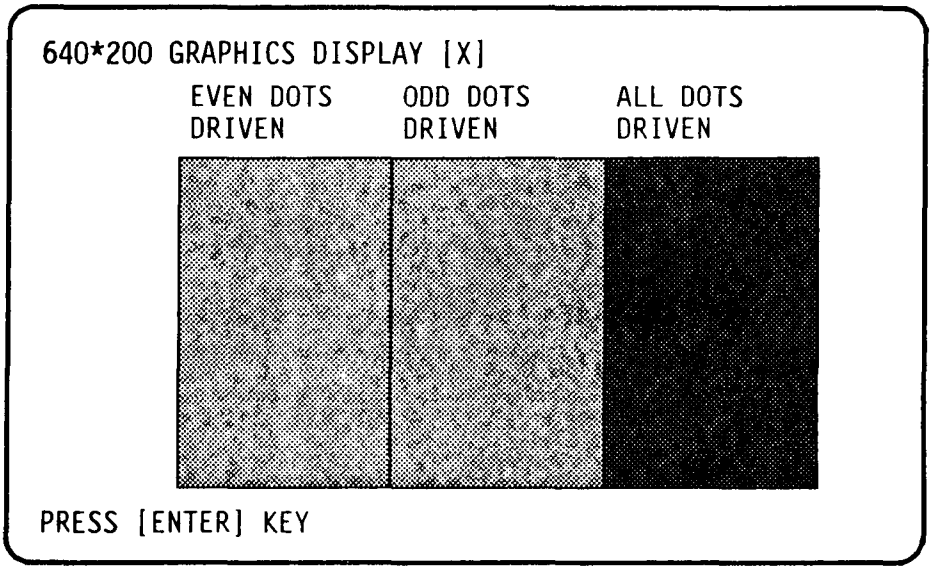
Subtest 05 320*200 Graphics display

This subtest displays two of color sets for the color display in the 320 x 200 dots graphics mode (Mode 4 and D) as shown below.
Color set 0: Green, Red, Yellow
Color set 1: Cyan, Magenta, White



Subtest 06 640*200 Graphics display

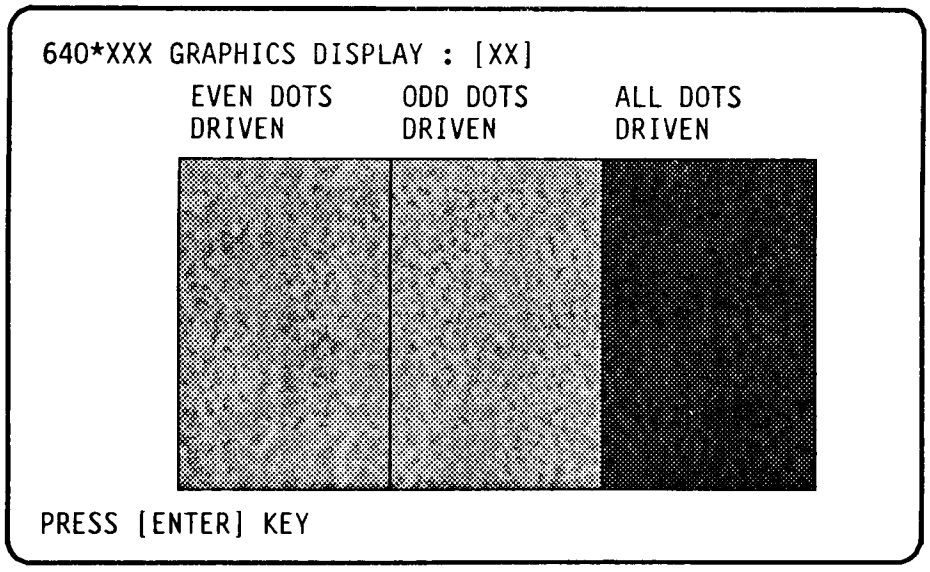
This subtest displays the color blocks for the black and white display in the 640 x 200 dots graphics mode (Mode 6 and E) as shown below.



Subtest 07 640 x 400 Graphics display

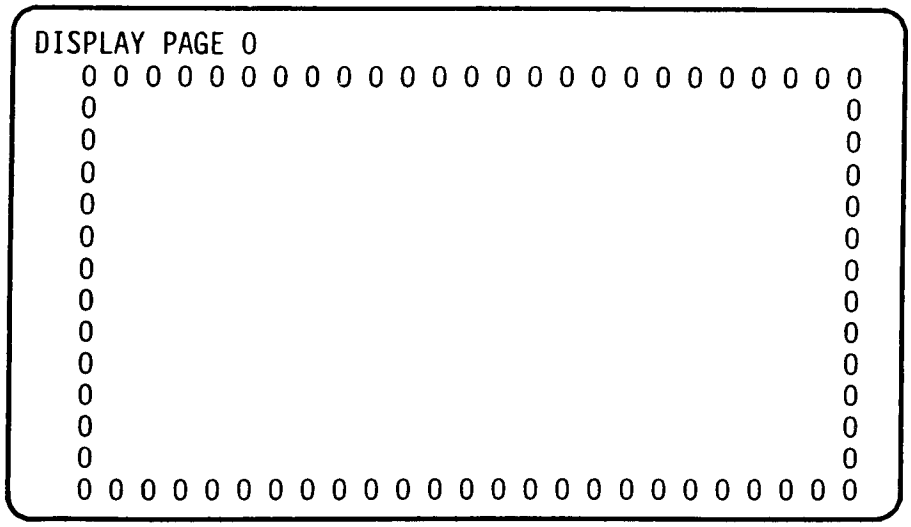
This subtest displays the color blocks for the black and white display in the 640 x 350 and 640 x 400 pixels graphics mode (Mode 10/ 74) as shown below.

NOTE: Mode 74 is not applicable when the external display is selected.



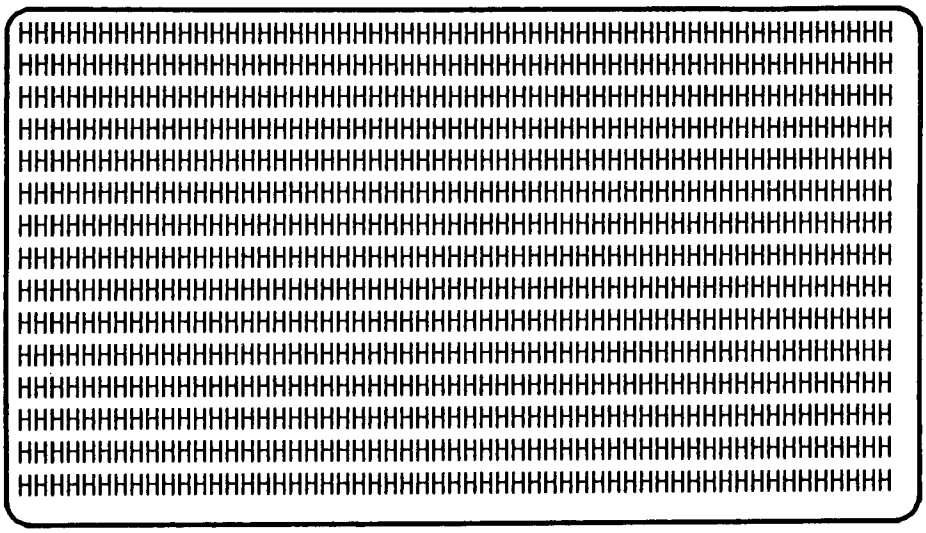
Subtest 08 Display page

This subtest confirms that the pages can be changed in order (page 0 to page 7) in the 40 x 25 character mode.



Subtest 09 "H" pattern display

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



Subtest 10 Special attribute test

This subtest displays as follows:

```
[ Speed/CRT/Caps/Num/Scroll 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)
   (5) Press [Scroll lock ] key! ...Scroll (on/off)
   (6) Press [ Fn + End ]  key!  ...CRT (on)
   (7) Press [ Fn + Home ] key!  ...CRT (off)
   (8) Press [ Fn + → ] key!  ...FONT change test


Press [ENTER] KEY
```

3.8 FLOPPY DISK TEST

> ***CAUTION***
>
> Before running the floppy disk test, prepare a formatted work disk and remove the diagnostics disk. Then insert the work disk into the FDD. Because the contents of the floppy disk will be erased.

OPERATION

1. When you select the floppy disk test of the DIAGNOSTIC TEST MENU, the following message will appear under the DIAGNOSTIC TEST MENU.

   Test drive number select (1:FDD1,2:FDD2,0:FDD1&2) ?

2. Select the test drive number, then press the Enter. The following message will appear.

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

3. Select the media type of the floppy disk to be tested, then press the Enter. The following message will appear.

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

4. You can select the start track number of the floppy disk test.
   When pressing the Enter only, the start track number will be zero.
   If you desire, select the start track number. Then the subtest menu of the floppy disk test will appear.

5. During the floppy disk test, the message shown below will appear. The **ADDRESS** number indicates that the first **XX** shows a cylinder number, the third **X** shows a head number, and the last **XX** shows a sector number.
   The **STATUS** number indicates that the the first **X** shows a drive number and the last **XX** shows an error status code.

```
FLOPPY DISK                              XXXXXXX

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

CONTENTS

Subtest 01 Sequential read

This test performs the CRC (cyclic redundancy check) with a continuous read operation of all tracks on a floppy disk.
2D (Double-sided, double-density): Track 0 to 39.
2DD (Double-sided, double-density, double-track) and 2HD (Double-sided, high-density, double-track): Track 0 to 79.
The start track can be specified at the previous stage.

Subtest 02 Sequential read/write

This test writes data to all tracks (as defined above) continuously and then reads the data out and compares it with the original data.
(The data pattern is B5ADADH repeated.)

Subtest 03 Random address/data

This test writes random data to random address on all tracks (as defined in subtest 01) and then reads the data out and compares it with the original data.

Subtest 04 Write specified address

This test writes the specified data on the specified address that you enter from the keyboard.

Subtest 05 Read specified address

This test performs read operation on the specified address that you enter from the keyboard.

3.9 PRINTER TEST

> ***CAUTION***
>
> A printer (IBM compatible) must be connected to the system in order to execute the test. Confirm that the A-B-PRT switch is set to PRT position.

CONTENTS

Subtest 01 Ripple pattern

This subtest prints characters for code 20H through 7EH line by line while shifting one character to the right at the beginning of each new line.

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

Subtest 02 Function

This subtest prints out various print type as 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 EMPASIZED PRINT.
5.  THIS LINE SHOWS DOUBLE STRIKE PRINT.
6.  ALL CHARACTERS PRINT
 !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmn
opqrstuvwxyz{|}~
```

Subtest 03 Wraparound

NOTE: A printer wraparound connector is necessary for executing this test. Wiring diagram of the printer wraparound connector is described in the part 3.25.

The data, control, and status lines will be checked with the printer wraparound connector.

OPERATION

Subtest 01 and 02

1. When you select the subtest 01 or 02, the following message will appear.

   Select the channel number (1-3) ?

   Select the printer channel number, then type in the number. The T5100 supports three printer channels.

2. After pressing the Enter, the subtest is executed.

Subtest 03

1. When you select this subtest, the following message will appear.

   Select the channel number (1-3) ?

   Select the printer channel number, then type in the number. The T5100 supports three printer channels.

2. After pressing the Enter, the following message will appear.

   [[[Change DIPSW-4 = ON]]] ?

3. Turn the DIP switch-4 ON, then press the Enter. The subtest is executed. Setting the DIP switch-4 ON changes the printer port to input/output mode.

4. Set the DIP switch-4 to the original position after the subtest is completed.

3.10 ASYNC TEST

In subtest 01 to subtest 05, data transmission is done with the following format:

Speed: 9600 BPS
Data 8 bits and one parity bit (EVEN)
One stop bit
Data pattern: 20H to 7EH

Subtest 01 Wrap around (channel 1)

NOTE: The RS232C wraparound connector must be connected to channel 1 to execute this test. The wiring diagram of the RS232C wraparound connector is described in part 3.25.

A data send/receive test is performed with the wraparound connector for the channel 1.

Subtest 02 Wrap around (channel 2)

The same test as the subtest 01 is performed for the channel 2.

Subtest 03 Point to point (send)

NOTE: This subtest must be executed in condition that two machines are connected with the RS232C direct cable and one side should be set as 'send' and the other set as 'receive'. The wiring diagram of the RS232C direct cable is described in part 3.25. The subtest 03 executed in one side and the subtest 04 executed in the other will check the communication capability as follows:

A block of data (20H to 7EH) is sent from one side to the other, and then returned back. The returned data is compared with the original one.
This test is used to check whether the returned data are same as the original ones.

Subtest 04 Point to point (receive)

This subtest is used with the subtest 03 as described above.

Subtest 05 300/1200 BPS card modem loopback

NOTE: If there is no modem card in the system, this test can not be executed.

This subtest is used to check whether the data to be sent from the modem card to the RS232C line is correct or not. This can be done with the loopback function inside the modem card.

Subtest 06 Card modem on-line test

NOTE: This test requires two machines which are connected to the PBX (Private Branch Exchange). One side is set as 'send' and the other set as 'receive'. When both sides are ready, you can start the test.

In this subtest, data are sent from the 'send' side to the 'receive' side through the PBX. This subtest is used to check whether data transmission through a telephone line is done properly or not.

Subtest 07 Dial tester test

NOTE: To execute this subtest, a dial tester must be connected to the system.

This subtest is carried out by sending the pulse dial and tone dial twice automatically.

[Pulse dial]: "1-2-3-4-5-6-7-8-9-0-1-2"
[Tone dial]: "1-2-3-4-5-6-7-8-9-*-0-#"

3.11 HARD DISK TEST

> ***CAUTION***
>
> The contents of the hard disk will be erased when subtest 02, 03, 04, 06, 08 and 09 is run. Before running the test, transfer the contents of the hard disk on the floppy disk. This can be done with the MS-DOS BACKUP command. After the test, enter the MS-DOS FDISK command, which will set the partition. Then enter the MS-DOS FORMAT command. (See the MS-DOS manual for details.)

OPERATION

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

   Test drive number select (1:HDD1,2:HDD2,0:HDD1&2) ?

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

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

3. This message is used to select whether to do retry operation or not when the hard disk controller detectes an error. Select yes or no and press the Enter. The following message will appear.

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

4. This message is used to select whether to do dump operation or not when data compare error is detected. Select yes or no and press the Enter. The following message will appear.

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

5. This message is used to select whether to display the detail status on the screen or not. The detail status are described in section 3.16. Select yes or no and press the Enter.

6. During the hard disk test, the message shown below will appear. The **ADDRESS** number indicates that the first **XXX** shows a cylinder number, the fourth **X** shows a head number, and the last **XX** shows a sector number. The **STATUS** number indicates that the first **X** shows a drive number and the last **XX** shows an error status code.

```
HARD DISK TEST                          XXXXXXX

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

CONTENTS

Subtest 01 Sequential read (CYL.0-804,CYL.804-0)

This subtest performs forward reading of contents from track 0 to track 804 and then performs reverse reading of the contents from track 804 to track 0.

Subtest 02 Address uniquence

1. Selecting this subtest, the following message will appear.

```
Read sequential select ?

   1  :  Forward sequential
   2  :  Reverse sequential
   3  :  Random
```

2. Select one of the above and press the Enter.

This subtest writes the address data that is different sector by sector at each track, then reads and compares it to the original data.
This test is done for all tracks.

Subtest 03 Random address/data

This subtest writes random data to random addresses (cylinder, head, sector) and then reads the data out and compares it to the original data.

Subtest 04 Cross talk & peak shift

This subtest writes the eight types of worst pattern data (shown below) to cylinders then reads the data while shifting cylinder by cylinder.

Worst pattern data
1. B5ADAD .....
2. 4A5252 .....
3. EB6DB6 .....
4. 149249 .....
5. 63B63B .....
6. 9C49C4 .....
7. 2DB6DB .....
8. D24924 .....

Subtest 05 Write/Read/Compare (CE)

This subtest writes B5ADAD worst pattern data to the CE cylinder and then reads the data out and compares it with the original data.

Subtest 06 Write specified address

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

Subtest 07 Read specified address

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

Subtest 08 ECC circuit (CE cylinder)

This subtest checks the ECC (Error check and correction) circuit functions to a specified cylinder and head.

Subtest 09 Sequential write

This subtest writes specified data of the two bytes to all cylinder.

3.12 REAL TIMER TEST

Subtest 01 Real time

A new date and time can be input during this subtest when the current date and time are displayed. Operations for the test are as follows.

1. Selecting the subtest, the following message will appear.

```
REAL TIME TEST                              901000

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

   Enter new date:

PRESS [ENTER] KEY TO EXIT TEST
```

2. If current date is not correct, input the current new date. Press the Enter, the **Enter new time:** message will appear.

3. If current time is not correct, input the current new time. Press the Enter, return to the subtest menu of the REAL TIME TEST.

Subtest 02 Backup memory

This subtest writes data (FFH, AAH, 55H, 00H) to 64 bytes of the backup memory, and then reads and compares it with the original data.

Subtest 03 Real time carry

CAUTION

When this subtest is executed, the current date and time is erased.

This subtest checks whether the real time clock increments the time displayed correctly (month, day, year, hour, minute, second).

3.13 NDP TEST

> ***CAUTION***
>
> This test cannot be run if there is no NDP mounted on the system board.

Subtest 01 NDP test

This subtest checks the control word, status word, bus, and addition/multiplication functions.

3.14 EXPANSION UNIT TEST

NOTE: If there is no expansion unit connected to the system, this test cannot be executed.

Subtest 01 Box wrap around (8 bits bus)

NOTE: As this subtest required a special tool to be executed, it cannot be carried out here.

Subtest 02 Box mono video ram

NOTE: If there is no monochrome display card in the expansion unit, this test cannot be executed.

This subtest writes data (FF, AA, 55, 00H) into the monochrome display memory (B0000H to B0F9FH), then reads the data out and compares it with the original data.

Subtest 03 Wrap around test (16 bit bus)

NOTE: As this subtest requires a special tool to be executed, it cannot be carried out here.

3.15 ERROR CODE AND ERROR STATUS NAMES

Table 3-4 lists the error code and error status names.

TABLE 3-4 Error Code and Error Status Names

DEVICE NAME	ERROR CODE	ERROR STATUS NAME
EVERYTHING	FF	Compare Error
SYSTEM	01	ROM Checksum Error
MEMORY	01	Parity Error
	02	Protected Mode Not Change Error
FDD	01	Bad Command
	02	Address Mark Not Found
	03	Write Protected
	04	Record Not Found
	06	Media Removed On Dual Attach Card
	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 (Not Ready)
	EE	Write Buffer Error
RS232C	01	DSR Off Time Out
	02	CTS Off Time Out
	04	RX Empty 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)
PRINTER	01	Time Out
	08	Fault
	10	Select Line
	20	Out Of Paper
	40	Power Off
	80	Busy Line

TABLE 3-4 Error Code and Error Status Names (continued)

DEVICE NAME	ERROR CODE	ERROR STATUS NAME
HDD	01	Bad Command Error
	02	Bad Address Mark
	04	Record Not Found
	05	HDC Not Reset
	07	Drive Not Initialize
	09	DMA Boundary Error
	0A	Bad Sector Error
	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
	F0	Not Sense Error (HW.code = FF)
NDP	01	No Co-processor
	02	Control Word Error
	03	Status Word Error
	04	Bus Error
	05	Addition Error
	06	Multiply Error

3.16 HARD DISK TEST DETAIL STATUS

When an error occurs on the hard disk test, the following message will appear.

HDC status = XXXXXXXX

Detailed status of the hard disk test error is shown on the screen by eight-unit number. The first **XXXX** is error status and the last **XXXX** is not used.
Error status is composed of 2 bytes; the first byte shows the contents of the HDC status register in hexadecimal form and the other the error register of the HDC.
These contents are described in the table 3-5 and 3-6.

TABLE 3-5 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 head disk drive heads are not settled over a track. "1" ... The hard disk drive head s 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" ... Otherwise "1" ... Correctable data error is corrected.
1	IDX (index)	"0" ... Otherwise "1" ... Index is sensed.
0	ERR (error)	"0" ... Otherwise "1" ... The previous command was terminated with some error.

TABLE 3-6 Error Register Contents

BIT	NAME	DESCRIPTION
7	BBK (bad block mark)	"0" ... Otherwise "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" ... There is ID field in the requested sector. "1" ... There was no ID field in the requested sector.
3		Not used.
2	ABRT (abort)	"0" ... Otherwise "1" ... Illegal command error or a drive status error occurs.
1	TK0 (track 0)	"0" ... The hard disk has found track 0 during a recalibrate command. "1" ... The hard disk could not find track 0 during a recalibrate command.
0		Not used.

3.17 HARD DISK FORMAT

There are two types of hard disk formatting:

1. Physical formatting
2. Logical formatting

This program is for physical formatting of the hard disk; it can execute the following items.

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

> ***CAUTION***
>
> The contents of the hard disk will be erased when this program is run. Before running the program, transfer the contents of the hard disk on to a floppy disk. This can be done with the MS-DOS BACKUP command. (See the MS-DOS manual for details.)

3.17.1 Program description

1. **All track FORMAT** (Execution time: 16 minutes)
   Performs physical formatting of hard disk in the manner shown below.

Sector sequences:	3
Cylinders:	0 to 804
Heads:	0 to 3
Sectors:	1 to 26
Sector length:	512 bytes per sector
Bad track:	MAX. 40 tracks

2. **Good track FORMAT** (Execution time: 1 second)
   Executes the formatting of a specified cylinder and track as a good track.

3. **Bad track FORMAT** (Execution time: 1 second)
   Executes the formatting of a specified cylinder and track as a bad track.

4. **Bad track CHECK** (Execution time: 90 seconds)
   Checks for bad tracks by performing a read operation for all tracks on the hard disk; a list of bad tracks is then displayed.

3.17.2 Operations

> ***CAUTION***
>
> After physical formatting is finished, enter the MS-DOS FDISK command, which will set the partition. Then enter the MS-DOS FORMAT command. (See the MS-DOS manual for details.)

1. After pressing 2 and Enter in the DIAGNOSTICS MENU, the following display will appear.

```
DIAGNOSTIC - HARD DISK FORMAT[26Stype]: V1.00
   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** Selection

   (1) When **All track FORMAT** (1) is selected, the following message will appear.

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

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

   Interleave number (3/1-3) ?

   (3) Select an interleave number. (Usually select 3.) Type the number and press Enter. The following display will appear.

```
[HDD TYPE] : CYLINDER   = XXX
[HDD TYPE] : HEAD       = X
[HDD TYPE] : SECTOR     = XX


[WARNING : Current DISK data will be
         completely destroyed]

Press [Bad track number (CCCH) key ?
                              [[cylinder,head = XXX X]]
```

(4) After pressing the Enter, the **[[cylinder, head = XXX X]]** message will appear; then all cylinders of the hard disk are formatted and checked.

(5) After formatting the hard disk, the **Format complete** message will then appear.

(6) Press the Enter to return to the HARD DISK FORMAT menu.

3. **Good track FORMAT** or **Bad track FORMAT** Selection

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

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

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

Interleave number (3/1-3) ?

(3) Select an interleave number. (Usually select 3.) Type the number and press Enter. The following message will appear.

```
[HDD TYPE] : CYLINDER   = XXX
[HDD TYPE] : HEAD       = X
[HDD TYPE] : SECTOR     = XX

Press [track number (CCCH)] key ?
```

(4) Type a track number (four digits) and press Enter. (The first three digits are the cylinder number and the last digit is the head number.) This executes the formatting of good tracks or bad tracks.

NOTE: This program can format only one track per operation. If it is desired to format several good tracks or bad tracks, repeat the operation as many times as necessary.

(5) After formatting the track of the hard disk, the **Format complete** message will appear.

(6) Press the Enter to return to the HARD DISK FORMAT menu.

4. **Bad track CHECK** Selection

(1) When **Bad track CHECK** is selected, the following message will appear.

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

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

Interleave number (3/1-3) ?

(3) Select an interleave number. (Usually select 3.) Type the number and press Enter.
When the following message appears, and bad tracks of the hard disk are checked.

```
[HDD TYPE] : CYLINDER   = XXX
[HDD TYPE] : HEAD       = X
[HDD TYPE] : SECTOR     = XX


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

(4) After checking the bad tracks of the hard disk, the **Format complete** message will appear.

(5) Press the Enter to return to the HARD DISK FORMAT menu.

3.18 SEEK TO LANDING ZONE (HDD)

3.18.1 Program description

When moving the unit, if an HDD head hits a data area severely, the data will be lost. In order to protect the data, this program moves HDD heads to safe areas. These areas called "landing zone."

NOTE: The built-in hard disk drive controls automatically the heads to move to the landing zone at power down.

3.18.2 Operations

1. After pressing "3" and Enter in the DIAGNOSTICS MENU, the program is automatically executed and the following message will appear.

```
Landing seek completed. (HDD#1)
Press [enter] key.
```

2. After pressing Enter, the DIAGNOSTICS MENU appers.

3.19 HEAD CLEANING

3.19.1 Program description

This program executes head loading and seek/read operations for head cleaning. A cleaning kit is necessary for cleaning the FDD head.

3.19.2 Operations

1. After pressing "4" and Enter in the DIAGNOSTICS MENU, the following message will appear.

```
HEAD CLEANING

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

2. After above message appears, remove the Diagnostics disk, insert the cleaning disk, and press any key.

3. When the following message appears, FDD head cleaning will begin.

```
HEAD CLEANING

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

4. When cleaning is finished, the display automatically returns to the DIAGNOSTICS MENU.

3.20 LOG UTILITIES

3.20.1 Program description

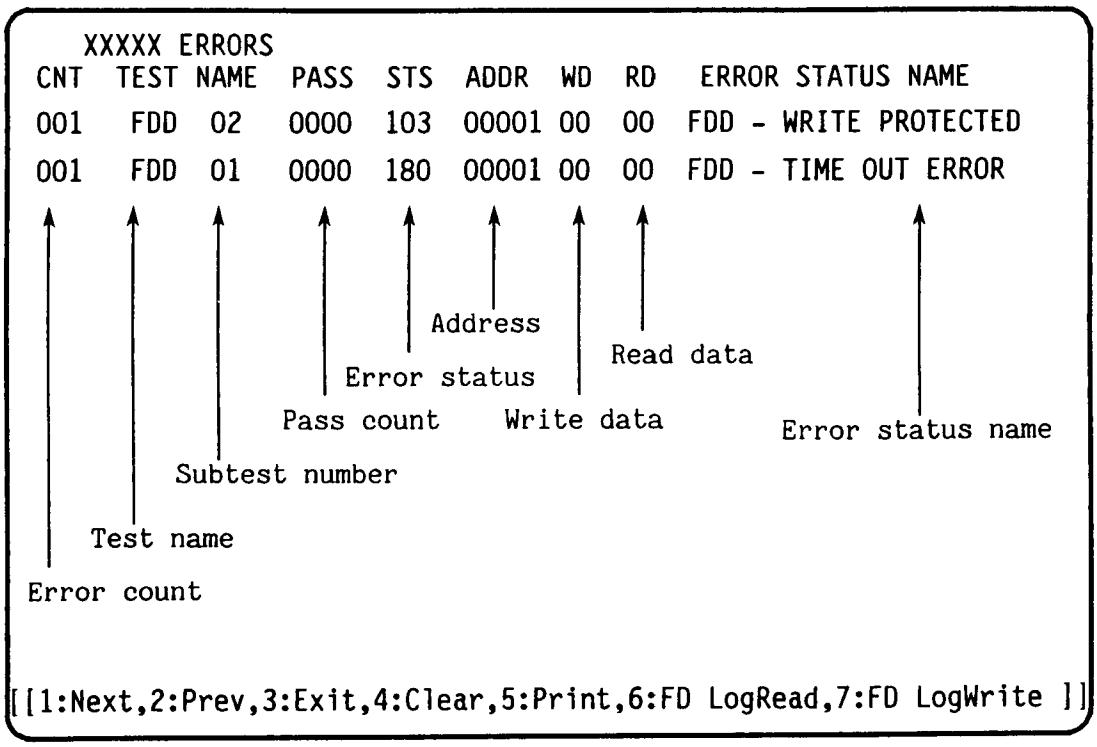
This program logs error information generated, while a test is in progress; the information is stored in the RAM.
However if the POWER switch is turned off the error information will be lost. The error information itself is displayed as the following.

1. Error count (CNT)
2. Test name (TEST)
3. Subtest number (NAME)
4. Pass count (PASS)
5. Error status (STS)
6. Address (FDD, HDD 1 or memory; ADDR)
7. Write data (WD)
8. Read data (RD)
9. Error status name

This program can store data on a floppy disk or output information to a printer.

3.20.2 Operations

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



2. Error information displayed on the screen can be manipulated with the following key operation.

   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 DIAGNOSTIC MENU.
   The 4 key erases all error log information in RAM.
   The 5 key outputs error log information to a printer.
   The 6 key reads log information from a floppy disk.
   The 7 key writes log information to a floppy disk.

3.21 RUNNING TEST

3.21.1 Program description

This program automatically runs the following tests in sequence.

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

When running an FDD test, this system automatically decides whether there are one or two FDDs.

3.21.2 Operations

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

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

2. After pressing 6 and Enter in the DIAGNOSTIC MENU, the following message will appear.

   Printer wrap around test (Y/N) ?

3. Select whether to execute the printer wraparound test (Yes) or not (No). Type Y or N and press Enter key. (If Y is selected, a wraparound connector must be connected to the printer connector on the back of the unit.) The following message will appear.

   Async wrap around test (Y/N) ?

4. Select whether to execute the test (Yes) or not (No). Type Y or N and press Enter Key. (If Y is selected, an RS232C wraparound connector must be connected to the COMMS connector on the back of the unit.)

5. This program is repeated continuously. To stop the program, press Ctrl + Break key.

3.22 FDD UTILITIES

3.22.1 Program description

These programs format and copy floppy disks, and display dump list for both the FDD and the HDD.

1. **FORMAT**

> ***CAUTION***
>
> This program is for only floppy disk drive test. The program is different the MS-DOS FORMAT command.

This program can format floppy disk (5.25-inch/3.5-inch) as follows.

(1) **2D:** Double-sided, double-density, 48/67.5 TPI, MFM mode, 512 bytes, 9 sectors/track.
(2) **2DD:** Double-sided, double-density, double-track, 96/135 TPI, MFM mode, 512 bytes, 9 sectors/track.
(3) **2HD:** Double-sided, high-density, double-track, 96/135 TPI, MFM mode, 512 bytes, 18 sectors/track.

2. **COPY**

This program copies from sourse floppy disk to target floppy disk.

3. **DUMP**

This program displays the contents of floppy disks (both 3.5" and 5.25") and hard disk (designated sectors).

3.22.2 Operations

1. After pressing 7 and Enter key in the DIAGNOSTICS MENU, the following display will appear before program execution.

```
[FDD UTILITIES]

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

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

2. **FORMAT** Selection

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

```
DIAGNOSTICS - FORMAT(V1.00)
Drive number select (1:A, 2:B) ?
```

(2) Select a drive number. Type the number and the following message will then appear.

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

(3) Select a media-drive type number. Type the number and the message similar to the below will appear.

```
Warning : Disk data will be destroyed.

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

(4) Remove the diagnostics disk from the FDD and insert the work disk; press any key.
The following message will appear; formatting is then 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 type 1 and press Enter key, the display will return to the message in (3) above. If you type 2 the display will return to the DIAGNOSTICS MENU.

3. **COPY** Selection

(1) When **COPY** is selected, the following message will appear.

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

(2) Select a media/drive type number. Type the number. The following message will then appear.

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

(3) Remove the diagnostics disk from the FDD and insert the source disk; press any key. The following message will appear, then start the copy to memory.

```
[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 and insert the work disk (formatted); press any key. The **[[track, head = XXX X]]** message will appear, then start the copy to work disk. When coping cannot be done with one operation, message (2) is displayed again. Repeat the operation. After the floppy disk has been copied, the following message will appear.

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

(5) If you type 1 the display will return to the message in (1) above. If you type 2 the display will return to the DIAGNOSTICS MENU.

4. **DUMP** Selection

(1) When **DUMP** is selected, the following message will appear.

```
[HDD&FLOPPY DISK DATA DUMP]
format type select (0:2DD,1:2D,2:2HD,3:HDD) ?
```

(2) Select a format type number. Type the number. If 3 is selected, the dump lists for the hard disk are displayed automatically.

0: Display a dump list for a floppy disk (2DD)
1: Display a dump list for a floppy disk (2D).
2: Display 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. If 3 is selected, the dump list will appear.

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

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

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

(5) Remove the diagnostics disk from the FDD and insert a source disk; press any key. The **Track number ??** message will then appear. Type the track number and press Enter.

(6) The **Head number ?** message will then appear. Type the head number and press Enter.

(7) The **Sector number ??** message will then appear. Type the sector number and press Enter. The dump list for the floppy disk will be displayed.

(8) After a dump list appears on the screen, the **Press number key (1:up,2:down,3:end) ?** message will appear.

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

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

(9) If you type 1 the display will return to the message shown after (4) above. If you type 2 the display will return to the DIAGNOSTICS MENU.

3.23 SYSTEM CONFIGURATION

3.23.1 Program description

This program displays the following system configuration.

1. BIOS ROM version
2. Base memory size
3. Display type
4. A number of floppy disk drives
5. A number of async ports
6. A number of hard disk drives
7. A number of printer ports
8. Extended memory size
9. Co-processor presents or not

3.23.2 Operations

After pressing 8 and Enter key to select from the DIAGNOSTICS MENU, the following display will appear.

```
SYSTEM CONFIGURATION

  *- BIOS ROM VERSION = VX.XX
  *- 640KB MEMORY
  *- PLASMA DISPLAY
  *- 1 FLOPPY DISK DRIVE(S)
  *- 1 ASYNC ADAPTER
  *- 1 HARD DISK DRIVE(S)
  *- 1 PRINTER ADAPTER
  *- 0000KB EXTENDED MEMORY
  *- 0 MATH CO-PROCESSOR

PRESS [ENTER] KEY
```

Press Enter key to return to the DIAGNOSTICS MENU.

3.24 SETUP

3.24.1 Program description

This program displays the current system setup information as listed below, and it can be changed automatically or manually.

1. Hard disk type
2. Memory size (system memory, extended memory, expanded memory)
3. Plasma font type (single font, double font)
4. Plasma font set (Standard font, North European font)
5. Plasma gray scale
6. Display card
7. Display mode:

3.24.2 Operations

1. Pressing 0 and Enter at the DIAGNOSTICS MENU, the following display will appear.

```
[[ System setup ]]

 1.Hard disk drives  = 6 - Cyl=805,h=4,s/t=26,Cap=40MB
 2.Memory size
     System memory    = 640KB
     Extended memory  =   0MB
     Expanded memory  = 1MB+256KB
 3.Internal KB type  = 84 keys
 4.Plasma font type  = Single
 5.Plasma font set   = Standard
 6.Plasma gray scale = (Normal) Bright      (Intensity) Semi-bright
 7.Display card      = (Internal)EGA compatible (External)MDA or None
 8.Display mode      = Enhanced color display (High resolution) mode
    *EGA··· Enhanced Graphics Card      CGA···Color Graphics Card
     MDA···Monochrome Display Card

Do you change setup ? (Y/N)
```

NOTE: You may have a different setup menu on the screen than that shown above. The setup menu has been changed from the system which has the System BIOS of version 2.00 or later version. Refer to Appendix F of this manual for the details.

The values on this menu represent the system configuration stored in the battery backed-up memory.

Type N, then press Enter if the values properly reflect the actual system configuration. Type Y, then press Enter if you want to change the descriptions. Typing N, then pressing Enter skips the system setup and restarts execution of the power-on selftest. Typing Y, then pressing Enter key continues the system setup operation as described in step 2.

2. The following message will appear on the bottom of the screen.

```
Do you change manually ? (Y/N)
```

Typing N, then pressing Enter writes the values of the system setup menu that are display into the battery backed-up memory, then automatically returns you to the system setup menu. Confirm the new descriptions.

Typing Y, then pressing Enter starts the display of a series of messages that prompt you to select the values for the system setup.

3. The following message will appear.

```
[Hard disk setup]

  type  cyl  head sector/trackcapacity
    0: No drive
    6:  805    4       26       40MB
    7:  979    5       17       40MB
    8:  613    6       26       48MB
    9:  776    8       33      100MB

(1)Hard disk type = 6 ?
```

Type the corresponding number according to the message. Pressing Enter goes to step 4. The HDD which the T5100 supports in standard must be type 6 (native mode) or type 7 (translate mode).

4. The following message will appear.

```
[Memory size setup]

(2)Do you use memory only as extended memory ? (Y/N)
```

Typing Y, then pressing Enter makes sure that memory is used only as extended memory and is not used as expanded memory at all, and goes to step 6. Typing N, then pressing Enter makes sure that memory is used as expanded memory, and Enter goes to step 5.

5. After step 4, the following message will appear.

```
(3) Do you use a part of memory as fast ROM ? (Y/N)
```

Typing Y, then pressing Enter makes sure that the BIOS ROM's contents are copied to a part of expanded memory whose size is 128KB, and which is used as fast ROM.
Typing N, then pressing Enter makes sure that fast ROM's function is not used, and goes to step 7.

6. After step 5, the following message will prompt you to specify the size of extended memory on the memory board.

```
   0:    0MB
   1:  0.5MB
   2:    1MB

(4)Extended memory size = 00 ? [  MB]
   (Expanded memory size [256KB+  MB])
```

The expanded memory size is dependant on the extended memory size you specify. (i.e. expanded memory size = 1MB - extended memory size). Choose the number reflecting the size of extended memory you want. Pressing Enter goes to step 7.

7. After step 4 or 6, the following message prompts you to specify the internal keyboard type.

```
[Internal keyboard type setup]

   1:84  Keys
   2:101 Keys

(5) Internal keyboard type = 1 ?
```

Type 1 or 2. Notice that you type 1 on the keyboard except for the USA keyboard, otherwise some letters shown on the key top may be different from characters displayed on the screen. Then, pressing the Enter goes to step 8.

8. After step 7, the following message will prompt you to specify the plasma font type.

```
[Plasma font type setup]

   1: Single
   2: Double

(6)Plasma font type = 1 ?
```

Type 1 or 2. Then, pressing Enter goes to step 9.

9. After step 8, the following message will prompt you to specify the plasma font set.

```
[Plasma font set setup]

   1: Standard
   2: North European

(7)Plasma font set = 1 ?
```

Type 1 or 2. Then, pressing Enter goes to step 10.

10. After step 9, the following message will prompt you to specify the plasma gray scale.

```
[Plasma gray scale setup]

      (Normal)       (Intensity)

  1:   Bright        Semi-bright
  2: Semi-bright       Bright

(8)Plasma gray scale = 1 ?
```

Type 1 or 2. Then, pressing Enter goes to step 11.

11. After step 10, the following message will prompt you to specify the display card.

```
[Display card setup]

     (Internal)          (External)
  1:EGA compatible       MDA or None
  2:CGA compatible       MDA or None
  3:   Disable           CGA (40*25)
  4:   Disable           CGA (80*25)
  5:   Disable               MDA
  6:   Disable             Others
  7:  Reserved

  If 3 through 6, you have to disable Internal
  Display Card by DIP-SW after setup.

(9)Display card = 1 ?
```

Type the corresponding number according to the message. T5100 supports 1 or 2 in standard. If 3 through 6 are selected, you have to install an optional external display card and disable internal display card by DIP switch after setup. Typing 1 and pressing Enter goes to step 12. Typing 2 through 7 and pressing Enter goes to step 15.

12. After step 11, the following message prompts you to specify the display mode.

```
[Display mode setup]

   1: Color display (40*25) mode
   2: Color display (80*25) mode
   3: Enhanced color display (Emulation)mode
   4: Enhanced color display (High resolution) mode

(10)Display mode = 4 ?
```

Type the corresponding number according to the message. Pressing Enter goes to step 13.

13. After step 12, the following message will appear.

```
(11) Do you use MDA as external display card ? (Y/N)
```

Type Y or N. Typing Y and pressing Enter goes to step 13. Typing N and pressing Enter goes to step 13.

14. After step 13, the following message will appear.

```
(12) Do you use MDA as secondary ? (Y/N)
```

Type Y or N. Typing Y makes sure that MDA is secondary. Typing N makes sure that MDA is primary. Then, pressing Enter goes to step 15.

15. The series of setup messages is now complete. The screen displays the system setup menu described in step 1. Confirm that the values displayed accurately describe the system configuration you want. If the values are correct, type **n**, then press Enter to continue execution of the power-on selftest. If the values are incorrect, type Y, then press Enter and repeat the setup procedure starting with step 2.

3.25 WIRING DIAGRAM

1. Printer wraparound connector

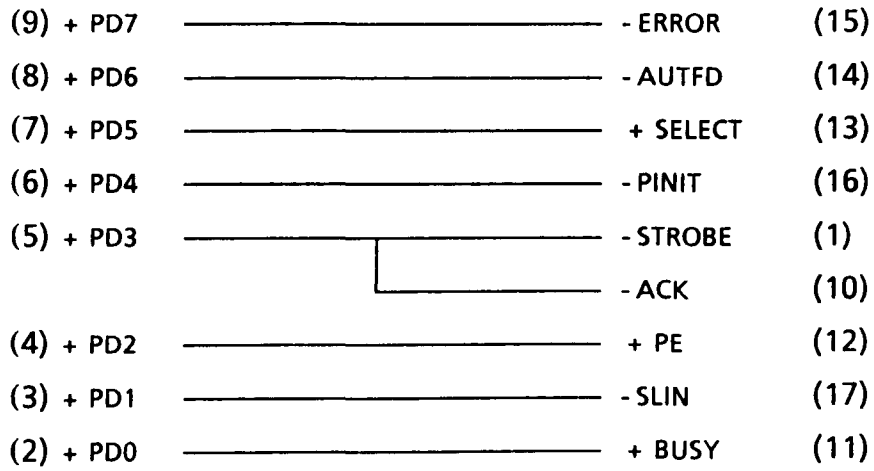


FIGURE 3-1 Printer Wraparound Connector

2. RS232C Wraparound connector

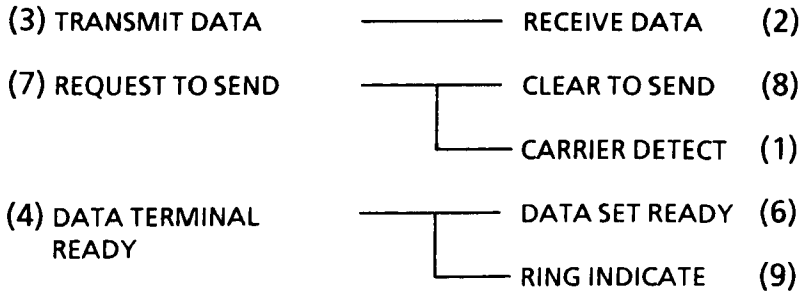


FIGURE 3-2 RS232C Wraparound Connector

3. RS232C direct cable (9-pin to 9-pin)

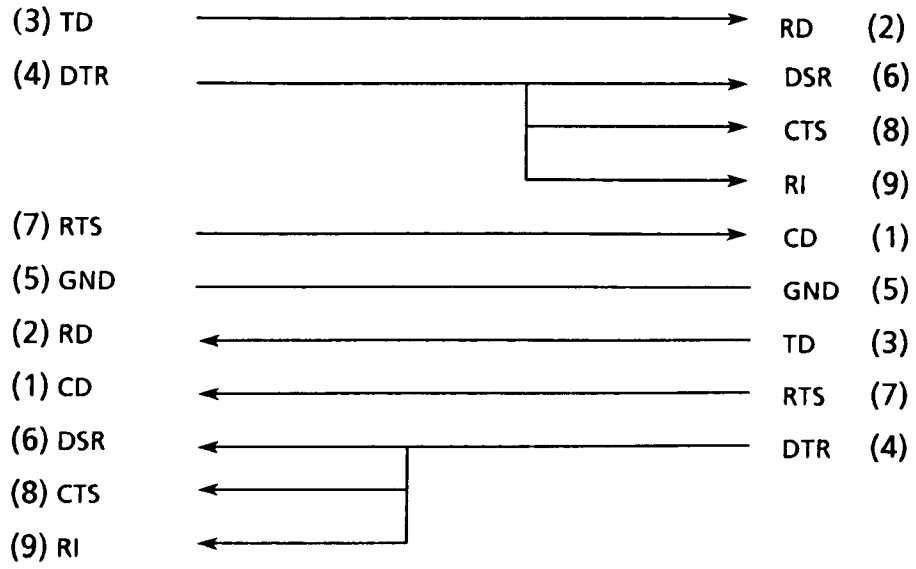


FIGURE 3-3 RS232C Direct Cable (9-pin to 9-pin)

4. RS232C direct cable (9-pin to 25-pin)

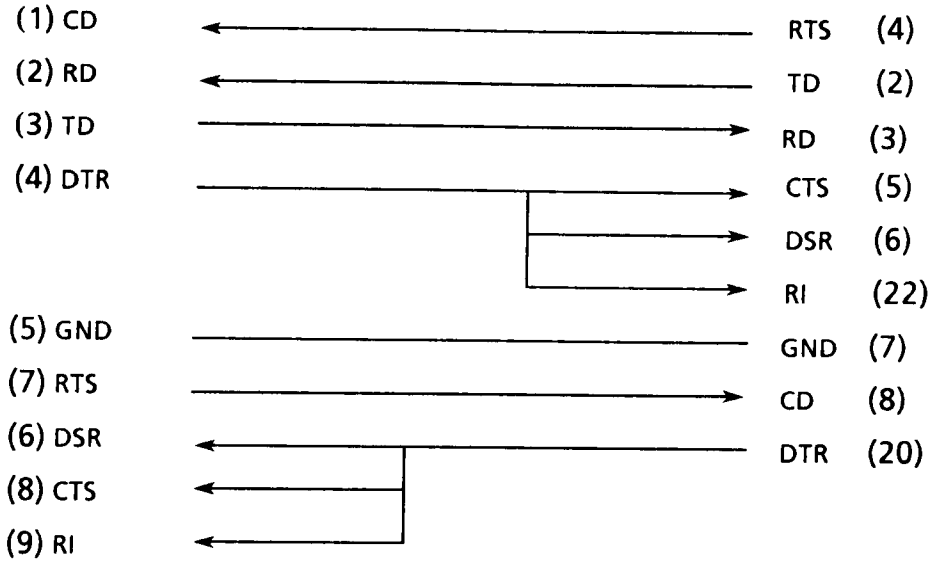


FIGURE 3-4 RS232C Direct Cable (9-pin to 25-pin)

4.1 GENERAL

This section gives a detailed description of the procedures for removing and replacing FRUs (field replaceable units).

FRUs are listed as follows:

1. Top cover
2. Keyboard
3. Lithium battery
4. PDP (plasma display panel) mask
5. PDP unit
6. Volume board
7. PDP cover
8. Power supply unit
9. Power supply cover
10. Cooling fan
11. Speaker
12. LED board
13. Handle
14. Cooling fan holder
15. Disk support
16. Plasma sensor
17. FDD (floppy disk drive)
18. HDD (hard disk drive)
19. AGS (advanced graphics subsystem) board
20. System board

The following points must be kept in mind:

1. The system should never be disassembled unless there is a problem (abnormal operation, etc.)
2. Only approved tools may be used.
3. After deciding the purpose of replacing the unit, and the procedures required, do not carry out any other procedures which are not absolutely necessary.
4. Be sure to turn the POWER switch off before beginning.
5. Be sure to disconnect the ac cord and all external cables from the system.
6. Follow the only fixed, standard procedures.
7. After replacing a unit, confirm that the system is operating normally.

Tools needed for unit replacement:

1. Phillips head screwdriver
2. Blade head screwdriver
3. Tweezers

4.2 REMOVING/REPLACING THE TOP COVER

1. Remove the ac power cord from the unit.
2. Turn the unit upside down and stand the handle (A).
3. Remove the five screws (B) and the two screws (C) if present.

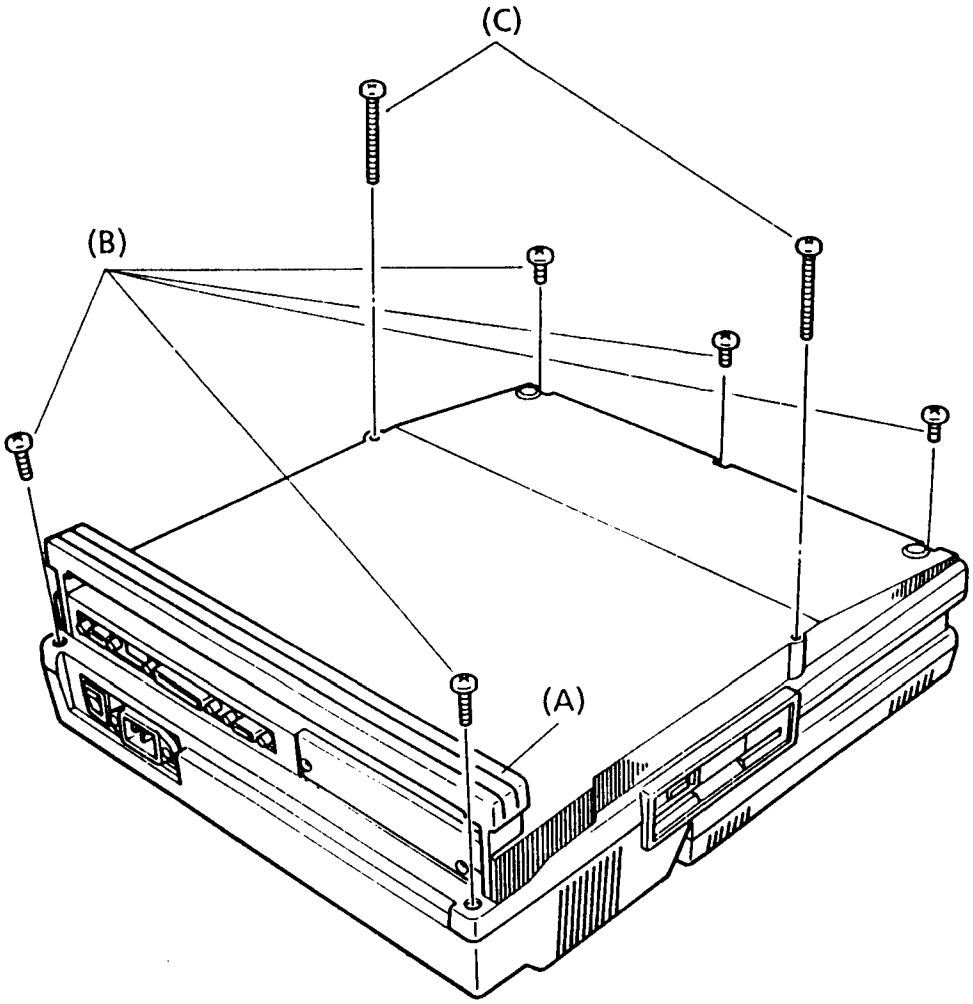


FIGURE 4-1 Removing the Screws from the Base

4. Turn the unit back over and open the plasma display.

5. Remove the PDP mask and PDP unit as directed in sections 4.4 and 4.5.

6. Remove the volume board and cable guide as directed in section 4.6.

7. Remove the ground wire (D) by removing the single screw (E) if present.

8. Take off the latches (F) and (G) of the top cover from the base and pass the cables (H) through the slit (I) of the top cover.

   NOTE: To avoid the latches be damaged, care should be taken when you take off the latches. There is no latches (F) when the screws (C) shown in figure 4-1 present.

9. Remove the top cover.

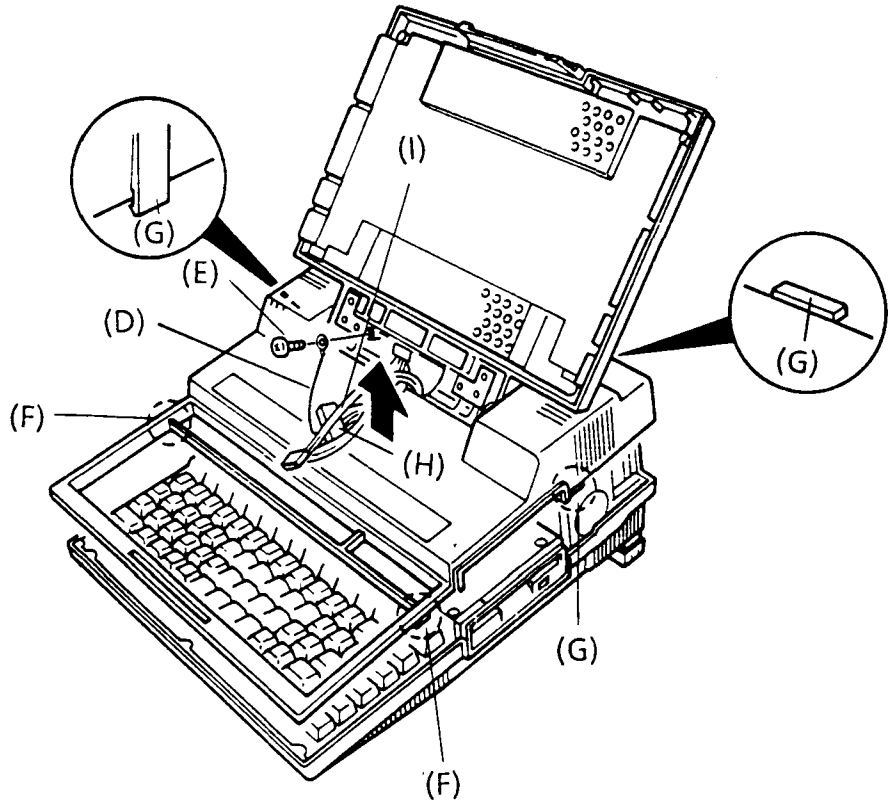


FIGURE 4-2 Removing the Top Cover

10. To install the top cover, follow the above procedures in reverse.

    NOTE: Confirm that the top cover is locked into the base with the five latches.

4.3 REMOVING/REPLACING THE KEYBOARD AND LITHIUM BATTERY

1. Remove the ac power cord from the unit.
2. Remove the five or seven screws from the base as directed in section 4.2.
3. Turn the unit back over and open the plasma display.
4. Take off the latches of the top cover and lift, then turn into the right and put it on the base (A).
5. Lift up the keyboard (B), then place it in front of the system.
6. Remove the two screws (C) if present and remove the aluminum plate (D).
7. To remove the keyboard, release the pressure plate (E) of the keyboard connector (F) to disconnect the keyboard cable (G) from the memory board (H).
8. To remove the lithium battery (I), disconnect the battery connector (J), then lift it up.

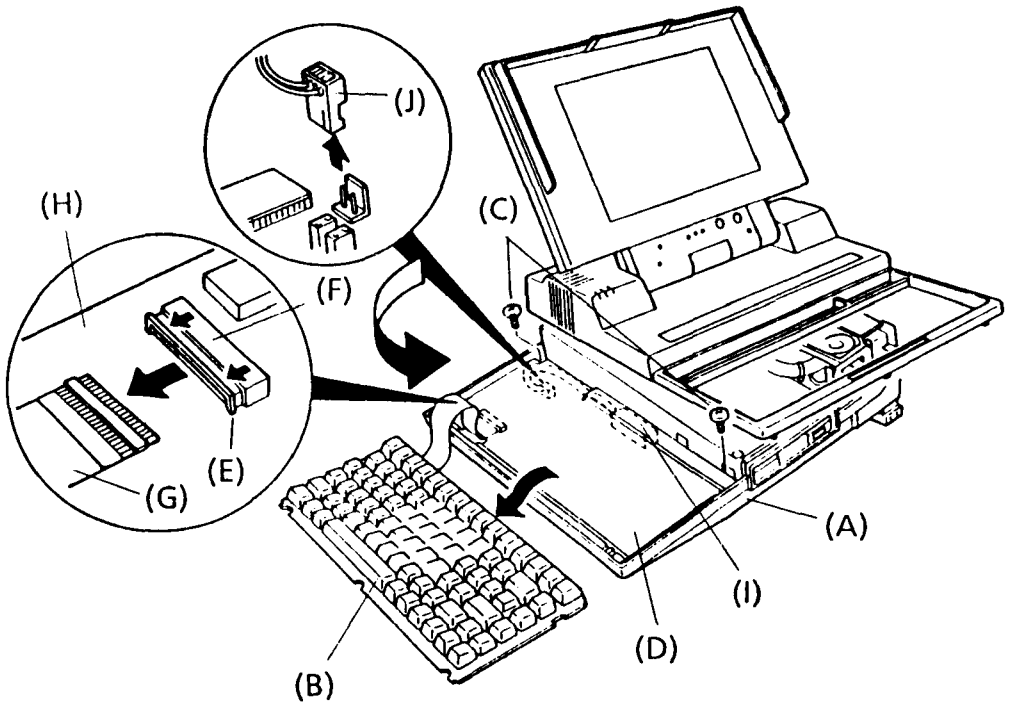


FIGURE 4-3 Removing the Keyboard and the Lithium Battery

9. To install the keyboard and the lithium battery, follow the above procedures in reverse.

NOTE: When the lithium battery is installed again, the following message will appear.

***** Error in CMOS. Bad battery *****
Check system. Then, press [F1] key.

Press F1 key and refer to the page 3-48 in the PART 3.

4.4 REMOVING/REPLACING THE PDP MASK

1. Remove the ac power cord from the unit.
2. Open the plasma display.
3. Using tweezers, peel off the label (A) and keep it in a clean place.
4. Remove the two screws (B), then remove the PDP mask (C) by pulling it up.

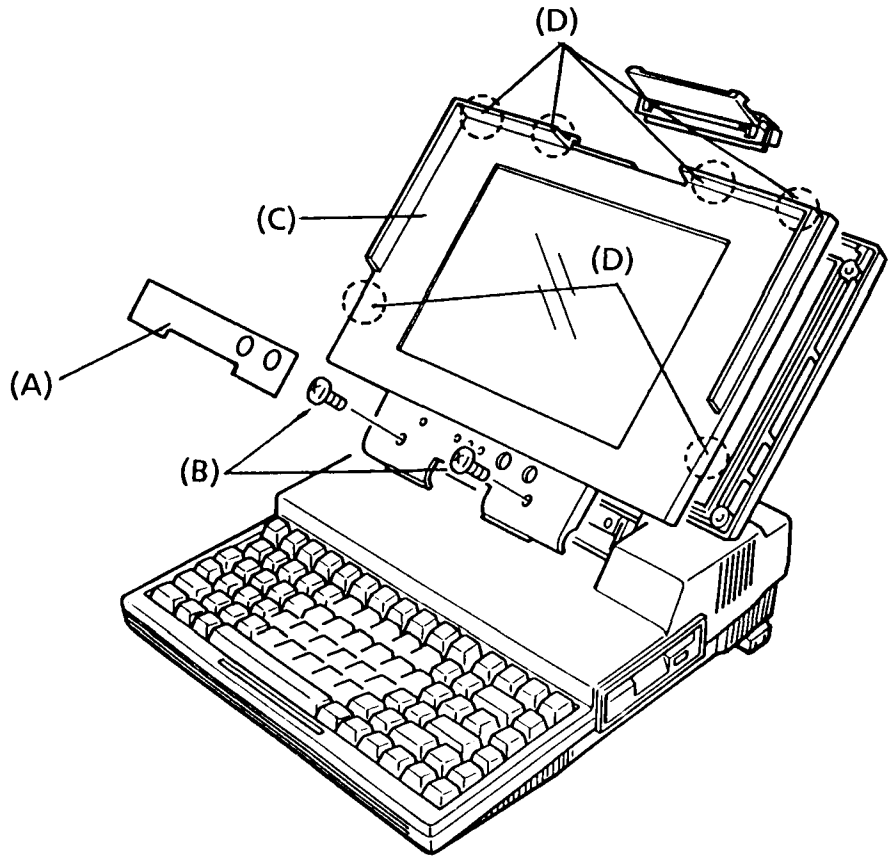


FIGURE 4-4 Removing the PDP Mask

5. To install the PDP mask, follow the above procedures in reverse.

NOTE: Confirm that the PDP mask is locked into the PDP cover with the six latches (D).

4.5 REMOVING/REPLACING THE PDP UNIT

1. Follow the steps described in section 4.4 and remove the PDP mask.

2. Remove the four screws (A).

3. Lift up the PDP unit (B), then gently put it on the keyboard.

4. Disconnect the three cables (C) from the plasma display board (D). In case (I), you must cut the band (E) before disconnecting the plasma display power cable (F). In case (II), remove the cable from the clip (G) with raising it up.
   NOTE: If you cut the band, should prepare the new band.

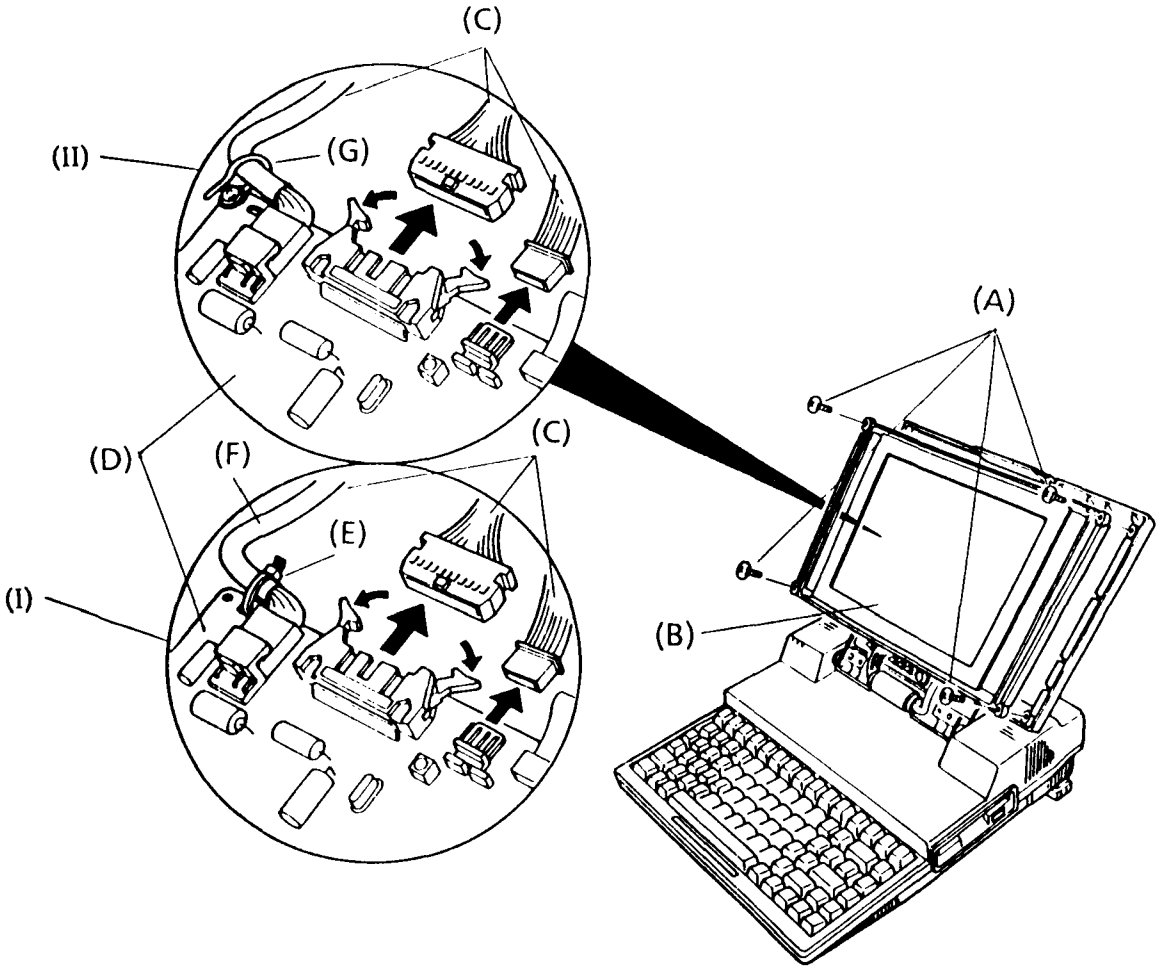


FIGURE 4-5 Removing the PDP Unit

5. To install the PDP unit, follow the above procedures in reverse.

NOTE: In case (I), remove the four screws (H), then lift up the plasma display board (I). Pass the new band through the hole (J) of the plasma display board, then fix the plasma display power cable.

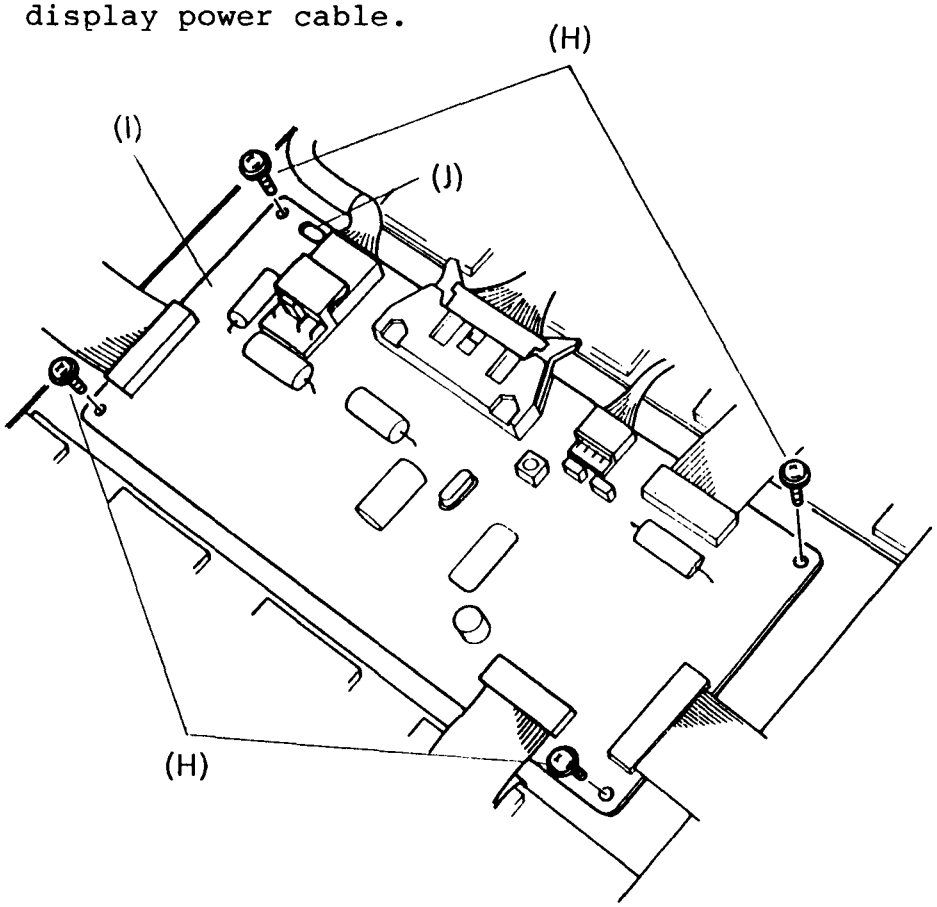


FIGURE 4-6 Setting the Plasma Display Power Cable

4.6 REMOVING/REPLACING THE VOLUME BOARD

1. Follow the steps described in sections 4.4 and 4.5, and remove the PDP unit.

2. Unlatch the latch (A), then remove the volume board (B) from the latch (C).

3. To remove the volume board, disconnect the cable (D).

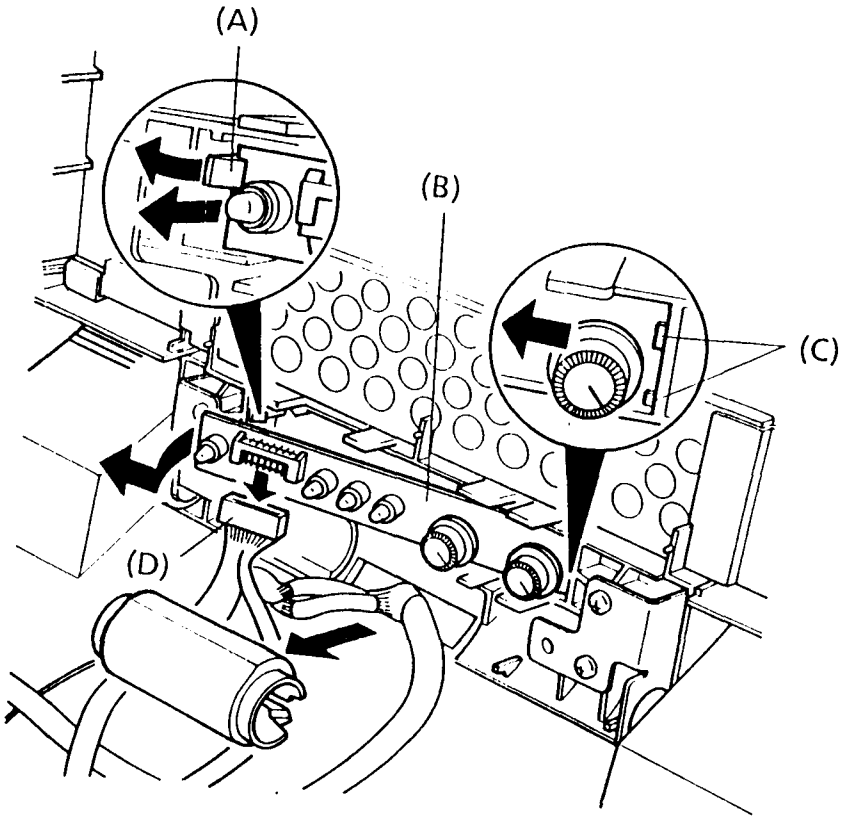


FIGURE 4-7 Removing the Volume Board and the Cable Guide

3. To install the volume board, follow the above procedures described in the previous page in reverse.

NOTE: When you pass the cables through the cable guide, be careful as follows:

(1) Put the plasma display power cable (C) to your right, and the volume board cable (D) and plasma display signal cable (E) to your left as shown in figure 4-8.

(2) Position the cable guide so that thicker part (F) comes to the upper side as shown in figure 4-9.

(3) Put the cable guide in the top cover, then place each cable in the two ditches (G) of the PDP cover assembly as shown in figure 4-8.

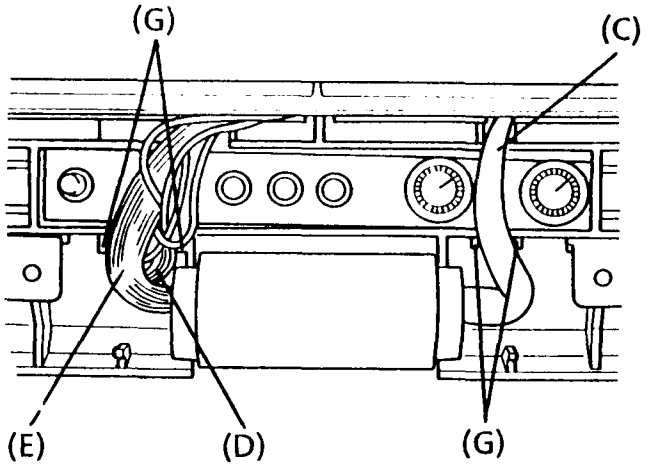


FIGURE 4-8 Cable Position

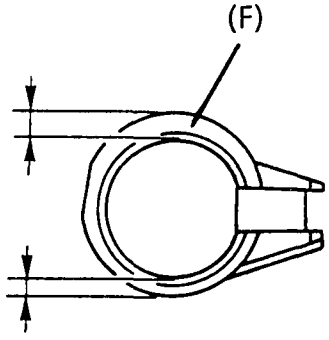


FIGURE 4-9 Cable Guide

4.7 REMOVING/REPLACING THE PDP COVER

1. Follow the steps described in sections 4.5 and 4.6, and remove the PDP unit and the volume board.

2. Remove the four screws (A) from the two hinges (B) and remove the ground wire (C) if present.

3. To remove the PDP cover (D), shift the two hinges to inside, then turn the PDP cover down and lift it up.

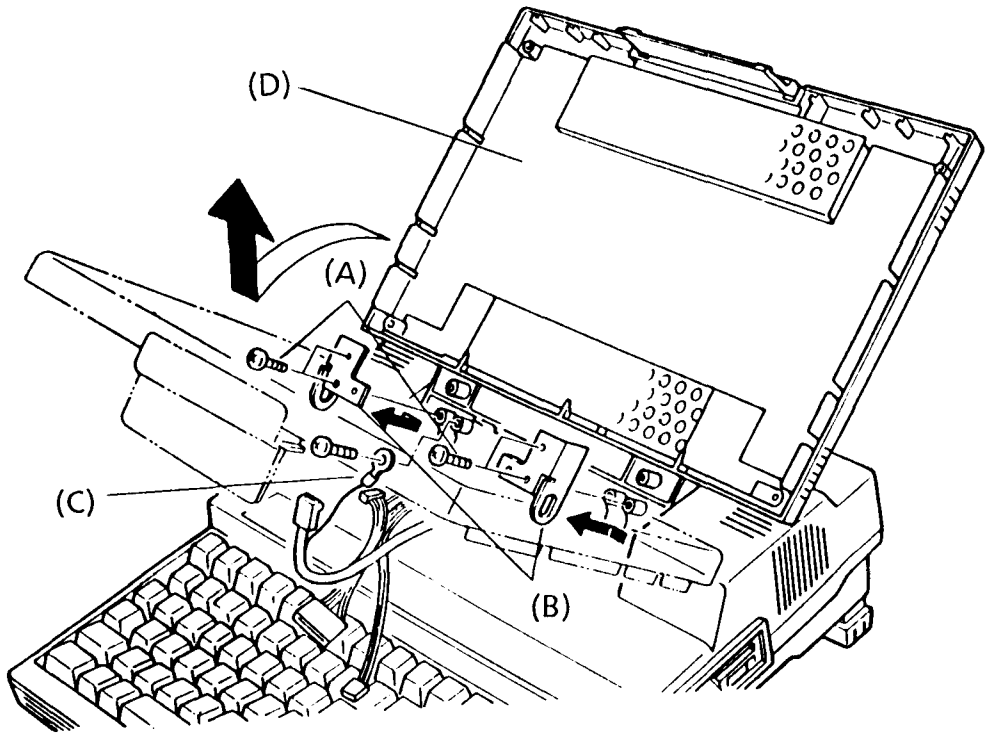


FIGURE 4-10 Removing the PDP Cover

4. To install the PDP cover, follow the above procedures in reverse.

4.8 REMOVING/REPLACING THE POWER SUPPLY UNIT

> ***WARNING***
>
> Dangerous high voltage is supplied to the power supply unit. Pay enough attention on handling. It takes few minutes after power off the discharge the electricity.

1. Follow the steps described in section 4.2 and remove the top cover.

2. Remove the speaker (A), disconnect the right cooling fan cable (B) from the power supply board (C), and remove the four screws (D).

3. To remove the power supply unit (E), lift up the power supply unit, then disconnect the power cable (F) from the system board (G).

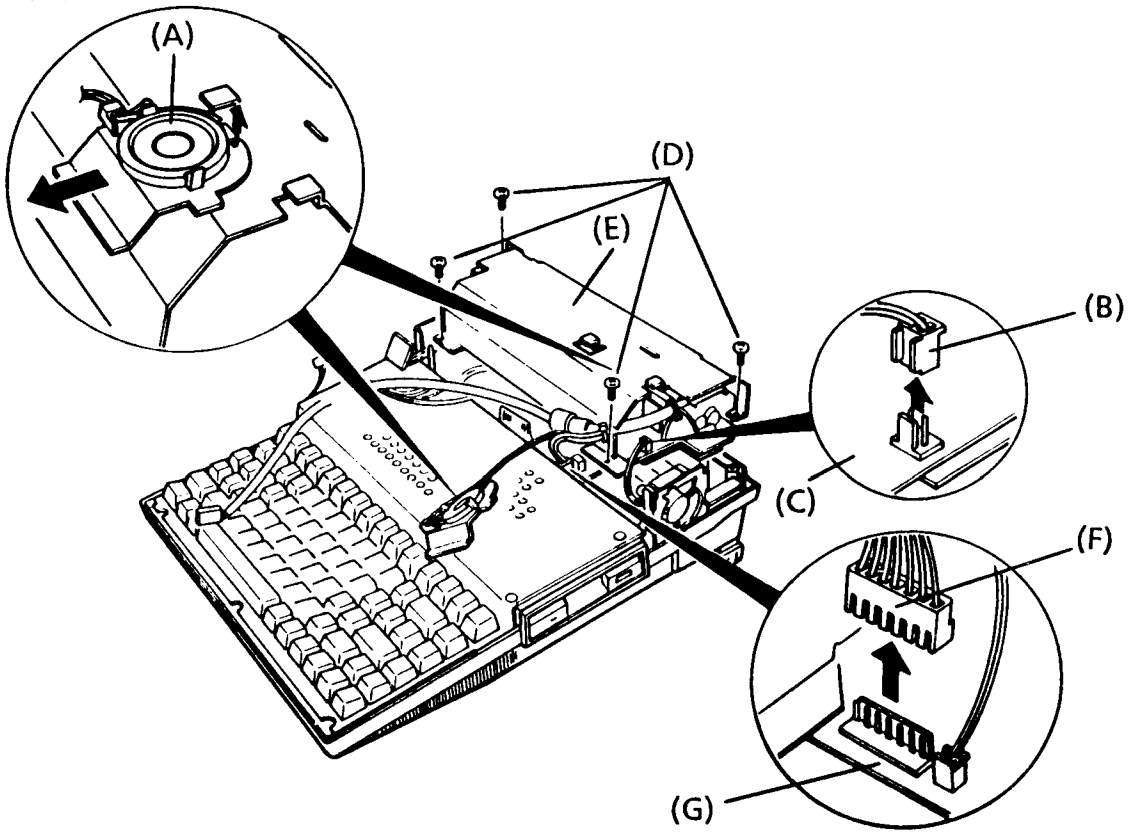


FIGURE 4-11 Removing the Power Supply Unit

4. To install the power supply unit, follow the above procedure in reverse.

4.9 REMOVING/REPLACING THE POWER SUPPLY COVER

1. Follow the steps described in sections 4.2 and 4.8, and remove the power supply unit.

2. To remove the power supply cover (A), remove the single screw (B), then slide the power supply cover to the direction that is shown with the arrow.

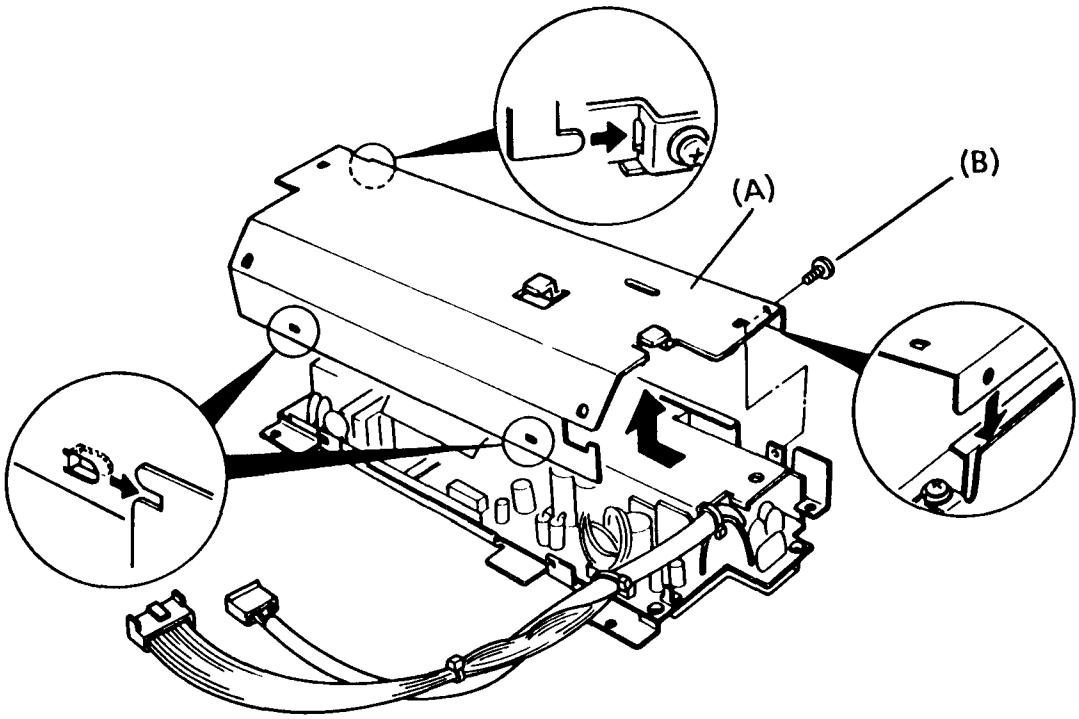


FIGURE 4-12 Removing the Power Supply Cover

3. To install the power supply cover, follow the above procedures in reverse.

4.10 REMOVING/REPLACING THE COOLING FANS, THE LED BOARD AND THE SPEAKER

1. Follow the steps described in sections 4.2 and 4.8, and remove the power supply unit.

2. To remove the right cooling fan (A), unlatch the latch (B) of the cooling fan stopper (C), then remove the cooling fan stopper.

3. To remove the left cooling fan (D), disconnect the cable (E) from the system board, then unlatch the latch of the cooling fan stopper, then remove the cooling fan stopper.

4. To remove the LED board (F), disconnect the LED cable (G) from the system board (H), then slide the LED board back on the disk support (I).

5. Disconnect the speaker cable (J) from the system board, then remove the speaker (K) with holder.

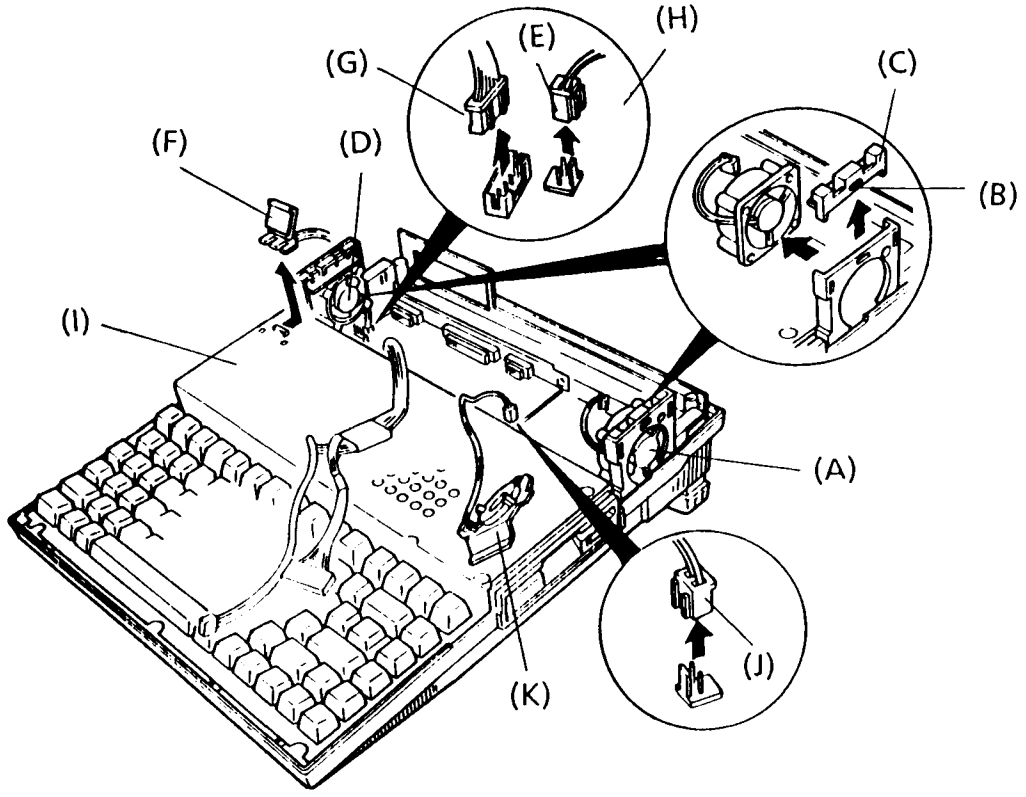


FIGURE 4-13 Removing the Fan, the LED Board and the Speaker

6. To install the cooling fans, the speaker, and the LED board, follow the above procedures in reverse.

4.11 REMOVING/REPLACING THE COOLING FAN HOLDERS AND THE HANDLE

1. Follow the steps described in sections 4.2, 4.8 and 4.10, and remove the power supply and the two cooling fans.

2. Remove the screw (A) from the mask panel (B) or, if any, take off an expansion card.

3. To remove the left cooling fan holder (C) and the right cooling fan holder (D), remove the two screws (E) from the two cooling fan holders.

4. To remove the handle (F), remove the two cooling fan holders, then pull out the handle from the base (G).

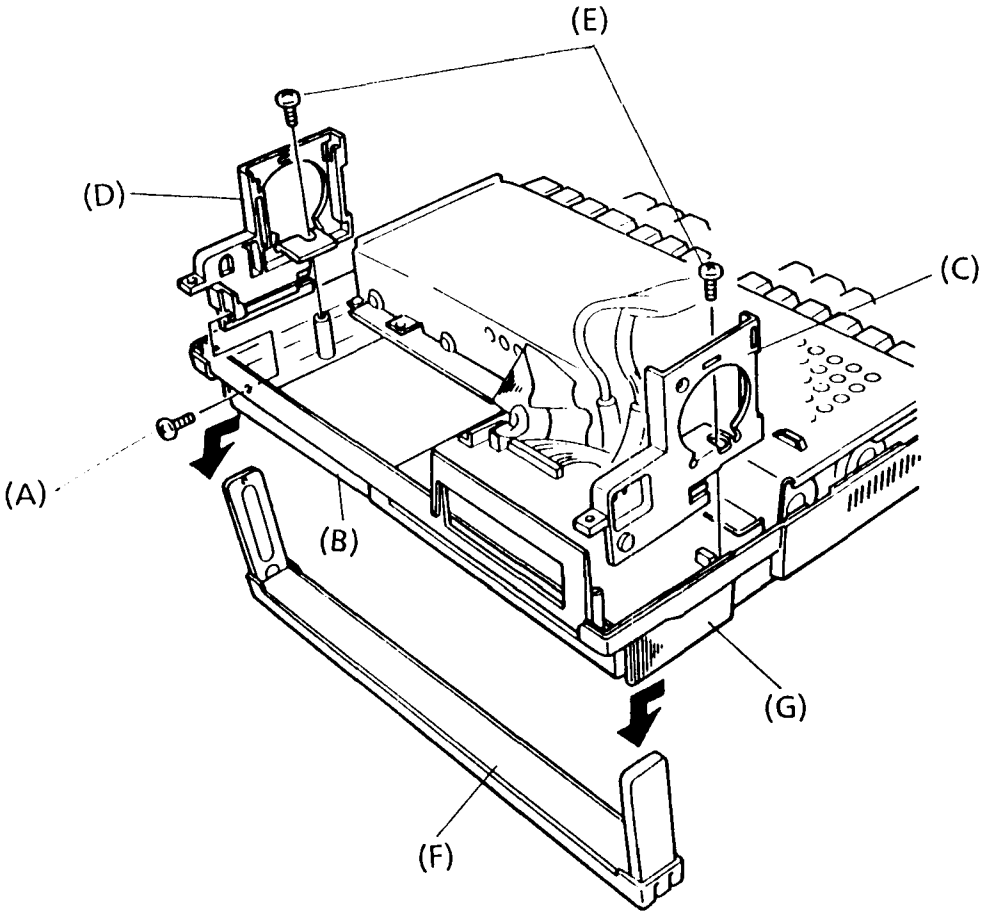


FIGURE 4-14 Removing the Cooling Fan and the Handle

5. To install the cooling fan holders and the handle, follow the above procedures in reverse.

4.12 REMOVING/REPLACING THE DISK SUPPORT AND PLASMA SENSOR

1. Follow the steps described in sections 4.2 and 4.8, and remove the power supply unit and LED board.

2. Slide the keyboard (A) forward, then remove the two screws (B) and the two screws (C) if present from the disk support (D).

3. Lift the disk support, then disconnect the HDC signal cable (E), HDD power cable (F), and the FDD cable (G) from the system board (H).

4. To remove the plasma sensor, push the two latches (I), then lift it up.

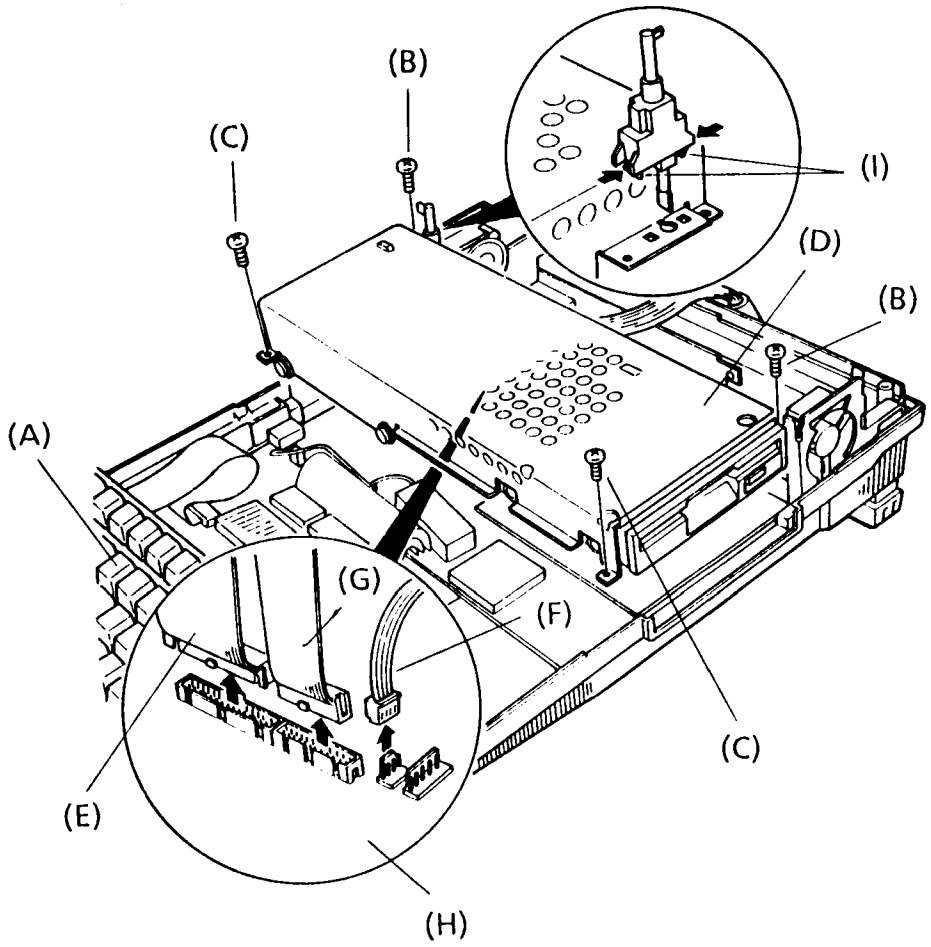


FIGURE 4-15 Removing the Disk Support and the Plasma Sensor

5. To install the disk support and the plasma sensor, follow the above procedures in reverse.

4.13 REMOVING/REPLACING THE FDD

1. Follow the steps described in sections 4.2, 4.8, 4.10 and 4.12, and remove the disk support.

2. Remove the four screws (A) from the disk support (B), then take off the FDD (C) from the disk support.

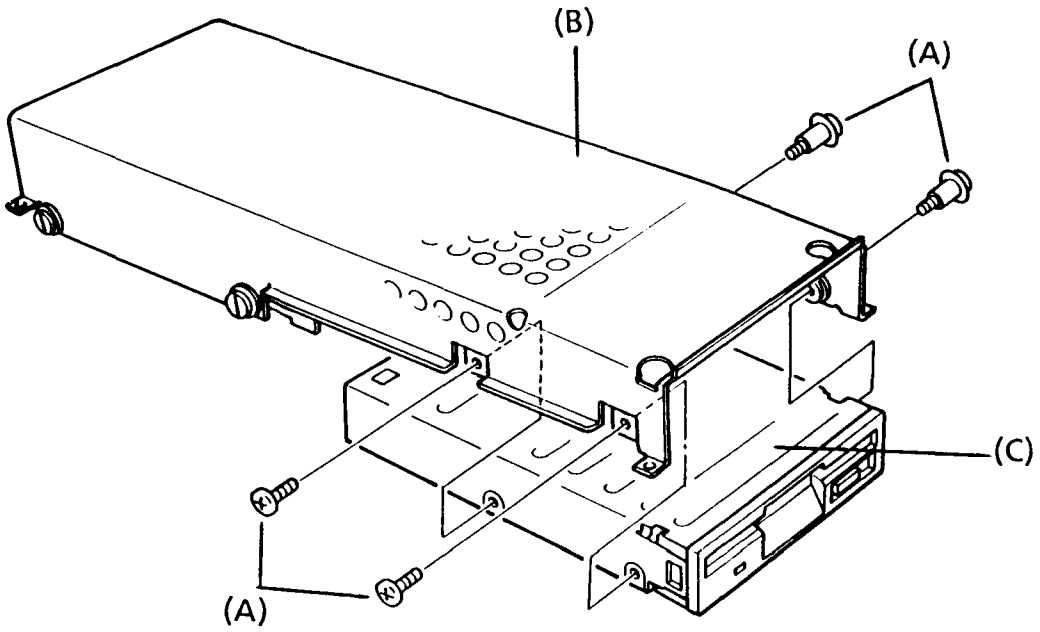


FIGURE 4-16 Removing the FDD

3. To install the FDD, follow the above procedures in reverse.

4.14 REMOVING/REPLACING THE HDD

1. Follow the steps described in sections 4.2, 4.8, 4.10 and 4.12, and remove the disk support.

2. Remove the four screws (A) from the disk support (B), then take off the HDD (C) from the disk support.

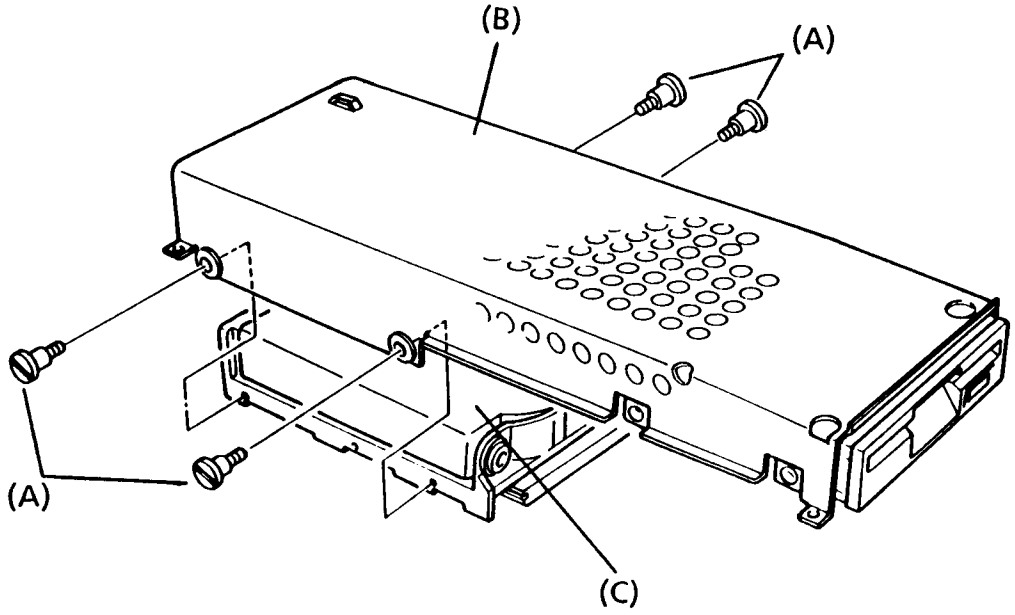


FIGURE 4-17 Removing the HDD

3. To install the HDD, follow the above procedures in reverse.

4.15 REMOVING/REPLACING THE AGS BOARD

1. Follow the steps described in sections 4.2, 4.8, 4.10 and 4.12.

2. Remove the two screws (A) on the AGS board (B), then pull up the AGS board disconnecting from the system board.

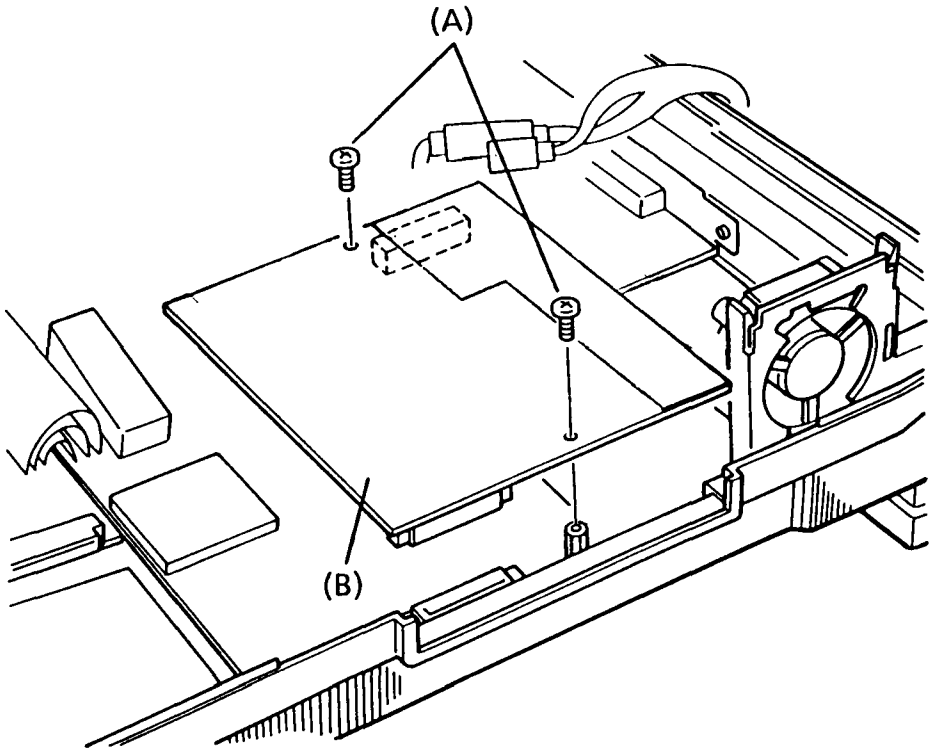


FIGURE 4-18 Removing the AGS Board

3. To install the AGS board, follow the above procedures in reverse.

4.16 REMOVING/REPLACING THE SYSTEM BOARD

> ***CAUTION***
>
> If your system has an optional card into the expansion slot or memory expansion card, remove them.

1. Follow the steps described in sections 4.2, 4.8, 4.10, 4.12 and 4.15.
2. Remove the two screws (A), then remove the mask panel (B).
3. Remove the eight screws (C), and two nuts (D) from the system board (E).

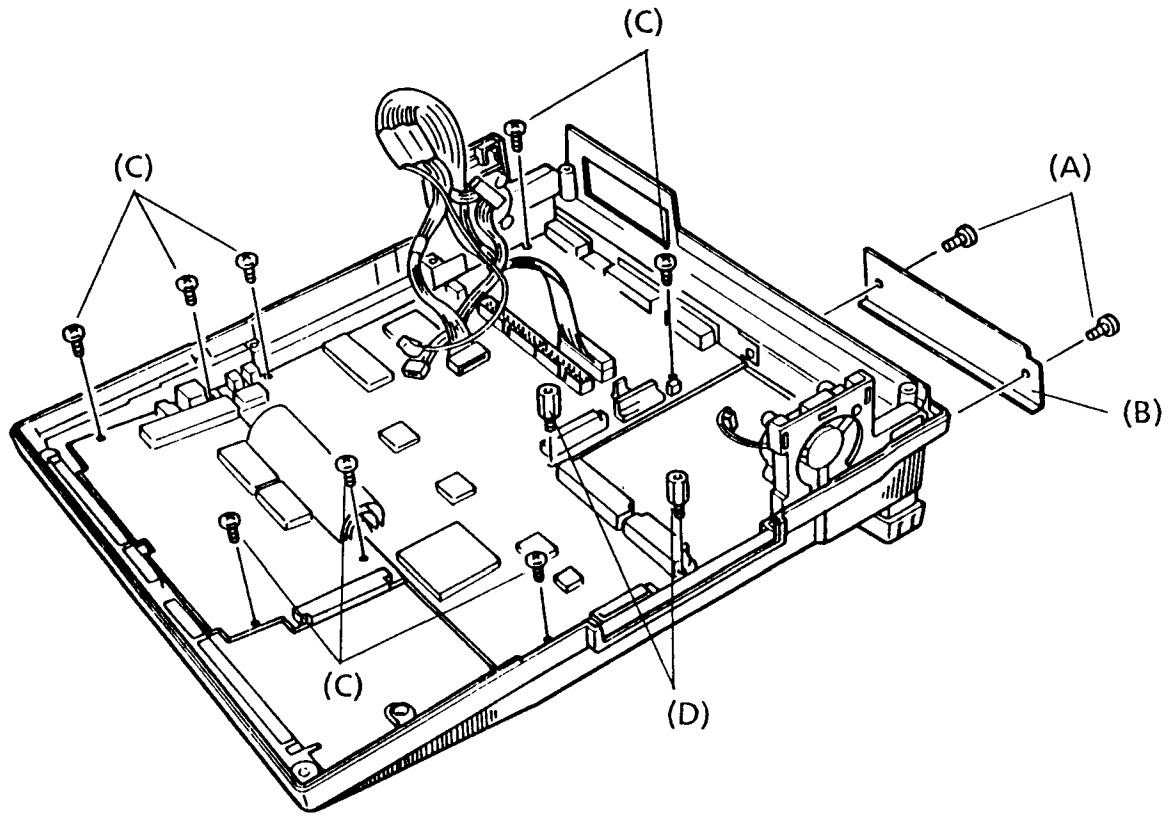


FIGURE 4-19 Removing the System Board

4. To install the system board, follow the above procedures in reverse.

APPENDIX A

BOARD LAYOUT

1. System board (ICs)

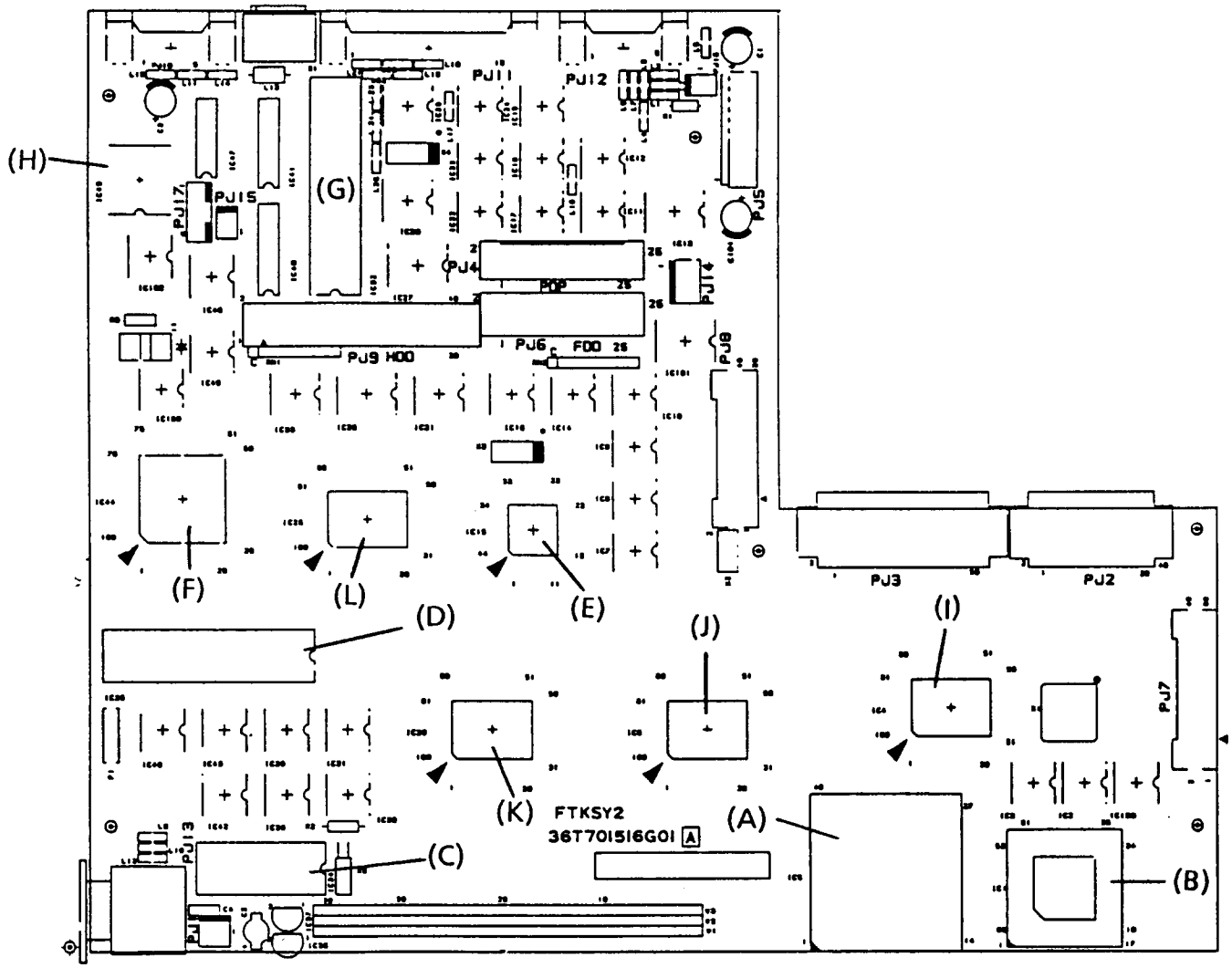


FIGURE A-1 System Board (ICs)

(A) CPU: Central processing unit (80386-16)

(B) NDP Socket: Numeric data processing socket (80387-16)

(C) RTC: Real time clock (MC146818)

(D) KBC: Keyboard controller (M5L8042-137P)

(E) FDC: Floppy disk controller (TC8565F)

(F) SI: Super integration (T4758)

(G) SIO: Serial input/output controller (SN16450)

(H) VFO: Variable frequency oscillator (MB4108)

(I) MCNT-GA: Memory controller gate array (DC2165P054A)

(J) BDRV-GA: Bus driver gate array (DC2147P401A)

(K) BCNT-GA: Bus controller gate array (DC2162P436A)

(L) FDC-GA: Floppy disk controller gate array (DC2051P0118A)

2. System board (connectors)

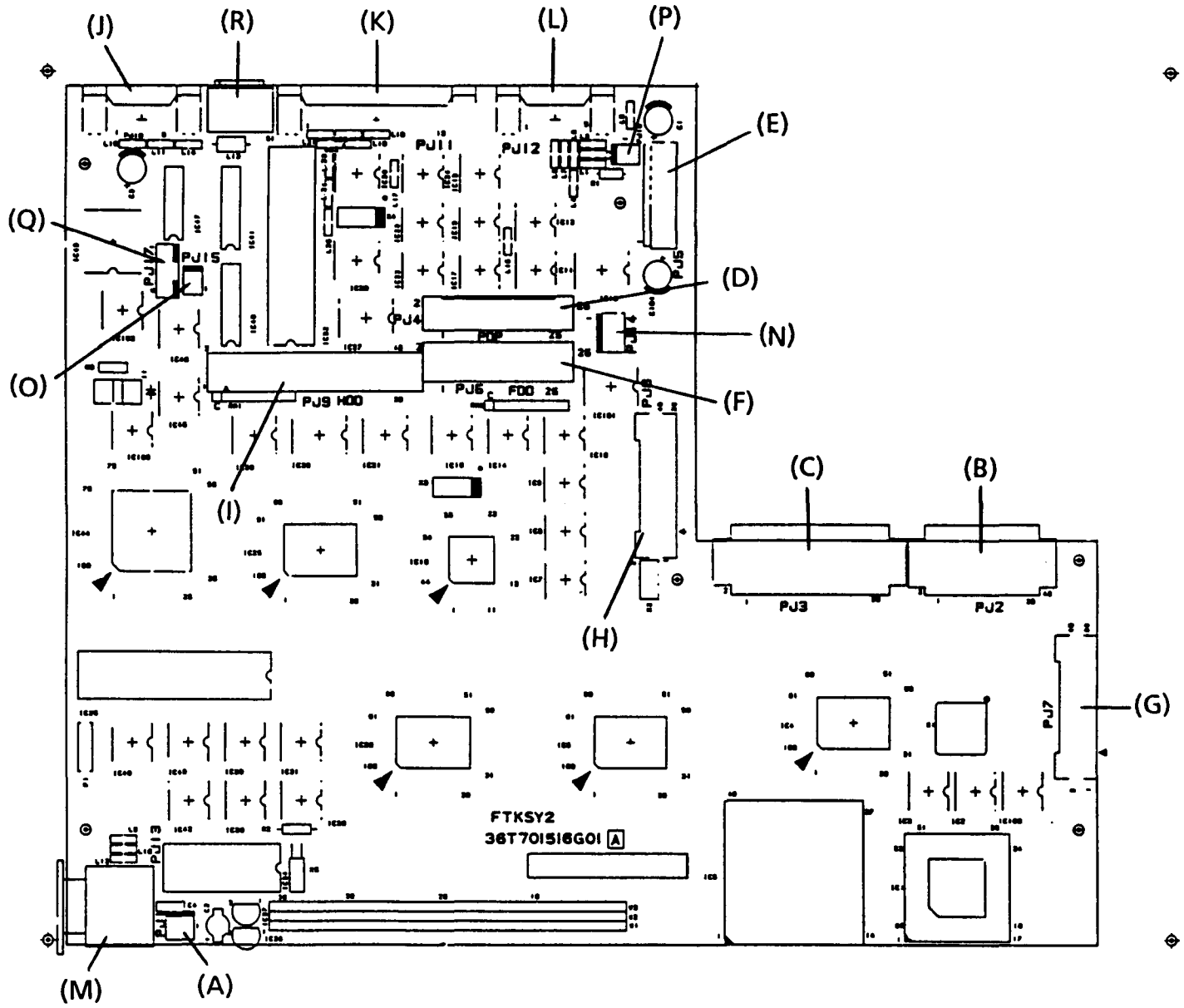


FIGURE A-2 System Board (connectors)

(A) PJ 1 Lithium battery connector

(B) PJ 2 Expansion bus connector (40 pin)

(C) PJ 3 Expansion bus connector (60 pin)

(D) PJ 4 Plasma display panel connector

(E) PJ 5 Power supply connector

(F) PJ 6 FDD connector

(G) PJ 7 AGS interface connector

(H) PJ 8 AGS interface connector

(I) PJ 9 HDD connector

(J) PJ 10 COMMS connector

(K) PJ 11 PRT/FDD connector

(L) PJ 12 RGB connector

(M) PJ 13 External keyboard connector

(N) PJ 14 HDD power connector

(O) PJ 15 Fan connector

(P) PJ 16 Speaker connector

(Q) PJ 17 LED board connector

(R) DIP switch

3. Memory board

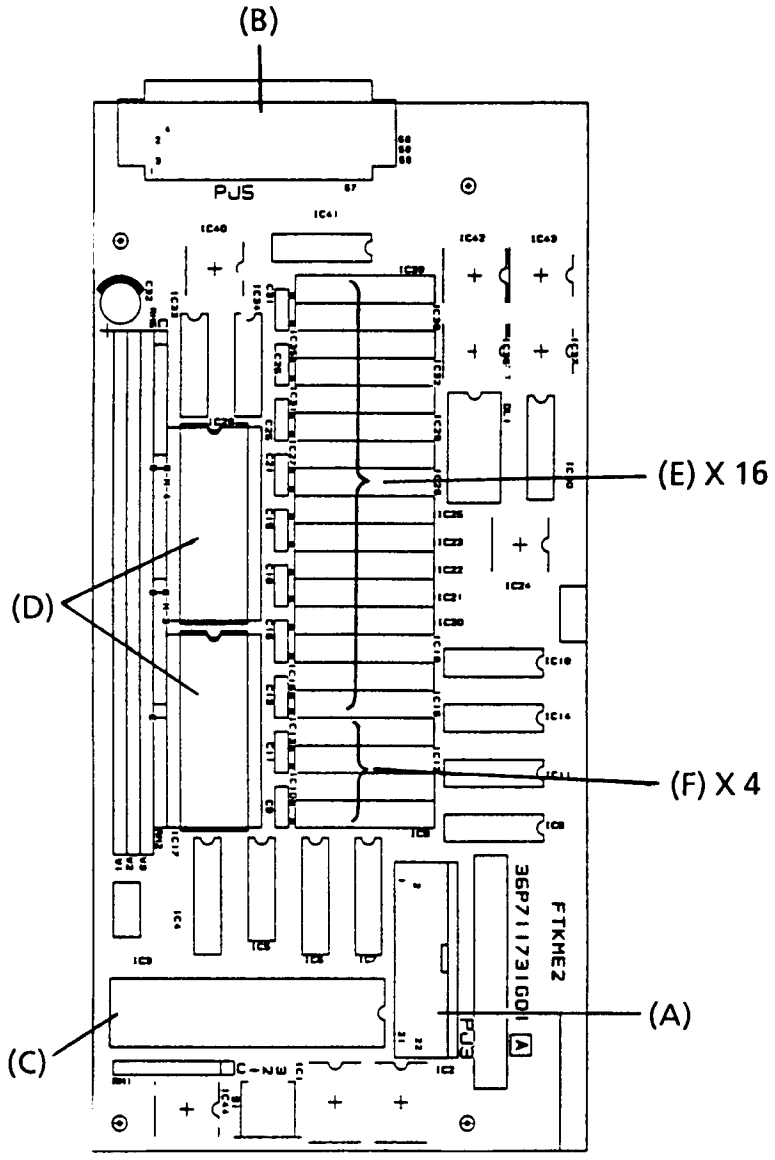


FIGURE A-3 Memory Board

(A) PJ 3 Keyboard connector

(B) PJ 5 External memory connector

(C) KBC: Keyboard controller (8742)

(D) System BIOS ROMs (TC57256AD-20)

(E) System RAMs (TC514256Z-85)

(F) System RAMs (TC511000Z-85)

4. AGS board

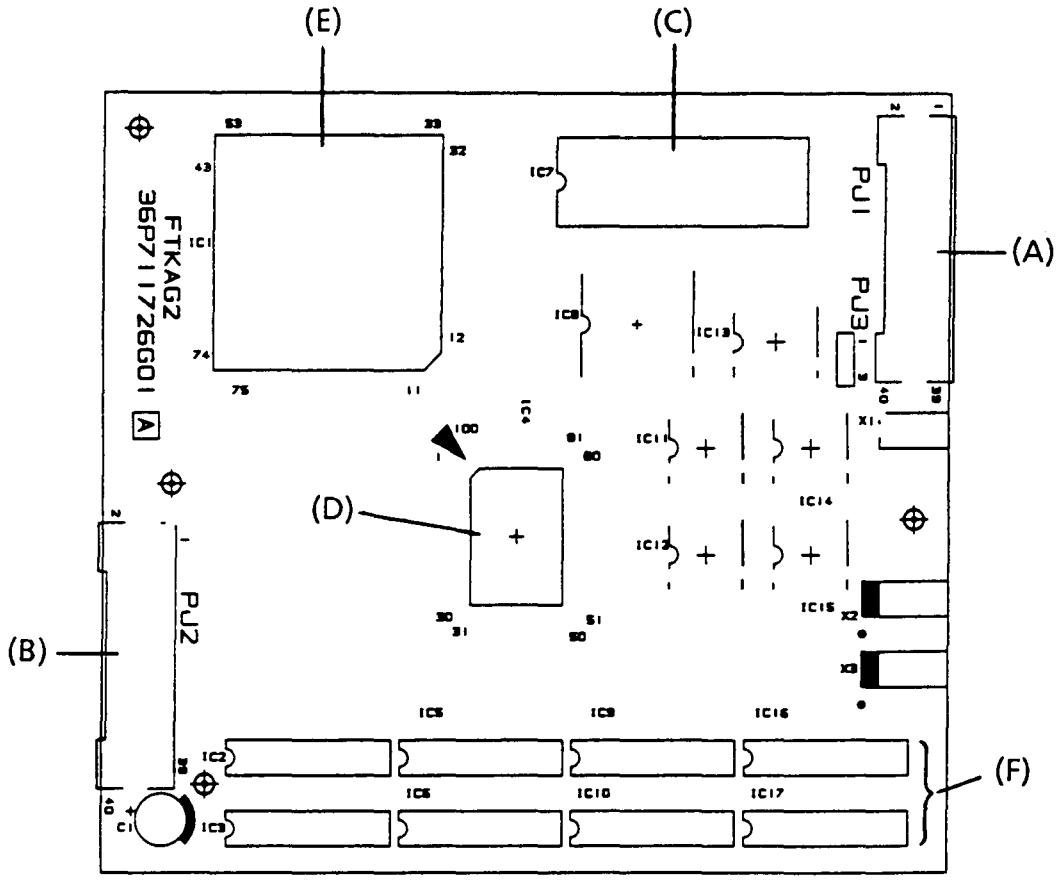


FIGURE A-4 AGS Board

(A) PJ1 System interface connector

(B) PJ2 System interface connector

(C) AGS BIOS ROM (TC57256AD-20)

(D) AGS-GA: Advanced graphics subsystem gate array (DC2139P427A)

(E) PEGA2: Paradise EGA chip

(F) Video RAMs (TMM41464P-12)

APPENDIX B

PIN ASSIGNMENT

1. System board

1.1 PJ 1 Lithium battery connector

TABLE B-1 Lithium Battery Connector Pin Assignment

PIN	SIGNAL	I/O	PIN	SIGNAL	I/O
1	GND		2	N/C	
3	BAT36V;100	I			

1.2 PJ 2 Expansion bus connector (40 pin)

TABLE B-2 Expansion Bus Connector Pin Assignment (40 pin)

PIN	I/O	SIGNAL	DESCRIPTION	PIN	I/O	SIGNAL	DESCRIPTION
1	I	IRQ10;100	INTERRUPT REQUEST	21	O	DACK6;000	DMA ACKNOWLEDGE
2	I	IRQ14;100	INTERRUPT REQUEST	22		GND	GROUND (0V)
3	I/O	SD8;100	SYSTEM DATA BUS BIT 8	23	I/O	REFRSH;000	REFRESH
4	I/O	SD9;100	SYSTEM DATA BUS BIT 9	24	I/O	LA18;100	ADDRESS BIT 18
5	I	IRQ11;100	INTERRUPT REQUEST	25	I	MASTER;000	EXTERNAL MASTER
6	I/O	SD10;100	SYSTEM DATA BUS BIT 10	26	I/O	LA17;100	ADDRESS BIT 17
7	I/O	SD11;100	SYSTEM DATA BUS BIT 11	27	I/O	SBHE;000	BUS HIGH ENABLE
8	I/O	SD12;100	SYSTEM DATA BUS BIT 12	28	I	IOCHK;000	I/O CHECK
9	I	IRQ12;100	INTERRUPT REQUEST	29	I	MEM16;000	MEMORY 16
10		GND	GROUND (0V)	30		GND	GROUND (0V)
11	I/O	SD13;100	SYSTEM DATA BUS BIT 13	31	I	IO16;000	I/O 16
12	I/O	SD14;100	SYSTEM DATA BUS BIT 14	32	O	DACK2;000	DMA ACKNOWLEDGE
13	I	IRQ6;100	INTERRUPT REQUEST	33	I	DRQ6;100	DMA REQUEST
14	I/O	SD15;100	SYSTEM DATA BUS BIT 15	34	I	DRQ5;100	DMA REQUEST
15	I/O	LA22;100	ADDRESS BIT 22	35	O	DACK5;000	DMA ACKNOWLEDGE
16	I/O	LA23;100	ADDRESS BIT 23	36	I/O	MEMR;000	MEMORY READ
17	I	DRQ2;100	DMA REQUEST	37	I	IRQ4;100	INTERRUPT REQUEST
18	I/O	LA21;100	ADDRESS BIT 21	38	I/O	MEMW;000	MEMORY WRITE
19	I/O	LA19;100	ADDRESS BIT 19	39	I	IRQ7;100	INTERRUPT REQUEST
20	I/O	LA20;100	ADDRESS BIT 20	40		GND	GROUND (0V)

1.3 PJ 3 Expansion bus connector (60 pin)

TABLE B-3 Expansion Bus Connector Pin Assignment (60 pin)

PIN	I/O	SIGNAL	DESCRIPTION	PIN	I/O	SIGNAL	DESCRIPTION
1		GND	GROUND (0V)	31	I/O	SA19;100	ADDRESS BIT 19
2	O	VCC	+ 5 VDC	32	I/O	SD0;100	SYSTEM DATA BUS BIT 0
3	O	M9V;000	-9 VDC	33	I/O	SD1;100	SYSTEM DATA BUS BIT 1
4	O	P12V;100	+ 12 VDC	34	I/O	SD2;100	SYSTEM DATA BUS BIT 2
5	O	CCMCS2;010	RS-232C SELECT SIGNAL	35	I/O	SD3;100	SYSTEM DATA BUS BIT 3
6	O	COMCLK;100	COMMUNICATION CLOCK	36		GND	GROUND (0V)
7	I	MIRQ;000	MODEM INTERRUPT REQUEST	37	I/O	SD4;100	SYSTEM DATA BUS BIT 4
8	I	MDSPK;000	SPEAKER DRIVE	38	I/O	SD5;100	SYSTEM DATA BUS BIT 5
9		GND	GROUND (0V)	39	I/O	SD6;100	SYSTEM DATA BUS BIT 6
10	I/O	SA0;100	ADDRESS BIT 0	40	I/O	SD7;100	SYSTEM DATA BUS BIT 7
11	I/O	SA1;100	ADDRESS BIT 1	41	O	SMEMW;000	MEMORY WRITE
12	I/O	SA2;100	ADDRESS BIT 2	42	O	SMEMR;000	MEMORY READ
13	I/O	SA3;100	ADDRESS BIT 3	43		GND	GROUND (0V)
14	I/O	SA4;100	ADDRESS BIT 4	44	I/O	IOW;000	I/O WRITE
15	I/O	SA5;100	ADDRESS BIT 5	45	I/O	IOR;000	I/O READ
16	I/O	SA6;100	ADDRESS BIT 6	46	O	TC;100	TERMINAL COUNT
17	I/O	SA7;100	ADDRESS BIT 7	47	O	BALE;100	SYSTEM BUS ADDRESS LATCH
18		GND	GROUND (0V)	48	O	RESET;100	RESET
19	I/O	SA8;100	ADDRESS BIT 8	49	O	DACK1;000	DMA ACKNOWLEDGE
20	I/O	SA9;100	ADDRESS BIT 9	50	I	IRQ9;100	INTERRUPT REQUEST
21	I/O	SA10;100	ADDRESS BIT 10	51		GND	GROUND (0V)
22	I/O	SA11;100	ADDRESS BIT 11	52	O	VCC	+ 5 VDC
23	I/O	SA12;100	ADDRESS BIT 12	53	O	SYSCLK;100	SYSTEM CLOCK
24	I/O	SA13;100	ADDRESS BIT 13	54	I	IRQ5;100	INTERRUPT REQUEST
25	I/O	SA14;100	ADDRESS BIT 14	55	I	DRQ3;100	DMA REQUEST
26	I/O	SA15;100	ADDRESS BIT 15	56	O	DACK3;000	DMA ACKNOWLEDGE
27		GND	GROUND (0V)	57	O	DMACK;100	DMA ACKNOWLEDGE
28	I/O	SA16;100	ADDRESS BIT 16	58	I	DRQ1;100	DMA REQUEST
29	I/O	SA17;100	ADDRESS BIT 17	59	I	IORDY;100	I/O READY
30	I/O	SA18;100	ADDRESS BIT 18	60		GND	GROUND (0V)

1.4 PJ 4 Plasma display panel connector

TABLE B-4 Plasma Display Panel Connector Pin Assignment

PIN	SIGNAL	I/O	PIN	SIGNAL	I/O
1	PVS;110	O	2	GND	
3	PHS;110	O	4	GND	
5	PPD5;110	O	6	PPD1;110	O
7	PPD6;110	O	8	PPD2;110	O
9	PPD7;110	O	10	PPD3;110	O
11	PPD8;110	O	12	PPD4;110	O
13	GND		14	GND	
15	PCK;110	O	16	PEN;110	O
17	VCC		18	VCC	
19	N/C		20	N/C	
21	CRTLED;000	O	22	VCC	
23	N/C		24	LEDCAP;010	O
25	LEDNUM;010	O	26	LEDSCR;010	O

1.5 PJ 5 Power supply connector

TABLE B-5 Power Supply Connector Pin Assignment

PIN	SIGNAL	I/O	PIN	SIGNAL	I/O
1	P12V;100	I	2	GND	
3	M9V;000	I	4	GND	
5	GND		6	VCC	I
7	VCC	I	8		

1.6 PJ 6 FDD connector

TABLE B-6 FDD Connector Pin Assignment

PIN	SIGNAL	I/O	PIN	SIGNAL	I/O
1	VCC	O	2	INDEX;000	I
3	VCC	O	4	FDSELA;000	O
5	VCC	O	6	DSKCHG;000	I
7	VCC	O	8	READY;000	I
9	VCC	O	10	MONA;000	O
11	LOWDNS;000	O	12	FDCDCR;000	O
13	GND		14	STEP;000	O
15	GND		16	WDATA;000	O
17	GND		18	WGATE;000	O
19	GND		20	TRACKO;000	I
21	GND		22	WPROTC;000	I
23	GND		24	RDDA;000	I
25	GND		26	SIDE;000	O

1.7 PJ 7 AGS interface connector

TABLE B-7 AGS Interface Connector Pin Assignment

PIN	SIGNAL	I/O	PIN	SIGNAL	I/O
1	GND		2	SD0;100	I/O
3	SD1;100	I/O	4	SD2;100	I/O
5	SD3;100	I/O	6	SD4;100	I/O
7	SD5;100	I/O	8	SD6;100	I/O
9	SD7;100	I/O	10	GND	
11	GND		12	SA0;100	O
13	SA1;100	O	14	SA2;100	O
15	SA3;100	O	16	SA4;100	O
17	SA5;100	O	18	SA6;100	O
19	SA7;100	O	20	GND	
21	SA8;100	O	22	SA9;100	O
23	SA10;100	O	24	SA11;100	O
25	SA12;100	O	26	SA13;100	O
27	SA14;100	O	28	SA15;100	O
29	GND		30	SA16;100	O
31	SA17;100	O	32	SA18;100	O
33	SA19;100	O	34	GND	
35	SW4;100	O	36	SW3;100	O
37	SW2;100	O	38	SW1;100	O
39	AUTOSW;100	O	40	GND	

1.8 PJ 8 AGS interface connector

TABLE B-8 AGS Interface Connector Pin Assignment

PIN	SIGNAL	I/O	PIN	SIGNAL	I/O
1	VCC		2	GND	
3	IRQ9;100	I	4	IORDY;100	I
5	$14MHZ;100	O	6	GND	
7	DMACK;100	O	8	SMEMW;000	O
9	SMEMR;000	O	10	GND	
11	IOW;000	O	12	IOR;000	O
13	RESET;100	O	14	REFRSH;000	O
15	IOCHK;000	I	16	GND	
17	VCC		18	GND	
19	FONT;000	O	20	DSPDIS;000	O
21	SH25AA;100	O	22	SRON;000	I
23	PDPSEL;100	O	24	GND	
25	VCC		26	GND	
27	PESR;100	I	28	PERE;100	I
29	PEGR;100	I	30	PEBL;100	I
31	PESG;100	I	32	PESB;100	I
33	PEHS;100	I	34	PEVS;100	I
35	GND		36	PEPD4;100	I
37	PEPD3;100	I	38	PEPD2;100	I
39	GND		40	VCC	

1.9 PJ 9 HDC connector

TABLE B-9 HDC Connector Pin Assignment

PIN	SIGNAL	I/O	PIN	SIGNAL	I/O
1	HRESET;000	O	2	GND	
3	HSD7;100	I/O	4	HSD8;100	I/O
5	HSD6;100	I/O	6	HSD9;100	I/O
7	HSD5;100	I/O	8	HSD10;100	I/O
9	HSD4;100	I/O	10	HSD11;100	I/O
11	HSD3;100	I/O	12	HSD12;100	I/O
13	HSD2;100	I/O	14	HSD13;100	I/O
15	HSD1;100	I/O	16	HSD14;100	I/O
17	HSD0;100	I/O	18	HSD15;100	I/O
19	GND		20	N/C	
21	N/C		22	GND	
23	HIOW;000	O	24	GND	
25	HIOR;000		26	GND	
27	N/C		28	N/C	
29	N/C		30	GND	
31	IRQ14;100	I	32	HIO16;000	I
33	HSA1;100	O	34	N/C	
35	HSA0;100	O	36	HSA2;100	O
37	HDDCS0;000	O	38	HDDCS1;000	O
39	HACT;000	I	40	GND	

1.10 PJ 10 COMMS connector

TABLE B-10 COMMS Connector Pin Assignment

PIN	I/O	SIGNAL	DESCRIPTION
1	I	MDCD;100	+ DATA CARRIER DETECT
2	I	MDRD;100	+ RECEIVE DATA
3	O	MDTD;100	+ TRANSMIT DATA
4	O	MDDTR;100	+ DATA TERMINAL READY
5		GND	GROUND (0 V)
6	I	MDDSR;100	+ DATA SET READY
7	O	MDRTS;100	+ REQUEST TO SEND
8	I	MDCTS;100	+ CLEAR TO SEND
9	I	MDRI;100	+ RING INDICATOR

1.11 PJ 11 PRT/FDD connector

TABLE B-11 PRT/FDD Connector Pin Assignment

PIN	(FOR PRT)			(FOR EXT FDD)		
	SIGNAL	I/O	DESCRIPTION	SIGNAL	I/O	DESCRIPTION
1	STROBE;000	O	- STROBE	READY;000	I	- EXTERNAL DRIVE READY
2	PD0;120	O	+ DATA BIT 0	INDEX;000	I	- INDEX
3	PD1;120	O	+ DATA BIT 1	TRACK0;000	I	- TRACK ZERO
4	PD2;120	O	+ DATA BIT 2	WPROTC;000	I	- WRITE PROTECTED
5	PD3;120	O	+ DATA BIT 3	RDDA;000	I	- READ DATA
6	PD4;120	O	+ DATA BIT 4	DSKCHG;000	I	- DISK CHANGE
7	PD5;120	O	+ DATA BIT 5	-		(NOT USED)
8	PD6;120	O	+ DATA BIT 6	-		(NOT USED)
9	PD7;120	O	+ DATA BIT 7	-		(NOT USED)
10	ACK;000	I	- ACKNOWLEDGE	SWFDB;100	O	+ DRIVE SELECT
11	BUSY;100	I	+ BUSY	SWMONB;000	O	+ MOTOR ON
12	PE;100	I	+ PAPER END	WRDATA;100	O	+ WRITE DATA
13	SELECT;100	I	+ SELECT	EXFDWE;100	O	+ WRITE ENABLE
14	AUTFD;000	O	- AUTO FEED	XRATE0;100	O	+ LOW DENSITY
15	ERROR;000	I	- ERROR (FAULT)	SIDE;100	O	+ SIDE SELECT
16	PINIT;000	O	- PRINTER INITIALIZE	FDCDRC;100	O	+ DIRECTION
17	SLIN;000	O	- SELECT INPUT	STEP;100	O	+ STEP
18-25	GND		GROUND (0 V)	GND		GROUND (0 V)

1.12 PJ 12 RGB connector

TABLE B-12 RGB Connector Pin Assignment

PIN	I/O	SIGNAL	MONOCHROME	STANDARD RGB	ENHANCED RGB
1		GND	GROUND	GROUND	GROUND
2	O	PESR;111	GROUND	GROUND	S.RED
3	O	PERE;111	NOT CONNECTED	RED	RED
4	O	PEGR;111	NOT CONNECTED	GREEN	GREEN
5	O	PEBL;111	NOT CONNECTED	BLUE	BLUE
6	O	PESG;111	INTENSITY	INTENSITY	INTENSITY/ S.GREEN
7	O	PESB;111	VIDEO	NOT CONNECTED	S.BLUE
8	O	PEHS;111	H.SYNC	H.SYNC	H.SYNC
9	O	PEVS;111	V.SYNC	V.SYNC	V.SYNC

1.13 PJ 13 External keyboard connector

TABLE B-13 External Keyboard Connector Pin Assignment

PIN	I/O	SIGNAL	DESCRIPTION
1	I/O	KBCLK;120	KB CLOCK
2	I/O	KBDAT;120	KB DATA
3	O	KBRST;120	KB RESET
4		GND	GROUND
5	O	KBPWR;120	KB POWER (+ 5V)

1.14 PJ 14 HDD power connector

TABLE B-14 HDD Power Connector Pin Assignment

PIN	SIGNAL	I/O	PIN	SIGNAL	I/O
1	P12V;100	O	2	GND	
3	GND		4	VCC	O

1.15 PJ 15 Fan connector

TABLE B-15 Fan Connector Pin Assignment

PIN	SIGNAL	I/O	PIN	SIGNAL	I/O
1	P12V;100	O	2	GND	

1.16 PJ 16 Speaker connector

TABLE B-16 Speaker Connector Pin Assignment

PIN	SIGNAL	I/O	PIN	SIGNAL	I/O
1	SPKON;000	O	2	SPKVCC;100	O

1.17 PJ 17 LED board connector

TABLE B-17 LED Board Connector Pin Assignment

PIN	SIGNAL	I/O	PIN	SIGNAL	I/O
1	VCC		2	DRVALD;000	O
3	DRVBLD;000	O	4	LED8M;000	O
5	N/C		6	GND	

2. Memory board

2.1 PJ 3 Keyboard connector

TABLE B-18 Keyboard Connector Pin Assignment

PIN	SIGNAL	I/O	PIN	SIGNAL	I/O
1	KBSC0;000	O	2	KBSC1;000	O
3	KBSC2;000	O	4	GND	
5	KBSC3;000	O	6	KBSC4;000	O
7	KBSC5;000	O	8	KBSC6;000	O
9	GND		10	KBSC7;000	O
11	KBSC8;000	O	12	KBSC9;000	O
13	KBSC10;000	O	14	KBRTN0;000	I
15	KBRTN1;000	I	16	KBRTN2;000	I
17	KBRTN3;000	I	18	GND	
19	KBRTN4;000	I	20	KBRTN5;000	I
21	KBRTN6;000	I	22	KBRTN7;000	I

2.2 PJ 5 Expansion memory connector

TABLE B-19 Expansion Memory Connector Pin Assignment

PIN	SIGNAL	I/O	PIN	SIGNAL	I/O
1	GND		2	VCC	
3	MCAS2;000	O	4	MCASO;000	O
5	MWE2;000	O	6	MCAS3;000	O
7	MCAS1;000	O	8	MRAS2;000	O
9	MRAS3;000	O	10	GND	
11	GND		12	MD1;100	I/O
13	MD2;100	I/O	14	MD0;100	I/O
15	MD3;100	I/O	16	MD5;100	I/O
17	MD6;100	I/O	18	MD4;100	I/O
19	MD7;100	I/O	20	GND	
21	MD16;100	I/O	22	MD17;100	I/O
23	MD19;100	I/O	24	MD18;100	I/O
25	MD20;100	I/O	26	MD21;100	I/O
27	MD23;100	I/O	28	MD22;100	I/O
29	MD24;100	I/O	30	GND	
31	MD25;100	I/O	32	MD27;100	I/O
33	MD26;100	I/O	34	MD28;100	I/O
35	MD29;100	I/O	36	MD31;100	I/O
37	MD30;100	I/O	38	GND	
39	MD13;100	I/O	40	MD9;100	I/O
41	MD12;100	I/O	42	MD8;100	I/O
43	MD11;100	I/O	44	MD15;100	I/O
45	MD10;100	I/O	46	MD14;100	I/O
47	GND		48	GND	
49	MMA0;000	O	50	MMA1;000	O
51	MMA2;000	O	52	MMA3;000	O
53	MMA4;000	O	54	MMA5;000	O
55	MMA6;000	O	56	MMA7;000	O
57	MMA8;000	O	58	EXMEM;000	O
59	GND		60	VCC	

2. UK version

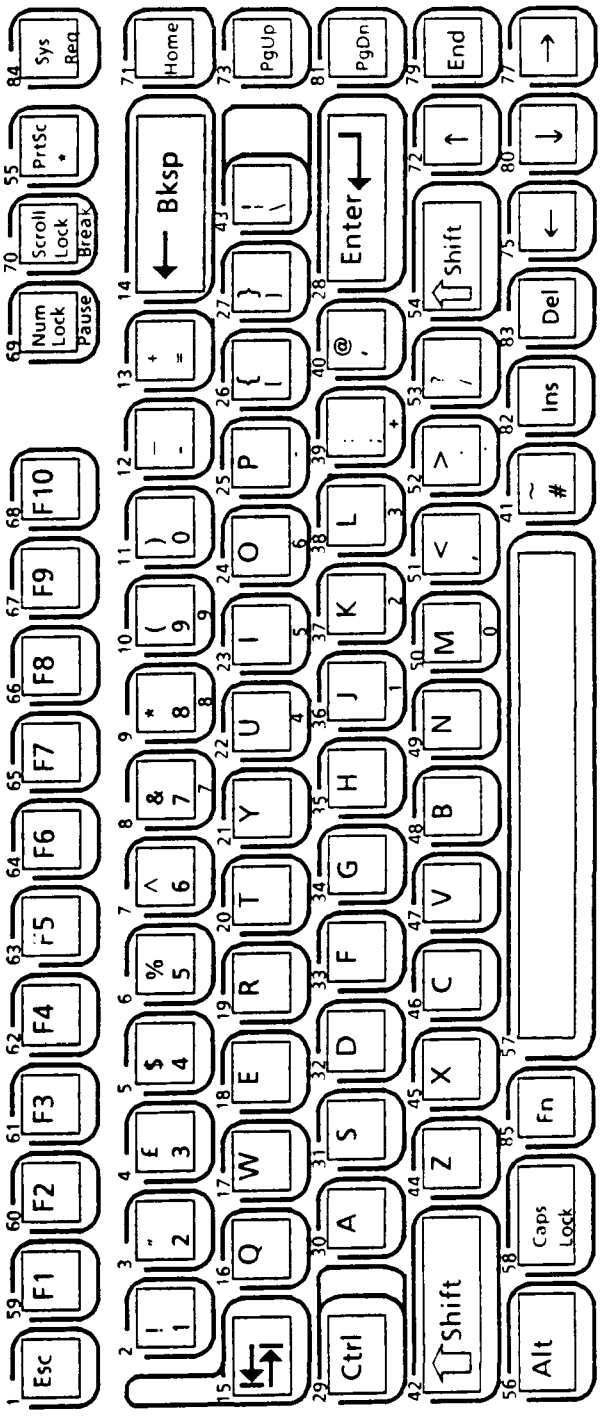


FIGURE C-2 UK Version

3. Germany version

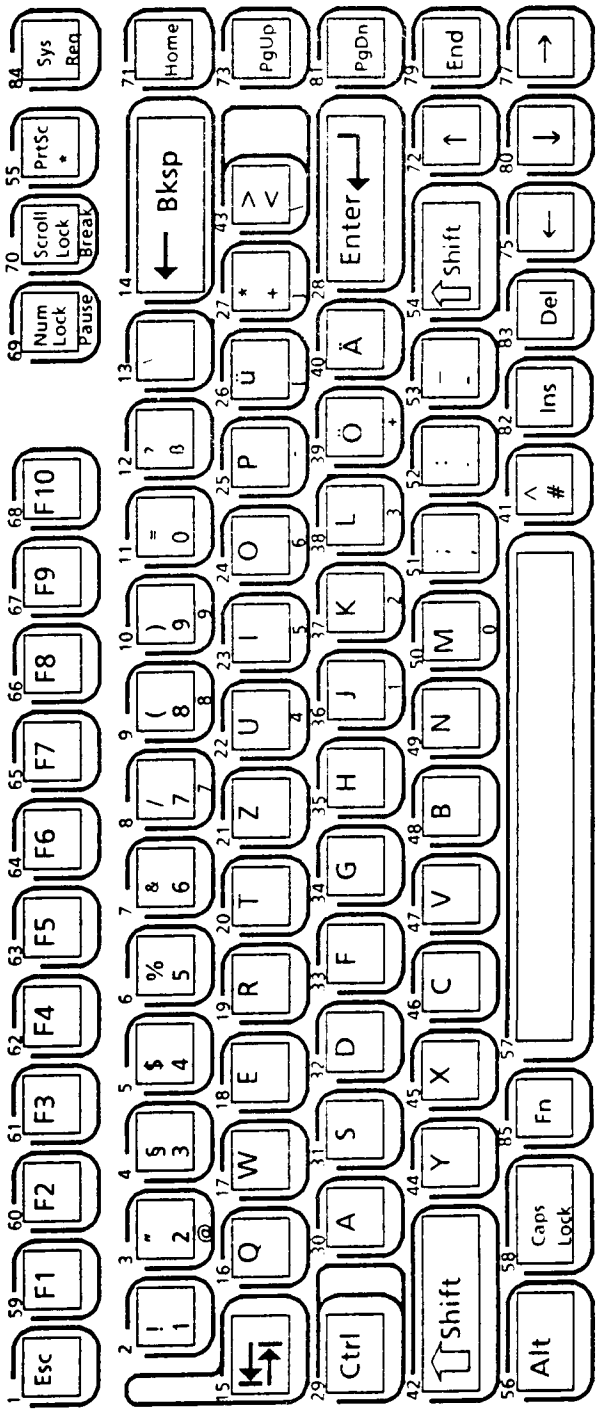


FIGURE C-3 Germany Version

4. France version

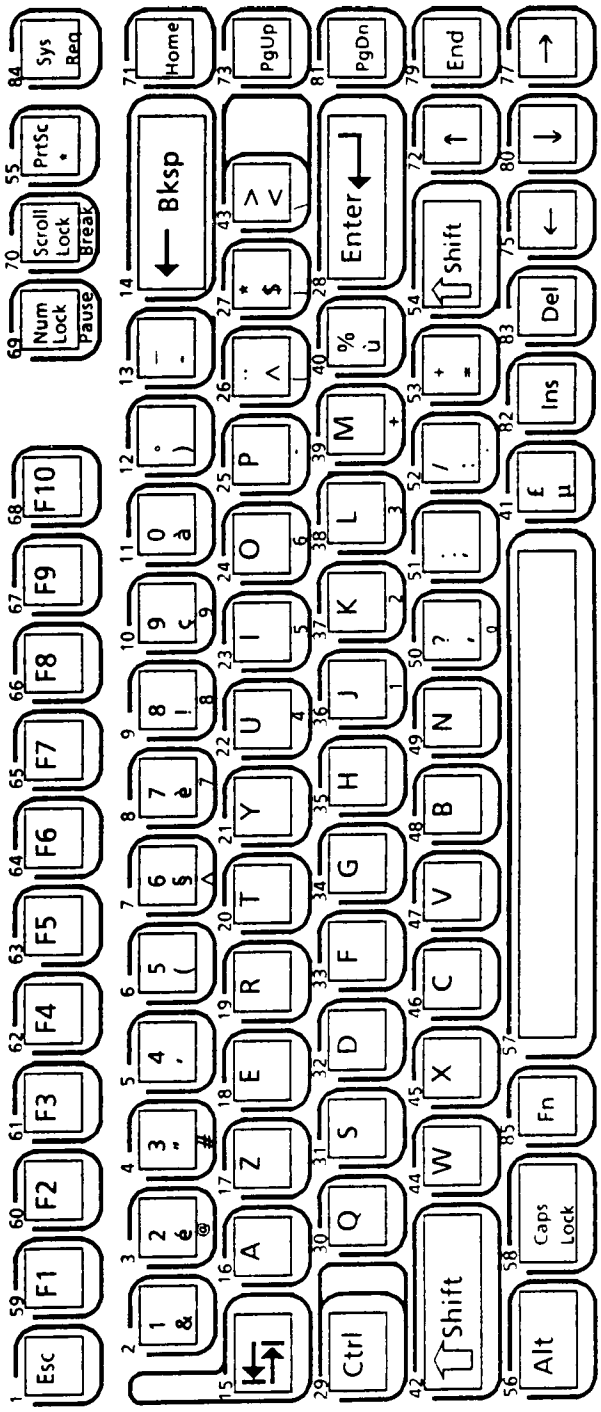


FIGURE C-4 France Version

5. Spain version

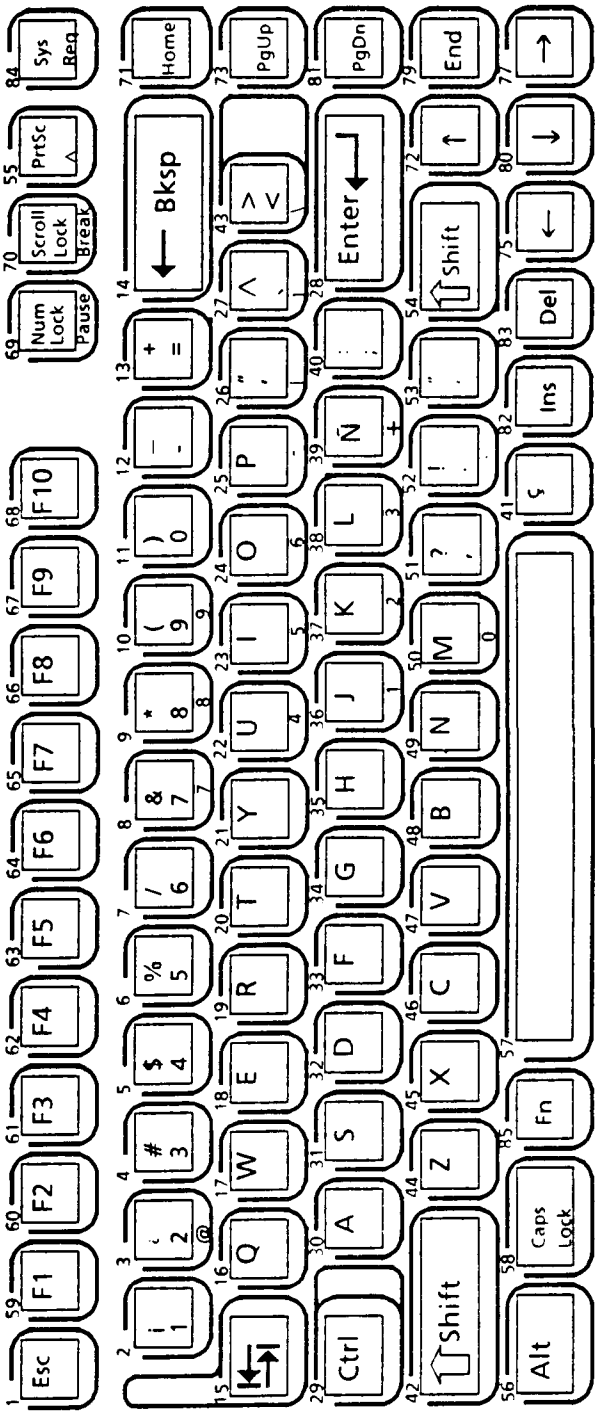


FIGURE C-5 Spain Version

6. Italy version

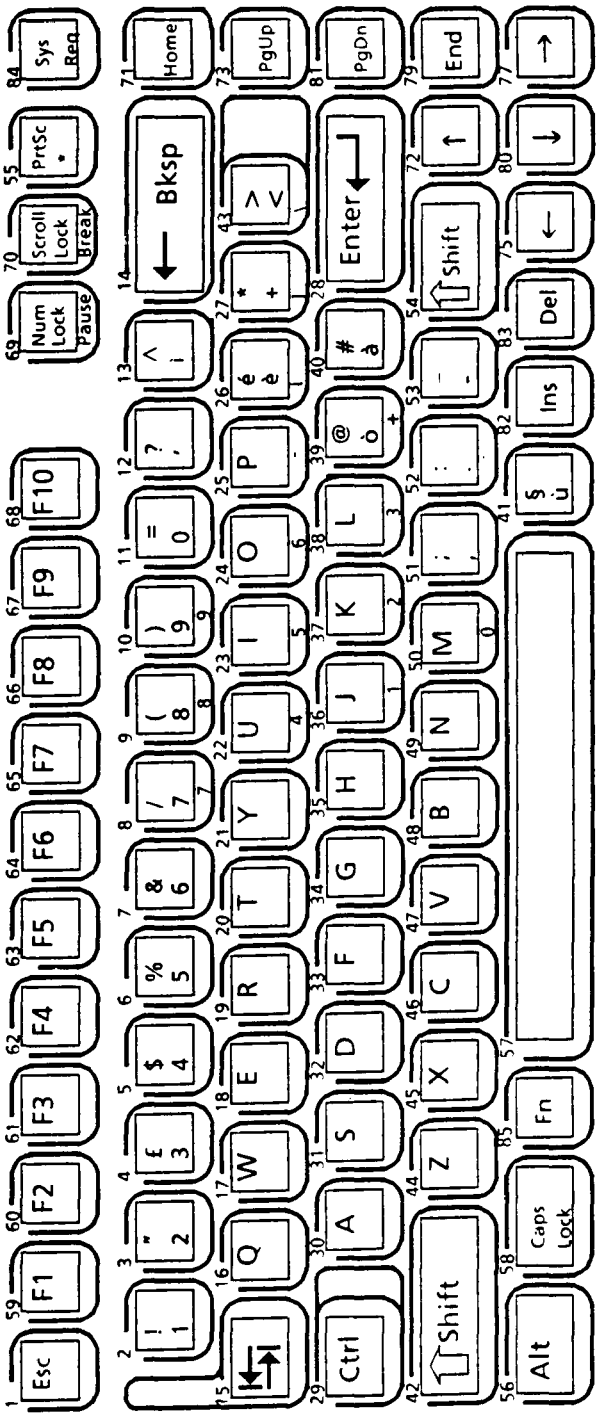


FIGURE C-6 Italy Version

7. Scandinavia version

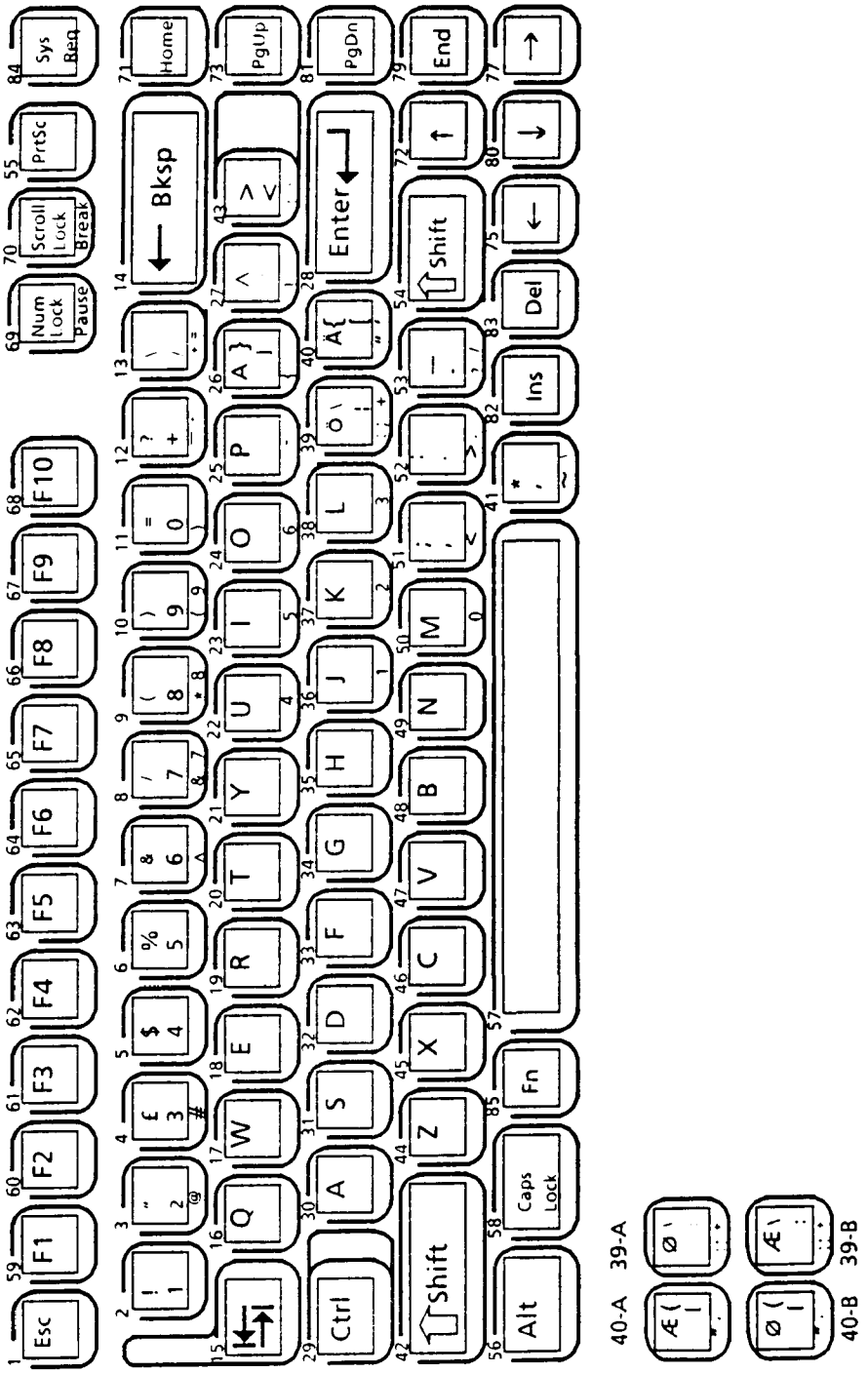


FIGURE C-7 Scandinavia Version

8. Switzerland version

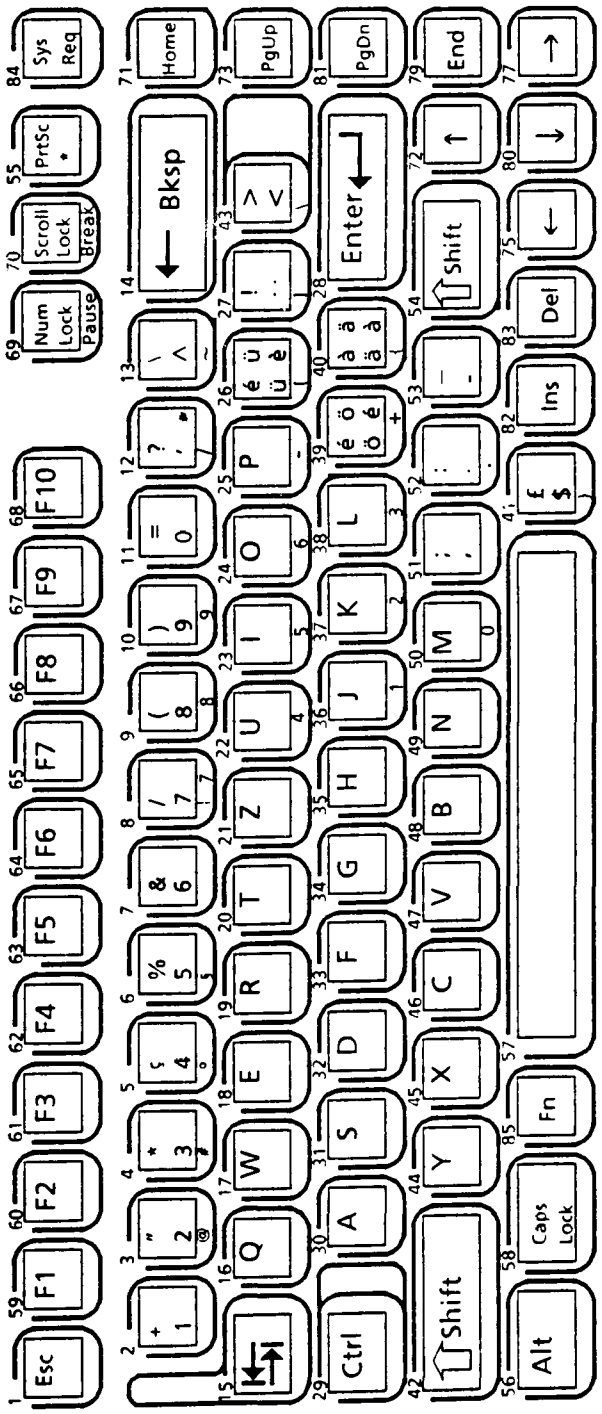


FIGURE C-8 Switzerland Version

9. Keycap number

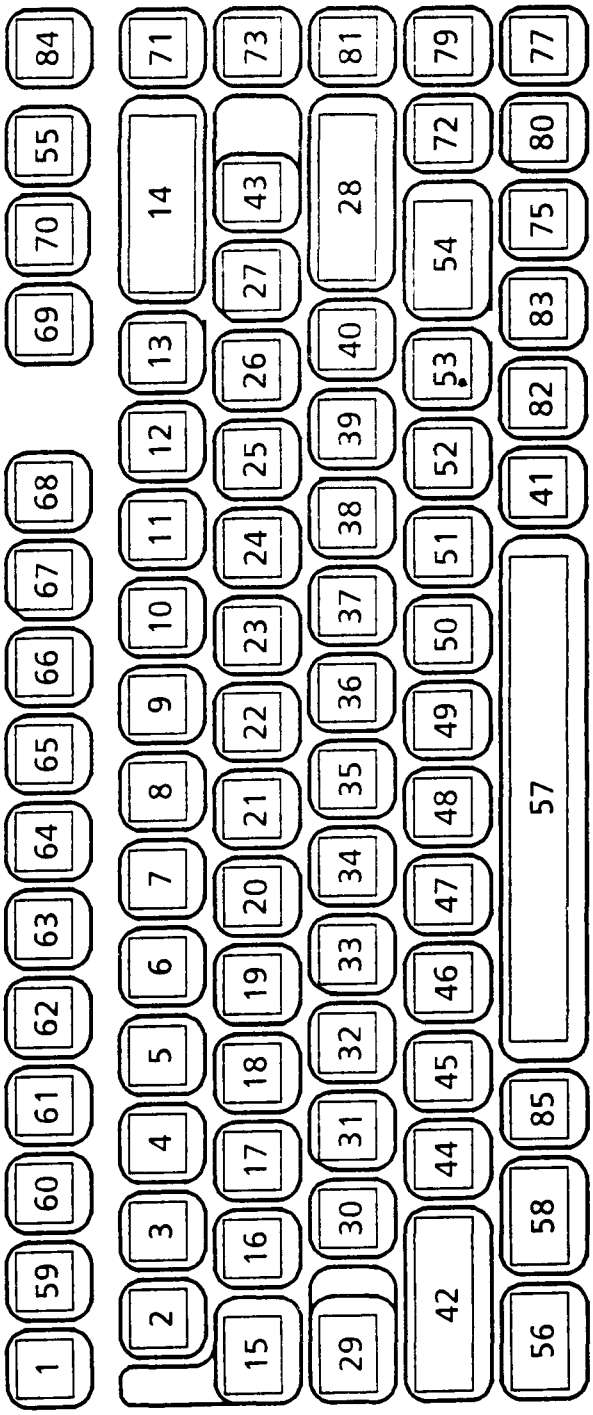


FIGURE C-9 Keycap Number

APPENDIX D

DISPLAY CODE

TABLE D-1 Display Code

HEXA DECIMAL VALUE	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	BLANK (NULL)	►	BLANK (SPACE)	0	@	P	‘	p	Ç	É	á	⁞⁞	⌐	‖	α	≡
1	☺	◄	!	1	A	Q	a	q	ü	æ	í	⁞⁞	⌐	‖	β	±
2	☻	↕	"	2	B	R	b	r	é	Æ	ó	▒	⌐	‖	Γ	≥
3	♥	‼	#	3	C	S	c	s	â	ô	ú	▒	⌐	‖	π	≤
4	♦	¶	$	4	D	T	d	t	ä	ö	ñ	▒	⌐	‖	Σ	⌠
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	▒	⌐	‖	σ	⌡
6	♠	▬	&	6	F	V	f	v	å	û	ª	▒	⌐	‖	μ	÷
7	•	↨	’	7	G	W	g	w	ç	ù	º	▒	⌐	‖	τ	≈
8	◘	↑	(	8	H	X	h	x	ê	ÿ	¿	▒	⌐	‖	Φ	°
9	○	↓	)	9	I	Y	i	y	ë	Ö	⌐	▒	⌐	‖	Θ	∙
A	◙	→	*	:	J	Z	j	z	è	Ü	¬	▒	⌐	‖	Ω	•
B	♂	←	+	;	K	[	k	{	ï	¢	½	▒	⌐	■	δ	√
C	♀	∟	,	<	L	\	l	¦	î	£	¼	▒	⌐	‖	∞	n
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E	♫	▲	.	>	N	^	n	~	Ä	Pt	Ø	▒	⌐	‖	∈	■
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APPENDIX E

SYSTEM BOARD PROBLEM ISOLATION PROCEDURES

This appendix describes the system board problem isolation procedures for the system which has the System BIOS of version 2.00 or later version.
The traditional Beep Sound Check has been deleted.

PROCEDURE 1

Message Check

1. Turn on the power.

2. If the system is loaded normally, go to PROCEDURE 3.

3. If one of the following messages is displayed on the screen, press the F1 key. Execute the setup operation. (See the APPENDIX F for details.)

```
*** Error in CMOS. Bad battery ***
Check system. Then, press [F1] key ......
```

```
*** Error in CMOS. Bad check sum ***
Check system. Then, press [F1] key ......
```

```
**  Error in CMOS. Bad configuration **
Check system. Then, press [F1] key ......
```

```
*** Error in CMOS. Bad memory size ***
Check system. Then, press [F1] key ......
```

```
**  Error in CMOS. Bad time function **
Check system. Then, press [F1] key ......
```

4. If one of the following messages is displayed on the screen, turn off the power. Wait 5 seconds or more, then turn on the power. If the following message is displayed again, go to HDD problem isolation procedures in section 2.6.

```
Insert system disk in drive
Press any key when ready .....
```

```
Check system disk in drive
Press any key when ready ....
```

5. If the following message is displayed on the screen, the system may not be set up correctly. Go to the system setup menu and select the appropriate system configuration. (See the APPENDIX F for details.) If the following message is displayed again, go to PROCEDURE 4.

```
VRAM ERROR
```

6. If any of the following messages is displayed on the screen, go to PROCEDURE 4.

```
*** ERROR DETECTED. ERROR CODE=
*** ERROR ADDRESS=
*** ERROR PATTERN=
CPU FLAG REGISTER ERROR                 PIT CHANNEL 0 ERROR
KBC OBF/IBF ERROR                       CMOS SHUTDOWN BYTE ERROR
KBC SELF TEST ERROR                     DMA CHANNEL 0 ERROR
KBC OBF ERROR                           DMA CHANNEL 1 EEROR
CPU REGISTER ERROR                      MEMORY REFRESH ERROR
ROM CHECKSUM ERROR                      1ST 64KB MEMORY ERROR
ERROR INTERRUPT CONTROLLER #1           KBC #2 ERROR
ERROR INTERRUPT CONTROLLER #2           VRAM ERROR
REFRESH TIMING ERROR                    1ST 64KB MEMORY ERROR
ERROR PROTECT MODE                      LIM PAGE REGISTER ERROR
ERROR SIZING EXPANSION MEMORY
MEMORY VERIFY ERROR AT _:_ FOUND_EXPEXTED_
MEMORY PARITY ERROR AT _:_ FOUND_EXPEXTED_
ERROR INTERRUPTS AND STUCK NMI
ERROR PROCESSOR EXCEPTIONAL INTERRUPTS
ERROR ENCOUNTERED INITIALIZING HARD DRIVE_
```

7. If none of the above messages are displayed and you have a printer port LED, go to PROCEDURE 2.

PROCEDURE 2

Printer Port LED Check

1. Turn off the power.
2. Plug the printer port LED into the PRT/FDD connector on the back of the unit and set the A-B-PRT switch to PRT position.
3. While watching the printer port LED, turn on the power. The printer port LED will light when the power switch is turned on.
4. Read the final LED status from left to right as a hexadecimal value.
5. If the final LED status matches any of the error code values in the table E-2, go to PROCEDURE 4.
6. If the final LED status is **32H,** go to PROCEDURE 3.

TABLE E-1 Printer Port LED Normal Status

Status	Meaning
00H	Shut-down process and video intialization
01H	CPU test 1
02H	KBC test 1
03H	KBC test 2
04H	KBC test 3
05H	KBC test 4
06H	LSI initialization (DMAC, PIT, PIC, RTC)
07H	CPU test 2
08H	RTC intialization
09H	ROM check-sum test
0AH	Video intialization
0BH	(Reserved)
0CH	(Reserved)
0DH	PIT ch.2 test and its intialization
0EH	(Reserved)
0FH	CMOS RAM test
10H	DMA ch.0 test
11H	DMA ch.1 test
12H	DMA page register test
13H	Memory refresh test
14H	First 64KB memory test
15H	Interrupt vector set
16H	PIC 1 mask register test
17H	PIC 2 mask register test
18H	CMOS RAM battery check
19H	CMOS RAM check-sum test

TABLE E-1 Printer Port LED Normal Status (continued)

Status	Meaning
1AH	Keyboard initialization -1
1BH	Video memory test
1CH	Display mode set for video I/O
1DH	System memory size set
1EH	System memory size check
1FH	System memory and extra memory test
20H	PICs test
21H	NMI and parity check
22H	Interrupt process check
23H	Protect mode test
24H	Extended memory size check
25H	Extended memory test
26H	Protect mode exception handling check
27H	ROM to RAM copy
28H	CRT type determination
29H	Timer interrupt check
2AH	Hardware interrupt vector set
2BH	Keyboard initialization -2
2CH	FDD initialization
2DH	SIO and printer initialization
2EH	Hard disk initialization
2FH	Option ROM check
30H	Timer check
31H	NDP initialization
32H	Prepare for boot

TABLE E-2 Printer Port LED Error Status

STATUS	DISPLAY MESSAGES	ERROR INFORMATION	PROCESS
81 H	CPU FLAG REGISTER EROOR		HALT
82 H	KBC IBF/OBF ERROR	KBC (8742) #1 error	HALT
83 H	KBC IBF ERROR	KBC (8742) #1 error	HALT
84 H	KBC SELF TEST ERROR	KBC (8742) #1 error	HALT
85 H	KBC OBF ERROR	KBC (8742) #1 error	HALT
87 H	CPU REGISTER ERROR		HALT
89 H	ROM CHECKSUM ERROR		HALT
8D H	PIT CHANNEL 2 ERROR		HALT
8F H	CMOS SHUTDOWN BYTE ERROR	CMOS RAM R/W error	HALT
90 H	DMA CHANNEL 0 ERROR		HALT
91 H	DMA CHANNEL 1 ERROR		HALT
92 H	DMA PAGE REGISTER ERROR		HALT
93 H	MEMORY REFRESH ERROR		HALT
94 H	1ST 64KB MEMORY ERROR		HALT
96 H	ERROR INTERRUPT CONTROLLER #1		CONT
97 H	ERROR INTERRUPT CONTROLLER #2		CONT
9A H	KBC #2 ERROR		CONT
9B H	VRAM ERROR		CONT
9F H	MEMORY VERIFY ERROR AT : FOUND EXPEXTED MEMORY PARITY ERROR AT : FOUND EXPEXTED	64KB through 640KB and extra memory error	CONT
A0 H	ERROR INTERRUPTS AND STUCK NMI	PIC error in the SI	CONT
A1 H	ERROR INTERRUPTS AND STUCK NMI		CONT

TABLE E-2 Printer Port LED Error Status (continued)

STATUS	ERROR MESSAGES	ERROR INFORMATION	PROCESS
A2 H	ERROR INTERRUPTS AND STUCK NMI		CONT
A3 H	ERROR PROTECT MODE		CONT
A4 H	ERROR SIZING EXPANSION MEMORY		CONT
A5 H	MEMORY VERIFY ERROR AT __:__ FOUND__EXPEXTED__ MEMORY PARITY ERROR AT __:__ FOUND__EXPEXTED__	Extended memory test error	CONT
A6 H	ERROR PROCESSOR EXCEPTIONAL INTERRUPTS		CONT
A9 H	REFRESH TIMING ERROR		CONT
AE H	ERROR ENCOUNTERED INITIALIZING HARD DRIVE or ERROR INITIALIZING HARD DISK CONTROLLER		CONT
C2 H	KBC OBF/IBF ERROR	KBC#2 (8042) error	HALT
C3 H	KBC IBF ERROR	KBC#2 (8042) error	HALT
C4 H	KBC SELF TEST ERROR	KBC#2 (8042) error	HALT
C5 H	KBC OBF ERROR	KBC#2 (8042) error	HALT
D4 H	1ST 64KB MEMORY ERROR	Parity error	HALT
DF H	LIM PAGE REGISTER ERROR		HALT

NOTE: 'HALT' means that the system will halt when the error is detected and the buzzer will sound once. 'CONT' means that the system will continue to operate even if the error is detected but the buzzer will sound three times.

PROCEDURE 3

Test Program Execution

1. Execute the following tests on the Diagnostic Test Menu. (Refer to Part 3 Test and Diagnostics.)

    1. System test
    2. Memory test
    3. Keyboard test
    4. Display test
    5. Floppy disk test
    6. Hard disk test
    7. Real timer test

2. If an error is detected during the system test, memory test, display test, or real timer test, go to PROCEDURE 4.

3. If an error is detected during the floppy disk test, go to FDD problem isolation procedures in section 2.5.

4. If an error is detected during the hard disk test, go to HDD problem isolation procedures in section 2.6.

5. If an error is detected during the keyboard test, go to keyboard problem isolation procedures in section 2.7.

PROCEDURE 4

System Board Replacement

1. Replace the system board. (Refer to section 4.16.)

2. If normal operation is restored after replacing the system board, the original system board is probably defective.

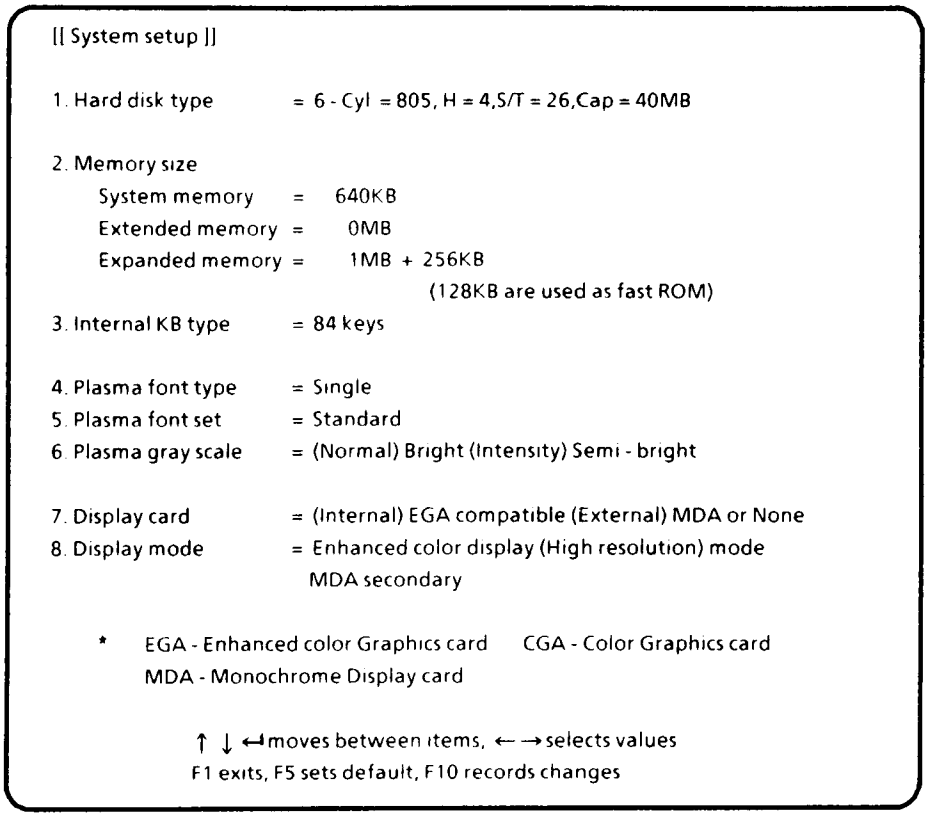
3. If normal operation is not restored, another FRU is probably defective. The defective unit must be isolated and replaced.

APPENDIX F

NEW SETUP PROCEDURES

The setup procedures described here are applied to the system which has the System BIOS of version 2.00 or later version.

After you select 'setup' in the TEST3 program, the following setup menu appears:



The items and settings displayed on this setup menu represent the system configuration stored in the backed-up memory.

You can select one of the items listed on the setup menu with using the up-arrow, down-arrow or Enter key. The selected item is shown by that whose setting is displayed in reverse and you can change the setting for that item with using the right-arrow or left-arrow key. Settings can be chosen among the predetermined ones which are described later in this section.

If you want just to look at the current setup, press the F1 key. No setup changes in the backed-up memory will be made even if the settings displayed on the screen are changed, and the system power-up sequence will be repeated. However, if you press the F5 key before exit, the contents of the backed-up memory will be changed to the default.

If you want to get the default setup which represents the standard system configuration, press the F5 key. The default setup will be stored into the backed-up memory. The memory size will automatically be examined and determined by the system.

After you finish all the setup that you want to change, press the F10 key. The system will ask to confirm it with this message:

```
ARE YOU SURE ? (N)
```

If you have mistaken on your setup, type n or just press the Enter. If your setup is O.K., type y. The new setup will be stored into the backed-up memory and the system power-up sequence will be repeated.

(1) Hard disk type:

You can select one of several types of the hard disk drive that can be installed in the system including future options. These drives are listed below:

Setting	Cyl	Head	Sector/track	Capacity
0:	- No drive -			
6:	805	4	26	40MB
7:	979	5	17	40MB
8:	613	6	26	48MB
9:	776	8	33	100MB

Setting 6 and 7 are physically of the same drive and the only difference is its logical definition. Setting 6 designates 'native mode' that works in a normal way, while Setting 7 designates 'translate mode' that internally translates a given address to the physical address.

The default is Setting 6 and you can select Setting 6 or 7 for the standard T5100.

(2) Memory size:

You can specify each memory size for the extended memory and the extra memory. The extended memory is defined for that above 1MB address, and the extra memory is the area above the system memory and below the extended memory. The extra memory is used as part of the expanded memory which is defined according to the LIM-EMS. The system memory which is also referred to 'conventional memory' is 640KB or 512KB depending on the DIP switch setting (switch 2).

You can specify the size of the extended memory from 0MB to the maximum (total memory size) in 0.5MB increments. The size of the expanded memory will be affected each time when you change it. The default size of the extended memory is 0MB.

For the extra memory you can choose one of three settings which are:

Setting	640KB system	512KB system
1:	0KB	0KB
2:	256KB	384KB (The remaining 128KB is used as fast ROM.)
3:	384KB	512KB

If you select Setting 1, the extra memory is used as part of the extended memory. In this case, no expanded memory is assigned and you can use all the memory as the extended memory. If you select Setting 2, the remaining 128KB memory is used as fast ROM that has a copy of the BIOS ROM and it can run faster more than three times. The default is Setting 2.

Setting 3 may be useful if you want the maximum size of the expanded memory or if you want to inhibit the copy of the ROM. The latter may happen in case that memory addresses between 0C8000H and 0CFFFFH are used by expansion slot options such as IBM Token Ring Adaptor. If you require more detailed information, consult your dealer.

(3) Internal KB type:

There are two types of keyboard that you can specify for the internal keyboard.

Setting	Keyboard
1:	84 keys
2:	101 keys

Setting 1 designates that the internal keyboard works just like the standard 84-key keyboard, while Setting 2 does that it works like the enhanced 101-key keyboard. However, Setting 2 is allowed only for USA version and you must set Setting 1 if your keyboard is not USA version. The default is Setting 1.

(4) Plasma font type:

You can select one of two font types for plasma display. The default is Setting 1.

Setting	Font
1:	Single dot
2:	Double dots

(5) Plasma font set:

You can select one of two font sets both for plasma and CRT displays. The default is Setting 1.

Setting	Font
1:	Standard
2:	North European

(6) Plasma gray scale:

For your convenience the system offers two possible settings for gray scale adjustment for plasma display.

Setting	Normal	Intensity
1:	Bright	Semi-bright
2:	Semi-bright	Bright

In text display mode, there are 16 color codes that are defind by four color bits; Intensity, Red, Green, Blue. 'Normal' designates a set of color codes when the Intensity bit is off, while 'Intensity' does a set of color codes when it is on. You can assign the brightest gray scale of plasma either for 'Normal' or 'Intensity'. The default is Setting 1.

(7) Display card:

You can select one of several display card settings as listed below.

Setting	Internal	External
1:	EGA compatible	MDA or None
2:	CGA compatible	MDA or None
3:	Disable	CGA (40*25)
4:	Disable	CGA (80*25)
5:	Disable	MDA
6:	Disable	Others
7:	Reserved	

You can select either Setting 1 or 2 when you use the internal display controller. If you select Setting 2, the display controller works just like IBM CGA card as well as T3100 display controller.

If you select one of Setting 3 through 6, you must set the internal display controller to be off by the DIP switch 3 after you exit the setup. In Setting 6, 'Others' designates other display cards such as IBM EGA card. Setting 7 must not be specified.

The default for display card is Setting 1.

If the previous setting is Setting 2 and you change it, the following message will be displayed on the screen when you exit and the system will halt.

```
Please turn OFF the power switch and turn ON it again.
```

Turn the system power off and turn it on again after at least five seconds elapsed.

(8) Display mode:

This item appears only when Setting 1 (Internal-EGA compatible) is selected in the previous item. You can select one of four settings listed below:

Setting	Display mode
1:	Color display (40*25) mode
2:	Color dispaly (80*25) mode
3:	Enhanced color display (Emulation) mode
4:	Enhanced color display (High resolution) mode

If you select Setting 1, the system will start up with low resolution text mode, 40 columns by 25 rows. Settings 2 and 3 specify the same resolution text mode, 80 columns by 25 rows. The difference is that you must select Setting 2 when a standard color display is connected to the system, while you can select Setting 3 when an enhanced color display is connected. In these modes, an 8x8 dots character font set is used. When an enhanced color display is connected, you can select Setting 4 that uses an 8x14 dots character font set in 80 columns by 25 rows text mode.

In plasma display, there is no differnce between Settings 2, 3 and 4. The same resolution text mode, 80 columns by 25 rows, is selected.

The default for display mode is Setting 4.

In addition, you can specify the external MDA card to be primary or secondary. If you specify 'primary', the following warning message will be displayed:

If it is O.K., type y. If not, type n or press the Enter.