1.1   GENERAL

The Toshiba T3200SX is one of the most advanced portable personal computers available offering high technology, high speed, and IBM PC AT compatibility.

The T3200SX main features are as follows:

- The central processing unit (CPU) is the 80386SX-16 32-bit microprocessor, operated at 16 MHz.

- The standard memory has 1 Mbyte of random access memory (RAM) with 16-bit data bus width, expandable up to 13 Mbytes maximum.

- The Intel80387 SX-16 math co-processor is connected.

- The display supports high resolution plasma display panel (PDP) with 640 by 480 pixels (dots) and 16-level gray scale.

- The display controller supports high resolution graphics subsystem, includes the functions of video graphics array (VGA).

- The hard disk drive (HDD) has a capacity of 40 Mbytes or 80 Mbytes (to be supplied) with 25-millisecond (ms) average access time.

- The floppy disk drive (FDD) can support 2DD (720 Kbytes) and 2HD (1.44 Mbytes) floppy disks.

- The keyboard has 91/92-key keyboard with the keys of a subset of the industry standard 101/102-key keyboard.

- The universal auto-sensing power supply is used for world-wide usage.

- The lithium battery bucks up the calendar clock.

- The T3200SX can connect one 8-bit half size industry standard slot or one 16-bit Toshiba slot, and one 16-bit full size industry standard slot.

- The interface connector has one PRT/EXT.FDD connector (25-pin), two serial connectors (9-pin), one VGA connector (15-pin), and external keyboard connector (5-pin).

- The built-in modern slot for T1200 style modem is supported.

The T3200SX Personal Computer is shown in figure 1-1, and the configuration of the T3200SX's system unit is shown in figure 1-2.
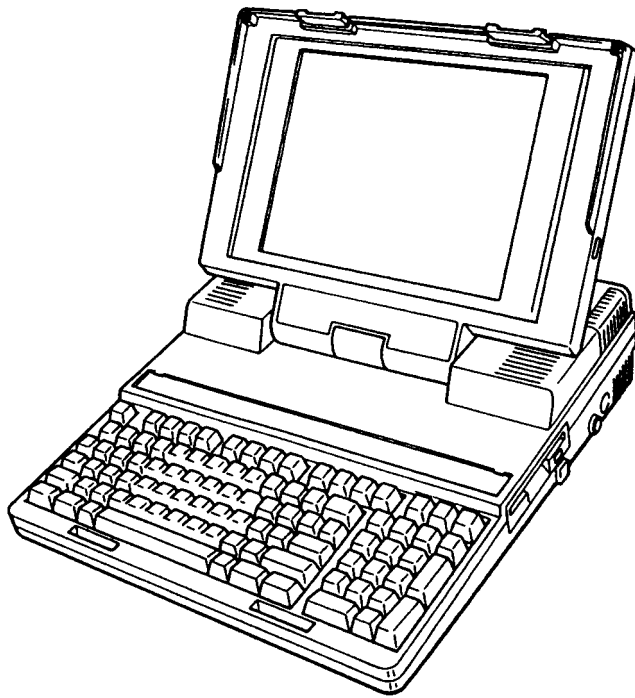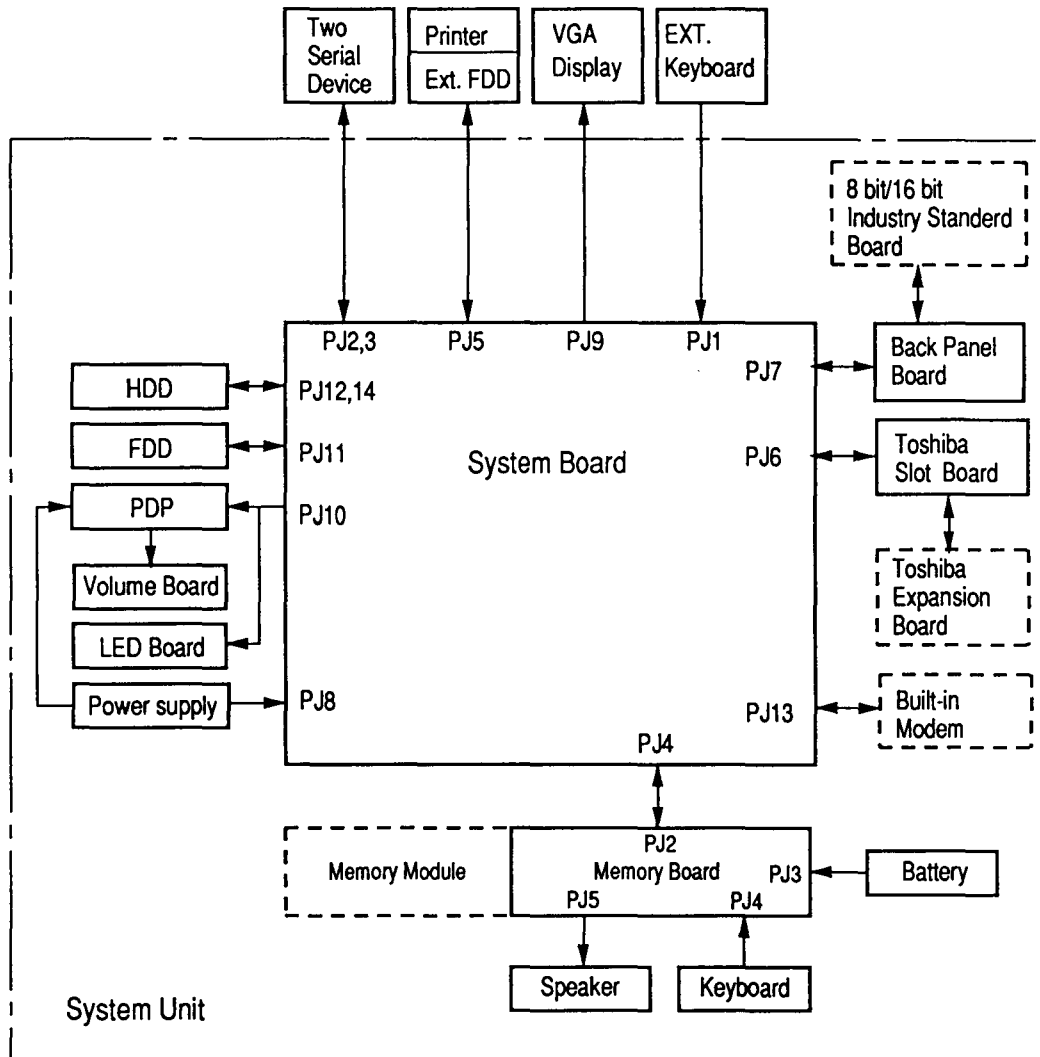
Figure 1-1 T3200SX personal computer

Figure 1-2 System unit configuration

1.2   SYSTEM BOARD/MEMORY BOARD

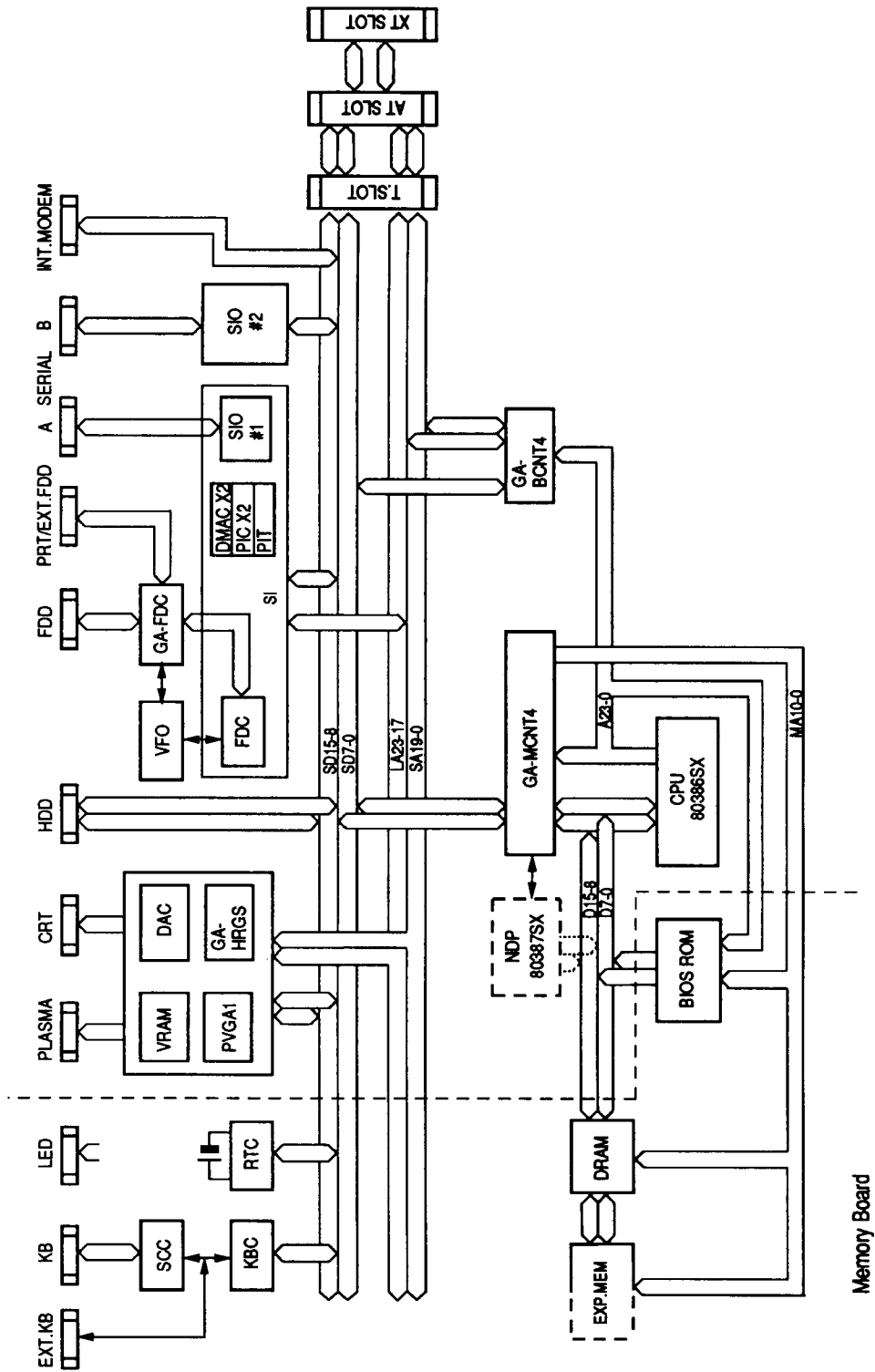Figure 1-3 shows the block diagram of the main boards.

Figure 1-3   Block diagram

The system board is composed of the following components:

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

- Numeric data processor socket for the 80387SX-16 (Optional)

- Serial input output (SIO): NS16450

- Variable frequency oscillator (VFO): MB4108

- Super integration (SI): T9778A
  SI includes the two DMACs (equivalent to 82C37), two PICs (equivalent to 82C59), one PIT (equivalent to 82C54), one FDC (equivalent to TC8565), and one SIO (equivalent to TC8570).

- Gate arrays
  Gate array memory controller (GA-MCNT4)
  Gate array bus controller (GA-BCNT4)
  Gate array FDD/printer controller (GA-FDC)

- High resolution graphic subsystem (HRGS)
  Gate array HRGS (GA-HRGS)
  Paradise video graphic array (PVGA1)
  Digital to analogue converter (DAC)
  Video RAM: 1 Mbyte

The system board is shown in figure 1-4.
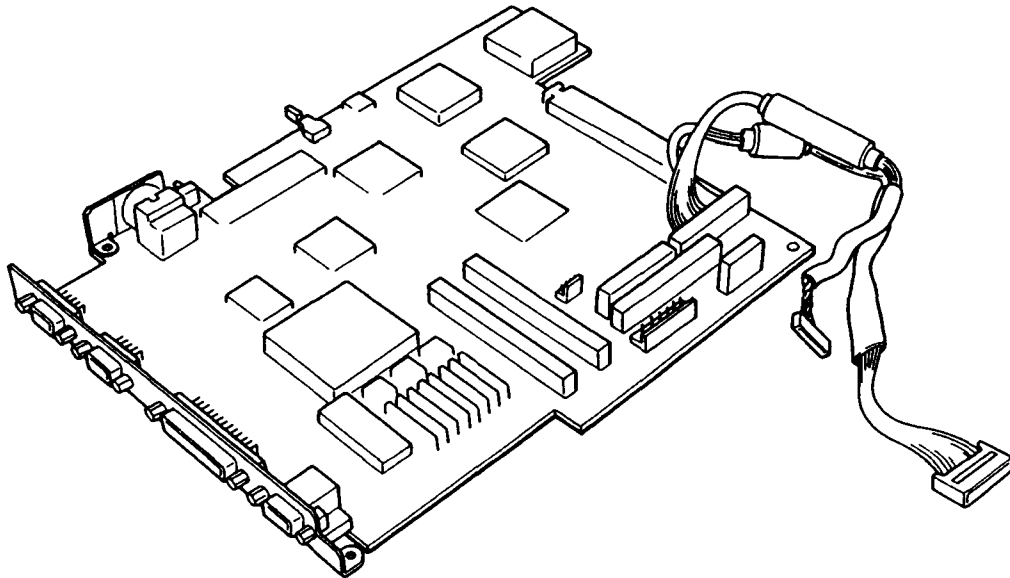
Figure 1-4 System board

The memory board is composed of the following components:

- Real time clock (RTC): MC146818A or equivalence

- Keyboard controller (KBC): 8742

- Keyboard scan controller (SCC): 8749

- Initial program loader (IPL) ROM: 128 Kbytes
                                     (96 Kbytes are used)
  This ROM contains initial reliability test (IRT),
  system basic input output system (system BIOS),
  and video BIOS.

- System RAM: 1 Mbytes

- Memory module socket
  The memory is expandable upto 13 Mbytes maximum.

The memory board is shown in figure 1-5.
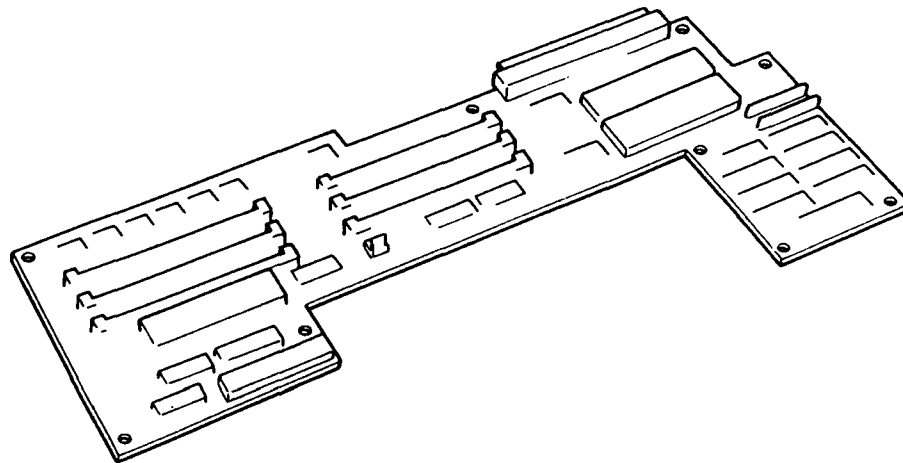
Figure 1-5 Memory board

1.3   3.5-INCH FLOPPY DISK DRIVE

The 3.5-inch internal FDD is a high performance, reliable
and thin drive that supports 720-Kbyte (formatted) 2DD and
1.44-Mbyte (formatted) 2HD 3.5-inch floppy disks.
The FDD is shown in figure 1-6 and its specifications are
described in table 1-1.
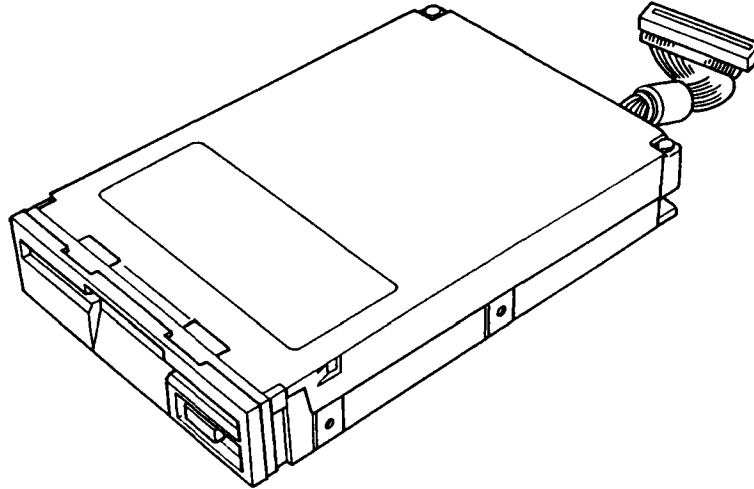
Figure 1-6   3.5-inch FDD

Table 1-1   3.5-inch FDD specifications

Item	Specifications	
	2-Mbyte Mode	1-Mbyte Mode

Storage capacity   (Kbytes)
  Unformatted
  Formatted
	2,000
	1,440
		1,000
		720

Number. of heads	2	2
Number. of cylinders	80	80

Access time   (ms)
  1 Track access
  Average
  Head settling time
	3
	94
	15
		3
		94
		15

Recording density (bit 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)	

1.4   3.5-INCH HARD DISK DRIVE

The 80-Mbyte (to be supplied) and 40-Mbyte hard disk drive (HDD) is a random access type storage device. It is equipped with non-removal 3.5-inch magnetic disk and mini-winchester type magnetic heads.

The HDD is shown in figure 1-7 and specifications are described in table 1-2.
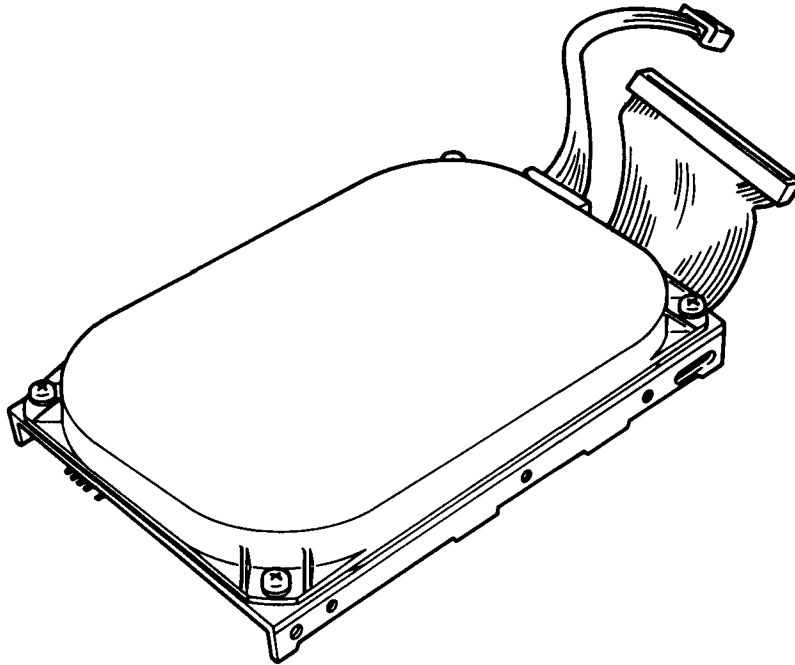
Figure 1-7   3.5-inch HDD

Table 1-2 3.5-inch HDD specifications

Item	Specifications 40-Mbyte (Translate mode)
Strange capacity (Mbyte) Formatted	42.8
Number of heads	5
Tracks per surface	980
Sector per track	48
Bytes per sector	512

Access time (ms)
  Track to track
  Average
  Maximum
	8
	25
	50

Interleave	1:1
Rotational speed (rpm)	3,557
Buffer (Kbyte)	8
Programmed I/O operation (bits)	16
Recording method	2-7 RLL code

Item	Power	
Voltage (VDC)	+12 V	+5 V
Current (A)	230 mA (R/W) 140 mA (Seeking) 100 mA (Idle)	275 mA (R/W) 180 mA (Seeking) 160 mA (Idle)

1.5　HDD JUMPER STRAPS

The HDD has four jumper straps located on the hard disk
control board as shown in figure 1-8, and their status is
listed in table 1-3.
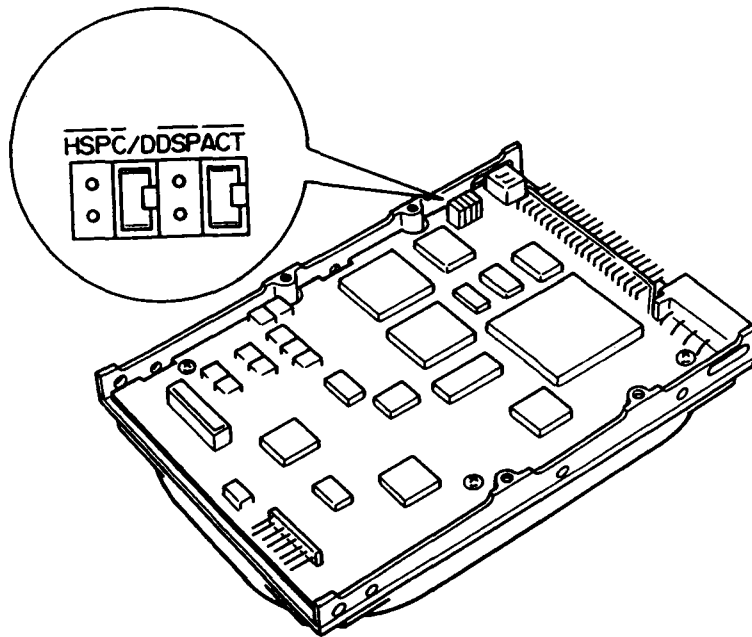
Figure 1-8　HDD jumper straps

Table 1-3　HDD jumper strap status

Signal	Status
HSP	Open
C/D	Short
DSP	Open
ACT	Short

1.6   KEYBOARD

The 91/92-key keyboard with full size keys and standard
spacing provides full compatibility with standard IBM
software.   The keyboard is connected to the keyboard
controller on the system board through a 27-pin flat cable.
The keyboard is shown in figure 1-9.
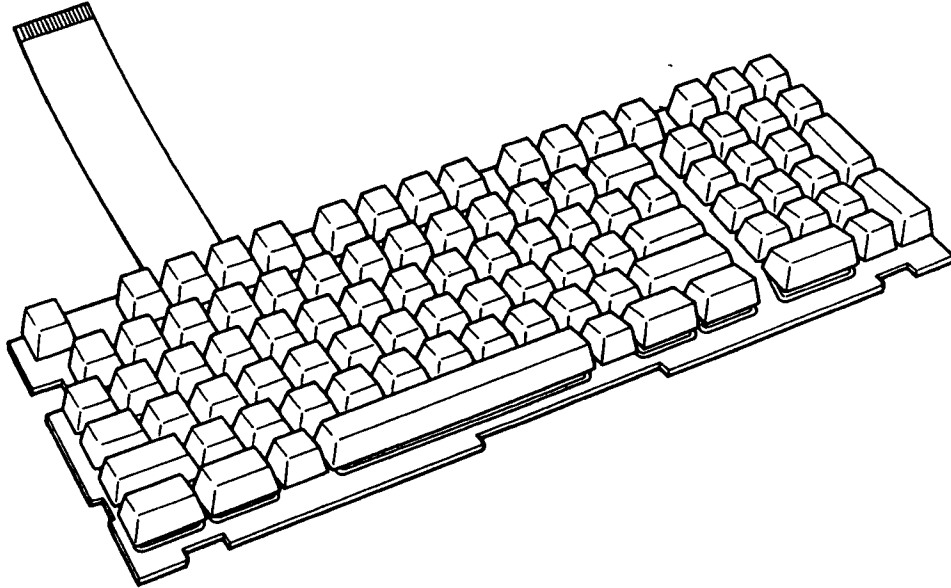
Figure 1-9 Keyboard

1.7   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 plasma display has 16 levels of gray scale and the display quality can be adjusted by contrast control. The specifications are described in table 1-4. The plasma display is shown in figure 1-10.
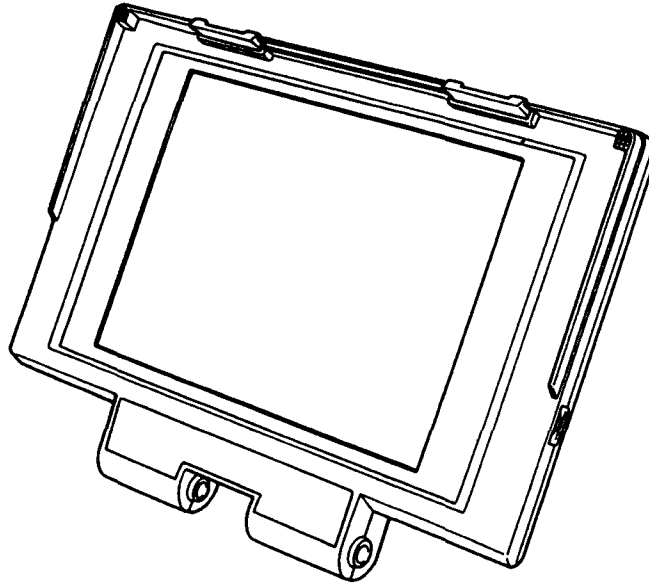
Figure 1-10   Plasma display

Table 1-4   Plasma display specifications

Item	Specifications
Number of dots (dots)	640×480
Dot dimension (mm)	0.20 (W)×0.24 (H)
Dot pitch (mm)	0.36 (W)×0.36 (H)
Display area (mm)	230.4 (W)×172.8 (H)
Color	Neon-Orange
Contrast ratio	100:1
Gray scale	16 levels
Power (max.)	44 watts
Mean time between failure (MTBF) (hours)	20,000

1.8   POWER SUPPLY UNIT

The universal auto-sensing power supply can be used world-
wide and supplies +5, -5, +12, -12 and +205 VDC to the
system.

The power supply unit is housed in the system unit and it
supplies the regulated power to:

1) System board
2) Memory board
3) 3.5-inch floppy disk drive (FDD)
4) 3.5-inch hard disk drive (HDD)
5) External keyboard
6) Plasma display
7) Option boards
8) Cooling fans

The power supply unit includes an input line filter, line
fuse, cooling fan, power conversion circuitry and
connectors.

Input ratings are: 115 VAC, 1.8 A or 230 VAC, 1.2 A.

The power supply unit is shown in figure 1-11 and the output
ratings are specified in table 1-5.
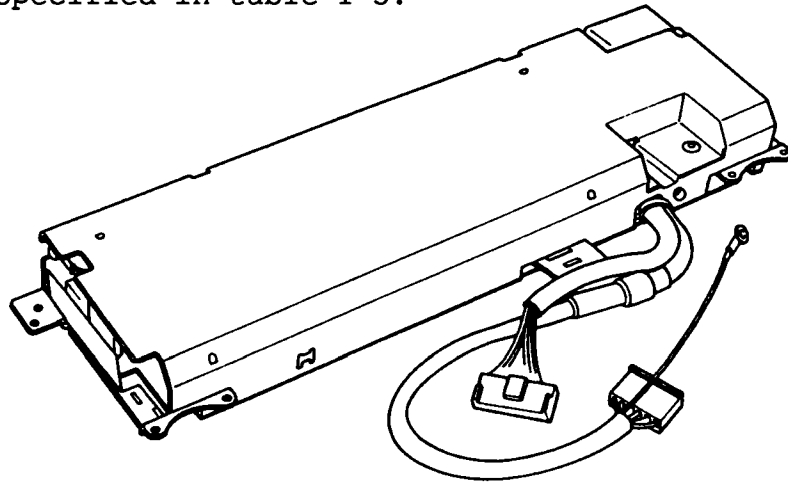
Figure 1-11   Power supply unit

Table 1-5   Power supply unit output rating

	DC Voltage (V)	Maximum Current (A)	Regulation Tolerance (%)
For system	+5	5.8	+/-5
	+12	1.4	+/-5
	-5	0.25	+/-10
	-12	0.3	+/-10
For plasma display	+5 (E1)	0.5	+/-5
	+205 (E2)	0.12	200 to 210 V
	+5 (E3)	0.006	+/-10

(This page is intentionally blank.)

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.   Memory board
    4.   FDD
    5.   HDD
    6.   Keyboard
    7.   Plasma display

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

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

    1.   T3200SX diagnostics disk
    2.   Phillips head screwdriver
    3.   Blade head screwdriver
    4.   Tweezers
    5.   2DD and 2HD formatted 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 an T3200SX 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.

```
                    ( START )
                        |
                        v
          +-------------------------+
          | Turn the POWER          |
          | switch off.             |
          +-------------------------+
                        |
                        v
          +-------------------------+
          | Wait 5 seconds          |
          | or more.                |
          +-------------------------+
                        |
                        v
              /\                          +-------------------------+
             /  \  Does the Power    No   | Perform power supply unit|
            <    > indicator come on ---->| problem isolation        |
             \  /  when the power is      | procedures in section 2.3|
              \/   turned on?             +-------------------------+
                |
                | Yes
                v
              /\                          +-------------------------+
             /  \  An error         Yes   | Perform system and memory|
            <    > message          ----->| boards problem isolation |
             \  /  displayed?             | procedures in section 2.4|
              \/                          +-------------------------+
                |
                | No
                v
              /\                          +-------------------------+
             /  \  The               No   | Perform plasma display   |
            <    > "640K Base Memory ----->| problem isolation        |
             \  /  XXXXXB Extended"       | procedures in section 2.8|
              \/   message displayed?     +-------------------------+
                |
                | Yes
                v
              /\                          +-------------------------+
             /  \  Does the          No   | Perform system and memory|
            <    > "640K Base Memory ----->| boards problem isolation |
             \  /  XXXXXB Extended" message| procedures in section 2.4|
              \/   proceed from 64KB to   +-------------------------+
                   Base Memory=640KB
                   Extended=384KB?
                |
                | Yes
                v
              /\                          +-------------------------+
             /  \  Is the CO>        No   | Perform HDD problem      |
            <    > displayed on      ----->| isolation procedures in  |
             \  /  the screen?            | section 2.6.             |
              \/                          +-------------------------+
                |
                | Yes
                v
               (1)
```
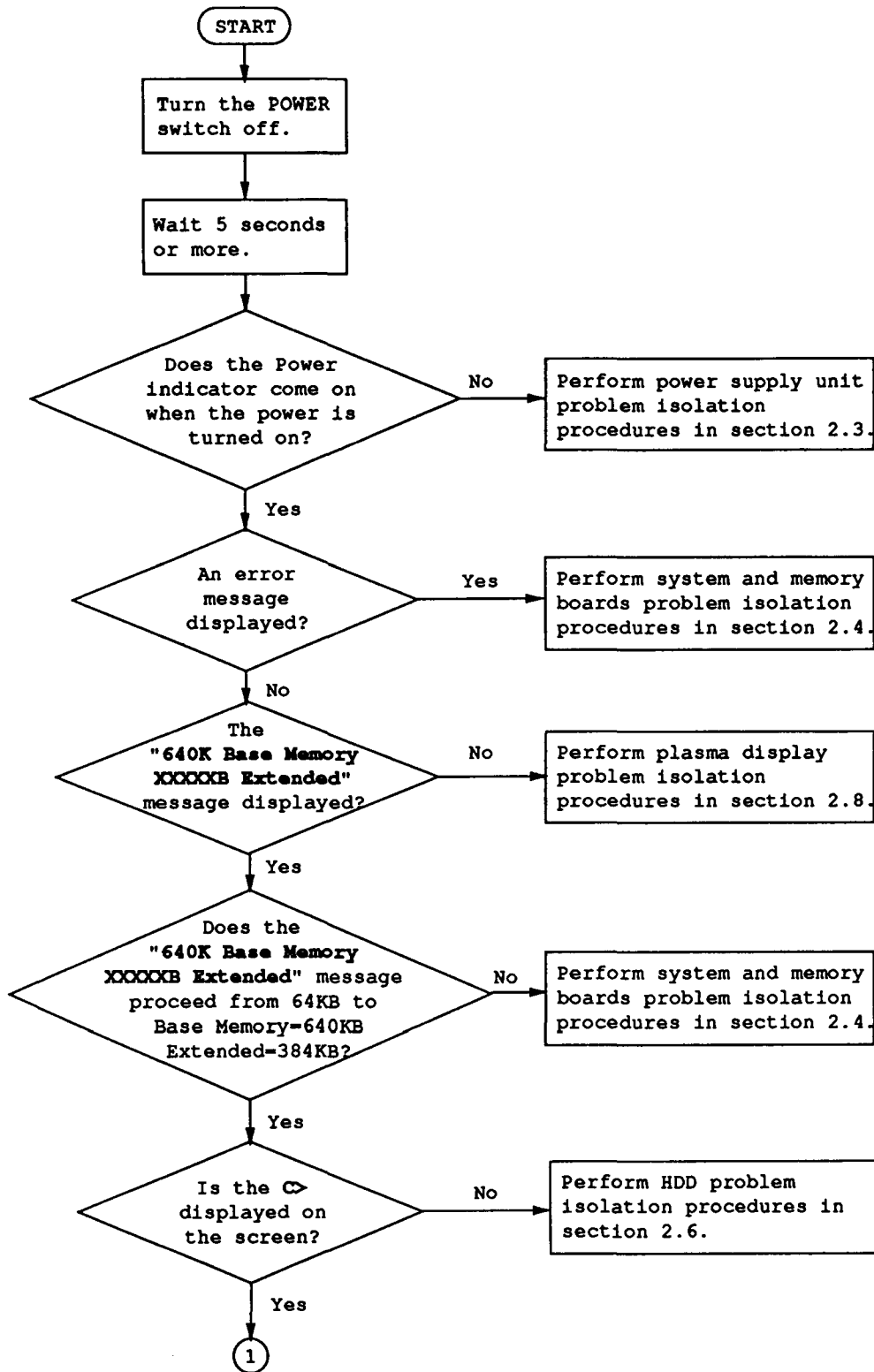
Figure 2-1 Problem isolation flowchart

①

```
Insert the diagnostics
disk into the FDD.
```

```
Type a:testce32, then
press Enter.
```

Is test and diagnostics program being loaded? (see PART 3) —— No —→ Perform FDD problem isolation procedures in section 2.5.

Yes

Is an error detected when the diagnostics disk program is run? —— Yes —→ After confirming which diagnostics test detected an error, perform the relevant problem isolation procedures, as indicated below.

No

```
System normal
```
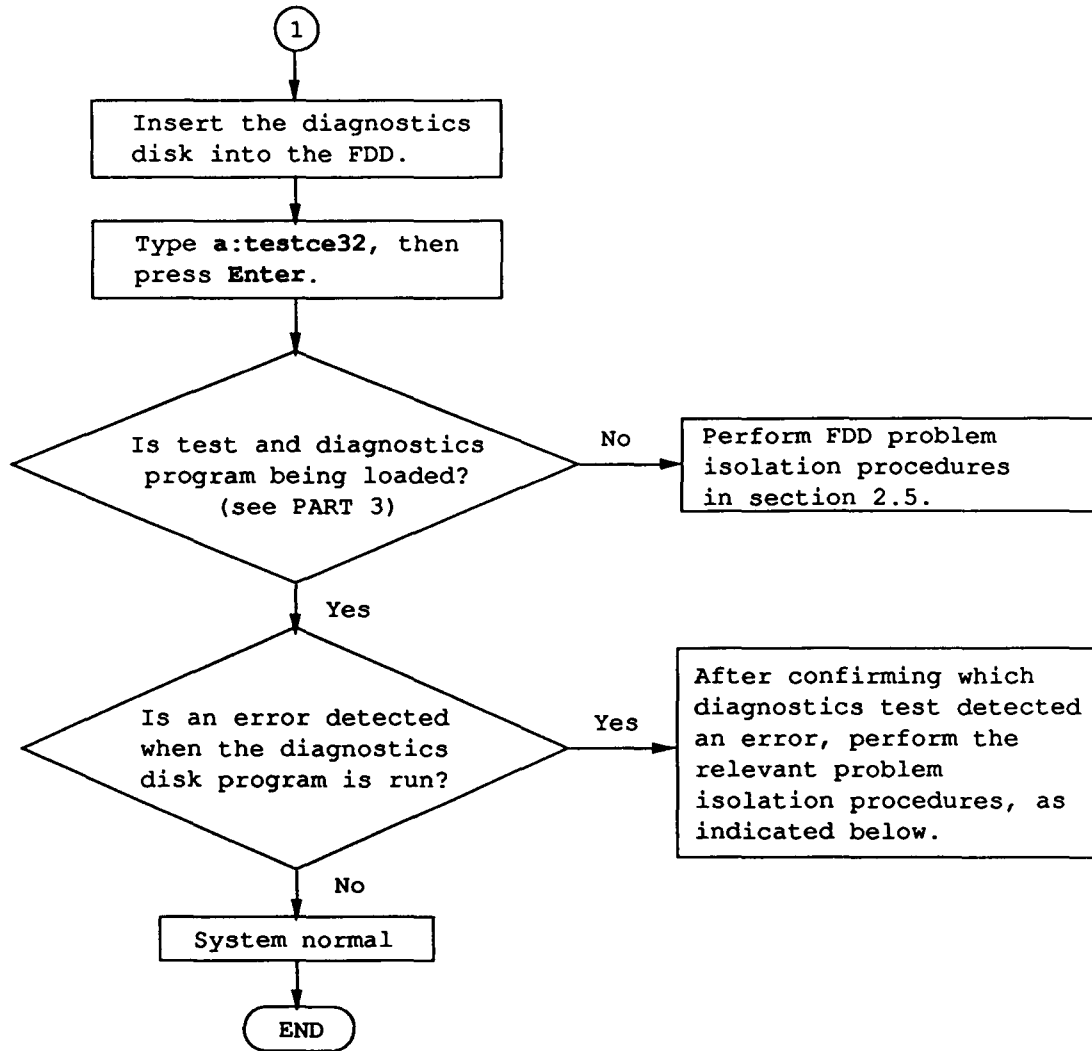
(END)

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 and memory boards 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 Replacement

PROCEDURE 1

Power Indicator Check

1. Turn on the power.

2. If the power indicator 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.

PROCEDURE 2

Connector Check

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

2.   Remove the top cover.   (Refer to section 4.6.)

3.   Remove the power supply unit.   (Refer to section 4.8.)

4.   If the power supply connector (PJ8) on the system
     board is connected properly, go to PROCEDURE 3.   If it
     is not connected properly, reconnect it.

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 of the three power supply connectors match to the values 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 and memory boards isolation procedures in section 2.4.

4. If the voltages are still not within the range of values given in table 2-1, go to PROCEDURE 4.

Table 2-1 Power supply unit output voltages

Connector	Pin Number		Voltage (VDC)		
	+lead	-lead	Normal	Min	Max
For system board	4	3, 5, 6	12	11.4	12.6
	7,8	3, 5, 6	5	4.75	5.25
	1	3, 5, 6	-12	-13.2	-10.8
	2	3, 5, 6	-5	-5.25	-4.75
For plasma display	1	4	5	4.75	5.25
	2	4	205	200	210
	3	4	5	4.75	5.25

PROCEDURE 4

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 AND MEMORY BOARDS 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 or memory 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:   Printer Port LED Check

PROCEDURE 3:   Test Program Execution

PROCEDURE 4:   Memory Board Replacement

PROCEDURE 5:   System Board Replacement

> **NOTE:** *The message of PROCEDURE 1 is for the system BIOS of version 1.XX.*

PROCEDURE 1

Message Check

1.   Turn on the power.

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

3.   If the following message is displayed on the screen, press the **F2** key.

> **Invalid configuration - please run SETUP program.**
>
> **Strike the F1 key to continue. F2 to run the setup utility.**

When pressing the **F2** key, following error message is displayed. Press any key, then execute the setup operation.

> **Errors have been found during the power on self test in your computer. The errors were:**
>
> **CMOS checksum Invalid**
> **Clock chip lost power**
> **Incorrect configuration data in CMOS**
>
> **Hit any key to continue:**

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, go to PROCEDURE 4.

> **CPU flag register error**
> **KBC IBF/OBF error**
> **KBC IBF error**
> **KBC self test error**
> **KBC OBF error**
> **CPU register error**
> **ROM checksum error**
> **PIT channel 2 error**
> **CMOS shutdown byte error**
> **DMA channel 0 error**
> **DMA channel 1 error**
> **DMA page register error**
> **Memory refresh error**
> **1st 64KB memory error**
> **Error interrupt controller 1**
> **Error interrupt controller 2**
> **VRAM error**
> **Memory verify error at X:X found X expanded X**
> **Memory parity error at X:X found X expected X**
> **Error interrupt and stuck NMI**
> **Error interrupts and stuck NMI**
> **Error protect mode...**
> **Error sizing expansion memory**
> **Memory verify error at X:X:X found X expected X**
> **Memory parity error at X:X:X found X expected X**
> **Error processor exceptional interrupts...**
> **Refresh timing error**
> **Error encountered initializing hard drive**
> **First 64KB memory error**

6.   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 status values in the table 2-3, go to PROCEDURE 4.

6. If the final LED status is **32H** (for BIOS version 1.XX), go to PROCEDURE 3.

Table 2-2 Printer port LED normal status

System BIOS version 1.XX

Status	Message
00H	Shutdown process and video initialization
01H	CPU test 1
02H	KBC test 1
03H	KBC test 2
04H	KBC test 3
05H	KBC test 4
06H	LSI initialization
07H	CPU test 2
08H	RTC initialization
09H	ROM checksum test
0AH	Video initialization
0BH	Reserved
0CH	Reserved
0DH	PIT Channel 2 test and initialization
0FH	CMOS RAM test
10H	DMA Channel 0 test
11H	DMA channel 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 battery test
19H	CMOS checksum test
1AH	Keyboard initialization 1
1BH	VRAM test
1CH	Video I/O initialization
1DH	System memory size set
1EH	System memory size check
1FH	System memory and extra memory test
20H	PIC test
21H	NMI and parity test
22H	Interrupt process test
23H	Protect mode test
24H	Extended memory size check
25H	Extended memory test
26H	Protect mode exception processing test
27H	ROM copy to RAM
28H	CRT type check
29H	PIT interrupt check
2AH	Hardware interrupt vector set
2BH	Keyboard initialization 2
2CH	FDD initialization
2DH	SIO/Printer initialization
2EH	HDD initialization
2FH	Option ROM check
30H	Timer check
31H	NDP initialization
32H	Prepare for boot

Table 2-3 Printer port LED error status

System BIOS version 1.XX

Status	Message	Process
81H	CPU flag register error	Halt
82H	KBC IBF/OBF error	Halt
83H	KBC IBF error	Halt
84H	KBC self test error	Halt
85H	KBC OBF error	Halt
87H	CPU register error	Halt
89H	ROM checksum error	Halt
8DH	PIT channel 2 error	Halt
8EH	CMOS date and clock error	Halt
8FH	CMOS shutdown byte error	Halt
90H	DMA channel 0 error	Halt
91H	DMA channel 1 error	Halt
92H	DMA page register error	Halt
93H	Memory refresh error	Halt
94H	1st 64KB memory error	Halt
96H	Error interrupt controller 1	Halt
97H	Error interrupt controller 2	Continue
9BH	VRAM error	Halt
9FH	Memory verify error at X:X found X expanded X	Continue
	Memory parity error at X:X:X found X expected X	Continue
A0H	Error interrupt and stuck NMI	Continue
A1H	Error interrupts and stuck NMI	Continue
A2H	Error interrupts and stuck NMI	Continue
A3H	Error protect mode	Continue
A4H	Error sizing expansion memory	Continue
A5H	Memory verify error at X:X:X found X expected X	Continue
	Memory parity error at X:X:X found X expected	Continue
A6H	Error processor exceptional interrupts	Continue
A9H	Refresh timing error	Continue
AEH	Error encountered initializing hard drive	Continue
D4H	First 64KB memory error	Halt

Table 2-3 Printer port LED error status (continued)

System BIOS version 3.XX

Message	Possible Cause
Diskette configuration error	The specified configuration is not supported.
Diskette drive reset failed	The diskette adapter has failed
Diskette drive 1 seek failure	The B: drive failed or is missing.
Diskette drive 0 seek failure	The A: drive has either failed or is missing.
Diskette drive reset failed	The diskette adapter has failed
Diskette read failure – strike F1 to retry boot	The diskette is either not formatted or defective.
Display adapter failed: using alternate	• The color/monochrome switch is set wrong. • The primary video adapter failed.
Errors found disk X: Failed Initialization	POST reports hard disk configuration information is incorrect.
Errors found Incorrect configuration Information memory size miscompare	POST reports the size of base or expansion memory does not agree with configuration information.
Gate A20 failure	Protected mode cannot be enabled.
Hard disk configuration error	The specified configuration is not supported.
Hard disk controller failure	The controller card has failed.
Hard disk failure	Bad disk or incorrect type number in CMOS.
Hard disk read failure – strike F1 to retry boot	The hard disk is defective.
Invalid configuration Information – please run SETUP program	• Memory size is incorrect. • Display adapter is configured.incorrectly. • Wrong number of diskette drives.
Keyboard clock line failure Keyboard data line failure	Either the keyboard or the keyboard cable connection is defective.
Keyboard controller failure	The keyboard controller firmware has failed.
Keyboard is locked – please unlock	The keyboard lock located at the front of the computer is activated.
Keyboard stuck key failure	A key(s) is jammed.

System BIOS version 3.XX (continued)

Message	Possible Cause
Memory address line failure at *hex-value*, read hex-value, expecting *hex-value*	Circuitry associated with the memory chips has failed.
Memory data line failure at *hex-value*, read *hex-value, hex-value*	One of the memory chips or associated circuitry has failed.
Memory high address line failure at *hex-value*, read *hex-value*, expecting *hex-value*	Circuitry associated with the memory chips has failed.
Memory double word logic failure at *hex-value*, read *hex-value*, expecting *hex-value*	Memory chip circuitry failed.
Memory odd/even logic failure at *hex-value*, read *hex-value*, expecting *hex-value*	Circuitry associated with the memory chips has failed.
Memory parity failure at *hex-value*, read *hex-value*, expecting *hex-value*.	One of the parity memory chips has failed.
Memory write/read failure at *hex-value*, read hex-value, expecting *hex-value*.	One of the memory chips has failed.
No boot device available - strike F1 to retry boot	Either diskette drive A:, the hard disk, or the diskette itself is defective.
No boot sector on hard disk - strike F1 to retry boot	The C: drive is not formatted or is not bootable.
Not a boot diskette - strike F1 to retry boot	The diskette in drive A: is not formatted as a bootable diskette.
No timer tick Interrupt	The timer chip has failed.
Hex-value optional ROM bad checksum= *hex-value*	The peripheral card contains a defective ROM.
Shutdown failure	The keyboard controller or its associated logic has failed.
Time-of-day clock stopped	The CMOS Time-of-day clock chip has failed.
Time-of-day not set - please run SETUP program	Clock not set.
Timer chip counter 2 failed	Chip failed.
Timer or Interrupt controller bad	Either the timer chip or the Interrupt controller is defective.
Unexpected Interrupt in protected mode	The nonmaskable Interrupt (NMI) port can't be disabled.

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.   Printer test
           7.   ASYNC test
           8.   Hard disk test
           9.   Real timer test

2.   If an error is detected during the memory test, go to
      PROCEDURE 4.

3.   If an error is detected during the system test, ASYNC
      test, or real timer test, go to PROCEDURE 5.

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

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

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

7.   If an error is detected during the display test, go to
      display problem isolation procedures in section 2.8.

PROCEDURE 4

Memory Board Replacement

1. Replace the memory board. (Refer to section 4.14.)

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

3. If normal operation is not restored, the system board is probably defective. Go to PROCEDURE 5.

PROCEDURE 5

<u>System Board Replacement</u>

1.   Replace the system board. (Refer to section 4.14.)

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 by test and diagnostics program 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 Diagnostics 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 Diagnostics Program 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 MS-DOS
        system 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
        MS-DOS system disk has been inserted into the FDD.
        Insert a new MS-DOS system 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

<u>Head Cleaning</u>

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.   Insert the diagnostics disk into the FDD. Then type
      a:testce32 and press **Enter** key.

2.   Remove the diagnostics disk from the FDD, then insert
      the formatted work disk in.

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

4.   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 2-4. Go to PROCEDURE 6.

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

Table 2-4   FDD error code

Code	Status
01	Bad Command
02	Address Mark Not Found
03	Write Protected
04	Record Not Found
06	Media Removed
08	DMA Overrun Error
09	DMA Boundary Error
10	CRC Error
20	FDC Error
40	Seek Error
60	FDD Not Drive
80	Time Out Error
EE	Write Buffer Error

PROCEDURE 5

<u>FDD Connector Check</u>

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

2.   Remove the top cover.   (Refer to section 4.6.)

3.   Check that the FDD connection (PJ11) is secured.

4.   If the FDD cable is securely connected to the system
      board, go to PROCEDURE 6.

5.   If the FDD cable is not securely connected to the
      system board, secure the connection.

PROCEDURE 6

New FDD Connection

1.   Turn off the power.

2.   Remove the FDD.   (Refer to section 4.11.)

3.   Connect a new FDD to the FDD connector without
      installing the new FDD. Then connect 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

<u>HDD Indicator Check</u>

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 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.

PROCEDURE 2

Message Check

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

2. If one of the following messages 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.   Insert the MS-DOS system disk into the FDD.

2.   Make partition of the hard disk. (See the MS-DOS Manual for details.)

3.   Format the hard disk. (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. Then type **a:testce32** and press **Enter** key and run the hard disk test as indicated on the diagnostic test menu.

2.   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 2-5.

3.   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 2-5   HDD error code

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 4.6)

3.   Check that the HDC signal cable (PJ12) and HDD power
      cable (PJ14) are secure (for Conner).

      Check that the HDC signal cable (PJ12) is secure (for
      JVC).

4.   If these cables are securely connected to the system
      board, go to PROCEDURE 6.

5.   If the cables are not securely connected, secure them.

PROCEDURE 6

HDD Jumper Straps Check

1.   Remove the HDD (Refer to section 4.9).

2.   Check that the jumper straps are set correctly as shown in figure 2-2 and described in table 2-6.

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 2-6   HDD jumper strap functions

Signal	Status
$\overline{HSP}$	Open
$\overline{C/D}$	Short
$\overline{DSP}$	Open
$\overline{ACT}$	Short
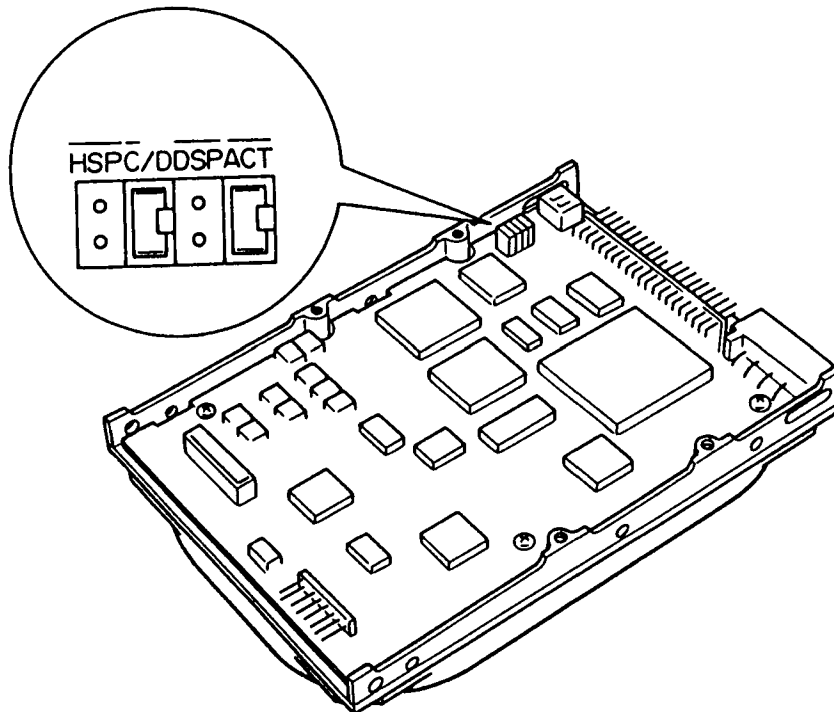
Figure 2-2   HDD jumper straps

PROCEDURE 7

New HDD Connection

1.   Turn off the power.

2.   Remove the HDD.   (Refer to section 4.9.)

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** key. Go to PROCEDURE 2.

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

```
Toshiba Personal Computer MS-DOS Version X.XX
/(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 X.XX
A>  abcdefghijilmnopqrst..........
```

PROCEDURE 2

<u>Keyboard Test Execution</u>

1.   Insert the diagnostics disk into the FDD. Then type
      a:testce32 and press **Enter** key and run the keyboard
      test as indicated on the diagnostic test menu.

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

3.   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 keyboard (refer to section 4.2) and check that the keyboard cable (PJ4) is securely connected to the system board. If it is securely connected, go to PROCEDURE 4.

3.   If it is not securely connected, secure it.

PROCEDURE 4

<u>New Keyboard Connection</u>

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

2.   Remove the keyboard. (Refer to section 4.2.)

3.   Connect a new keyboard to the system 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:   Display Test Execution

PROCEDURE 3:   PDP Connector Check

PROCEDURE 4:   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:

640K Base Memory XXXXX K Extended

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

4.   If the above message does not appear:

(a) Check that the contrast is correctly adjusted.

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

PROCEDURE 2

<u>Display Test Execution</u>

1. Insert the diagnostics disk into the FDD. Then type
    a:testce32 and press **Enter** key and run the display
    test as indicated on the diagnostic test menu.

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

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

PROCEDURE 3

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 and check that the cables are securely connected to the plasma display board.

3. If the cable is securely connected, go to PROCEDURE 4.

4. If the cable is not securely connected, secure it.

PROCEDURE 4

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.

(This page is intentionally blank.)

3.1   GENERAL

This section explains test and diagnostics programs. That checks the functions of all hardware modules of the T3200SX. There are 18 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 7 tasks:

>   HARD DISK FORMAT
>   SEEK TO LANDING ZONE (HDD)
>   HEAD CLEANING
>   LOG UTILITIES
>   RUNNING TEST
>   FDD UTILITIES
>   SYSTEM CONFIGURATION

The test program module is composed of 11 tests:

>   SYSTEM TEST
>   MEMORY TEST
>   KEYBOARD TEST
>   DISPLAY TEST
>   FLOPPY DISK TEST
>   PRINTER TEST
>   ASYNC TEST
>   HARD DISK TEST
>   REAL TIMER TEST
>   NDP TEST
>   EXPANSION TEST

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

1. T3200SX diagnostics disk
2. MS-DOS system disk
3. 2HD and 2DD formatted work disk (for FDD test)
4. Cleaning disk kit (for read cleaning)
5. Printer wraparound connector (for printer wraparound test)
6. RS-232-C wraparound connector (for ASYNC wraparound test)

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.   After running the MS-DOS, insert the diagnostics
     disk in the floppy disk drive.

2.   Type in a:**testce32**, then press **Enter.**

3.   The following display will appear:

         TOSHIBA personal computer T3200SX
         DIAGNOSTICS version X.X (c) copyright
         TOSHIBA Corp. 1989

         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 sections 3.17 to
     3.23.

NOTE: *To stop the test program:*

*(1) During keyboard operation, press **Ctrl+C**.*

(2) While running the test program, press
    ***Ctrl+Break**.*

---

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

          TOSHIBA personal computer T3200SX
          DIAGNOSTICS version X.XX (c) copyright
          TOSHIBA Corp. 1989

          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:

```
SYSTEM TEST                          XXXXXX
                                            ┌────────────────────────────────┐
                                            │ T3200SX  DIAGNOSTIC  TEST  X.XX │
                                            │  [Ctrl]+[Break]  ; test  and    │
                                            │  [Ctrl]+[C]       ; key stop    │
                                            └────────────────────────────────┘
SUB-TEST   ; XX
PASS COUNT; XXXXX        ERROR COUNT; XXXXX
WRITE DATA; XX           READ DATA  ; XX
ADDRESS    ; XXXXXX      STATUS     ; XXX

SUB-TEST MENU :

01 - ROM checksum
02 - HW status
99 - Exit to DIAGNOSTIC TEST MENU
```

The screen shown above, for example, appears when you type **1** and **Enter**.

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 go 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.

    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	
		02	RAM address pattern data	
		03	RAM refresh	
		04	Protected mode	
		05	Memory module	
3	KEYBOARD	01	Pressed key display (91/92)	
		02	Pressed key code display	
		03	Pressed key display (101/102)	
4	DISPLAY	01	VRAM read/write	
		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	
		09	"H" pattern display	
		10	LED/DAC pallet	
5	FDD	01	Sequential read	
		02	Sequential read/write	
		03	Random address/data	
		04	Write specified address	
		05	Read specified address	
6	PRINTER	01	Ripple pattern	
		02	Function	
		03	Wraparound	
7	ASYNC	01	Wraparound (board)	
		02	Board (#1) <=> Board (#2)	
		03	Point to point (send)	
		04	Point to point (receive)	
		05	Card modem loopback	
		06	Card modem on-line	
		07	Dial tester	
		08	Interrupt	

Table 3-1 Subtest names and execution time (continued)

No.	Test name	Subtest No.	Subtest item	Time(s)
8	HDD	01	Sequential read	
		02	Address uniqueness	
		03	Random address/data	
		04	Cross talk & peak shift	
		05	Write/read/compare (CE)	
		06	Write specified address	
		07	Read specified address	
		08	ECC circuit (CE cylinder)	
		09	Sequential write	
		10	W-R-C specified address	
9	REAL TIMER	01	Real time	
		02	Backup memory	
		03	Real time carry	
10	NDP	01	NDP test	
11	EXPANSION UNIT	01	Box wraparound	
		02	Box mono video RAM	
		03	Wraparound (51-bus)	
		04	Wraparound (32-bus)	

3.4   SYSTEM TEST

Subtest 01   ROM checksum

This test performs the ROM checksum test on the system 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. If you want to return to the SYSTEM TEST MENU, press **Enter**.

```
                      76543210
H/W status  =  10001101

      Bit7 ---                    =
      Bit6 ---                    =
      Bit5 --- Notch signal  = 2HD
      Bit4 --- FDD type      = 2HD
      Bit3 ---                    =
      Bit2 --- Drive A/B     = Normal
      Bit1 --- External FDD  = OFF
      Bit0 ---                    =
```

Table 3-2   Hardware status bit

Items	H/W status	1	0
Bit7, 6	Reserved		
Bit5	Media type	2DD	2HD
Bit4	FDD type	2DD	2HD
Bit3	Reserved		
Bit2	Drive A/B	Normal	Change
Bit1	External FDD	ON	OFF
Bit0	Reserved		

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 (address 100000H to the max.) in protected mode, then reads and compares it with the original data.

Subtest 05   Protected mode for the memory module

The same test as the subtest 04 is done for the memory module. Memory module capacity is 2 MB and 4 MB.

After selecting the subtest, the following message will appear:

Memory module size (1:2MB, 2:4MB)?

When the memory module is 2 Mbyte, select the 1.

When the memory module is 4 Mbyte, select the 2.

3.6   KEYBOARD TEST

Subtest 01   Pressed key display (91/92)

> *NOTE:* *Make sure the Num-lock key is off. If*
> *this key is on, the test cannot be carried out.*

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.

```
KEYBOARD  TEST                    IN  PROGRESS      301000
```



```
[SCC  Version  =  VX.XXXX  :  XX  Key]
[Print  :  Alt+SysReq  ,  Pause  :  Ctrl+Break]
IF  TEST  OK,  PRESS  [DEL]  THEN  [ENTER]  KEY
```

Subtest 02   Pressed key code display

> When a key is pressed, 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 Appendix E.

```
    KEYBOARD  TEST        IN  PROGRESS     302000

        Scan code       = XX
        Character code  = XX
        Keytop          = XXXX
    Ins Lock    Caps Lock    Num Lock     Scroll Lock
    Alt         Ctrl         Left Shift   Right Shift

    PRESS [ENTER] KEY
```

Subtest 03   Pressed key display (101/102)

> ┌───┐
> │ **NOTE:** *Make sure the **Num-lock** key is off. If* │
> │ *this key is on, the test cannot be carried out.* │
> └───┘

> 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.

```
KEYBOARD  TEST                  IN PROGRESS     303000
```



```
            [SCC Version = VX.XXXX : XX Key]
            Print : Alt+SysReq , Pause : Ctrl+Break]
            IF TEST OK, PRESS [DEL] THEN [ENTER] KEY
```

3.7   DISPLAY TEST

> **NOTE:**   *The contents of this test differ with the display mode (VGA-color and VGA-monochrome). This mode is changed with the SETUP program.*

Subtest 01   VRAM read/write

This subtest writes constant data (FFFFH, AAAAH, 5555H, and 0000H) and address data to video RAM (256 Kbytes), 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, and 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.

CHARACTER ATTRIBUTES

NEXT LINE SHOWS NORMNAL DISPLAY
         NNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNN

NEXT LINE SHOWS INTENSIFIED DISPLAY
         IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII

NEXT LINE SHOWS REVERSE DISPLAY
         RRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRR

NEXT LINE SHOWS BLINKING DISPLAY
         BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBB (Blinks)

			BLACK
00	88	;	**BLACK**
01	89	;	**BLUE**
04	0C	;	**RED**
05	0D	;	**MAGENTA**
02	0A	;	**GREEN**
03	0B	;	**CYAN**
06	03	;	**YELLOW**
07	0F	;	**WHITE**

PRESS [ENTER] KEY

320*200 GRAPHICS DISPLAY [13]

BLACK
BLUE
GREEN
CYAN
RED
MAGENTA
BROWN
WHITE
GRAY
LIGHT   BLUE
LIGHT   GREEN
LIGHT   CYAN
LIGHT   RED
LIGHT   MAGENTA
YELLOW
INTENSE   WHITE

PRESS [ENTER] KEY

Next, this subtest displays sixteen colors in mode 13H as shown above.

Subtest 03   Character set

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

CHARACTER SET IN 40X25

PRESS [ENTER] KEY

Subtest 04   80*25 character display

> In this subtest, the character string is displayed shifting one character line by line in the 80*25 and 80*30 character mode as shown below.

80*XX CHARACTER DISPLAY

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

PRESS [ENTER] KEY

Subtest 05   Graphics display (color set O/I)

> This subtest displays two of color sets for the color display in the 320*200 dots graphics mode (Mode 4 and D) as shown below:

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

GREEN	**RED**	**YELLOW**
CYAN	**MAGENTA**	**WHITE**
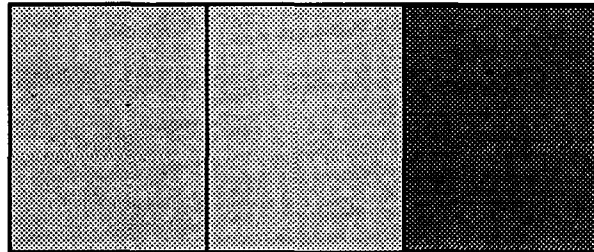
PRESS [ENTER] KEY

Subtest 06   640*200 graphics display

This subtest displays EVEN DOTS, ODD DOTS and
ALL DOTS in the 640*200 dots graphics mode (Mode
6 and E) as shown below:

640*200 GRAPHICS DISPLAY [X]
EVEN DOTS   ODD DOTS   ALL DOTS
DRIVEN   DRIVEN   DRIVEN
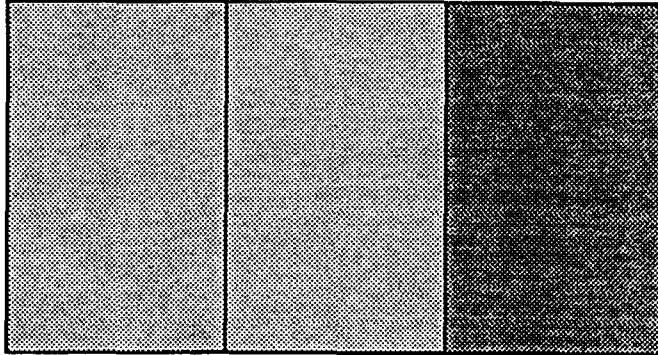
PRESS [ENTER] KEY

Subtest 07   640*400 graphics display

This subtest displays EVEN DOTS, ODD DOTS, ALL
DOTS in the 640*350, 640*480, and 640*400 pixels
graphics mode (Mode 10, 12, and 74) as shown
below.

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

PRESS [ENTER] KEY

3-19
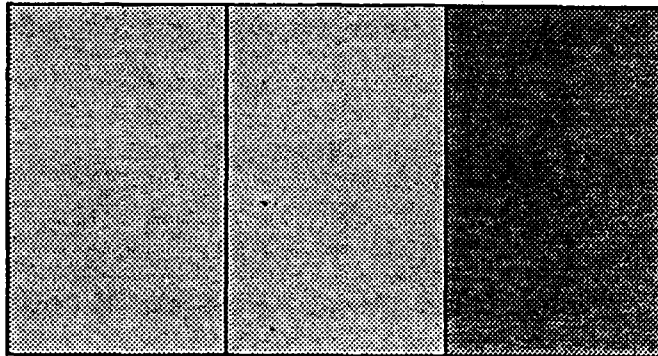
Subtest 08   Display page

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

DISPLAY PAGE 0

```
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0                                                                             0
0                                                                             0
0                                                                             0
0                                                                             0
0                                                                             0
0                                                                             0
0                                                                             0
0                                                                             0
0                                                                             0
0                                                                             0
0                                                                             0
0                                                                             0
0                                                                             0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

Subtest 09   "H" pattern display

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

```
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
```

Subtest 10   LED/DAC pallet

This subtest displays as follows:

```
DISPLAY  TEST        IN  PROGRESS        410000
                                                ┌──────────────────────────────────┐
                                                │T3200SX  DIAGNOSTIC  TEST  X.XX     │
                                                │   [Ctrl]+[Break]  ;  test  end     │
                                                │   [Ctrl]+[C]         ;  key  stop  │
                                                └──────────────────────────────────┘
SUB-TEST   ;  10
PASS  COUNT;  00000      ERROR  COUNT;  00000
WRITE  DATA;  00         READ  DATA   ;  00
ADDRESS      ;  000000   STATUS       ;  000

[Speed/CRT/Caps/Num/Scroll  LED  test]

     (1)  Press  [ Caps  Lock    ]  key  !  ...  Caps     (on/off)
     (2)  Press  [ Num  lock      ]  key  !  ...  Num      (on/off)
     (3)  Press  [ Scroll  lock ]  key  !  ...  Scroll   (on/off)


PRESS  [ENTER]  KEY
```

> Check Caps Lock LED, Num Lock LED and Scroll
> Lock LED light by pressing **Caps Lock** key, **Num
> Lock** key and **Scroll Lock**. Then, press **Enter**
> key and this subtest writes constant data
> (2AH/15H) to DAC registers.

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 **STATUl** number indicates that 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       :  XXXXX      STATUS         :  XXX
```

CONTENTS

Subtest 01   Sequential read

This subtest 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 subtest 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 subtest 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 subtest writes the specified data on the
specified address that you enter from the
keyboard. You can specify the test data, track
number, and head number.

Subtest 05   Read specified address

This subtest performs read operation on the
specified address that you enter from the
keyboard. You can specify the track number and
head number.

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   Ripper 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··'--`^^`^CDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrst`
*+,-./012345^^                    `^KLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqr`
+,-./012^                      ^^QRSTUVWXYZ[\]^_`abcdefghijklmnop`
,-./01`                          ^^^VWXYZ[\]^_`abcdefghijklmn`
-./^                              ^^7[\]^_`abcdefghijk1`
.`                                ^abcdef^``
```

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 section 3.25.*
>
> *The data, control, and status lines will be checked with the printer wraparound connector.*

OPERATION

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

    Select the channel number (1-3) ?

    Select the printer channel number, then type in the number. The T3200SX supports three printer channels.

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

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   Wraparound (channel 1)

> **NOTE:**   *The RS-232-C wraparound connector must be connected to SERIAL A CONNECTOR to execute this test.   The wiring diagram of the RS-232-C wraparound connector is described in section 3.25.*

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

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

> **NOTE:**   *The RS-232-C direct cable (9-pin to 9-pin) must be connected to channels 1 and 2 to execute this test.   The wiring diagram of the RS-232-C direct cable is described in section 3.25.*

The same test as the sub test 01 is performed for the channel #1 <=> #2.

Subtest 03   Point to point (send)

> **NOTE:**   *This subtest must be executed in condition that two machines are connected with the RS-232-C direct cable and one side should be set as 'send' and the other set as 'receive'. The wiring diagram of the RS-232-C direct cable is described in section 3.25. The subtest 03 executed in one side and the sub test 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   Card modem loopback

> **NOTE:**   *If there is no modem card in the system, this test cannot be executed.*

This subtest is used to check whether the data to be sent from the modem card to the RS-232-C 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-#"

Subtest 08   Interrupt test (IRQ4, 3, 5)

This subtest generates the interrupt request levels 4, 3, and 5 in this order, then checks if this function works correctly.

3.11 HARD DISK TEST

> **CAUTION:** *The contents of the hard disk will be erased when subtest 02, 03, 04, 06, 08, or 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:HDD,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 detects 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   : XXXXX   STATUS   : XXX

CONTENTS

Subtest 01   Sequential read

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

Subtest 02   Address uniqueness

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) that is shifted cylinder by cylinder then reads the data out and compares it to the original data.

Worst pattern data
1. **B5ADAD** ....
2. **4A5252** ....
3. **EB5DB6** ....
4. **149249** ....
5. **63B63B** ....
6. **9C49C4** ....
7. **2DB6DB** ....
8. **D24924** ....

Subtest 05   Write/Read/Compare (CE)

This subtest writes B5ADADH 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 cylinders.

Subtest 10   W-R-C specified address

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

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 data: 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 (01H, 02H, 04H,..., 80H, FEH, FBH, FDH, ...7FH, AAH, 55H) to 50 bytes of the backup memory (addresses 0EH to 3FH), and then reads and compares it with the original data.

Subtest 03   Real time carry

> **CAUTION:** *When this test 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, and 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 test 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 wraparound (8-bit 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 (FFH, AAH, 55H, 00H) into the monochrome display memory (B0000H to B0F9FH), then reads the data out and compares it with the original data.

Subtest 03   Wraparound test (32-bit bus)

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

Subtest 04   Wraparound 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 3-3 lists the error code and error status names

Table 3-3 Error code and error status names

Device name	Error code	Error status name
EVERYTING	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
	08	DMA Overrun Error
	09	DMA Boundary Error
	10	CRC· Error
	20	FDC Error
	40	Seek Error
	60	FDD Not Drive
	80	Time Out Error
	EE	Write Buffer Error
ASYNC	01	DSR Off Time Out
	02	CTS Off Time Out
	04	RX-Enable Time Out
	08	TX-Buffer Full Time Out
	10	Parity Error
	20	Framing Error
	40	Overrun Error
	80	Line Status Error
	88	Modem Status Error
	33	No Carrier (CARD MODEM)
	34	Error (CARD MODEM)
	36	No Dial Tone 9CARD MODEM)
PRINTER	01	Time Out
	08	Fault
	10	Select Line
	20	Out Of Paper
	40	Power Off
	80	Busy Line

Table 3-3 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 tables 3-4 and 3-5.

Table 3-4   HDC status register contents

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

Bit	Name	Description
7	BBK (Bad block mark)	"0" ... Otherwise "1" ... A bad block mark is detected.
6	UNC (Uncorrect-able)	"0" ... There is no uncorrectable data error. "1" ... Uncorrectable data error has been detected.
5		Not used.
4	IDNF (Identifica-tion)	"0" ... Otherwise "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 found 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 onto 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

   Performs physical formatting of hard disk in the manner shown in table 3-6 below:

Table 3-6 Hard disk formatting manner

Items	40 MB
Sector sequences	1
Cylinders	0 to 980
Heads	0 to 5
Sectors	1 to 17
Sector length	512 bytes per sector
Bad track	Max. 40 tracks

2. Good track FORMAT

   Executes the formatting of a specified cylinder and track as a good track.

3. Bad track FORMAT

   Executes the formatting of a specified cylinder and track as a bad track.

4. Bad track CHECK

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

    Press [NUMBER] key ?

2. All track FORMAT 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
1). 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
1). Type the number and press **Enter**. The
following message will appear:

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

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

(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 1). 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

[WARNING  :  Current  DISK  data  will  be
             completely  destroyed]

          [[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 HARTD DISK FORMAT menu.

3.18   SEEK TO LANDING ZONE (HDD)

3.18.1 Program Description

When moving the unit, and 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 are 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 DIAGNOSTIC MENU
    appears.

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:

DIAGNOSTIC FLOPPY DISK HEAD CLEANING: VX.XX

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 **Cleaning start** message appears, FDD
head cleaning will begin.

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

3.20   LOG UTILITIES

3.20.1 Program Description

The error information is stored in the RAM, while a test is in progress. And this program can store the error information on a floppy disk or output it to a printer.
This program displays the error information as the following:

      1.   Error count (CNT)
      2.   Test name (TS)
      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.   HDC status (HSTS)
    10.   Error status name

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:

```
XXXXX  ERRORS
CNT     T-NAME     PASS     STS     ADDR     WD    RD    HSTS  [ERROR  STATUS  NAME
001     FDD  02    0000     103     00001    00    00    FDD  -  WRITE  PROTECTED
001     FDD  01    0000     180     00001    00    00    FDD  -  TIME  OUT  ERROR
```

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

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

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 DIAGNOSTICS 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 DIAGNOSTICS 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**. (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#1 wrap around test (Y/N) ?
     Async#2 wrap around test (Y/N) ?

4.   Select whether to execute the test (Yes) or not (No). Type **Y** or **N** and press **Enter**. (If Y is selected, an RS-232-C wraparound connector must be connected to the SER. A or SER. B connector on the back of the unit.)

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

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 from 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 source floppy disk to
target floppy disk.

3.   DUMP

This program displays the contents of floppy
disks (both 3.5-inch and 5.25-inch) 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

PRES [1] - [9] KEY

2. FORMAT selection

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

        DIAGNOSTICS - FLOPPY DISK FORMAT : VX.XX
        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-2D,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 into 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 - FLOPPY DISK COPY : VX.XX
    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 target disk (formatted); press any key. The **[[track, head = XXX X]]** message will appear, then start the copy to target disk. When copying 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.

        DIAGNOSTICS - HARD DISK & FLOPPY DISK DUMP : VX.XX
        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: Displays a dump list for a floppy disk (2DD).

        1: Displays a dump list for a floppy disk (2D).

        2: Displays a dump list for a floppy disk (2HD).

        3: Displays a dump list for a hard disk.

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

3.23   SYSTEM   CONFIGURATION

3.23.1 Program   Description

This program displays the following system configuration.

```
1.   BIOS ROM VERSION = VX.XX
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.   Co-processor presents or not
9.   Extended memory size
```

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
        * -   COLOR/GRAPH  (80-column)
        * -   1  FLOPPY  DISK  DRIVE(S)
        * -   2  ASYNC  ADAPTER(S)
        * -   1  HARD  DISK  DRIVE(S)
        * -   1  PRINTER  ADAPTER(S)
        * -   0  MATH  CO-PROCESSOR
        * -   00384KB  EXTENDED  MEMORY


      PRESS  [ENTER]  KEY
```

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

Meant to be page 3-55,
but person scanning
has done page 3-56
twice.

3.23   SYSTEM   CONFIGURATION

3.23.1 Program   Description

This program displays the following system configuration.

1. BIOS ROM VERSION = VX.XX
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. Co-processor presents or not
9. Extended memory size

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
*- COLOR/GRAPH   (80-column)
*- 1 FLOPPY DISK DRIVE(S)
*- 2 ASYNC ADAPTER(S)
*- 1 HARD DISK DRIVE(S)
*- 1 PRINTER ADAPTER(S)
*- 0 MATH CO-PROCESSOR
*- 00384KB EXTENDED MEMORY

PRESS   [ENTER]   KEY

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

3.24   SETUP

See the T3200SX Reference Manual.

.

3.25　WARNING DIAGRAM

1.　Printer wraparound connector

(Pin No.)	Signal name		Signal name	(Pin No.)
(9)	+PD7	───────────────	─ERROR	(15)
(8)	+PD6	───────────────	─AUTFD	(14)
(7)	+PD5	───────────────	+SELECT	(13)
(6)	+PD4	───────────────	PINIT	(16)
(5)	+PD3	───────────────	─STROBE	(1)
		│────────	─ACK	(10)
(4)	+PD2	───────────────	+PE	(12)
(3)	+PD1	───────────────	─SLIN	(17)
(2)	+PD0	───────────────	+BUSY	(11)
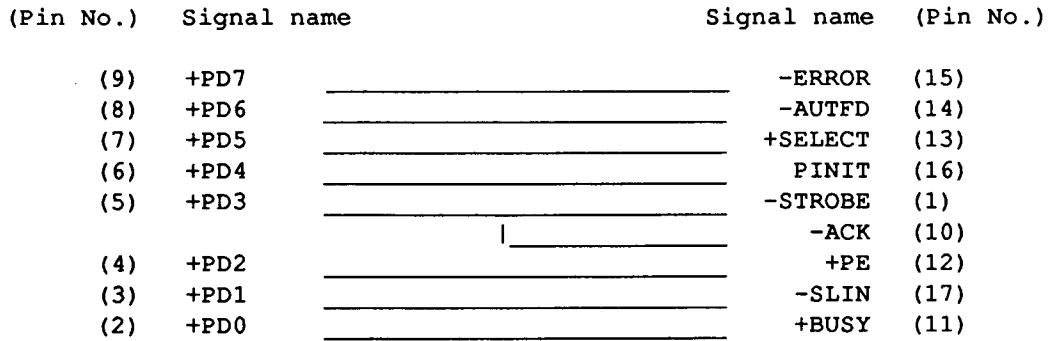
Figure 3-1　Printer wraparound connector

2.　RS-232-C wraparound connector

(3)	+TRANSMIT DATA	───────────	RECEIVE DATA	(2)
(7)	REQUESDT TO SEND	───────────	CLEAR TO SEND	(8)
		│───────	CARRIER DETECT	(1)
(4)	DATA TERMINAL	───────────	DATA SET READY	(6)
	READY	│───────	RING INDICATE	(9)
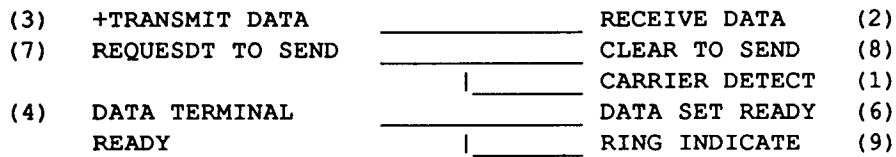
Figure 3-2　RS-232-C wraparound connector

3.　RS-232-C direct cable (9-pin to 9-pin)

(3)	+TD	───────────────	RD	(2)
(4)	DTR	───────────────	DSR	(6)
		│────────	CTS	(8)
		│────────	RI	(9)
(7)	RTS	───────────────	CD	(1)
(5)	GND	───────────────	GND	(5)
(2)	RD	───────────────	TD	(3)
(1)	CD	───────────────	RTS	(7)
(6)	DSR	───────────────	DTR	(4)
(8)	CTS	────────│		
(9)	RI	────────│		
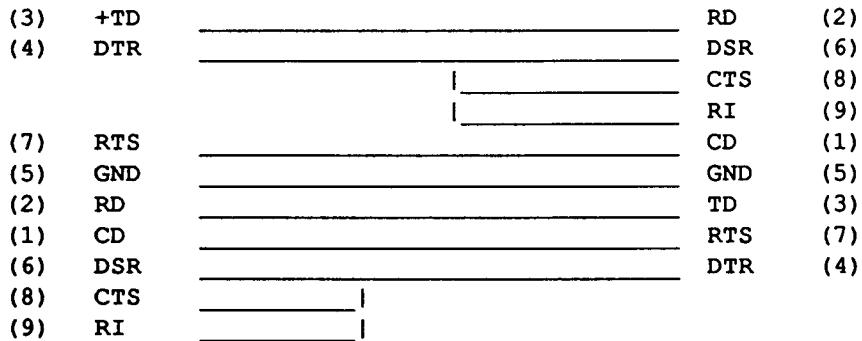
Figure 3-3　RS-232-C direct cable (9-pin to 9-pin)

4.   RS-232-C direct cable (9-pin to 25-pin)

```
(1)  CD    _____  RTS   (4)
(2)  RD    _____  TD    (2)
(3)  TD    _____  RD    (3)
(4)  DTR   _____  CTS   (5)
                              |_____  DSR   (6)
                              |_____  RI    (22)
(5)  GND   _____  GND   (7)
(7)  RTS   _____  CD    (8)
(6)  DSR   _____  DTR   (20)
(8)  CTS   _____|
(9)  RI    _____|
```
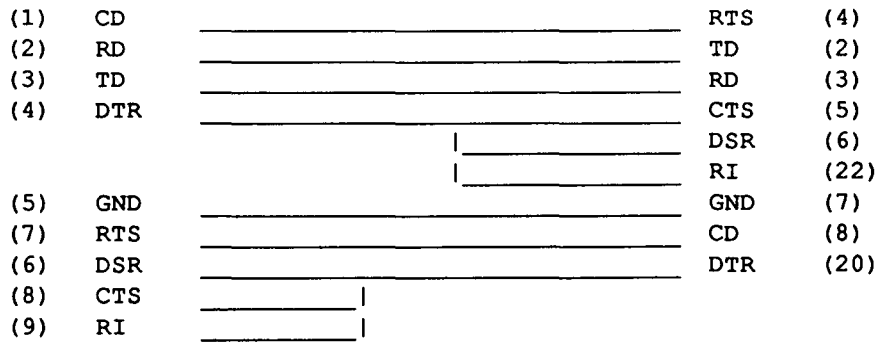
Figure 3-4   RS-232-C direct cable (9-pin to 25-pin)

(This page is intentionally blank.)

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. Keyboard
2. Speaker
3. Plasma display panel (PDP)
4. Contrast board
5. LED board
6. PDP cover assembly
7. Top cover
8. Fan
9. Plasma sensor
10. Power supply
11. HDD (hard disk drive)
12. Lithium battery
13. FDD (floppy disk drive)
14. Back panel board
15. Modem connector cable
16. System board
17. Memory 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. Tweezers

4.2 REMOVING/REPLACING THE KEYBOARD AND SPEAKER

1. Remove the AC power cord from the system unit.

2. Turn the system unit upside down and remove the four screws (A) from the bottom cover.
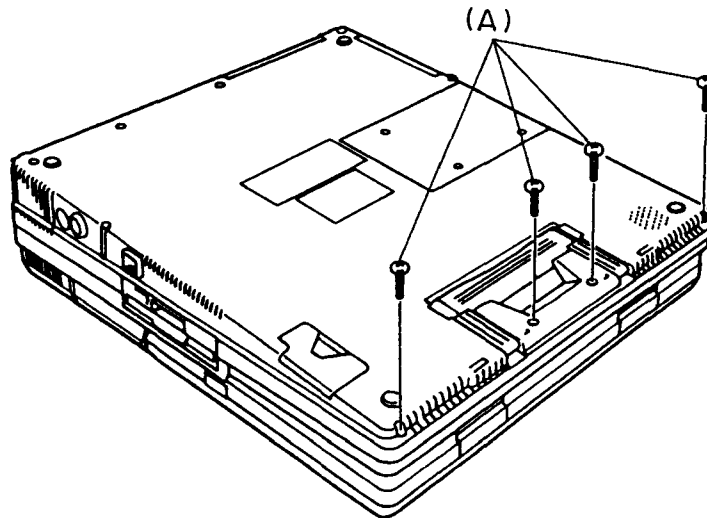
Figure 4-1 Removing the four screws

3. Turn the system unit back over, then open the display.

4. Lift up the front edge of the keyboard unit (B) and place it in front of the system unit. At this time, you can not disconnect the keyboard cable yet.
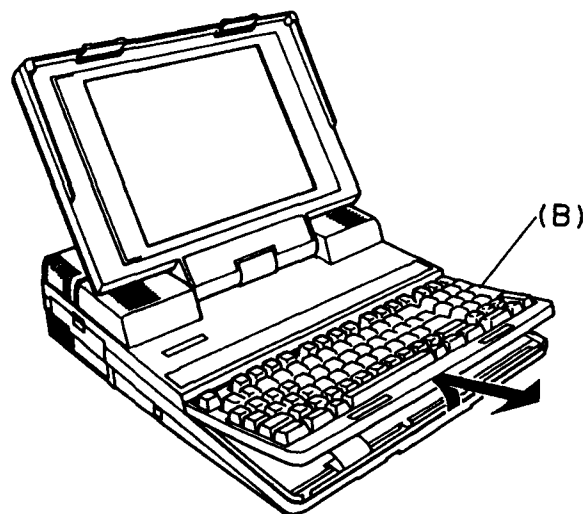
Figure 4-2 Removing the keyboard unit

4-6

5. Remove the two screws (C) from the shield plate (D) and lift up the front edge of the shield plate to pull out the shield plate.

6. Release the pressure plate (E) of the PJ4 keyboard connector (F) to disconnect the keyboard cable (G) from the system board (H).
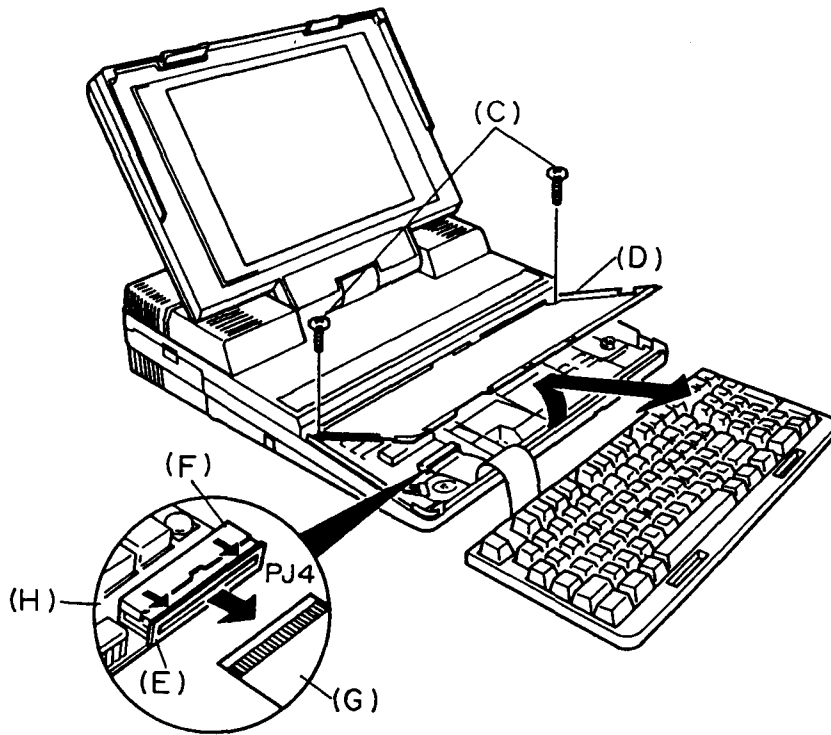
Figure 4-3 Removing the shield plate and disconnecting the keyboard cable

7. Unlatch the four latches (I), then pull out the keyboard mask (J) from the keyboard (K).
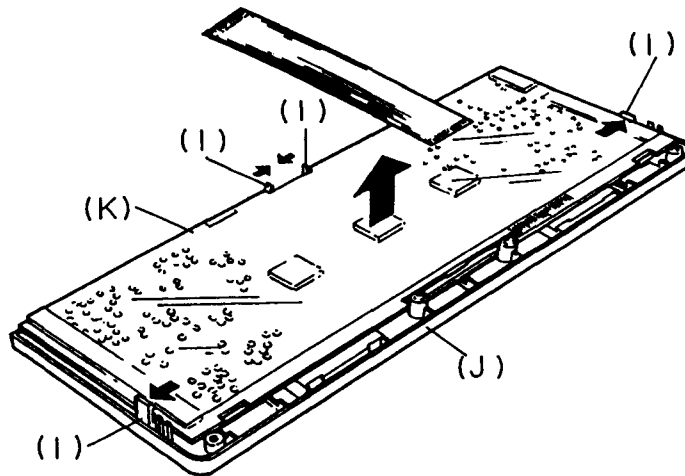
Figure 4-4   Removing the keyboard

8. Disconnect the speaker cable (L) from the PJ5 of the system board.

9. Remove the two screws (M), then remove the speaker.
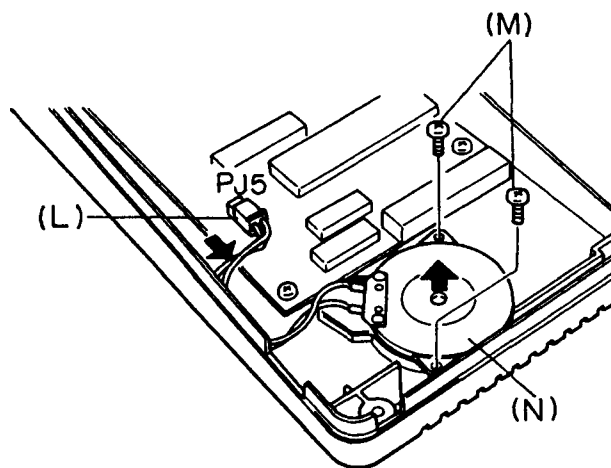
Figure 4-5   Removing the speaker

10. To install the keyboard and the speaker, follow the above procedures in reverse.

4.3 REMOVING/REPLACING THE PLASMA DISPLAY PANEL

1. Remove the AC power cord from the system unit.

2. Using tweezers, peel off the label (A) from the PDP mask (B), then remove the two rubbers (C).

3. Remove the four screws (D), then remove the PDP mask by pulling it up.

NOTE: *Confirm that the PDP mask is locked into the six latches (E).*
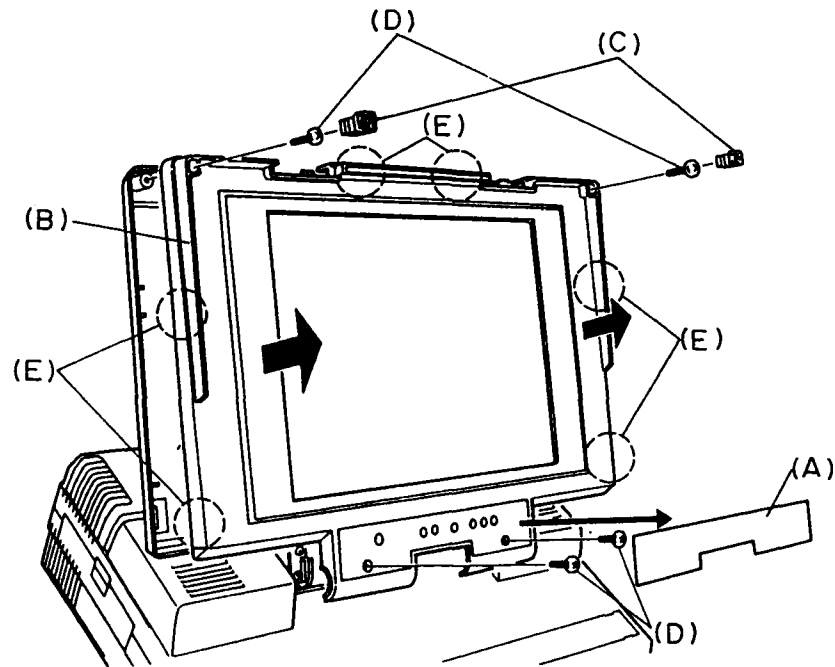
Figure 4-6 Removing the PDP mask

4. Remove the four screws (F) from the PDP cover assembly (G). To remove the PDP (H), disconnect the three PDP cables (I) from the three J1, J2, and J3 PDP connectors (J) in the back of the PDP.
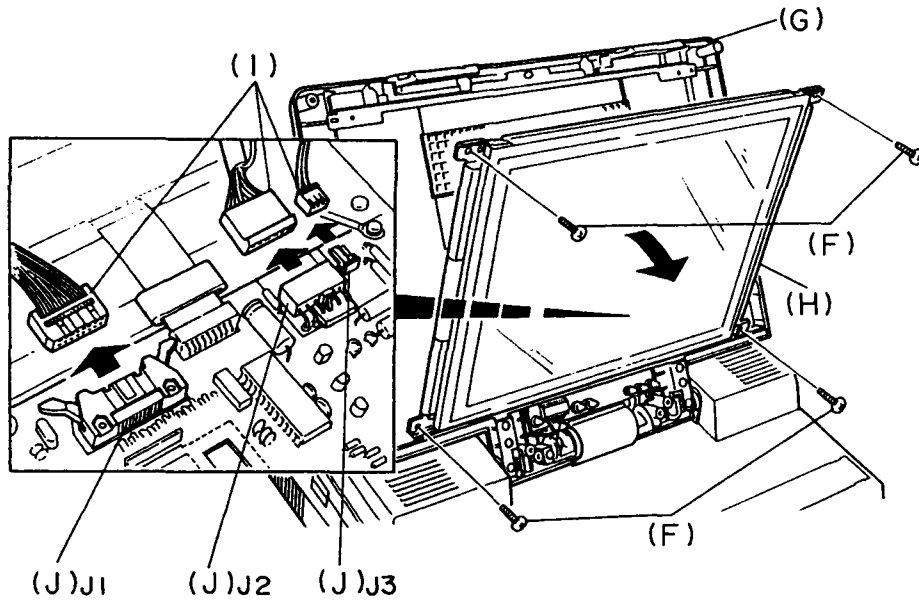
Figure 4-7 Removing the PDP unit

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

4.4 REMOVING/REPLACING THE CONTRAST BOARD AND LED BOARD

1. To remove the contrast board (A), disconnect the contrast connector (B) from the PJ901 (C) and remove the screw (D).

2. Unlatch the latch (E) fixing the LED board (F) then remove the LED board from the PDP cover (G).

3. Remove the LED signal cable (H) from the PJ201 (I) on the LED board.
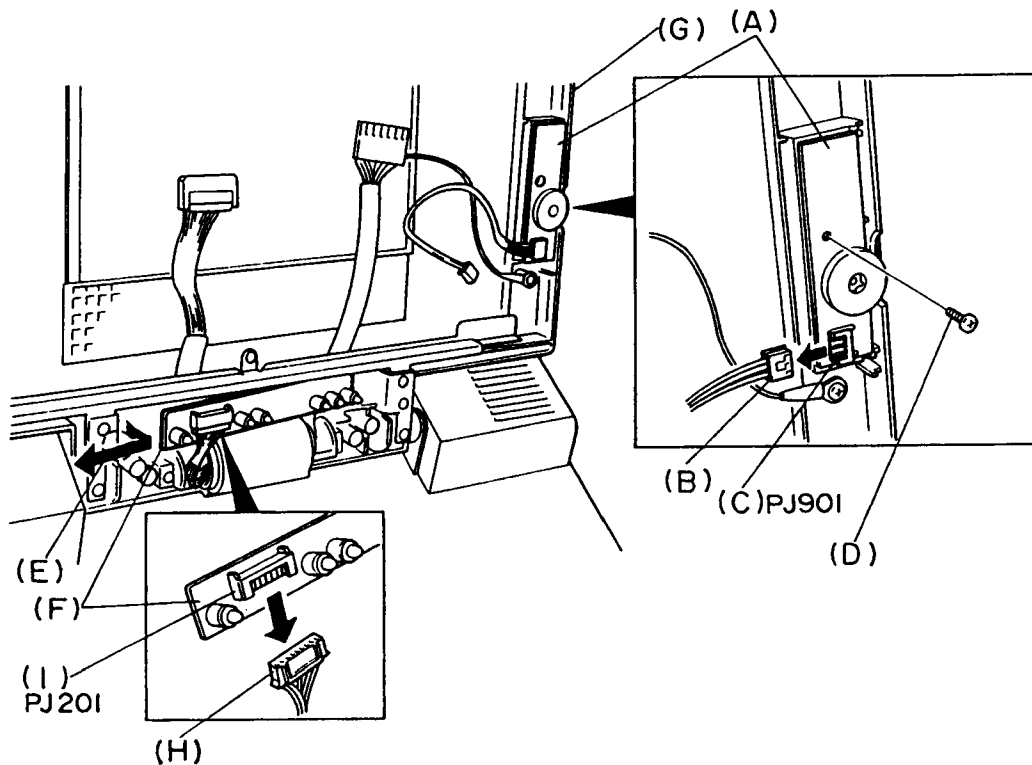
Figure 4-8 Removing the contrast board and LED board

4. To install the contrast board and the LED board, follow the above procedures in reverse.

> **CAUTION:** When installing the LED board, make sure that the power cable and the signal cable of the PDP are run through the hollow of the PDP cover properly.
>
> If the power cable or the signal cable get jammed between the rib of the PDP cover and the LED board, the system unit will be damaged.

4.5   REMOVING/REPLACING THE PDP COVER ASSEMBLY

1. Remove the PDP, the LED board and the contrast board according to sections 4.3 and 4.4.

2. Remove the eight screws (A), then remove the GND cable (B), the two reinforce plates (C), the shaft holder (D), and the chassis (D) as shown in figure 4-9.

3. Remove the PDP cover assembly (E) from the system unit while inclining the PDP cover assembly forward.
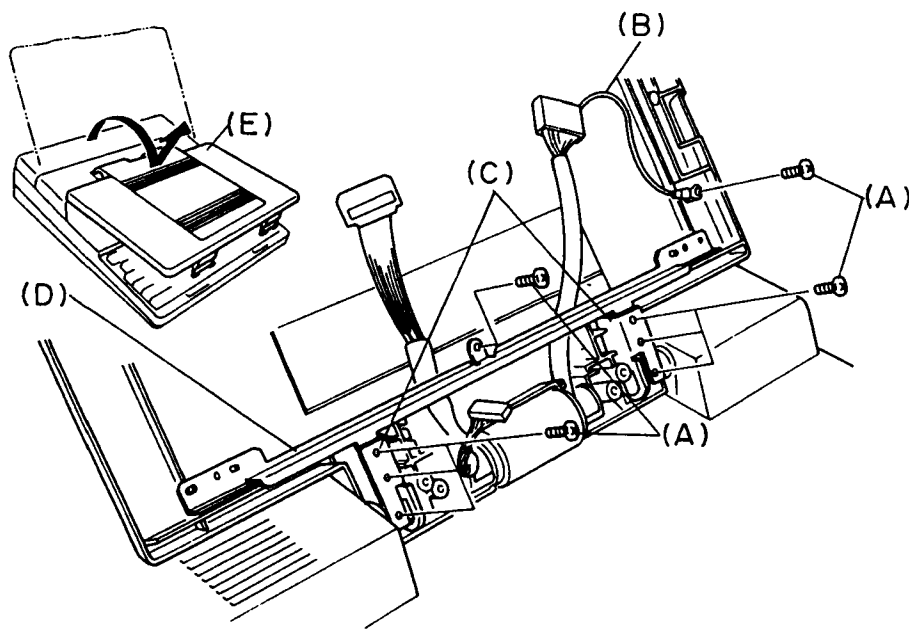
Figure 4-9   Removing the PDP cover assembly

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

4.6   REMOVING/REPLACING THE TOP COVER

1. Turn the system unit upside down and remove the
    six screws (A).
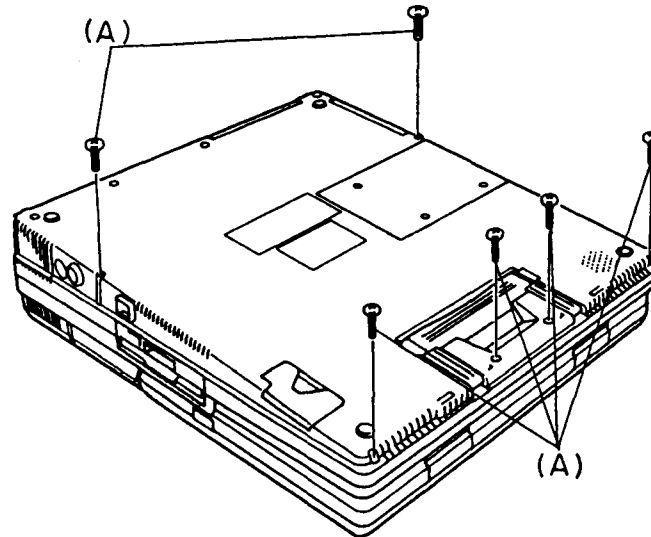
Figure 4-10   Removing the six screws

2. Turn the system unit back over, then remove the
    keyboard and the PDP cover assembly according to
    sections 4.2 and 4.5.

3. Remove the two screws (B) from the cable guide,
    then remove the front cable guide (C).
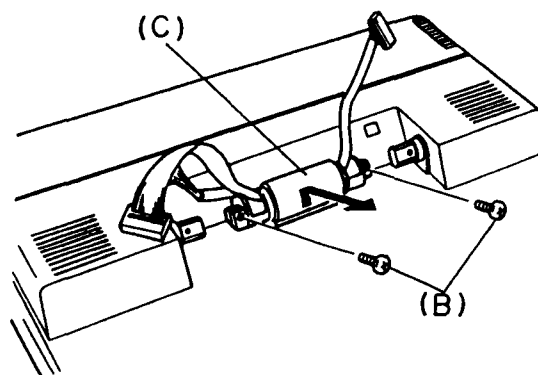
Figure 4-11   Removing the cable guide

4. Remove the two screws (D) and the rear panel
(E). And remove the three screws (F).
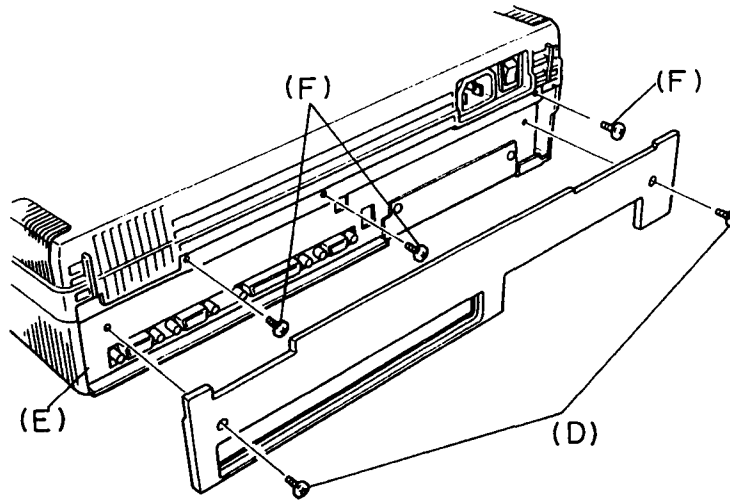
Figure 4-12   Removing the rear panel and three screws

5. Remove the two mask top covers (H) from the top
cover (I) by sliding them outside. To remove
the top cover remove the two screws (J) under
the mask top covers and the screw (K) in front
of the top cover.
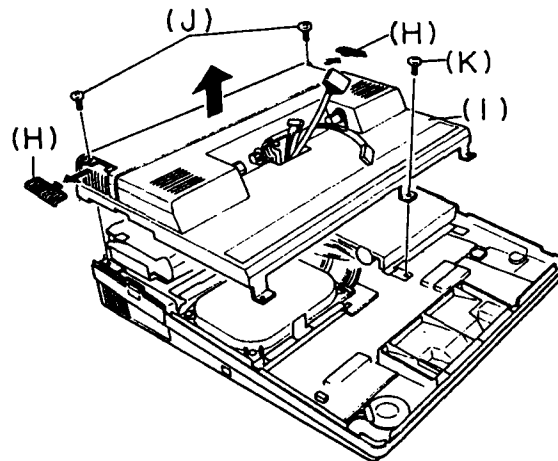
Figure 4-13   Removing the top cover

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

4.7   REMOVING/REPLACING THE HDD

> **CAUTION**: The HDD of T3200SX has two types. One type is made by JVC Co. and another type is made by Conner Co.If your HDD is made by JVC Co., there is no HDD power supply cable. Refer to figure 4-14.

1. Remove the top cover according to the section 4.6.

2. Remove the three screws (A) fixing the HDD unit (B), then disconnect the HDD signal cable (C) from the PJ12 (D) on the system board.

3. Remove the HDD power supply cable (E) from PJ14 (F) on the system board (for Conner). The removing method is shown in Figure 4-15.
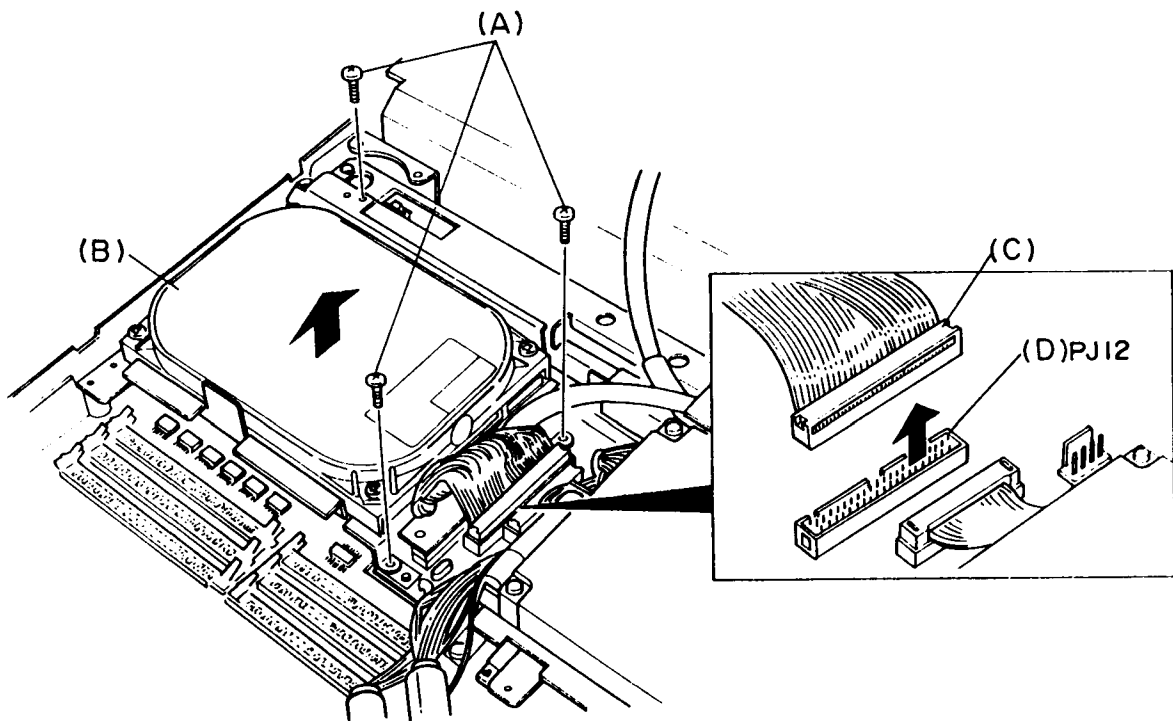
Figure 4-14   Removing the HDD unit (for JVC)
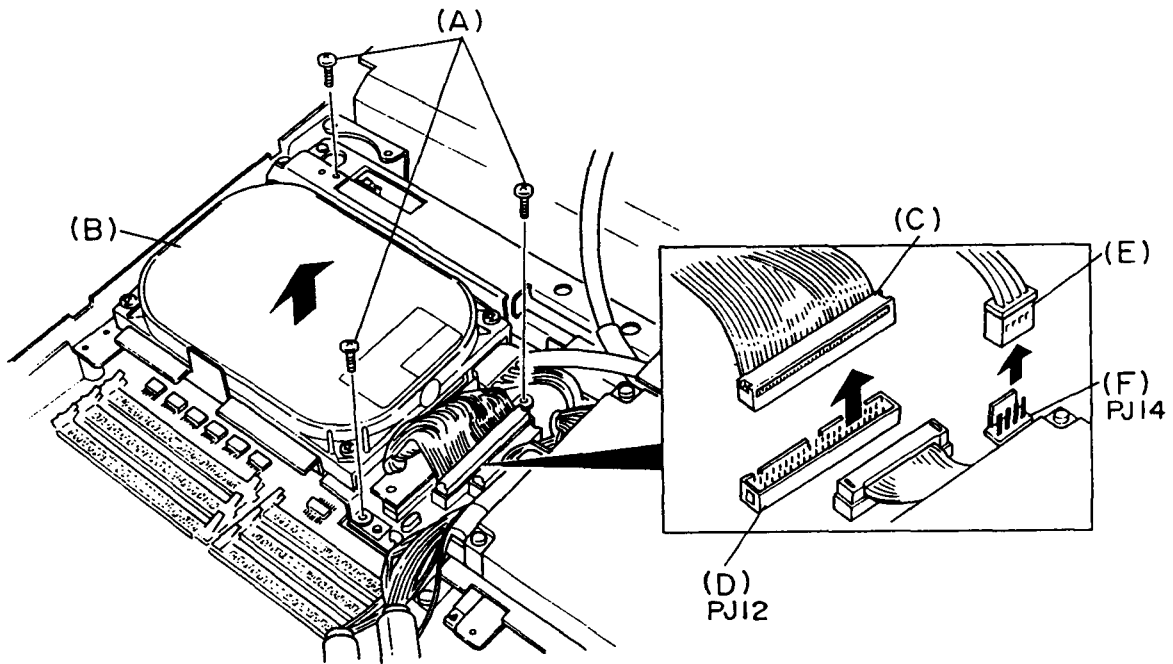
Figure 4-15   Removing the HDD unit (for Conner)

4.   Remove the four screws (G), then remove the HDD
      (H) from the HDD support (I).
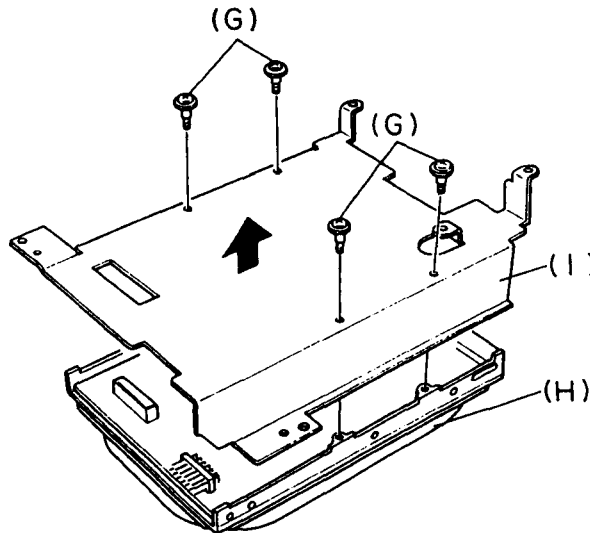
Figure 4-16   Removing the HDD

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

4.8   REMOVING/REPLACING THE FAN AND THE PLASMA SENSOR

1.   Remove the top cover according to section 4.6.

2.   To remove the fan (A), disconnect the fan cable (B) from the fan connector PJ6 (C) and the two screws (D) from the fan.

3.   To remove the plasma sensor (E), disconnect the plasma sensor cable (F) from the PJ5 (G) on the system board, then remove the screw (H) from the plasma sensor.
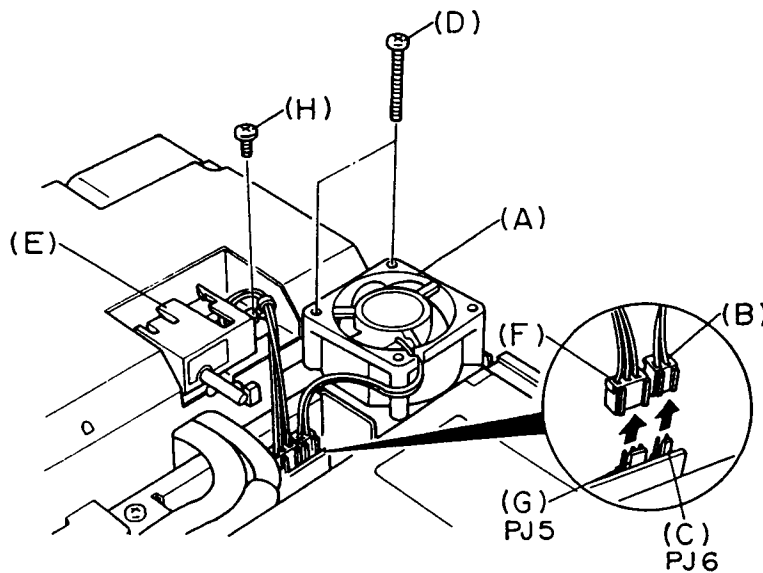
Figure 4-17   Removing the fan and the plasma sensor

4.   To install the fan and the plasma sensor, follow the above procedures in reverse.

4.9 REMOVING/REPLACING THE POWER SUPPLY

1. Remove the top cover, the fan, the plasma sensor, and the HDD according to sections 4.6, 4.7, and 4.8.

2. Disconnect the power supply cable (A) from the PJ8 (B) on the system unit, then remove the five screws (C) and power supply cable bracket (D) to remove the power supply unit (E).
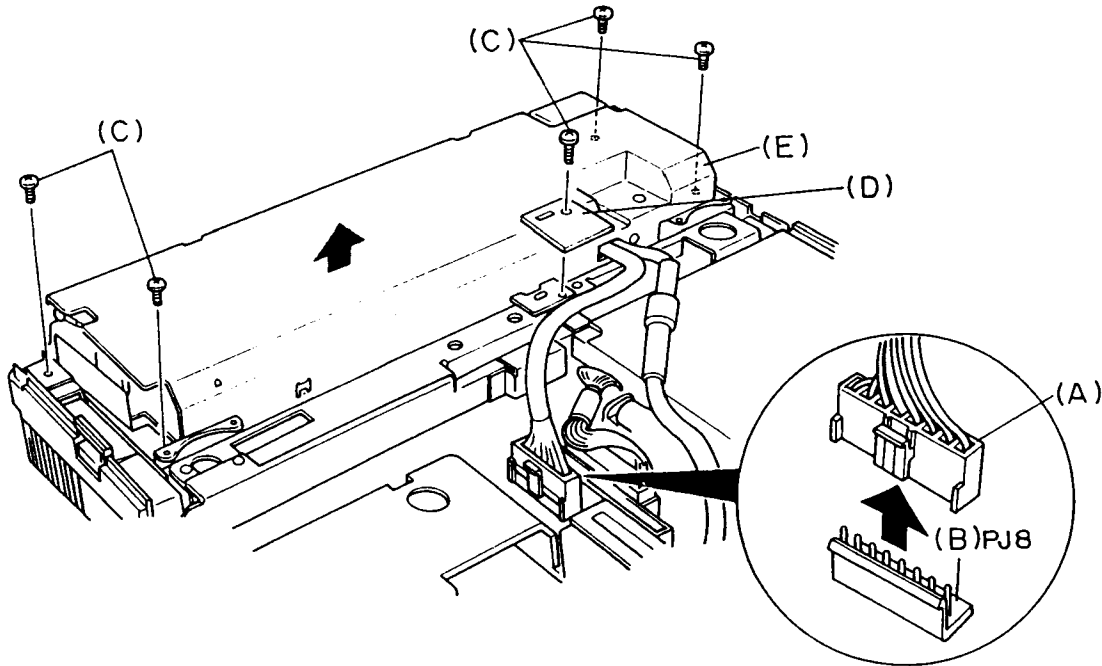
Figure 4-18 Removing the power supply unit

3. Remove the screw (F) from the power supply cover
   (G), then remove the power supply cover by
   sliding it.

NOTE: *When you exchange power supply unit, you
need not remove the power supply cover.*

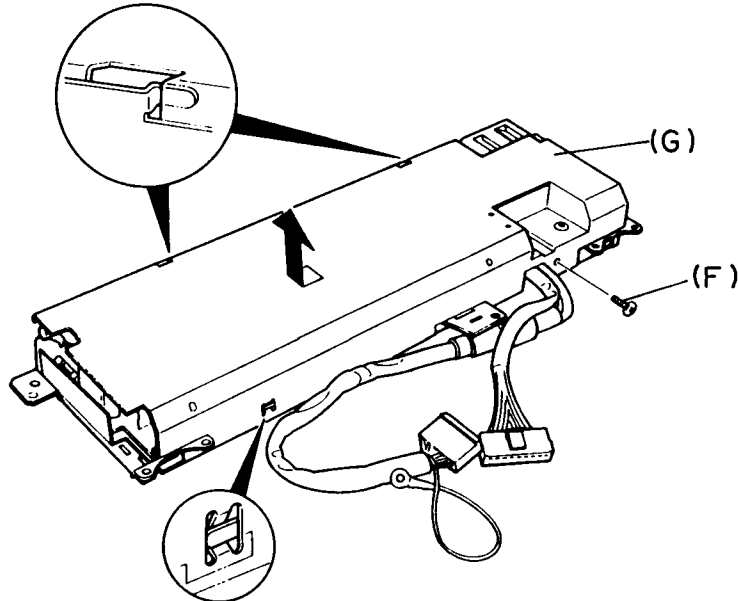|		
TOSHIBA	*Left sliding*	*figure 4-19*
MATSUSHITA	*Right sliding*	*figure 4-20*

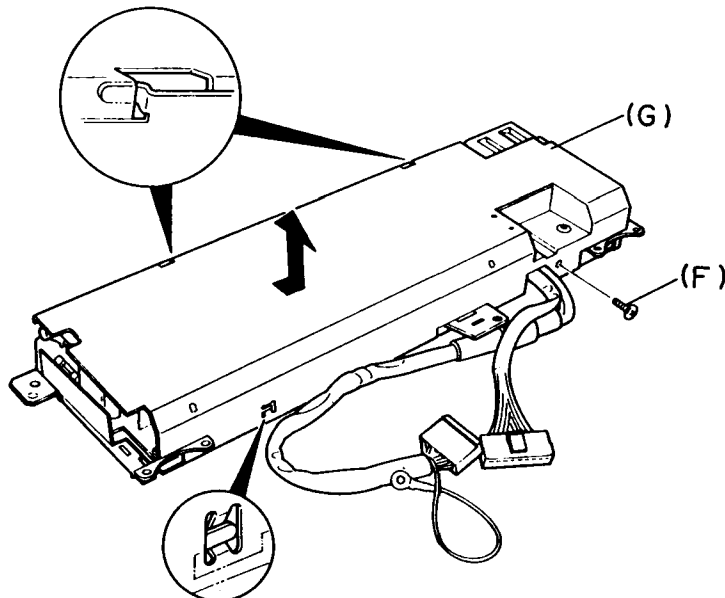Figure 4-19   Removing the power supply cover
(for TOSHIBA)

Figure 4-20   Removing the power supply cover
(for MATSUSHITA)

4. To install the power supply follow the above
   procedures in reverse.

4.10   REMOVING/REPLACING THE LITHIUM BATTERY

> **WARNING:** *Lithium battery. Danger of explosion.*
> *Replace the battery with the same type recommended*
> *by the manufacturer of the equipment.*

1. Remove the top cover according to the section
    4.6.

2. Disconnect the lithium battery cable (A) from
    the PJ3 (B) on the system board, then remover
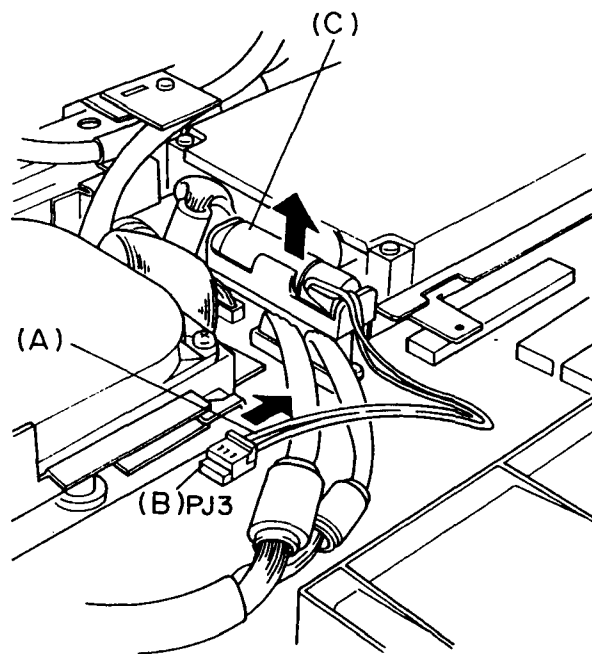   the lithium battery (C).

Figure 4-21   Removing the lithium battery

3. To install the lithium battery, follow the above
    procedures in reverse.

4.11   REMOVING/REPLACING THE FDD

1.   Remove the power supply and the lithium battery according to the sections 4.9 and 4.10.

2.   Remove the screw (A), then remove the power supply cable bracket (B) from the power supply and the three screws (C) fixing the FDD support, then disconnect the FDD cable (D) from the PJ11 (E) to remove the FDD unit (F).
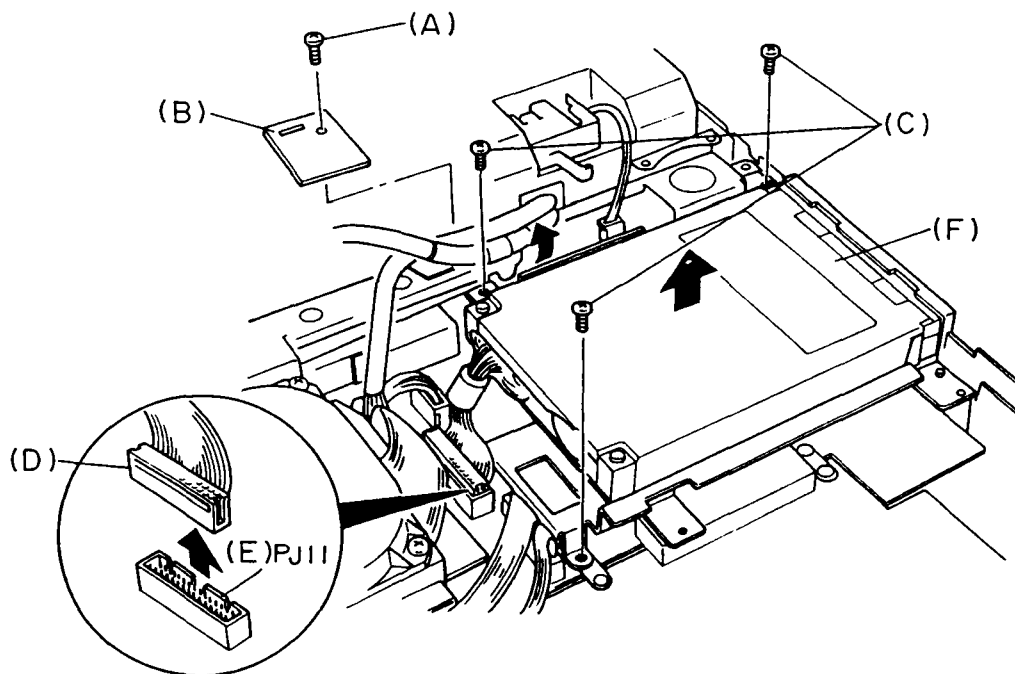
Figure 4-22   Removing the FDD unit

3. Remove the three screws (E) from the FDD support, then remove the FDD (F) from the FDD support (G).
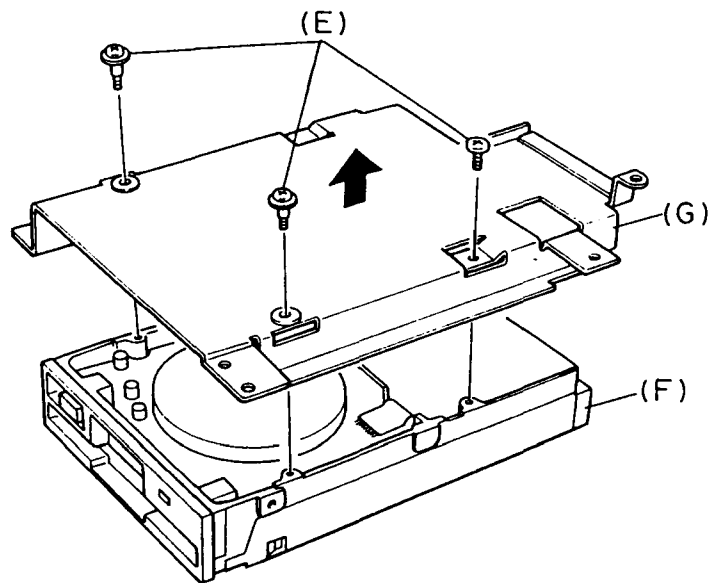
Figure 4-23   Removing the FDD

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

4.12 REMOVING/REPLACING THE BACK PANEL BOARD

1. Remove HDD, the power supply, and FDD according to the sections 4.7, 4.9, and 4.11.

2. Remove the Back panel board unit (A) from the system board (B) by removing the three screws (C).

Figure 4-24 Removing the back panel board unit

3. Remove the back panel board 1 (D) by removing the two screws (E).
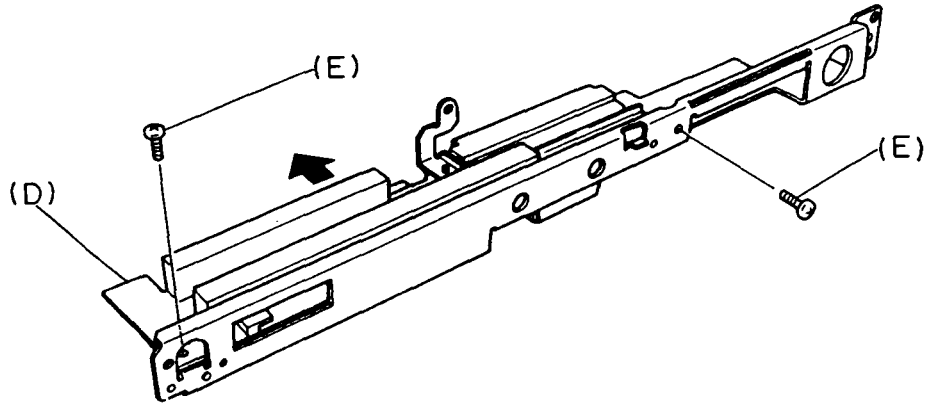
Figure 4-25   Removing the back panel board 1

4. Remove the two screws (F) from the back panel board 1 to remove the back panel board bracket (G).
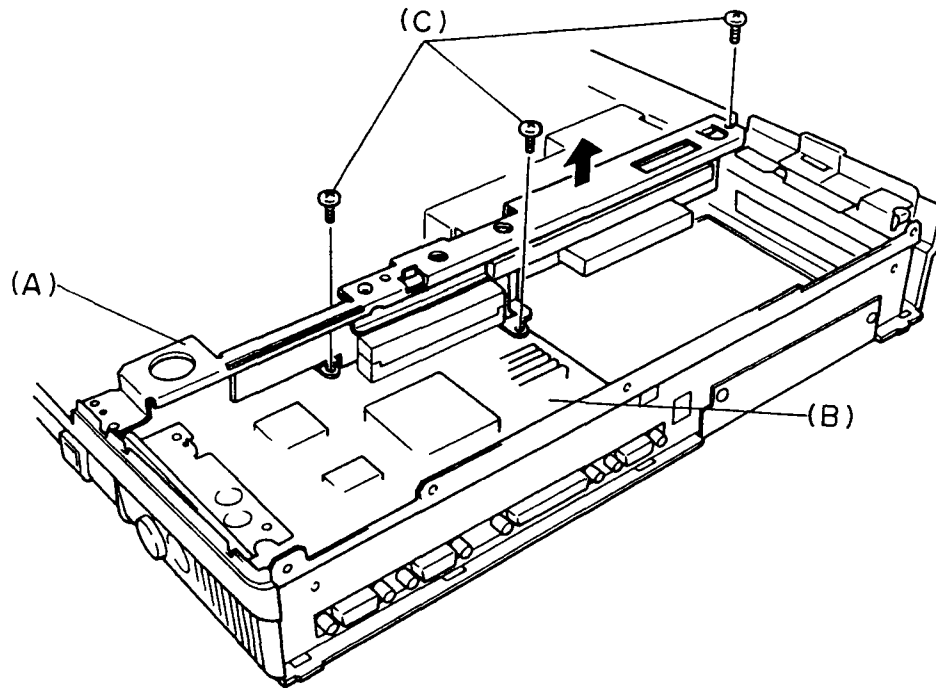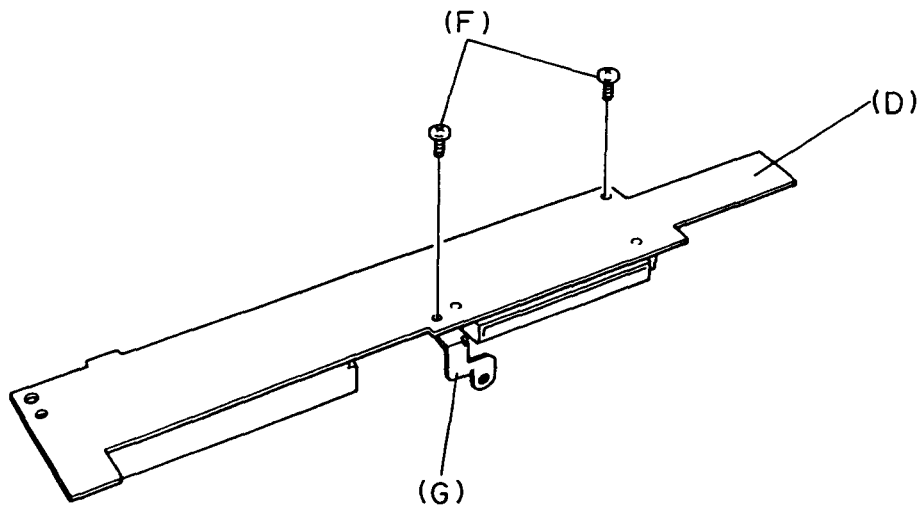

Figure 4-26   Removing the back panel board bracket

5. Remove the back panel board 2 (H) by removing the two screws (I).
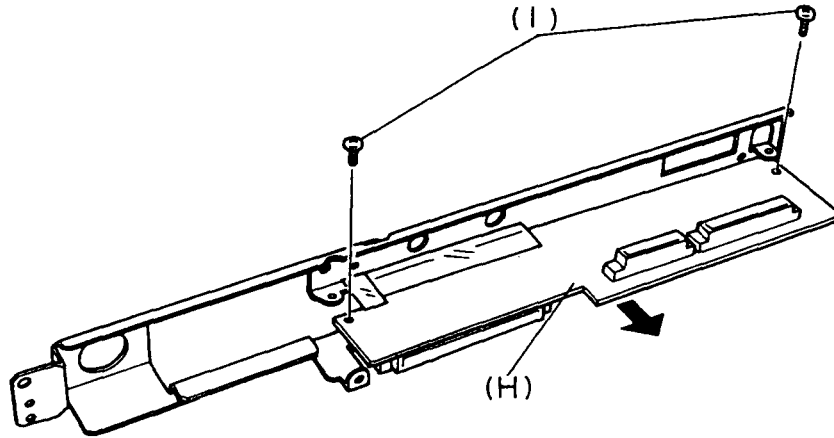
Figure 4-27 Removing the back panel board 2

6. To install the back panel board, follow the above procedures in reverse.

4.13 REMOVING/REPLACING THE MODEM CONNECTOR CABLE

1. Turn the system unit upside down,then remove the three screws (A) to remove the modem connecter cover (B) from the back side of the system unit (C).
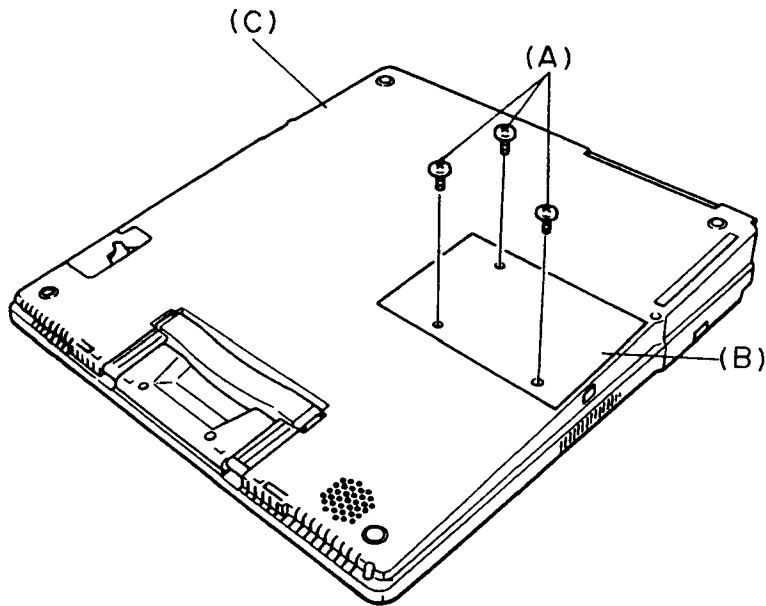
Figure 4-28 Removing the modem connecter cover

2. Remove the HDD according to the section 4.9.
    Remove the modem cable (D) from the PJ13 (E) by
    removing the screw (F) fixing the modem cable
    (D).
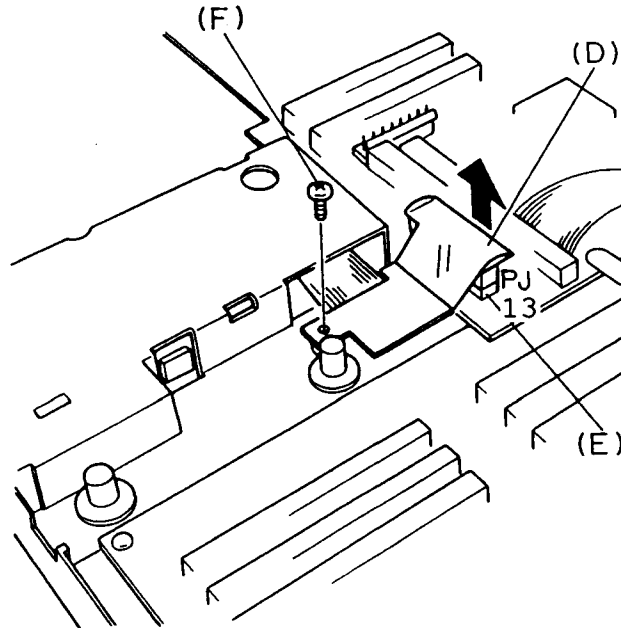
Figure 4-29   Removing the modem cable

3. To install the modem connector cable, follow the
    above procedures in reverse.

4.14 REMOVING/REPLACING THE SYSTEM BOARD AND THE MEMORY BOARD

1. Remove the back panel board unit and modem connector cable according to the sections 4.12 and 4.13.

2. Remove the two screws (A) in the rear of the system unit, then remove the mask panel (B).
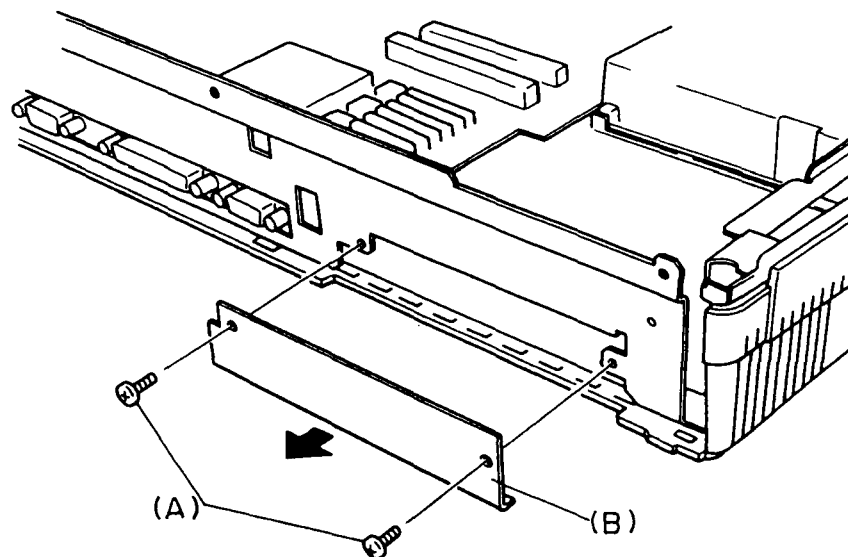
Figure 4-30 Removing the mask panel

3. Turn the system unit upside down, then remove
    the four screws (C) from the bottom cover to
    remove the rear support(D).
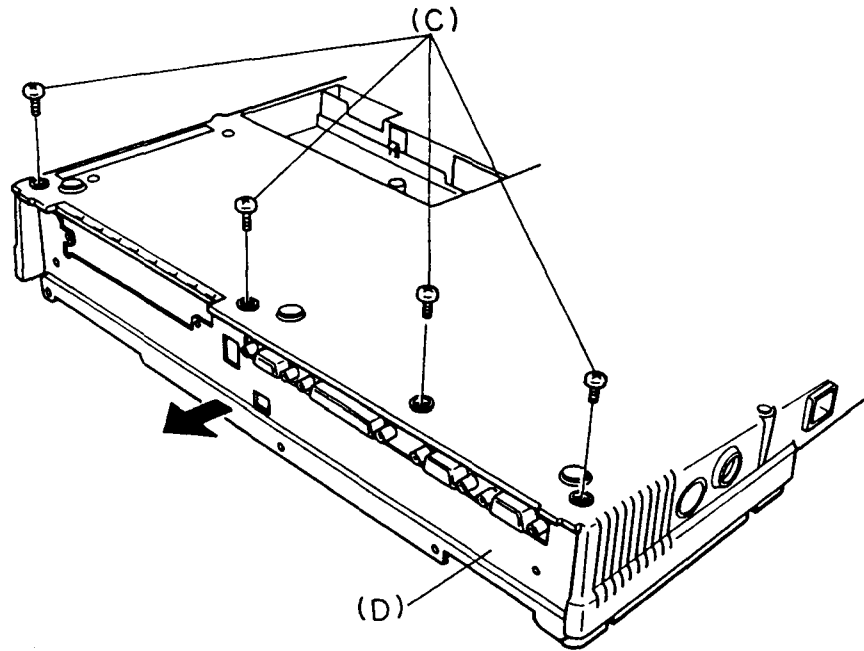
Figure 4-31   Removing the rear support

4. Remove the thirteen screws (E) to remove the system board (F) and the memory board (G) from the bottom cover (H).

At this time, you should remove the speaker cable from the PJ5 in the system board.
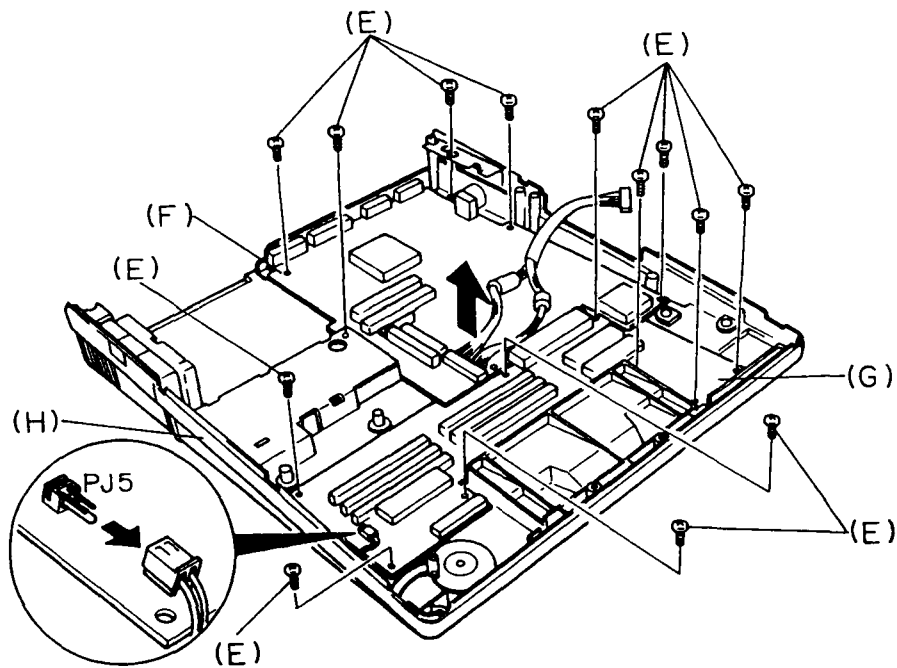
Figure 4-32 Removing the system board and the memory board

5. Remove the memory board (I) from the system board (J).
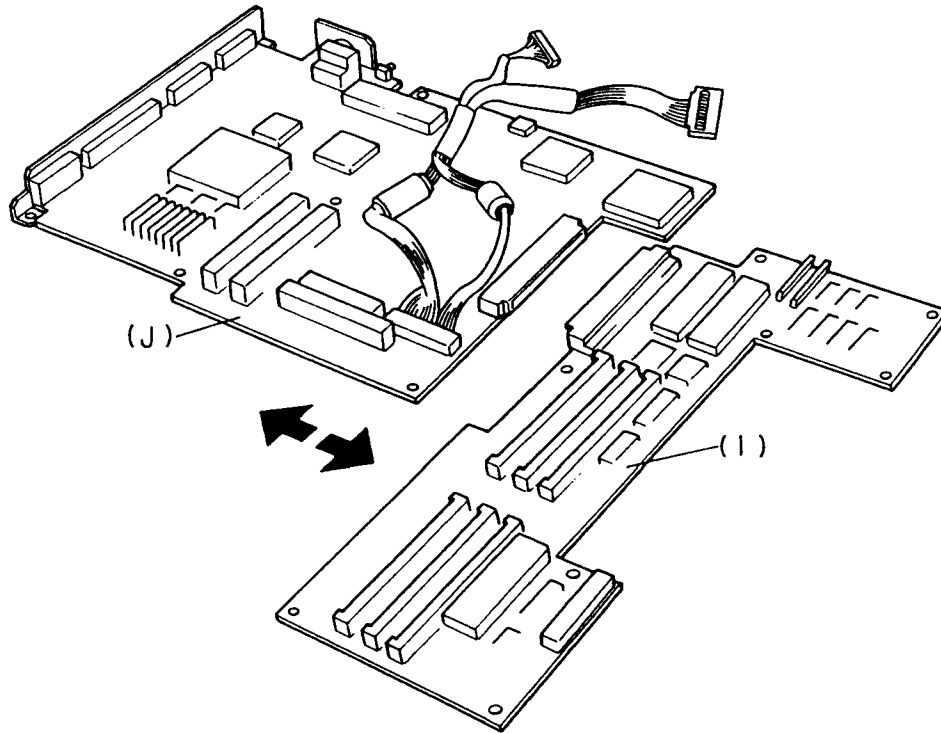
Figure 4-33 Removing the system board

6. To install the system board and the memory board, follow the above procedures in reverse.

4-32

(This page is intentionally blank.)

GENERAL

The appendices include the following parts:

APPENDIX A   BOARD LAYOUT

This parts shows location of the ICs
and connectors on the system board and
memory board.

APPENDIX B   PIN ASSIGNMENT

This part describes pin assignments of
the connectors on the system board,
and memory board.

APPENDIX C   DISPLAY CODE

This part shows the display code used
in the T3200SX.

APPENDIX D   KEYBOARD SCAN/CHARACTER CODE

This part shows the scan/character
code of the keyboard used in the
T3200SX.

APPENDIX E   KEY LAYOUT

This part describes key layouts of the
keyboards that are available for the
T3200SX.

APPENDIX A   BOARD LAYOUT

A.1   SYSTEM BOARD (ICs)
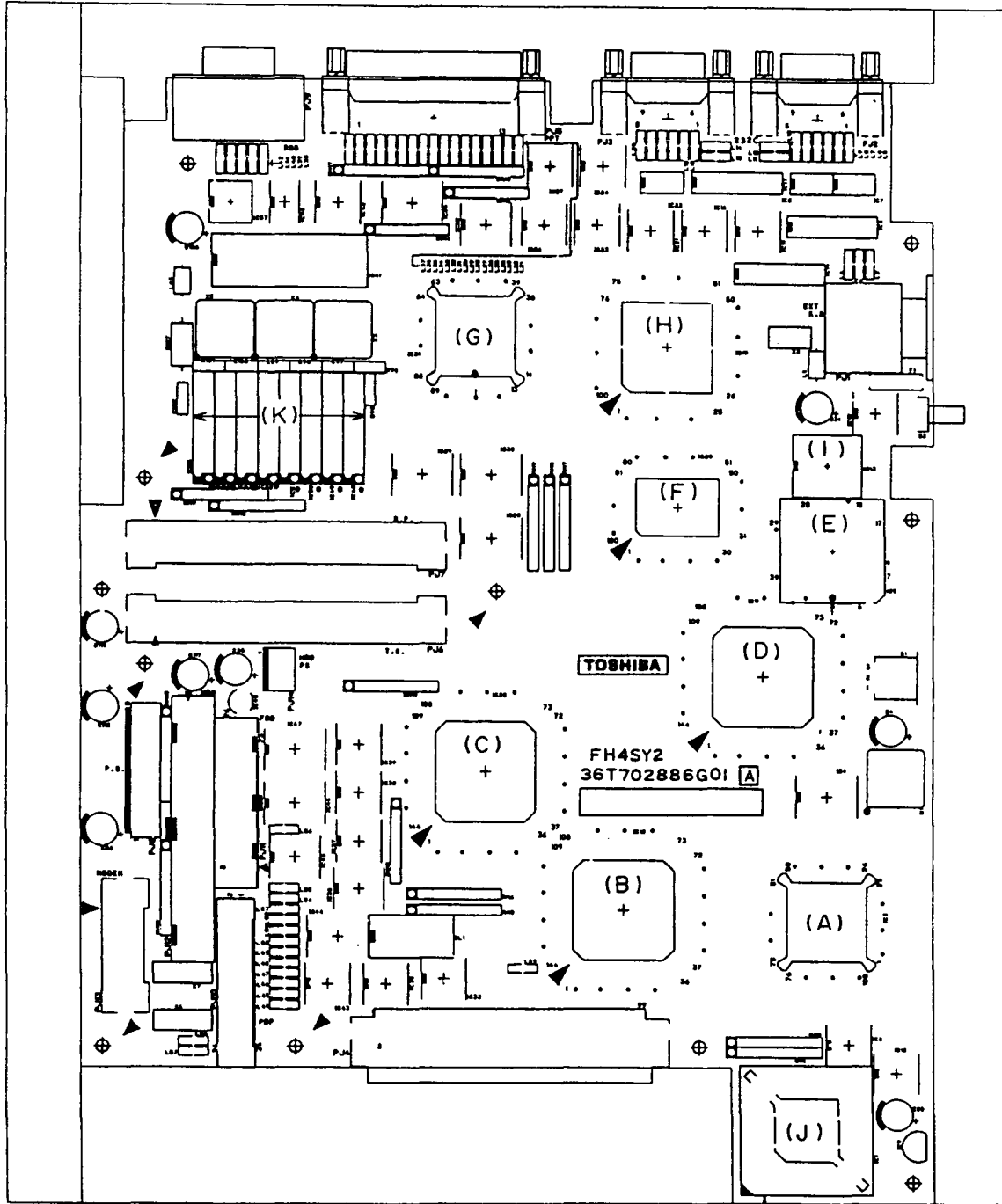
Figure A-1 System board (ICs)

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

(B) GA-MCNT4:   Memory controller gate array

(C) GA-BCNT4:   Bus controller gate array

(D) SI: Super integration (T9778A)

(E) SIO: Serial I/O controller (NS16450)

(F) GA-FDC: FDD/printer controller gate array

(G) PVGA1:   Paradise video graphics array

(H) HRGS-GA: High resolution graphics subsystem
                   gate array

(I) VFO: Variable frequency oscillator
                   (MB4108)

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

(K) Video RAMs

A.2 MEMORY BOARD (ICs)
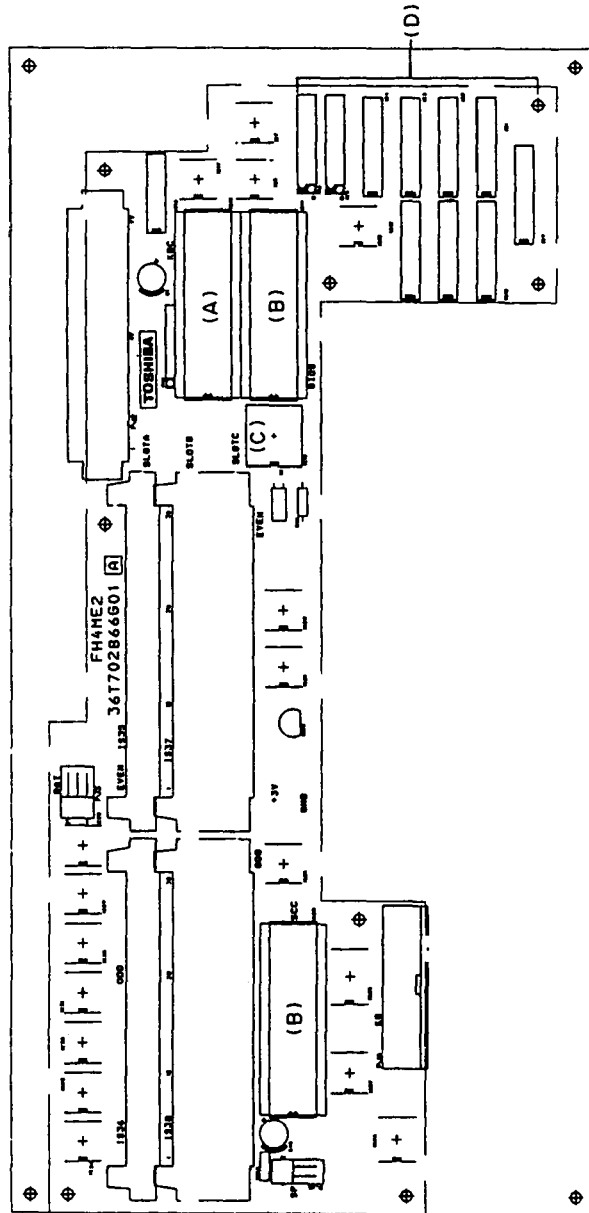
Figure A-2 Memory board (ICs)

(A)   KBC: Keyboard controller

(B)   SCC: Keyboard scan controller

(C)   RTC: Real time clock (MC146818A)

(D)   System memories

(E)   BIOS ROM

A.3   SYSTEM BOARD   (CONNECTORS)
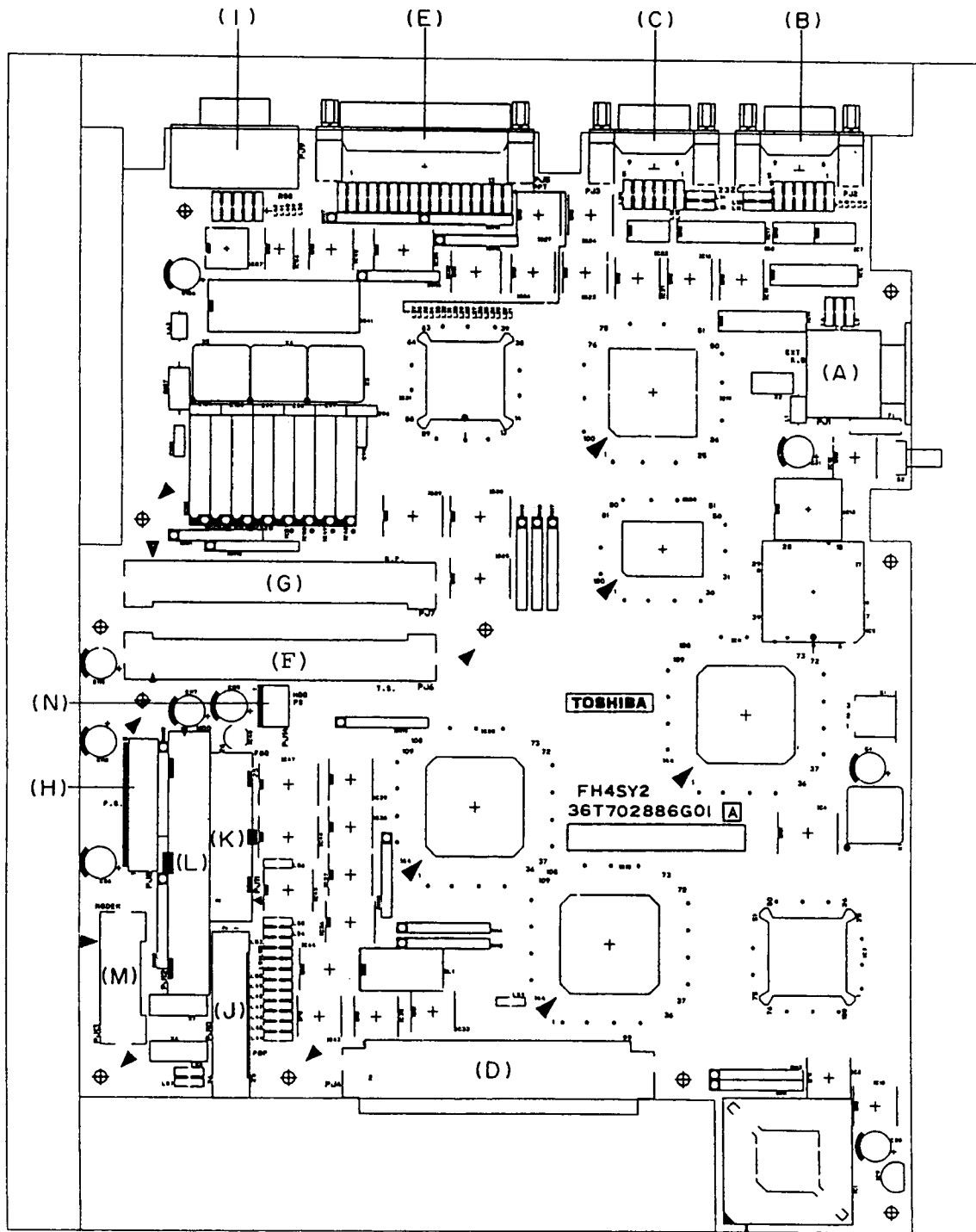
Figure A-3   System board (connectors)

(A)   PJ1   EXT KB I/F connector

(B)   PJ2:   SIO I/F connector B

(C)   PJ3:   SIO I/F connector A

(D)   PJ4:   Memory board I/F connector

(E)   PJ5:   PRT/EXT.FDD I/F connector

(F)   PJ6:   Toshiba slot board I/F connector

(G)   PJ7:   Back panel I/F connector

(H)   PJ8:   Power supply connector

(I)   PJ9:   CRT I/F connector

(J)   PJ10:   PDP I/F connector

(K)   PJ11:   3.5-inch FDD I/F connector

(L)   PJ12:   HDC I/F connector

(M)   PJ13:   Built-in modem I/F connector

(N)   PJ14:   HDD power supply connector

A.4 MEMORY BOARD (CONNECTORS)
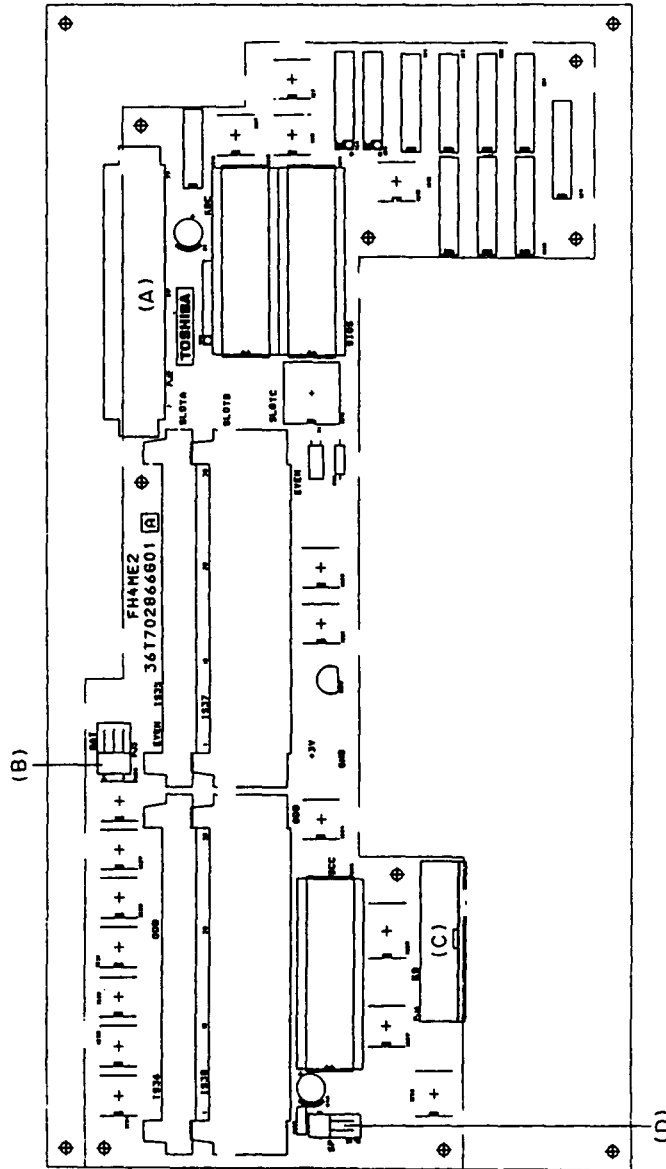
Figure A-4 Memory board (connectors)

(A) PJ2:   System board I/F connector

(B) PJ3:   Lithium battery connector

(C) PJ4:   Keyboard connector

(D) PJ5   Speaker connector

APPENDIX B   PIN ASSIGNMENT

B.1   SYSTEM BOARD

B.1.1 PJ1 EXT Keyboard I/F Connector (5-Pin)

Table B-1   EXT keyboard I/F connector pin assignment

Pin	Signal	I/O	Pin	Signal	I/O
1	EKBCLK;110	I/O	4	GND	
2	EKBDAT;110	I/O	5	EKB5V;100	
3	N/C				

B.1.2 PJ2 SIO I/F Connector B (9-Pin)

Table B-2   SIO I/F connector B pin assignment

Pin	Signal	I/O	Pin	Signal	I/O
1	MDCD2;110	I	6	MDDSR2;110	I
2	MDRD2;110	I	7	MDRTS2;110	O
3	MDTD2;110	O	8	MDCTS2;110	I
4	MDDTR2;110	O	9	MDRI2;110	I
5	GND				

B.1.3 PJ3 SIO I/F Connector A (9-Pin)

Table B-3   SIO I/F connector A pin assignment

Pin	Signal	I/O	Pin	Signal	I/O
1	MDCD1;110	I	6	MDDSR1;110	I
2	MDRD1;110	I	7	MDRTS1;110	O
3	MDTD1;110	O	8	MDCTS1;110	I
4	MDDTR1;110	O	9	MDRI1;110	I
5	GND				

B.1.4 PJ4 Memory Board I/F Connector (100-Pin)

Table B-4 Memory board I/F connector pin assignment

Pin	Signal	I/O	Pin	Signal	I/O
1	GND		51	MA10;110	O
2	VCC		52	MA9;110	O
3	SPK;000	O	53	MA8;110	O
4	LEDCAP;100	I	54	MA7;110	O
5	LEDNUM;100	I	55	GND	
6	LEDSCR;100	I	56	MA6;110	O
7	PUCLR;000	I	57	MA5;110	O
8	POWOFF;000	O	58	MA4;110	O
9	KBDATO;010	I	59	MA3;110	O
10	IRQ8;100	I	60	MA2;110	O
11	GND		61	MA1;110	O
12	DSTRB;000	O	62	MA0;110	O
13	RETIMW;000	O	63	RAS6;110	O
14	AS18;000	O	64	RAS5;110	O
15	SD0;100	I/O	65	RAS4;110	O
16	SD1;100	I/O	66	GND	
17	SD2;100	I/O	67	VCC	
18	SD3;100	I/O	68	RAS3;110	O
19	SD4;100	I/O	69	RAS2;110	O
20	SD5;100	I/O	70	RAS1;110	O
21	SD6;100	I/O	71	RAS0H;110	O
22	GND		72	RAS0L;110	O
23	SD7;100	I/O	73	RAS0P;110	O
24	ROMCS;010	O	74	CAS1;110	O
25	A16;100	O	75	CAS0;110	O
26	A15;100	O	76	WE;110	O
27	A14;100	O	77	GND	
28	A13;100	O	78	MPD1;100	I/O
29	A12;100	O	79	MPD0;100	I/O
30	A11;100	O	80	N/C	
31	A10;100	O	81	MD15;100	I/O
32	KBCCS;000	O	82	MD14;100	I/O
33	GND		83	MD13;100	I/O
34	VCC		84	MD12;100	I/O
35	IOR;020	O	85	MD11;100	I/O
36	A2;100	O	86	MD10;100	I/O
37	IOW;020	O	87	MD9;100	I/O
38	KBCLK0;000	I	88	GND	
39	IRQ1;100	I	89	MD8;100	I/O
40	FSELSW;000	O	90	MD7;100	I/O
41	EXTFDD;100	O	91	MD6;100	I/O
42	NOTCH;000	O	92	MD5;100	I/O
43	EKBDAT;010	O	93	MD4;100	I/O
44	GND		94	MD3;100	I/O
45	EKBCLK;010	O	95	MD2;100	I/O
46	REAL;000	I/O	96	MD1;100	I/O
47	RTCD;000	I	97	MD0;100	I/O
48	RESET;101	O	98	KBSEL;100	O
49	CK8M;110	O	99	VCC	
50	N/C		100	GND	

B.1.5 PJ5 PRT/EXT.FDD I/F Connector (25-Pin)

Table B-5 PRT/EXT.FDD I/F connector pin assignment

Pin	For PRT		For EXT.FDD	
	Signal	I/O	Signal	I/O
1	STROBE;000	I/O	READY;000	I
2	PD0;20	I/O	INDEX;000	I
3	PD1;120	I/O	TRACK;000	I
4	PD2;120	I/O	WPROTC;000	I
5	PD3;120	I/O	RDDA;000	I
6	PD4;120	I/O	DSKCHG;000	I
7	PD5;120	I/O	N/C	
8	PD6;120	I/O	N/C	
9	PD7;120	I/O	N/C	
10	ACK;000	I/O	SWFDB;100	O
11	BUSY;100	I/O	SWMONB;000	O
12	PE;100	I/O	WRDATA;100	O
13	SELECT;100	I/O	EXFDWE;100	O
14	AUTFD;000	I/O	XRATE0;100	O
15	ERROR;000	I/O	SIDE;100	O
16	PRINT;000	I/O	FDCDRC;100	O
17	SLIN;000	I/O	STEP;100	O
18 to 25	GND		GND	

B.1.6 PJ6 Toshiba Slot Board I/F Connector (100-Pin)

Table B-6 Toshiba slot board I/F connector pin assignment

Pin	Signal	I/O	Pin	Signal	I/O
1	GND		51	VCC	
2	VCC		52	DRQ2;100	I
3	SA1;100	I/O	53	SA9;100	I/O
4	SA0;100	I/O	54	SA10;100	I/O
5	SD7;100	I/O	55	RESET;100	O
6	BIOCHK;000	I	56	IRQ9;100	I
7	SA3;100	I/O	57	SA8;100	I/O
8	SA2;100	I/O	58	SD14;100	I/O
9	SD6;100	I/O	59	SD15;100	I/O
10	GND		60	GND	
11	COMCLK;012	O	61	SA6;100	I/O
12	SA4;100	I/O	62	SA7;100	I/O
13	SD4;100	I/O	63	SD12;100	I/O
14	SD5;100	I/O	64	SD13;100	I/O
15	TC;100	O	65	SD10;100	I/O
16	BALE;110	I	66	SA5;100	I/O
17	SD2;100	I/O	67	MASTER;000	I
18	SD3;100	I/O	68	SD11;100	I/O
19	DACK2;000	O	69	SD9;100	I/O
20	GND		70	GND	
21	SD1;100	I/O	71	MEMW;010	I/O
22	IRQ5;100	I	72	SD8;100	I/O
23	IRQ4;100	I	73	DACK6;000	O
24	BIORDY;100	I	74	DRQ6;100	I
25	SD0;100	I/O	75	LA17;100	I/O
26	IRQ7;100	I	76	MEMR;010	I/O
27	IRQ6;100	I	77	DACK5;000	O
28	SA19;100	I/O	78	DRQ5;100	I
29	DMACK;100	O	79	LA18;100	I/O
30	GND		80	GND	
31	REFRSH;000	I/O	81	LA20;100	I/O
32	SYSCLK;21	O	82	LA19;100	I/O
33	SA18;100	I/O	83	IRQ14;100	I
34	DACK1;000	O	84	LA22;100	I/O
35	DRQ1;100	I	85	LA21;100	I/O
36	SA16;100	I/O	86	IRQ11;100	I
37	SA17;100	I/O	87	IRQ12;100	I
38	DACK3;000	O	88	LA23;100	I/O
39	DRQ3;000	I	89	IRQ10;100	I
40	GND		90	GND	
41	SA14;100	I/O	91	BIO16;000	I
42	SA15;100	I/O	92	SBHE;000	I/O
43	IOW;010	I/O	93	BMEM16;000	I
44	IOR;010	I/O	94	TMSPK;000	I
45	SA13;100	I/O	95	TMIRQ;000	I
46	SMEMW;010	O	96	TMDMCS;000	O
47	SMEMR;010	O	97	P+12V	
48	SA11;100	I/O	98	VCC	
49	SA12;100	I/O	99	M-9V	
50	GND		100	GND	

B.1.7 PJ7 Back Panel I/F Connector (100-Pin)

Table B-7 Back panel I/F connector pin assignment

Pin	Signal	I/O	Pin	Signal	I/O
1	SA1;100	I/O	51	SA9;100	I/O
2	SA0;100	I/O	52	SA10;100	I/O
3	SD7;100	I/O	53	RESET;100	O
4	BIOCHK;000	I	54	IRQ9;100	I
5	SA3;100	I/O	55	SA8;100	I/O
6	SA2;100	I/O	56	VCC	
7	SD6;100	I/O	57	SD14;100	I/O
8	GND		58	SD15;100	I/O
9	CK14M;031	O	59	SA6;100	I/O
10	SA4;100	I/O	60	SA7;100	I/O
11	SD4;100	I/O	61	SD12;100	I/O
12	SD5;100	I/O	62	SD13;100	I/O
13	TC;100	O	63	SD10;100	I/O
14	BALE;110	O	64	SA5;100	I/O
15	SD2;100	I/O	65	MASTER;000	I
16	SD3;100	I/O	66	SD11;100	I/O
17	IRQ3;100	I	67	SD9;100	I/O
18	DACK2;000	O	68	GND	
19	SD1;100	I/O	69	DACK7;000	O
20	GND		70	DRQ7;100	I
21	IRQ5;100	I	71	MEMW;010	I/O
22	IRQ4;100	I	72	SD8;100	I/O
23	BIORDY;100	I	73	DACK6;000	O
24	SD0;100	I/O	74	DRQ6;100	I
25	IRQ7;100	I	75	LA17;100	I/O
26	IRQ6;100	I	76	MEMR;010	I/O
27	SA19;100	I/O	77	DACK5;000	O
28	DMACK;100	O	78	DRQ5;100	I
29	REFRSH;000	I/O	79	LA18;100	I/O
30	SYSCLK;120	O	80	GND	
31	SA18;100	I/O	81	DACK0;000	O
32	VCC		82	DRQ0;000	I
33	DACK1;000	O	83	LA20;100	I/O
34	DRQ1;100	I	84	LA19;100	I/O
35	SA16;100	I/O	85	IRQ15;100	I
36	SA17;100	I/O	86	IRQ14;100	I
37	DACK3;000	O	87	LA22;100	I/O
38	DRQ3;100	I	88	LA21;100	I/O
39	SA14;100	I/O	89	IRQ11;100	I
40	SA15;100	I/O	90	IRQ12;100	I
41	IOW;010	I/O	91	LA23;100	I/O
42	IOR;010	I/O	92	VCC	
43	SA13;100	I/O	93	P+12V	
44	GND		94	IRQ10;100	I
45	SMEMW;010	O	95	BIO16;000	I
46	SMEMR;010	O	96	SBHE;000	I/O
47	SA11;100	I/O	97	M-12V	
48	SA12;100	I/O	98	BMEM16;000	I
49	DRQ2;100	I	99	M-5V	
50	COVER;100	O	100	GND	

B.1.8 PJ8 Power Supply Connector (8-Pin

Table B-8 Power supply connector pin assignment

Pin	Signal	I/O	Pin	Signal	I/O
1	M-12V		5	GND	
2	M-5V		6	GND	
3	GND		7	VCC	
4	P+12V		8	VCC	

B.1.9 PJ9 CRT I/F Connector (15-Pin)

Table B-9 CRT I/F connector pin assignment

Pin	Signal	I/O	Pin	Signal	I/O
1	RED;110	O	9	N/C	
2	CGREEN;110	O	10	GND	
3	BLUE;110	O	11	N/C	
4	N/C		12	N/C	
5	GND		13	PHSYNC;120	O
6	GND		14	PVSYNC;120	O
7	GND		15	N/C	
8	GND				

B.1.10 PJ10 PDP I/F Connector (26-Pin)

Table B-10 PDP I/F connector B pin assignment

Pin	Signal	I/O	Pin	Signal	I/O
1	PVSYNC;121	O	14	GND	
2	GND		15	GND	
3	PHSYNC;121	O	16	PVCK0;120	O
4	GND		17	GND	
5	PPD0;020	O	18	DRVALD;010 ·	O
6	GND		19	DRVBLD;010	O
7	PPD1;020	O	20	N/C	
8	GND		21	LEDPWR;100	
9	PPD2;020	O	22	LEDCAP;020	O
10	GND		23	LEDNUM;020	O
11	PPD3;020	O	24	LEDSCR;020	O
12	GND		25	N/C	
13	DSPE;020	O	26	N/C	

B.1.11 PJ11 3.5-inch FDD I/F Connector (26-Pin)

Table B-11 3.5-inch FDD I/F connector pin assignment

Pin	Signal	I/O	Pin	Signal	I/O
1	VCC		14	STEP;000	O
2	INDEX;000	I	15	GND	
3	VCC		16	WDATA;000	O
4	FDSELA;000	O	17	GND	
5	VCC		18	WGATE;000	O
6	DSKCHG;000	I	19	GND	
7	VCC		20	TRACK0;000	I
8	READY;000	I	21	GND	
9	NOTCH;010	I	22	WPROTC;000	I
10	MONA;000	O	23	GND	
11	LOWDNS;000	O	24	DDA;000	I
12	FDCDRC;010	O	25	GND	
13	GND		26	SIDE;010	O

B.1.12 PJ12 HDC I/F Connector (44-Pin)

Table B-12 HDC I/F connector pin assignment

Pin	Signal	I/O	Pin	Signal	I/O
1	HRESET;010	O	23	HIOW;001	O
2	GND		24	GND	
3	HSD7;100	I/O	25	HIOR;001	O
4	HSD8;100	I/O	26	GND	
5	HSD6;100	I/O	27	HRDY;100	
6	HSD9;100	I/O	28	HALE;110	
7	HSD5;100	I/O	29	N/C	
8	HSD10;100	I/O	30	GND	
9	HSD4;100	I/O	31	IRQ14;100	I
10	HSD11;100	I/O	32	HIO16;000	I
11	HSD3;100	I/O	33	HSA1;101	O
12	HSD12;100	I/O	34	N/C	
13	HSD2;100	I/O	35	HSA0;101	O
14	HSD13;100	I/O	36	HSA2;101	O
15	HSD1;100	I/O	37	HDDCS0;010	O
16	HSD14;100		38	HDDCS1;010	O
17	HSD0;100	I/O	39	HACT;000	I
18	HSD15;100	I/O	40	GND	
19	GND		41	VCC	
20	VCC		42	VCC	
21	N/C		43	GND	
22	GND		44	GND	

B.1.13 PJ13 Built-in Modem I/F Connector (30-Pin)

Table B-13   Built-in modem I/F connector pin assignment

Pin	Signal	I/O	Pin	Signal	I/O
1	M-9V		16	GND	
2	BMDMCS;000	O	17	SD2;100	I/O
3	COMCLK;130	O	18	SD1;100	I/O
4	GND		19	GND	
5	SA0;100	O	20	GND	
6	SA1;100	O	21	SD0;100	I/O
7	SA2;100	O	22	IOW;020	O
8	GND		23	IOR;020	O
9	SD7;100	I/O	24	VCC	
10	SD6;100	I/O	25	RESET;101	O
11	GND		26	GND(MPWROF;100)	
12	GND		27	VCC	
13	SD5;100	I/O	28	VCC	
14	SD4;100	I/O	29	BMIRQ;000	I
15	SD3;100	I/O	30	BMSPK;000	I

B.1.14 PJ14 HDD Power Supply Connector (4-Pin)

Table B-14   HDD power supply connector pin assignment

Pin	Signal	I/O	Pin	Signal	I/O
1	P+12V		3	GND	
2	GND		4	VCC	

B.2   MEMORY BOARD

B.2.1   PJ2 System Board I/F Connector (100-Pin)

Table B-15   System board I/F connector pin assignment

Pin	Signal	I/O	Pin	Signal	I/O
1	GND		51	MA10;110	I
2	VCC		52	MA9;110	I
3	SPK;000	I	53	MA8;110	I
4	LEDCAP;100	O	54	MA7;110	I
5	LEDNUM;100	O	55	GND	
6	LEDSCR;100	O	56	MA6;110	I
7	PUCLR;000	O	57	MA5;110	I
8	POWOFF;000	I	58	MA4;110	I
9	KBDAT0;010	O	59	MA3;110	I
10	IRQ8;100	O	60	MA2;110	I
11	GND		61	MA1;110	I
12	DSTRB;000	I	62	MA0;110	I
13	RETIMW;000	I	63	RAS6;110	I
14	AS18;000	I	64	RAS5;110	I
15	SD0;100	I/O	65	RAS4;110	I
16	SD1;100	I/O	66	GND	
17	SD2;100	I/O	67	VCC	
18	SD3;100	I/O	68	RAS3;110	I
19	SD4;100	I/O	69	RAS2;110	I
20	SD5;100	I/O	70	RAS1;110	I
21	SD6;100	I/O	71	RAS0H;110	I
22	GND		72	RAS0L;110	I
23	SD7;100	I/O	73	RAS0P;110	I
24	ROMCS;010	I	74	CAS1;110	I
25	A16;100	I	75	CAS0;110	I
26	A15;100	I	76	WE;110	I
27	A14;100	I	77	GND	
28	A13;100	I	78	MPD1;100	I/O
29	A12;100	I	79	MPD0;100	I/O
30	A11;100	I	80	N/C	
31	A10;100	I	81	MD15;100	I/O
32	KBCCS;000	I	82	MD14;100	I/O
33	GND		83	MD13;100	I/O
34	VCC		84	MD12;100	I/O
35	IOR;010	I	85	MD11;100	I/O
36	A2;110	I	86	MD10;100	I/O
37	IOW;010	I	87	MD9;100	I/O
38	KBCLK0;000	O	88	GND	
39	IRQ1;100	O	89	MD8;100	I/O
40	FSELSW;000	I	90	MD7;100	I/O
41	EXTFDD;100	I	91	MD6;100	I/O
42	NOTCH;000	I	92	MD5;100	I/O
43	EKBDAT;010	I	93	MD4;100	I/O
44	GND		94	MD3;100	I/O
45	EKBCLK;010	I	95	MD2;100	I/O
46	REAL;000	I/O	96	MD1;100	I/O
47	RTCD;000	O	97	MD0;100	I/O
48	RESET;101	I	98	KBSEL;100	I
49	CK8M;110	I	99	VCC	
50	N/C		100	GND	

B.2.2 PJ3 Lithium Battery Connector (3-Pin)

Table B-16   Lithium battery connector (3-pin)

Pin	Signal	I/O	Pin	Signal	I/O
1	GND		3	BAT36V;100	I
2	N/C				

B.2.3 PJ4 Keyboard Connector (27-Pin)

Table 17   Keyboard connector pin assignment

Pin	Signal	I/O	Pin	Signal	I/O
1	GND		15	KBRN0;000	I
2	KBCS0;010	O	16	KBRN1;000	I
3	KBSC1;010	O	17	KBRN2;000	I
4	KBSC2;010	O	18	KBRN3;000	I
5	GND		19	GND	
6	KBCS3;010	O	20	KBRN4;000	I
7	KBSC4;010	O	21	KBRN5;000	I
8	KBSC5;010	O	22	KBRN6;000	I
9	KBSC6;010	O	23	KBRN7;000	I
10	GND		24	KBSC11;010	O
11	KBSC7;010	O	25	KBSC12;010	O
12	KBSC8;010	O	26	N/C	
13	KBSC9;010	O	27	GND	
14	KBSC10;010	O			

B.2.4 PJ5 Speaker Connector (2-Pin)

Table B-18   PJ5 speaker connector pin assignment

Pin	Signal	I/O	Pin	Signal	I/O
1	SPKON;000	O	2	SPKVCC;100	O

APPENDIX C

DISPLAY CODE

Table C-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
D	♪	↔	—	=	M	]	m	}	ì	¥	¡	╜	═	▐	φ	²
E	♫	▲	.	>	N	∧	n	~	Ä	Pt	Ø	╛	╬	▌	∈	■
F	☼	▼	/	?	O	_	o	△	Å	ƒ	»	┐	╧	▬	∩	BLANK FF

APPENDIX D   KEYBOARD SCAN/CHARACTER CODE

Table D-1   Keyboard scan/character code

Key No.	Key top	Base	Upper	Caps lock Base	Caps lock Upper	Ctrl	Alt
1	ESC "	011B "	011B "	011B "	011B "	011B "	--- "
2	! 1	0231 "	0221 "	0231 "	0221 "	----- ----	7800 "
3	@ 2	0332 "	0340 "	0332 "	0340 "	0300 "	7900 "
4	# 3	0433 "	0423 "	0433 "	0423 "	---- ----	7A00 "
5	$ 4	0534 "	0524 "	0534 "	0524 "	---- ----	7A00 "
6	% 5	0635 "	0625 "	0635 "	0625 "	---- ----	7C00 "
7	^ 6	0736 "	075E "	0736 "	075E "	071E "	7D00 "
8	& 7	0837 "	0826 "	0837 "	0826 "	---- ----	7300 "
9	* 8	0938 "	092A "	0938 "	092A "	---- ----	7F00 "
10	(9	0B30 "	0B29 "	0B30 "	0B29 "	---- ----	8000 "
11	) 0	0B30 "	0B29 "	0B30 "	0B29 "	---- ----	8100 "
12	-	0C2D "	0C5F "	0C2D "	0C5F "	0C1F "	8200 "
13	+ =	0D3D "	0D2B "	0D3D "	0D2B "	---- ----	8300 "
14	BS	0E08 "	0E08 "	0E08 "	0E08 "	0E7F "	---- ---- "
15	TAB	0F09 "	0F00 "	0F09 "	0F00 "	---- 9400	---- A500
16	Q	1071 "	1051 "	1051 "	1071 "	1011 "	1000 "
17	W	1177 "	1157 "	1157 "	1177 "	1117 "	1100 "
18	E	1265 "	1245 "	1245 "	1265 "	1205 "	1200 "
19	R	1372 "	1352 "	1352 "	1372 "	1312 "	1300 "
20	T	1474 "	1454 "	1454 "	1474 "	1414 "	1400 "
21	Y	1579 "	1559 "	1559 "	1579 "	1519 "	1500 "

Table D-1 Keyboard scan/character code (continued)

Key No.	Key top	Base	Upper	Caps lock Base	Caps lock Upper	Ctrl	Alt
22	U	1675 "	1655 "	1655 "	1675 "	1615 "	1600 "
23	I	1769 "	1749 "	1749 "	1769 "	1709 "	1700 "
24	O	186F "	184F "	184F "	186F "	180F "	1800 "
25	P	1970 "	1950 "	1950 "	1970 "	1910 "	1900 "
26	{ [	1A5B "	1A7B "	1A5B "	1A7B "	1A1B "	---- 1A00
27	}]	1B5D "	1B7D "	1B5D "	1B7D "	1B1D "	---- 1B00
28	L-E	1C0D "	1C0D "	1C0D "	1C0D "	1C0A "	---- 1C00
29	L-C	---- ----	---- ----	---- ----	---- ----	---- ----	---- ----
30	A	1E61 "	1E41 "	1E41 "	1E61 "	1E01 "	1E00 "
31	S	1F73 "	1F53 "	1F53 "	1F73 "	1F13 "	1F00 "
32	D	2064 "	2044 "	2044 "	2064 "	2004 "	2000 "
33	F	2166 "	2146 "	2146 "	2166 "	2106 "	2100 "
34	G	2267 "	2247 "	2247 "	2267 "	2207 "	2200 "
35	H	2368 "	2348 "	2348 "	2368 "	2308 "	2300 "
36	J	246A "	244A "	244A "	246A "	240A "	2400 "
37	K	256B "	254B "	254B "	256B "	250B "	2500 "
38	L	266C "	264C "	264C "	266C "	260C "	2600 "
39	: ;	273B "	273A "	273B "	273A "	---- ----	---- 2700
40	" '	2827 "	2822 "	2827 "	2822 "	---- ----	---- 2800
41	*2	2960 "	297E "	2960 "	2973 "	---- ----	---- 2900
42	L-S	---- ----	---- ----	---- ----	---- ----	---- ----	---- ----
43	*1	2B5C "	287C "	2B5C "	2B7C "	2B1C "	---- 2B00
44	Z	2C7A "	2C5A "	2C5A "	2C7A "	2C1A "	2C00 "
45	X	2D78 "	2D58 "	2D58 "	2D78 "	2D18 "	2D00 "
46	C	2E63 "	2E43 "	2E43 "	2E63 "	2E03 "	2E00 "

Table D-1 Keyboard scan/character code (continued)

Key No.	Key top	Base	Upper	Caps lock Base	Caps lock Upper	Ctrl	Alt
47	V	2F76 "	2F56 "	256 "	2F76 "	2F16 "	2F00 "
48	B	3062 "	3042 "	3042 "	3062 "	3002 "	3000 "
49	N	316E "	314E "	314E "	316E "	310E "	3100 "
50	M	326D "	324D "	324D "	326D "	320D "	3200 "
51	< ,	332C "	333C "	332C "	333C "	---- ----	---- 3300
52	> .	342E "	343E "	342E "	343E "	---- ----	---- 3400
53	? /	352F "	353F "	352F "	353F "	---- ----	---- 3500
54	R-S	---- ----	---- ----	---- ----	---- ----	---- ----	---- ----
55	*	372A "	372A "	372A "	372A "	---- 9600	---- 3700
56	L-A	---- ----	---- ----	---- ----	---- ----	---- ----	---- ----
57	SPC	3920 "	3920 "	3920 "	3920 "	3920 "	3920 "
58	CAP	---- ----	---- ----	---- ----	---- ----	---- ----	---- ----
59	F1	3B00 "	5400 "	3B00 "	5400 "	5E00 "	6800 "
60	F2	3C00 "	5500 "	3C00 "	5500 "	5F00 "	6900 "
61	F3	3D00 "	5600 "	3D00 "	5600 "	6000 "	6A00 "
62	F4	3E00 "	5700 "	3E00 "	5700 "	6100 "	6B00 "
63	F5	3F00 "	5800 "	3F00 "	5800 "	6200 "	6C00 "
64	F6	4000 "	5900 "	4000 "	5900 "	6300 "	6D00 "
65	F7	4100 "	5A00 "	4100 "	5A00 "	6400 "	6E00 "
66	F8	4200 "	5B00 "	4200 "	5B00 "	6500 "	6F00 "
67	F9	4300 "	5C00 "	4300 "	5C00 "	6600 "	7000 "
68	F10	4400 "	5D00 "	4400 "	5D00 "	6700 "	7100 "
69	NUM	---- ----	---- ----	---- ----	---- ----	---- ----	---- ----
70	SCR	---- ----	---- ----	---- ----	---- ----	---- ----	---- ----
71	7 HOM	4700 "	4737 "	4737 "	4700 "	7700 "	* *

Table D-1   Keyboard scan/character code (continued)

Key No.	Key top	Base	Upper	Caps lock Base	Caps lock Upper	Ctrl	Alt
72	8 UC	4800 "	4838 "	4838 "	4800 "	---- "	* *
73	9 PUP	4900 "	4939 "	4939 "	4900 "	8400 "	* *
74	—	4A2D "	4A2D "	4A2D "	4A2D "	---- 8E00	---- 4A00
75	4 LC	4B00 "	4B34 "	4B34 "	4B00 "	7300 "	* *
76	5	---- 4C00	4C35 "	4C35 "	---- 4C00	---- 8F00	* *
77	6 RC	4D00 "	4D36 "	4D36 "	4D00 "	7400 "	* *
78	+	4E2B "	4E2B "	4E2B "	4E2B "	---- 9000	---- 4E00
79	1 END	4F00 "	4F31 "	4F31 "	4F00 "	7500 "	* *
80	2 DC	5000 "	5032 "	5032 "	5000 "	---- 9100	* *
81	3 PDN	5100 "	5133 "	5133 "	5100 "	7600 "	* *
82	0 INS	5200 "	5230 "	5230 "	5200 "	---- 9200	* *
83	. DEL	5300 "	532E "	532E "	5300 "	---- 9300	---- ----
84	R-A	---- ----	---- ----	---- ----	---- ----	---- ----	---- ----
85	R-C	---- ----	---- ----	---- ----	---- ----	---- ----	---- ----
87	F11	---- 8500	---- 8700	---- 8500	---- 8700	---- 8900	---- 8B00
88	F12	---- 8600	---- 8800	---- 8600	---- 8800	---- 8A00	---- 8C00
89	R-S S-R	---- ----	---- ----	---- ----	---- ----	7200 "	---- ----
90	PUS BRK	---- ----	---- ----	---- ----	---- ----	0000 "	---- ----
91	/	352F E02F	352F E02F	352F E02F	352F E02F	---- 9500	---- A400
92	R-E	1C0D E00D	1C0D E00D	1C0D 300D	1C0D 300D	1C0A 300A	---- A600

NOTES:

BS:	Back Space	NUM:	Num Lock	R-A:	Right Alt
L-E:	Left Enter	SCR:	Scroll Lock	R-C:	Right Ctrl
L-C:	Left Ctrl	HOM:	Home	R-S:	Right Screen
L-S:	Left Shift	UC:	Up Cursor	S-R:	Sys Req
R-S:	Right Shift	PUP:	PgUp	PUS:	Pursue
L-A:	Left Alt	RC:	Right Cursor	BRK:	Break
SPC:	Space	DC:	Down Cursor	R-E:	Right Enter
CAP:	Caps Lock	PDN:	PgDn		

APPENDIX E KEY LAYOUT

E.1   USA VERSION
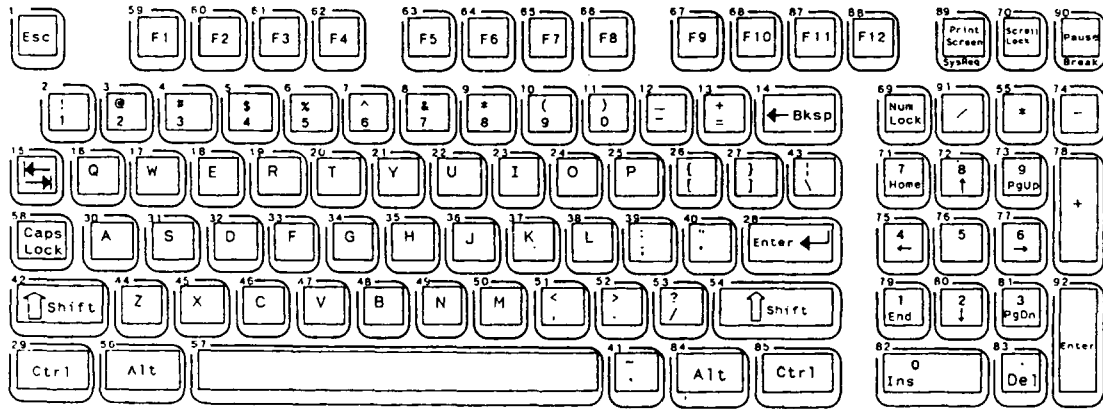
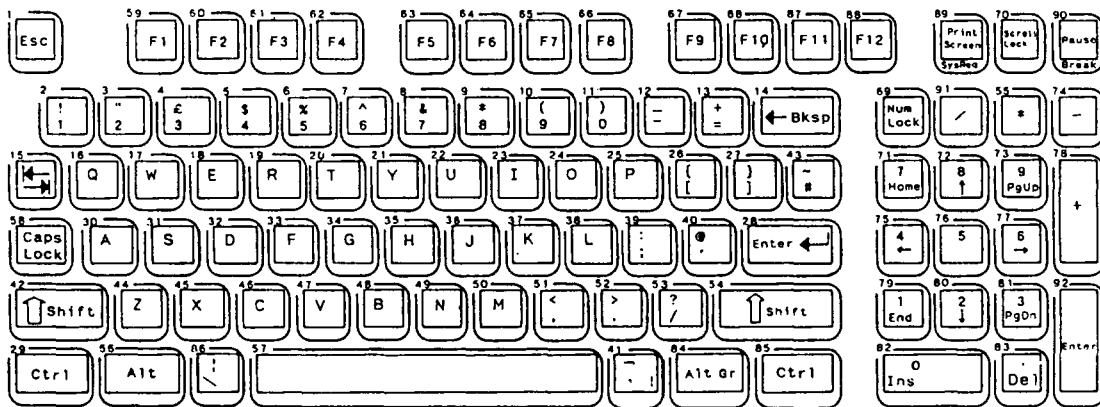Figure E-1 USA version

E.2   UK VERSION

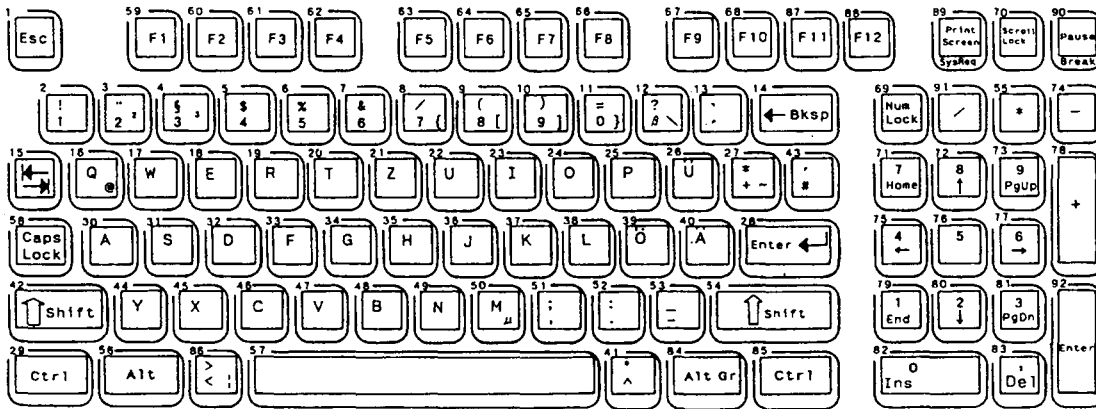Figure E-2 UK version

E.3   GERMANY VERSION

Figure E-3   Germany version
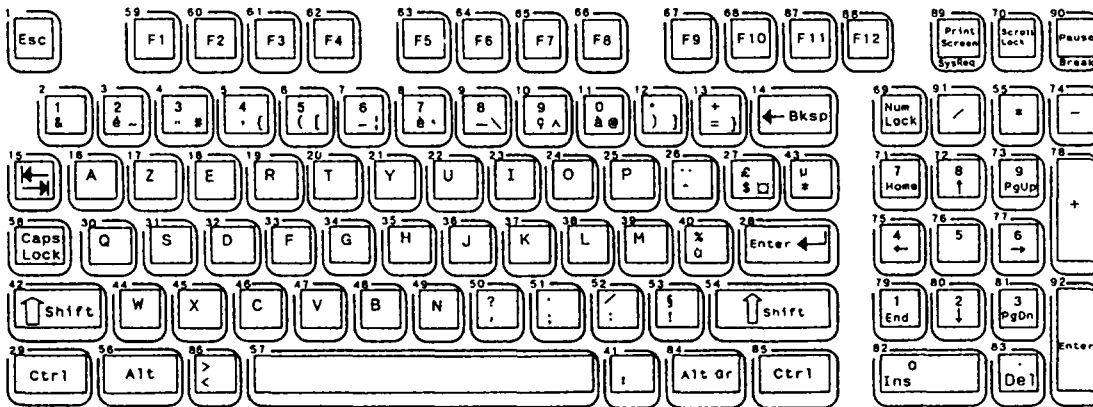
E.4   FRANCE VERSION

Figure E-4   France version
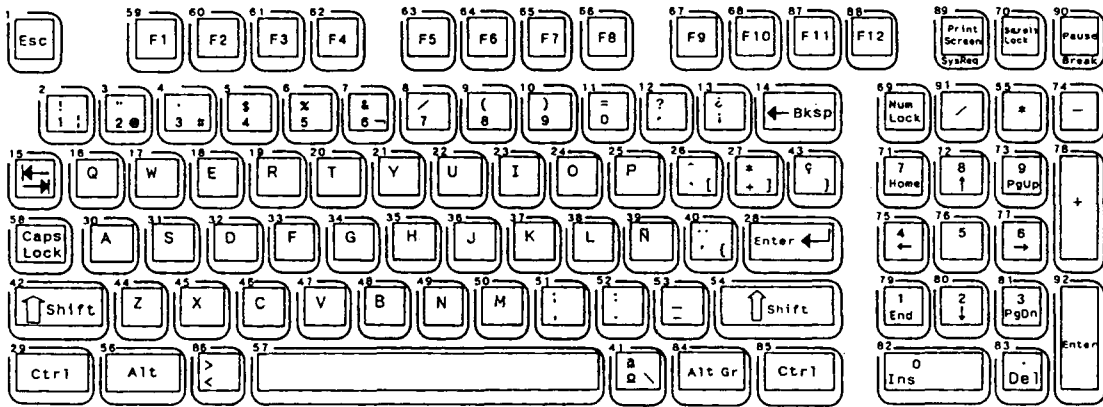
E.5   SPAIN VERSION
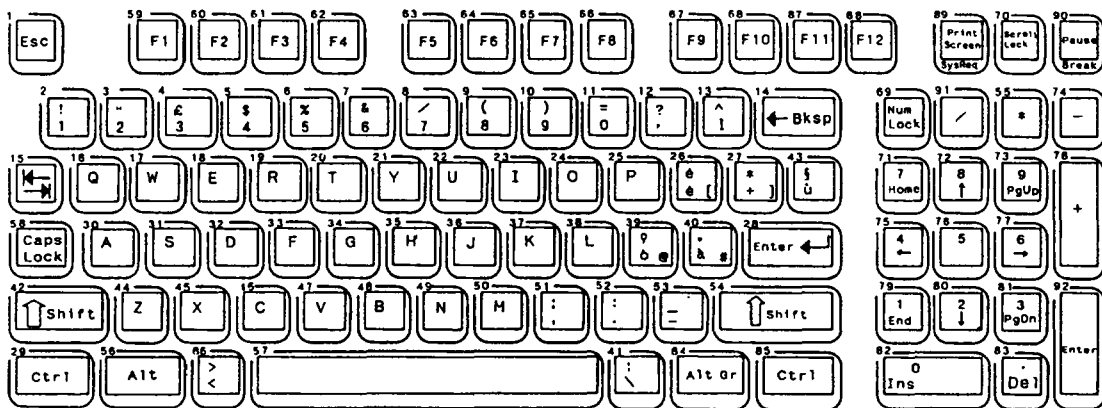

Figure E-5   Spain version

E.6   ITALY VERSION

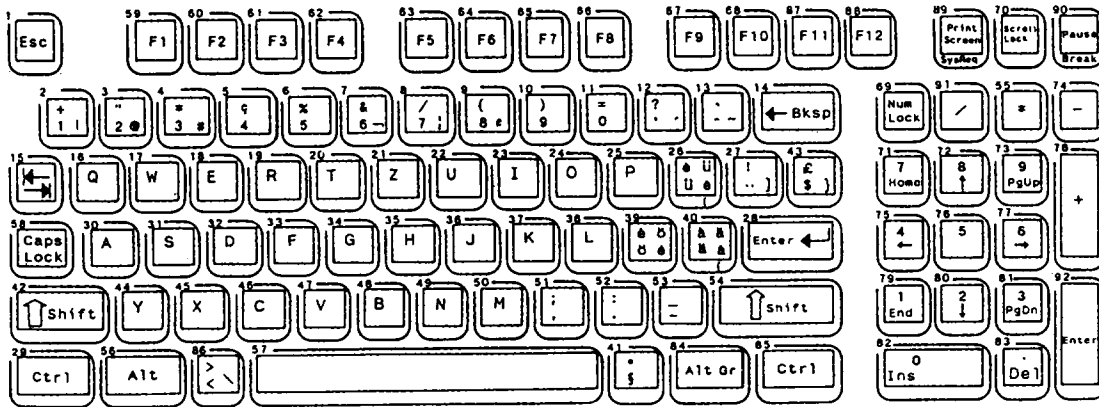

Figure E-6   Italy version

E.7   SWITZERLAND VERSION

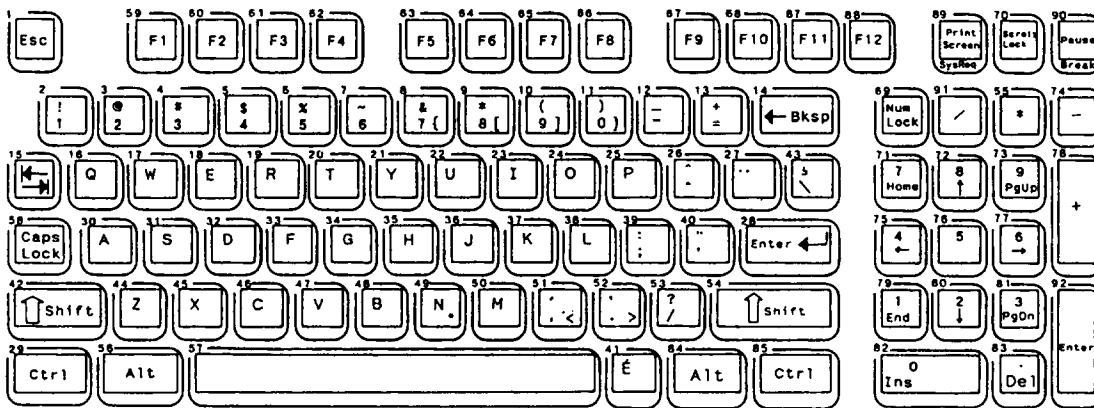Figure E-7   Switzerland version

E.8   CANADIAN VERSION

Figure E-8   Canadian version

E.9　　SWEDEN VERSION
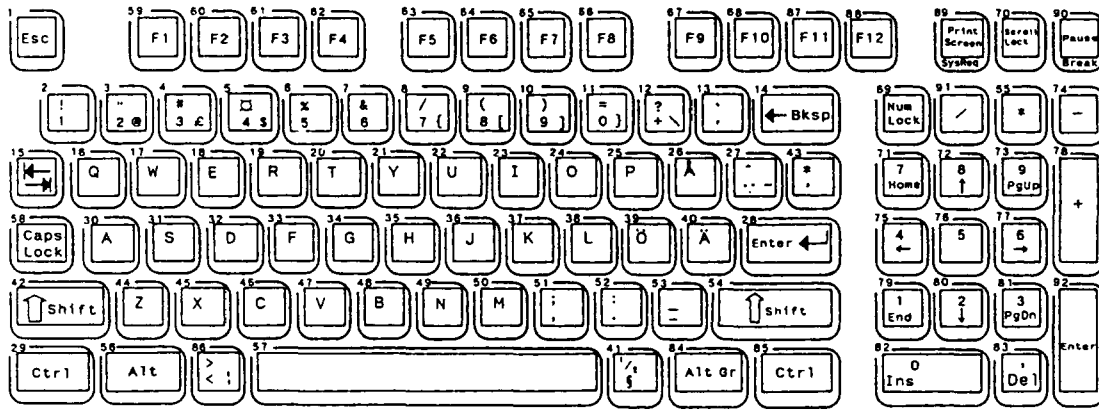
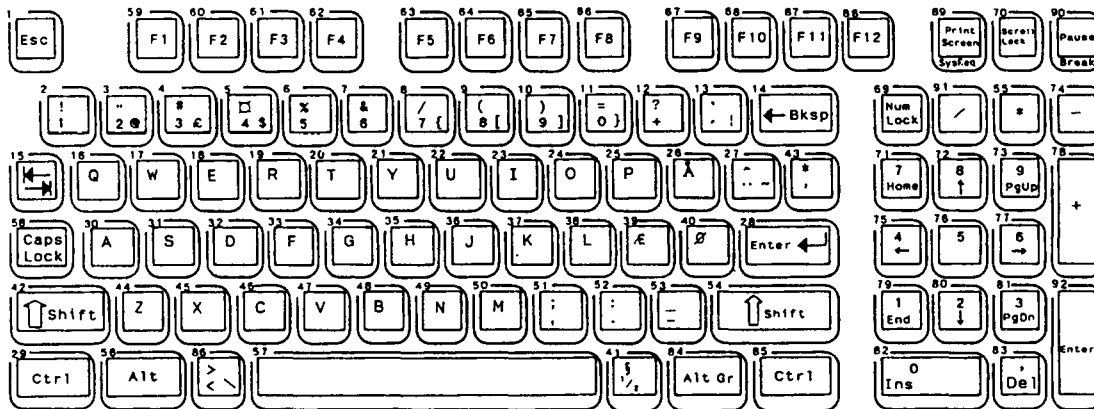Figure E-9　Sweden version
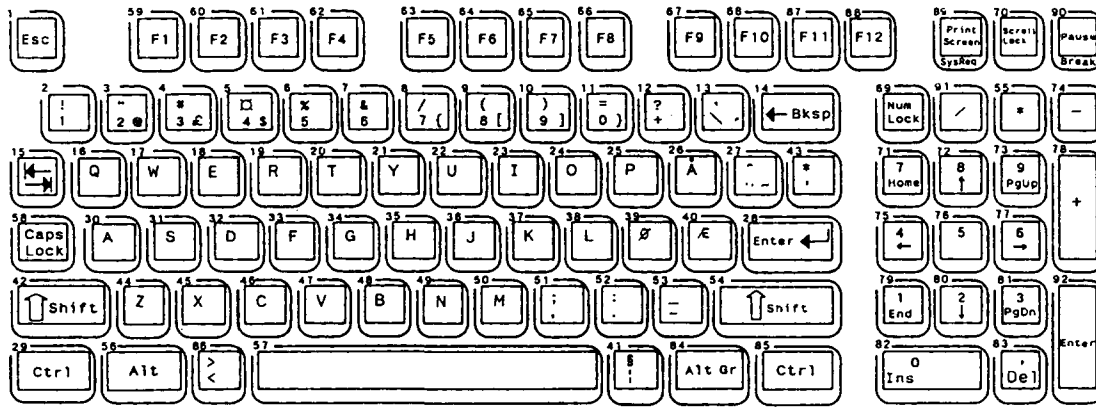
E.10　　DENMARK VERSION

Figure E-10　Denmark version

E.11   NORWAY   VERSION

Figure E-11   Norway version