

IBM Mobile Systems

ThinkPad Computer  
Hardware Maintenance Manual

January 2000

**This manual supports:**

**ThinkPad 570 (MT 2643/2644)**

**ThinkPad 570E (MT 2643/2644)**

**Note**

Before using this information and the product it supports, be sure to read the general information under "Notices" on page 111.

**First Edition (January 2000)**

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## Introduction

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### Important Service Information

#### Important

Diskette fixes are customer installable. The diskette fixes are located on the PC Company Bulletin Board Service (BBS). The direct phone line for modem connection is 919-557-0001 or tieline 255-0001.

Advise customers to contact the PC Company HelpCenter at 800-772-2227 if they need assistance in obtaining or installing any diskette fixes.

Customers in Canada should call IBM HelpPC at 800-565-3344 for assistance or down-load information.

The Canadian BBS phone numbers are:

<b>Montreal</b>	514-938-3022
<b>Toronto</b>	905-316-4255
<b>Vancouver</b>	604-664-6464
<b>Winnipeg</b>	204-934-2735

### FRU Replacement Strategy

#### Before Replacing Parts

Ensure that all diskette fixes are installed prior to replacing any FRUs listed in this manual.

Use the following strategy to prevent unnecessary FRU replacement and service expense:

- **If you are instructed to replace a FRU and that does not correct the problem, reinstall the original FRU before you continue.**
- Some computers have both a processor board and a system board. If you are instructed to replace either the processor board or the system board, and the first board that you replaced does not correct the problem, reinstall the original board, then replace the other (processor or system) board.
- 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. Replace only the FRU that changed the symptoms.

**Attention**

A customized setup configuration (other than default settings) may exist on the computer you are servicing. Running Automatic Configuration may alter those settings. Note the current configuration settings (using the View Configuration option) and verify that the settings are in place when service is complete.

**Hard Disk Drive Replacement Strategy:**

Always try to run a low-level format before replacing a hard disk drive.

**Attention**

The drive startup sequence in the computer you are servicing might have been changed. Be extremely careful during write operations such as copying, saving, or formatting. Data or programs can be overwritten if you select an incorrect drive.

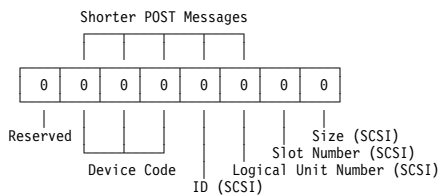
**How to Use Error Messages**

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 for the computer you are servicing.

**How to Read POST Error Messages**

POST error messages are displayed on the screen as three, four, five, or eight digits. The error messages that can be displayed as shorter POST messages are highlighted in this index. Some digits will represent different information for SCSI errors versus non-SCSI errors.

The following example shows which digits display the shorter POST error messages and also defines the SCSI information in an eight-digit error message.



All SCSI devices are set to a different SCSI ID. Duplicate SCSI ID settings can generate a false error message. Use the SCSI ID to determine whether the error message is coming from an internal or an external device.

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## Drive and Diskette Compatibility Matrix

The following table provides identification information for 3.5-inch drives.

Diskette Drive	Identifying Mark
3.5-Inch - 1.44MB	1.44 on the eject button
3.5-Inch - 2.88MB	2.88 on the eject button

The following table provides compatibility information for 3.5-inch diskettes and 3.5-inch diskette drives.

Diskette Capacity	1.44MB Drive	2.88MB Drive
1.0MB	Read/Write	Read/Write
2.0MB	Read/Write	Read/Write
4.0MB	Not Compatible	Read/Write

The following table provides identification information for 5.25-inch diskette drives.

Diskette Drive	Identifying Mark
5.25-Inch - 360KB (External)	Asterisk on bezel
5.25-Inch - 1.2MB (Internal)	1.2 on the eject button

The following table provides compatibility information for 5.25-inch diskettes and 5.25-inch diskette drives.

Diskette Capacity	360KB Drive	1.2MB Drive
360KB	Read/Write	Read/Write
1.2MB	Not Compatible	Read/Write

**Note:** A 360KB diskette written to or formatted on a 1.2MB drive can be read reliably only on a 1.2MB drive.

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## Safety Notices (Multi-lingual Translations)

In this manual, safety notices appear in English with a page number reference to the appropriate multi-lingual, translated safety notice found in this section.

The following safety notices are provided in English, French, German, Italian, and Spanish languages.

### Safety Notice 1

Before the computer is powered-on after FRU replacement, make sure all screws, springs, or other small parts are in place and are not left loose inside the computer. Verify this by shaking the computer and listening for rattling sounds. Metallic parts or metal flakes can cause electrical shorts.

Avant de remettre l'ordinateur sous tension après remplacement d'une unité en clientèle, vérifiez que tous les ressorts, vis et autres pièces sont bien en place et bien fixées. Pour ce faire, secouez l'unité et assurez-vous qu'aucun bruit suspect ne se produit. Des pièces métalliques ou des copeaux de métal pourraient causer un court-circuit.

Bevor nach einem FRU-Austausch der Computer wieder angeschlossen wird, muß sichergestellt werden, daß keine Schrauben, Federn oder andere Kleinteile fehlen oder im Gehäuse vergessen wurden. Der Computer muß geschüttelt und auf Klappergeräusche geprüft werden. Metallteile oder -splitter können Kurzschlüsse erzeugen.

Prima di accendere l'elaboratore dopo che é stata effettuata la sostituzione di una FRU, accertarsi che tutte le viti, le molle e tutte le altri parti di piccole dimensioni siano nella corretta posizione e non siano sparse all'interno dell'elaboratore. Verificare ciò scuotendo l'elaboratore e prestando attenzione ad eventuali rumori; eventuali parti o pezzetti metallici possono provocare cortocircuiti pericolosi.

Antes de encender el sistema despues de sustituir una FRU, compruebe que todos los tornillos, muelles y demás piezas pequeñas se encuentran en su sitio y no se encuentran sueltas dentro del sistema. Compruébelo agitando el sistema y escuchando los posibles ruidos que provocarían. Las piezas metálicas pueden causar cortocircuitos eléctricos.



## Safety Notice 2

Some standby batteries contain a small amount of nickel and cadmium. Do not disassemble it, recharge it, throw it into fire or water, or short-circuit it. Dispose of the battery as required by local ordinances or regulations. Use only the battery in the appropriate parts listing. Use of an incorrect battery can result in ignition or explosion of the battery.

Certaines batteries de secours contiennent du nickel et du cadmium. Ne les démontez pas, ne les rechargez pas, ne les exposez ni au feu ni à l'eau. Ne les mettez pas en court-circuit. Pour les mettre au rebut, conformez-vous à la réglementation en vigueur. Lorsque vous remplacez la pile de sauvegarde ou celle de l'horloge temps réel, veillez à n'utiliser que les modèles cités dans la liste de pièces détachées adéquate. Une batterie ou une pile inappropriée risque de prendre feu ou d'exploser.

Die Bereitschaftsbatterie, die sich unter dem Diskettenlaufwerk befindet, kann geringe Mengen Nickel und Cadmium enthalten. Sie darf nur durch die Verkaufsstelle oder den IBM Kundendienst ausgetauscht werden. Sie darf nicht zerlegt, wiederaufgeladen, kurzgeschlossen, oder Feuer oder Wasser ausgesetzt werden. Die Batterie kann schwere Verbrennungen oder Verätzungen verursachen. Bei der Entsorgung die örtlichen Bestimmungen für Sondermüll beachten. Beim Ersetzen der Bereitschafts- oder Systembatterie nur Batterien des Typs verwenden, der in der Ersatzteilliste aufgeführt ist. Der Einsatz falscher Batterien kann zu Entzündung oder Explosion führen.

Alcune batterie di riserva contengono una piccola quantità di nichel e cadmio. Non smontarle, ricaricarle, gettarle nel fuoco o nell'acqua né cortocircuitarle. Smaltirle secondo la normativa in vigore (DPR 915/82, successive disposizioni e disposizioni locali). Quando si sostituisce la batteria dell'RTC (real time clock) o la batteria di supporto, utilizzare soltanto i tipi inseriti nell'appropriato Catalogo parti. L'impiego di una batteria non adatta potrebbe determinare l'incendio o l'esplosione della batteria stessa.

Algunas baterías de reserva contienen una pequeña cantidad de níquel y cadmio. No las desmonte, ni recargue, ni las eche al fuego o al agua ni las cortocircuite. Deséchelas tal como dispone la normativa local. Utilice sólo baterías que se encuentren en la lista de piezas. La utilización de una batería no apropiada puede provocar la ignición o explosión de la misma.

### Safety Notice 3

The battery pack contains small amounts of nickel. 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. Use only the battery in the appropriate parts listing when replacing the battery pack. Use of an incorrect battery can result in ignition or explosion of the battery.

La batterie contient du nickel. Ne la démontez pas, ne l'exposez ni au feu ni à l'eau. Ne la mettez pas en court-circuit. Pour la mettre au rebut, conformez-vous à la réglementation en vigueur. Lorsque vous remplacez la batterie, veillez à n'utiliser que les modèles cités dans la liste de pièces détachées adéquate. En effet, une batterie inappropriée risque de prendre feu ou d'exploser.

Akkus enthalten geringe Mengen von Nickel. Sie dürfen nicht zerlegt, wiederaufgeladen, kurzgeschlossen, oder Feuer oder Wasser ausgesetzt werden. Bei der Entsorgung die örtlichen Bestimmungen für Sondermüll beachten. Beim Ersetzen der Batterie nur Batterien des Typs verwenden, der in der Ersatzteilliste aufgeführt ist. Der Einsatz falscher Batterien kann zu Entzündung oder Explosion führen.

La batteria contiene piccole quantità di nichel. Non smontarla, gettarla nel fuoco o nell'acqua né cortocircuitarla. Smaltirla secondo la normativa in vigore (DPR 915/82, successive disposizioni e disposizioni locali). Quando si sostituisce la batteria, utilizzare soltanto i tipi inseriti nell'appropriato Catalogo parti. L'impiego di una batteria non adatta potrebbe determinare l'incendio o l'esplosione della batteria stessa.

Las baterías contienen pequeñas cantidades de níquel. No las desmonte, ni recargue, ni las eche al fuego o al agua ni las cortocircuite. Deséchelas tal como dispone la normativa local. Utilice sólo baterías que se encuentren en la lista de piezas al sustituir la batería. La utilización de una batería no apropiada puede provocar la ignición o explosión de la misma.

#### Safety Notice 4

The lithium battery can cause a fire, explosion, or severe burn. 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. Use only the battery in the appropriate parts listing. Use of an incorrect battery can result in ignition or explosion of the battery.

La pile de sauvegarde contient du lithium. Elle présente des risques d'incendie, d'explosion ou de brûlures graves. Ne la rechargez pas, ne retirez pas son connecteur polarisé et ne la démontez pas. Ne l'exposez pas à une température supérieure à 100°C, ne la faites pas brûler et n'en exposez pas le contenu à l'eau. Mettez la pile au rebut conformément à la réglementation en vigueur. Une pile inappropriée risque de prendre feu ou d'exploser.

Die Systematterie ist eine Lithiumatterie. Sie kann sich entzünden, explodieren oder schwere Verbrennungen hervorrufen. Batterien dieses Typs dürfen nicht aufgeladen, zerlegt, über 100 C erhitzt oder verbrannt werden. Auch darf ihr Inhalt nicht mit Wasser in Verbindung gebracht oder der zur richtigen Polung angebrachte Verbindungsstecker entfernt werden. Bei der Entsorgung die örtlichen Bestimmungen für Sondermüll beachten. Beim Ersetzen der Batterie nur Batterien des Typs verwenden, der in der Ersatzteilliste aufgeführt ist. Der Einsatz falscher Batterien kann zu Entzündung oder Explosion führen.

La batteria di supporto è una batteria al litio e può incendiarsi, esplodere o procurare gravi ustioni. Evitare di ricaricarla, smontarne il connettore polarizzato, smontarla, riscaldarla ad una temperatura superiore ai 100 gradi centigradi, incendiarla o gettarla in acqua. Smaltirla secondo la normativa in vigore (DPR 915/82, successive disposizioni e disposizioni locali). L'impiego di una batteria non adatta potrebbe determinare l'incendio o l'esplosione della batteria stessa.

La batería de repuesto es una batería de litio y puede provocar incendios, explosiones o quemaduras graves. No la recargue, ni quite el conector polarizado, ni la desmonte, ni caliente por encima de los 100°C (212°F), ni la incinere ni exponga el contenido de sus celdas al agua. Deséchela tal como dispone la normativa local.

#### Safety Notice 5

If the LCD breaks and the fluid from inside the LCD gets into your eyes or on your hands, immediately wash the affected areas with water for at least 15 minutes. Seek medical care if any symptoms from the fluid are present after washing.

Si le panneau d'affichage à cristaux liquides se brise et que vous recevez dans les yeux ou sur les mains une partie du fluide, rincez-les abondamment pendant au moins quinze minutes. Consultez un médecin si des symptômes persistent après le lavage.

Die Leuchtstoffröhre im LCD-Bildschirm enthält Quecksilber. Bei der Entsorgung die örtlichen Bestimmungen für Sondermüll beachten. Der LCD-Bildschirm besteht aus Glas und kann zerbrechen, wenn er unsachgemäß behandelt wird oder der Computer auf den Boden fällt. Wenn der Bildschirm beschädigt ist und die darin befindliche Flüssigkeit in Kontakt mit Haut und Augen gerät, sollten die betroffenen Stellen mindestens 15 Minuten mit Wasser abgespült und bei Beschwerden anschließend ein Arzt aufgesucht werden.

Nel caso che caso l'LCD si dovesse rompere ed il liquido in esso contenuto entrasse in contatto con gli occhi o le mani, lavare immediatamente le parti interessate con acqua corrente per almeno 15 minuti; poi consultare un medico se i sintomi dovessero permanere.

Si la LCD se rompe y el fluido de su interior entra en contacto con sus ojos o sus manos, lave inmediatamente las áreas afectadas con agua durante 15 minutos como mínimo. Obtenga atención medica si se presenta algún síntoma del fluido despues de lavarse.

#### Safety Notice 6

To avoid shock, do not remove the plastic cover that surrounds the lower portion of the inverter card.

Afin d'éviter tout risque de choc électrique, ne retirez pas le cache en plastique protégeant la partie inférieure de la carte d'alimentation.

Aus Sicherheitsgründen die Kunststoffabdeckung, die den unteren Teil der Spannungswandlerplatine umgibt, nicht entfernen.

Per evitare scosse elettriche, non rimuovere la copertura in plastica che avvolge la parte inferiore della scheda invertitore.

Para evitar descargas, no quite la cubierta de plástico que rodea la parte baja de la tarjeta invertida.

#### Safety Notice 7

Though main batteries have low voltage, a shorted or grounded battery can produce enough current to burn combustible materials or personnel.

Bien que le voltage des batteries principales soit peu élevé, le court-circuit ou la mise à la masse d'une batterie peut produire suffisamment de courant pour brûler des matériaux combustibles ou causer des brûlures corporelles graves.

Obwohl Hauptbatterien eine niedrige Spannung haben, können sie doch bei Kurzschluß oder Erdung genug Strom abgeben, um brennbare Materialien zu entzünden oder Verletzungen bei Personen hervorzurufen.

Sebbene le batterie di alimentazione siano a basso voltaggio, una batteria in corto circuito o a massa può fornire corrente sufficiente da bruciare materiali combustibili o provocare ustioni ai tecnici di manutenzione.

Aunque las baterías principales tienen un voltaje bajo, una batería cortocircuitada o con contacto a tierra puede producir la corriente suficiente como para quemar material combustible o provocar quemaduras en el personal.

#### **Safety Notice 8**

Before removing any FRU, power-off the computer, unplug all power cords from electrical outlets, remove the battery pack, then disconnect any interconnecting cables.

Avant de retirer une unité remplaçable en clientèle, mettez le système hors tension, débranchez tous les cordons d'alimentation des socles de prise de courant, retirez la batterie et déconnectez tous les cordons d'interface.

Die Stromzufuhr muß abgeschaltet, alle Stromkabel aus der Steckdose gezogen, der Akku entfernt und alle Verbindungskabel abgenommen sein, bevor eine FRU entfernt wird.

Prima di rimuovere qualsiasi FRU, spegnere il sistema, scollegare dalle prese elettriche tutti i cavi di alimentazione, rimuovere la batteria e poi scollegare i cavi di interconnessione.

Antes de quitar una FRU, apague el sistema, desenchufe todos los cables de las tomas de corriente eléctrica, quite la batería y, a continuación, desconecte cualquier cable de conexión entre dispositivos.

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## Safety Information

The following section contains the safety information that you need to be familiar with before servicing an IBM mobile computer.

### General Safety

Follow these rules to ensure general safety:

- Observe good housekeeping in the area of the machines during and after maintenance.
- When lifting any heavy object:
  1. Ensure you can stand safely without slipping.
  2. Distribute the weight of the object equally between your feet.
  3. Use a slow lifting force. Never move suddenly or twist when you attempt to lift.
  4. Lift by standing or by pushing up with your leg muscles; this action removes the strain from the muscles in your back. *Do not attempt to lift any objects that weigh more than 16 kg (35 lb) or objects that you think are too heavy for you.*
- Do not perform any action that causes hazards to the customer, or that makes the equipment unsafe.
- Before you start the machine, ensure that other service representatives and the customer's personnel are not in a hazardous position.
- Place removed covers and other parts in a safe place, away from all personnel, while you are servicing the machine.
- Keep your tool case away from walk areas so that other people will not trip over it.
- Do not wear loose clothing that can be trapped in the moving parts of a machine. Ensure that your sleeves are fastened or rolled up above your elbows. If your hair is long, fasten it.
- Insert the ends of your necktie or scarf inside clothing or fasten it with a nonconductive clip, approximately 8 centimeters (3 inches) from the end.
- Do not wear jewelry, chains, metal-frame eyeglasses, or metal fasteners for your clothing.  
**Attention:** Metal objects are good electrical conductors.
- Wear safety glasses when you are: hammering, drilling soldering, cutting wire, attaching springs, using solvents, or working in any other conditions that might be hazardous to your eyes.
- After service, reinstall all safety shields, guards, labels, and ground wires. Replace any safety device that is worn or defective.
- Reinstall all covers correctly before returning the machine to the customer.

## Electrical Safety

Observe the following rules when working on electrical equipment.

### Important

Use only approved tools and test equipment. Some hand tools have handles covered with a soft material that does not insulate you when working with live electrical currents.

Many customers have, near their equipment, rubber floor mats that contain small conductive fibers to decrease electrostatic discharges. Do not use this type of mat to protect yourself from electrical shock.

- Find the room emergency power-off (EPO) switch, disconnecting switch, or electrical outlet. If an electrical accident occurs, you can then operate the switch or unplug the power cord quickly.
- Do not work alone under hazardous conditions or near equipment that has hazardous voltages.
- Disconnect all power before:
  - Performing a mechanical inspection
  - Working near power supplies
  - Removing or installing main units
- Before you start to work on the machine, unplug the power cord. If you cannot unplug it, ask the customer to power-off the wall box that supplies power to the machine and to lock the wall box in the off position.
- If you need to work on a machine that has *exposed* electrical circuits, observe the following precautions:
  - Ensure that another person, familiar with the power-off controls, is near you.

**Attention:** Another person must be there to switch off the power, if necessary.
  - Use only one hand when working with powered-on electrical equipment; keep the other hand in your pocket or behind your back.

**Attention:** There must be a complete circuit to cause electrical shock. By observing the above rule, you may prevent a current from passing through your body.
  - When using testers, set the controls correctly and use the approved probe leads and accessories for that tester.
  - Stand on suitable rubber mats (obtained locally, if necessary) to insulate you from grounds such as metal floor strips and machine frames.

Observe the special safety precautions when you work with very high voltages; these instructions are in the safety sections of maintenance information. Use extreme care when measuring high voltages.



- Regularly inspect and maintain your electrical hand tools for safe operational condition.
- Do not use worn or broken tools and testers.
- *Never assume* that power has been disconnected from a circuit. First, *check* that it has been powered-off.
- Always look carefully for possible hazards in your work area. Examples of these hazards are moist floors, nongrounded power extension cables, power surges, and missing safety grounds.
- Do not touch live electrical circuits with the reflective surface of a plastic dental mirror. The surface is conductive; such touching can cause personal injury and machine damage.
- Do not service the following parts *with the power on* when they are removed from their normal operating places in a machine:
  - Power supply units
  - Pumps
  - Blowers and fans
  - Motor generators
 and similar units. (This practice ensures correct grounding of the units.)
- If an electrical accident occurs:
  - **Use caution; do not become a victim yourself.**
  - **Switch off power.**
  - **Send another person to get medical aid.**

## Safety Inspection Guide

The intent of this inspection guide is to assist you in identifying potentially unsafe conditions on these products. Each machine, 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 any unsafe conditions are present, you must determine how serious the apparent hazard could be 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 damaged CRT face or bulging capacitor
- Mechanical hazards, such as loose or missing hardware

The guide consists of a series of steps presented in a checklist. Begin the checks with the power off, and the power cord disconnected.

Checklist:

1. Check exterior covers for damage (loose, broken, or sharp edges).
2. Power-off the computer. Disconnect the power cord.
3. Check the power cord for:
  - a. A third-wire ground connector 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 power cord should be the appropriate type as specified in the parts listings.
  - c. 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-supply cover fasteners (screws or rivets) have not been removed or tampered with.

## Handling Electrostatic Discharge-Sensitive Devices

Any computer part containing transistors or integrated circuits (ICs) should be considered sensitive to electrostatic discharge (ESD). ESD damage can occur when there is a difference in charge between objects. Protect against ESD damage by equalizing the charge so that the machine, the part, the work mat, and the person handling the part are all at the same charge.

### Notes

1. Use product-specific ESD procedures when they exceed the requirements noted here.
2. Make sure that the ESD protective devices you use have been certified (ISO 9000) as fully effective.

When handling ESD-sensitive parts:

- Keep the parts in protective packages until they are inserted into the product.
- Avoid contact with other people.
- Wear a grounded wrist strap against your skin to eliminate static on your body.
- Prevent the part from touching your clothing. Most clothing is insulative and retains a charge even when you are wearing a wrist strap.
- Use the black side of a grounded work mat to provide a static-free work surface. The mat is especially useful when handling ESD-sensitive devices.
- Select a grounding system, such as those listed below, to provide protection that meets the specific service requirement.

### Note

The use of a grounding system is desirable but not required to protect against ESD damage.

- Attach the ESD ground clip to any frame ground, ground braid, or green-wire ground.
- Use an ESD common ground or reference point when working on a double-insulated or battery-operated system. You can use coax or connector-outside shells on these systems.
- Use the round ground-prong of the AC plug on AC-operated computers.

## Grounding Requirements

Electrical grounding of the computer is required for operator safety and correct system function. Proper grounding of the electrical outlet can be verified by a certified electrician.

---

## Laser compliance statement

Some IBM Personal Computer models are equipped from the factory with a CD-ROM drive. CD-ROM drives are also sold separately as options. The CD-ROM drive is a laser product. The CD-ROM drive is certified in the U.S. to conform to the requirements of the Department of Health and Human Services 21 Code of Federal Regulations (DHHS 21 CFR) Subchapter J for Class 1 laser products. Elsewhere, the drive is certified to conform to the requirements of the International Electrotechnical Commission (IEC) 825 and CENELEC EN 60 825 for Class 1 laser products.

When a CD-ROM drive is installed, note the following.



### CAUTION:

**Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

**O uso de controles, ajustes ou desempenho de procedimentos diferentes daqueles aqui especificados pode resultar em perigosa exposição à radiação.**

凡未在这里指明的任何控制用法、调整、行为，都会导致严重后果。

**Pour éviter tout risque d'exposition au rayon laser, respectez les consignes de réglage et d'utilisation des commandes, ainsi que les procédures décrites.**

**Werden Steuer- und Einstellelemente anders als hier festgesetzt verwendet, kann gefährliche Laserstrahlung auftreten.**

Az itt előírt eljárásoktól, beállítástól és vezérlésektől eltérni a lézersugárzás veszélye miatt kockázatos !

**L'utilizzo di controlli, regolazioni o l'esecuzione di procedure diverse da quelle specificate possono provocare l'esposizione a**

**Использование элементов настройки и выполнение процедур иных, чем указано здесь, может привести к опасному радиационному облучению.**

Použitie kontrol, úprav alebo iných vykonaní od iných výrobcov, ako je v tomto špecifikované, mohlo by mať za následok nebezpečenstvo vystavenia sa vyžiarovaniu.

**El uso de controles o ajustes o la ejecución de procedimientos distintos de los aquí especificados puede provocar la exposición a radiaciones peligrosas.**

Opening the CD-ROM drive could result in exposure to hazardous laser radiation. There are no serviceable parts inside the CD-ROM drive. **Do not open.**

Some CD-ROM drives contain an embedded Class 3A or Class 3B laser diode. Note the following.

**DANGER:**

**Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.**

**Radiação por raio laser ao abrir. Não olhe fixo no feixe de luz, não olhe diretamente por meio de instrumentos óticos e evite exposição direta com o feixe de luz.**

开启时会有激光发射时，请勿盯视激光光束，请勿直接查看视觉仪器，并且避免直接接触在激光光束之中。

**Rayonnement laser si carter ouvert. Évitez de fixer le faisceau, de le regarder directement avec des instruments optiques, ou de vous exposer au rayon.**

**Laserstrahlung bei geöffnetem Gerät. Nicht direkt oder über optische Instrumente in den Laserstrahl sehen und den Strahlungsbereich meiden.**

**Kinyitáskor lézersugár ! Ne nézzen bele se szabad szemmel, se optikai eszközökkel. Kerülje a sugárnyalábbal való érintkezést !**

**Aprondo l'unità vengono emesse radiazioni laser. Non fissare il fascio, non guardarlo direttamente con strumenti ottici e evitare l'esposizione diretta al fascio.**

Открывая, берегитесь лазерного излучения. Не смотрите на луч, не разглядывайте его с помощью оптических инструментов, а также избегайте прямого воздействия лазерного луча.

Keď je laserová jednotka otvorená. Vyhňte sa priamemu pohľadu a nehládte priamo s optickými nástrojmi do lúča a vyhňte sa priamemu vystaveniu lúčov.

**Radiación láser al abrir. No mire fijamente ni examine con instrumental óptico el haz de luz. Evite la exposición directa al haz.**



*Read this first*

---

## General descriptions

This chapter includes descriptions for any ThinkPad model that has the PC-Doctor DOS diagnostics program. Some descriptions might not apply to your particular computer.

---

### 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.**
- **Read the entire FRU removal and replacement page before replacing any FRU.**
- **Use new nylon-coated screws when you replace FRUs.**
- **Be extremely careful during such write operations 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 might be overwritten.
- **Replace FRUs only for the correct model.** When you replace a FRU, make sure the model of the machine and the FRU part number are correct by referring to the FRU parts list.
- **A FRU should not be replaced because of a single, unreproducible failure.** Single failures can occur for a variety of reasons that have nothing to do with a hardware defect, such as cosmic radiation, electrostatic discharge, or software errors. Consider replacing a FRU only when a problem recurs. If you suspected that a FRU is defective, 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.**

**What to do first:** When you do return a FRU, you must include the following information in the parts exchange form or parts return form that you attach to it:

- \_\_\_ 1. Name and phone number of servicer
- \_\_\_ 2. Date of service
- \_\_\_ 3. Date on which the machine failed
- \_\_\_ 4. Date of purchase
- \_\_\_ 5. Failure symptoms, error codes appearing on the display, and beep symptoms

*Read this first*

- \_\_\_ 6. Procedure index and page number in which the 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 the damage is covered under 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 might indicate that the system was subjected to stress beyond normal use.

**Important**

**The following is not covered under warranty:**

- LCD panel cracked from the application of excessive force or from being dropped.
- Scratched (cosmetic) parts.
- Cracked or broken plastic parts, broken latches, broken pins, or broken connectors caused by excessive force.
- Damage caused by liquid spilled into the system.
- Damage caused by the improper insertion of a PC Card or the installation of an incompatible card.
- Damage caused by foreign material in the diskette drive.
- Diskette drive damage caused by pressure on the diskette drive cover or by the insertion of a diskette with multiple labels.
- Damaged or bent diskette eject button.
- Fuses blown by attachment of a nonsupported device.
- Forgotten computer password (making the computer unusable).



*Read this first*

**Important**

**The following symptoms might indicate damage caused by nonwarranted activities:**

- Missing parts might be a symptom of unauthorized service or modification.
- Hard disk drive spindles can become noisy from being subjected to excessive force or from being dropped.
- 19990303 errors can be caused by exposure to strong magnetic fields.

\*

## Related service information

This section provides information about the following:

- “Reset switch”
- “Service Web site”
- “Passwords”
- Power management features

### Reset switch

The Reset switch resets the system (regardless of the microcode status) and forces the power off. Use this pushbutton to power off when power is not completely off or the microcode is in a hung state. For its location, see “Front view” on page 94.

### Service Web site

When the latest maintenance diskette and the system program service diskette are available, a notice will be posted on <http://pccbbs.raleigh.ibm.com/>

### Passwords

As many as three passwords may be needed for any ThinkPad computers: the power-on password (POP), the hard disk password (HDP), and the supervisor password (PAP).

When the power-on password (POP), the hard disk password (HDP), or the supervisor password (PAP) is used, the following situations may occur:

- **If the PAP is used**, the HDP is enabled automatically, but no HDP prompt appears. The HDP is set the same as the PAP.
- **If the POP is the same as the HDP**, the POP prompt appears, but the HDP prompt does not appear.
- **If the POP is not the same as the HDP**, both prompts appear.

If a ThinkPad computer has an extra bay, it can support more than two HDPs. Then the following situations may occur:

- If the **POP** is the same as one of the **HDPs** (HDP-1 or HDP-2), a POP prompt appears. The passwords are different.
- If the **POP** is not the same as either of the **HDPs** (HDP-1 or HDP-2), both prompts appear.
- If the **PAP** is used, the **HDP-1** or the **HDP-2** is automatically enabled, but the HDP prompt does not appear. The HDP-1 or the HDP-2 are then set to the same password as the PAP.

#### *Related service information*

**Supervisor and hard disk passwords:** The supervisor password (PAP) and the hard disk password (HDP) are security features that are used to protect the system and the hard disk data from unauthorized access. No overriding capability is provided. If only a hard disk password is set, you must get the password from its owner in order to run diagnostic tests and perform service. If both the supervisor password and the hard disk password are set, you can enter Easy-Setup by pressing the **Enter** key or by entering the power-on password at the supervisor password prompt. In this case, the **Password**, **Start up**, **Network**, and **Initialize** or **Asset ID** (for some models) icons cannot be selected.

**Note:** The supervisor password and the hard disk password cannot be replaced if they are forgotten. If the customer forgets the supervisor password, the system board must be replaced. If the customer forgets the hard disk password, the hard disk drive must be replaced.

#### **How to remove the power-on passwords:**

If only the power-on password is set, do the following to remove it:

1. Turn off the computer.
2. Remove the DIMM cover from the bottom of the computer.
3. Short-circuit the two password pads or put the jumper on the pins.

For the location of the password pads or the jumper, see "Password pads" on page 98.

4. Turn on the computer and wait until the POST ends. After the POST ends, the password prompt does not appear. The power-on password has been removed.
5. Reinstall the DIMM cover.

If both the power-on password and the supervisor password are set, do the following to remove them:

1. Power on the computer by pressing and holding **F1**.
2. Enter the supervisor password. The Easy-Setup menu appears.
3. Click the **Password** icon.
4. Click the **Power on** icon.
5. Enter the supervisor password, and press the **Space bar**.
6. Press **Enter** twice.
7. Click **Exit**; then click **Restart**.  
The power-on password has been removed.

*Related service information*

## Power management features

To reduce power consumption, the computer has three power management modes: standby, suspend, and hibernation.

**Standby mode:** In standby mode, the following occurs:

- The LCD backlight turns off.
- The hard disk drive motor stops.
- The speaker is muted.

**Note:** Standby mode in Windows 98 is called *suspend mode* in Windows 95.

To enter standby mode, press **Fn + F3**. To end standby mode and resume normal operation, press any key.

**Suspend mode:** When the computer enters suspend mode, the following events occur in addition to what occurs in standby mode:

- The LCD is powered off.
- The hard disk drive is powered off.
- The CPU stops.

Suspend mode in Windows 95 is called *standby mode* in Windows 98.

You can cause the computer to enter suspend mode by doing any of the following:

- Press **Fn + F4**.
- Close the LCD cover. (To prevent the computer from entering suspend mode when the LCD is closed, click **Will not suspend even if LCD is closed** in the Power Management Properties window. Then only the LCD turns off.)
- Select the **Suspend** button in the Fuel Gauge program.

In certain circumstances, the computer goes into suspend mode automatically:

- If a "suspend time" has been set on the timer, and the user does not do any operation with the keyboard, the TrackPoint, the hard disk, the parallel connector, or the diskette drive within the time set.
- If the ac adapter is plugged in.
- If the battery indicator blinks orange, indicating that the battery power is low. (Alternatively, if **Hibernate when battery becomes low** has been selected in the "Power Management Properties" window, the computer goes into hibernation mode.)

**Note:** Even if you don't set the low-battery alarm, the charge indicator lets you know that the battery is low, and then the ThinkPad automatically enters

#### *Related service information*

the power-saving mode. This default low-battery behavior is independent of the operating system: so if you have set the low-battery alarm, the computer may not do what you specified. It chooses either your setting or the default setting, whichever is appropriate.

Any one of the following events causes the computer to resume operation from suspend mode:

- The **Fn** key is pressed.
- The LCD cover is opened.
- The ring indicator (RI) is signaled by a serial device or a PC Card device.
- The power switch is turned on.
- The resume timer is set. In Windows 98, the **Scheduled Tasks** setting has priority over the **Resume on timer** selection in the "Power Management Properties" window.

**Note:** The computer does not accept any input immediately after it enters suspend mode. Therefore, wait a few seconds before taking any action to reenter operation mode.

## Hibernation mode

### Note for Windows NT

A Windows NT user cannot create a hibernation file in a Windows NT system that uses the NTFS format system, the Windows NT default format. If you want to use hibernation mode, you should reinstall Windows NT with a FAT format system.

In hibernation mode, the following occurs:

- The system status, RAM, VRAM, and setup data are stored on the hard disk.
- The system is powered off.

### Notes

1. In the ThinkPad Configuration program, the computer can be set to **suspend/hibernate while docked**.
2. The computer cannot enter hibernation mode when it is powered with ac power and a communication PC Card is used.

Any one of the following events causes the computer to enter hibernation mode:

- The **Fn + F12** keys are pressed.
- The **Hibernation** button is selected in the Fuel-Gauge program.
- The power switch is turned off and the mode is set to **Power switch mode [Hibernation]**.

*Related service information*

- The timer conditions are satisfied in suspend mode (for operating systems other than Windows 98).
- A critically low battery condition occurs and the mode is set to **Hibernate when battery becomes low**.

When the power is turned on, the computer leaves hibernation mode and resumes operation. The hibernation file in the boot record on the hard disk drive is read, and system status is restored from the hard disk drive.

---

## Checkout guide

Use the following procedures as a guide in identifying and correcting problems with the ThinkPad computer.

**Note:** The diagnostic tests are intended to test only IBM products. The use of non-IBM products, prototype cards, or modified options can lead to false indications of errors and invalid system responses.

1. Identify the failing symptoms in as much detail as possible.
2. Verify the symptoms. Try to re-create the failure by running the diagnostic test or by repeating the operation.

## Testing the computer

The ThinkPad computer has a test program called PC-Doctor DOS (hereafter called *PC-Doctor*). You can detect errors by running the diagnostics test included in PC-Doctor. This section is an overview of the procedure. For details that depend on model-unique functions, refer to “Product overview” on page 35.

For some possible configurations of the computer, PC-Doctor might not run correctly. To avoid this problem, you need to initialize the computer setup by Easy-Setup before you run PC-Doctor. In the Easy-Setup screen, click **Config** and **Initialize**.

**Note:** When you initialize the computer configuration, some devices are disabled, such as the serial port. If you test one of these devices, you need to enable it by using PS2.EXE.

To run the test, do as follows:

**Note:** In the following procedure, you can select an item not only with the arrow keys, but also with the TrackPoint. Instead of pressing **Enter**, click the left button.

1. Insert the PC-Doctor disk into the diskette drive; then power on the computer.

If the computer cannot be powered on, go to “Power system checkout” on page 29, and check the power sources.

If an error code appears, go to “Symptom-to-FRU index” on page 42.

In the first screen, select the model and press **Enter**. Follow the instructions on the screen.

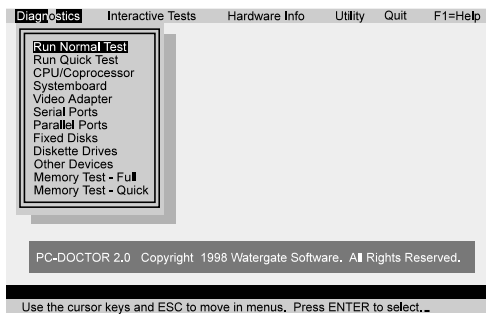
2. The PC-Doctor main panel appears.
3. Select **Diagnostics** with the arrow keys, and press **Enter**.

A pull-down menu appears. (Its exact form depends on the model.)

### Checkout guide

The options on the test menu are as follows:

Diagnosics	Interactive Tests
<ul style="list-style-type: none"><li>• Run Normal Test</li><li>• Run Quick Test</li><li>• CPU/Coprocessor</li><li>• Systemboard</li><li>• Video Adapter</li><li>• Serial Ports</li><li>• Fixed Disks</li><li>• Diskette Drives</li><li>• Other Devices</li><li>• Memory Test – Full</li><li>• Memory Test – Quick</li></ul>	<ul style="list-style-type: none"><li>• Keyboard</li><li>• Video</li><li>• Internal Speaker</li><li>• Mouse</li><li>• Joystick</li><li>• Diskette</li><li>• System Load</li><li>• CD-ROM/DVD</li><li>• Stereo Speaker</li></ul>
<b>Notes:</b> <ul style="list-style-type: none"><li>• In the <b>Keyboard</b> test in <b>Interactive Tests</b>, the <b>Fn</b> key is scanned only once. Each key should be held down for at least 2 seconds; otherwise, it cannot be sensed.</li><li>• Sound Card is not recognized in the <b>Hardware Info</b>.</li></ul>	



4. Run the applicable function test.
5. Follow the instructions on the screen. If there is a problem, PC-Doctor shows some messages.
6. To exit the test, select **Quit — Exit Diag**.  
To cancel the test, press **Esc**.

## Detecting system information with PC-Doctor

PC-Doctor can detect the following system information:

### Hardware Info:

- System Configuration
- Memory Contents
- Physical Disk Driver
- Logical Disk Driver



### *Checkout guide*

- VGA Information
- IDE Drive Info
- PCI Information
- PNPISA Info
- SMBIOS Info
- FRU Info

### **Utility:**

- Run External Tests
- Surface Scan Hard Disk
- Benchmark System
- DOS Shell
- Tech Support Form
- Battery Rundown
- View Test Log
- Print Log
- Save Log
- Full Erase Hard Drive
- Quick Erase Hard Drive

### **Power system checkout**

To verify the symptom of a problem, do the following:

1. Power off the computer.
2. Remove the battery pack.
3. Connect the ac adapter.
4. Check that power is supplied when you power on the computer.
5. Power off the computer.
6. Disconnect the ac adapter and install the charged battery pack.
7. Check that power is supplied by the battery pack when you power on the computer.

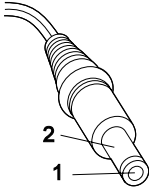
If you suspect a power problem, see the appropriate one of the following power supply checkouts:

- “Checking the ac adapter”
- “Checking operational charging” on page 30
- “Checking the battery pack” on page 30
- “Checking the backup battery” on page 31

**Checking the ac adapter:** You are here because the computer fails only when the ac adapter is used:

- If the power problem occurs only when the port replicator is used, replace the port replicator.
  - If the power-on indicator does not turn on, check the power cord of the ac adapter for correct continuity and installation.
  - If the computer does not charge during operation, go to “Checking operational charging” on page 30.
1. Unplug the ac adapter cable from the computer and measure the output voltage at the plug of the ac adapter cable. See the following figure:

## Checkout guide



(16 - 10 V)

Pin	Voltage (V dc)
1	+15.5 to +17.0
2	Ground

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

If the voltage is acceptable, do the following:

- Replace the system board.
- If the problem persists, go to “Product overview” on page 35.

**Note:** Noise from the ac adapter does not always indicate a defect.

**Checking operational charging:** To check operational charging, use a discharged battery pack or a battery pack that has less than 50% of the total power remaining when installed in the computer.

Perform operational charging. If the battery status indicator or icon does not turn on, remove the battery pack and let it return to room temperature. Reinstall the battery pack. If the charge indicator or icon still does not turn on, replace the battery pack.

If the charge indicator still does not turn on, replace the system board. Then reinstall the battery pack. If the reinstalled battery pack is not charged, go to the next section.

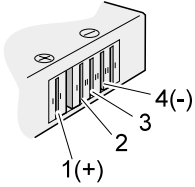
**Checking the battery pack:** Battery charging does not start until the Fuel Gauge shows that less than 95% of the total power remains; under this condition the battery pack can charge to 100% of its capacity. This protects the battery pack from being overcharged or from having a shortened life.

**Note:** The battery pack might not be able to charge when it is hot. If it is hot, remove it from the computer and after it cools down, reinstall and recharge it.

To check the battery pack, do the following:

1. Power off the computer.
2. Remove the battery pack and measure the voltage between battery terminals 1 (+) and 4 (-). See the following figure:

Checkout guide



Terminal	Voltage (V dc)
1	+ 0 to + 12.6
4	Ground (-)

- If the voltage is less than +11.0 V dc, the battery pack has been discharged. Recharge the battery pack.

**Note:** It takes at least 3 hours to recharge the battery pack.

If the voltage is still less than +11.0 V dc after recharging, replace the battery.

- If the voltage is more than +11.0 V dc, measure the resistance between battery terminals 3 and 4. The resistance must be 4 to 30 K ohm.

If the resistance is not correct, replace the battery pack. If the resistance is correct, replace the system board.

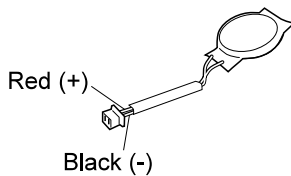
**Checking the backup battery:** Do the following:

- Power off the computer, and unplug the ac adapter from it.
- Turn the computer upside down.
- Remove the backup battery (see “Checking the battery pack” on page 30).

**Note**

Removing the backup battery will cause loss of configuration data unless the battery pack is installed.

- Measure the voltage of the backup battery. See the following figure.



Wire	Voltage (V dc)
Red	+2.5 to +3.2
Black	Ground

*Checkout guide*

- If the voltage is correct, replace the system board.
- If the voltage is not correct, replace the backup battery.
- If the backup battery discharges quickly after replacement, replace the system board.

## ThinkPad 570 and 570E

This chapter includes the descriptions for the ThinkPad 570 series computer.

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## Product overview

This section describes the following product-unique information:

- “Specifications”
- “Status indicators” on page 37
- “Structure” on page 38
- “Fn key combinations” on page 41

## Specifications

The following table lists the specifications of the ThinkPad 570 series:

Feature	Description
Processor	<p><b>570</b></p> <ul style="list-style-type: none"> <li>• Mobile Pentium® II 300 MHz, L2 256-KB cache</li> <li>• Intel® Mobile Pentium II 333 MHz, L2 256-KB cache</li> <li>• Intel Mobile Pentium II 366 MHz, L2 256-KB cache</li> <li>• Intel Celeron® processor 366 MHz, L2 256-KB cache (Japan and Korea only)</li> <li>• Intel Celeron® processor 400 MHz, L2 256-KB cache (Japan and Korea only)</li> </ul> <p><b>570E</b></p> <ul style="list-style-type: none"> <li>• Mobile Pentium III 450 MHz, L2 256-KB cache</li> <li>• Mobile Pentium III 500 MHz, L2 256-KB cache</li> </ul>
Bus architecture	<ul style="list-style-type: none"> <li>• PCI Bus</li> </ul>
Memory (standard)	<ul style="list-style-type: none"> <li>• 64 MB (on the system board)</li> </ul>
Memory (option)	<p><b>570</b></p> <ul style="list-style-type: none"> <li>• 32 MB, 64 MB, or 128 MB DIMM card (maximum of 192 MB)</li> </ul> <p><b>570E</b></p> <ul style="list-style-type: none"> <li>• 32 MB, 64 MB, 128 MB, or 256 MB DIMM card (maximum of 320 MB)</li> </ul>
CMOS RAM	114 bytes +4 Kbytes

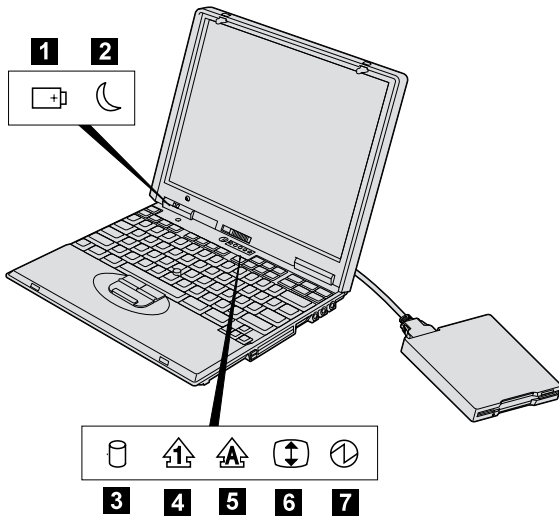
Product overview

Feature	Description
Video	<p><b>570</b></p> <ul style="list-style-type: none"> <li>• 12.1-inch, 16M colors SVGA (800×600 resolution) TFT color LCD</li> <li>• 13.3-inch, 16M colors, XGA (1024×768 resolution) TFT color LCD</li> </ul> <p><b>570E</b></p> <ul style="list-style-type: none"> <li>• 13.3-inch, 16M colors, XGA (1024×768 resolution) TFT color LCD</li> </ul>
Diskette drive (external)	1.44 MB (3-mode), 3.5-inch
Hard disk drive	<p><b>570</b></p> <ul style="list-style-type: none"> <li>• 4.0 GB, 2.5-inch, IDE interface</li> <li>• 6.4 GB, 2.5-inch, IDE interface</li> <li>• 10 GB, 2.5-inch, IDE interface</li> </ul> <p><b>570E</b></p> <ul style="list-style-type: none"> <li>• 6.0 GB, 2.5-inch, IDE interface</li> <li>• 12.0 GB, 2.5-inch, IDE interface</li> </ul>
I/O port	<ul style="list-style-type: none"> <li>• External monitor</li> <li>• Line-in</li> <li>• Headphone</li> <li>• Microphone</li> <li>• Mouse</li> <li>• Parallel</li> <li>• Expansion connector</li> <li>• Serial</li> <li>• USB</li> <li>• RJ11</li> </ul>
Internal modem	<ul style="list-style-type: none"> <li>• 56.6 Kbps</li> </ul>
Audio	<ul style="list-style-type: none"> <li>• Internal microphone</li> <li>• Software control volume</li> </ul>
Infrared transfer	IrDA 1.1
PC Card	One Type-III or two Type-II
Ac adapter	56-watt type
UrtraBase (Option)	<ul style="list-style-type: none"> <li>• CD-ROM/DVD drive <ul style="list-style-type: none"> <li>– 24 x CD-ROM drive</li> <li>– 2 x DVD drive (570 only)</li> <li>– 6 x DVD drive (570E only)</li> </ul> </li> <li>• Audio <ul style="list-style-type: none"> <li>– Internal monaural speaker</li> </ul> </li> </ul>



## Status indicators

The system status indicators show the current computer status in different colors (green or orange):



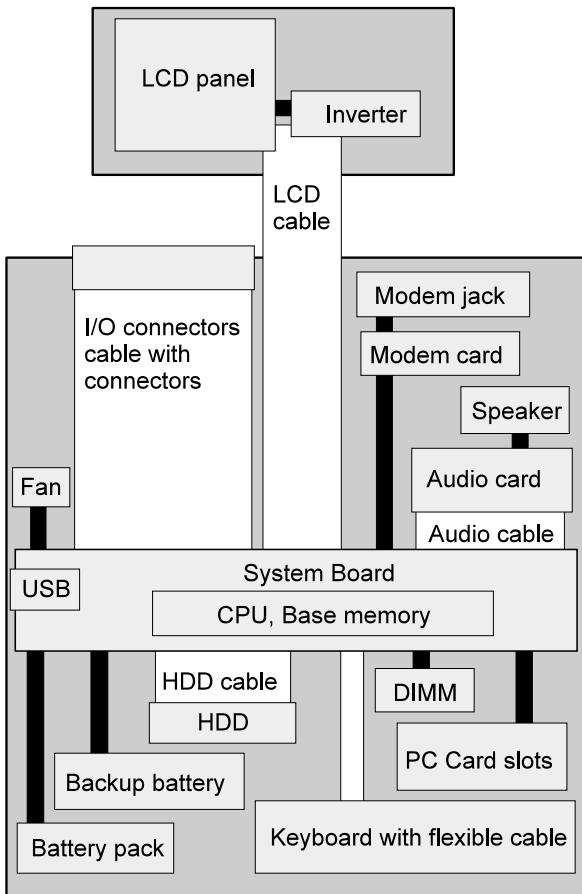
Symbol	Color	Meaning
<b>1</b> Battery	Green	The battery is fully charged.
	Orange	The battery is charging.
	Blinking orange	The battery needs charging.
<b>2</b> Suspend Mode	Green	Suspend mode
	Blinking green	Entering suspend mode
<b>3</b> Hard Disk In Use	Orange	Data is read from or written to the hard disk drive.
<b>4</b> Numeric Lock	Green	The numeric keypad on the keyboard is enabled.
<b>5</b> Caps Lock	Green	Caps Lock mode is enabled.
<b>6</b> Scroll Lock	Green	Arrow keys can be used as screen-scroll function keys.
<b>7</b> Power On	Green	Power on

Product overview

### Structure

The following illustration shows the overall organization of the FRUs.

- Flexible cable
- Connection



Product overview

The following table shows the test for each FRU.

FRU	Applicable test
System board	<ol style="list-style-type: none"> <li>1. <b>Diagnostics</b> --&gt; CPU/Coprocessor</li> <li>2. <b>Diagnostics</b> --&gt; Systemboard</li> </ol>
Power	<b>Diagnostics</b> --> Battery
LCD unit	<ol style="list-style-type: none"> <li>1. <b>Diagnostics</b> --&gt; Video Adapter</li> <li>2. <b>Interactive Tests</b> --&gt; Video</li> </ol>
Modem	<ol style="list-style-type: none"> <li>1. Make sure the modem sets up correctly.</li> <li>2. Replacing the modem jack and modem card one at a time, run the modem test in <b>Other Devices (Diagnostics)</b></li> </ol>
Audio	<ol style="list-style-type: none"> <li>1. <b>Interactive Tests</b> --&gt; Monaural Speaker</li> <li>2. <b>Diagnostics</b> --&gt; Systemboard</li> </ol>
Speaker	<ul style="list-style-type: none"> <li>• System beeper: <ul style="list-style-type: none"> <li>– <b>Interactive Tests</b> --&gt; Internal Speaker</li> </ul> </li> <li>• Speaker of the UltraBase: <ul style="list-style-type: none"> <li>– <b>Interactive Tests</b> --&gt; Monaural Speaker</li> </ul> </li> </ul>
PC Card slots	<b>Diagnostic</b> --> Systemboard
Keyboard	<ol style="list-style-type: none"> <li>1. <b>Diagnostics</b> --&gt; Keyboard</li> <li>2. <b>Interactive Test</b> --&gt; Keyboard</li> </ol>
TrackPoint or pointing device	<p>If the TrackPoint does not work, check the configuration in the ThinkPad Configuration program. If the TrackPoint is disabled, select <b>Enable</b> to enable it.</p> <p>After you use the TrackPoint, the pointer drifts on the screen for a short time. This drift can occur when a slight, steady pressure is applied to the TrackPoint pointer. This symptom is not a hardware problem. No service action necessary if the pointer stops after a short time.</p> <p>If this does not correct the TrackPoint problem, continue with the following.</p> <ul style="list-style-type: none"> <li>• <b>Interactive Tests</b> --&gt; Mouse</li> </ul>
Hard disk drive	<b>Diagnostics</b> --> Fixed Disks

Product overview

FRU	Applicable test
Diskette drive	<ol style="list-style-type: none"><li>1. <b>Diagnostics</b> --&gt; Diskette Drive</li><li>2. <b>Interactive Tests</b> --&gt; Diskette</li></ol>
CD-ROM or DVD drive (in the UltraBase)	<b>Interactive Tests</b> --> CD-ROM/DVD
Joystick	<b>Interactive Tests</b> --> Joystick
Memory	<ol style="list-style-type: none"><li>1. If a DIMM is installed, remove it and run <b>Memory Test - Quick (Diagnostics)</b>.</li><li>2. If the problem does not recur, replace the DIMM and run the test again.</li><li>3. If the test does not detect the error, run <b>Memory Test - Full (Diagnostics)</b>.</li></ol>
Fan	<ol style="list-style-type: none"><li>1. Turn on the computer and check the air turbulence at the louver near the power switch.</li><li>2. Run the fan test in <b>Other Devices (Diagnostics)</b></li></ol>

## Fn key combinations

The following table shows the function of each combination of **Fn** with a function key.

The **Fn** key works independently from the operating system. The operating system obtains the status through the system management interface to control the system.

Key combination	Description
<b>Fn + F1</b>	Reserved.
<b>Fn + F2</b>	Turn the Fuel Gauge display on or off.
<b>Fn + F3</b>	Turn standby mode on.
<b>Fn + F4</b>	Turn suspend mode on.
<b>Fn + F5</b>	Reserved.
<b>Fn + F6</b>	Reserved.
<b>Fn + F7</b>	Switch between the LCD and an external monitor.
<b>Fn + F8</b>	Turn screen expansion on or off. (There is no symbol on the key.)
<b>Fn + F9</b>	Reserved.
<b>Fn + F10</b>	Reserved.
<b>Fn + F11</b>	Switch the power management mode: High performance, automatic, or customized. <b>Note:</b> In Windows 98, only the CPU speed is changed.
<b>Fn + F12</b>	Turn hibernation mode on.
<b>Fn + Pg Up</b>	Increase the volume, or unmute.
<b>Fn + Pg Dn</b>	Decrease the volume, or unmute.
<b>Fn + Backspace</b>	Mute. <b>Note:</b> To turn on the sound, press <b>Fn + PgUp</b> or <b>Fn + PgDn</b> .

## Symptom-to-FRU index

The symptom-to-FRU index lists symptoms and errors and their possible causes. The most likely cause is listed first, in boldface type.

### Note

Do the FRU replacement or other actions in the sequence shown in the "FRU/Action in Sequence" column. If a FRU replacement does not solve the problem, put the original part back in the computer. Do not replace a nondefective FRU.

This index can also help you determine, during regular servicing, what FRUs are likely to need to be replaced next.

A numeric error is displayed for each error detected in POST or system operation. In the displays, **n** can be any number.

If no numeric code is presented, check the narrative description of symptoms. If the symptom is not described there, go to "Intermittent problems" on page 46.

### Note

For IBM devices not supported by diagnostic codes in the ThinkPad notebook computers, see the manual for that device.

## Numeric error codes

Symptom or error	FRU or action, in sequence
<b>0200</b> Fixed disk failure	<ol style="list-style-type: none"><li>1. <b>Reseat the hard disk drive.</b></li><li>2. Load Setup Defaults in IBM BIOS Setup Utility.</li><li>3. Hard disk drive.</li><li>4. System board.</li></ol>
<b>0210, 0211</b> Stuck key Keyboard error	<ol style="list-style-type: none"><li>1. <b>Run the keyboard test in the interactive tests and auxiliary input device.</b></li></ol>
<b>0212</b> Keyboard controller failure	<ol style="list-style-type: none"><li>1. <b>Run the keyboard test in the interactive tests and auxiliary input device.</b></li></ol>
<b>0213</b> Keyboard is locked	<ol style="list-style-type: none"><li>1. <b>Unlock external keyboard.</b></li></ol>

*Symptom-to-FRU index*

Symptom or error	FRU or action, in sequence
<b>0220</b> Monitor type does not match CMOS	1. <b>Load Setup Defaults in IBM BIOS Setup Utility.</b>
<b>0230</b> Shadow RAM failure at offset nnnn	1. <b>System board.</b>
<b>0231</b> System RAM failure at offset nnnn	1. <b>DIMM.</b> 2. <b>System board.</b>
<b>0250</b> System battery is dead—replace and run setup	1. <b>Replace the backup battery and run IBM BIOS Setup Utility to reset the time and date.</b>
<b>0251</b> System CMOS checksum bad—Default configuration used	1. <b>Replace the backup battery. and run IBM BIOS Setup Utility to reset the time and date.</b>
<b>0260</b> System timer error	1. <b>Replace the backup battery. and run IBM BIOS Setup Utility to reset the time and date.</b> 2. <b>System board.</b>
<b>0270</b> Real time clock error	1. <b>Replace the backup battery and run IBM BIOS Setup Utility to reset the time and date.</b> 2. <b>System board.</b>
<b>0280</b> Boot incomplete error—Default configuration used	1. <b>Load Setup Defaults in IBM BIOS Setup Utility.</b> 2. <b>DIMM.</b> 3. <b>System board.</b>
<b>0281</b> Memory size recognized by POST is different from that recognized by CMOS	1. <b>Load Setup Defaults in IBM BIOS Setup Utility.</b> 2. <b>DIMM.</b> 3. <b>System board.</b>
<b>02B0</b> Diskette drive error	1. <b>Check that the drive is defined with the proper diskette type in IBM BIOS Setup Utility.</b> 2. <b>Run the diskette diagnostics test.</b>
<b>02D0</b> System cache error—Cache is disabled	1. <b>System board.</b>
<b>02F0</b> CPU ID	1. <b>System board.</b>

*Symptom-to-FRU index*

Symptom or error	FRU or action, in sequence
<b>02F5</b> DIMM test failure	1. <b>DIMM.</b> 2. System board.
<b>02F6</b> Software NMI failure	1. <b>DIMM.</b> 2. System board.
<b>02F7</b> Fail—safe timer NMI failure	1. <b>DIMM.</b> 2. System board.

## Error messages

Symptom or error	FRU or action, in sequence
Device address conflict	1. <b>Load Setup Defaults in IBM BIOS Setup Utility.</b> 2. Backup battery. 3. System board.
Allocation error for: device	1. <b>Load Setup Defaults in IBM BIOS Setup Utility.</b> 2. Backup battery. 3. System board.
Failing bits: nnnn	1. <b>DIMM.</b> 2. System board.
Invalid system configuration data	1. <b>DIMM.</b> 2. System board.
I/O Device IRQ conflict	1. <b>Load Setup Defaults in IBM BIOS Setup Utility.</b> 2. Backup battery. 3. System board.
Operating system not found	1. <b>Enter IBM BIOS Setup Utility and see whether the hard disk drive and diskette drive are properly identified.</b> 2. Diskette drive. 3. Hard disk drive. 4. System board.



## Beep symptoms

Symptom or error	FRU or action, in sequence
One beep and a blank, unreadable, or flashing LCD	<ol style="list-style-type: none"> <li>1. <b>Reseat the LCD connector</b></li> <li>2. LCD assembly</li> <li>3. System board</li> </ol>
One long and two short beeps, and a blank or unreadable LCD	<ol style="list-style-type: none"> <li>1. <b>System board.</b></li> <li>2. LCD assembly.</li> </ol>
Two short beeps with error codes	<b>POST error. See "Numeric error codes" on page 42.</b>
Two short beeps with blank screen	<ol style="list-style-type: none"> <li>1. <b>System board.</b></li> </ol>

## No beep symptoms

Symptom or error	FRU or action, in sequence
No beep, power-on indicator on, LCD blank, and no POST	<ol style="list-style-type: none"> <li>1. <b>Ensure that every connector is connected tightly and correctly.</b></li> <li>2. DIMM.</li> <li>3. System board.</li> </ol>
No beep, power-on indicator on, and LCD blank during POST	<ol style="list-style-type: none"> <li>1. <b>Reseat DIMM.</b></li> <li>2. System board.</li> </ol>
No beep, during POST but system runs correctly	<ol style="list-style-type: none"> <li>1. <b>Speaker.</b></li> </ol>

## LCD-related symptoms

### Important

The TFT LCD for the notebook computer contains many thin-film transistors (TFTs). A small number of dots that are missing, discolored, or always lighted is characteristic of TFT LCD technology, but excessive pixel problems can cause viewing concerns. The LCD should be replaced if the number of missing, discolored, or lighted dots in any background is:

- **SVGA (12.1 in.):** 5 or more bright dots, 5 or more dark dots or a total of 9 or more bright and dark dots.
- **XGA (13.3 in.):** 8 or more bright dots, 8 or more dark dots or a total of 9 or more bright and dark dots.

### Symptom-to-FRU index

Symptom or error	FRU or action, in sequence
No beep, power-on indicator on, and a blank LCD during POST	1. <b>System board.</b>
<ul style="list-style-type: none"><li>• LCD backlight not working</li><li>• LCD too dark</li><li>• LCD brightness cannot be adjusted</li><li>• LCD contrast cannot be adjusted</li></ul>	<ol style="list-style-type: none"><li>1. <b>Reseat the LCD connectors..</b></li><li>2. LCD assembly.</li><li>3. System board.</li></ol>
<ul style="list-style-type: none"><li>• LCD screen unreadable</li><li>• Characters missing pixels</li><li>• Screen abnormal</li><li>• Wrong color displayed</li></ul>	<ol style="list-style-type: none"><li>1. <b>See important note for "LCD-related symptoms."</b></li><li>2. Reseat all LCD connectors.</li><li>3. LCD assembly.</li><li>4. System board.</li></ol>
LCD has extra horizontal or vertical lines displayed	1. <b>LCD assembly.</b>

## Intermittent problems

Intermittent system hang problems can be due to a variety of causes that have nothing to do with a hardware defect, such as: cosmic radiation, electrostatic discharge, or software errors. FRU replacement should be considered only when a recurring problem exists.

When analyzing an intermittent problem, do the following:

1. Run the diagnostic test for the system board in loop mode **at least 10 times**.
2. If no error is detected, do **not** replace any FRUs.
3. If any error is detected, replace the FRU shown by the FRU code. Rerun the test to verify that no more errors exist.

## Undetermined problems

You are here because the diagnostic tests did not identify which adapter or device failed, installed devices are incorrect, a short circuit is suspected, or the system is inoperative. Follow these procedures to isolate the failing FRU (do not isolate nondefective FRUs).

Verify that all attached devices are supported by the computer.

Verify that the power supply being used at the time of the failure is operating correctly. (See "Power system checkout" on page 29.)

1. Power off the computer.
2. Visually check each FRU for damage. Replace any damaged FRU.

*Symptom-to-FRU index*

3. Remove or disconnect all of the following devices:
  - a. Non-IBM devices
  - b. Devices attached to the port replicator
  - c. Printer, mouse, and other external devices
  - d. Battery pack
  - e. Hard disk drive
  - f. External diskette drive
  - g. DIMM
  - h. CD-ROM and diskette drive in the UltralimBay
  - i. PC Cards
4. Power on the computer.
5. Determine whether the problem has changed.
6. If the problem does not recur, reconnect the removed devices one at a time until you find the failing FRU.
7. If the problem remains, replace the following FRUs one at a time (do not replace a nondefective FRU):
  - a. System board
  - b. LCD assembly

## FRU replacement notices

This section contains notices for removal and replacement. Read this section carefully before replacing any FRU.

### Screw notices

Loose screws can cause a reliability problem. The an IBM ThinkPad computer address this problem with special nylon-coated screws that have the following characteristics:

- They maintain tight connections.
- They do not easily come loose, even with shock or vibration.
- They need additional force to tighten.
- They should be used only once.

Do the following when you service this machine:

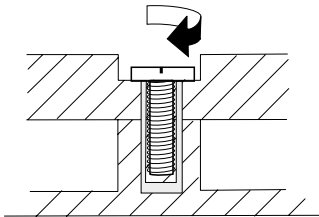
- Keep the screw kit (P/N 05K4841) in your tool bag.
- Always use new screws.
- Use a torque screwdriver if you have one.

Tighten screws as follows:

- **Plastic to plastic**

Turn an additional **90 degrees** after the screw head touches the surface of the plastic part:

90 degrees more

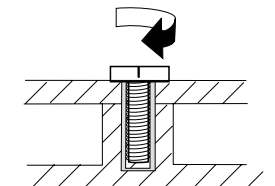


(Cross section)

- **Logic card to plastic**

Turn an additional **180 degrees** after the screw head touches the surface of the logic card:

180 degrees more



(Cross section)

- **Torque driver**

If you have a torque driver, refer to the "Torque" column with each step.

- Make sure you use the correct screw. If you have a torque screwdriver, tighten all screws firmly to the

### *FRU replacement notices*

torque shown in the table. **Never use a screw that you removed. Use a new one. Make sure the screws are tightened firmly**

## **Retaining serial numbers**

This section includes the following descriptions:

- “Restoring the serial number of the system unit”
- “Retaining the UUID”

## **Restoring the serial number of the system**

**unit:** When the computer was manufactured, the EEPROM on the system board was loaded with the serial numbers of the system and all major components. The numbers need to remain the same throughout the life of the computer.

When you replace the system board, you must restore the system unit serial number to its original value.

Before replacing the system board, save the original serial number by doing the following:

1. Install the ThinkPad Hardware Maintenance Diskette Version 1.60 and restart the computer.
2. From the main menu, select **1. Set System Identification**.
3. Select **2. Read S/N data from EEPROM**.

The serial number for each device is displayed. Write down the serial number of the system unit, designated as follows:

20: System unit serial number

After you have replaced the system board, restore the serial number by doing the following:

1. Install the ThinkPad Hardware Maintenance Diskette Version 1.60 and restart the computer.
2. From the main menu, select **1. Set System Identification**.
3. Select **1. Add S/N data from EEPROM**.  
Follow the instructions on the screen.

**Note:** The serial number of the system unit is written on the label attached on the bottom of the computer.

**Retaining the UUID:** The Universally Unique Identifier (UUID) is a 128-bit number uniquely assigned to your computer at production and stored in the EEPROM of your system board. The algorithm that generates the unique number is designed to provide unique IDs until the year A.D. 3400. No two computers in the world have the same number.

When you replace the system board, you must set the UUID on the new system board as follows:

*FRU replacement notices*

1. Install the ThinkPad Hardware Maintenance Diskette Version 1.60, and restart the computer.
2. Select **4. Assign UUID** from the main menu.  
A new UUID is created and written. If a valid UUID already exists, it is not overwritten.

---

## Removing and replacing a FRU

This section presents information and drawings for use in removing and replacing a FRU. Be sure to observe the following general rules:

1. Do not try to service the computer unless you have been trained and certified. An untrained person runs the risk of damaging parts.
2. Before replacing any FRU, review “FRU replacement notices” on page 48.
3. Begin by removing any FRUs that have to be removed before the failing FRU. Any such FRUs are listed at the top of the page. Remove them in the orders in which they are listed.
4. Follow the correct sequence in the steps for removing the FRU, as indicated in the drawings by the numbers in square callouts.
5. When turning a screw to replace a FRU, turn it in the direction indicated by the arrow in the drawing.
6. When removing the FRU, move it in the direction indicated by the arrow in the drawing.
7. To put the new FRU in place, reverse the removal procedure and follow any notes that pertain to replacement. For information about connecting and arranging internal cables, see “Locations” on page 94.
8. When replacing a FRU, use the correct screw as shown in the procedures.

**Safety Notice 1: Translation on page 4**

Before the computer is powered on after FRU replacement, make sure all screws, springs, and other small parts are in place and are not loose inside the computer. Verify this by shaking the computer gently and listening for rattling sounds. Metallic parts or metal flakes can cause electrical short circuits.

**Safety Notice 3: Translation on page 6**

The battery pack contains small amounts of nickel. 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.

**Safety Notice 8: Translation on page 10**

Before removing any FRU, power off the computer, unplug all power cords from electrical outlets, remove the battery pack, and then disconnect any interconnecting cables.

*Removing and replacing a FRU*

**Attention**

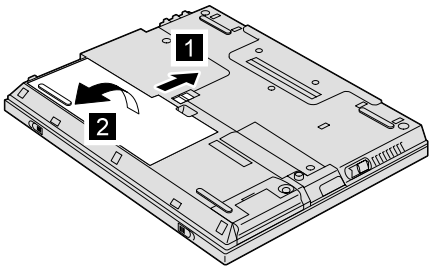
The system board is sensitive to, and can be damaged by, electrostatic discharge. Establish personal grounding by touching a ground point with one hand before touching these units.

You must use electrostatic discharge (ESD) strap (P/N 6405959) to establish personal grounding.



*Removing and replacing a FRU*

## **1010 Battery pack**

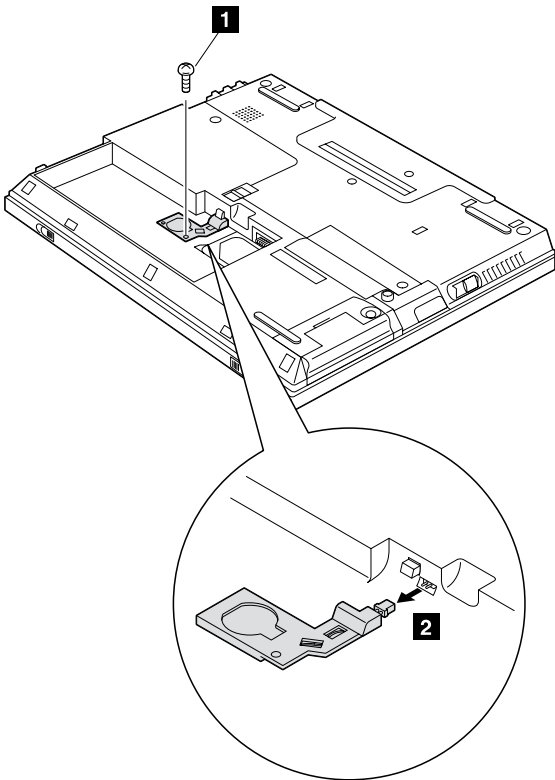


## 1020 Backup battery

**Safety Notice 4: Translation on page 7**

The backup battery is a lithium battery and can cause a fire, an explosion, or severe burns. 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. The use of an incorrect battery can result in ignition or explosion of the battery.

- Battery pack (1010)

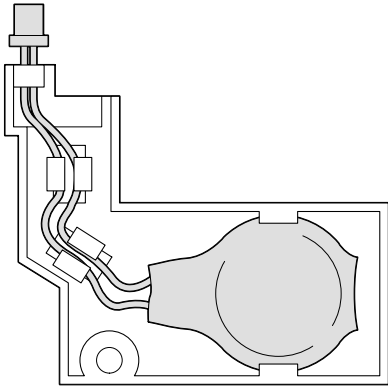


Step	Screw (quantity)	Torque
1	M2.5 x 3 mm (1)	4 kgcm

(continued)

*Removing and replacing a FRU*

**Cable route:**



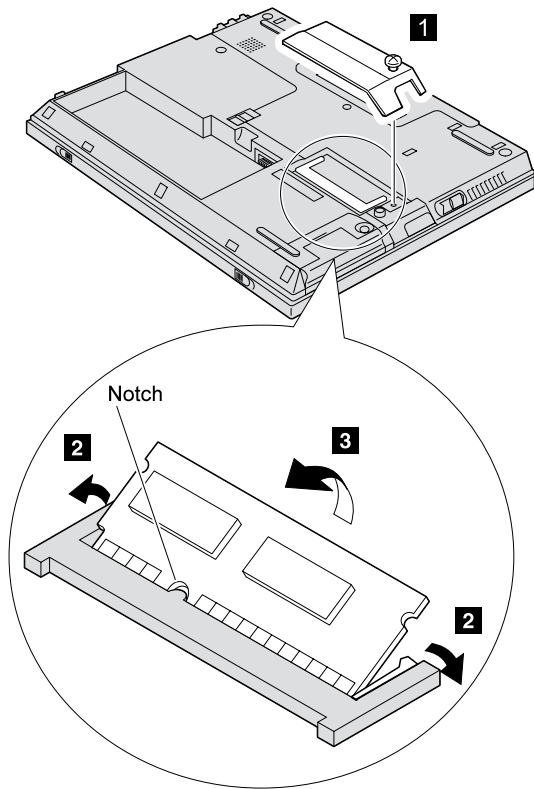
Removing and replacing a FRU

**1030 DIMM**

- Battery pack (1010)

**Note**

The ThinkPad 570E computer's DIMM slot faces in the direction opposite that shown here. However, the procedure for removing DIMM is the same.



Step	Screw (quantity)	Torque
1	Not removable	4 kgcm

## 1040 Hard disk drive

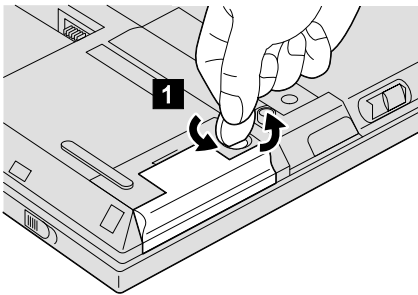
### Attention

**Do not drop or apply any shock to the hard disk drive.** The hard disk drive is sensitive to physical shock. Incorrect handling can cause damage and permanent loss of data.

Before removing the drive, have the user make a backup copy of all the information on the drive if possible.

Never remove the drive while the system is operating or in suspend mode.

- Battery pack (1010)

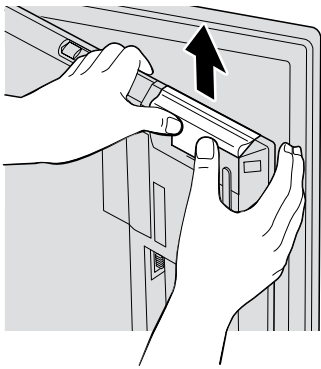


**1** Coin screw or security screw

**Note:** Use a 2.5-mm allen wrench to remove the security screw. (continued)

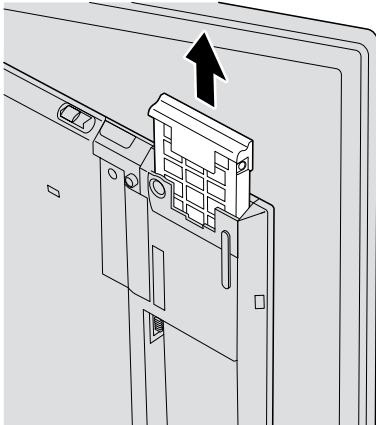
### *Removing and replacing a FRU*

When removing the hard disk drive, open the LCD a little as shown in the figure.



### **Attention**

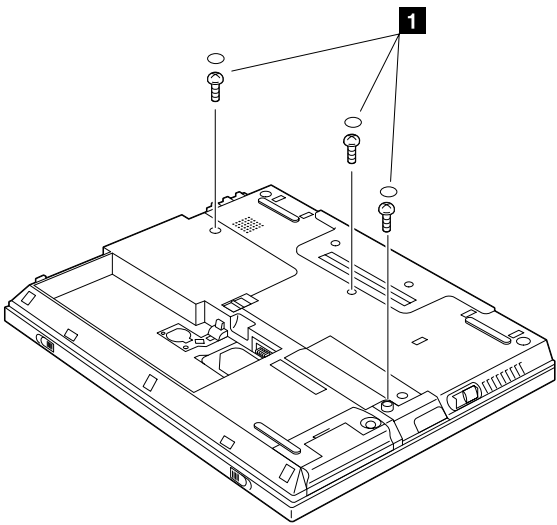
Be careful not to drop the hard disk drive. It is still attached to the cover when you push it up.



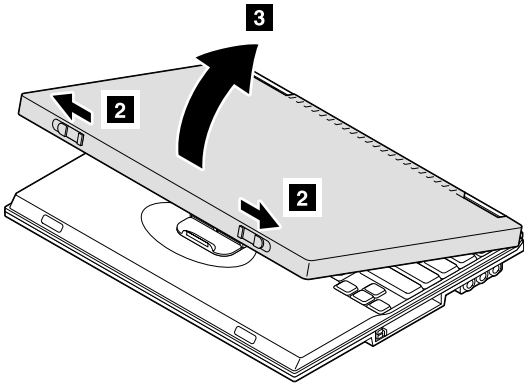
Removing and replacing a FRU

**1050 Keyboard**

- Battery pack (1010)
- Hard disk drive (1040)



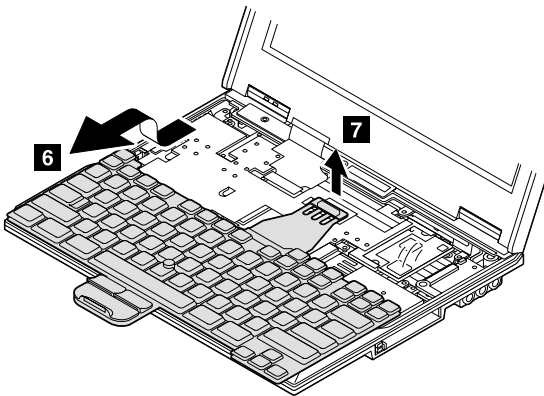
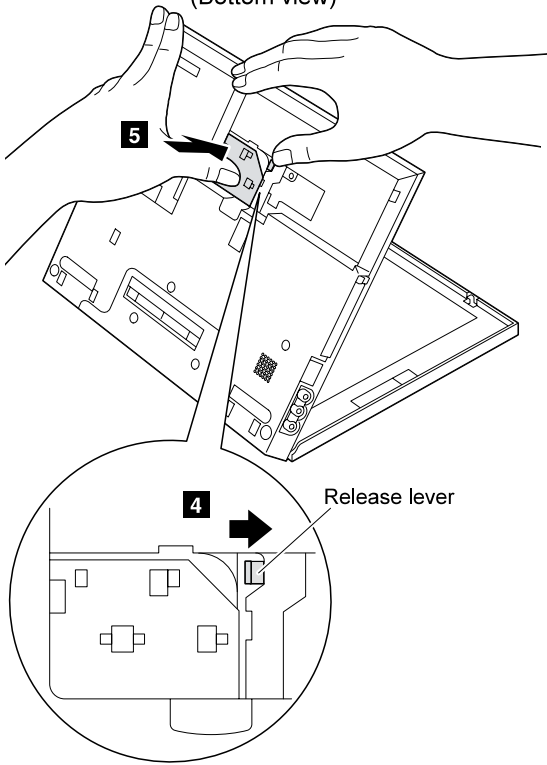
Step	Screw (quantity)	Torque
1	M2.5 x 9 mm (3)	4 kgcm



(continued)

Removing and replacing a FRU

(Bottom view)

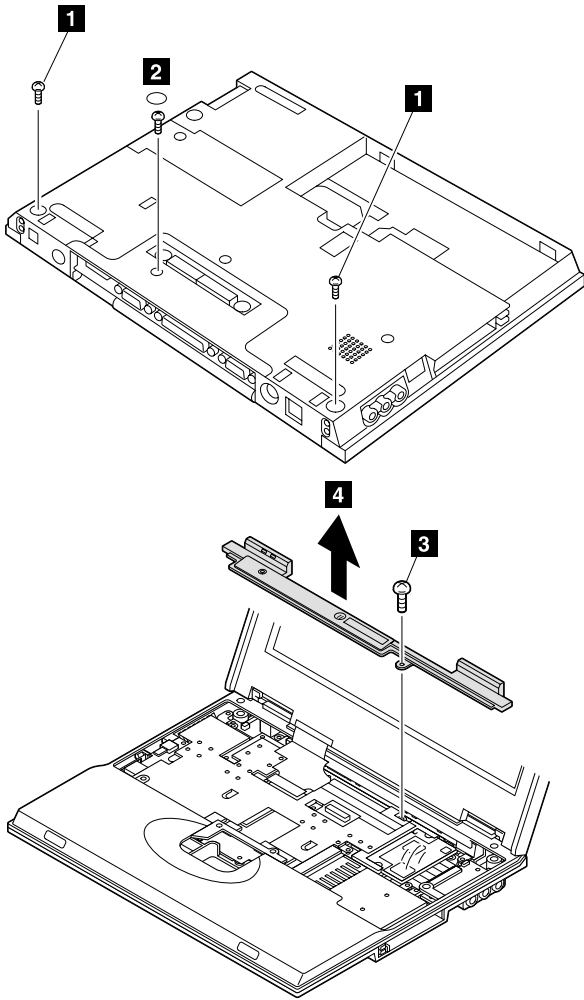




Removing and replacing a FRU

**1060 Center cover**

- Battery pack (1010)
- Hard disk drive (1040)
- Keyboard (1050)

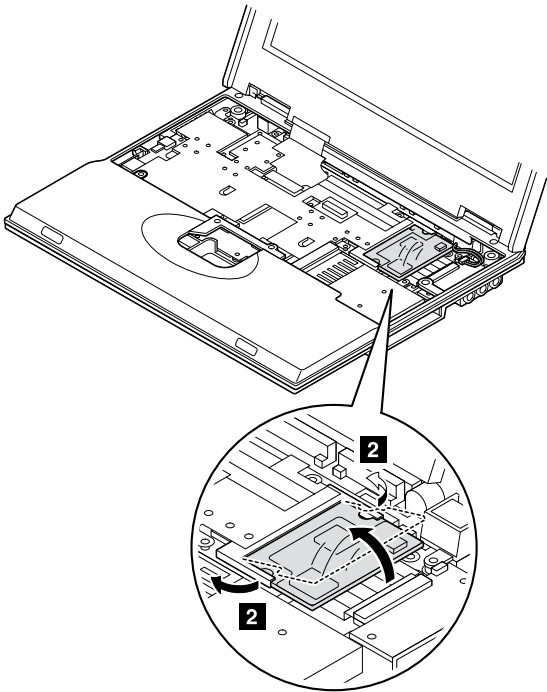
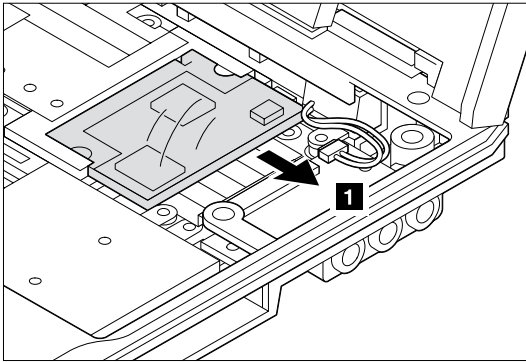


Step	Screw (quantity)	Torque
<b>1</b>	M2.5 x 3 mm (2)	4 kgcm
<b>2</b>	M2.5 x 9 mm (1)	4 kgcm
<b>3</b>	M2.5 x 9 mm (1)	4 kgcm

*Removing and replacing a FRU*

**1070 Modem card**

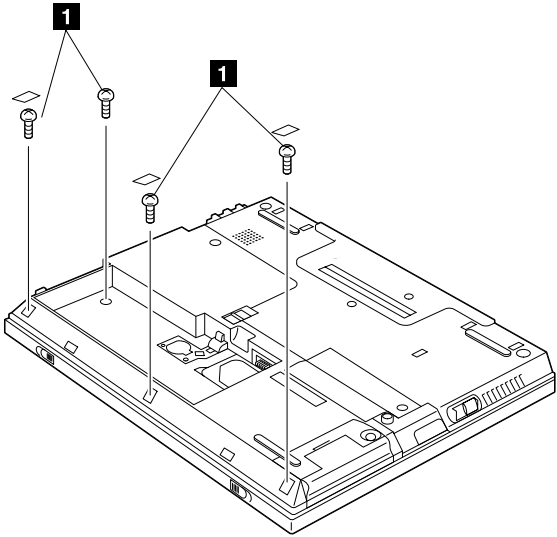
- Battery pack (1010)
- Hard disk drive (1040)
- Keyboard (1050)
- Center cover (1060)



Removing and replacing a FRU

**1080 Frame and power switch**

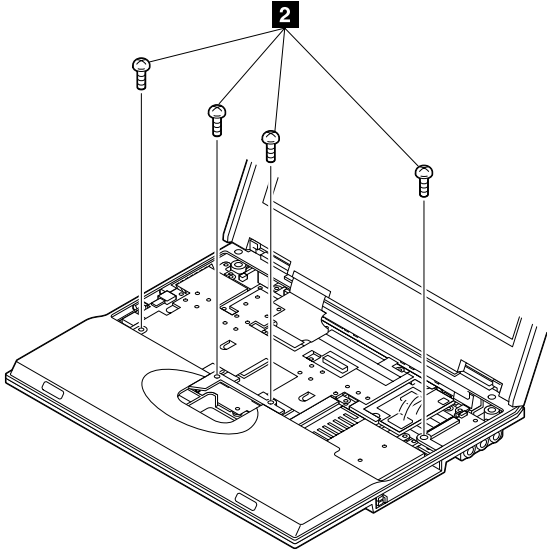
- Battery pack (1010)
- Hard disk drive (1040)
- Keyboard (1050)
- Center cover (1060)



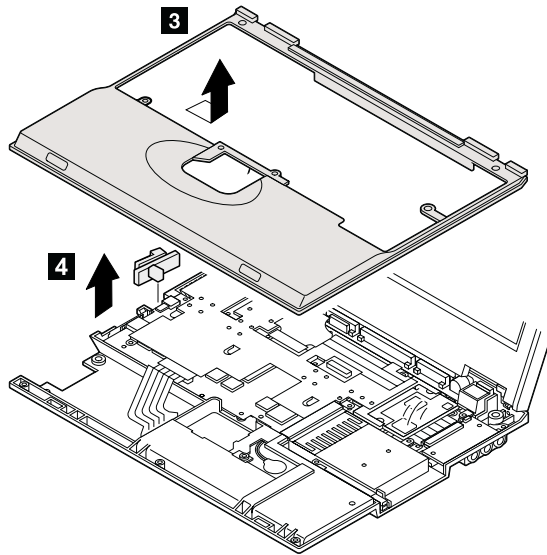
Step	Screw (quantity)	Torque
1	M2.5 x 3 mm (4)	4 kgcm

(continued)

Removing and replacing a FRU



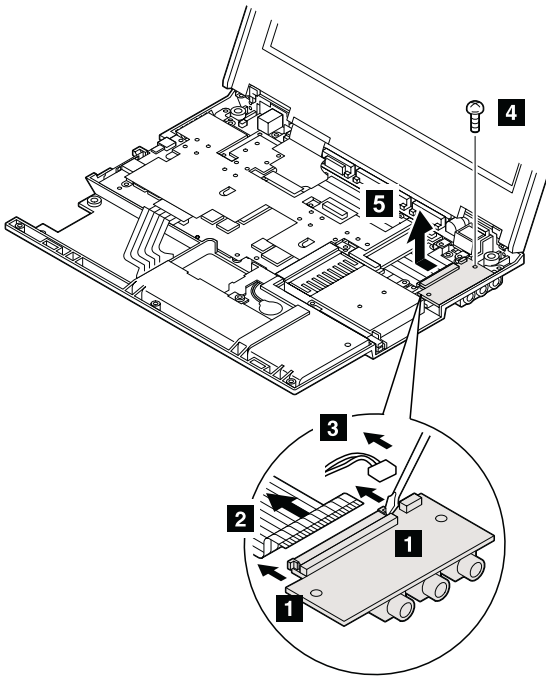
Step	Screw (quantity)	Torque
2	M2.5 x 4.8 mm (4)	4 kgcm



Removing and replacing a FRU

**1090 Audio card**

- Battery pack (1010)
- Hard disk drive (1040)
- Keyboard (1050)
- Center cover (1060)
- Modem card (1070)
- Frame and power switch (1080)

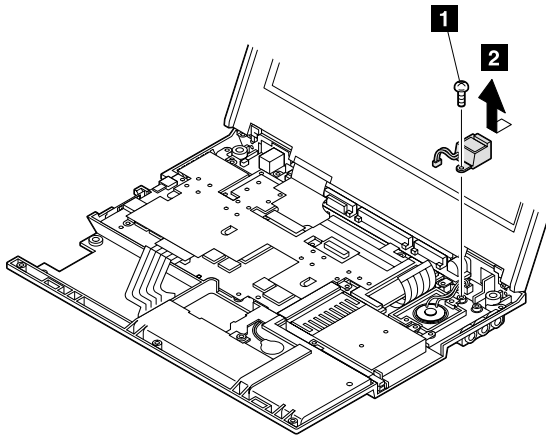


Step	Screw (quantity)	Torque
4	M2.5 x 4.8 mm (1)	4 kgcm

Removing and replacing a FRU

## 1100 Modem jack

- Battery pack (1010)
- Hard disk drive (1040)
- Keyboard (1050)
- Center cover (1060)
- Modem card (1070)
- Frame and power switch (1080)
- Audio card (1090)



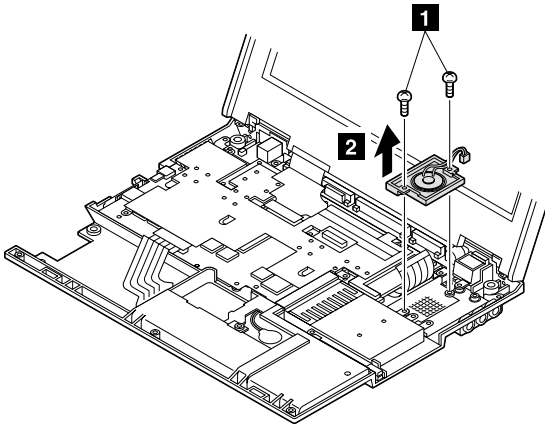
Step	Screw (quantity)	Torque
1	M2.5 x 4.8 mm (1)	4 kgcm

*Removing and replacing a FRU*

## 1110 Speaker

- Battery pack (1010)
- Hard disk drive (1040)
- Keyboard (1050)
- Center cover (1060)
- Modem card (1070)
- Frame and power switch (1080)
- Audio card (1090)

For the ThinkPad 570 computer

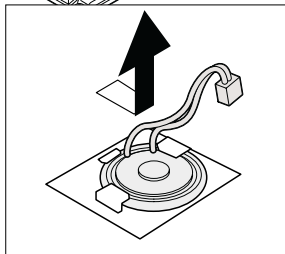
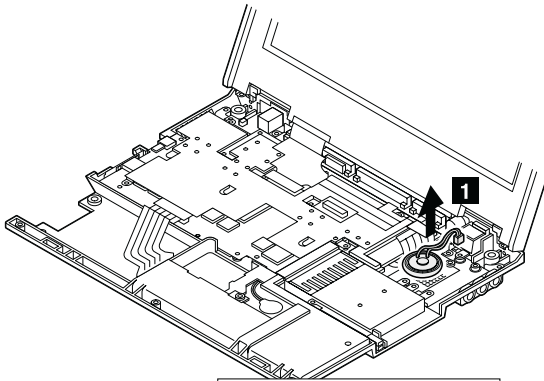


Step	Screw (quantity)	Torque
1	M2.5 x 4.8 mm (2)	4 kgcm

(continued)

*Removing and replacing a FRU*

**For the ThinkPad 570E computer**

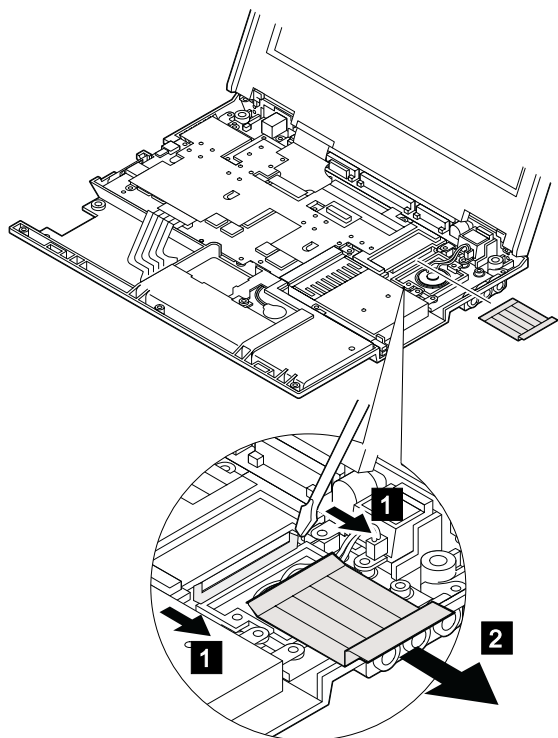




*Removing and replacing a FRU*

**1120 Audio cable**

- Battery pack (1010)
- Hard disk drive (1040)
- Keyboard (1050)
- Center cover (1060)
- Modem card (1070)
- Frame and power switch (1080)
- Audio card (1090)

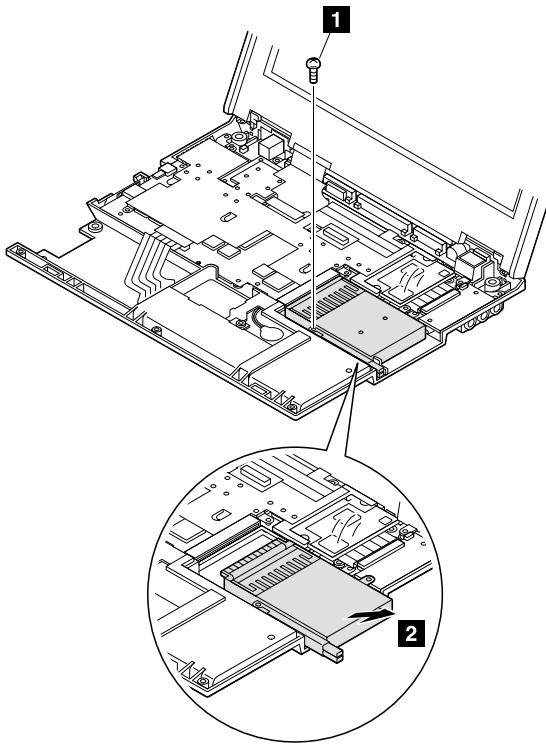


**When replacing:** Make sure you install the cable in the correct direction. Installing it the wrong direction will cause audio problems.

Removing and replacing a FRU

### 1130 PC Card slots

- Battery pack (1010)
- Hard disk drive (1040)
- Keyboard (1050)
- Center cover (1060)
- Frame and power switch (1080)



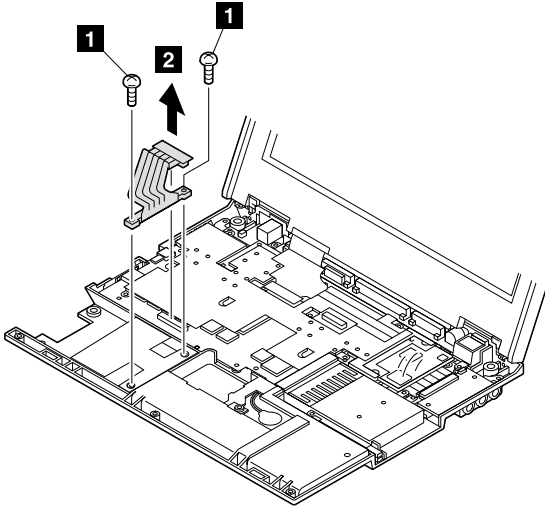
Step	Screw (quantity)	Torque
1	M2.5 x 4.8 mm (1)	4 kgcm

Removing and replacing a FRU

**1140 Hard disk drive cable**

- Battery pack (1010)
- Hard disk drive (1040)
- Keyboard (1050)
- Center cover (1060)
- Frame and power switch (1080)

For the ThinkPad 570 computer

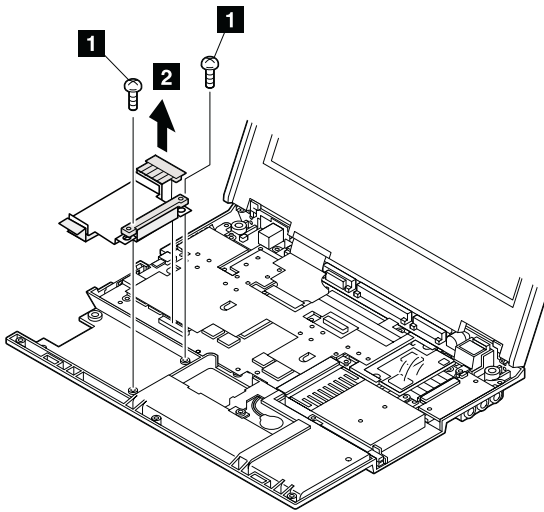


Step	Screw (quantity)	Torque
<b>1</b>	M2.5 x 4.8 mm (2)	4 kgcm

(continued)

*Removing and replacing a FRU*

**For the ThinkPad 570E computer**



Step	Screw (quantity)	Torque
<b>1</b>	M2.5 x 4.8 mm (2)	4 kgcm

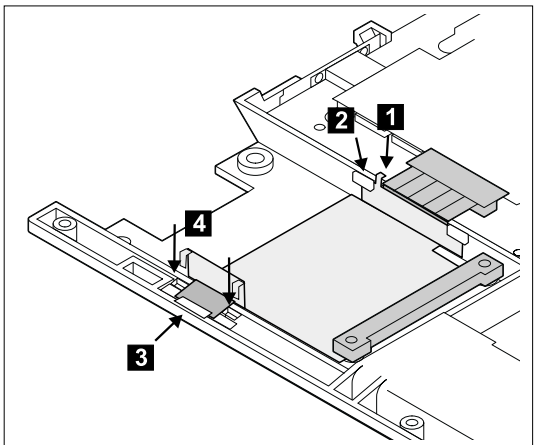
(continued)

*Removing and replacing a FRU*

**When replacing:** If the cable and cable shield are not installed correctly, they might be in the way when you install the hard disk drive.

To install them correctly, do as follows:

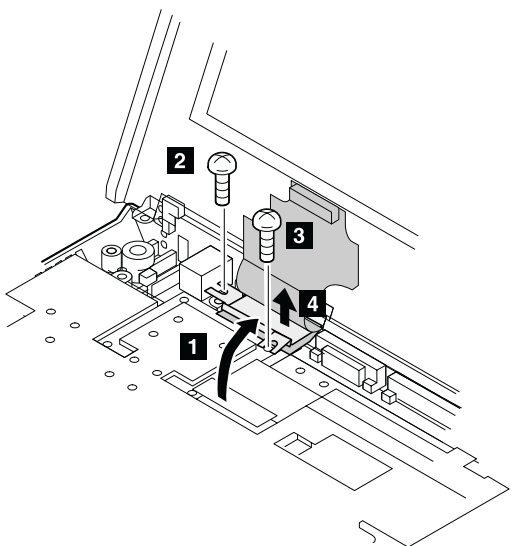
1. Insert the tab of the cable **1** and catch the cable shield by the base cover latches **2**.
2. Catch the cable by the base cover latch **3**.
3. Insert the tabs of the cable shield **4** into the holes of the base cover.



Removing and replacing a FRU

## 1150 Upper shield

- Battery pack (1010)
- Hard disk drive (1040)
- Keyboard (1050)
- Center cover (1060)
- Frame and power switch (1080)

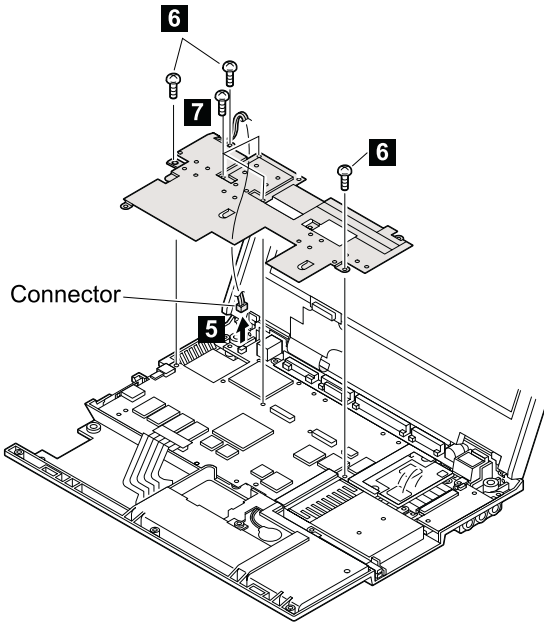


Step	Screw (quantity)	Torque
2	M2.5 x 4.8 mm (3)	4 kgcm
3	M2 x 9 mm (4)	2 kgcm

(continued)

Removing and replacing a FRU

For the ThinkPad 570 computer

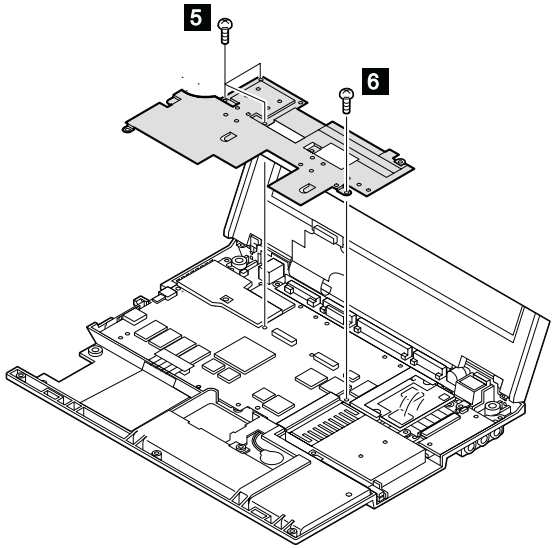


Step	Screw (quantity)	Torque
6	M2.5 x 4.8 mm (3)	4 kgcm
7	M2 x 9 mm (3)	Yellow
2 kgcm		

(continued)

*Removing and replacing a FRU*

**For the ThinkPad 570E computer**



Step	Screw (quantity)	Torque
5	M2 x 9 mm (3)	4 kgcm
6	M2.5 x 4.8 mm (1)	4 kgcm

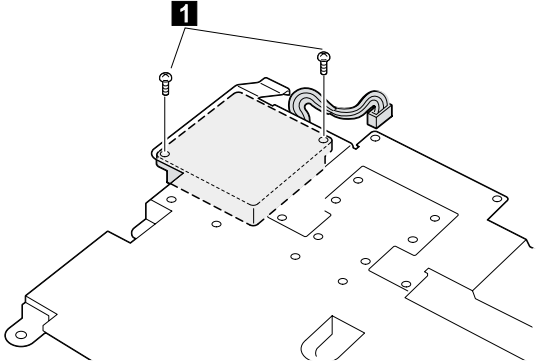


*Removing and replacing a FRU*

## 1160 Fan

- Battery pack (1010)
- Hard disk drive (1040)
- Keyboard (1050)
- Center cover (1060)
- Frame and power switch (1080)
- Upper shield (1150)

For the ThinkPad 570 computer

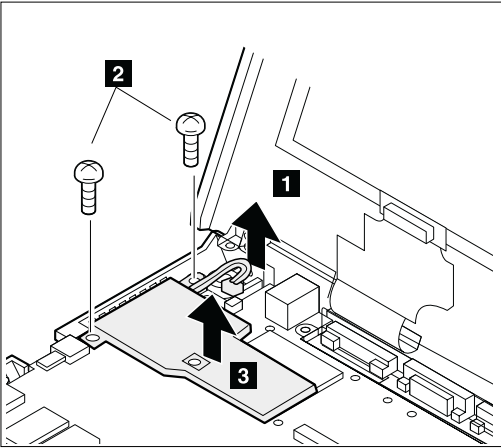


**Note:** Do not pinch the fan cable when re-installing the fan.

Step	Screw (quantity)	Torque
1	M2 x 9 mm (2)	2 kgcm

Removing and replacing a FRU

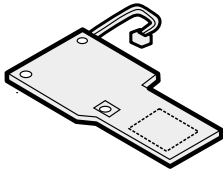
For the ThinkPad 570E computer



Step	Screw (quantity)	Torque
1	M2.5 x 4.8 mm (2)	2 kgcm

When replacing:

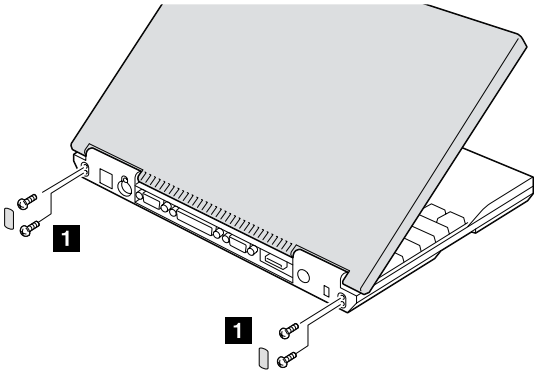
1. Make sure not to pinch the fan cable when re-installing the fan.
2. Apply grease to the underside of the surface shown in the dotted square in the following figure:



*Removing and replacing a FRU*

**1170 LCD unit**

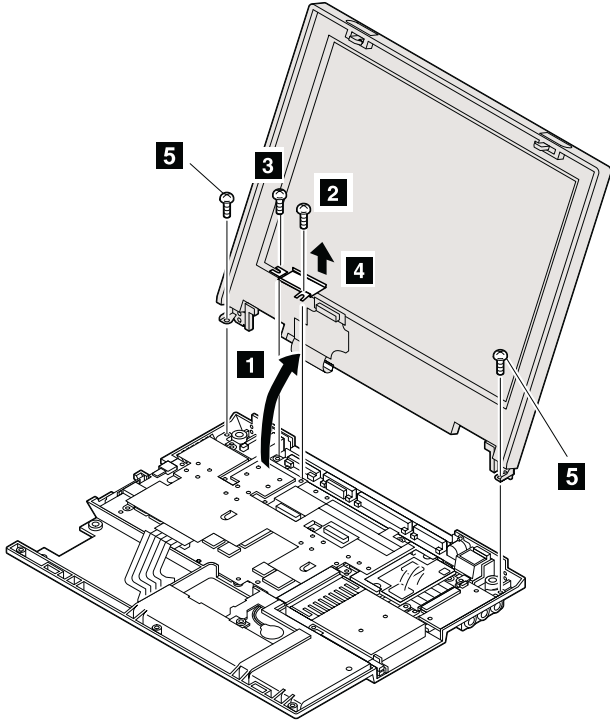
- Battery pack (1010)
- Hard disk drive (1040)
- Keyboard (1050)
- Center cover (1060)
- Frame and power switch (1080)



Step	Screw (quantity)	Torque
1	M2.5 x 4.8 mm (4)	4 kgcm

(continued)

Removing and replacing a FRU

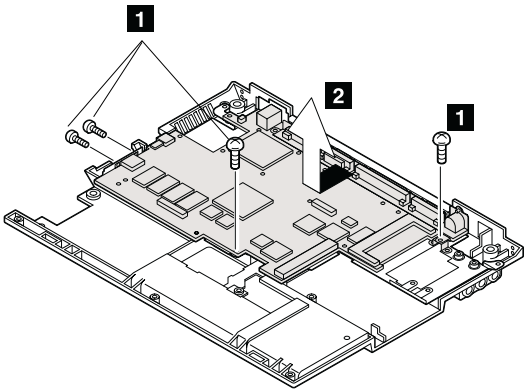


Step	Screw (quantity)	Torque
2	M2 x 9 mm (1)	4 kgcm
3	M2.5 x 4.8 mm (1)	4 kgcm
5	M2.5 x 4.8 mm (2)	4 kgcm

Removing and replacing a FRU

### 1180 System board assembly

- Battery pack (1010)
- Backup battery (1020)
- DIMM (1030)
- Hard disk drive (1040)
- Keyboard (1050)
- Center cover (1060)
- Modem card (1070)
- Frame and power switch (1080)
- Audio card (1090)
- Modem jack (1100)
- Speaker (1110)
- Audio cable (1120)
- PC Card slots (1130)
- Hard disk drive cable (1140)
- Upper shield (1150)
- LCD unit (1170)

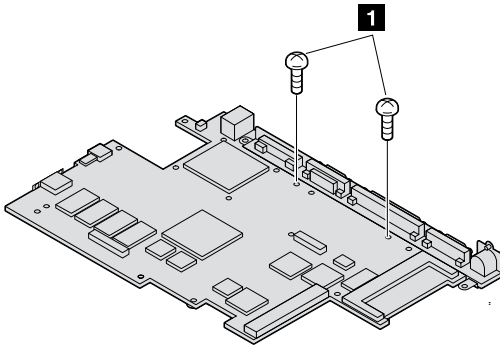


Step	Screw (quantity)	Torque
1	M2.5 x 4.8 mm (4)	4 kgcm

Removing and replacing a FRU

## 1190 I/O Connector cable or system board

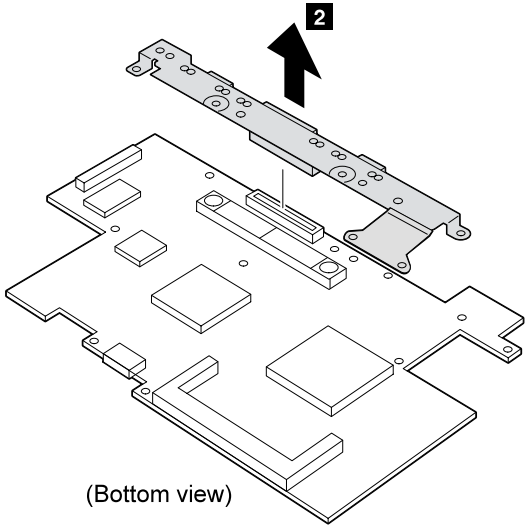
- Battery pack (1010)
- Backup battery (1020)
- DIMM (1030)
- Hard disk drive (1040)
- Keyboard (1050)
- Center cover (1060)
- Modem card (1070)
- Frame and power switch (1080)
- Audio card (1090)
- Modem jack (1100)
- Speaker (1110)
- Audio cable (1120)
- PC Card slots (1130)
- Hard disk drive cable (1140)
- Upper shield (1150)
- LCD unit (1170)



Step	Screw (quantity)	Torque
1	M2.5 x 4.8 mm (2)	4 kgcm

(continued)

*Removing and replacing a FRU*



(Bottom view)

*Removing and replacing a FRU*

## **2010 LCD front bezel**

- Battery pack (1010)
- Hard disk drive (1040)
- Keyboard (1050)
- Center cover (1060)
- Frame and power switch (1080)
- LCD unit (1170)

### **CAUTION:**

**The inverter card has a high tension current. To avoid shock hazard, never power on the computer when the LCD cover is opened.**

The TFT LCD for the notebook computer contains many thin-film transistors (TFTs). A small number of dots that are missing, discolored, or always lighted is characteristic of TFT LCD technology, but excessive pixel problems can cause viewing concerns. The LCD should be replaced if the number of missing, discolored, or lighted dots in any background is:

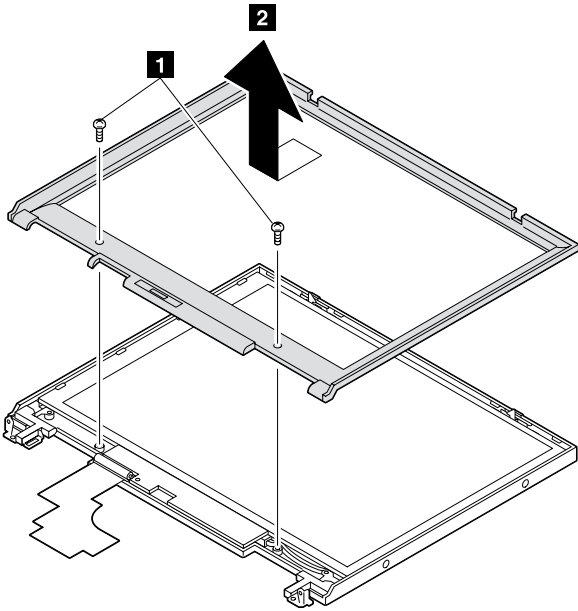
- **SVGA (12.1 in.):** 5 or more bright dots, 5 or more dark dots or a total of 9 or more bright and dark dots.
- **XGA (13.3 in.):** 8 or more bright dots, 8 or more dark dots or a total of 9 or more bright and dark dots.

(continued)



Removing and replacing a FRU

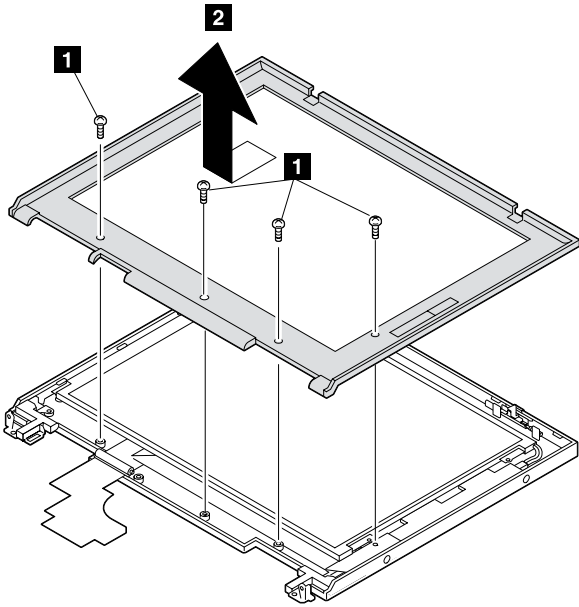
13.1-inch XGA TFT LCD



Step	Screw (quantity)	Torque
1	M2.5 x 3 mm (2)	4 kgcm

Removing and replacing a FRU

12.1-inch SVGA TFT LCD



Step	Screw (quantity)	Torque
1	M2.5 x 3 mm (4)	4 kgcm

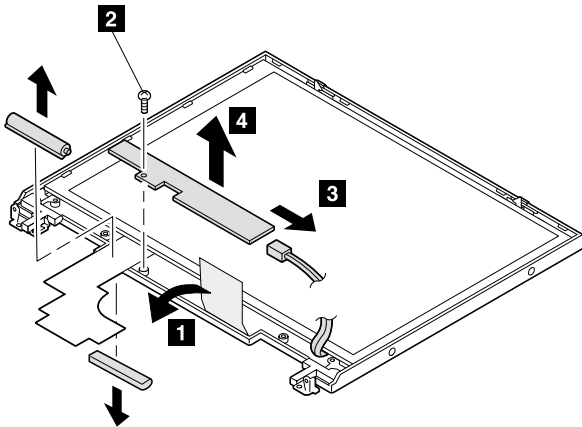
Removing and replacing a FRU

**2020 Inverter card**

- Battery pack (1010)
- Hard disk drive (1040)
- Keyboard (1050)
- Center cover (1060)
- Frame and power switch (1080)
- LCD unit (1170)
- LCD front bezel (2010)

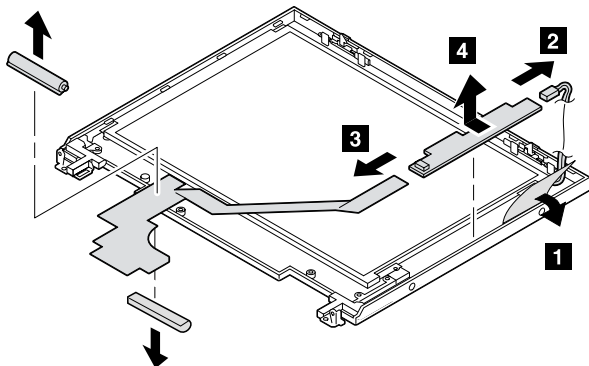
**Note:** Be careful of high voltage on the cable. Connect the LCD connector firmly to the inverter card by lifting it up straight.

**13.3-Inch XGA TFT LCD**



Step	Screw (quantity)	Torque
1	M2.5 x 3 mm (1)	4 kgcm

**12.1-inch SVGA TFT LCD**

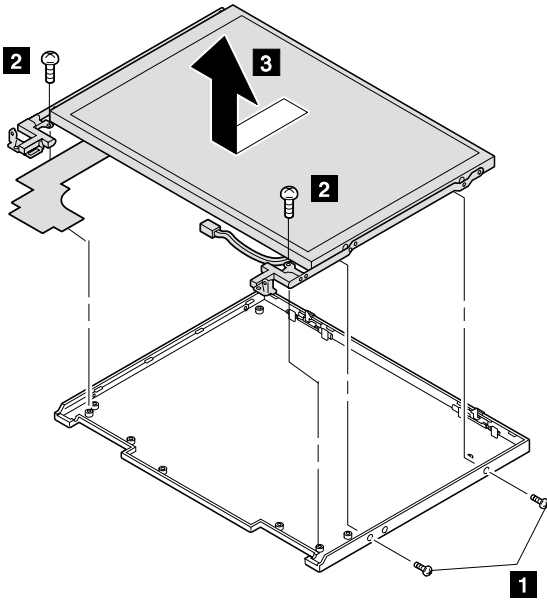


Removing and replacing a FRU

### 2030 LCD panel

- Battery pack (1010)
- Hard disk drive (1040)
- Center cover (1060)
- LCD unit (1170)
- LCD front bezel (2010)
- Inverter card (2020)

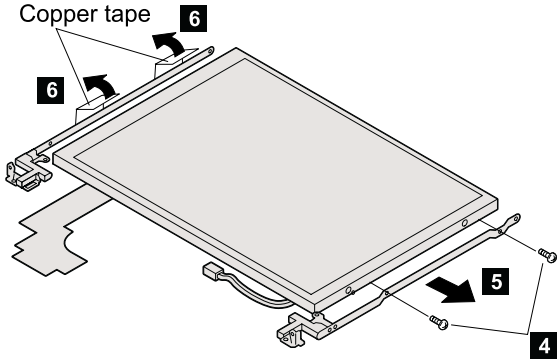
### 13.3-inch XGA TFT LCD



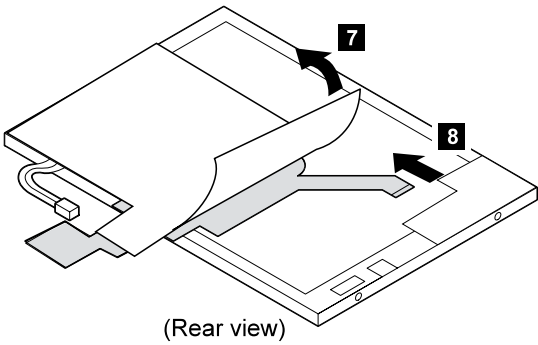
Step	Screw (quantity)	Torque
1	M2.5 x 3 mm (2)	4 kgcm
2	M2.5 x 3 mm (2)	4 kgcm

(continued)

Removing and replacing a FRU

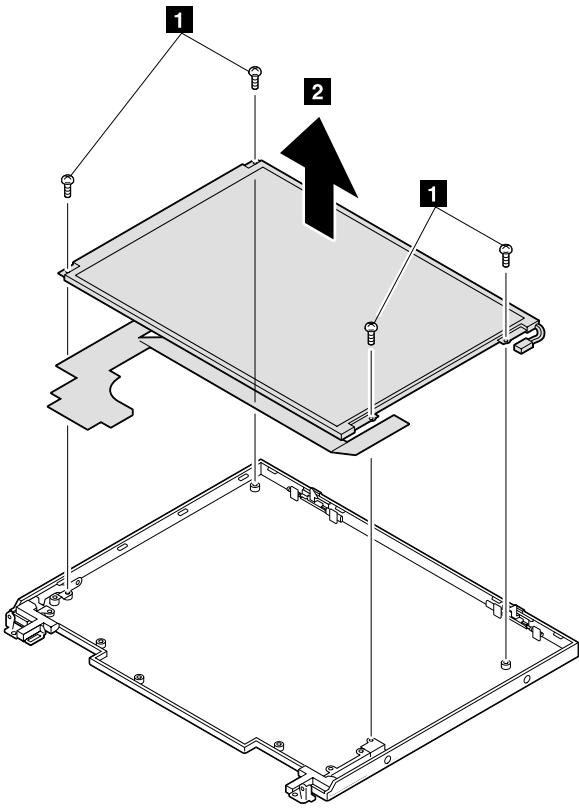


Step	Screw (quantity)	Torque	Note
4	M2.5 x 3 mm (2)	4 kgcm	Blue, Small head

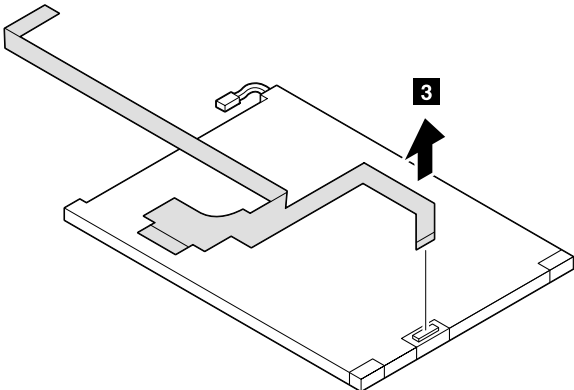


Removing and replacing a FRU

**12.1-inch SVGA TFT LCD**



Step	Screw (quantity)	Torque
<b>1</b>	M2.5 x 3 mm (4)	4 kgcm



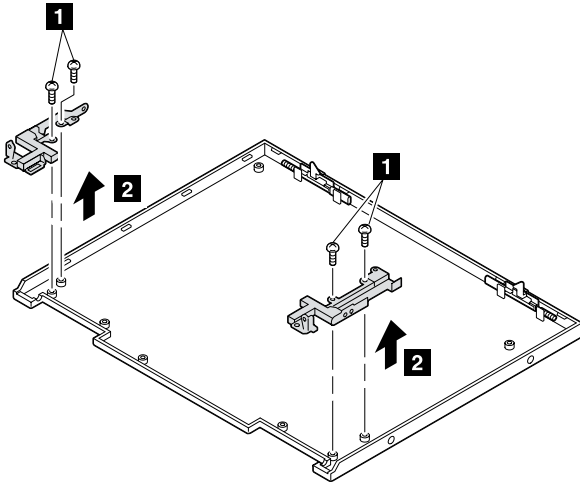
*Removing and replacing a FRU*

**2040 Hinges**

- Battery pack (1010)
- Hard disk drive (1040)
- Keyboard (1050)
- Center cover (1060)
- Frame and power switch (1080)
- LCD unit (1170)
- LCD front bezel (2010)
- Inverter card (2020)
- LCD panel (2030)

**13.3-inch XGA TFT LCD:** See “2030 LCD panel” on page 88.

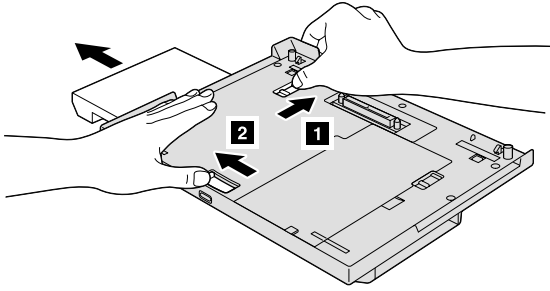
**12.1-inch SVGA TFT LCD**



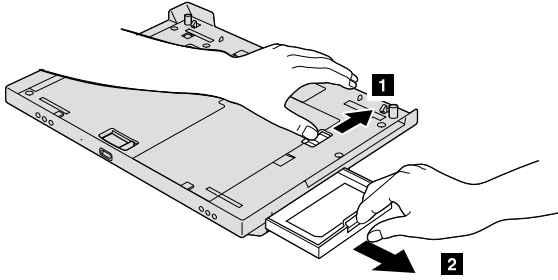
Step	Screw (quantity)	Torque
<b>1</b>	M2.5 x 3 mm (4)	4 kgcm

Removing and replacing a FRU

**3010 Blank bezel in the UltraBase  
In the UltraslimBay**



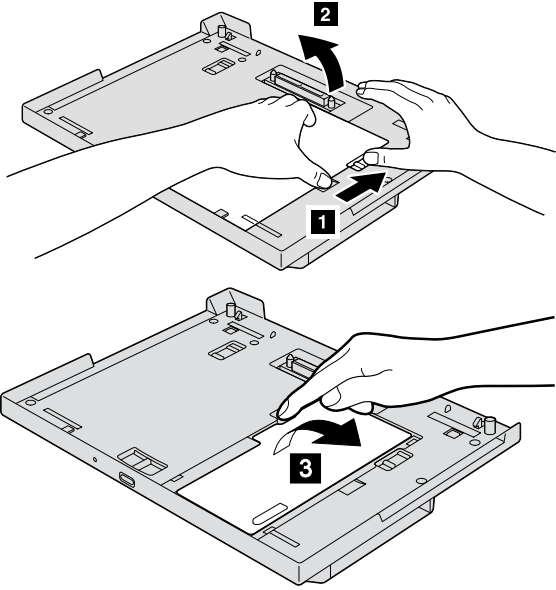
**In the diskette-drive/battery bay**





Removing and replacing a FRU

### Battery pack in the UltraBase

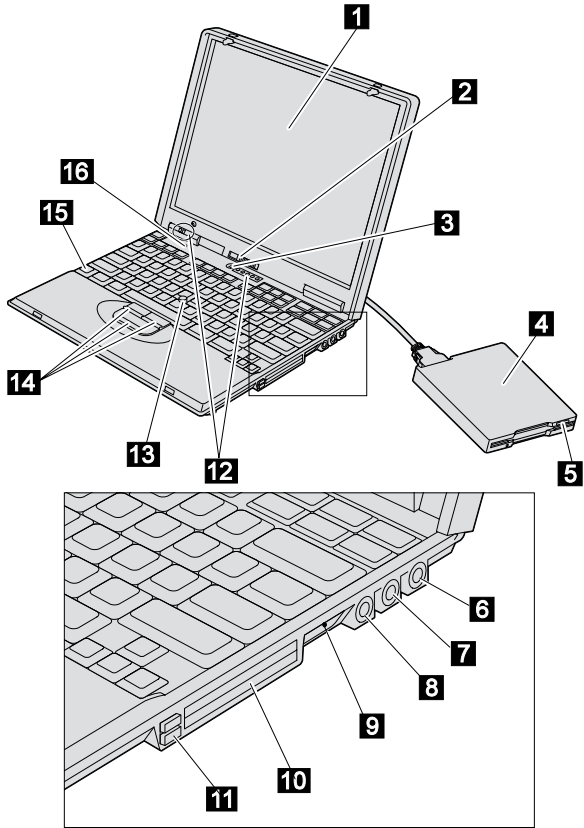


## Locations

### Front view

- 1** LCD panel
- 2** Brightness control
- 3** Built-in microphone
- 4** External diskette drive
- 5** Diskette eject button
- 6** Headphone jack
- 7** Line-In jack
- 8** Microphone jack
- 9** Reset switch
- 10** PC Card slots
- 11** PC Card eject button
- 12** Status indicator
- 13** TrackPoint
- 14** Click buttons
- 15** Fn Key
- 16** Suspend switch

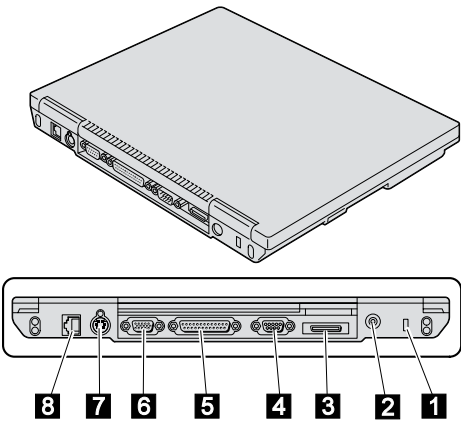
Locations



*Locations*

**Rear view**

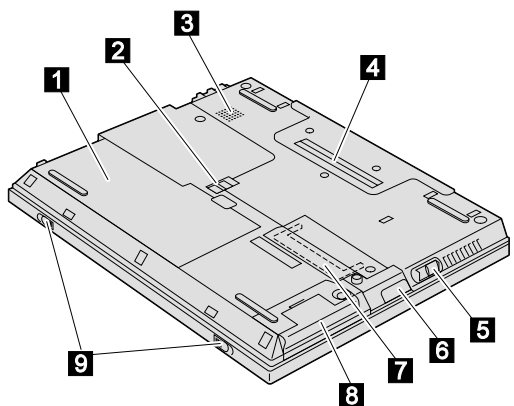
- 1** Security keyhole
- 2** AC Adapter jack
- 3** External-diskette-drive connector
- 4** Serial connector
- 5** Parallel connector
- 6** External-monitor connector
- 7** External-input-device connector
- 8** Modem connector



*Locations*

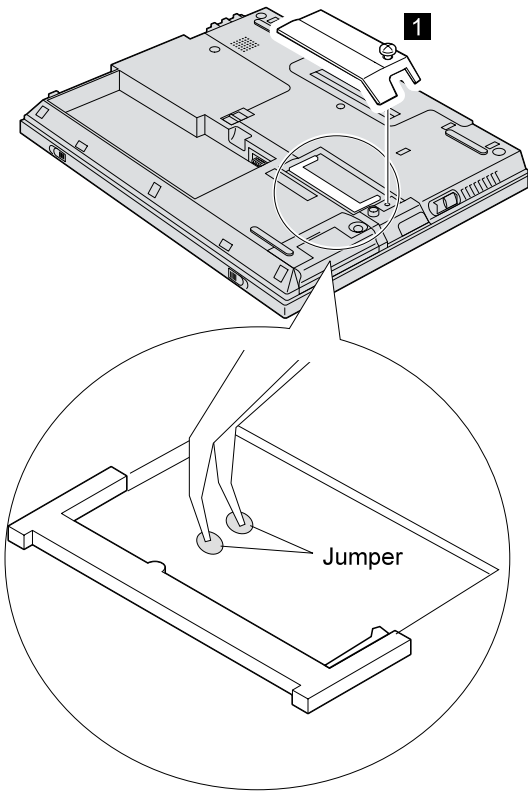
**Bottom view**

- 1** Battery pack
- 2** Battery release switch
- 3** Built-in speaker
- 4** Expansion connector
- 5** Power switch
- 6** USB port
- 7** Memory slot
- 8** Hard disk drive
- 9** LCD latches

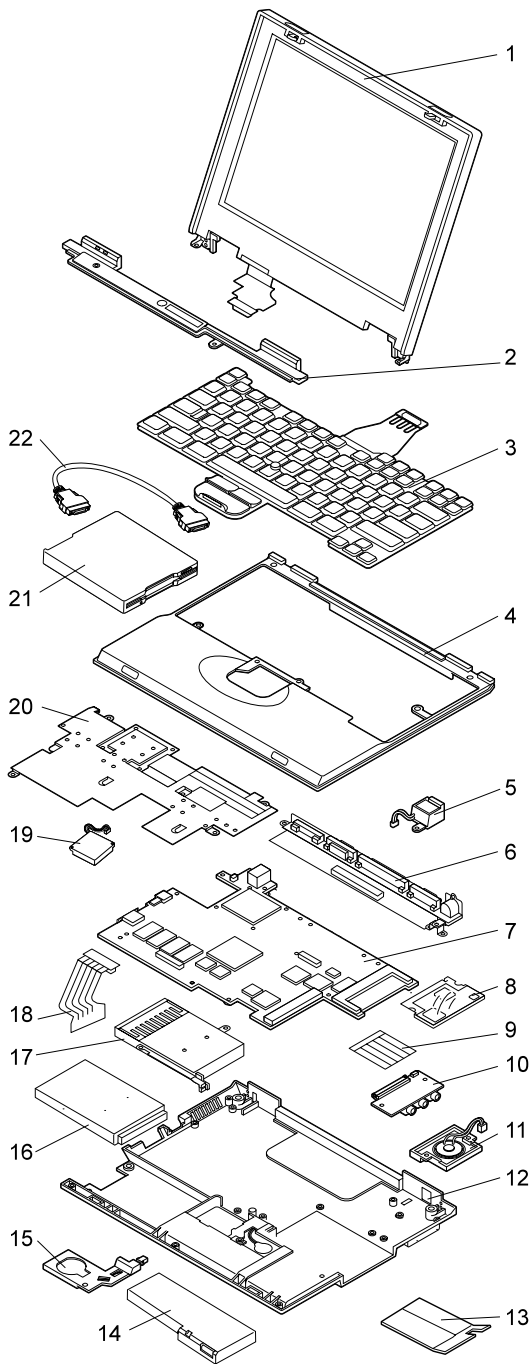


*Locations*

## Password pads



## Parts List



*Parts list*

The parts marked with asterisk are CRU (customer replacement unit).

No.	FRU	P/N
1	LCD unit (see "LCD FRU" on page 103.)	
2	Center cover, for 12.1-inch	05K6081
	Center cover (570), for 13.3-inch	05K6082
	Center cover (570E), for 13.3-inch	05K6096
3	Keyboard (see "Keyboard" on page 106)	
4	Keyboard bezel (570)	08K5981
	Keyboard bezel (570E)	05K4759
5	Modem jack (RJ11)	05K2834
	Holder, modem jack	05K6063
6	I/O connector cable (570)	27L0529
	I/O connector cable (570E)	05K4877
7	System board, Pentium II 300 MHz	10L1243
	System board, Pentium II 333 MHz	10L1299
	System board, Pentium II 366 MHz	10L1244
	System board, Celeron 366 MHz	10L1379
	System board, Celeron 400 MHz	08K3420
	System board, 450 MHz (570E)	10L1429
	System board, 500 MHz (570E)	10L1376
8	Modem card	08K3412
9	Cable, audio card	05K2833
10	Audio card	10L1245
11	Speaker (570)	02K4870
	Speaker (570E)	02K4937
12	For 570, MT 2643	
	Base cover	08K5687
	Base cover, for Korea	08K5688
	Base cover, for China	08K5689
	Base cover, for Taiwan	08K5690
	For 570, MT 2644	
	Base cover	05K6061
	Base cover, for Korea	10L1906
	Base cover, for China	10L1907
	Base cover, for Taiwan	10L1908

(continued)



Parts list

No.	FRU	P/N
	For 570E, MT 2643	
	Base cover	08K5683
	Base cover, for Korea	08K5684
	Base cover, for China	08K5685
	Base cover, for Taiwan	08K5686
	For 570E, MT 2644	
	Base cover	05K6286
	Base cover, for Korea	05K6287
	Base cover, for China	05K6288
	Base cover, for Taiwan	05K6289
13	DIMM cover*	05K6071
14	Battery pack*, Panasonic	02K6638
	Battery pack*, SANYO	02K6639
15	Backup battery*	02K6572
	Holder, backup battery (see system misc. parts)	
16	Hard disk drive* (4.0 GB)	22L0018
	Hard disk drive* (6.0 GB)	22L0055
	Hard disk drive* (6.4 GB)	22L0019
	Hard disk drive* (10.0 GB)	22L0016
	Hard disk drive* (12.0 GB)	22L0053
17	PC Card slots (570)	05K6068
	PC Card slots (570E)	05K6291
18	Hard disk drive cable (570)	05K2837
	Hard disk drive cable (570E)	27L0476
	Holder, hard disk drive cable	08K6379
	Holder, hard disk drive (570E)	05K6294
	Cover*, hard disk drive	05K6072
	Bracket, hard disk drive	05K4752
19	Fan (570)	05K6065
	Fan (570E)	05K6293
20	Upper shield (570)	05K6064
	Upper shield (570E)	05K6290
21	Diskette drive* (TEAC)	05K8989
21	Diskette drive* (SONY)	05K8990
22	Cable*, diskette drive	05K2844

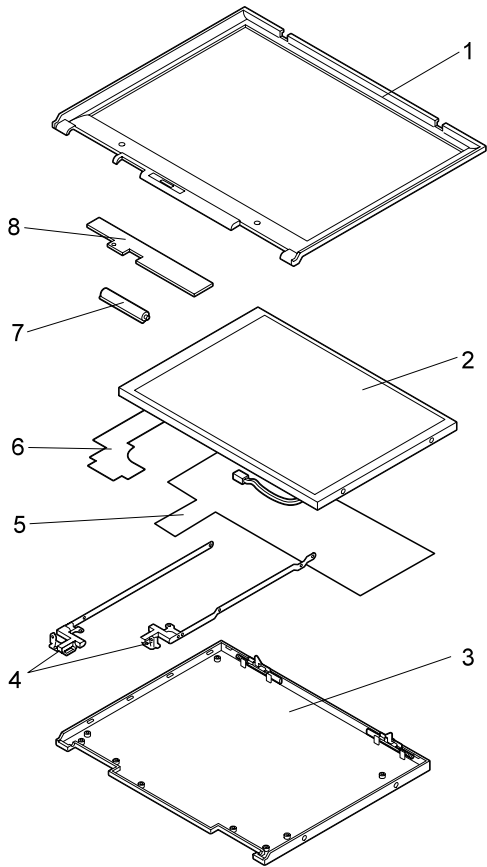
(continued)

Parts list

No.	FRU	P/N
	Screw kit (including nylon-coated screws): <ul style="list-style-type: none"> <li>• M2 x 4 mm, pan head (5)</li> <li>• M2 x 9 mm, flat head (10)</li> <li>• M2.5 x 3 mm, flat head (20)</li> <li>• M2.5 x 4.8 mm, flat head (30)</li> <li>• M2.5 x 9 mm, flat head (10)</li> <li>• M2.5 x 3 mm, flat head small (5)</li> <li>• M3 x 3 mm, flat head (5)</li> <li>• Hex stud D-sub (10)</li> <li>• Screw caps (10)</li> <li>• Screw caps, front (5)</li> <li>• Screw caps, side (5)</li> <li>• Screw caps, rear (5)</li> </ul>	08K5892
	System miscellaneous parts* (including nylon-coated screws): <ul style="list-style-type: none"> <li>• Power switch knob</li> <li>• Holder, backup battery</li> <li>• Cover, microphone</li> <li>• Cover, I/O connector</li> <li>• LID modem blank</li> <li>• GND spring, LCD I/F</li> </ul>	05K6066 08K6444
	Hard disk drive screw kit*	05K6073

*Parts list*

**LCD FRU**  
**13.3-inch XGA TFT**



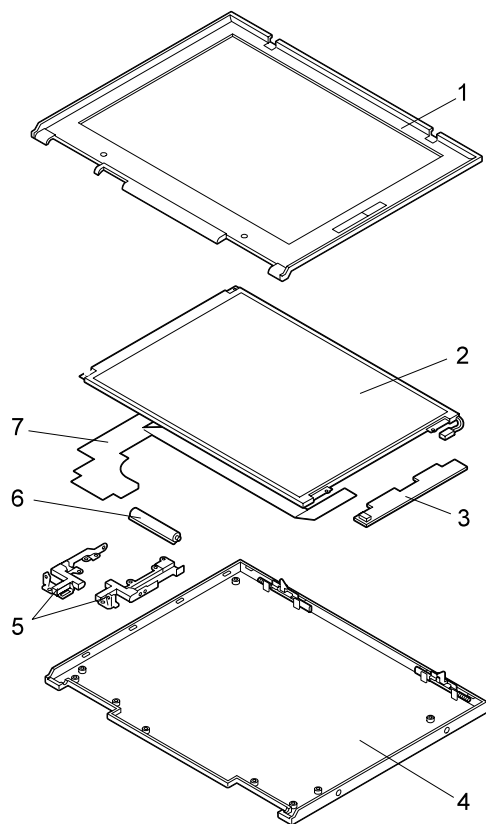
(continued)

*Parts list*

No.	FRU	P/N
	LCD unit (DBU)	05K9506
	LCD unit (HITACHI)	05K9492
	LCD rear cover kit for Korea (570)	05K6456
	LCD rear cover kit for Korea (570E)	05K6455
1	LCD front bezel	05K6077
2	LCD panel (see LCD Unit)	
3	LCD rear cover	08K6454
4	Hinges	08K5290
5	Shield	08K6384
6	LCD cables	05K2836
7	LCD miscellaneous parts kit	05K6080
8	Inverter card	10L1249
	Rear shield	08K6384
	Copper tape	27L6460

Parts list

12.1-inch SVGA TFT



No.	FRU	P/N
	LCD unit	05K9505
	LCD rear cover kit for Korea	10L1909
1	LCD front bezel	05K6076
2	LCD panel (see LCD unit)	
3	Inverter card	10L1248
4	LCD rear cover	05K6074
5	Hinges	05K6078
6	LCD miscellaneous parts kit	05K6080
7	LCD cables	27L0507

Parts list

## Keyboard

No.	FRU	P/N
	Arabic	10L2208
	Belgian	10L2190
	Canadian French	10L2168
	Chinese, Simplified	02K4875
	Chinese, Traditional	10L2176
	Czech	10L2210
	Danish	10L2200
	Dutch	10L2188
	French	10L2182
	German	10L2180
	Hungary	10L2212
	Hebrew	10L2206
	Italian	10L2184
	Japanese	10L2172
	Korean	10L2174
	Latin American Spanish	10L2170
	Norwegian	10L2198
	Portuguese	10L2194
	Russian	10L2202
	Spanish	10L2192
	Swedish or Finnish	10L2196
	Swiss	10L2186
	Turkish	10L2204
	U.K. English	10L2178
	U.S. English	10L2166

## Option list

AC adapter* (56W, Sanken)	02K6555
AC adapter*, for Japan	02K6554
AC adapter* (56W, Astec)	02K6557
AC adapter* (56W, Astec), for Japan	02K6556
TrackPoint III cap*	84G6536
Telephone cable	05K2707
UltraBase	10L2149
UltraBase blank bezel	05K6211
UltraBase miscellaneous kit	08K6585
Quick charger	11J9003
Attachment, quick charger	05K5666

*Parts list*

Modem kit	
for Australia	22L1939
for Austria	22L1863
for Belgium	22L1929
for Denmark	22L1919
for France	22L1909
for Germany	22L1911
for Israel	22L1935
for Italy	22L1915
for Malaysia	27L0425
for Netherlands	22L1917
for New Zealand	22L1937
for Norway or Finland	22L1921
for Portugal	22L1931
for Singapore	22L1941
for Spain	22L1913
for Sweden	22L1923
for Switzerland	22L1925
for Turkey	22L1933
for U.K.	22L1907
UltraslimBay HDD adapter	05K5336
SuperDisk UltraslimBay drive	20L1929
24X-10X IDE CD-ROM drive	12J2471
20X-8X CD-ROM drive	1969010
20X-8X stereo CD-ROM drive	1969011
6.4-GB hard disk drive	02K0518
DVD 6X (RPC II) UltraslimBay drive	05K9169
DVD UltraslimBay drive	
for North America (Region 1)	05K8890
for Japan and EMEA (Region 2)	05K8891
for AP North and AP South (Region 3)	05K8832
for LA and AP South (Region 4)	05K8893
for Russia (Region 5)	05K8959
for China (Region 6)	05K8960
32-MB SDRAM SO DIMM*	76H0294
64-MB SDRAM SO DIMM*	20L0241
128-MB SDRAM SO DIMM*	01K1150
Miniature mouse (black)	07G0033

Parts list

## Common Parts List

### Tools

Triconnector wrap plug	72X8546
PC test card	35G4703
Audio wrap cable	66G5180
USB parallel test cable	05K2580
Screwdriver kit	95F3598
Torque screwdriver	05K4695
5mm socket wrench	05K4694
Screwdriver	27L8126
ThinkPad hardware maintenance diskette version 1.60 <b>Note:</b> Download the file from the Web site.	–



*Parts list*

**Power cords:** IBM power cords for a specific country are usually available only in that country:

**For 2-pin power cords:**

Used in these countries	P/N
Japan	13H5273
Argentina	36L8870

**For 3-pin power cords:**

Used in these countries	P/N
Argentina	36L8867
People's Republic of China (other than Hong Kong)	76H3514
Argentina, Australia, New Zealand, Papua New Guinea, Paraguay, Uruguay	76H3516
Aruba, Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Curaçao, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Korea (South), Liberia, Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Suriname, Taiwan, Thailand, Trinidad (West Indies), United States of America, Venezuela	02K0539
Austria, Belgium, Bosnia-Herzegovina, Bulgaria, Croatia, Czech Republic, Egypt, Finland, France, Germany, Greece, Hungary, Iceland, Indonesia, Macao, Macedonia, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Turkey, Yugoslavia	76H3518
Denmark	76H3520
Bangladesh, Myanmar, Pakistan, South Africa, Sri Lanka	76H3522
Abu Dhabi, Albania, Antigua, Bahrain, Brunei, Dubai, Fiji, Hong Kong, India, Ireland, Kenya, Kuwait, Malaysia, Nigeria, Oman, Qatar, Singapore, United Kingdom	76H3524
Liechtenstein, Switzerland	76H3528
Chile, Ethiopia, Italy, Libya	76H3530
Israel	76H3532
Korea	76H3535

*Parts list*

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