IBM®

30H2383

S30H-2383-00

P30H2383

IBM

Hardware Maintenance
Service and Reference
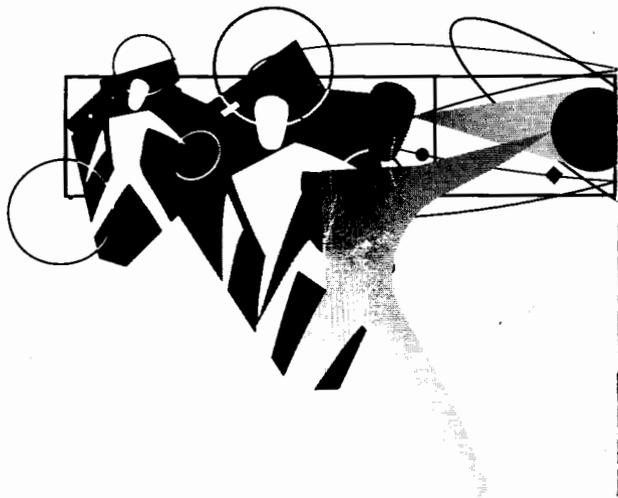
ThinkPad
Power Series 850

First Edition (July 1995)

Safety Information

The following inspection guide will assist you in identifying potentially unsafe conditions on IBM products. Each product, as it was designed and built, had required safety items installed to protect users and service personnel from injury. This guide addresses only those items. However, good judgment should be used to identify potential safety hazards due to attachment of non-IBM features or options not covered by this inspection guide.

If unsafe conditions are present, determine how serious the hazard is, and whether you can continue without first correcting the problem.

Consider these conditions and the safety hazards they present:

- Electrical hazards, especially primary power: primary voltage on the frame can cause serious or fatal electrical shock.
- Explosive hazards, such as a capacitor, can cause serious injury.
- Mechanical hazards, such as loose or missing hardware, can cause serious injury.

The guide consists of a series of steps presented in a checklist. Begin the checks with the power off and the power cord removed from the electrical outlet.

Checklist:

1. Power off the computer. Disconnect the power cord from the electrical outlet.
2. Check exterior covers for damage (loose, broken, or sharp edges).
3. Check the power cord:
   a. There should be a third-wire ground connector, and it should be in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and frame ground.
   b. The cord should be the appropriate molded type as specified in the parts section of this manual.
   c. The insulation must not be frayed or worn.
4. Remove the cover.
5. Check for any obvious non-IBM alterations. Use good judgment as to the safety of any non-IBM alterations.
6. Check inside the unit for any obvious unsafe conditions, such as metal filings, contamination, water or other liquids, or signs of fire or smoke damage.
7. Check for worn, frayed, or pinched cables.
8. Check that the power card shield has not been removed or tampered with.
9. Check that all safety labels and information labels are attached correctly.

Contents

© Copyright IBM Corp. 1995

Read This First

Before you go to the checkout guide, be sure to read this section.

Important Notes

- **Only certified trained personnel should service the computer**.
- **Be extremely careful during write operations such as copying, saving, or formatting.** Drives in the computer that you are servicing might have been rearranged or the drive startup sequence might have been altered. If you select an incorrect drive, data or programs can be written over.
- **Replace FRUs only for the correct model.** When you replace the FRU, make sure the model of the machine and FRU part number are correct by referring to the part list.
- **FRUs should not be replaced because of a single, unreproducible failure.** Single failures can occur from a variety of reasons that have nothing to do with a hardware defect—for example, cosmic radiation, electrostatic discharge, or software errors. FRU replacement should only be considered when a recurring problem exists. If this is suspected, clear the error log and run the test again. Do not replace any FRUs if log errors do not reappear.
- **Be careful not to replace a nondefective FRU.**
- Do not forget to return the original FRU if you find the suspected or replaced FRU is not the cause of the original problem or symptom.

How to Use Error Messages

Use the error codes displayed on the screen to diagnose failures. If more than one error code is displayed, begin the diagnosis with the first error code. The cause of the first error code can result in false error codes being displayed. If no error code is displayed, see if the error symptom is listed in the "Symptom-to-FRU Index" on page 27.

How to Diagnose Multiple FRUs

When the adapter or device has more than one FRU, the error code could be caused by a single FRU. Before replacing several FRUs, try removing or exchanging each FRU, one by one in the designated sequence, to see if the symptoms change.

What to Do First

The servicer must include the following in the parts exchange form or part return form that is attached to the returned FRU.

- ___ 1. Name and phone number of servicer.
- ___ 2. Date of service.
- ___ 3. Date when part failed.
- ___ 4. Date of purchase.
- ___ 5. Failure symptoms, error codes appearing on display, and beep symptoms.
- ___ 6. Procedure index and page number in which failing FRU was detected.
- ___ 7. Failing FRU name and part number.
- ___ 8. Machine type, model number, and serial number.
- ___ 9. Customer's name and address.

Before checking problems with the computer, determine whether or not the damage applies the warranty by referring to the following:

Note for Warranty: During the warranty period, the customer may be responsible for repair costs if the computer damage was caused by misuse, accident, modification, unsuitable physical or operating environment, or improper maintenance by the customer. The following list provides some common items that are not covered under warranty and some symptoms that may indicate the system was subjected to stresses beyond normal use:

The following is not covered under warranty:
- A cracked LCD panel caused by the application of excessive force or from being dropped.
- Scratched (cosmetic) parts.
- Cracked or broken plastic parts, broken latches, broken pins or connectors if the damage was caused by excessive force.
- Damage caused by liquid spilled into the system.
- Damage caused by the improper insertion of a PCMCIA card or the installation of an incompatible card.
- Damage due to foreign material in the FDD.
- Diskette drive damage caused by pressing the diskette drive cover or inserting diskettes with multiple labels.
- A bent or damage diskette eject button.
- CD-ROM drive damage caused by the application of excessive force from being dropped.
- A fuse blown from the attachment of a nonsupported device.
- Inability to use the computer because the password was forgotten.

If the following symptoms are present, they may indicate damage caused by nonwarranted activity:
- Missing parts may be a symptom of unauthorized service or modification.
- HDD spindles can become noisy if subjected to excessive force or if they are dropped.

FRU Service Notice

Review these service notice *before* replacing a FRU.

LCD FRU Replacement Notice

If missing or discolored dots appear on the LCD, carefully read the following note to determine whether you should replace the LCD or not.

Important

A small number of missing, discolored, or lighted dots (on all the time) is characteristic of LCD technology, but excessive pixel problems can cause viewing concerns. The LCD should be replaced if the number of dots satisfies either of the following conditions:
- The number of missing, discolored, or colored dots in any colored background is 21 or more.

ThinkPad Power Series 850
Hardware Maintenance Service

> **Important**
>
> If you are not familiar with the IBM* ThinkPad*
> Power Series* 850 safety information, begin by
> reading "Safety Information" on page iv. Then
> continue with the service or reference sections of this
> manual as required.

The service section of this manual provides the necessary
information for a trained service representative to
diagnose a failure to the field-replaceable unit (FRU).
This section includes:
- Password overriding
- General checkout
- Undetermined problems
- Power systems checkout
- Various computer tests
- Symptom-to-FRU index
- FRU codes
- Parts listing

---

* Trademark of the IBM Corporation.

How to Disable the Power-On Password

J21
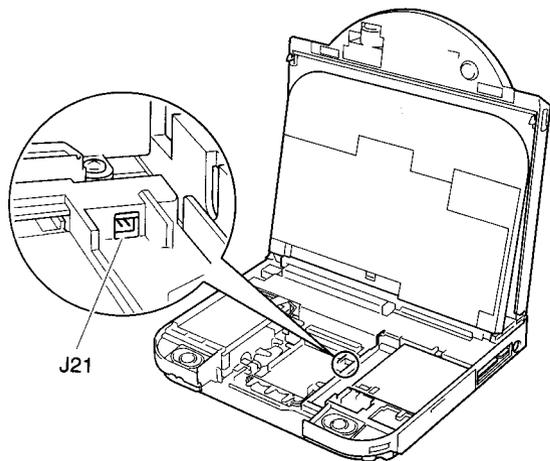
Do the following to disable the power-on password:
1. Power off the computer.
2. Open the LCD panel and keyboard assembly. (See "1000 Opening the Display Assembly" on page 47 and "1030 Opening the Keyboard" on page 55.)
3. Remove the FDD or CD-ROM drive assembly. (See "1040 FDD Assembly" on page 57 or "1045 CD-ROM Drive Assembly" on page 58.)
4. Identify and install a jumper on the J21 connector on the system board.
5. Power on the computer.

Note: Remove the jumper from the J21 connector after you have finished the service action.

To enable the password again, select **password** on the **Easy-Setup** screen; then enter the password.

Supervisor Password

The supervisor password is a security feature that is used to protect the system from unauthorized use. No overriding is provided. Obtaining permission from the password owner to unlock the password is a prerequisite for running diagnostic tests and performing service.

Power Shutdown Switch

The power shutdown switch is located on the rear side of the system unit. This switch forces the computer power off when the power switch does not work because of a system hang.

General Checkout

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

┌─ **Important** ─────────────────────────────┐

If more than one error code appears, diagnose the first error code first. The cause of the first error code can cause additional false error codes to appear. Multiple error codes may appear on the LCD during the POST process.

└───┘

| **001** |

- Power off the computer and all external devices.
- Check that all cables and the power cord are correctly connected.
- Make sure there are no diskettes in the diskette drive.
- Set all display controls to their middle positions.
- Power on all external devices.
- Power on the computer while holding down the **F1** key. Check for the following responses:
  - The power on indicator lights.
  - One short beep sounds.
  - The **Easy-Setup** screen or **Power-On Password** screen appears.

DID EITHER THE EASY-SETUP OR POWER-ON PASSWORD SCREEN APPEAR?

Easy-Setup

Config   Password   Start Up   Test

Exit
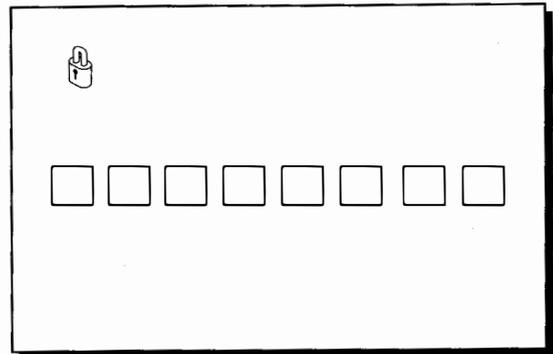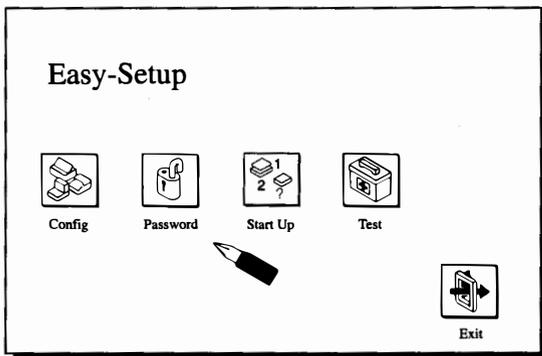
Yes   No

       | **002** |

       Press the **Ctrl + E** keys to display the **Error Log** screen. Go to Step 004.

| **003** |

- If the **Power-On Password** screen appears, enter the password or disable the power-on password. (See "How to Disable the Power-On Password" on page 2.)
- Select **Test** on the **Easy-Setup** screen; then go to Step 007 on page 6.

| **004** |

WERE ANY ERRORS LOGGED?

Video
01230123

OK
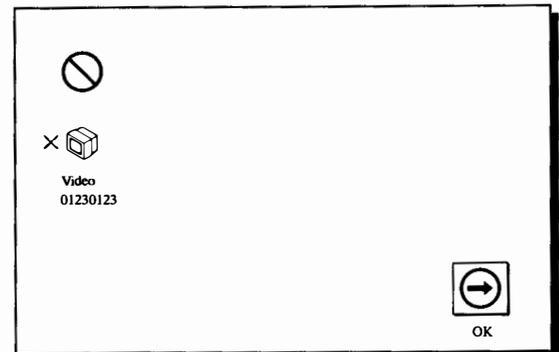
Yes   No

       | **005** |

       (Step **005** continues)

(continued)

005 (continued)
– Press the **Enter** key to exit the error log and select **Test** on the **Easy-Setup** screen; then go to Step 007.

006

– Note all error codes on the screen; then clear the error log. Go to "Numeric Error Codes" on page 24 and find the error code; then follow the instructions. If the problem remains, go to "Undetermined Problems" on page 10.

007

DID THE TEST MENU APPEAR?
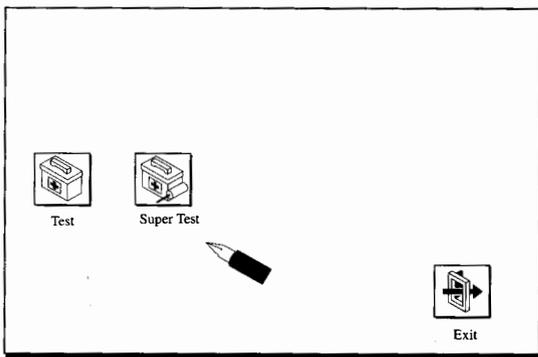
Yes No

    008

    – Go to "Symptom-to-FRU Index" on page 27 and find the error code or the symptom and follow the instructions. If the problem remains, go to "Undetermined Problems" on page 10.

009

Press the **Ctrl + A** keys and select **Super Test** on the **Test** screen; then go to Step 010.

010

(Step **010** continues)

010 (continued)
DID EITHER THE SUPER TEST OR SUPER PASSWORD SCREEN APPEAR?
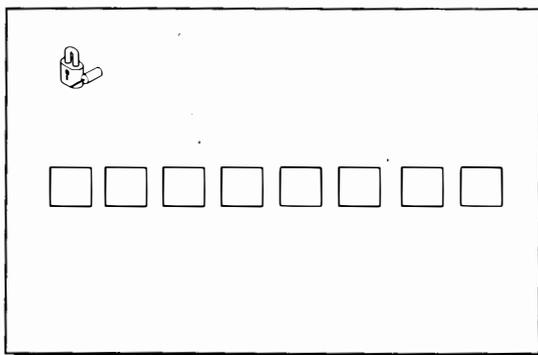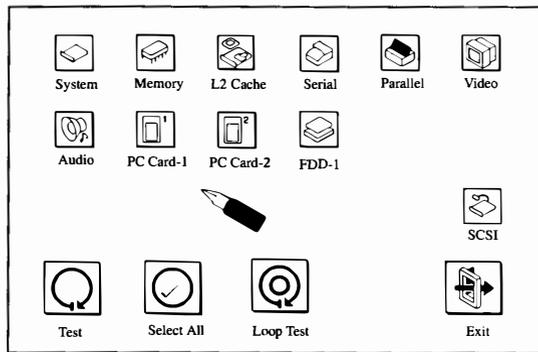
Yes No

    011

    – Go to "Symptom-to-FRU Index" on page 27 and find the error code or the symptom and follow the instructions. If the problem remains, go to "Undetermined Problems" on page 10.

012

– If the password screen appears, unlock the supervisor password. (See "Supervisor Password" on page 2.)

(Step **012** continues)

(continued)

012 (continued)
IS THE DISPLAYED ICON CORRECT WITH THE INSTALLED DEVICES ON THE SUPER TEST SCREEN?

Note: The icons of the installed devices are displayed.

Yes No

> 013
>
> – Go to "Installed Devices Check" on page 10.

014

Select **Select All** or the specific icon you want to test; then select **Test**. Go to Step 015 on page 9. (Diagnostic tests will run on all devices in which icons are displayed.)

The serial, parallel, and PC cards icons have the wrap test option. When you run the wrap test, install the wrap plug on each connector and click the icon twice; then select **Test**.

Serial   Serial

Serial
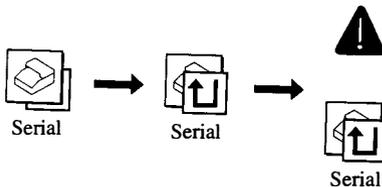
The FDD icon has a scratch diskette test option. When you run the scratch diskette test, install the scratch diskette into the FDD and click on the icon twice; then select **Test**.

The CD-ROM drive icon has a CD-ROM test option. When you run the CD-ROM test, install a CD-ROM into the drive and click on the icon twice; then select **Test**.

See "Special Tools" on page 45 for the tool information.

You can do the video camera test by clicking on the video test icon. When you run the video camera test, set the camera toward your face. Make sure your face is displayed on the screen and no error is detected.

015

DID THE TESTS DETECT A FAILURE?

Note: If the test stops or hangs when the test is running, replace the last device that was tested.

Yes No

> 016
>
> The error was not detected by the test:
> - Check that the cables and connectors are not damaged.
> - Reconnect all adapters, drives, and modules; then test the system several times. A **Loop Test** option is available for looping the tests. To exit the loop test, press the **Ctrl + C** keys between each test.
> - If no error is detected, go to "Symptom-to-FRU Index" on page 27. Find the symptom and follow the instructions.
> - If any errors are detected, go to "Numeric Error Codes" on page 24.

017

– Note the error codes shown on the screen. Go to "Numeric Error Codes" on page 24 and replace the appropriate FRU.

Undetermined Problems

1. Power off the computer.
2. Remove or disconnect any external device or cables.
3. Power on the computer and run the diagnostic tests.
4. If the symptom remains, repeat steps 1, 2, and 3 until you find the failing adapter or device.
5. If all devices are disconnected and the symptom remains, go to "Power Systems Checkout" on page 12. If this does not resolve the problem, replace the system board.
6. If an intermittent problem remains after replacement of the FRUs, consider external electrical noises that can have an effect on the computer. Check that the EMC contacts on the system board are not broken. The contacts are fragile and can be easily damaged.

Installed Devices Check

If a device is installed but the icon does not appears on the **Test** or **Super Test** screen, the device is defective. Make sure that the device is connected correctly. If the symptom remains, replace the device or the system board.

Parallel and **Serial** icons are always displayed on the **Test** or **Super Test** screen. That is, these icons represent adapters on the system board, not the external devices.

Printer

1. Make sure the printer is correctly connected and power is on.
2. Run the printer self-test, if available. If the printer self-test does not run correctly, the problem is in the printer. Refer to the printer service manual.
3. Disconnect the printer cable.
4. Select **Parallel** on the **Super Test** screen and run the parallel test, if the printer is attached to the parallel port. If the test detects an error, replace the system board. If the test runs error free, replace the printer cable; then run the program to see if the error is re-created. If the problem remains, replace the system board.

Power Systems Checkout

Use the following procedure when you suspect a computer power problem, for example:

- The computer does not power on.
- The computer attempts to power on; then it shuts down immediately.

Obtain from the user all information about the symptoms of the power failure. Before analyzing the power systems, disconnect both the battery pack and the AC Adapter from the computer; then reconnect them to the computer (see note on page 17).

001
DOES THE COMPUTER FAIL *ONLY* WHEN USING THE AC ADAPTER?
Yes   No

> ### 002
> Go to Step 004.

003
– Go to "AC Adapter Test" on page 14 and do the test.

004
DOES THE COMPUTER FAIL *ONLY* WHEN USING THE BATTERY PACK?
Yes   No

> ### 005
> – If the problem occurs *both* in AC Adapter operation and in battery pack operation, go to "System Power Problems" on page 17.

006
DOES THE BATTERY PACK POWER BECOME LOW QUICKLY?
Yes   No

> ### 007
> (Step **007** continues)

007 (continued)
Go to "Battery Pack Test" on page 15.

008
– Using the AC Adapter, do the **Super Test** from the **Easy-Setup** screen. Select **Select All** to test all devices. Go to Step 009.

009
DID THE TESTS RUN SUCCESSFULLY?
Yes   No

> ### 010
> If any error code is displayed, go to "Numeric Error Codes" on page 24.
> If nothing is displayed, go to "Symptom-to-FRU Index" on page 27 and replace the appropriate FRU.

011
– Go to "System Power Problems" on page 17 and do the open/short circuit test.

AC Adapter Test

Do the following to analyze an AC Adapter problem.
1. Unplug the AC Adapter from the power outlet and the computer.
2. Inspect the AC Adapter for any signs of overheating or damage.
3. Inspect the AC Adapter power cord for cuts or damage. Replace the power cord, if necessary.
4. Plug the power cord into the power outlet. Listen for any sound that might indicate defective operation.
5. Measure the output voltage at the AC Adapter plug between pins 1 and 3.
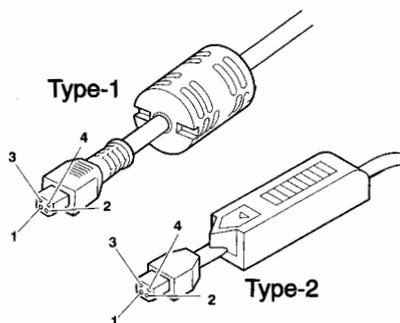
Pin	Voltage (V dc)	Signal Name
1	+17.8 to +21	dc output
2		VCCSEL# (VCCC mode select signal)
3	dc ground	RTN
4		COMMGND (Type-1) Open (Type-2)

- If the voltage is incorrect, but not 0, replace the AC Adapter.
- If the voltage is 0, check the power cord and the power outlet.
- If the power cord and power outlet are OK, replace the AC Adapter.

- If the voltage is correct, suspect a short circuit or a failure in the computer. Go to "System Power Problems" on page 17.
- If the system does not start up when the system is powered on with the battery pack removed and the AC Adapter connected, and if you hear noise coming from the AC Adapter, suspect a short circuit in the computer. Go to the "System Power Problems" on page 17.
- If the system starts up with the battery pack installed and the AC Adapter disconnected, replace the DC/DC card and make sure that the system starts up with the AC Adapter connected. If the system starts up, the original DC/DC card was bad. If the system still does not start up, replace the AC Adapter and reinstall the original DC/DC card. Make sure the system starts up with the new AC Adapter and the original DC/DC card.

Battery Pack Test

Note: When the battery power becomes low, the computer alerts you by sounding three short beeps.

1. Remove the battery pack from the computer.
2. Make sure that the storage switch **1** on the battery pack is in the ON (I) position.
3. Measure the voltage between battery pack terminals + and −.
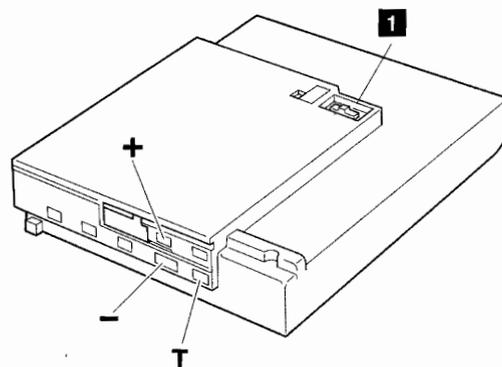
Note: The + terminal has a shutter on it to protect it from accidentally being shorted.

Terminals	Description
+	+9.6 ± 2.4 V dc
−	Ground
T	Thermal

- Charge the battery pack with the power off charge procedure.
- If the voltage is not correct after the battery pack is charged, replace it.
- If the voltage is correct, suspect a short circuit or failure in the computer. Go to the "System Power Problems" on page 17.
- If the system starts up with the AC Adapter connected, the battery pack removed, and the voltage of the battery pack correct, replace the DC/DC card and check if the system starts up with only the battery pack installed. If the system starts up, the original DC/DC card is failing; if the system still does not start up with the good DC/DC and with the original battery, replace the battery pack and confirm the system starts up with the new battery and with the original DC/DC card.

Do the following to check to see if the thermal protection has tripped:
1. Measure the resistance between terminal (−) and (T).
2. The resistance should be from 2 kΩ to 50 kΩ. If the measured resistance is not in this range, replace the battery pack. If the resistance is between 2 kΩ to 5 kΩ, the temperature of the battery pack is too high for the battery pack to be charged. Do not charge the battery pack until its resistance is more than 5.5 kΩ.

System Power Problems

Do the following to analyze a short or an open circuit in the computer:
1. Disconnect *both* the battery pack and the AC Adapter; then reconnect them (see note).
2. Disconnect and then reconnect all external devices from the computer one by one and see if the same symptom appears. If you find a problem with an external device or its associated cables, follow the maintenance procedure for that device.
3. If the same symptom remains with no external devices connected, the problem is in the computer. Visually check the cables, wires, connecters, and cards for short circuits, open wires, or loose or damaged wires. Also check to see if there are any foreign metal material in the computer.
4. If the problem remains after you have done all of the preceding, isolate the failure in the computer by changing the FRUs one by one. The most probable failing FRUs are the DC/DC card and the system board.
5. If the battery power becomes low immediately after power on and no problems are found in other parts of the computer and all internal tests run without detecting any errors, replace the battery pack.

Note: If the power protection mechanism works, the output voltage from the DC/DC card and the AC Adapter continues to be blocked. To cancel the mechanism, disconnect the battery pack and the AC Adapter and then reconnect them.

Standby Battery Test

This battery is used for suspend mode back up.
1. Remove the standby battery. (See "1055 Backup Battery, Standby Battery, IC Card" on page 60.)
2. Measure the battery voltage between the connector pins as shown below.
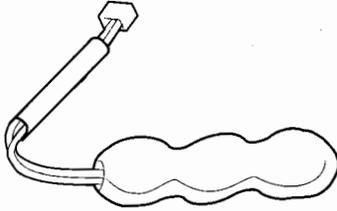
Wire	Voltage (V dc)
Red (+)	+2.7 to +4.5
Black (−)	Ground

If the voltage is not correct, replace the standby battery.

Also check the voltage across the pins of the J20 connector for the standby battery with the AC Adapter connected to the system and with the system power switch off. If the voltage is less than 4.5V, replace the DC/DC card first. If the voltage is more than 4.5V, the original DC/DC card was bad. If the voltage is still low, replace the system board. If the battery voltage is correct and the system is still in suspend mode, a short circuit or a failure in the system board is likely. Replace the system board.

Backup Battery Test

1. Remove the backup battery. (See "1055 Backup Battery, Standby Battery, IC Card" on page 60.)
2. Measure the battery voltage between the connector pins as shown below.

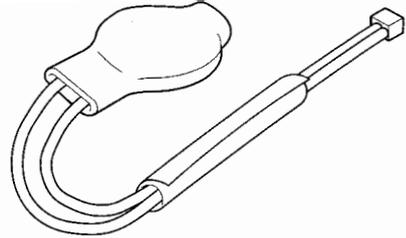| Wire	Voltage (V dc)
Red (+)	+2.7 to +3.7
Black (−)	Ground

If the voltage is not correct, replace the backup battery.

If the voltage is correct, a short circuit or a failure in the system board has occurred. Replace the system board.

Quick Charger Test

Do the following if you suspect a Quick Charger problem.

1. Make sure that the battery storage switch is in the ON (I) position. Verify that the battery voltage and the resistance are within the range described in "Battery Pack Test" on page 15.
2. Connect the power cord to the Quick Charger. Connect the power plug to the power outlet. The power indicator should turn on. If the indicator does not turn on, recheck the connections of the power cord.
3. Install the battery pack. The charging indicator should start blinking.
4. Within 3.0 hours, the battery pack should be fully charged and the charging indicator should change from a blinking state to on all the time.

If the charger does not work as just stated, replace the Quick Charger.

For other functions and operations, refer to the Quick Charger manual.

Maintenance Utility

The Maintenance Utility is part of Easy-Setup. It consists of two items:

- System Info
- SCSI Format

To start the Maintenance Utility, press the **Ctrl + V** keys in the **Super Test** screen. The following screen appears:

Easy-Setup   MAINTENANCE UTILITY

System Info   SCSI Format

Exit
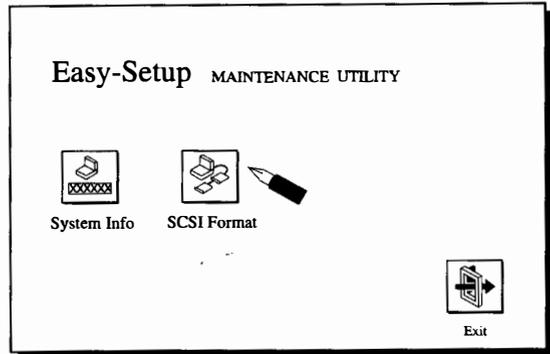
System Information

Select **System Info** in the Maintenance Utility menu. This screen shows the Firmware Part Number, Installed Memory, and Serial Number of the system board.

Whenever you replace the system board, specify the serial number of the new system board on this screen.

If the layout of your keyboard for alphanumeric keys is different from the layout on the following page, use the layout on the following page when you type the new system information.
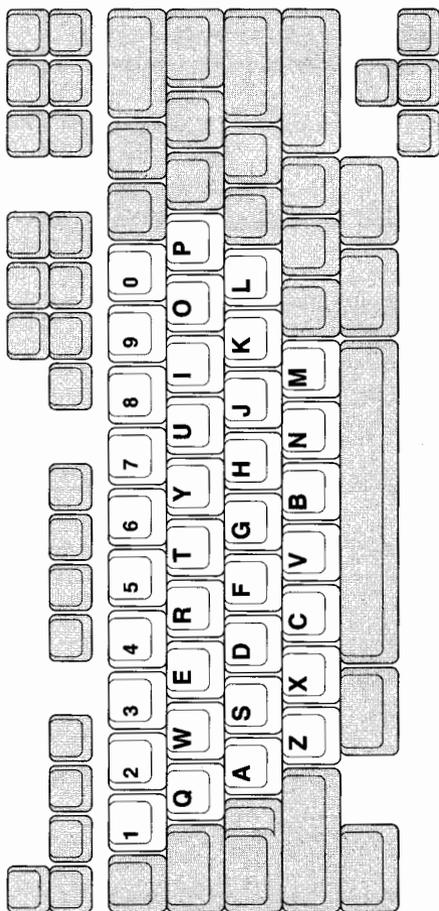
SCSI Format

Do the following to format the disk:

Warning: Make sure the drive address for the disk to be formatted is correct. This procedure erases all information on the disk.

1. Select **SCSI Format** on the Maintenance Utility menu.
2. Select the drive from the menu.
3. Follow the instructions on the screen.

Numeric Error Codes

If an error is detected by the diagnostic test or POST, an eight-digit error code is displayed. The error code indicates the suspected FRUs. The most likely cause is listed first.

In the following error codes, **X** can be any number.

> **Note**
>
> For IBM devices not supported by the ThinkPad Power Series 850 diagnostic codes, refer to the manual for that device.

Symptom or Error	FRU and Action
00010000 (Processor)	**CPU card** System board
0001500X (Flash)	**System board**
0001550X (Interrupt)	**System board**
0001600X (CMOS/NVRAM)	**Backup battery connection** (Disconnect and reconnect the connector.) Backup battery System board
000170XX (NVRAM/EEPROM)	**Backup battery** System board
00020000 (Memory error)	**Memory card** System board
000200ZZ (Memory error)	**Memory card configuration error** ZZ Meaning 01 DIMM Card mismatch 02 Bottom DIMM slot is empty 03 Upper DIMM slot is empty 11 IC DRAM card mismatch 12 IC DRAM slot 2 is empty 13 IC DRAM slot 1 is empty

Symptom or Error	FRU and Action
000210Y0 (Memory error)	**Memory error in slot Y** Y Memory card 1 DIMM in upper slot 2 DIMM in bottom slot 3 IC DRAM in slot 1 4 IC DRAM in slot 2 5 Either DIMM 6 Either IC DRAM System board
000300XX (Keyboard)	**Keyboard assembly** System board
00063XX0 (Diskette drive)	**Diskette drive** Media System board
000640D0 (Diskette drive)	**No media found** Media is defective Diskette drive System board
0006XXX0 (Diskette drive)	**Diskette drive** System board
00110001 (Serial port)	**Disconnect any I/O device from the serial port.** System board
001100XX (Serial port)	**System board**
00140006 (Parallel port)	**Disconnect any I/O device from the parallel port.** System board
0014000X (Parallel port)	**System board**
00140010 (Enhanced parallel port)	**Check the enhanced parallel port and disconnect any I/O from it.** System board
00140011 (Enhanced parallel port)	**System board**
0024000X (Video)	**Video card** System board
0037XXX0 (SCSI controller)	**System board**
00370730 (SCSI controller)	**Device ID conflict**

Symptom or Error	FRU and Action
00800004 (PCMCIA)	**PCMCIA wrap plug not installed.**
008000XX (PCMCIA)	**System board**
008600X0 (Mouse)	**Keyboard assembly** System board Mouse
01291000 (L2 cache)	**System board** CPU card
02XXXXX0 (SCSI)	**SCSI drive**
0250100X (Audio)	**Audio card** Sub audio card System board
10EDXXXX (Video)	**Video card** System board

Symptom-to-FRU Index

The symptom-to-FRU index lists the symptoms and errors and the possible causes. The most probable cause is listed first. Use this index to help you decide which FRUs to have available when servicing a computer.

No-Beep Symptoms

Symptom or Error	FRU and Action
No beep, power on LED not lit, and a blank LCD during POST. (See "Power Systems Checkout" on page 12 before replacing any FRUs.)	**DC/DC card** AC adapter Battery System board CPU card
No beep, power on LED lit, and a blank LCD during POST. (See "Power Systems Checkout" on page 12 before replacing any FRUs.)	**DC/DC card** System board CPU card
No beep during POST but system runs OK.	**System board (speaker)** CPU card

Beep Symptoms

Symptom or Error	FRU and Action
Continuous beep.	**System board**
One beep and a blank, unreadable, or flashing LCD.	**LCD assembly** Interposer card DC/DC card Base memory card System board
Four short beeps followed by one long beep during battery charge operation and battery power status LED keeps lighting yellow, orange, and green repeatedly.	**Battery pack** DC/DC card System board

| Symptom or Error	FRU and Action
Four short beeps followed by one long beep during battery charge operation and battery power status LED keeps lighting orange.	**Battery pack**

Miscellaneous Symptoms

Symptom or Error	FRU and Action
LCD screen unreadable or characters missing pels.	**LCD assembly** LCD cable assembly Video card System board
Vertical or horizontal line defects on the LCD screen.	**LCD assembly**
LCD backlight not functioning.	**LCD assembly** LCD power cable LCD cable assembly Video card System board
LCD backlight intensity not adjustable.	**LCD assembly**
LCD contrast not adjustable.	**LCD assembly**
One or more keys do not work.	**Keyboard assembly** System board
System hangs or intermittently hangs. (See "Undetermined Problems" on page 10 before replacing any FRUs.)	**Press the power shutdown switch** If "ThinkPad Power Series" is displayed continuously, replace the system board. If the user's defined screen does not appear, ensure there is no problem with the operating system; then replace the system board.
The system does not suspend or resume.	**Operating system** System board
The system does not power off.	**Press power shutdown switch** System board
Real-time clock is inaccurate.	**Backup battery** System board

Symptom or Error	FRU and Action
Printer problems. (See "Printer" on page 11.)	**System board** Parallel port device cable
Serial or parallel port device problems.	**Device** Device cable System board
Battery power status LED keeps blinking yellow during battery charge operation with AC adapter.	**Battery pack**
Incorrect LED status, but system runs OK.	**System board**

If the problem remains, see "Undetermined Problems" on page 10.

Parts Listing
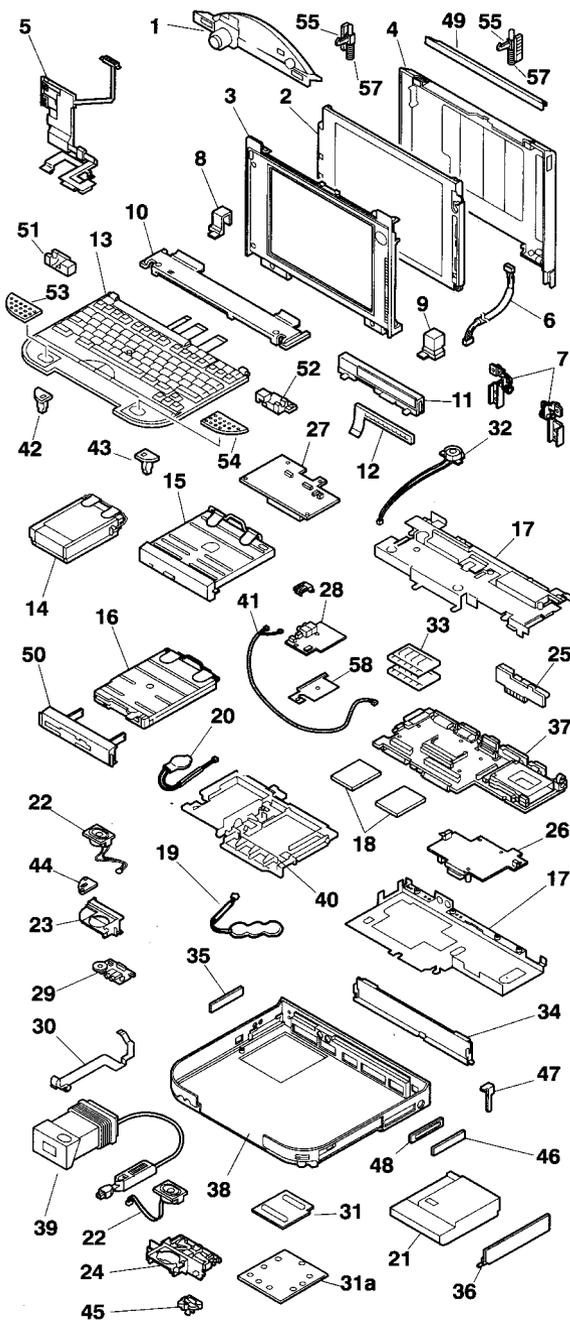
FRU List

1	84G4530	. Camera Assembly
2	84G4529	. Display Assembly, TFT(VGA)
2	29H9928	. Display Assembly, TFT(SVGA)
3	29H8168	. Display Bezel Assembly(VGA)
3	29H8143	. Display Bezel Assembly(SVGA)
4	85G2719	. Display Rear Cover Assembly
5	29H8223	. LCD Cable Assembly(VGA)
5	29H8149	. LCD Cable Assembly(SVGA)
6	29H8224	. LCD Power Cable
7	85G2720	. Display Hinge
8	84G4522	. Hinge Cap, Left
9	84G4523	. Hinge Cap, Right
10	29H8030	. Middle Cover Assembly
11	29H8166	. Center Cover Assembly
12	84G5521	. LED FPC Card
13	(Note)	. Keyboard Assembly
14	85G0153	. Hard Disk Drive, 540MB
14	85G0157	. Hard Disk Drive, 810MB
14	30H1471	. Hard Disk Drive, 1.2GB
15	84G4538	. CD-ROM Drive Assembly
16	84G4597	. FDD Drive Assembly
17	29H8108	. Shield Assembly
18	92G7239	. 4MB IC DRAM Card
18	92G7242	. 8MB IC DRAM Card
18	92G7279	. 16MB IC DRAM Card
18	92G7282	. 32MB IC DRAM Card
19	39H1266	. Standby Battery
20	84G4535	. Backup Battery
21	85G2677	. Battery Pack, W/T
22	84G4511	. Speaker Assembly
23	29H8029	. Bracket Speaker Left
24	84G4513	. Bracket Speaker Right
25	84G4514	. Interposer Card
26	29H8106	. DC/DC Card
27	29H8105	. Video Card
28	29H8104	. Main Audio Card
29	29H9925	. Sub Audio Card
30	84G4542	. Audio FPC Cable
31	29H8147	. CPU Card
31a	29H8146	. CPU Card Door
32	29H8148	. Microphone Assembly
33	84G6545	. 8MB DIMM Card
33	84G4324	. 16MB DIMM Card
34	84G4524	. I/O Door
35	84G4596	. ISA Bus Door
36	29H8167	. Battery Door
37	29H8102	. System Board w/o DIMM
38	29H8101	. Base Cover Assembly
39	85G0167	. AC Adapter, W/T
39	85G0168	. AC Adapter, Japan
40	29H9927	. Inner Structure Holder

41	29H8099	. Audio Cable, Twisted Pair
-	84G4517	. Keyboard Catch Group
42	-	. . Keyboard Latch, Left
43	-	. . Keyboard Latch, Right
44	-	. . Keyboard Catch, Left
45	-	. . Keyboard Catch, Right
-	84G4525	. PCMCIA Door Assembly
46	-	. . PCMCIA Door
47	-	. . PCMCIA Latch
48	-	. . PCMCIA Door With Window
-	85G5457	. External FDD Drive Cover
-	84G9870	. Quick Charger, W/T
-	84G9871	. Quick Charger, Japan
-	29H8169	. Mechanical Group
49	-	. . Plate - Camera Blind
50	-	. . Bezel - FDD
51	-	. . Holder - Keyboard Left
52	-	. . Holder - Keyboard Right
53	-	. . Plate - Keyboard Left
54	-	. . Plate - Keyboard Right
55	-	. . Latch - Display Left
55	-	. . Slide - Display Latch Left
56	-	. . Latch - Display Right
56	-	. . Slide - Display Latch Right
57	-	. . Spring - Display Latch
58	-	. . Plate - Audio Card Insulator
-	-	. . Shaft I/O Door
-	-	. . Screw - M 2.5, L=4, Zinc
-	-	. . Screw - M 2.5, L=6, Zinc
-	-	. . Screw - M 2.5, L=6, Black Zinc
-	-	. . Screw - M 2.5, L=8, Zinc
-	-	. . Screw - M 2.5, L=14, Zinc
-	-	. . Screw - M 2.5, L=16, Zinc
-	-	. . Screw - M 2.5, L=18, Zinc
-	-	. . Screw - M 2.5, L=24, Zinc
-	-	. . Screw - M 2.5, L=5, Pan
-	-	. . Screw - M 2.5, Self Tap
-	-	. . Screw - M 1.4, L=6
-	-	. . Stud - M 2.5, L=10
-	-	. . Stud - M 2.5, L=18
-	-	. . Stud - M 2.5, L=7
-	-	. . Screw - Hex, 5mm
-	-	. . Screw - Hex, 7mm
-	-	. . Cover - Screw
-	-	. . Screw (M 2.5, L=6, Plastic)
-	-	. . Plate - EMI #1
-	-	. . Plate - EMI #2
-	-	. . Plate - EMI #3
-	-	. . Plate - EMI #5
-	-	. . Plate - EMI #6
-	-	. . Tape - Insulation
-	-	. . Clamp - LCD Power Cable A
-	-	. . Clamp - LCD Power Cable B
-	-	. . Bush - Display
-	-	. . Spacer - Display
-	-	. . Tape - Keyboard Latch Left
-	-	. . Tape - Keyboard Latch Right
-	-	. . Bracket - Display Lower

Keyboard Assembly

29H8109	U.S. English
29H8110	U.K. English
29H8101	German
29H8102	Swiss German
29H8113	French
29H8114	Swiss French
29H8115	Italian
29H8128	Swedish
29H8129	Dutch
29H8130	Spanish
29H8131	Danish
29H8132	Belgian
29H8133	Norwegian
29H8134	Arabic
29H8135	Hebrew
29H8136	Portuguese
29H8137	Turkish
29H8138	Greek
29H8139	Latin American
29H8140	Canadian French
29H8141	Japanese

Option List

85G2671	Battery Pack, U.S.
85G5411	Battery Pack, EMEA
85G5412	Battery Pack, Japan
92G7238	4MB IC DRAM Card
92G7241	8MB IC DRAM Card
92G7234	16MB IC DRAM Card
92G7235	32MB IC DRAM Card
92G7255	8MB DIMM Card
92G7257	16MB DIMM Card
30H1388	Hard Disk Drive 540MB, U.S.
30H1390	Hard Disk Drive 540MB, EMEA
30H1391	Hard Disk Drive 540MB, Japan
30H1392	Hard Disk Drive 810MB, U.S.
30H1394	Hard Disk Drive 810MB, EMEA
30H1395	Hard Disk Drive 810MB, Japan
30H1467	Hard Disk Drive 1.2GB, U.S.
30H1468	Hard Disk Drive 1.2GB, EMEA
30H1469	Hard Disk Drive 1.2GB, Japan
06H5985	Microphone - Peavy
30H1519	Mouse - 3 Button, U.S.
30H1520	Mouse - 3 Button, EMEA
30H1521	Mouse - 3 Button, Japan
85G2715	Camera, U.S.
85G5448	Camera, EMEA
85G5449	Camera, Japan
(Note 1)	Quick Charger
(Note 2)	AC Adapter

Note 1: Quick Charger

85G2662	U.S.
85G2663	U.K.
85G2664	EMEA
85G2665	Switzerland
85G2666	Italy
85G2667	Denmark
85G2668	Israel
85G2669	Latin American
85G2670	Japan

Note 2: AC Adapter

30H1403	U.S.
30H1405	U.K.
30H1406	EMEA
30H1407	Switzerland
30H1408	Italy
30H1409	Denmark
30H1410	Israel
30H1411	Latin America
30H1412	Japan

Accessories

The warranty times for accessories are different from the warranty time for the system unit. Some of the accessories related to services are:

49G2169	Key Guard, U.S.
54G0443	Key Guard, EMEA
54G0441	Keyboard/Mouse Connector

Power Cords

ThinkPad Power Series 850 Hardware Maintenance Reference

This section provides the reference information for the computer. It includes:

- Product overview
- Component descriptions
- Operating requirements
- Specifications
- Special tools
- Repair information
- Removals and replacements
- Locations

Product Overview

The computer, the ThinkPad Power Series 850, is a lightweight, portable computer with a CD-ROM drive. The keyboard is the primary means of data entry and editing; however, a mouse can be attached to the computer via a keyboard cable with a separator.

The portability of the computer allows you to operate the computer in various places. It is ideally suited to the mobile professional who requires a portable computer for work. The computer is powered by a rechargeable, nickel-metal hydride (Ni-MH) battery pack.

The video capturing function is available on selected models.

Product Description

The computer has the following standard features:
- 100-MHz microprocessor
- Color liquid crystal display (LCD)
- Minimum of 16MB random access memory (RAM), expandable up to 96MB
- Video controller(VGA and SVGA)
- External diskette drive(1.44MB)
- 2.5-inch, 1.2GB, 810MB, or 540MB hard disk drive
- CD-ROM drive
- Audio card
- Power cord
- Intelligent battery pack (rechargeable)
- Backup battery

The computer has the following external indicators, controls, connectors, and ports:
- AC Adapter connector
- JEIDA IC DRAM card sockets
- PCMCIA sockets
- IBM PS/2 Mouse connector
- SCSI connector
- Expansion connector
- External diskette drive connector
- External display connector
- Parallel port connector
- Serial port connector
- Audio line-in/out connector
- Headphone jack
- Microphone jack
- Audio volume control
- Contrast control slide switch
- Brightness control slide switch
- CD-ROM eject button
- CD-ROM in-use light
- CD-ROM emergency eject button
- Power shutdown switch
- Power switch
- Battery power status light
- PC card in-use light
- Diskette drive in-use light
- Hard disk drive in-use light
- Numeric lock light
- Caps lock light
- Scroll lock light
- Suspend mode light
- Power-on light

Options

Several options are available for the computer. See"Option List" on page 34 .

Option Compatibility

The computer has no internal expansion slots for standard PC or PS/2 adapters.

Accessories

Several accessories are available for the computer. See"Accessories" on page 35 .

Component Descriptions

System Board

The system board contains the computer logic, memory, and adapters.

Microprocessor

The PowerPC microprocessor interprets and performs the instructions. Its 64-bit processor runs at 100 MHz and contains an internal cache which has a 16KB instruction cache and a 16KB data cache. Its operating voltage is +3.3 V dc.

Flash ROM

The 512KB flash ROM contains the POST, BOOT, Resident Setup and Resident Diagnostic code. Algorithms for writing data into the flash ROM after the computer is manufactured are provided. After power-on, the initial code for the ROM is supplied from the device. A maximum ROM space of 16MB is reserved; however, the system board uses 512KB.

RT/CMOS/NVRAM
These provide the real-time clock and calendar function and store configuration and vital product data.

The stored data in the RT/CMOS/NVRAM are kept active by the backup battery when the system power is not on. If the stored data is lost because of a depleted or removed backup battery, use **Easy Setup** to restore the data.

EEPROM

A 64-by-16 type-A EEPROM contains the security passwords.

Power Management System

The power management system controls the power applied to the computer. This reduces the power drain on the battery when the computer power is on, but not actively being used.

LCD

The VGA LCD supports a maximum of 640 by 480 pels. The SVGA LCD supports a maximum of 800 by 600 pels. The LCD control logic provides the LCD support functions, which include bias voltage, backlight (brightness) control, and contrast control. Prior to replacement of the LCD, refer to the notice on page 50.

IC Card Controller

The IC card controller is integrated on the system board and can accommodate two IC cards. The slots conform to PCMCIA Release 2.0 and JEIDA Release 4.1.

Diskette-Drive Controller

The controller connects to the diskette drive through one, 26-pin cable connector on the system board. Signals and voltages are supplied through the connector to the drive. These signals and voltages can operate the computer's 3.5-inch external diskette drive.

For the standard model, a CD-ROM drive is built in. For users who want to use diskettes, the system unit has a connector for the detachable external diskette drive.

For users who want to replace the CD-ROM drive with a diskette drive, a kit is provided. Both the internal and

external diskette drives can be connected at the same time.

Serial Port

The serial port is fully programmable and supports asynchronous communication. The 9-pin, D-shell connector provides the signals to drive a standard EIA-232D device.

Parallel Port

The parallel port allows the attachment of devices that accept eight bits of parallel data at standard transistor-transistor logic (TTL) levels. The port can be used as a general input and output port for any device or application that matches its input and output capabilities. It has a 25-pin, D-shell connector and is designed primarily for printers.

External Input-Device Connector

The external input-device connector is located at the right-front of the computer and accepts an external keyboard, mouse, or numeric keypad.

The keyboard/mouse connector (a Y-shaped connector with cable and available an option) must be used when the external keyboard is attached. You can directly attach an external numeric keypad and a 2-button/3-button mouse to the external input-device connector.

External Display Connector

The display connector is used to connect an external monitor.

Operating Requirements

The following describes the operations that occur after power is applied and until the minimum operating requirements are met:

Power-On Self-Test (POST)

The POST is initiated automatically each time the system power is switched on. The POST is a series of system checks and initialization. The POST checks only those areas that permit the system to be operational enough to boot the operating system.

After a successful POST, control is then given to the operating system.

Memory Requirements and Limitations

You can expand the system memory up to 96MB by installing different capacities of DIMM and IC DRAM cards into the DIMM and IC DRAM card sockets on the system board.

The computer has two DIMM card sockets on the system board that support either 16MB (8MB+8MB) or 32MB (16MB+16MB) DIMM cards. Two identical DIMM cards must be added at the same time, one in each DIMM socket.

The computer has two IC DRAM card sockets on the system board. The IC DRAM sockets accept either 4MB, 8MB, 16MB, or 32MB IC DRAM cards. Two identical IC DRAM cards must be added at the same time, one in each IC DRAM socket.

Specifications

System

Size
- Width: 297 mm (11.7 in.)
- Depth: 264 mm (10.4 in.)
- Height: 58 mm (2.3 in.)

Weight
- System unit (CD-ROM model): 3.8 kg (8.3 lb)
- Battery pack: 0.7 kg (1.5 lb)

Environment
- Air temperature:
  - System on: 5°C to 35°C (41°F to 95°F)[1]
  - System on (with diskette): 10°C to 35°C (50°F to 95°F)
  - System off: 5°C to 43°C (41°F to 109°F)
- Humidity:
  - System on: 8% to 80%
  - System off: 8% to 80%
- Maximum altitude: 3048 m (10000 ft)[2]

Heat Output
160 British Thermal Units (BTUs) per hour (47 watts per hour) with power supplied from the AC Adapter.

---

[1] A maximum of 32°C (90°F) at altitudes higher than 915 m (3000 ft).

[2] A maximum temperature of 31.3°C (88°F) with no pressurized condition.

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
- Operating mode: +20 V dc
- Charging mode
  - Minimum: +9.0 V dc
  - Maximum: +16.0 V dc

Maximum Current
  2.50 A

Quick Charger

Input Voltage
- Low range
  - Minimum: 90 V ac
  - Maximum: 137 V ac
- High range
  - Minimum: 180 V ac
  - Maximum: 264 V ac

  Output Voltage
  - Nominal 12 V dc

  Maximum Current
    2.7 A

Special Tools

The following tools are used to service the computer.
- Super Test (Advanced Diagnostics) in Easy Setup
- PCMCIA Wrap Card (P/N 35G4680)
- Tri-Connector Wrap Plug (P/N 72X8546)
- Scratch diskette

  Note: These tools are used in Step 014 on page 8.

- Maintenance Utility in Easy Setup
    System Information
    SCSI Format

  Note: Refer to "Maintenance Utility" on page 21.

- Box Wrench (5m/m, 7m/m)

Repair Information

This section contains information about removals and replacements, and locations.

- Do not damage any part. Only certified and trained personnel should service the computer.
- The arrows in the "Removals and Replacements" section show the direction of movement to remove a field-replaceable unit (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 connections and arrangement information.
- When replacing a FRU, use the correct screw size as shown in the procedures.

```
┌─ CAUTION ─────────────────────────────┐
│                                        │
│ Before removing any field-replaceable  │
│ unit (FRU), switch off the power of     │
│ the computer, unplug all power cords    │
│ from electrical outlets, disconnect any │
│ interconnecting cables, then remove the │
│ battery pack. The batteries used        │
│ (battery pack, standby battery, and     │
│ backup battery) contain small amounts   │
│ of harmful substances. Do not           │
│ disassemble it, throw it into fire or    │
│ water, or short-circuit it. Dispose of   │
│ the battery pack as required by local    │
│ ordinances or regulations.               │
│                                        │
└────────────────────────────────────────┘
```

```
┌─ WARNING ─────────────────────────────┐
│                                        │
│ The system board and memory card are    │
│ sensitive to, and can be damaged by,     │
│ electrostatic discharge. Establish       │
│ personal grounding by touching a ground  │
│ point with one hand before touching      │
│ these units. An electrostatic discharge  │
│ (ESD) strap must be used to establish    │
│ personal grounding.                      │
│                                        │
└────────────────────────────────────────┘
```

Removals and Replacements

1000 Opening the Display Assembly
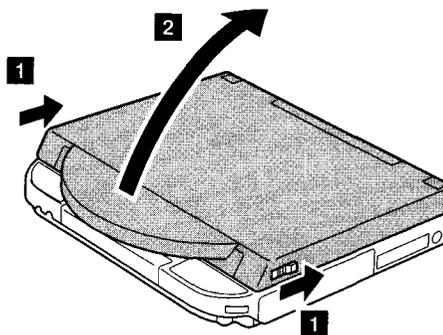
Note: Open the display assembly as shown below to prevent the computer from falling backward when some devices are removed.
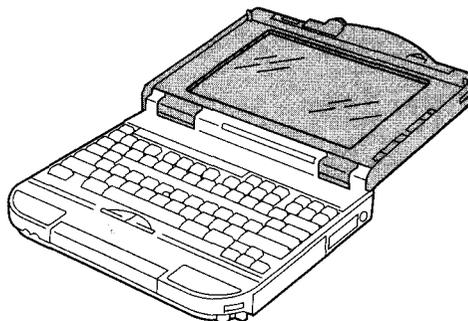
1005 Camera Assembly, Middle Cover, Camera Plate

- Opening the Display Assembly (1000)

Camera Assembly 1 , 2
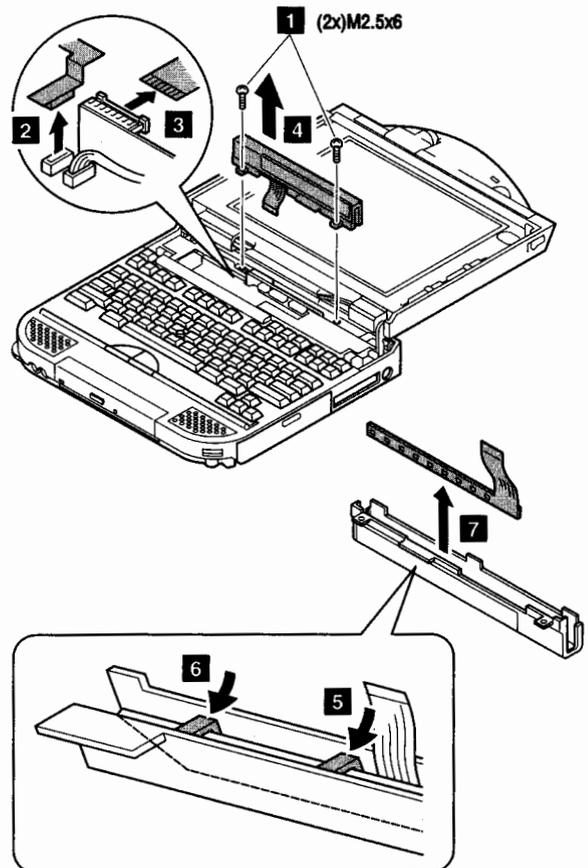**Middle Cover 3 – 5**
Camera Plate 6
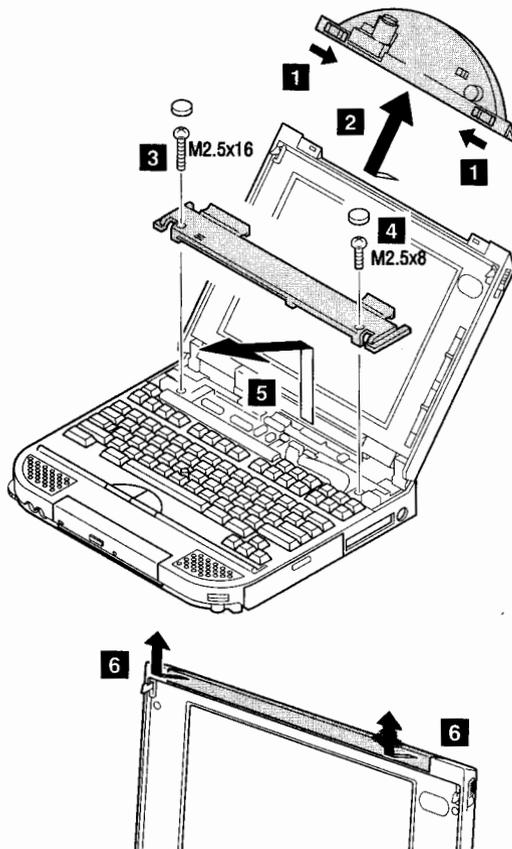
Note: 4 Do not use any screws longer than 8mm, otherwise the DC/DC card will be damaged.

1010 Center Cover Assembly, LED FPC

- Opening the Display Assembly (1000)
- Middle Cover (1005) 3 , 4

Center Cover Assembly 1 – 4
LED FPC 1 – 7

1015 Hinge Cap, Display Assembly

LCD FRU Replacement Notice

> **CAUTION**
>
> **The liquid crystal display (LCD) includes a fluorescent light that contains a small amount of mercury. Dispose of the LCD assembly as required by local ordinances or regulations.**
>
> **The LCD is made of glass, and rough handling or dropping the computer can cause the LCD to break. If the LCD breaks and the internal fluid gets into your eyes or on your hands, immediately wash the affected areas with water for at least 15 minutes; then get medical care if any symptoms are present after washing.**

If missing or discolored dots appear on the LCD, carefully read the following note to determine whether you should replace the LCD:

> **Important**
>
> A small number of missing, discolored, or lighted dots (on all the time) is characteristic of LCD technology, but excessive pixel problems can cause viewing concerns. The LCD should be replaced if the number of dots satisfies the following condition:
> * The number of missing, discolored, or colored dots in any colored background is 21 or more.

Note: When you need to clean the LCD, gently wipe the LCD with a dry, soft cloth. Do not use alcohol or detergent to clean the LCD.

To avoid damaging the LCD, do not scratch or apply any force to its surface.

* Opening the Display Assembly (1000)
* Middle Cover (1005) **3** , **4**
* Center Cover Assembly (1010) **1** – **4**

Hinge Cap 1
Display Assembly 1 – 6
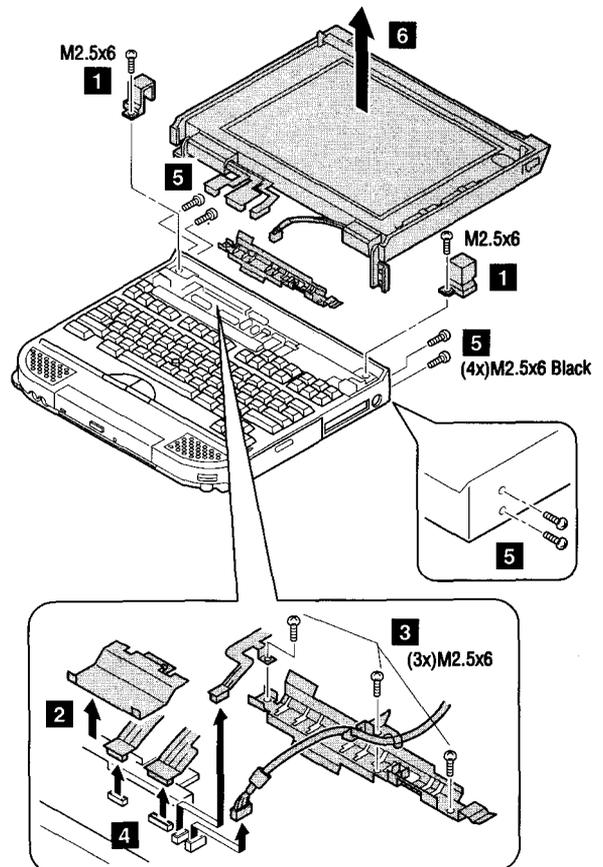
Display Bezel Assembly **1** , **2**
LCD Power Cable **1** – **4**
LCD Cable Assembly **1** – **5**
Display Assembly (TFT) **1** – **6**
Display Hinge **1** – **7**
Display Rear Cover Assembly **1** – **8**

- Opening the Display Assembly (1000)
- Middle Cover (1005) **3** , **4**
- Center Cover Assembly (1010) **1** – **4**

* Plastic Screw

(2x)M2.5x8

(2x)M2.5x6

(2x)M2.5x4
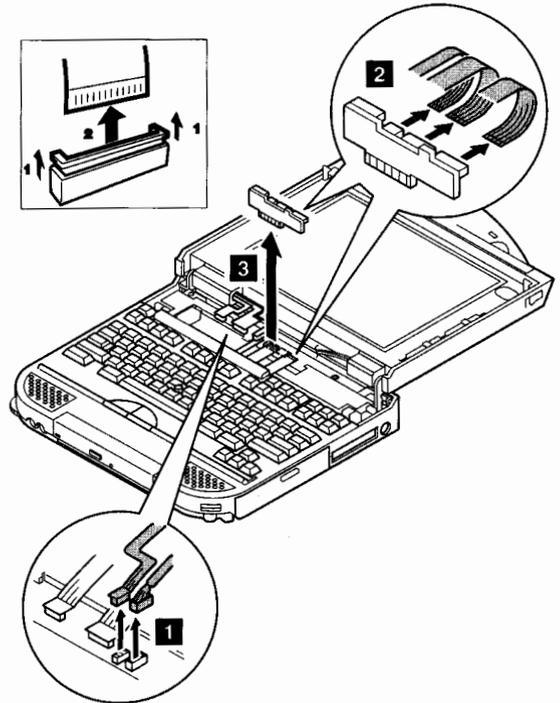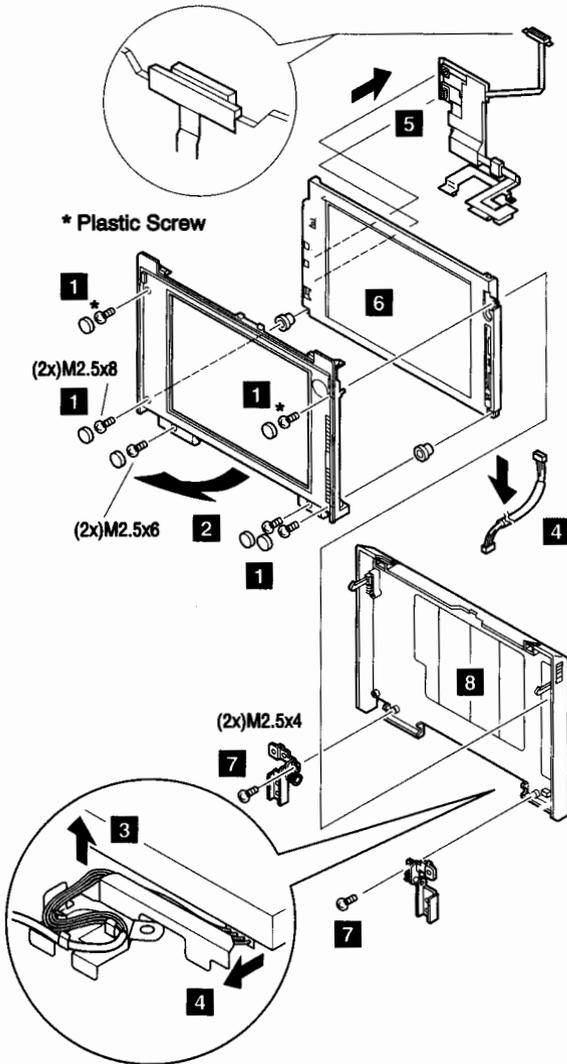
1025 Keyboard Assembly, Keyboard Latch

- Opening the Display Assembly (1000)
- Middle Cover (1005) **3** , **4**
- Center Cover Assembly (1010) **1** – **4**

Keyboard Assembly **1** – **3**
Keyboard Latch **1** – **4**
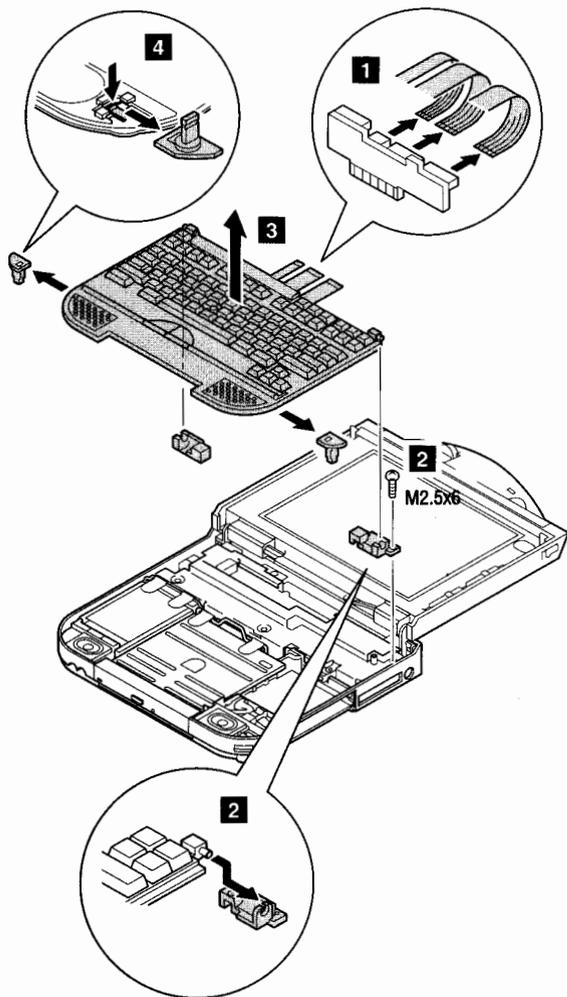
1030 Opening the Keyboard

- Opening the Display Assembly (1000)
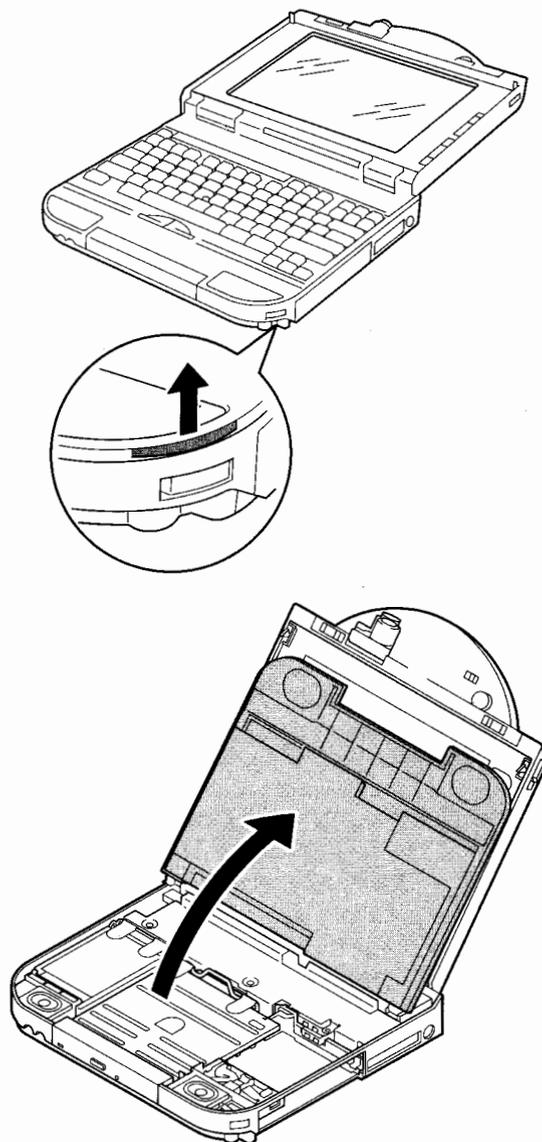
1035 HDD Assembly

- Opening the Display Assembly (1000)
- Opening the Keyboard (1030)
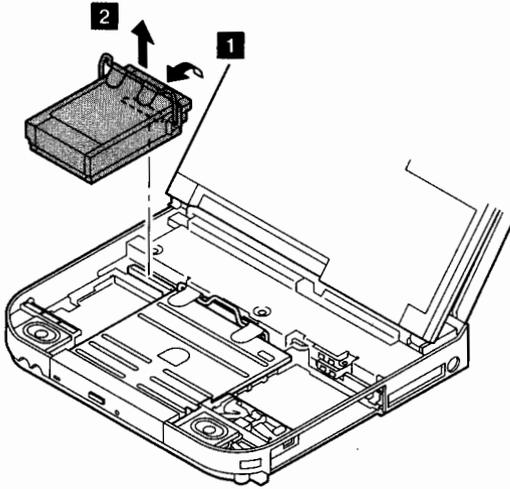
1040 FDD Assembly

- Opening the Display Assembly (1000)
- Opening the Keyboard (1030)

FDD Assembly **1**, **2**
FDD Bezel **1** – **4**
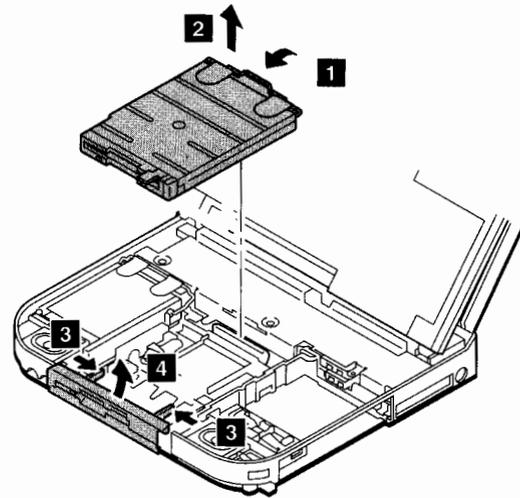
1045 CD-ROM Drive Assembly

- Opening the Display Assembly (1000)
- Opening the Keyboard (1030)
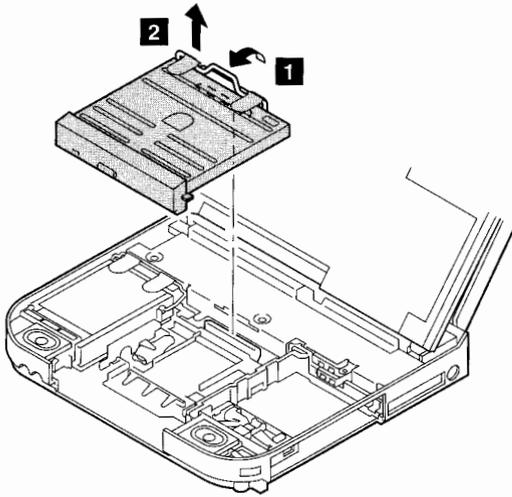
1050 Battery Pack, Door (Battery, ISA Bus)

Battery Door 1
Battery Pack 1 – 3
ISA Bus Door 4

CAUTION

Battery packs are capable of delivering high currents for a significant amount of time. Do not short-circuit the battery terminals.
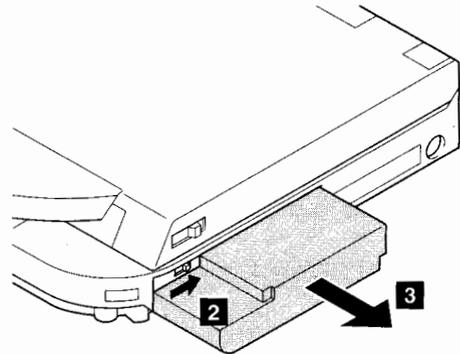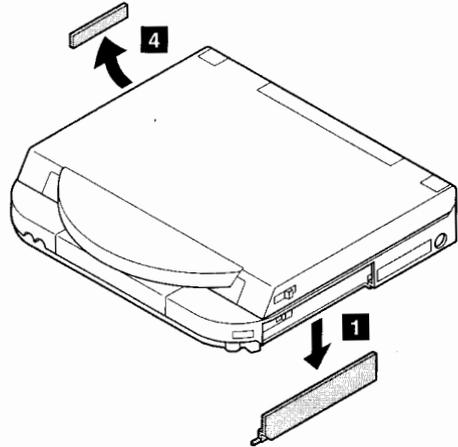
1055 Backup Battery, Standby Battery, IC Card

- Opening the Display Assembly (1000)
- Opening the Keyboard (1030)
- HDD Assembly (1035)
- FDD Assembly (1040)
- CD-ROM Drive Assembly (1045)

Backup Battery 1
Standby Battery 2
IC DRAM Card 3
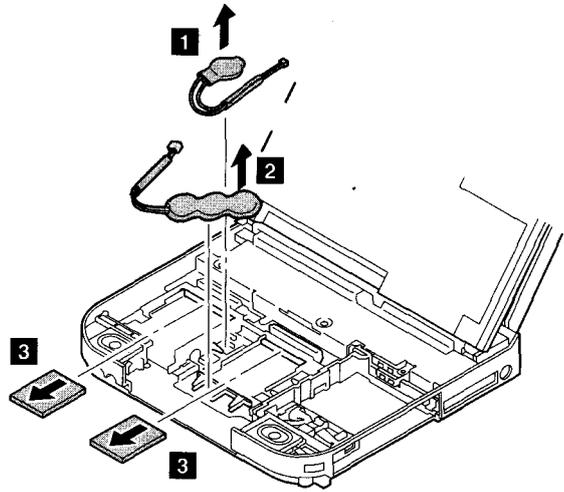
> ### CAUTION
>
> **The backup battery is a lithium battery and can cause a fire, explosion, or severe burn if not properly used or disposed of. Do not recharge it, disassemble it, heat it above 100°C (212°F), incinerate it, or expose its cell contents to water. Dispose of the battery as required by local ordinances or regulations. When replacing the battery, use the one that is available as a FRU. Use of a wrong battery could result in ignition or explosion of the battery. Replacement batteries can be ordered from IBM or IBM Authorized Dealers.**

> ### NOTE
>
> Real-time clock, configuration, and power-on password data will be lost when the backup battery is removed. Always reset this data after the battery has been replaced.
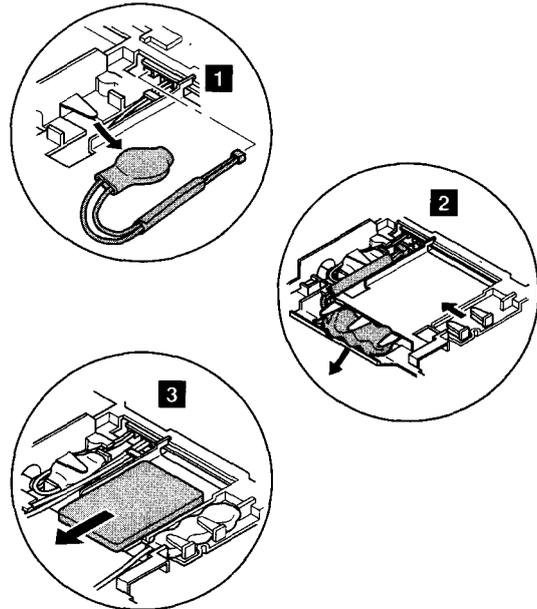
1060 PCMCIA Door

- Opening the Display Assembly (1000)
- Opening the Keyboard (1030)
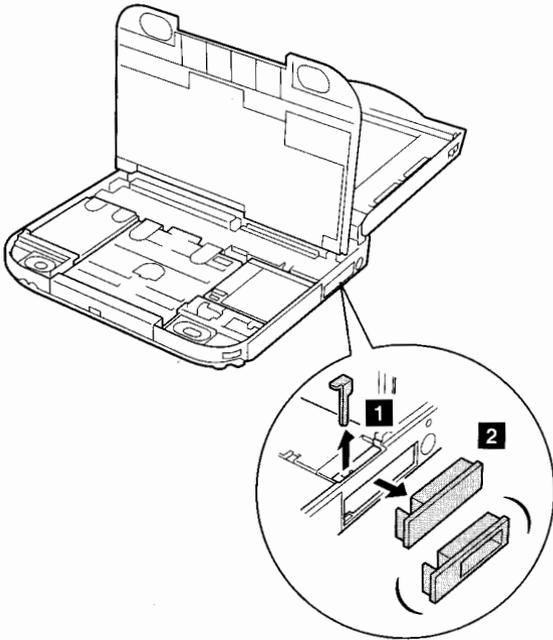
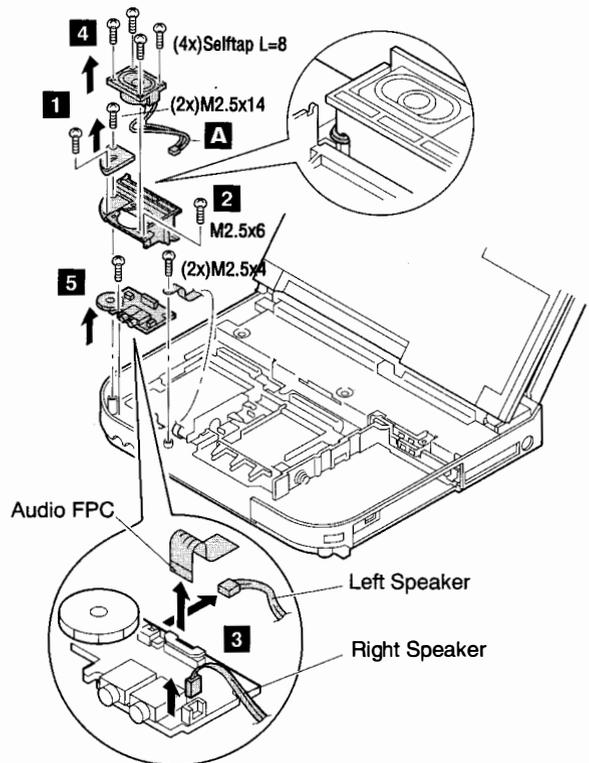## 1065 Speaker Assembly (Left), Sub-Audio Card, Speaker Bracket (Left), Keyboard Catch (Left)

- Opening the Display Assembly (1000)
- Opening the Keyboard (1030)
- HDD Assembly (1035)
- FDD Assembly (1040)
- CD-ROM Drive Assembly (1045)

Keyboard Catch (Left) **1**
Speaker Bracket (Left) **1** – **4**
Speaker Assembly (Left) **1** – **4**
Sub-Audio Card **1** – **5**

Note: **A** Do not pinch the cable when you install the speaker assembly.

1070 Speaker Assembly (Right), Speaker Bracket (Right), Keyboard Catch (Right)

- Opening the Display Assembly (1000)
- Opening the Keyboard (1030)
- HDD Assembly (1035)
- FDD Assembly (1040)
- CD-ROM Drive Assembly (1045)
- Battery Pack (1050) **1** – **3**
- Backup Battery, Standby Battery, IC Card (1055)
- Speaker Bracket (Left) (1065) **1** – **3**

Keyboard Catch (Right) **1**
Speaker Bracket (Right) **1** , **2**
Speaker Assembly (Right) **1** – **5**
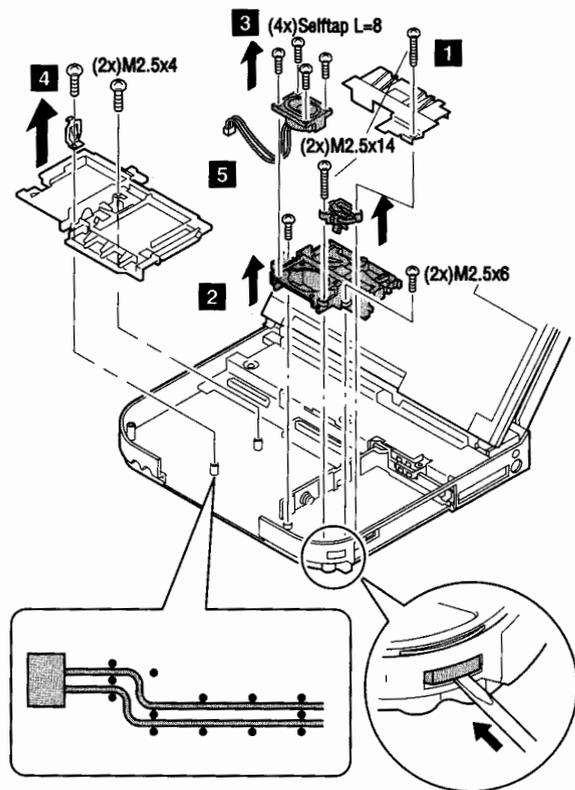
1075 Shield Assembly, Microphone Assembly

- Opening the Display Assembly (1000)
- Middle Cover (1005) **4** , **4**
- Center Cover Assembly (1010) **1** – **4**
- Interposer Card (1020) **1**
- Keyboard Assembly (1030) **1** – **4**
- HDD Assembly (1035)
- FDD Assembly (1040)
- CD-ROM Drive Assembly (1045)
- Hinge Cap, Display Assembly (1015)

Shield Assembly **1** , **2**
Microphone Assembly **1** – **4**
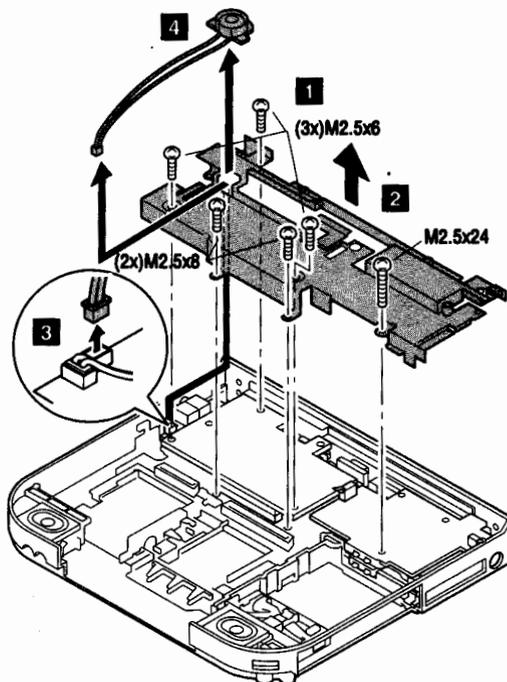
1080 DC/DC Card, Video Card

- Middle Cover (1005) **3** , **4**
- Center Cover Assembly (1010) **1** – **4**
- Interposer Card (1020) **1**
- Keyboard Assembly (1030) **1** – **4**
- HDD Assembly (1035)
- FDD Assembly (1040)
- CD-ROM Drive Assembly (1045)
- Hinge Cap, Display Assembly (1015)
- Shield Assembly, Microphone Assembly (1075)
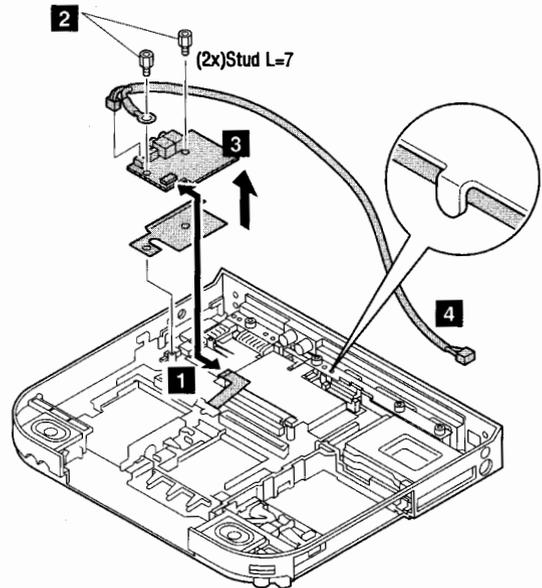
DC/DC Card 1 , **2**
Video Card 3 – **5**
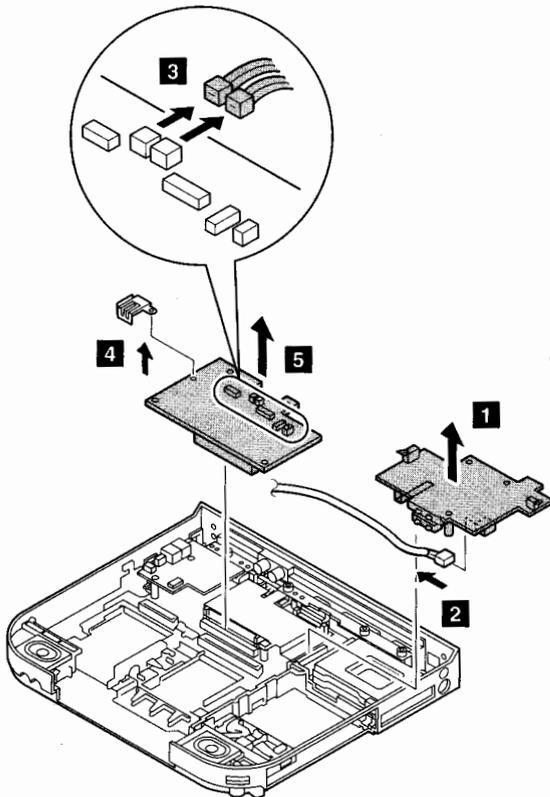
1085 Audio Card, Audio Cable

- Middle Cover (1005) **3** , **4**
- Center Cover Assembly (1010) **1** – **4**
- Interposer Card (1020) **1**
- Keyboard Assembly (1030) **1** – **4**
- HDD Assembly (1035)
- FDD Assembly (1040)
- CD-ROM Drive Assembly (1045)
- Hinge Cap, Display Assembly (1015)
- Shield Assembly, Microphone Assembly (1075)
- Video Card (1080) **2** , **3**
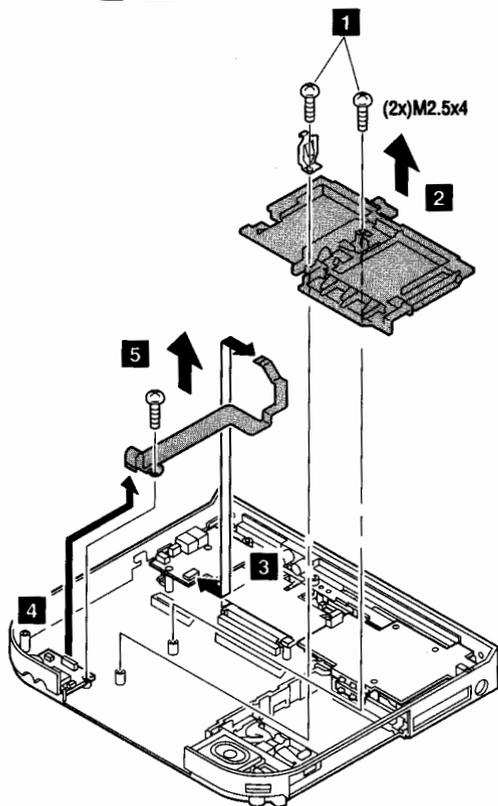
Audio Card 1 – **3**
Audio Cable 4

1090 Inner Structure Holder, Audio FPC
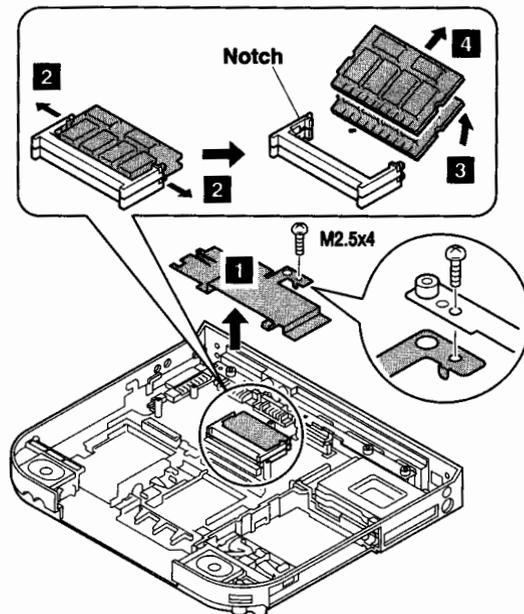
- Middle Cover (1005) **3** , **4**
- Center Cover Assembly (1010) **1** – **4**
- Interposer Card (1020) **1**
- Keyboard Assembly (1030) **1** – **4**
- HDD Assembly (1035)
- FDD Assembly (1040)
- CD-ROM Drive Assembly (1045)
- Backup Battery, Standby Battery, IC Card (1055)
- Hinge Cap, Display Assembly (1015)
- Shield Assembly, Microphone Assembly (1075)
- Video Card (1080) **2** , **3**
- Speaker Bracket (Left) (1065) **1** – **4**

Inner Structure Holder **1** , **2**
Audio FPC **1** – **5**

1095 Memory Card

- Middle Cover (1005) **3** , **4**
- Center Cover Assembly (1010) **1** – **4**
- Interposer Card (1020) **1**
- Keyboard Assembly (1030) **1** – **4**
- HDD Assembly (1035)
- FDD Assembly (1040)
- CD-ROM Drive Assembly (1045)
- Hinge Cap, Display Assembly (1015)
- Shield Assembly, Microphone Assembly (1075)
- Video Card (1080) **2** , **3**
- Audio Card (1085)

> **Memory Card**
>
> When you install a memory card, make sure the card is installed with the corner notch toward the left side; then check that both sides of the card are firmly latched.

1100 System Board

> **Serial Number**
>
> When you replace the system board, do not forget to change the serial number of the system board. Refer to "System Information" on page 22.

- CPU Card (1105)
- Middle Cover (1005) **3** , **4**
- Center Cover Assembly (1010) **1** – **4**
- Interposer Card (1020) **1**
- Keyboard Assembly (1030) **1** – **4**
- HDD Assembly (1035)
- FDD Assembly (1040)
- CD-ROM Drive Assembly (1045)
- Backup Battery, Standby Battery, IC Card (1055)
- Hinge Cap, Display Assembly (1015)
- Shield Assembly, Microphone Assembly (1075)
- DC/DC Card, Video Card (1080)
- Inner Structure Holder, Audio FPC (1090) **1** – **3**
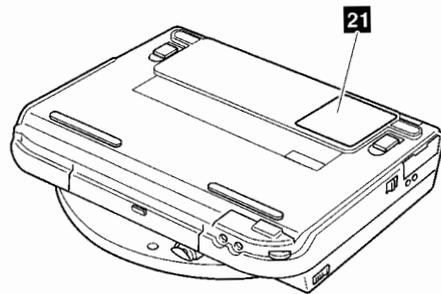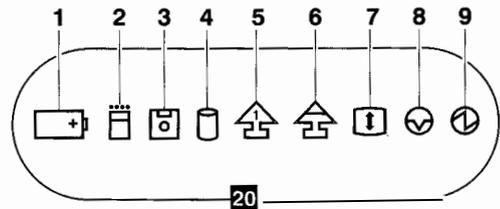- Audio Card (1085)
- Memory Card (1095)

1105 CPU Card

(9x)M2.5x4
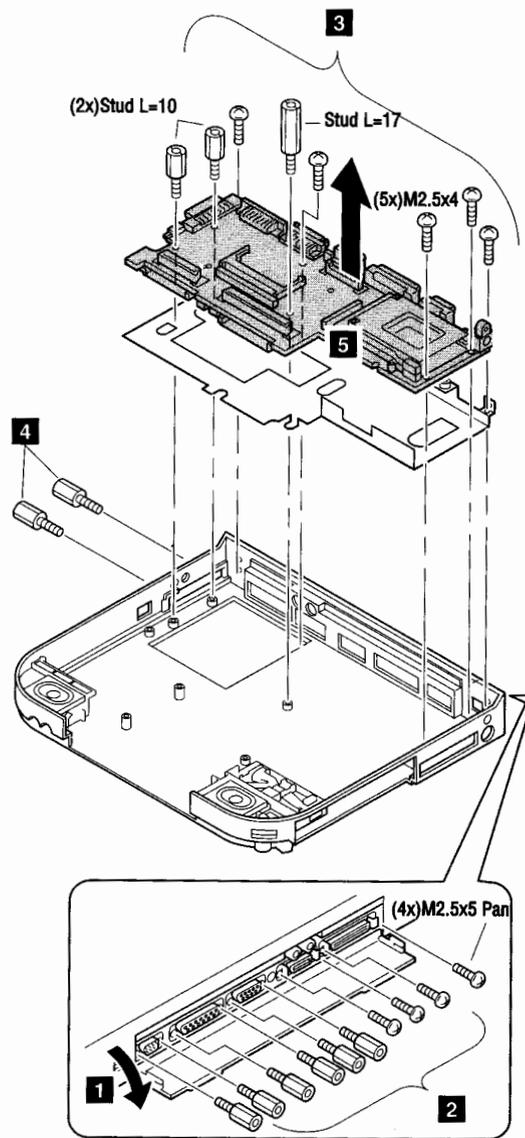
Locations

Rear Side View
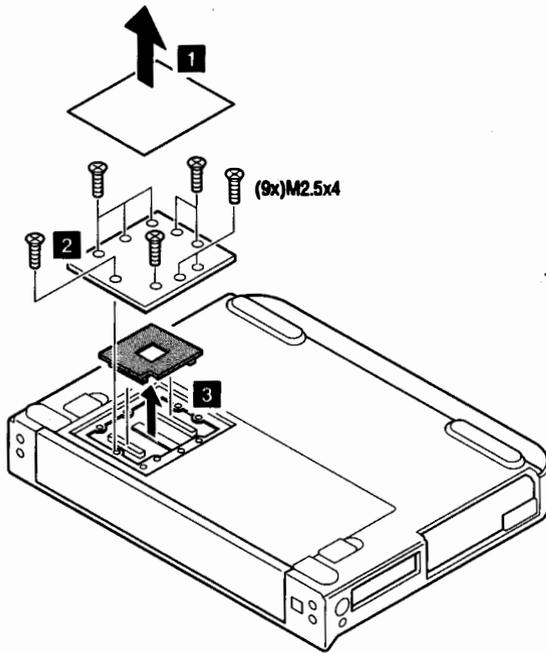
1. Video Camera
2. Cover Lock Latch
3. Power Switch
4. Audio-Out Jack
5. Audio-In Jack
6. ISA Bus Connector
7. SCSI-2 Connector
8. Video-Out Jack
9. Video-In Jack
10. External Diskette Drive Connector
11. Power Shutdown Switch
12. External Display Connector
13. Parallel Connector
14. Serial Connector
15. Power Jack Connector
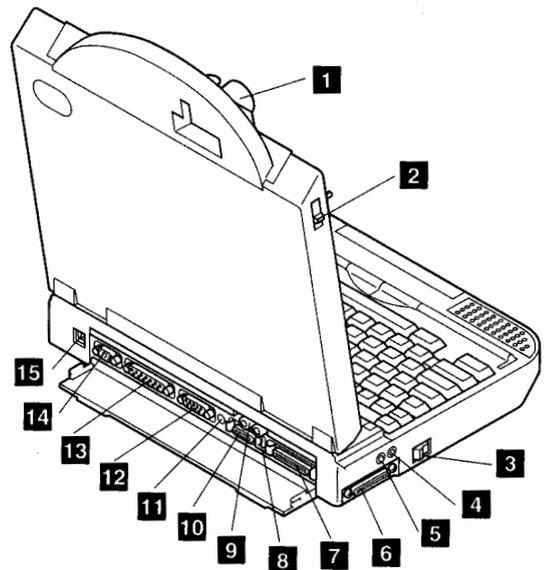
Front and Bottom View

1 Video Camera
2 Cover Lock Latch
3 Contrast Control Slide Switch
4 Brightness Control Slide Switch
5 LCD Screen
6 External Input-Device Connector
7 PCMCIA Slot
8 Battery Pack Door
9 Locking Lever
10 Speaker Right
11 CD-ROM Drive
12 Disk Eject Hole
13 Disk Eject Button
14 Microphone Jack
15 Headphone Jack
16 Audio Volume Control
17 Speaker Left
18 Pointing Click Buttons
19 Pointing Stick
20 LED

    1 Battery Power Status Light
    2 PC Card In-Use Light
    3 Diskette Drive In-Use Light
    4 Hard Disk Drive In-Use Light
    5 Numeric Lock Light
    6 Caps Lock Light
    7 Scroll Lock Light
    8 Suspend Mode Light
    9 Power-on Light

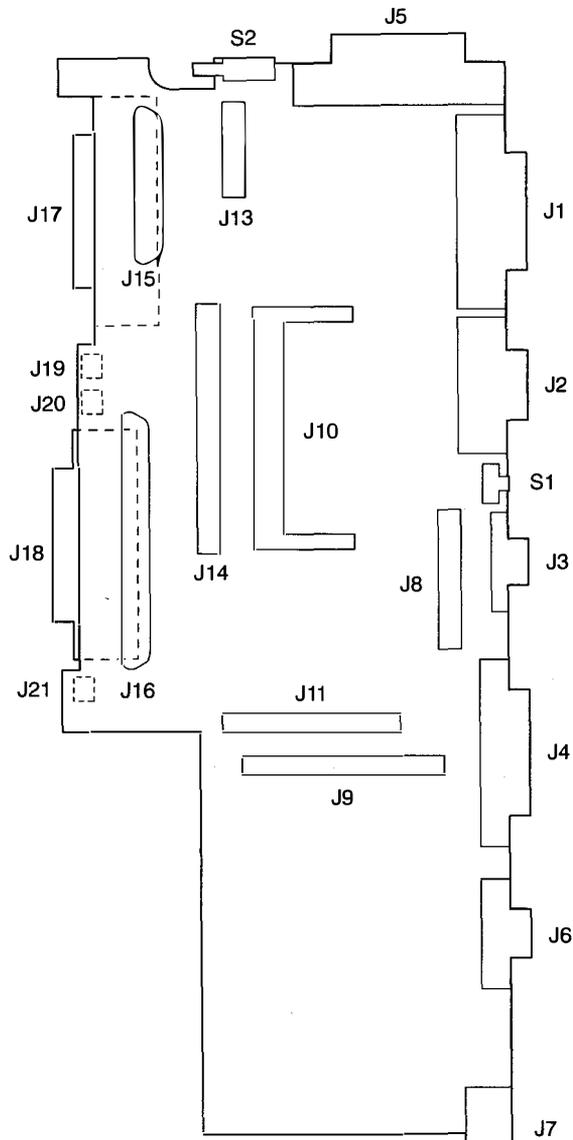**21** CPU Cover
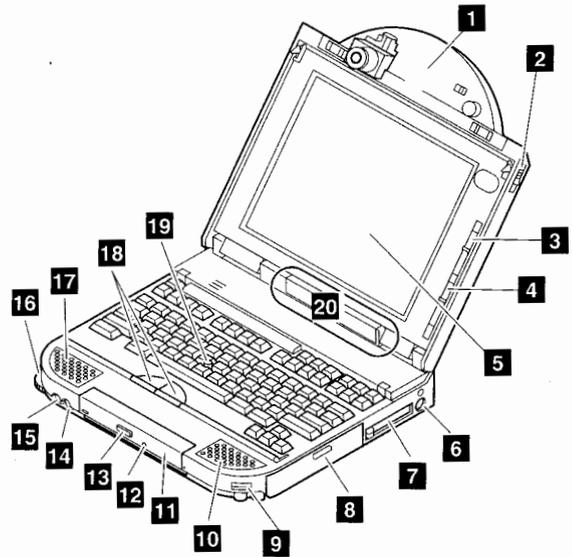
Inside View

1 LED FPC
2 Interposer Card
3 DC/DC Card
4 System Board
5 Battery Pack
6 Right Speaker
7 CD-ROM Drive
8 Standby Battery
9 Backup Battery
10 Sub Audio Card
11 Left Speaker
12 Hard Disk Drive
13 IC DRAM Card
14 Audio Card
15 Video Card
16 Memory Card

(This page is left blank intentionally.)
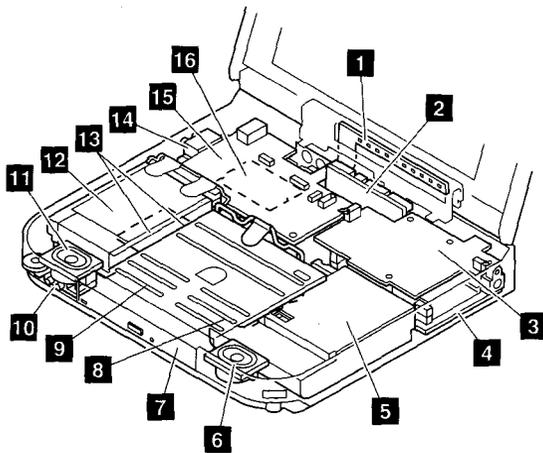
System Board Connectors

Connector	Device
S1	Power Shutdown Switch
S2	Power Switch
J1	SCSI-2 Connector
J2	External Diskette Drive Connector
J3	External Display Connector
J4	Parallel Connector
J5	ISA Bus Connector
J6	Serial Connector
J7	Keyboard/Mouse Connector
J8	Interposer Card
J9	PCMCIA Socket
J10	Base Memory Card
J11	DC/DC Card
J13	Audio Card
J14	Video Card
J15	Hard Disk Drive Connector
J16	Diskette/CD-ROM Drive Connector
J17	IC DRAM Socket 1
J18	IC DRAM Socket 2
J19	Backup Battery Connector
J20	Standby Battery Connector
J21	Password Override Pin