



Personal System/2
Model N33 SX
Repair Center
Maintenance Information

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Contents

Product Description	1
Security	2
System Board Features	3
Diskette Drive and Diskette	7
Hard Disk Drive	7
Operating Requirements	8
Power-On Self-Test (POST)	8
System Memory	9
Specifications	10
System	10
AC Adapter	10
Quick Charger	11
Special Tools	12
Repair Information	13
General Checkout	15
Undetermined Problem	18
Power Supply	19
Testing the AC Adapter	22
Testing the Rechargeable Battery	23
Testing the Backup Battery	24
Installed Devices List	25
Memory	26
Keyboard	27
Printer	28
Symptom-to-FRU Index	29
Removals and Replacements	34
1005 Bottom Cover	34
1010 System Board (Sub Board)	40
1015 System Board (Main Board)	52
1020 LED Board	57
1025 Speaker Assembly	58
1030 Standby Battery	59
1035 Keyboard Assembly	60
1040 Hard Disk Drive	61
1045 Memory-Module Kit	63
1050 Option Adapter	64
1055 Backup Battery	65
1060 LCD Front Cover and LCD Panel	66
Locations	71

Front View	71
System Status Indicator	72
Rear View	73
Interior View (Front View)	74
Interior View (Rear View)	75
Parts Catalog	76

Product Description

The IBM Personal System/2 Model N33 SX is a notebook-size computer that is functionally compatible with the IBM Personal Computer AT*. With a rechargeable battery, the computer can be operated where no external power source is available. The features of Model N33 SX include:

- Security:
 - Power-on password
 - Keyboard password
- Power source:
 - Rechargeable battery
 - AC adapter and quick charger, automatically switch to 90 - 137 V ac or 180 - 264 V ac (50 or 60 Hz).
- System board (Main and Sub):
 - 12-MHz i80386SX™ Microprocessor
 - Diskette-drive controller
 - Parallel port
 - Serial port
 - Black mini mouse or numeric keypad connector
 - System-expansion connector
 - Minimum of 2MB (1MB = 1 048 576 bytes) random access memory (RAM), up to 6MB expandability on board
 - Real-time-clock circuitry, configuration and status information storage provided by the real-time clock/complementary metal oxide semiconductor (RT/CMOS) RAM
 - Read-only memory basic input/output system (ROM BIOS)
 - Suspend and Resume modes
- Video Graphics Array (VGA) with Liquid Crystal Display (LCD) control
- Liquid Crystal Display
 - 640 X 480 PELS
 - 16 shades of gray addressable
- Built-in LED status indicators
- A 40MB hard disk drive (fixed disk drive)

* IBM, Personal Computer AT, and Personal System/2 are trademarks of the International Business Machines Corporation.

™ i80386SX is trademark of the Intel Corporation.

- A 1.44MB 3.5-inch external diskette drive
- Speaker
- Separate 17-key numeric keypad
- Backup battery (to keep real-time clock circuitry, configuration, and status information active when power is off)
- Standby battery to supply power to the system during replacement of the rechargeable battery.

Security

Power-On Password

System access can be controlled by using a power-on password. When a power-on password is active, the password prompt, which resembles a small key, appears on the screen each time the system is powered on. At the password prompt, type the password and press Enter. The password does not appear on the screen.

- *To set a power-on password:*

Select the **Set passwords and network server mode** from the Main Menu of the Reference Diskette.

System Board Features

The system board consists of the following parts:

- Main board
- Sub board
- LED board
- FDD interface board.

The major features of the system board are:

- i80386SX Microprocessor
- CMOS RAM
- ROM BIOS
- Suspend/Resume modes
- Display controller for LCD
- Diskette-drive controller
- Serial port
- Parallel port
- Pointing-device connector
- System-expansion connector
- One additional memory-module socket for memory expansion
- Keyboard/mouse controller
- Power supply
- Charger.

Microprocessor

The microprocessor interprets and carries out instructions. The 80386SX Microprocessor is a 32-bit processor and operates in real-mode and virtual-mode. The maximum speed of the microprocessor is 12-MHz.

RT/CMOS RAM and Battery

The RT/CMOS RAM provides 128 bytes of storage. The real-time clock uses 14 bytes of this storage to track the date, time, and battery level. The remaining 114 bytes are assigned to store system configuration and security information.

The stored data in the RT/CMOS RAM is kept active by the backup battery when the system is not powered on. If the stored data is lost due to a depleted or removed backup battery, start the Reference

Diskette to permit the **Automatic configuration** program to run. The data also can be restored by using the **Restore configuration** program, the customer's backup copy of the Reference Diskette.

ROM BIOS

Read Only Memory — Basic Input/Output System (ROM BIOS) contains the instructions and routines that control the keyboard, diskette drive, hard disk drive, displays and other major I/O devices in the system. Some adapters have their own ROM modules containing extended BIOS routines that work with the system board ROM BIOS. The routines for performing the power-on self-test (POST) are also contained in the ROM.

Suspend and Resume Modes

The suspend and resume modes are unique methods to minimize the use of power from the battery. When the computer enters Suspend mode, one beep sounds. All tasks are stopped and their present states are stored in memory to save power.

When the computer returns to Resume mode, the computer restores the same states as when it entered Suspend mode. One beep sounds when the resume operation completes.

- The system enters Suspend mode when:
 - Closing the computer display
 - Turning the resume switch to off
 - Detecting the battery-low condition
 - Entering *PS2 OFF* command in the Set Features program.
- The system returns to Resume mode when:
 - Opening the computer display
 - Turning the resume switch to on
 - Detecting the ring indicator on the communication interface.

LCD Controller

The LCD controller contains the LCD Controller and the VGA. The LCD Controller can display a maximum 640 by 480 picture elements (PELs) with 32 addressable shades of gray on the LCD.

The VGA is a graphics controller on the LCD controller. It supports color and monochrome analog direct-drive displays in a variety of alphanumeric (A/N) text and all-points-addressable (APA) graphics modes.

The VGA supports a maximum of 640 by 480 PELs in text mode, and a maximum of 640 by 480 PELs in graphics mode. The VGA can support 16 shades of gray at one time. Composite video is not supported.

Diskette-Drive Controller

The controller on the system board connects to the external diskette drive through FDD interface board and 26-pin external FDD cable. Signals and voltages are supplied through the cable that plugs into the connector. These signals and voltages can operate one external IBM 3.5-inch diskette drive.

Serial Port

The serial port is fully programmable and supports asynchronous communications. The 9-pin D-shell connector provides the signals to drive a standard EIA-232C device and is identified by the system configuration as SERIAL_1 or SERIAL_2.

Note: Conflicts occur when two or more communication lines are addressed the same. Use the **Set configuration** option on the Reference Diskette to check that no two lines have the same address.

Parallel Port

A parallel port makes possible the attachment of devices that accept 8 bits of parallel data at standard transistor-transistor logic (TTL) levels. The port can be used as a general input/output port for any device or application that matches its input/output capabilities. It has a 25-pin, D-shell connector and is primarily designed for printers. The system can support three different devices, each addressed separately as PARALLEL_1, PARALLEL_2, or PARALLEL_3.

Note: Conflicts occur when two or more devices are addressed the same. Use the **Set configuration** option on the Reference Diskette. Select **View configuration** to verify that no two lines have the same address.

Mini Mouse Connector

The mouse connector is located at the rear of the computer and accepts a mouse or numeric keypad.

The Model N33 SX has only one pointing-device connector. However, it is possible for you to concurrently use the numeric keypad and mouse through another mouse connector located at the rear of the numeric keypad.

Diskette Drive and Diskette

The Model N33 SX uses a 1.44MB formatted external diskette drive. (It has **1.44** on the eject button). Both 1.0MB (formatted 720KB) and 2.0MB (formatted 1.44MB) capacity diskettes can be used in this drive.

Hard Disk Drive

The Model N33 SX has a hard disk drive that automatically positions the read/write heads in nondata areas either when the system is powered off or the system enters Suspend mode. No special precautions are required regarding parking the heads when moving the computer. The hard disk drive controller is on the drive assembly.

Note: Turn off the computer or close the display whenever moving the computer to prevent damage to the hard disk drive.

Operating Requirements

The following describes the operations that take place from power-on until the minimum operating requirements are met.

Power-On Self-Test (POST)

The POST is initiated automatically each time the system power is turned on. The POST is a series of system checks and initializations that verify the correct operation of the system unit. The POST checks only those areas that permit the system to be operational enough to run advanced diagnostics. The POST can detect two types of errors: critical and noncritical.

Critical errors either prevent the system from operating or cause incorrect results that are apparent to the user. Examples of critical errors include microprocessor or interrupt controller errors. If the POST detects a critical error, the microprocessor attempts to display the error and all testing stops.

Noncritical errors cause incorrect results that may not be apparent to the user. An example of a noncritical error is a serial communications failure. For a noncritical error the microprocessor displays an error code and the testing stops; pressing F1 allows testing to continue.

When the Reference Diskette is in drive A and a noncritical error is detected, the system displays the POST error message along with a message generated from the Reference Diskette. The Reference Diskette message instructs the user to take a specific action to correct the error.

After a successful POST, a single short beep is generated. Control is then given to the BIOS routine called the system bootstrap loader. The bootstrap loader attempts to load an operating system or program from either a diskette or the hard disk drive. If neither is present in the system, the Insert Diskette icon is displayed. This icon indicates that a diskette should be inserted into drive A. After the diskette is inserted, press F1 to resume operation.

System Memory

Memory Requirements and Limitations

The Model N33 SX has two megabytes of memory on the system board. Additional memory-module kits can be installed into the one memory module connector on the system board. The connector accepts 2MB or 4MB memory-module kit.

Note: Whenever memory is added or removed from the system, run the **Automatic configuration** program on the Reference Diskette.

Specifications

System

Size

- Depth: 210 mm (8.3 in.)
- Height: Front 43.5 mm (1.7 in.) Rear 51.5 mm (2.0 in.)
- Width: 297 mm (11.7 in.)

Weight

- Approximately 2.5 kg (5.5 lb.) with a rechargeable battery.

Environment

- Air Temperature:
 - System On: 5.0° to 35.0° C (41.0° to 95.0° F)
 - System On (with diskette): 10.0° to 35.0° C (50.0° to 95.0° F)
 - System Off: -20° C to 60° C (-4.0° to 140.0° F)
- Humidity:
 - System On: 8% to 80%
 - System On (with diskette): 8% to 80 %
 - System Off: 8% to 80%
- Maximum altitude: 2133 m (7000 ft.) (15° C to 25° C)

Heat Output

140 British Thermal Units (BTUs) per hour (41 watts per hour).

AC Adapter

Input Voltage

- Low Range
 - Minimum: 90 V ac
 - Maximum: 137 V ac
- High Range
 - Minimum: 180 V ac
 - Maximum: 264 V ac.
- Frequency Range
 - Minimum: 47 Hz
 - Maximum: 63 Hz

Output Voltage

+15 V dc

- Minimum: +14.25 V dc
- Maximum: +15.75 V dc

Maximum Current

2.7A

Quick Charger

Input Voltage

- Low Range
 - Minimum: 90 V ac
 - Maximum: 137 V ac
- High Range
 - Minimum: 180 V ac
 - Maximum: 264 V ac
- Frequency Range
 - Minimum: 47 Hz
 - Maximum: 63 Hz

Output Voltage

+15 V dc

- Minimum: +14.25 V dc
- Maximum: +15.75 V dc

Maximum Rush Current

50A

Special Tools

The following special tools are required to service the Model N33 SX.

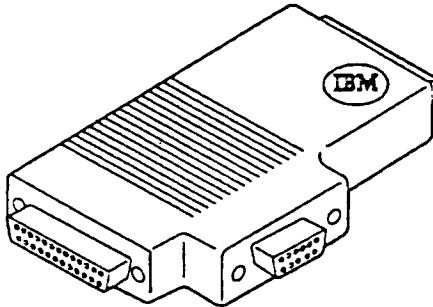
Volt-Ohm Meter

A meter similar to the Triplet Model 310¹.

Wrap Plug

The Tri-Connector wrap plug (IBM part 72X8546) is used during advanced diagnostic tests of:

- Parallel Ports
- Serial Ports
- Tool Kit for Repair Center (IBM part 95F3598)
- Socket Wrench (IBM part 07G0007).



¹ Manufactured by Triplet Corporation, Bluffton, Ohio 45817, U.S.A.

Repair Information

This section contains information about general checkout, removals and replacements, locations, and safety grounds.

- The arrows in the "Removals and Replacements" section show the direction of movement to remove a FRU or to turn a screw to release the FRU. The arrows are marked in numeric order to show the correct sequence of removal.
- When other FRUs must be removed before removing the failing FRU, they are listed at the top of the page. Go to the removal procedure for each FRU listed, remove the FRU, and then continue with the removal of the failing FRU.
- To replace a FRU, reverse the removal procedure and follow any notes that pertain to replacement. See "Locations" for internal cable connection and arrangement information.

CAUTION:

Before removing any field replaceable unit (FRU), power-off the system, unplug all power cords from electrical outlets, remove the rechargeable battery, then disconnect any interconnecting cables.

CAUTION:

The rechargeable battery contains small amounts of nickel and cadmium. Do not disassemble it, throw it into fire or water, or short-circuit it. Dispose of the rechargeable battery as required by local ordinances or regulations.

CAUTION:

Dispose of the LCD Panel as required by local ordinances or regulations.

Warning: The system board, adapters, and memory modules are sensitive to, and can be damaged by, electrostatic discharge. Always use the IBM ESD kit when handling the ESD sensitive parts.

General Checkout

The advanced diagnostic tests are intended to test *only* IBM products. Non-IBM products, prototype cards, or modified options can give false errors and invalid system responses.

IMPORTANT:

- If more than one error code is displayed, diagnose the first error code first. The cause of the first error code can cause false error codes to be displayed.
- If an adapter or device consists of more than one FRU, an error code may be caused by any of the FRUs. Before replacing the adapter or device, remove the FRUs, one by one, to see if the symptoms change.

001

IS IT A POWER SUPPLY PROBLEM?

Yes No

002

Go to Step 004.

003

Go to "Power Supply" on page 19.

004

- Power-off the system and all external devices.
- Check all cables and power cords.
- Power-on all external devices.
- Insert the backup Reference Diskette.
- Power-on the system and check for the following responses:

1. The system-status LED appears once for about 1 second.

Note: Others go off after 1 second.

2. Memory test (the number increases.)
3. One or two short beeps.
4. A correct IBM logo screen appears.

(Step 004 continues)

04 (continued)

DO YOU RECEIVE THE RESPONSES LISTED ABOVE?

Yes No

005

Go to "Symptom-to-FRU Index" on page 29.

- or -

If that does not correct the problem, go to "Undetermined Problem" on page 18 .

006

- Advance to the Main Menu.
- Press Ctrl+A, then type 0 to run the System Checkout.

Notes:

1. If the system has an incorrect keyboard response, go to "Keyboard" on page 27.
2. If the printer has incorrect responses, go to "Printer" on page 28.
3. If the display has problems such as jittering, rolling, shifting, or being out-of-focus, the most likely causes are listed below:
 - LCD Panel Assembly Failure
 - LCD Adapter Failure
 - System Board Failure

IS THE LIST OF INSTALLED DEVICES CORRECT?

Yes No

007

Go to "Installed Devices List" on page 25.

008

- Run the diagnostic tests.
(Step 008 continues)

008 (continued)

DID THE TEST IDENTIFY A FAILURE?

Note: If the test stops and you cannot continue, replace the last device being tested.

Yes No

009

You may have an intermittent problem:

- Check for damaged cables and connectors.
- Reseat all adapters, drives, and modules.
- Check the power supply in use when the error is reported.
- Start an error log and run the tests multiple times.
- Check "Undetermined Problem" on page 18.
- Go to "Symptom-to-FRU Index" on page 29.

010

Go to "Symptom-to-FRU Index" on page 29.

Indetermined Problem

1. If you do not have any symptom, go to "Power Supply" on page 19.
2. Power-off the system.
3. Remove or disconnect one of the following devices or adapter:
 - a. Non-IBM devices
 - b. Any external devices
 - c. Any adapter and device
 - d. Hard disk drive (Fixed disk drive)
 - e. Memory module kit.
4. Power-on the system.
5. If the symptom remains, repeat steps 1, 2, and 3 until you find the failing adapter or device.
6. Go to "Power Supply" on page 19. If this does not solve the problem, replace the system board.

Power Supply

As the Rechargeable, Backup, and Standby batteries have a given lifespan, having spares of these batteries on hand can eliminate problems. When one of these batteries is suspected of failing, the spare can be used in its place. One or all of these batteries can be discharged if a short circuit is present in the system.

1. Replace the failing FRU if the power supply problem is caused by a short circuit.
2. Determine if one (or all) of the batteries have become discharged. Replace the discharged battery with its spare.

The test procedures for each power device are as follows:

- "Testing the AC Adapter" on page 22.
- "Testing the Rechargeable Battery" on page 23.
- "Testing the Backup Battery" on page 24.
- None of the above. Follow the steps below.

001

DID THE PROBLEM OCCUR ONLY WHEN USING THE AC ADAPTER?

Yes No

002

Go to Step 004.

003

Go to "Testing the AC Adapter" on page 22.

If "Testing the AC Adapter" does not correct the problem, replace the system board.

004

(Step 004 continues)

004 (continued)

DOES THE PROBLEM OCCUR ONLY WHEN USING THE BATTERY?

res No

005

Go to Step 011.

006

DOES A FULLY-CHARGED BATTERY DISCHARGE QUICKLY?

Yes No

007

Go to Step 010.

008

- Run advanced diagnostics for all devices using the AC adapter.
Use the 'RUN TEST ONE TIME' option.

DO ALL THE TESTS END WITHOUT AN ERROR?

res No

009

Follow the instructions on the screen.
If the instructions do not appear or do not correct the problem,
replace the system board.

010

Go to "Testing the Rechargeable Battery" on page 23.

If "Testing the Rechargeable Battery" does not correct the problem,
replace the system board.

011

- Remove the following if installed:

- Rechargeable battery
- Standby battery
- Backup battery

(Step 011 continues)

011 (continued)

- Memory module kit in connector
- Serial adapter
- Numeric keypad
- Mouse
- Cables to the hard disk drive
- Cables to the diskette drive
- Power cable to the LCD
- Signal cables to the LCD.

– Connect the AC adapter and power-on the system.

DID YOU HEAR ONE LONG OR TWO SHORT BEEPS?

Yes No



Replace the system board or LED board.



- Suspect one of the options or devices. Reinstall each of the options or devices to the system one at a time, and power-on the system to see if the original problem occurs.
 - Replace the last installed option or device when the problem occurs.
-

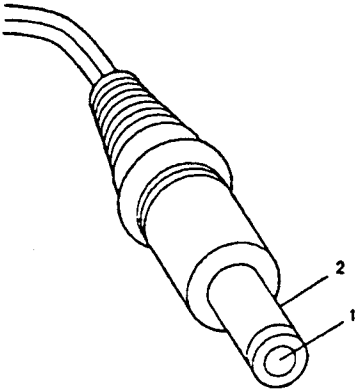
Testing the AC Adapter

1. If any strange noise can be heard from the AC adapter when it is plugged into line voltage, replace the AC adapter with a new one to isolate the problem.

If the strange noise still comes from the AC adapter, suspect the system unit.

If not, the AC adapter has a problem. Replace the AC adapter with the original one, then go to the next step.

2. Measure the output voltage at the plug of the AC adapter cable.

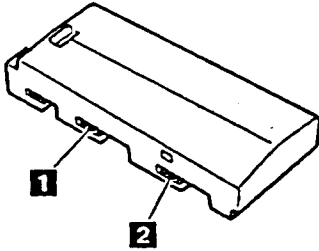


Pin	Voltage (V dc)
1	+14.3 to +15.8
2	Ground

If the voltage is not correct, replace the AC adapter.

Testing the Rechargeable Battery

1. Remove the rechargeable battery from the computer.
2. Measure the voltage at the battery terminals.



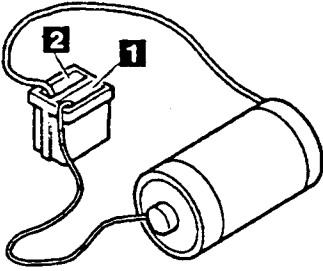
Pin	Voltage (V dc)
1	+8.5 to +12.6
2	Ground

If the voltage is not greater than the allowance, replace the AC adapter. If the voltage is greater than the allowance, go to the next step.

If the voltage is not correct, the rechargeable battery is discharged or defective.

Testing the Backup Battery

1. Remove the lithium battery.
2. Measure the voltage at the connectors of the backup battery.



Pin	Voltage (V dc)
1	+2.8 to +3.2
2	Ground

If the voltage is not correct, the backup battery is discharged by a short circuit or is defective.

Installed Devices List

If an adapter or device is missing from the list, you may have one of the following conditions:

- An adapter or device is defective.
- The missing adapter or device is unrecognizable.
- The Reference Diskette does not contain the module of code required to diagnose the adapter or device. Use the adapter or device Advanced Diagnostics diskettes to test the adapter or device.

If any of the above conditions are not present, replace the system board.

Memory

1. Power-off the system before removing or replacing any parts.
2. If the error code 110 displays, the parity check error of system board occurs. Replace the memory module kit (See the figure on page 71.) or system board (See the figure on page 40.).

Keyboard

- Make sure that the two keyboard cables are properly attached to the connectors on the system board (sub board). (See the figure on page 68.)
- If you suspect a problem with any of the auxiliary input devices, replace the device. If that does not correct the problem, replace the system board (sub board or main board).
- If the system has no response or an incorrect keyboard response, replace the keyboard. If that does not correct the problem, replace the system board (sub board or main board).

Note: The following auxiliary input devices are available for Model N33 SX.

- Numeric keypad
- Mouse

Printer

1. Make sure the printer is properly connected and powered on.
2. Run the printer self-test.

If the printer self-test does not run correctly, the problem is in the printer. Refer to the printer service manual.

If the printer self-test runs correctly, install a wrap plug (IBM part 72X8546) on the parallel port and run the advanced diagnostics tests to determine which of the following FRUs is failing:

- System board (Sub board)
- System board (Main board)
- Parallel adapter
- Printer cable.

Symptom-to-FRU Index

The Symptom-to-FRU Index lists symptoms and errors and the possible causes. The most likely cause is listed first. Use this index to help you decide which FRUs you should have available when servicing a system.

If the system displays an error message, first replace FRUs listed in the error message. An X in an error message can be any number.

Note: If you are unable to find an error message, you have an IBM device with its own service manual or a device not supported by the advanced diagnostics tests. Refer to the manual for that device.

Symptom/Error	FRU/Action
One or more keys do not work. (See "Keyboard" on page 27 before replacing any FRUs.)	Keyboard System Board (Sub Board) System Board (Main Board)
No beep and a blank or unreadable display during POST. (See "Power Supply" on page 19 before replacing any FRUs.)	System Board (Main Board) Any options or devices System Board (Sub Board) Speaker LED Board
No beep with a normal display during POST.	Speaker LED Board System Board (Main Board)
Continuous beep	System Board (Main Board) System Board (Sub Board) Any options or devices
Repeating short beeps. (See "Keyboard" on page 27 before replacing any FRUs.)	System Board (Sub Board) Keyboard System Board (Main Board)
One long and one short beep.	System Board (Main Board)
One long and two short beeps.	System Board (Main Board)

Symptom/Error	FRU/Action
One short beep and a blank, unreadable, or flashing display with no external display attached.	Display (LCD) System Board (Main Board)
One short beep and Diskette Prompt or a program load from the hard disk drive or unable to read diskette(s).	Diskette Drive System Board (Sub Board) System Board (FDD Interface Board) Diskette Drive Cable
Two short beeps and a blank display.	System Board (Main Board) System Board (Sub Board)
Incorrect memory size during POST. (See "Memory" on page 26 before replacing any FRUs.)	System Board (Main Board)
System hang-up or intermittent hang-up.	System Board (Main Board) System Board (Sub Board)
The system does not suspend or resume.	System Board (Sub Board) LED Board
The system does not power off.	System Board (Sub Board) LED Board
Real-time clock inaccurate.	System Board (Sub Board)
Printer problems.	See "Printer" on page 28.
Serial or parallel port device problems.	Device Cable System Board (Sub Board)
LED is incorrectly blinking or stays on.	System Board (Sub Board) Related Device (Mini mouse or Numeric keypad)
LED incorrectly remains off, but diagnostics runs without an error.	System Board (Sub Board) Related Device (Mini mouse or Numeric keypad) LED Board

Symptom/Error	FRU/Action
110 (See "Memory" on page 26 before replacing any FRUs.)	Memory Module Kit System board (Main Board)
111	Any option System Board (Main Board) System Board (Sub Board)
161	Run Automatic configuration Backup Battery System Board (Sub Board)
162	Run Automatic configuration, then check the installed devices using the View configuration utility. System Board (Sub Board) Diskette Drive Hard Disk Drive FDD Interface Board Diskette Drive Cable Hard Disk Drive Cable Internal modem
163	Time and Date Set? System Board (Sub Board)
164	Run Automatic configuration Memory Module Kits System Board (Main Board)
199	See "Installed Devices List" on page 25.
1XX	System Board (Sub Board) System Board (Main Board)
20X, 25X	System Board (Main Board) Memory Module Kit
2XX (See "Memory" on page 26 before replacing any FRUs.)	Memory Module Kit System Board (Main Board)
301, 31X	System Board (Sub Board) System Board (Main Board) Keyboard

Symptom/Error	FRU/Action
04, 305	System Board (Sub Board) Auxiliary Input Device System Board (Main Board)
308	Numeric Keypad System Board (Sub Board) System Board (Main Board)
3XX (See "Keyboard" on page 27 before replacing any FRUs.)	Keyboard Auxiliary input device System Board (Sub Board) System Board (Main Board)
601	System Board (Sub Board) Diskette Drive FDD Interface Cable Diskette Drive Cable
602	Defective diskette
6XX	Diskette Drive System Board (Sub Board) FDD Interface Cable Diskette Drive Cable
9XX	System Board (Sub Board) Any parallel Device
11XX	System Board (Sub Board) Any serial device
12XX	Any serial adapter System Board (Sub Board) Any serial device Communication Cable
17XX	Hard Disk Drive System Board (Sub Board) Hard disk drive cable
24XX	System Board (Main Board) LCD Display Assembly
5001 through 5016	System Board (Main Board) LCD Display Assembly
5017 through 5020	LCD Display Assembly System Board (Main Board)

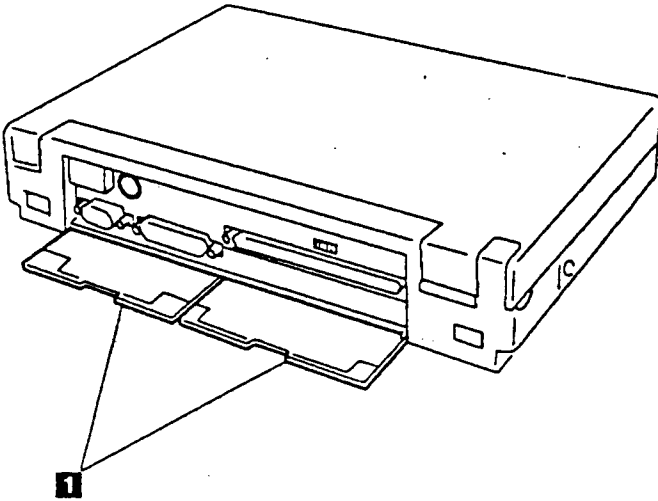
Symptom/Error	FRU/Action
8601, 8603	System Board (Sub Board) Mouse Numeric Keypad
86XX	Mouse System Board (Sub Board) Numeric Keypad
101XX	Internal Modem System Board (Sub Board) System Board (Main Board)
102XX	LED Board System Board (Sub Board) Related device (Mini mouse or Numeric keypad)

If problem remains, see "Undetermined Problem" on page 18.

Removals and Replacements

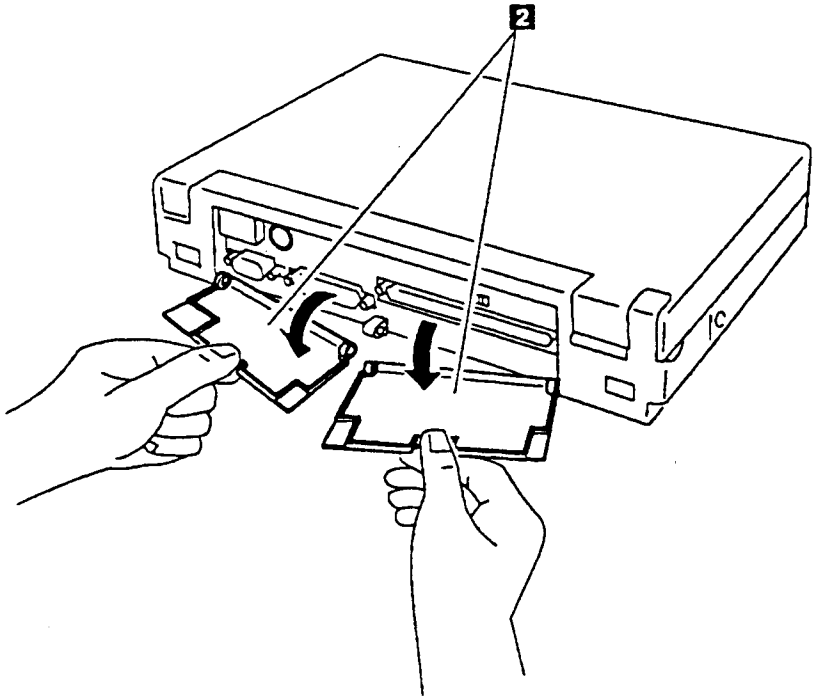
1005 Bottom Cover

Bottom Cover Removal



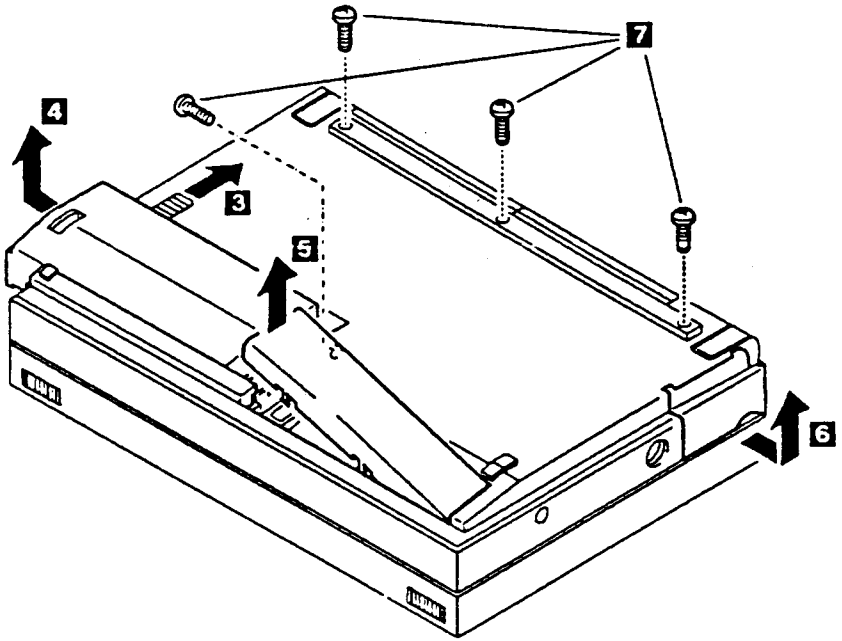
1. Open two covers **1** at the rear side of computer.

Bottom Cover Removal (Continued)



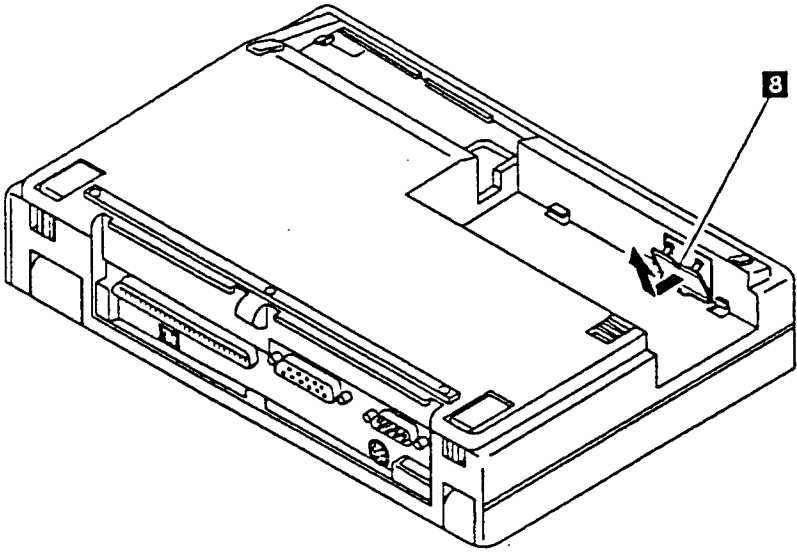
2. Remove two covers **2** from the rear side of computer in the direction of arrow.

Bottom Cover Removal (Continued)



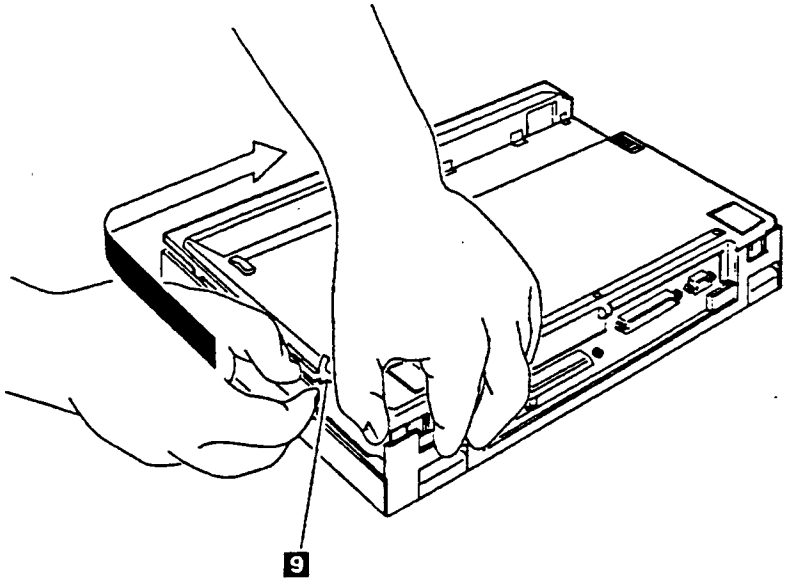
3. Turn the computer upside down on a flat surface.
4. Slide and hold the battery lock knob **3**, pull the rechargeable battery out of the battery compartment in the direction of arrow **4**.
5. Remove the cover of memory-module kit in the direction of arrow **5**.
6. Remove the memory-module kit if it is installed.
7. Remove the cover of option adapter in the direction of arrow **6**.
8. Remove four screws **7** from the bottom cover.

Bottom Cover Removal (Continued)



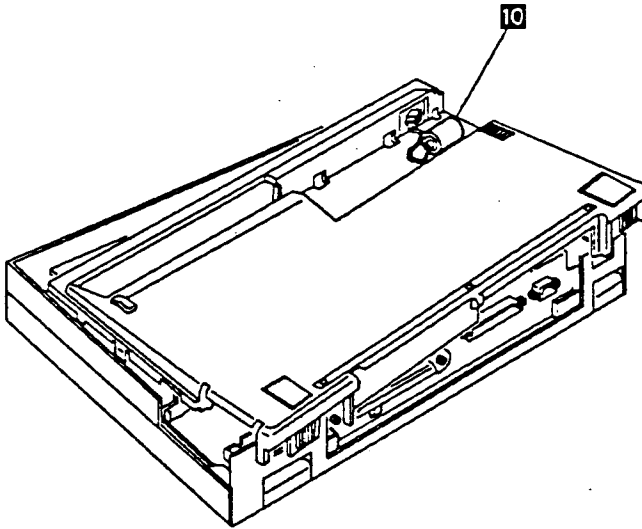
9. Remove the cover **8** of the backup battery in the direction of arrow.

Bottom Cover Removal (Continued)



10. With the tip of thumb-nail of your right hand or the flat blade of screw driver, open the space **9** between the top and bottom covers; then wrench the bottom cover from the top cover in the direction of arrow.

Bottom Cover Replacement

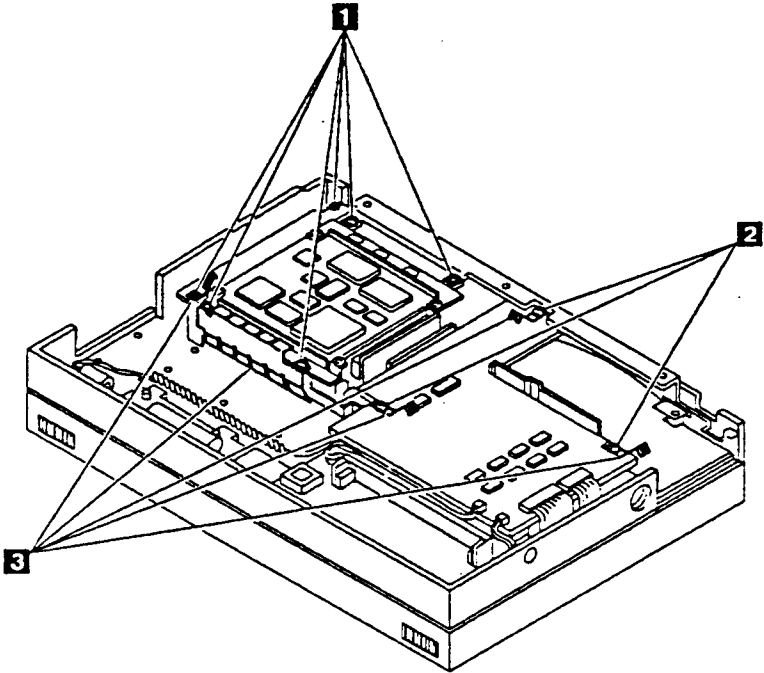


1. When the bottom cover is installed, put the backup battery **10** on the battery compartment of rechargeable battery.
2. Reverse the removal procedure.

1010 System Board (Sub Board)

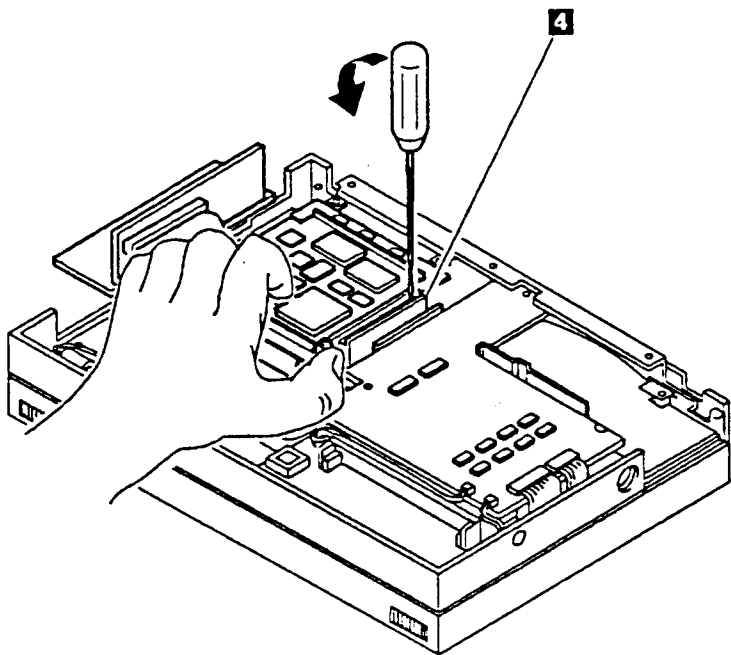
Sub Board Removal

- Bottom Cover (1005)



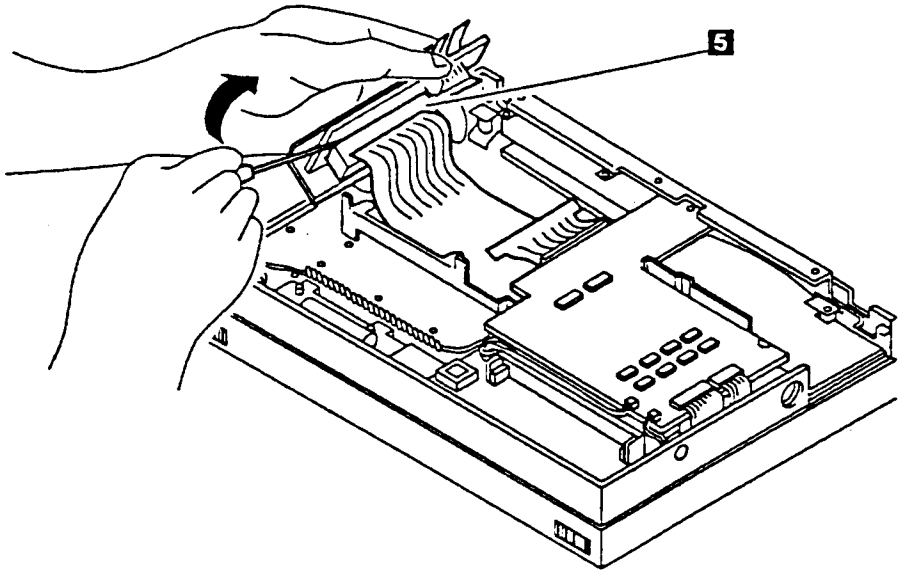
1. Make sure the five electrostatic-discharge wings **3** are located on the hard disk drive and sub board.
2. Remove the six screws **1** from the hard disk drive.
3. Remove the three screws **2** from the sub board.

Sub Board Removal (Continued)



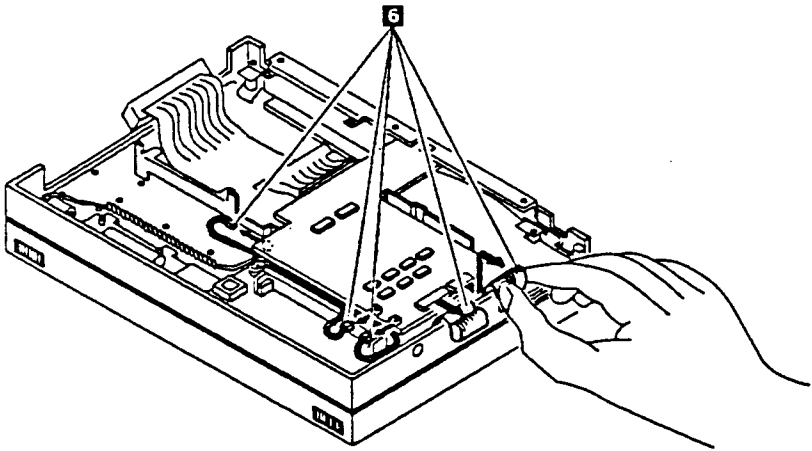
4. Using a small screwdriver, disconnect the cable **4** from the hard disk drive.

Sub Board Removal (Continued)



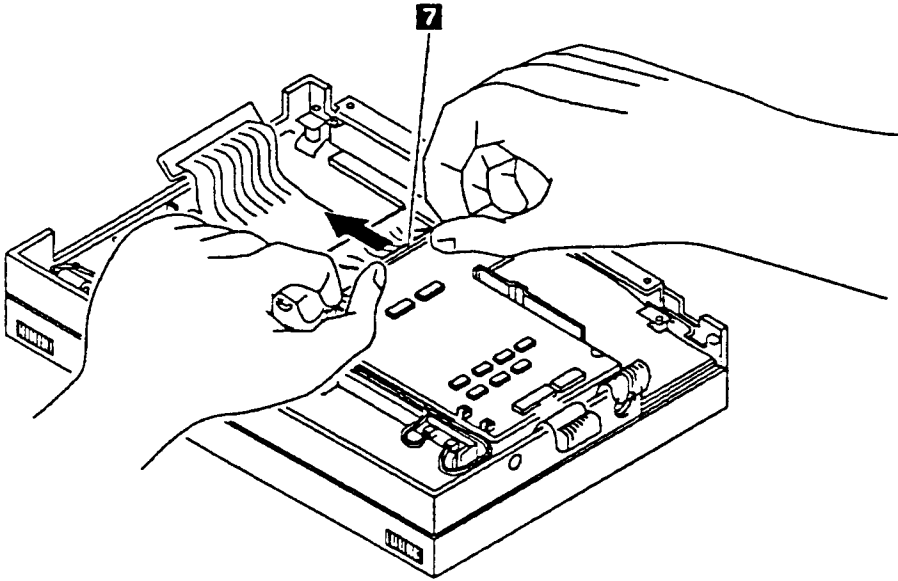
5. Using a small screwdriver, disconnect the cable **5** from the bracket of hard disk drive.

Sub Board Removal (Continued)



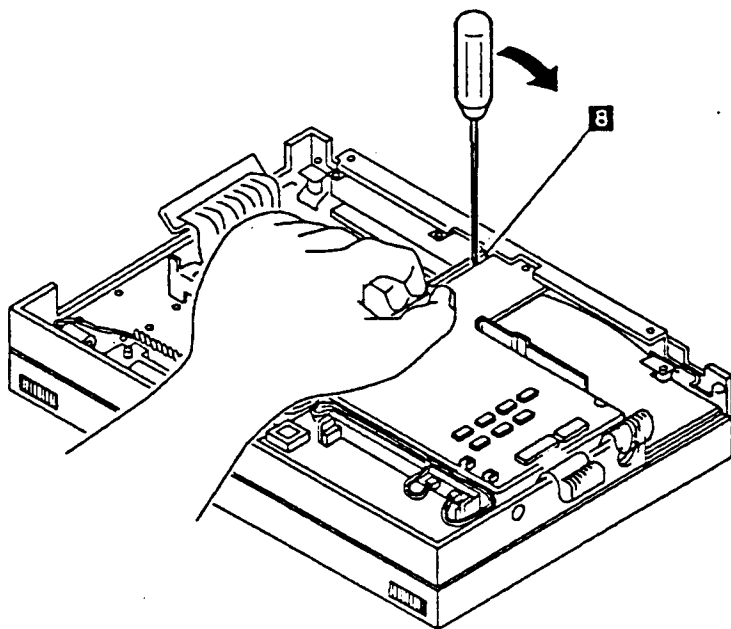
6. Disconnect the five cables **6** from the connectors as shown.

Sub Board Removal (Continued)



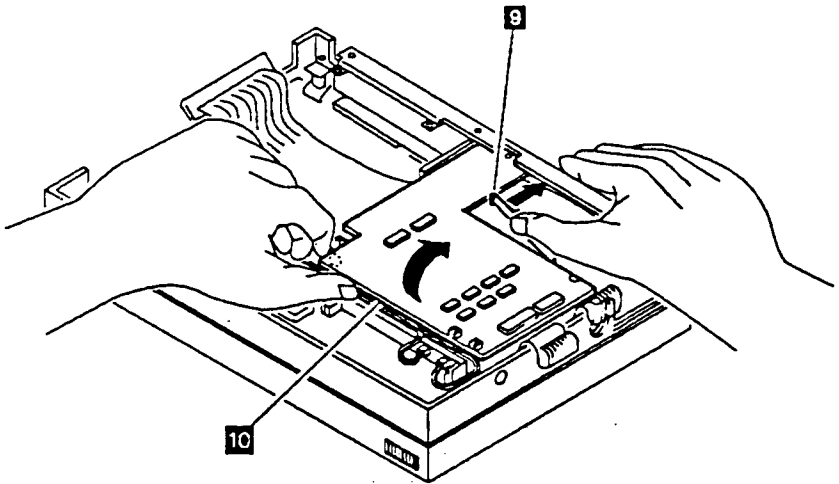
7. Disconnect the cable **7** from the sub board as shown.

Sub Board Removal (Continued)



8. Using a small screwdriver, disconnect the cable **8** from the sub board as shown.

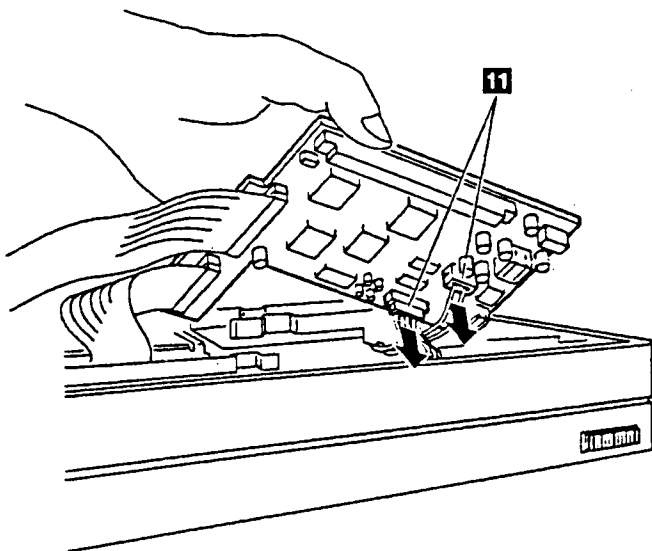
Sub Board Removal (Continued)



9. Push and hold the bracket **9**, lift the sub board **18** up in the direction of arrows.

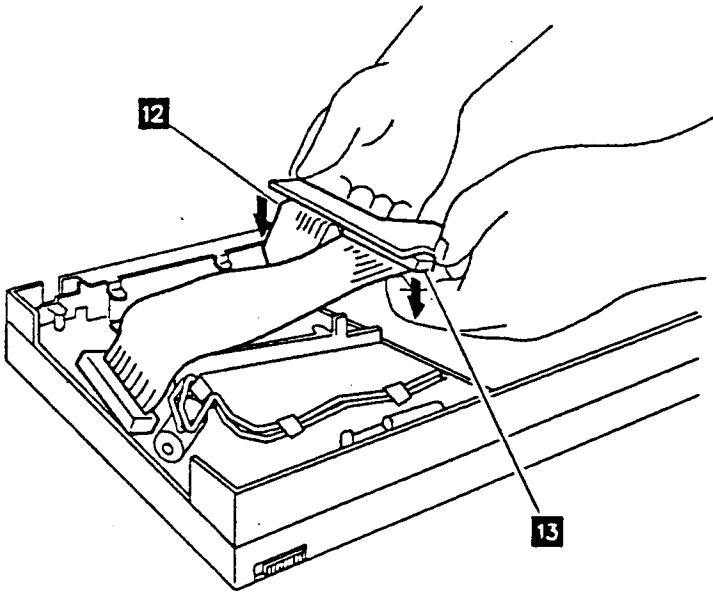
Note: When replacing the sub board, push the area at position **10** of the sub board down strongly to tightly connect the sub and main boards.

Sub Board Removal (Continued)



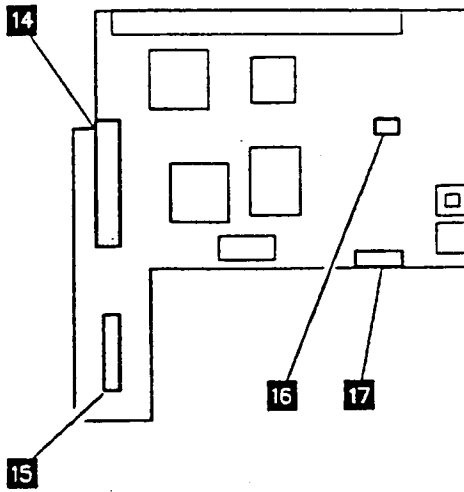
10. Disconnect the two cables **11** from the sub board as shown.

Sub Board Removal (Continued)



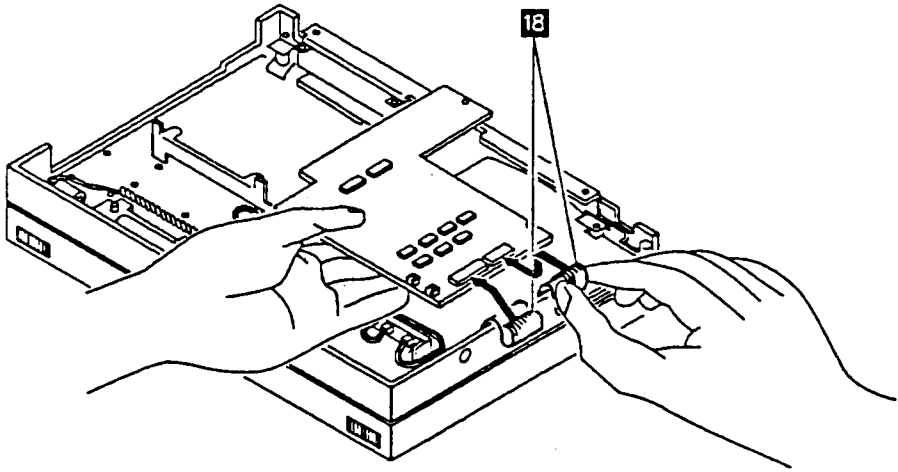
11. Disconnect the two cables **12** and **13** from the sub board as shown.

Sub Board Replacement



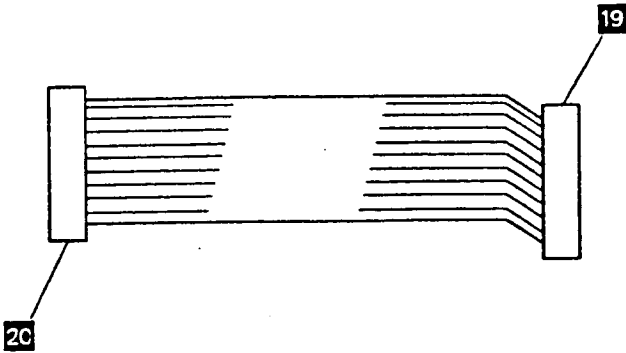
1. The figure shown above describes the connector side of the sub board.

Sub Board Replacement (Continued)



2. When the sub board is installed, the two flat cables **18** are connected to the sub board as shown.

Sub Board Replacement (Continued)

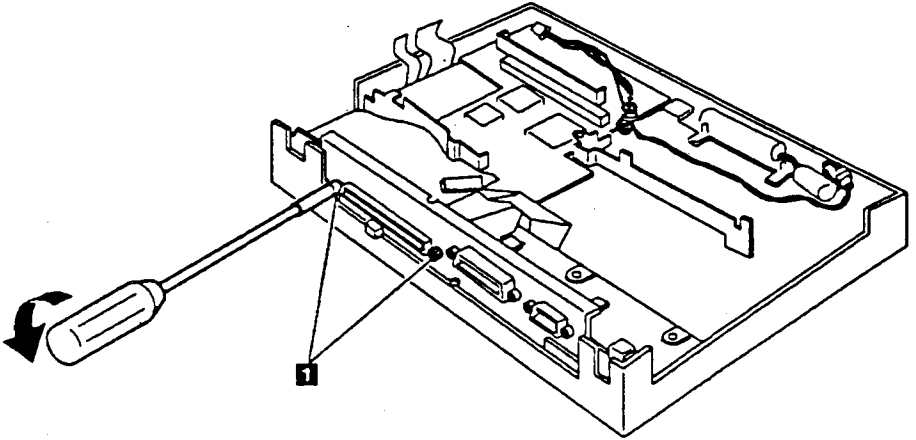


3. When the cable shown above is installed, the connector **19** is connected to the sub board side.
4. Reverse the removal procedure.

1015 System Board (Main Board)

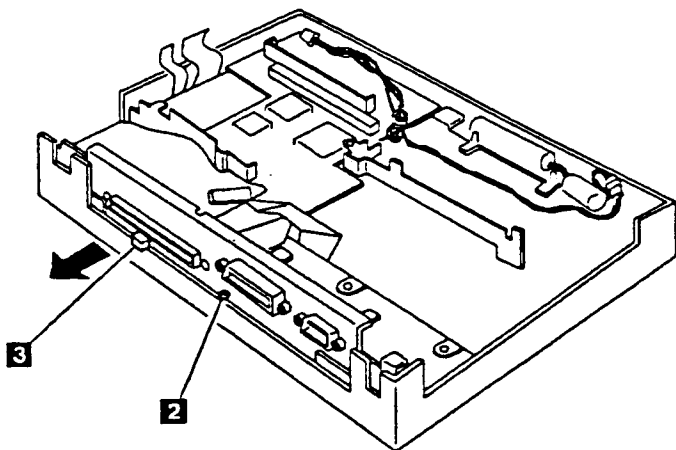
Main Board Removal

- Memory-Module Kit (1045)
- Option Adapter (1050)
- Bottom Cover (1005)
- System Board (Sub Board) (1010)



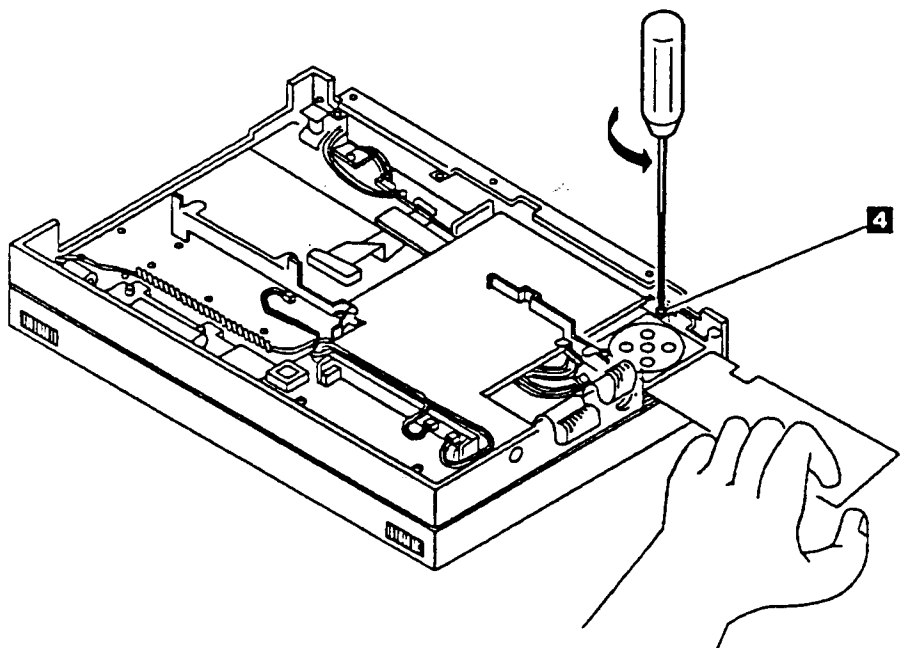
1. Using the hexagonal wrench, remove the two nuts **1** from the rear panel as shown.

Main Board Removal (Continued)



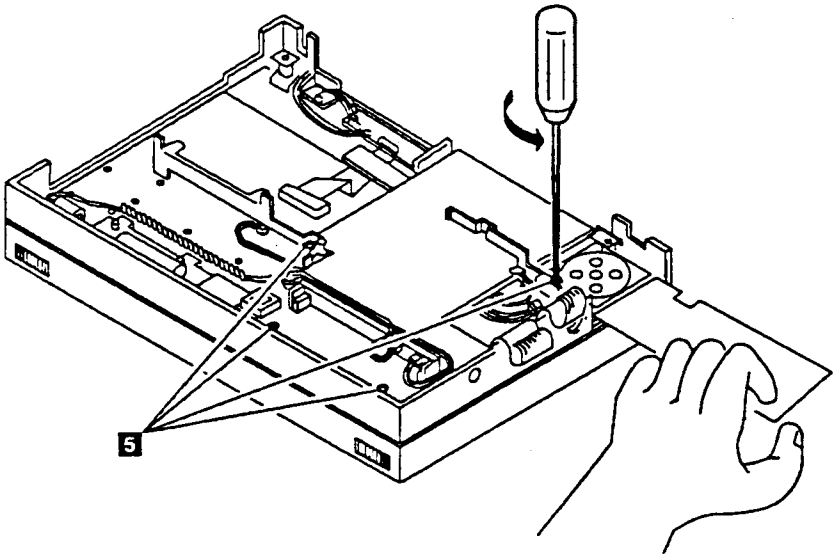
2. Remove the screw **2** and the white cap **3** from the rear panel as shown.

Main Board Removal (Continued)



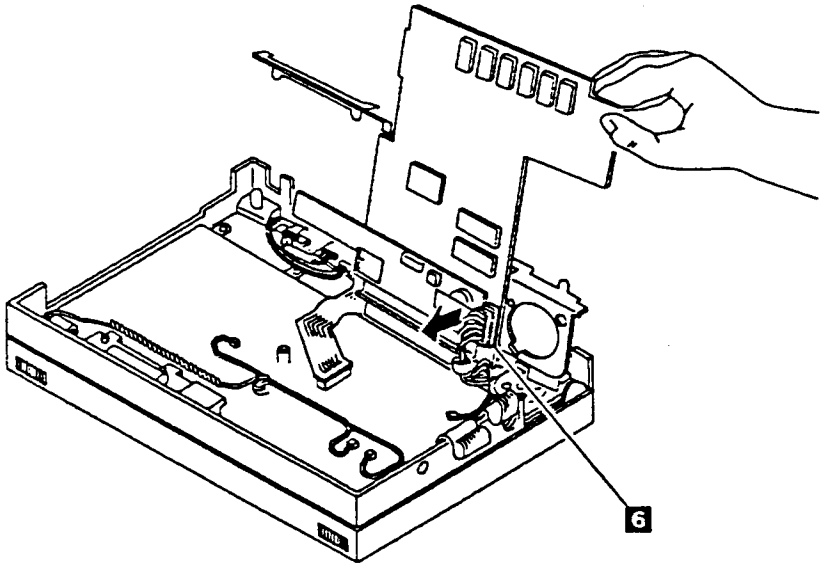
3. Remove the screw **4** from the bracket; then remove the bracket from the system unit.

Main Board Removal (Continued)



4. Remove the four screws **5** from the main board.

Main Board Removal (Continued)

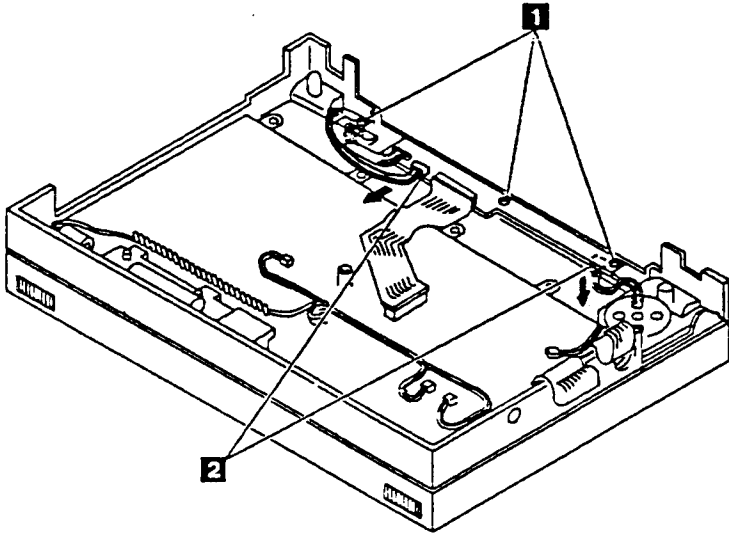


5. Disconnect the cable **6** from the main board as shown.

1020 LED Board

LED Board Removal

- Bottom Cover (1005)
- System Board (Sub Board) (1010)
- System Board (Main Board) (1015)
- Option Adapter (1050)

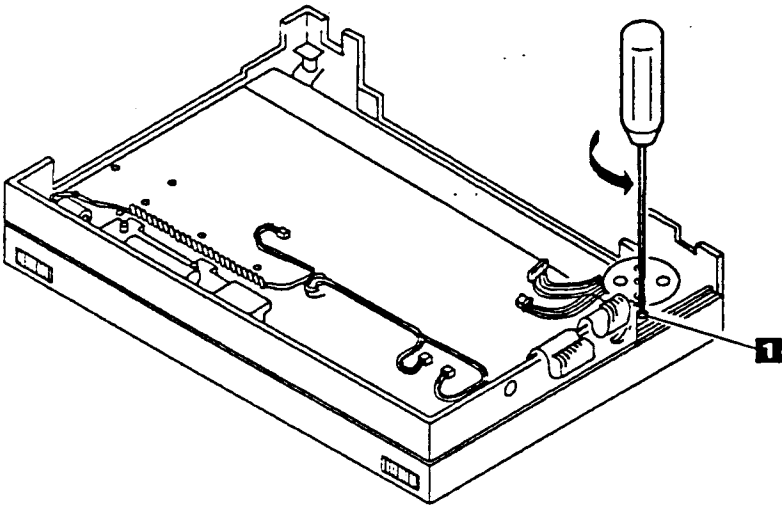


1. Remove the three screws **1** and disconnect the two cables **2** as shown.

1025 Speaker Assembly

Speaker Assembly Removal

- Bottom Cover (1005)
- System Board (Sub Board) (1010)
- System Board (Main Board) (1015)
- LED Board (1020)

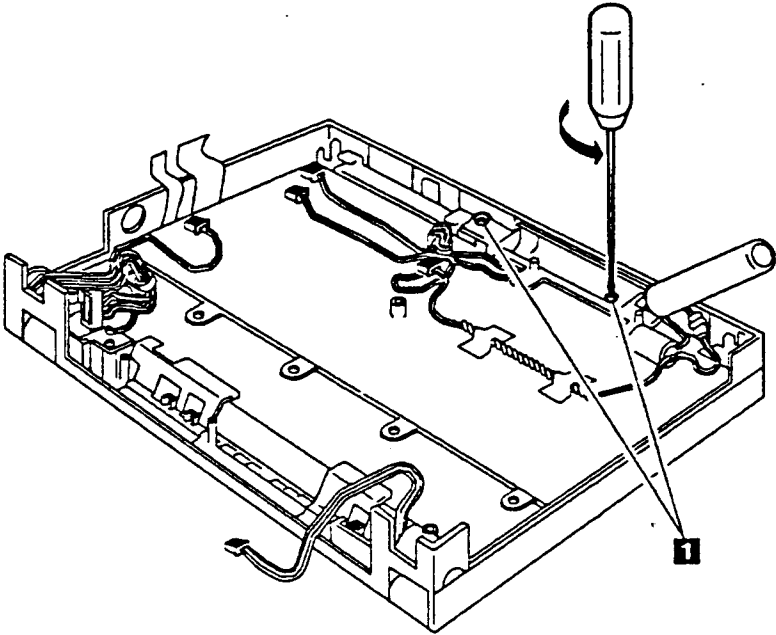


1. Remove the screw **1** as shown.

1030 Standby Battery

Standby Battery Removal

- Bottom Cover (1005)
- System Board (Sub Board) (1010)
- System Board (Main Board) (1015)
- LED Board (1020)

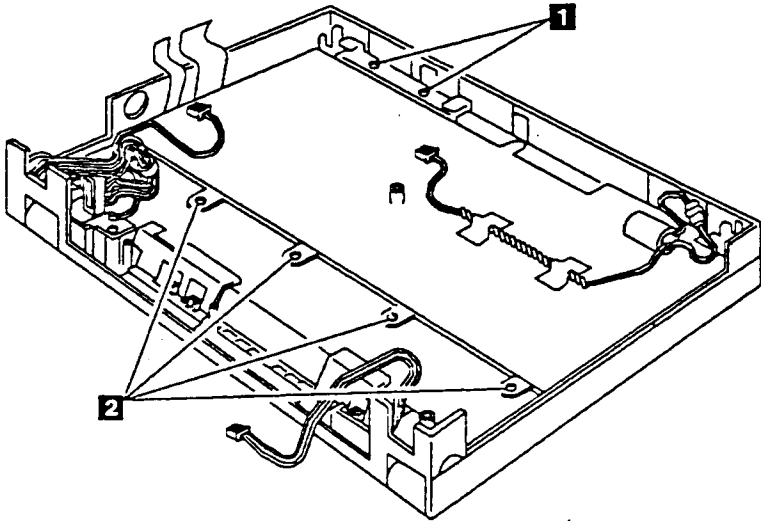


1. Remove the two screws **1** from the compartment of standby battery as shown.

1035 Keyboard Assembly

Keyboard Assembly Removal

- Bottom Cover (1005)
- Hard Disk Drive (1040)
- System Board (Sub Board) (1010)
- System Board (Main Board) (1015)
- Backup Battery (1055)
- Standby Battery (1030)



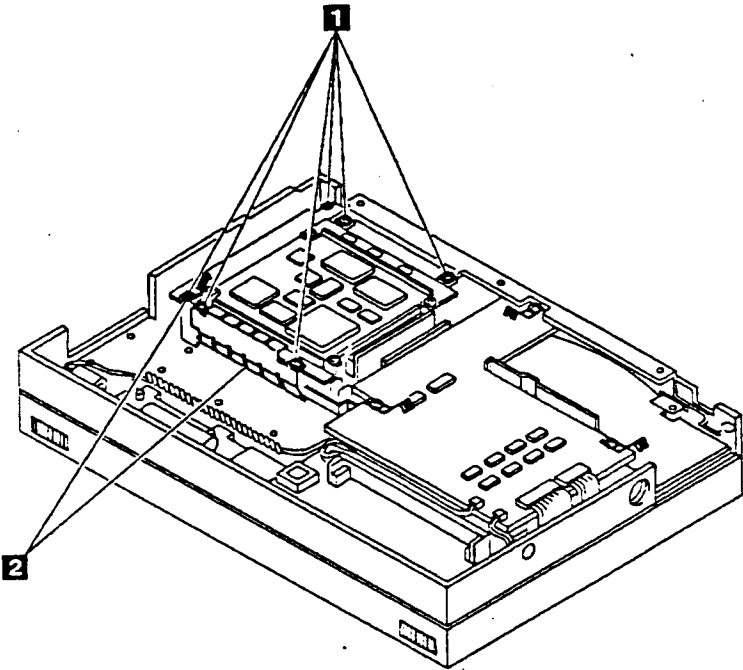
1. Remove the two screws **1** from the bracket; then remove the bracket from the system unit.
2. Remove the four screws **2** from the bottom of keyboard as shown.

1040 Hard Disk Drive

Hard Disk Drive Removal

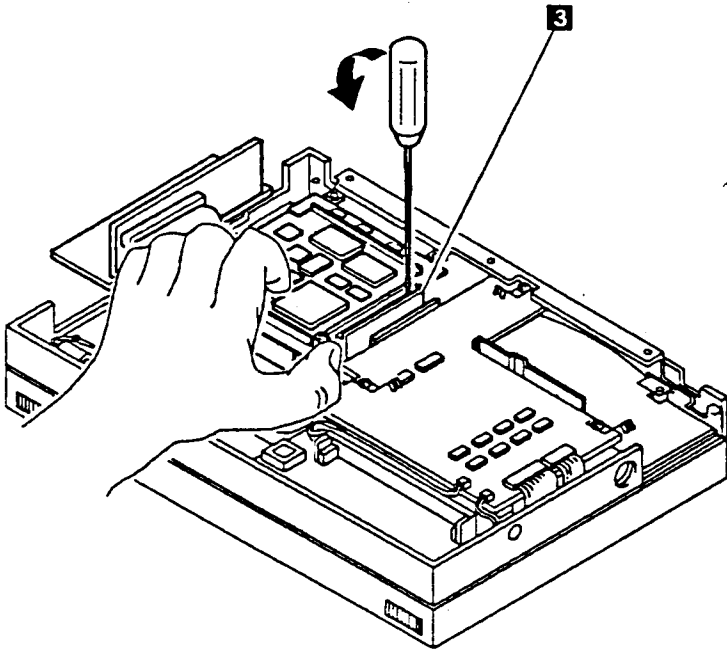
- Bottom Cover (1005)

Warning: A strong shock to the system can result in the permanent loss of data and the formatting on the hard disk drive. Have the customer back up all information on the hard disk drive.



1. Make sure the two electrostatic-discharge wings **2** are located on the hard disk drive.
2. Remove the six screws **1** from the hard disk drive.

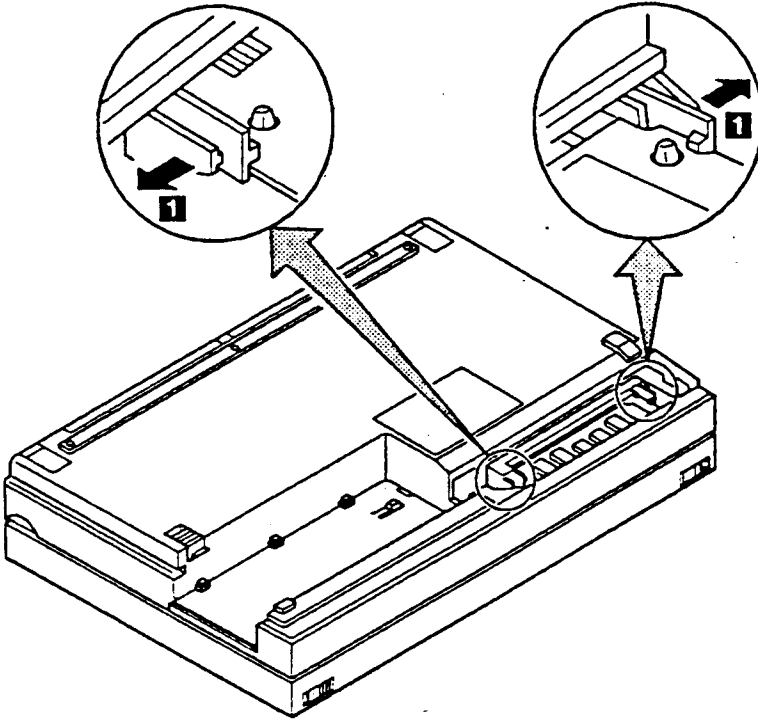
Hard Disk Drive Removal (Continued)



3. Using a small screwdriver, disconnect the cable **3** from the hard disk drive.

1045 Memory-Module Kit

Memory-Module Kit Removal

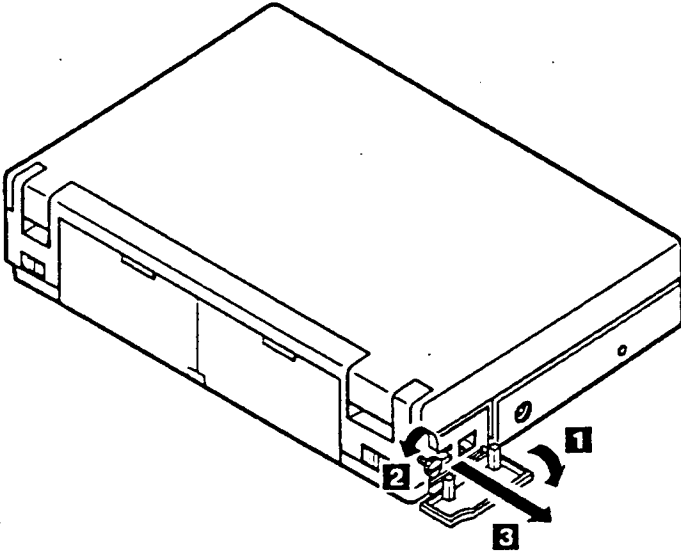


Notes:

1. Remove the Rechargeable Battery and the Memory Card Cover before installing/removing memory-module kit.

1050 Option Adapter

Option Adapter Removal

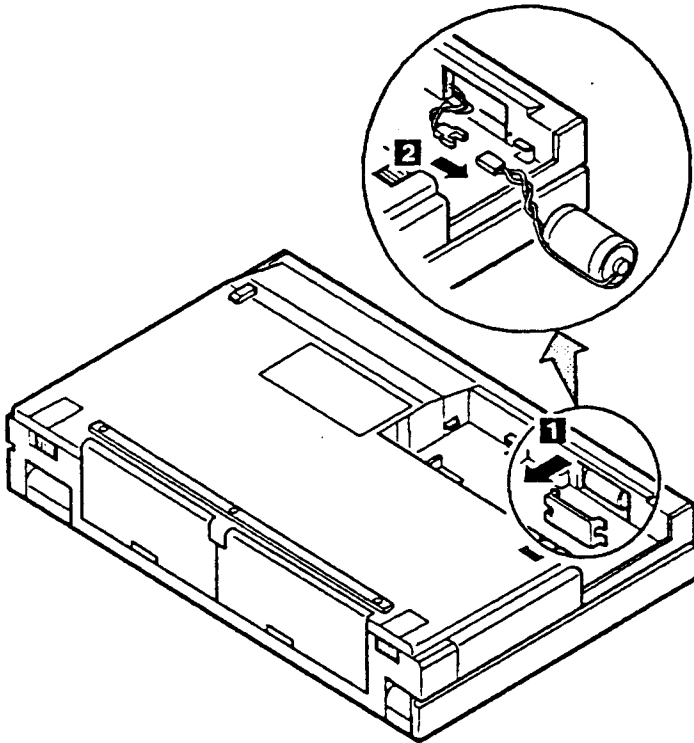


1055 Backup Battery

Backup Battery Removal

CAUTION:

The backup battery is a lithium battery and presents a fire, explosion, or sever burn risk. Do not recharge it, remove its polarized connector, disassemble it, heat it above 100°C (212°F), incinerate it, or expose its cell contents to water. Dispose of the battery as required by local ordinances or regulations. When replacing the backup battery, use only Part No. 95F5710. Use of another battery could result in ignition or explosion of the battery. Replacement batteries can be ordered from IBM.



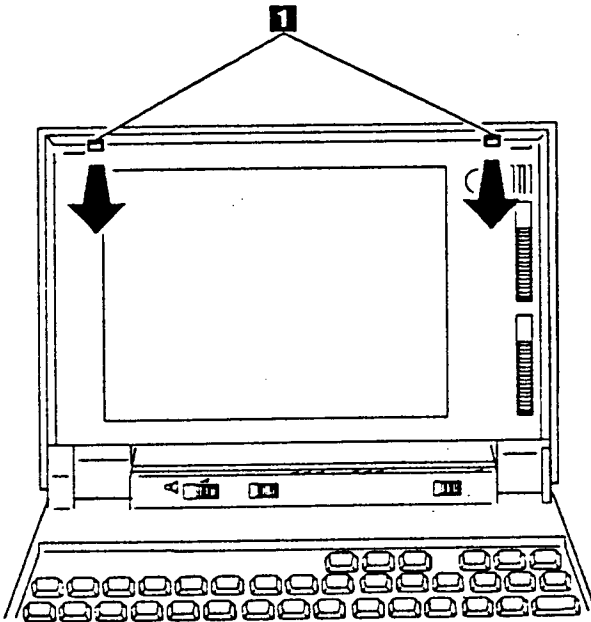
1060 LCD Front Cover and LCD Panel

LCD Front Cover and LCD Panel Removal

CAUTION:

Dispose of the LCD Panel as required by local ordinances or regulations.

When replacing the LCD panel, do not touch the surface of LCD panel.

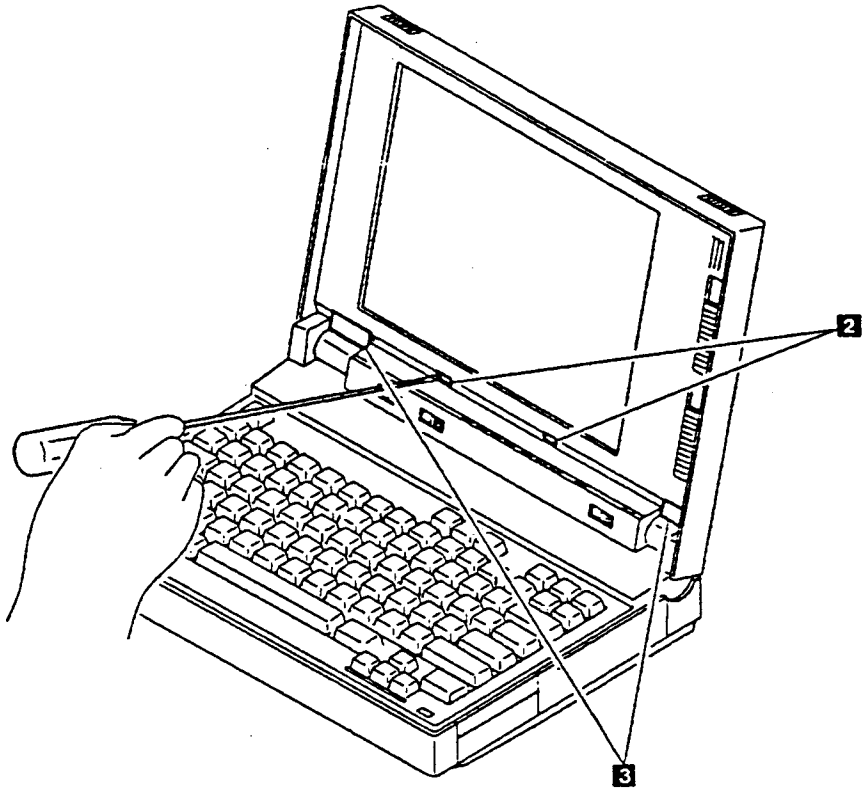


1. Remove the two rubber plugs **1** from the LCD front cover.

LCD Front Cover and LCD Panel Removal (Continued)

CAUTION:

When replacing the LCD Panel, do not touch the surface of LCD Panel.

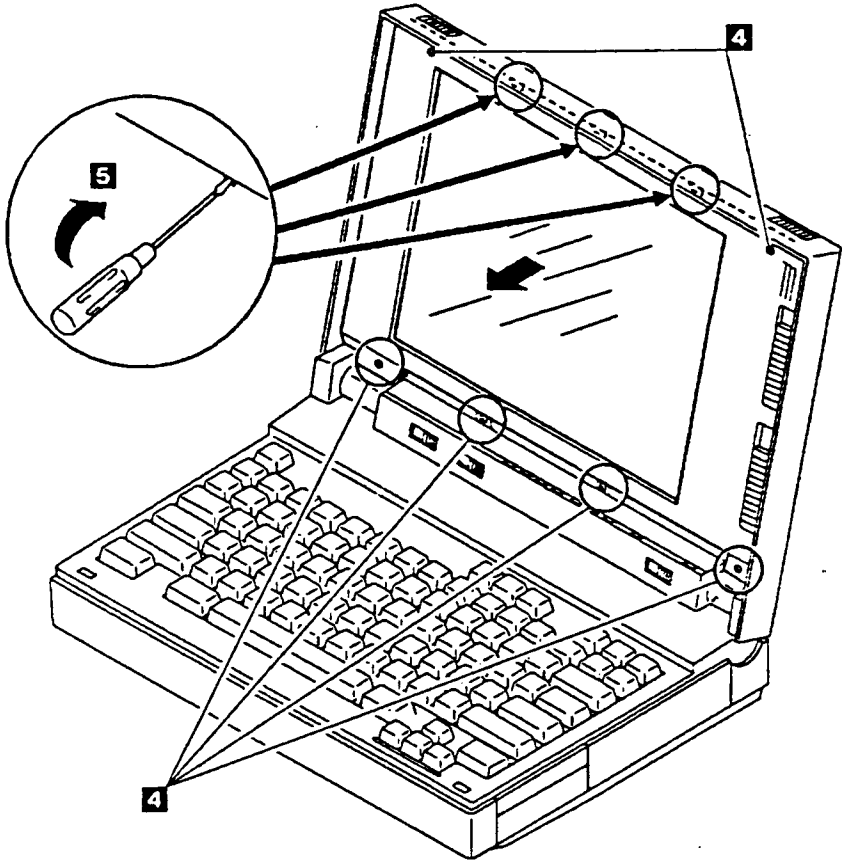


2. Tear off the two labels **2** using a screwdriver. Save the two labels.
3. Remove the two panels **3** using a screwdriver.

LCD Front Cover and LCD Panel Removal (Continued)

CAUTION:

When replacing the LCD Panel, do not touch the surface of LCD Panel.

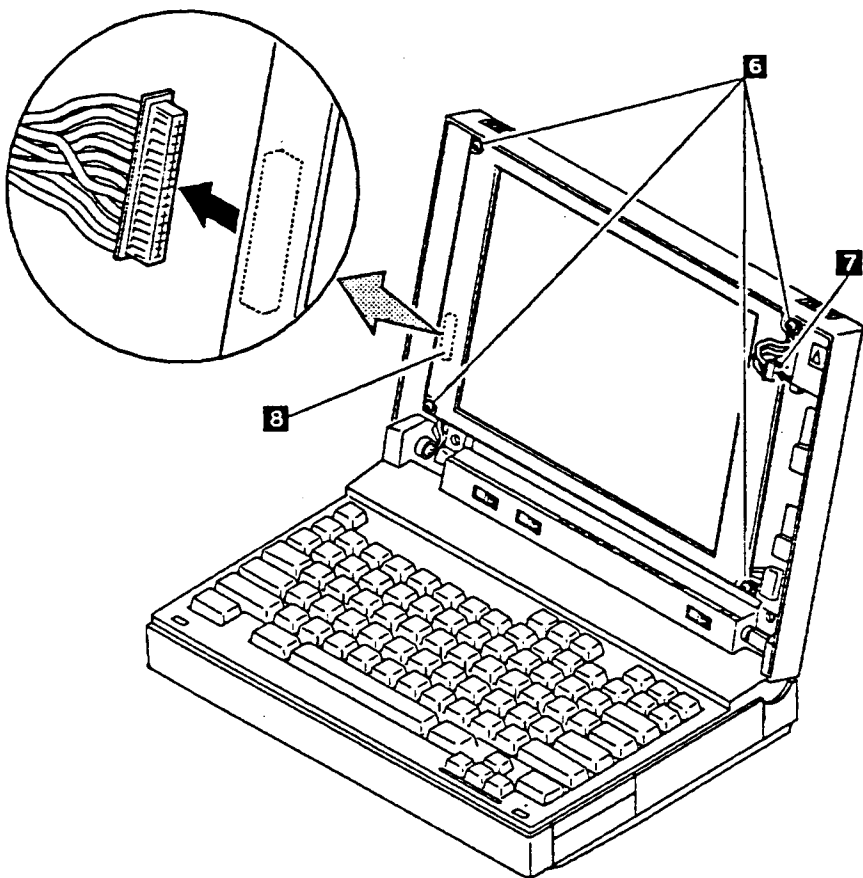


4. Remove the six screws **4** from the LCD front panel.
5. Using a screwdriver, wrench the LCD front panel **5** from the LCD panel.

LCD Front Cover and LCD Panel Removal (Continued)

CAUTION:

When replacing the LCD Panel, do not touch the surface of LCD Panel.

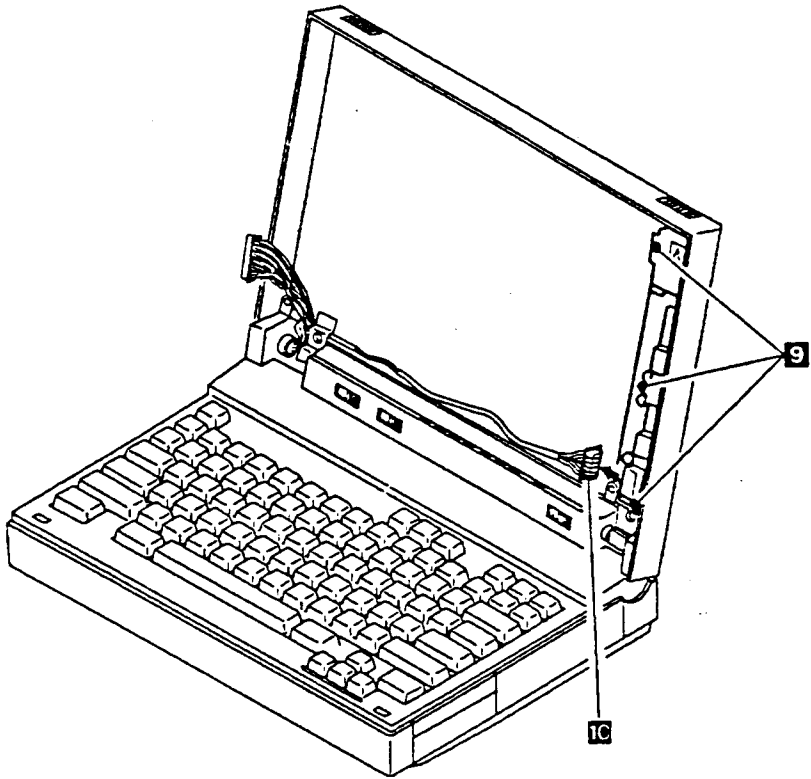


6. Remove the four screws **6** from the LCD panel.
7. Disconnect the two connectors **7** and **8** as shown above.

LCD Front Cover and LCD Panel Removal (Continued)

CAUTION:

When replacing the LCD Panel, do not touch the surface of LCD Panel.

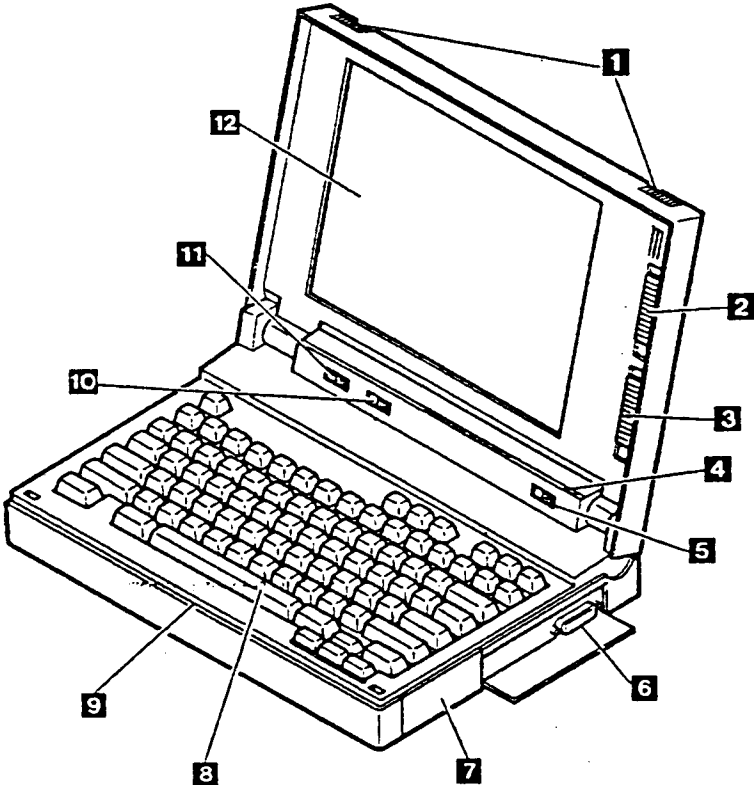


8. Remove the three screws **9** from the adapter.
9. Disconnect the connector **10** as shown above.

Locations

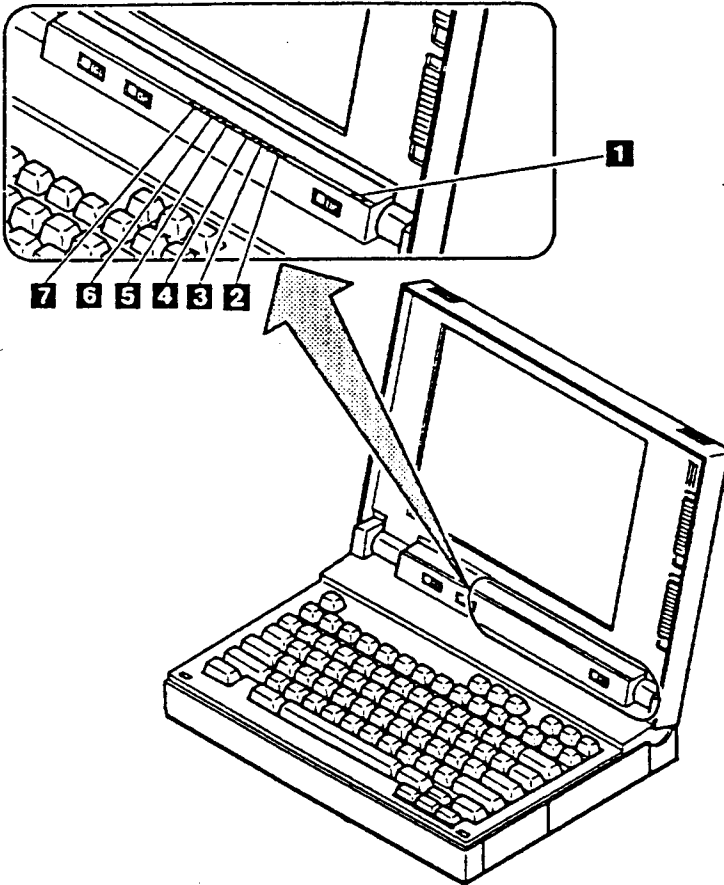
Front View

- 1** Release Lever
- 2** Contrast Control
- 3** Brightness Control
- 4** Resume LED
- 5** Resume Switch
- 6** Diskette Drive Connector
- 7** Rechargeable Battery
- 8** Keyboard
- 9** Top Cover
- 10** Speed Control
- 11** Speaker Volume
- 12** Display (LCD)



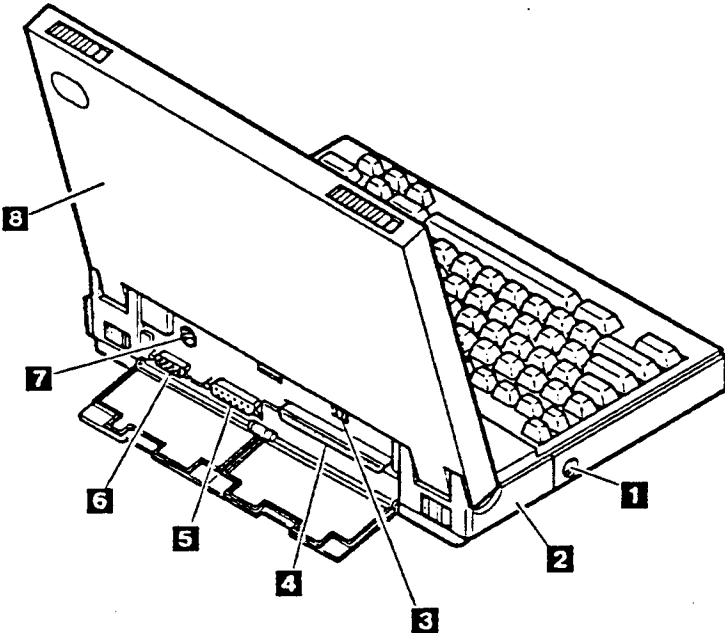
System Status Indicator

- 1** Resume
- 2** Scroll Lock
- 3** Caps Lock
- 4** Num Lock
- 5** Disk
- 6** Charge
- 7** Battery



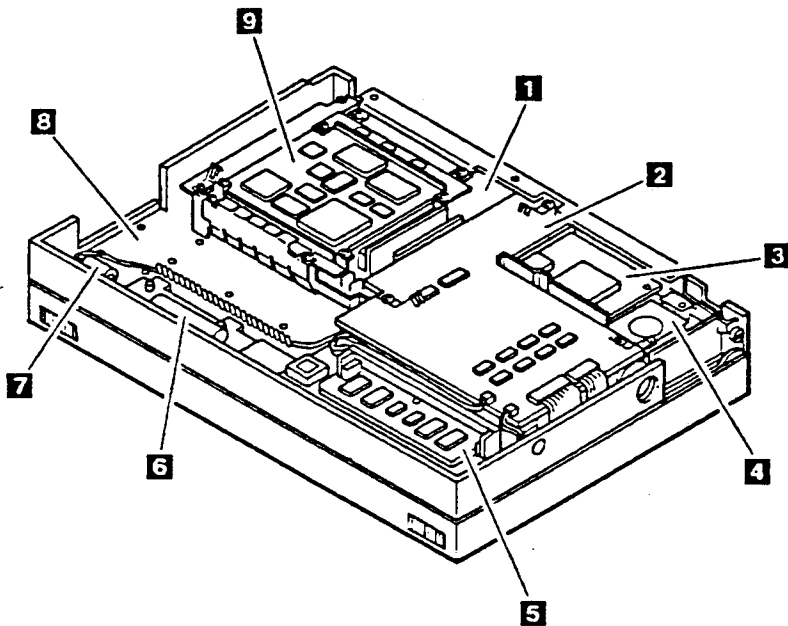
Rear View

- 1** AC Adapter Connector
- 2** Option Slot
- 3** Power Switch
- 4** System-Expansion Connector
- 5** Parallel Connector
- 6** Serial Connector
- 7** Pointing-Device Connector
- 8** LCD Rear Cover



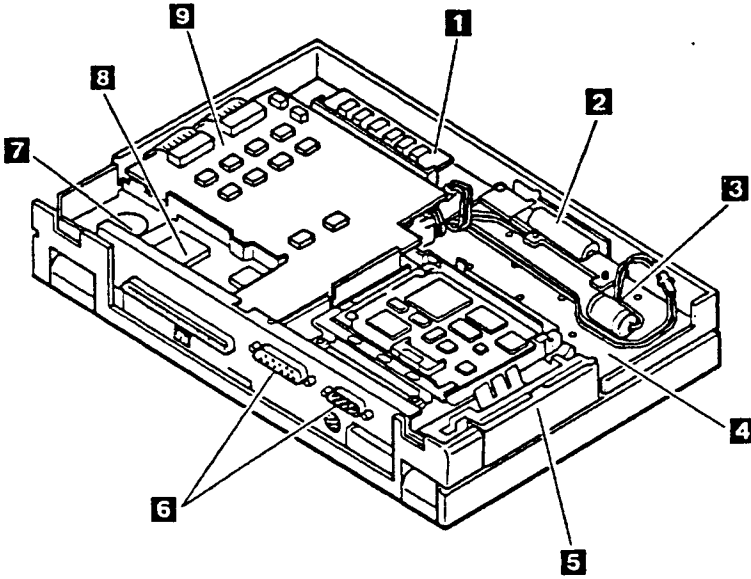
Interior View (Front View)

- 1** I/O Connector Board
- 2** System Board-Sub
- 3** System Board-Main
- 4** Speaker Assembly
- 5** Memory Card (Option)
- 6** Standby Battery
- 7** Backup Battery
- 8** Keyboard Assembly
- 9** Hard Disk Drive



Interior View (Rear View)

- 1** Memory Card (Option)
- 2** Standby Battery
- 3** Backup Battery
- 4** Keyboard Assembly
- 5** Hard Disk Drive
- 6** I/O Connector Board
- 7** Speaker Assembly
- 8** System Board - Main
- 9** System Board - Sub



Parts Catalog

ystem Unit Assembly

Arabic	95F6854
Belgian	95F6339
Danish	95F6343
Netherlands	95F6830
Finnish	07G2077
French Azerty	95F6872
German	95F6873
Greek	95F6858
Hebrew	95F6862
Icelandic	95F6866
Italian	95F6874
Norwegian	95F6834
Portuguese	95F6838
Spanish	95F6875
Swedish / Finnish	95F6842
Swiss / French	95F6846
Swiss / German	95F6850
Turkish	95F6870
U.K. English	95F5716
U.S. English	95F5471

Battery and Memory

Rechargeable Battery	07G2093
Backup Battery	95F5710
Standby Battery	95F5706
Cover, Backup Battery	95F6260
Cover, Memory module kit	95F6259

Diskette Drive / Hard Disk Drive

Cable, Hard Disk Drive	95F6273
External Diskette Drive	95F5722
Hard Disk Drive, 40MB	56F8897

Options and Adapters

AC Adapter	95F5470
Quick Charger (E.M.E.A.)	95F5696
Memory Module Kit (4MB)	07G0038
Memory Module Kit (2MB)	07G0039

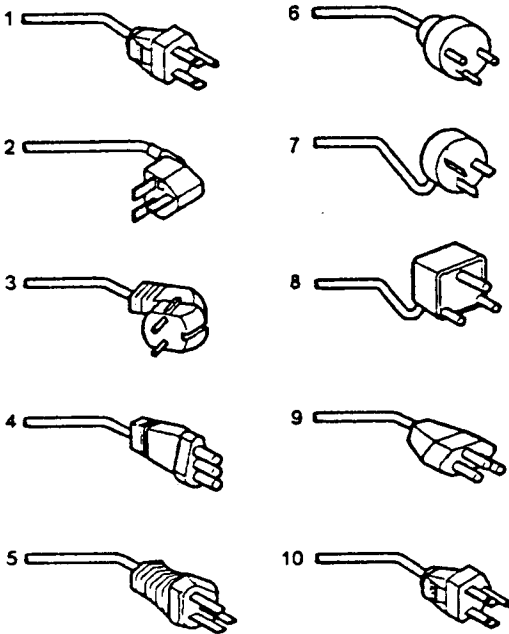
Keyboard

Arabic	95F6855
Belgium	95F6340
Danish	95F6344
Netherlands	95F6831
French Azerty	95F6318
German	95F6319
Greek	95F6859
Hebrew	95F6863
Icelandic	95F6867
Italian	95F6321
Norwegian	95F6835
Portuguese	95F6839
Spanish	95F6320
Swedish / Finnish	95F6843
Swiss / French	95F6847
Swiss / German	95F6851
Turkish	95F6871
U.K. English	95F6876
U.S. English	95F6277

Numeric Keypad and Mouse

Arabic	95F6877
Belgian	95F5741
Danish	95F5467
Netherlands	95F5467
French Azerty	95F6313
German	95F6314
Greek	95F5467
Hebrew	95F5741
Icelandic	95F5467
Italian	95F6316
Norwegian	95F5467
Portuguese	95F5741
Spanish	95F6315
Swedish / Finnish	95F5468
Swiss / French	95F5711
Swiss / German	95F5715
Turkish	95F5467
U.K. English	95F5741
U.S. English	95F5741
Mouse	95F5723

Power Cords



Index

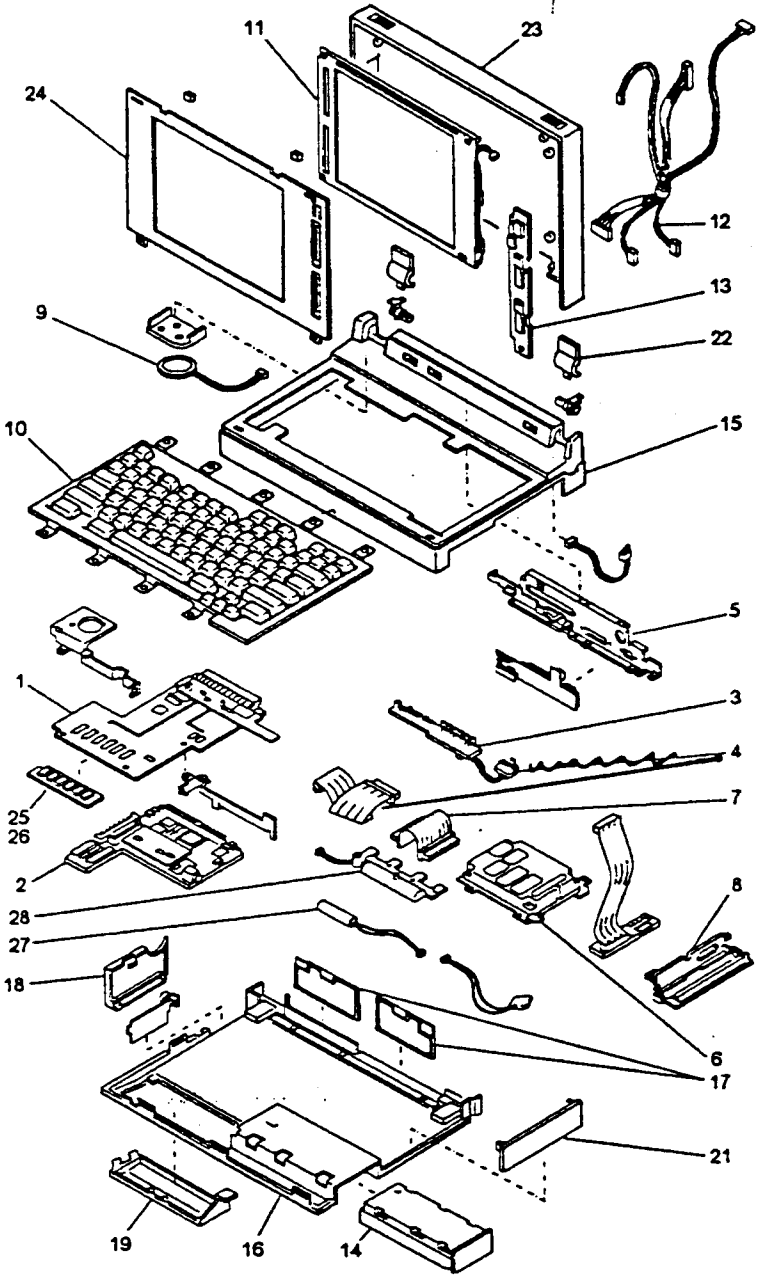
Power Cords

Warning: Use the power cord certified for your country.

1	Power Cord, System Unit, for: Colombia, U.S., Venezuela	6952301
2	Power Cord, System Unit, for: Hong Kong, Singapore, U.K.	6952356
3	Power Cord, System Unit, for: France, Germany, Spain	6952320
4	Power Cord, System Unit, for: Italy	72X8539
5	Power Cord, System Unit, for: Australia, New Zealand	6952311
5	Power Cord, System Unit, for: Paraguay	72X8508
6	Power Cord, System Unit, for: Denmark	72X8566
7	Power Cord, System Unit, for: Israel	72X8564

8	Power Cord, System Unit, for: Pakistan	72X8556
9	Power Cord, System Unit, for: Switzerland	72X8536
10	Power Cord, System Unit, for: Japan	78F9924

System Unit



Ref.	Part Name	Part No.
1	System Board (Main)	95F6263
2	System Board (Sub)	95F5705 (European model)
	System Board (Sub)	95F6264 (U.S. English model)
3	LED/Vol Board ASM	95F6265
4	LED/Vol Cable	95F6266
5	I/O Connector Board	95F6267
6	Disk Drive ASM (40MB)	56F8897
7	Disk Drive Cable	95F6273
8	External FDD Port PCB	95F6274
9	Speaker ASM	95F6276
10	Keyboard ASM	See Keyboard part list on page 77.
11	LCD Panel ASM	95F6279
12	LCD Cable ASM	95F6281
13	Inverter Board	95F6280
14	Rechargeable Battery	07G2093
	Rechargeable Battery (Swiss)	07G0024
15	Cover - Top	95F6283
16	Cover - Bottom	95F5742
17	Cover - Connector	95F5743
18	Cover - Modem	95F6258
19	Cover - Memory Card	95F6259
20	Cover - Backup Battery	95F6260
21	Cover - HDD	95F6261
22	Masking Set	95F6289
23	LCD Cover - Base	95F6286
24	LCD Cover - Front	95F6288
25	4MB Memory Card	07G0038
26	2MB Memory Card	07G0039
27	Backup Battery	95F5710
28	Standby Battery	95F5706
	External Diskette Drive ASM	95F5722
	Panel Close Switch ASM	95F6278
	Volume Knob	95F6285
	Quick Charger	95F5696
	Mouse	95F5723
	Numeric Keypad	See Numeric Keypad part list on page 78.
	AC Adapter	95F5470
	Miscellaneous Kit	79F6421
	Speaker Holder	07G0014
	Miscellaneous Kit for Repair Center	95F3604
	EMI Finger Kit	95F5460

Serial Number Label Blank	95F5448
Battery Holder ASM	95F6269
Battery Extension Cable	95F6271
Latch Kit	95F6287
Metal Chassis Kit	95F6290
Screw Kit	95F3614
Modem Blank Plate	07G0041

Supplemental Parts:

Supplemental Parts:
