IBM Mobile Systems

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ThinkPad 570 (2644)
ThinkPad 570 UltraBase

Hardware Maintenance Manual

February 1999

IBM

Note

Before using this information and the product it
supports, be sure to read the general information
under "Notices" on page 103.

First Edition (February 1999)

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About This Manual

This manual contains service and reference information for IBM ThinkPad 570Z (2644) and ThinkPad Ultrabase products. Use this manual along with the advanced diagnostic tests to troubleshoot problems effectively.

The manual is divided into sections as follows:

- The Introduction section provides general information, guidelines, and safety information required to service computers.

- The product-specific section includes service, reference, and product-specific parts information.

Important

This manual is intended for trained servicers who are familiar with ThinkPad products. Use this manual along with the advanced diagnostic tests to troubleshoot problems effectively.

Before servicing an IBM ThinkPad product, be sure to review the safety information under "Safety Notices (Multi-lingual Translations)" on page 6 and "Safety Information" on page 13.

Related Publications

The following product publications are available through IBM or your IBM Authorized Dealer.

Publication	Part, Form Number
Mobile Systems HMM Volume 1: Laptop, Notebook, Portable, and ThinkPad Computers (Models L40, CL57, N45, N51, P70/P75, ThinkPad 300, 350, 500, 510, 710T, Expansion Unit, Dock I, Dock II)	30H2356, S82G-1501-01
Mobile Systems HMM Volume 2: ThinkPad Computers (Models 340, 355, 360, 370, 700, 701, 720, 750, 755)	30H2357, S82G-1502-03
Mobile Systems HMM Volume 3: ThinkPad Computers (Models 365, 380, 385, 560, 760, SelectaDock)	84H8099, S82G-1503-05
Mobile Systems HMM Volume 4: ThinkPad Computers (Models 380, 385, 560, 760, 765)	05L1271, S05L-1270-01

Related Diskettes

The following diskettes are available through IBM or your IBM Authorized Dealer.

Diskette	Part, Form Number
ThinkPad 300 (2615) Advanced Diagnostics Diskette	33G9361, S33G-9361
ThinkPad 350, 350C, 425, 425C (2618) Advanced Diagnostics Diskette	A211000, GA21-1000
ThinkPad 365 (2625) Advanced Diagnostics Diskette	76H7578, S30H-2498
ThinkPad 380/385 (2635) Maintenance Diskette	06J0333, S06J-0333
ThinkPad 500 (2603) Advanced Diagnostics Diskette	71G3702, S71G-3702
ThinkPad 510 (2604) Advanced Diagnostics Diskette	83G8095, S83G-8095
ThinkPad 700 (9552) Reference Diskette	42G2017, S42G-2017
ThinkPad 700C (9552) Reference Diskette	42G2023, S42G-2023
ThinkPad 720/720C (9552) Reference Diskette	61G1194, S61G-1194
ThinkPad Hardware Maintenance Diskette (for all Models 355, 360, 560, 750, 755, 760)	78H5384, S78H-5384
ThinkPad Dock I (3545)	71G4140, S71G-4140
Docking Station (3550)	42G2428, S42G-2428
Data/Fax Modem	61G1556, S61G-1556
FaxConcentrator/A	84F8540, S84F-8540

Contents

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.

INTRODUCTION

Introduction

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:
>
> **Montreal**   514-938-3022
> **Toronto**   905-316-4255
> **Vancouver** 604-664-6464
> **Winnipeg**   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.

INTRODUCTION

> **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.

```
              Shorter POST Messages
             ┌───┬───┬───┬───┐
             │   │   │   │   │
          ┌──┴──┴──┴──┴──┴──┴──┴──┐
          │ 0 │ 0 │ 0 │ 0 │ 0 │ 0 │ 0 │ 0 │
          └──┴──┴──┴──┴──┴──┴──┴──┘
           │     │   │       │   │   │
  Reserved │     │   │       │   │    Size (SCSI)
           │     │   │       │    Slot Number (SCSI)
       Device Code │    Logical Unit Number (SCSI)
                ID (SCSI)
```
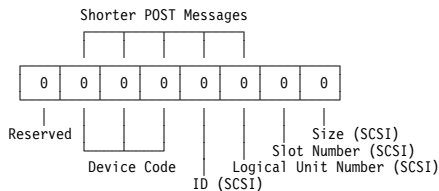
All SCSI devices are set to a different SCSI ID. Duplicate SCSI ID settings can generate a false error message. Use the SCSI ID to determine whether the error message is coming from an internal or an external device.

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.

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 temperature 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 Systembatterie ist eine Lithiumbatterie. 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 e una batteria al litio e puo 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 bateria de repuesto es una bateria 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.

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, beállításoktól 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 kontrôl, 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 !

Aprendo 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. Vyhnite sa priamemu pohľadu a nehľadte priamo s optickými nástrojmi do lúča a vyhnite 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

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 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 from a variety of reasons 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. If this is suspected, clear the error log and run the test again. Do not replace any FRUs if log errors do not reappear.

- **Be careful not to replace a nondefective FRU.**

What to do first: The servicer must include the following in the parts exchange form or parts return form that is attached to the returned FRU:

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

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 FDD.
- Diskette drive damage caused by the diskette
  drive cover being pressed 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).

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

- Missing parts might be a symptom of
  unauthorized service or modification.
- HDD spindles can become noisy from being
  subjected to excessive force or from being
  dropped.
- I9990303 errors can be caused by exposure to
  strong magnetic fields.

FRU replacement notices

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

LCD replacement notice

The TFT LCD for the computer contains over 2,359,296 thin-film transistors (TFTs). A small number of missing, discolored, or lighted dots (on all the time) 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 **8 or more**.

Screw notices

This computer uses special nylon-coated screws with 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 if you are instructed.
- Use a torque screwdriver if you have one.

Loose screws can cause a reliability problem. The IBM ThinkPad computer addresses this problem with nylon-coated screws. 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
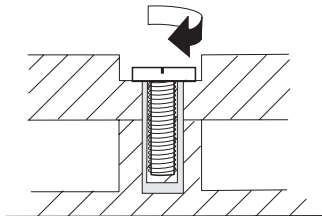
   (Cross-section)

- **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)
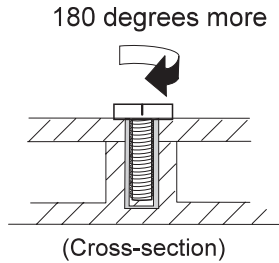
- **Torque driver**
  If you have a torque driver, refer to the "Torque" column with each step.
- Make sure you use the correct screw, and tighten all screws firmly to the torque shown in the table if you have a torque screwdriver. **Never use a screw that you removed. Use a new one. Make sure the screws are tightened firmly.**

System board replacement notice

Restoring the system unit serial number:

The EEPROM on the system board contains vital product data (VPD), such as the system unit serial number and the system board serial number. You must restore the system unit serial number to its original number when the system board is replaced.

To restore the system unit serial number, do the following:

1. Install the ThinkPad Hardware Maintenance Diskette Version 1.60 and restart the computer.
2. Select **1. Set System Identification** from the main menu.
3. Verify the system unit serial number displayed. If it is incorrect, type the correct number on the panel.

> **Notes**
> - Do not power-off the computer during the restoration process.
> - The serial number label is attached to the bottom of the computer.

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 EEPROM contains the following serial numbers:

- System board serial number
- System unit serial number

You must restore the system unit serial number to its original value when replacing the system board.

Introduction   **23**

To save the original serial number, do the following:

1. Install the ThinkPad Hardware Maintenance Diskette Version 1.60 and restart the computer.

2. Select **1. Set System Identification** from the main menu.

3. Select **2. Read S/N data from EEPROM**.

Each serial number is displayed with its device type. Write down the system unit serial number. The device type designations for each serial number are as follows:

     20: System unit serial number
     40: System board serial number

To restore the serial number after you have replaced the system board, do the following:

1. Install the ThinkPad Hardware Maintenance Diskette Version 1.60 and restart the computer.

2. Select **1. Set System Identification** from the main menu.

3. Select **1. Add S/N data from EEPROM**.

    Follow the instruction on the screen.

Note

The system unit serial number is written in the label attached on the bottom of the computer.

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. Consequently, 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:

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.

Related service information

This section provides information about the following:

- "Reset switch"
- "Running a low-level format"
- "Service Web site"
- "Passwords"
- "Power management features" on page 28
- "Fn key combinations" on page 32

Reset switch

The Reset switch resets the system (regardless of the microcode status) and forces the power off. Use this push button to power off when power is not completely off or the microcode is in a hung state. See the "Locations" on page 89 for the Reset switch location.

Running a low-level format

> **Attention**
>
> Make sure the drive address to be formatted is correct. This procedure erases all information on the disk.

To format the hard disk, use the **Full Erase Hard Drive** or **Quick Erase Hard Drive** in Utility of the PC-Doctor DOS. Refer to "Utility" on page 36.

Service Web site

When the latest maintenance diskette and system program service diskette are available, they are posted on:

Maintenance diskette:
> http://www.pc.ibm.com/partner/infotips

System program service diskette:
> http://pccbbs.raleigh.ibm.com/

Passwords

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

- **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.
- **The PAP and the HDP:**
  If the PAP is used, the HDP is enabled automatically, and no HDP prompt appears. The HDP is set the same as the PAP.

The ThinkPad computer with the bay can support more than two HDPs.

- If the **POP** is the same as one of the **HDPs** (HDP-1 or HDP-2), a POP prompt appears. But one of the HDP prompts does not appear.
- 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, and neither HDP prompt appears. Both HDP-1 and HDP-2 are set the same as the PAP.

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 obtain permission from the password owner to unlock the password before running diagnostic tests and performing service. If both a supervisor password and a hard disk password are set, you can enter IBM BIOS Setup Utility by pressing the **Enter** key or by entering the power-on password at the supervisor password prompt. In this case, you can not select some items in the IBM BIOS Setup Utility.

Attention

The supervisor password and 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.

Removing the power-on passwords:

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

1. Power off the computer.
2. Remove the DIMM cover on the bottom side of the computer.
3. Short-circuit the two password pads. (see "Password pads" on page 92).
4. Under the short-circuit condition, power on the computer and wait until the POST ends.

   After the POST ends, the password prompt does not appear. The power-on password is removed.
5. Reinstall the DIMM cover.

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

1. Power on the computer and press **F1** to start the IBM BIOS Setup Utility.

2. Enter the supervisor password. The IBM BIOS Setup Utility menu appears.

3. Using the up or down arrow key, select **Password**. The item you selected appears in reverse.

4. Press the **Enter** key.
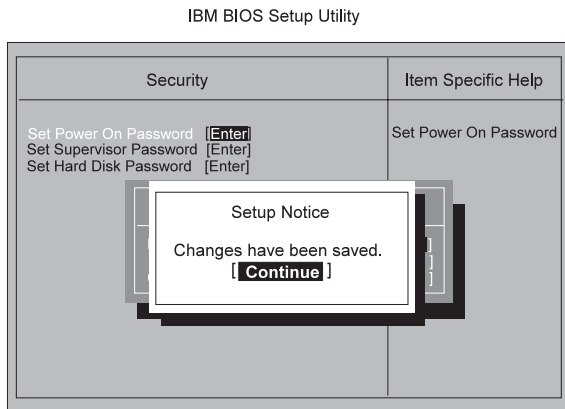
   The password selection window appears.

   IBM BIOS Setup Utility

Password	Item Specific Help
Set Power On Password [Enter] Set Hard Disk1 Password [Enter] Set Hard Disk2 Password [Enter] Set Supervisor Password [Enter]	Set Power On Password

   F1   Help↓↑ Select Item   **Space/-** Change Values   **F9** Setup Defaults
   F3/ESC Exit ↔   Select Menu **Enter**   Select Sub-Menu **F10** Save and Exit
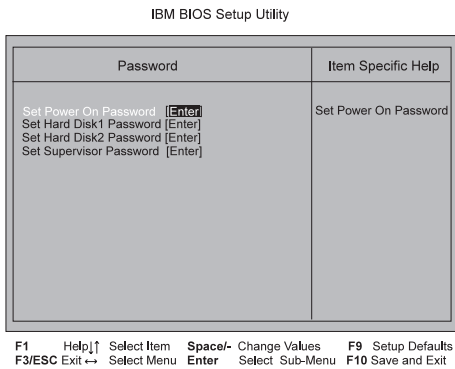
5. Using the up or down arrow key, select the **Set Power-On Password**. The item you selected appears in reverse.

6. Press the **Enter** key.

   The password setup window appears.

   IBM BIOS Setup Utility

Security	Item Specific Help
Set Power On Password [Enter] Set Supervisor Password [Enter] Set Hard Disk Password [Enter] Set Power On Password **Enter Current Password** [ ] Enter New Password [ ] Comfirm New Password [ ]	Set Power On Password

   Enter   Accepts
   F3/ESC Exit
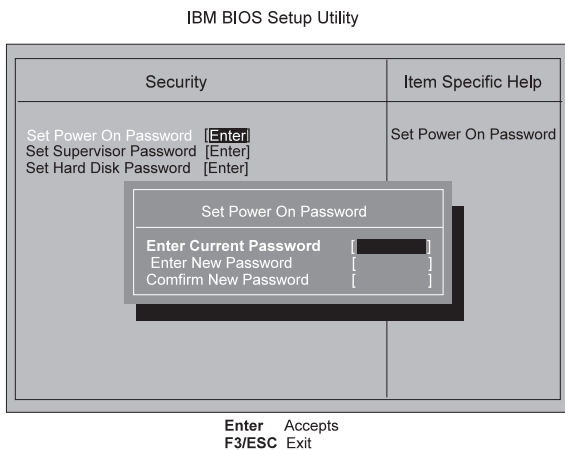
7. Type the current supervisor password and press **Enter**.

8. Leaving the two lines for the new password blank, press the **Enter** key twice.

9. Press the **Enter** key.

   The "Setup Notice" message appears.

IBM BIOS Setup Utility

```
┌─────────────────────────────────────────────────────────────┐
│                                                               │
│              Security               │  Item Specific Help     │
│─────────────────────────────────────┼─────────────────────── │
│  Set Power On Password   [Enter]    │  Set Power On Password  │
│  Set Supervisor Password  [Enter]   │                         │
│  Set Hard Disk Password   [Enter]   │                         │
│         ┌─────────────────────────────────┐                   │
│         │         Setup Notice            │                   │
│         │                                 │                   │
│         │   Changes have been saved.      │                   │
│         │      [ Continue ]               │                   │
│         └─────────────────────────────────┘                   │
│                                                               │
│                                                               │
└─────────────────────────────────────────────────────────────┘
```

10. Press the **Enter** key.

    The power-on password has been removed.

Power management features

Three power management modes are provided by the computer to reduce power consumption and prolong battery power.

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.

The computer enters standby mode when the **Fn** + **F3** keys are pressed.

The computer exits standby and resumes normal operation when any key is pressed.

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.

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

Any of the following events causes the computer to enter suspend mode:

- The **Fn** + **F4** keys are pressed.
- The LCD cover is closed. If you select the **Will not suspend even if LCD is closed** check box in the Power Management Properties window, the computer will not enter suspend mode even if the LCD is closed; the LCD only turns off.
- The **Suspend** button is selected in the Fuel-Gauge program.
- The specified time has elapsed from the last operation with the keyboard, the TrackPoint, the hard disk drive, the parallel connector, or the diskette drive; or the AC Adapter is plugged in.

  In Windows 95, the timer is set by the **Suspend Timer** selection in the Power Properties window. In Windows 98, the timer is set by the **System standby timer** selection in the "Power Management Properties" window.
- The battery indicator blinks orange, indicating that the battery power is low. If you select **Hibernate when battery becomes low** check box in the "Power Management Properties" window, the computer enters hibernation mode under this condition.

  > **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 the power-saving mode. This default low-battery behavior is independent of the operating system, so the computer might behave differently from your setting if you set the low-battery alarm. The computer chooses appropriately between your setting and the default setting.

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 PC Card device.
- The power switch is turned on.
- The resume timer is set. In Windows 95, you can set the time with the **Resume on timer** selection in the "Power Management Properties" window. In Windows 98, the **Scheduled Tasks** setting has priority over the **Resume on timer** selection in the "Power Management Properties" window.

RELATED SERVICE INFORMATION

Note

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

Hibernation mode

┌─ **For the Windows NT User** ──────────────┐

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** ─────────────────────────────────┐

- In the ThinkPad Configuration program, the
  computer can be set to **suspend/hibernate
  while docked.**
- 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 hibernation mode
  is set to **Power switch mode [Hibernation]**.
- The timer conditions are satisfied in suspend mode
  (for operating systems other than Windows 98).
- A critically low battery condition occurs and
  hibernation mode is set to **Hibernate when battery
  becomes low**.

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

Fn key combinations

The following table shows the **Fn** key and function key combinations and their corresponding functions.

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

Fn +	Description
F1	Reserved.
F2	Turn Fuel-Gauge display on or off.
F3	Turn standby mode on.
F4	Turn suspend mode on.
F5	Reserved.
F6	Reserved.
F7	Switch between the LCD and an external monitor.
F8	Turn screen expansion on or off. (There is no symbol on the key.)
F9	Reserved.
F10	Reserved.
F11	Switch the power management mode (High Performance, Automatic, or Customized). **Note** In Windows 98, only the CPU speed is changed.
F12	Turn hibernation mode on.
Model-dependent functions	
Pg Up	Increase the sound volume.
Pg Dn	Decrease the sound volume.
Back space	Mute.

Checkout guide

Use the following procedures as a guide for computer problems.

Note

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

---

1. Obtain the failing symptoms in as much detail as possible.
2. Verify the symptoms by attempting to re-create the failure by running the diagnostic test or by repeating the same 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 of PC-Doctor. This section is an overview on detecting the problem. Refer to "Product overview" on page 42 for details that depend on model-unique functions.

To run the test, do the following:

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**, you can click the the left click button.

---

1. Insert the PC Doctor Startup Disk into the diskette drive; then power on the computer.

    If the computer cannot be powered on, go to "Power systems checkout" on page 37 and check the power sources.

    If an error code appears, go to "Symptom-to-FRU index" on page 47

    The following panel appears:

```
PC DOS 7.0 Startup Menu
======================

    1. CONFIG for TP-390E or TP-570 Test (without Audio)
    2. CONFIG for TP-390E Audio Test
    3. CONFIG for TP-570 Audio Test

Enter a Choice:   1    Time remaining:  00
```
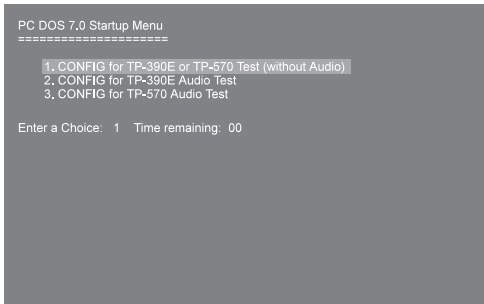
To run any test except the audio test, select choice 1 and press **Enter**.

To run the audio test, select the applicable audio test and press **Enter**.

2. Insert the PC-Doctor DOS Disk 2 and press any key.

```
Diagnostics    Interactive Tests    Hardware Info    Utility    Quit    F1=Help




                PC-DOCTOR 2.0   Copyright 1998 Watergate Software.  All Rights Reserved.

Diagnostic tests that check the functionality of your PC.
Use the cursor keys and ESC to move in menus.  Press ENTER to select.
```
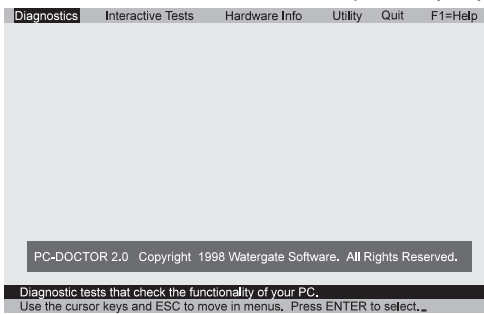
The PC-Doctor main panel appears.

3. Select **Diagnostics** with the arrow keys, and press **Enter**.

A pull-down menu appears:

> ──── **Note** ────
>
> The pull-down menu differs depending on the model.

```
Diagnostics    Interactive Tests    Hardware Info    Utility    Quit    F1=Help
Run Normal Test
Run Quick Test
CPU/Coprocessor
Systemboard
Video Adapter
Serial Ports
Parallel Ports
Fixed Disks
Diskette Drives
Other Devices
Memory Test - Full
Memory Test - Quick


                PC-DOCTOR 2.0   Copyright 1998 Watergate Software.  All Rights Reserved.

Use the cursor keys and ESC to move in menus.  Press ENTER to select.
```

4. Run the applicable function test.

5. Follow the instructions on the screen. If there is a problem, PC Doctor shows some messages.

6. Reseat the cable or connector of the detected FRU and run the test again.

   If the error recurs, replace the FRU that caused the error.

   Note

   With some FRUs, especially the system board, the problem might be caused by peripheral FRUs. Verify that each peripheral FRU, such as the flexible cable, has no problem by doing the following:

   1. Replace each peripheral FRU one at a time, and run the test again.
   2. If the peripheral FRUs have no problem, replace the main FRU itself.

      To see the FRU structure of the each model, refer to "Product overview" on page 42.
   ---

7. To exit the test, select **Quit - Exit Diag**.

   To cancel the test, press **Esc**.

The following table lists the options on the test menu:

Diagnostics	Interactive Tests
• Run Normal Test • Run Quick Test • CPU/Coprocessor • Systemboard • Video Adapter • Serial Ports • Fixed Disks • Diskette Drives • Other Devices • Memory Test - Full • Memory Test - Quick	• Keyboard • Video • Internal Speaker • Mouse • Joystick • Diskette • System Load • CD-ROM/DVD • Stereo Speaker

Notes:

- In **Keyboard** test within **Interactive Tests**, the **Fn** key is scanned only once. Each key should be pressed for at least 2 seconds; otherwise, it cannot be sensed.
- To run the **Linear Write/Read** and **Linear Write/Random** tests within **Diskette Drives**, you must boot the system from its hard disk and start the PC-Doctor from the hard disk drive.

  If you reboot the PC-Doctor from its diskette, the tests cannot be run, because the PC-Doctor requires the system disk be in the diskette drive.
- Stereo Speaker test within the Interactive Tests is not supported on ThinkPad 570.
- Sound Card is not recognized in the **Hardware Info.**

Related service information

The PC-Doctor can detect following system information:

Hardware Info:

- System Configuration
- Memory Contents
- Physical Disk Driver
- Logical Disk Driver
- 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 systems 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 power supply checkout in the following list:

- "Checking the AC Adapter"
- "Checking operational charging" on page 38
- "Checking the battery pack" on page 38
- "Checking the backup battery" on page 39

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 operational charge does not work, go to "Checking operational charging" on page 38.

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:
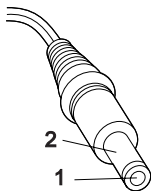
(16 - 10 V)

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

Pin	Voltage (V dc)
2	Ground

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

If the voltage is within the range, do the following:
- Replace the system board.
- If the problem persists, go to "Undetermined problems" on page 51.

Note

An audible 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; with 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 charged when it is hot. In that case, remove it from the computer and leave it at room temperature for a while. After it cools down, reinstall it and recharge it.

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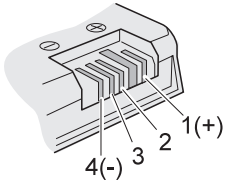
Terminal	Voltage (V dc)
1	+ 0 to + 12.6
4	Ground (−)

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

> **Note**
>
> In this case, the battery pack is over-discharged. It takes at least 3 hours to recharge the battery pack even if the indicator does not turn on.

4. If the voltage is still less than +11.0 V dc after recharging, replace the battery.
5. If the voltage is more than +11.0 V dc, measure the resistance between battery terminals 3 and 4. The resistance must be 4 K to 30 K ohm.
6. 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:

1. Power off the computer and unplug the AC Adapter from the computer.
2. Turn the computer upside down.
3. Remove the backup battery (see "1020 Backup battery" on page 56).
4. Measure the voltage of the backup battery. See the following figure.
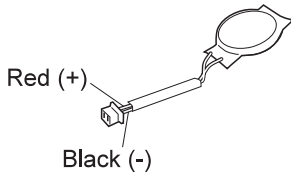
Wire	Voltage (V dc)
Red	+2.5 to +3.2
Black	Ground

- If the voltage is correct, replace the system board.
- If the voltage is not correct, replace the backup battery.

CHECKOUT GUIDE

- If the backup battery discharges quickly after
  replacement, replace the system board.

ThinkPad 570

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

Product overview

Specifications

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

Feature	Description
Processor	• Mobile Pentium® II 300 MHz, L2 256-KB cache • Mobile Pentium II 333 MHz, L2 256-KB cache • Mobile Pentium II 366 MHz, L2 256-KB cache
Bus architecture	• PCI Bus
Memory (standard)	• 64 MB (on the system board)
Memory (option)	• 32 MB, 64 MB, or 128 MB DIMM card (maximum of 192 MB)
CMOS RAM	114 bytes +4 Kbytes
Video	• 12.1-inch, 16M colors SVGA (800×600 resolution) TFT color LCD • 13.3-inch, 16M colors, XGA (1024×768 resolution) TFT color LCD
Diskette drive (external)	1.44 MB (3-mode), 3.5-inch
Hard disk drive	• 4.0 GB, 2.5-inch, IDE interface • 6.4 GB, 2.5-inch, IDE interface
CD-ROM/DVD drive (Option)	• 24 x CD-ROM drive • 2 x DVD drive
I/O port	• External monitor • Line-in • Headphone • Microphone • Mouse • Parallel • Expansion connector • Serial • USB • RJ11
Internal modem	• 56.6 Kbps
Audio	• Internal stereo speaker • Internal microphone • Software control volume
Infrared transfer	IrDA 1.1
PC Card	One Type-III or two Type-II
AC Adapter	56-watt type

Status indicators

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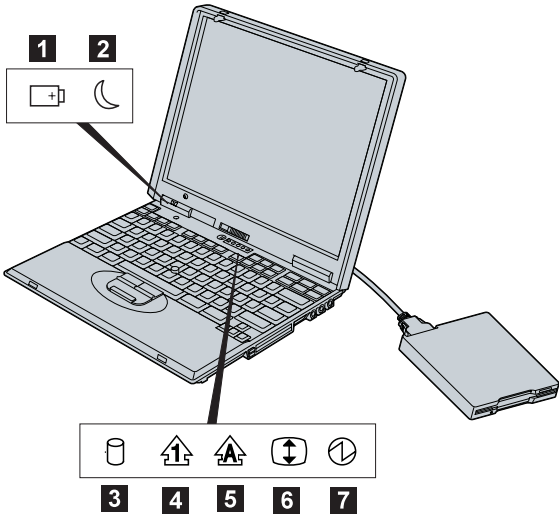
Symbol	Color	Meaning
1 Battery	Green	The battery is fully charged.
	Orange	The battery is charging.
	Blinking orange	The battery needs charging.
2 Suspend Mode	Green	Suspend mode
	Blinking green	Entering suspend mode
3 Hard Disk In Use	Orange	Data is read from or written to the hard disk drive.
4 Numeric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

Structure

The following illustration shows the overall FRU structure.
Use it for detecting the applicable FRU.

☐ Flexible cable
■ Connection

LCD panel

Inverter

LCD
cable

I/O connectors
cable with
connectors

Modem jack

Modem card

Speaker

Audio card

Audio cable

Fan

USB

System Board

CPU, Base memory

HDD cable

HDD

DIMM

PC Card slots

Backup battery

Battery pack

Keyboard with flexible cable
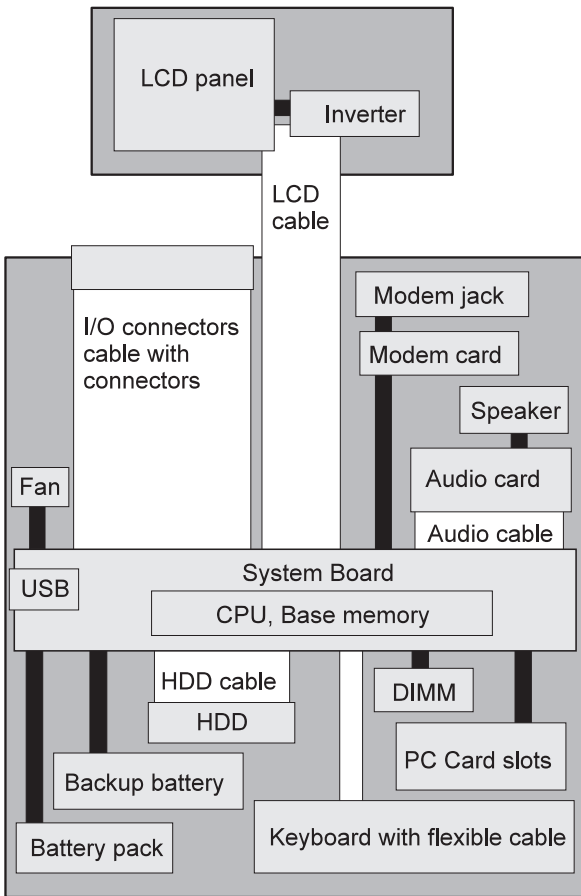
The following table shows the applicable test for each FRU.

FRU	Applicable test
System board	1. CPU/Coprocessor (**Diagnostics**) 2. Systemboard (**Diagnostics**)
Power	Battery (**Diagnostics**)
LCD unit	1. Video Adapter (**Diagnostics**) 2. Video (**Interactive Tests**)
Modem	1. Make sure the modem sets up correctly. 2. Replacing the modem jack and modem card one at a time, run the modem test in **Other Devices** (**Diagnostics**)
Audio	1. Stereo Speaker (**Interactive Tests**)

Speaker	• System beeper:
	   – Internal Speaker (**Interactive Tests**)
	• Speaker of the UltraBase:
	   – Stereo Speaker (**Interactive Tests**)

PC Card slots	Systemboard (**Diagnostic**)
Keyboard	1. Keyboard (**Diagnostics**) 2. Keyboard (**Interactive Test**)
TrackPoint or pointing device	If the TrackPoint does not work, check the configuration in the ThinkPad Configuration program. If the configuration of the TrackPoint is disabled, select **Enable** to enable it. After you use the TrackPoint, the pointer drifts on the screen for a short time. This self-acting pointer movement can occur when a slight, steady pressure is applied to the TrackPoint pointer. This symptom is not a hardware problem. No service actions are necessary if the pointer movement stops in a short period of time. If this does not correct the TrackPoint problem, continue with the following. • Mouse (**Interactive Tests**)
Hard disk drive	Fixed Disks (**Diagnostics**)

FRU	Applicable test
Diskette drive	1. Diskette Drive (**Diagnostics**) 2. Diskette (**Interactive Tests**)
CD-ROM or DVD drive (in the UltraBase)	CD-ROM/DVD (**Interactive Tests**)
Joystick	Joystick (**Interactive Tests**)
Memory	1. If a DIMM is installed, remove it and run **Memory Test - Quick** (**Diagnostics**). 2. If the problem does not recur, replace the DIMM and run the test again. 3. If the test does not detect the error, run **Memory Test - Full** (**Diagnostics**).
Fan	1. Start Windows 98 and check the air turbulence at the louver near the power switch. 2. Run the fan test in **Other Devices** (**Diagnostics**)

Symptom-to-FRU index

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

> **Note**
>
> Perform the FRU replacement or actions in the sequence shown in the "FRU/Action in Sequence" column. If a FRU replacement did 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 the next possible FRU to be replaced when servicing a computer.

Numeric error codes show the errors detected in POST or system operation. In the following error codes, **n** can be any number.

If no codes are available, use narrative symptoms.

If the symptom is not listed, go to "Intermittent problems" on page 51.

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

Numeric error codes

Symptom / error	FRU / action in sequence
0200 Fixed disk failure	1. **Reseat the hard disk drive** 2. Load Setup Defaults in IBM BIOS Setup Utility 3. Hard disk drive 4. System board
0210, 0211 Stuck key Keyboard error	1. **Run the keyboard test in the interactive tests and auxiliary input device**
0212 Keyboard controller failure	1. **Run the keyboard test in the interactive tests and auxiliary input device**
0213 Keyboard is locked—Unlock key switch	1. **Unlock external keyboard**
0220 Monitor type does not match CMOS—run setup	1. **Load Setup Defaults in IBM BIOS Setup Utility**

SYMPTOM-TO-FRU INDEX

Symptom / error	FRU / action in sequence
0230 Shadow RAM failure at offset nnnn	1. **System board**
0231 System RAM failure at offset nnnn	1. **DIMM** 2. System board
0250 System battery is dead—Replace and run setup	1. **Replace the backup battery and run IBM BIOS Setup Utility to reset the time and date**
0251 System CMOS checksum bad—Default configuration used	1. **Replace the backup battery and run IBM BIOS Setup Utility to reset the time and date**
0260 System timer error	1. **Replace the backup battery and run IBM BIOS Setup Utility to reset the time and date** 2. System board
0270 Real time clock error	1. **Replace the backup battery and run IBM BIOS Setup Utility to reset the time and date** 2. System board
0280 Boot incomplete error—Default configuration used	1. **Load Setup Defaults in IBM BIOS Setup Utility** 2. DIMM 3. System board
0281 Memory size recognized by POST is different from that recognized by CMOS	1. **Load Setup Defaults in IBM BIOS Setup Utility** 2. DIMM 3. System board
02B0 Diskette drive error	1. **Check that the drive is defined with the proper diskette type in IBM BIOS Setup Utility** 2. Run the diskette diagnostics test
02D0 System cache error—Cache is disabled	1. **System board**
02F0 CPU ID	1. **System board**
02F5 DIMM test failure	1. **DIMM** 2. System board

Symptom / error	FRU / action in sequence
02F6 Software NMI failure	1. **DIMM** 2. System board
02F7 Fail—Safe timer NMI failure	1. **DIMM** 2. System board

Error messages

Symptom / error	FRU / action in sequence
Device address conflict	1. **Load Setup Defaults in IBM BIOS Setup Utility** 2. Backup battery 3. System board
Allocation error for: device	1. **Load Setup Defaults in IBM BIOS Setup Utility** 2. Backup battery 3. System board
Failing Bits: nnnn	1. **DIMM** 2. System board
Invalid System Configuration Data	1. **DIMM** 2. System board
I/O Device IRQ Conflict	1. **Load Setup Defaults in IBM BIOS Setup Utility** 2. Backup battery 3. System board
Operating System not found	1. **Enter IBM BIOS Setup Utility and see whether the hard disk drive and diskette drive are properly identified** 2. Diskette drive 3. Hard disk drive 4. System board

Beep symptoms

Symptom / error	FRU / action in sequence
One beep and a blank, unreadable, or flashing LCD.	1. **Reseat the LCD connector** 2. LCD assembly 3. System board
One long and two short beeps, and a blank or unreadable LCD.	1. **System board** 2. LCD assembly
Two short beeps with error codes.	**POST error. See "Numeric error codes" on page 47.**
Two short beeps with blank screen.	1. **System board**

No beep symptoms

Symptom / error	FRU / action in sequence
No beep, power-on indicator on, LCD blank, and no POST	1. **Ensure that every connector is connected tightly and correctly** 2. DIMM 3. System board
No beep, power-on indicator on, and LCD blank during POST	1. **Reseat DIMM** 2. System board
No beep, during POST but system runs correctly	1. **Speaker**

LCD-related symptoms

> **Important**
>
> The TFT LCD for the notebook computer contains over 2,359,000 thin-film transistors (TFTs). A small number of missing, discolored, or lighted dots (on all the time) 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 **8 or more**.

Symptom / error	FRU / action in sequence
No beep, power-on indicator on, and a blank LCD during POST.	1. **System board**

Symptom / error	FRU / action in sequence
• LCD backlight not working. • LCD too dark. • LCD brightness cannot be adjusted. • LCD contrast cannot be adjusted.	1. **Reseat the LCD connectors.** 2. LCD assembly 3. System board
• LCD screen unreadable. • Characters missing pels. • Screen abnormal. • Wrong color displayed.	1. **See important note for "LCD-related symptoms."** 2. Reseat all LCD connectors. 3. LCD assembly 4. System board
LCD has extra horizontal or vertical lines displayed.	1. **LCD assembly**

Intermittent problems

Intermittent system hang problems can be caused by a variety of reasons 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 systems checkout" on page 37):

1. Power off the computer.
2. Visually check them for damage. If any problems are found, replace the FRU.
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 UltraslimBay

      i. PC Cards

4. Power on the computer.

5. Determine if 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 removals and replacements

This section contains information about removals and replacements:

- Do not damage any part. Only certified and trained personnel should service the computer.
- The arrows in this section show the direction of movement to remove a FRU, or to turn a screw to release the FRU. The arrows are marked in numeric order, in square callouts, to show the correct sequence of removal.
- If other FRUs must be removed before the failing FRU is removed, they are listed at the top of the page.
- To replace a FRU, reverse the removal procedure and follow any notes that pertain to replacement. See "Locations" on page 89 for internal cable connections and arrangement information.
- When replacing a FRU, use the correct screw as shown in the procedures.

Review "FRU replacement notices" on page 22 before replacing any FRU.

Safety Notice 1: Translation on page 6

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 short circuits.

Safety Notice 3: Translation on page 8

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 12

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.

┌─── **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.   │
│   │
│ An electrostatic discharge (ESD) strap (P/N 6405959) │
│ must be used to establish personal grounding. │
│   │
└──┘

1010 Battery pack
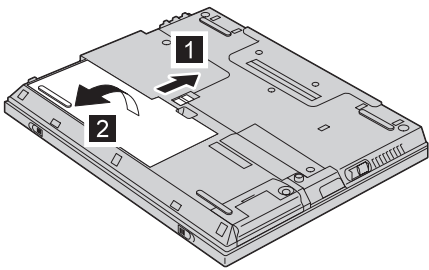
1020 Backup battery

Safety Notice 4: Translation on page 9

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. Use of an incorrect battery can result in ignition or explosion of the battery. Replacement batteries can be ordered from IBM or IBM Authorized Dealers.

- Battery pack **(1010)**
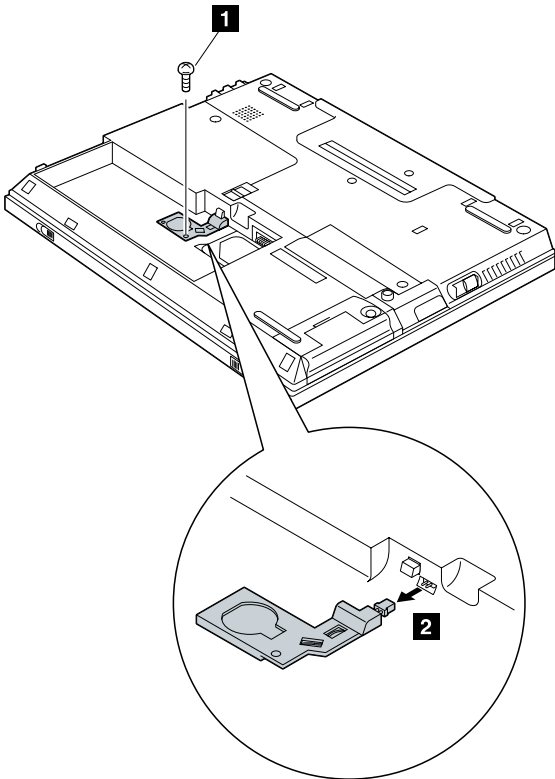
Step	Screw (Quantity)	Color	Torque
1	M2.5 x 3.5 mm (1)	Silver	4 kgcm

Cable routing:
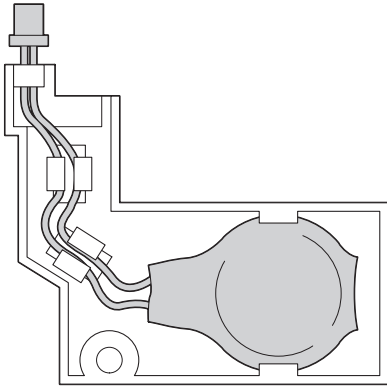
1030 DIMM

- Battery pack **(1010)**

Notch
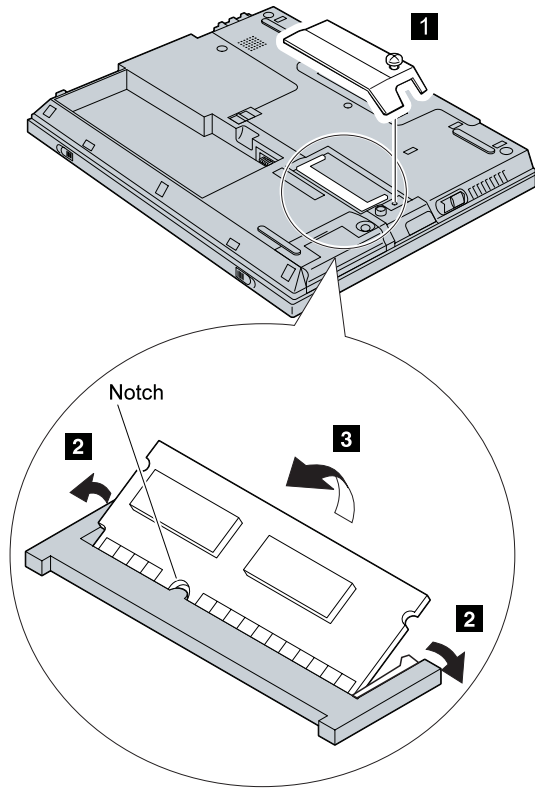
Step	Screw (Quantity)	Color	Torque
1	Not removable	Black	4 kgcm

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 on the drive.
>
> 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)**
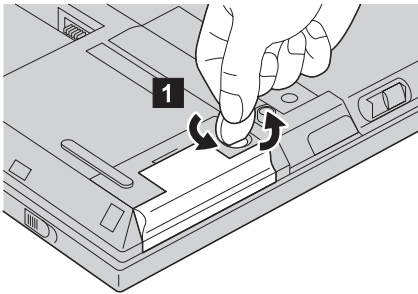
Step	Screw (Quantity)	Color	Torque
1	Coin screw —Or— Security screw	Black	—
Note: Use a 2.5-mm allen wrench to remove the security screw.			
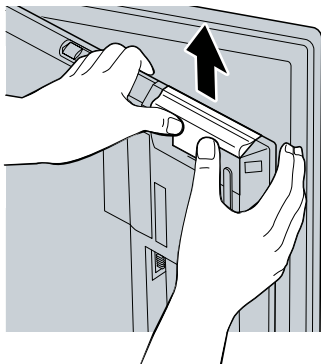
Attention

Be careful not to drop the hard disk drive. It is still attached to the cover when you push it up.
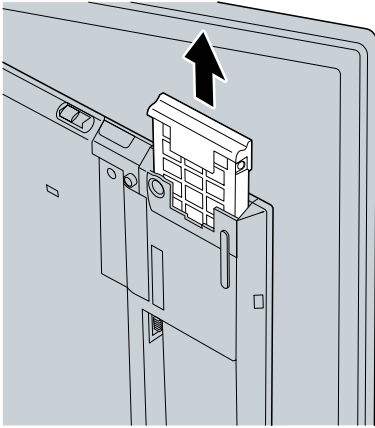
1050 Keyboard

- Battery pack **(1010)**
- Hard disk drive **(1040)**
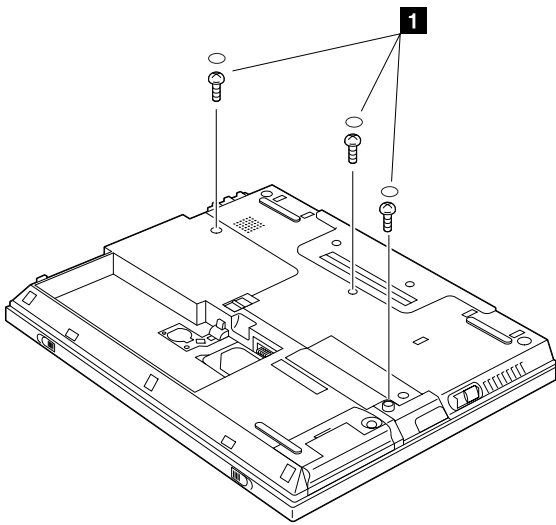
Step	Screw (Quantity)	Color	Torque
1	M2.5 x 9 mm (3)	Black	4 kgcm

(Bottom view)

5

4 Release lever

6 **7**
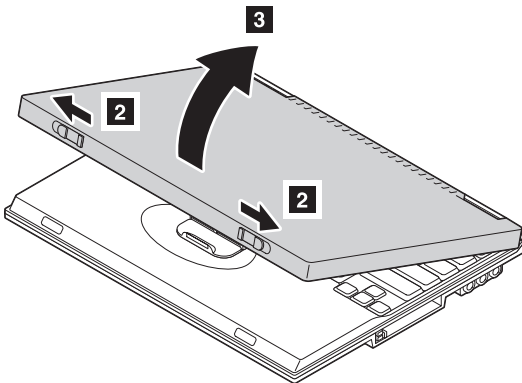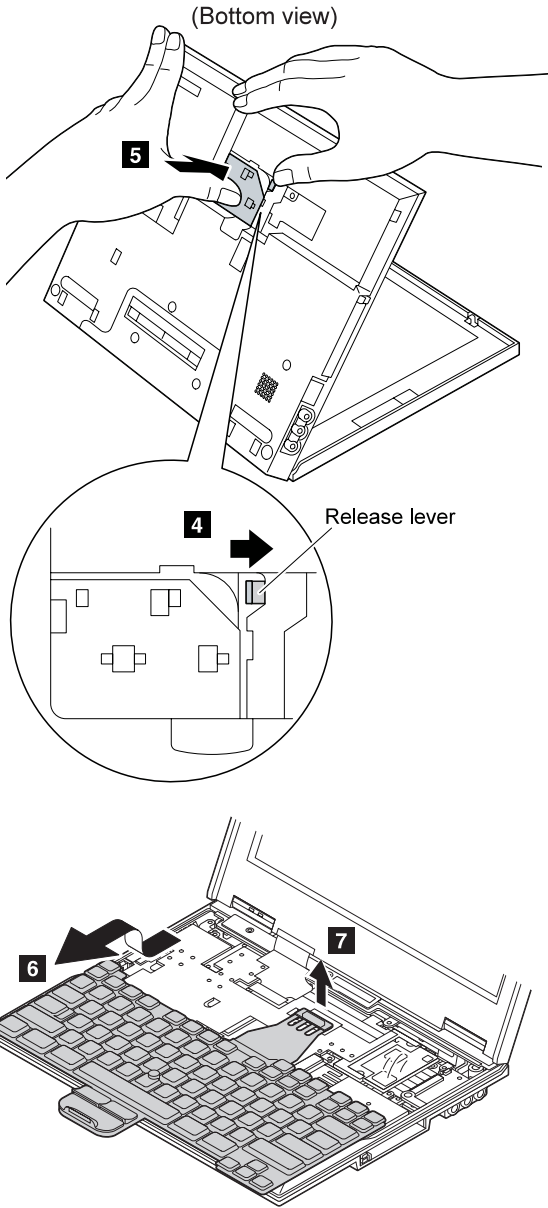
1060 Center cover

- Battery pack **(1010)**
- Hard disk drive **(1040)**
- Keyboard **(1050)**
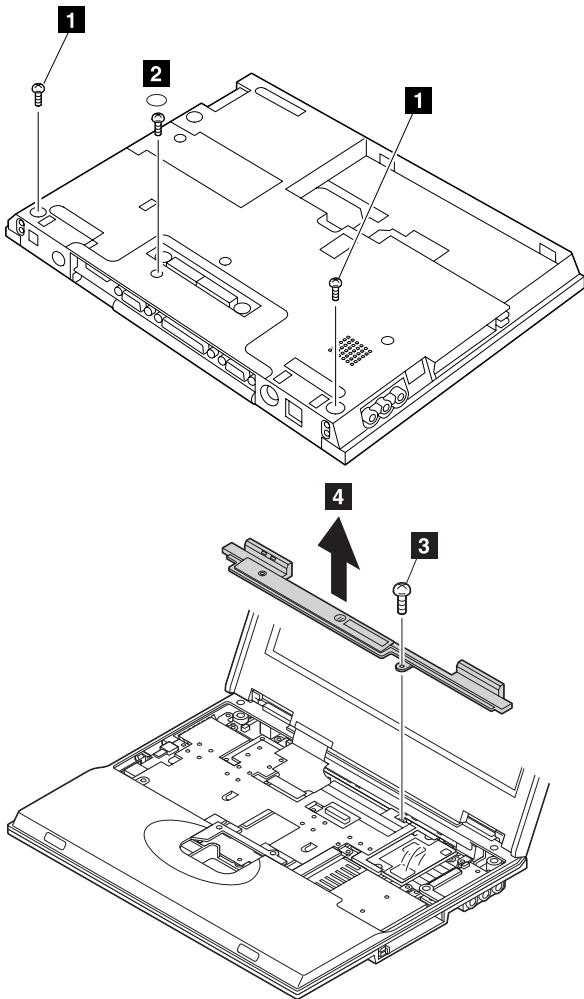
Step	Screw (Quantity)	Color	Torque
1	M2.5 x 3 mm (2)	Yellow	4 kgcm
2	M2.5 x 9 mm (1)	Black	4 kgcm
3	M2.5 x 9 mm (1)	Black	4 kgcm

1070 Modem card

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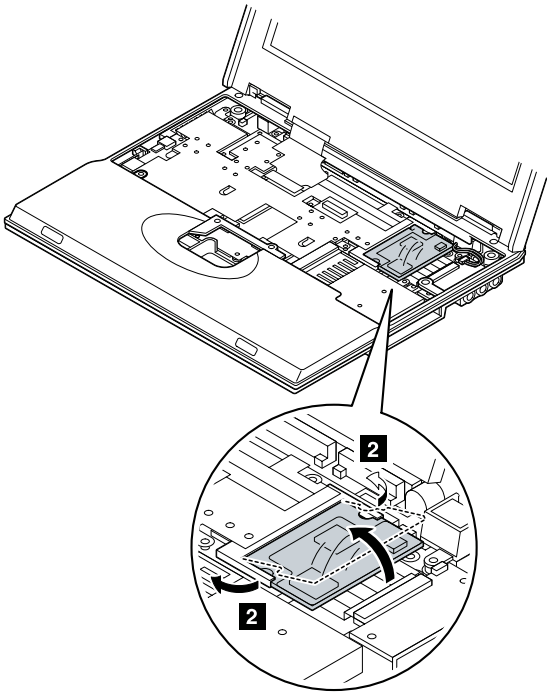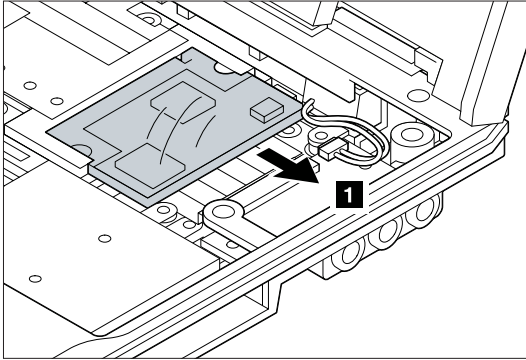
1080 Frame and power switch

- Battery pack **(1010)**
- Hard disk drive **(1040)**
- Keyboard **(1050)**
- Center cover **(1060)**
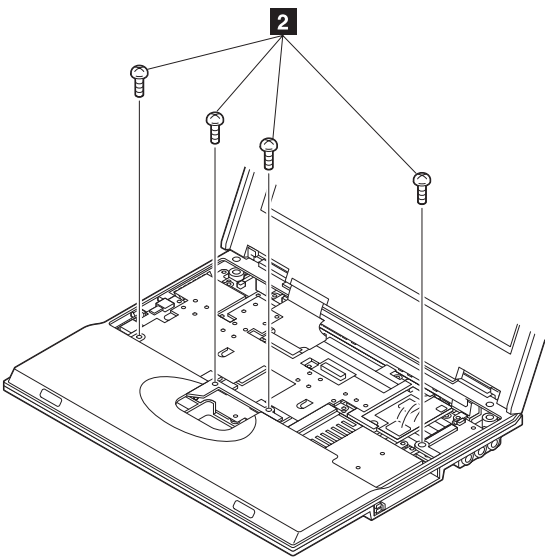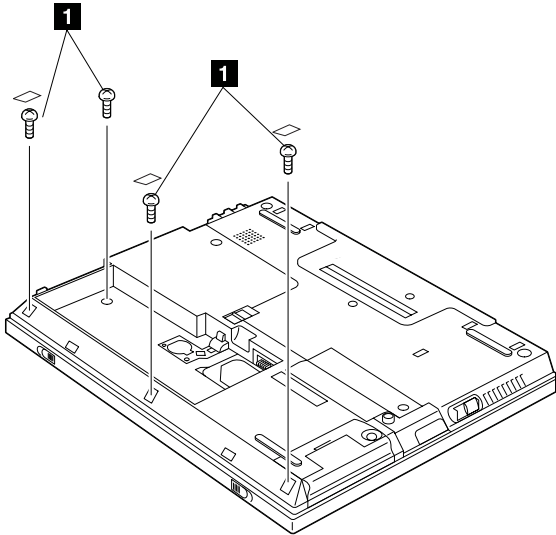
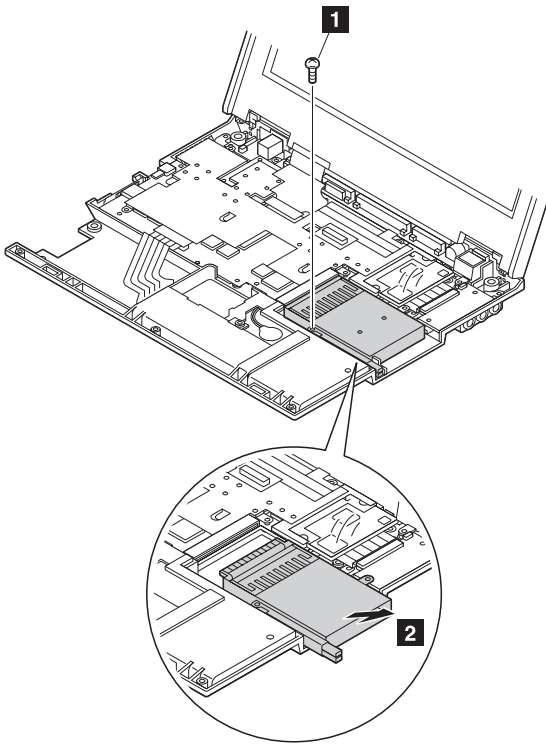| Step	Screw (Quantity)	Color	Torque
1	M2.5 x 3.5 mm (4)	Silver	4 kgcm
2	M2.5 x 4.8 mm (4)	Black	4 kgcm
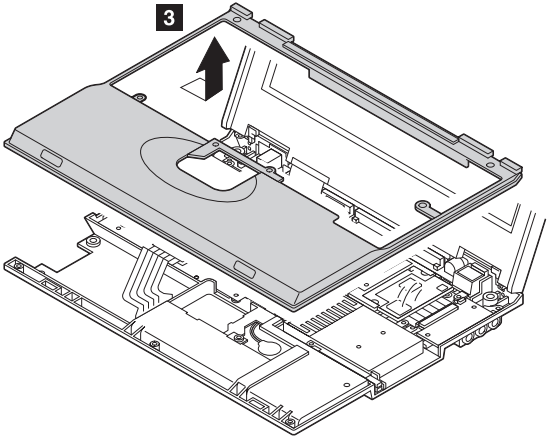
FRU REMOVALS AND REPLACEMENTS

1090 Audio card

- Battery pack **(1010)**
- Hard disk drive **(1040)**
- Keyboard **(1050)**
- Center cover **(1060)**
- Modem card **(1070)**
- Frame and power switch **(1080)**
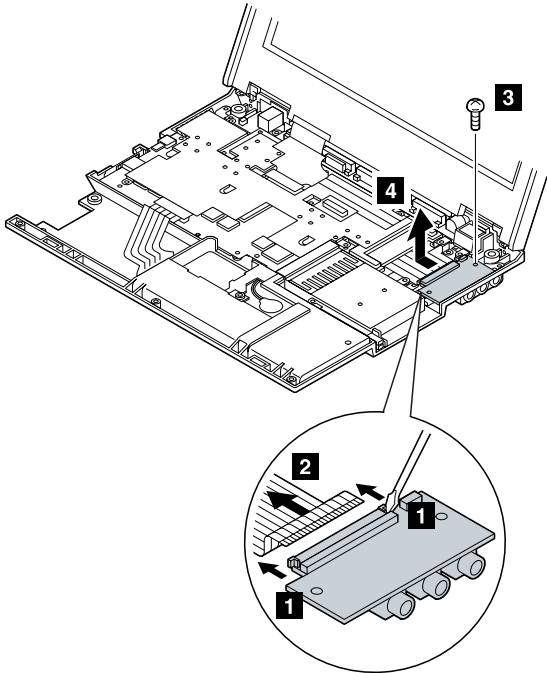
Step	Screw (Quantity)	Color	Torque
3	M2.5 x 4.8 mm (1)	Black	4 kgcm

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)**
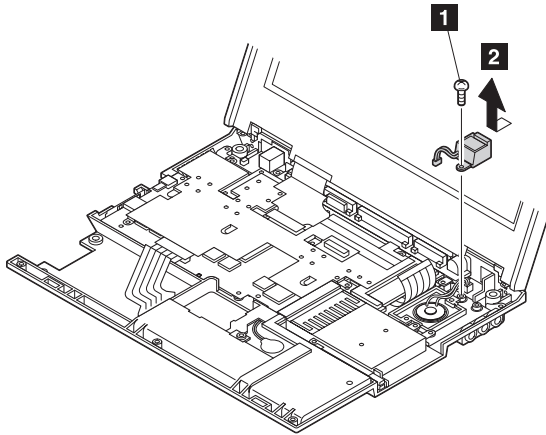
Step	Screw (Quantity)	Color	Torque
1	M2.5 x 4.8 mm (1)	Black	4 kgcm

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)**
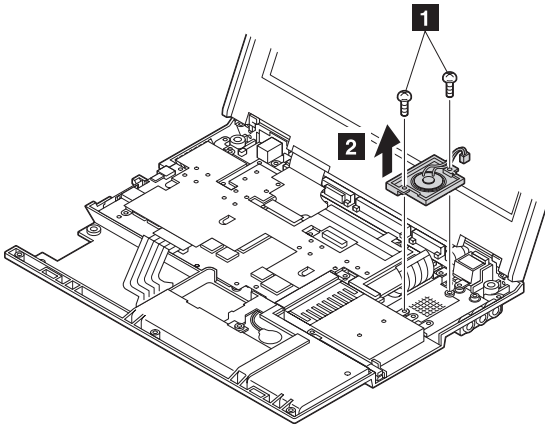
Step	Screw (Quantity)	Color	Torque
1	M2.5 x 4.8 mm (2)	Black	4 kgcm

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)**
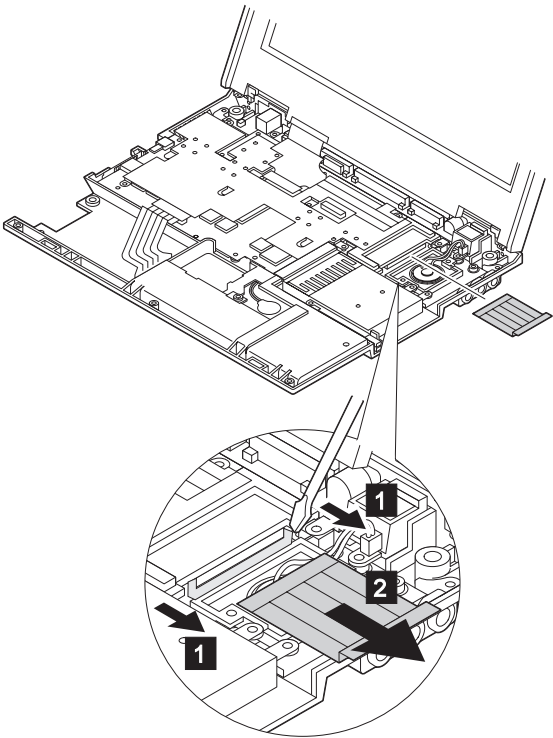
1130 PC Card slots

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

Step	Screw (Quantity)	Color	Torque
1	M2.5 x 4.8 mm (1)	Black	4 kgcm

1140 HDD cable

- Battery pack **(1010)**
- Hard disk drive **(1040)**
- Keyboard **(1050)**
- Center cover **(1060)**
- Frame and power switch **(1080)**
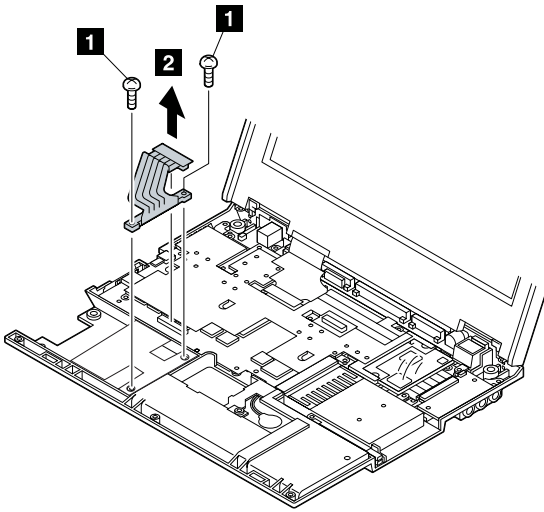
Step	Screw (Quantity)	Color	Torque
1	M2.5 x 4.8 mm (2)	Black	4 kgcm

1150 Upper shield

- Battery pack **(1010)**
- Hard disk drive **(1040)**
- Keyboard **(1050)**
- Center cover **(1060)**
- Frame and power switch **(1080)**
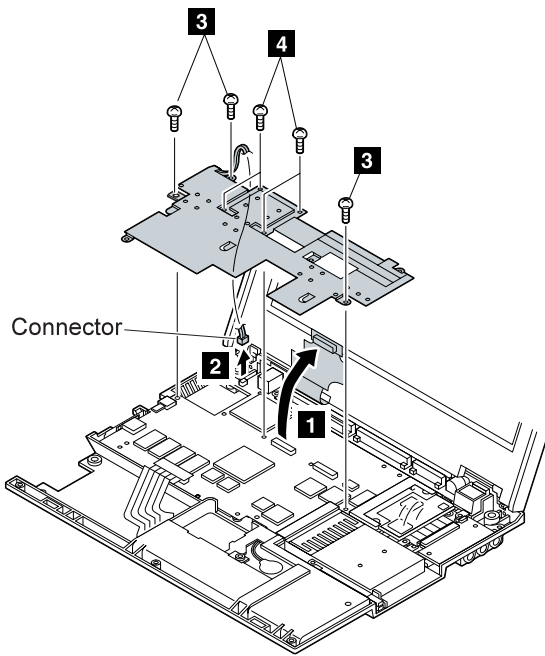
Step	Screw (Quantity)	Color	Torque
3	M2.5 x 4.8 mm (3)	Black	4 kgcm
4	M2 x 9 mm (4)	Yellow	2 kgcm

1160 Fan

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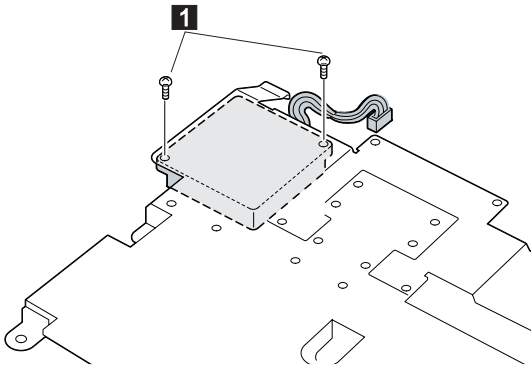
Note

Do not pinch the fan cable when re-installing the fan.

Step	Screw (Quantity)	Color	Torque
1	M2 x 9 mm (2)	Black	2 kgcm

1170 LCD unit

- Battery pack **(1010)**
- Hard disk drive **(1040)**
- Keyboard **(1050)**
- Center cover **(1060)**
- Frame and power switch **(1080)**
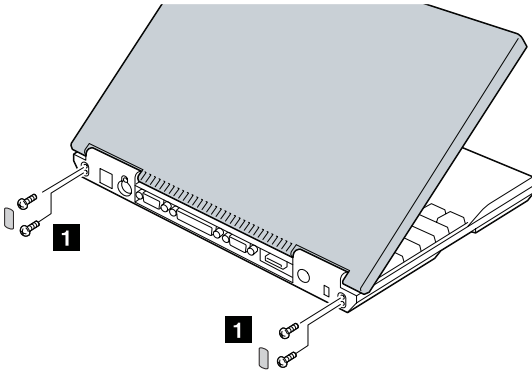
Step	Screw (Quantity)	Color	Torque
1	M2.5 x 4.8 mm (4)	Black	4 kgcm
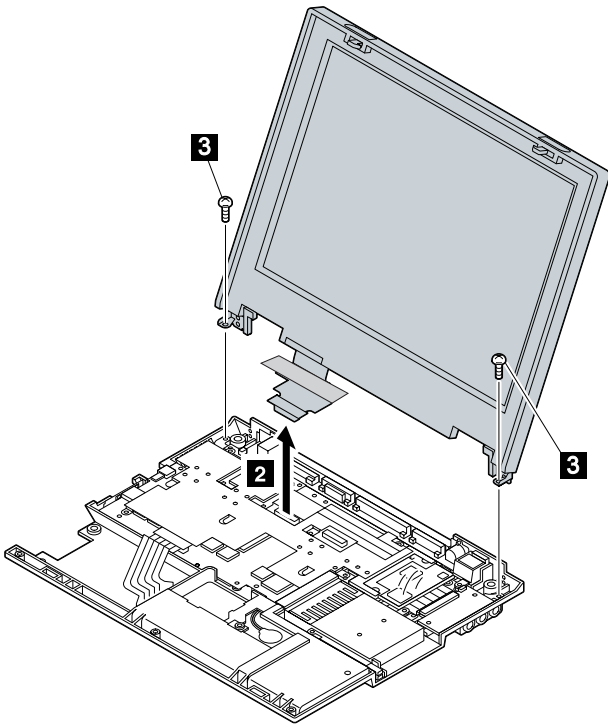
Step	Screw (Quantity)	Color	Torque
3	M2.5 x 4.8 mm (2)	Black	4 kgcm

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)**
- HDD cable **(1140)**
- Upper shield **(1150)**
- LCD unit **(1170)**
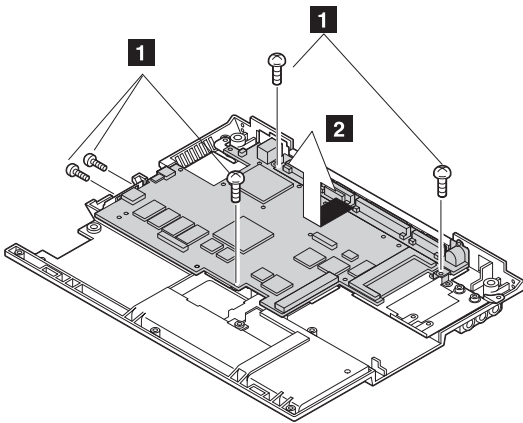
Step	Screw (Quantity)	Color	Torque
1	M2.5 x 4.8 mm (5)	Black	4 kgcm

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)**
- HDD cable **(1140)**
- Upper shield **(1150)**
- LCD unit **(1170)**
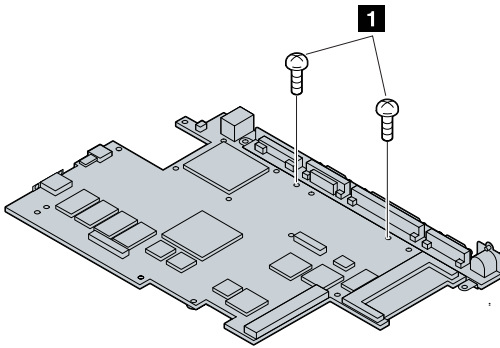
Step	Screw (Quantity)	Color	Torque
1	M2.5 x 4.8 mm (2)	Black	4 kgcm

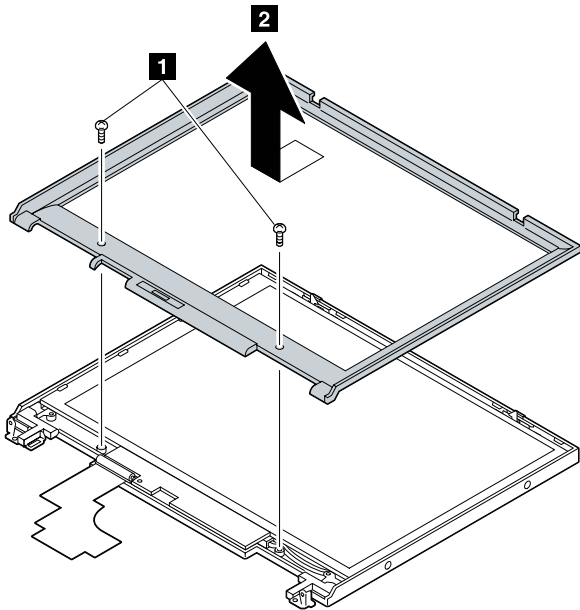FRU REMOVALS AND REPLACEMENTS

(Bottom view)
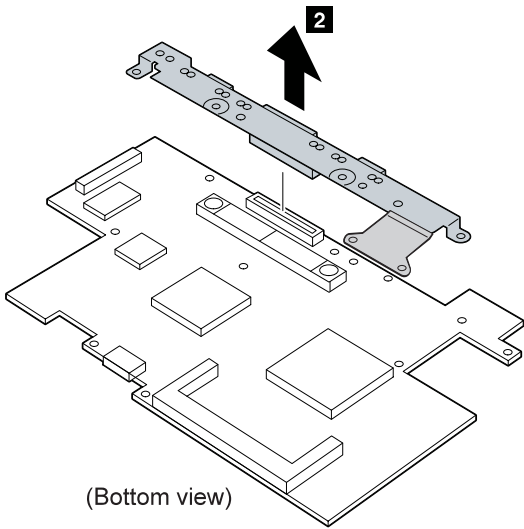
2010 LCD front bezel

- 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.
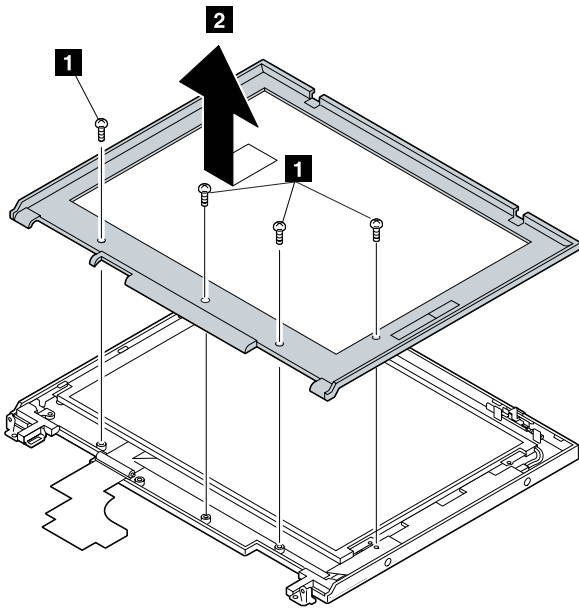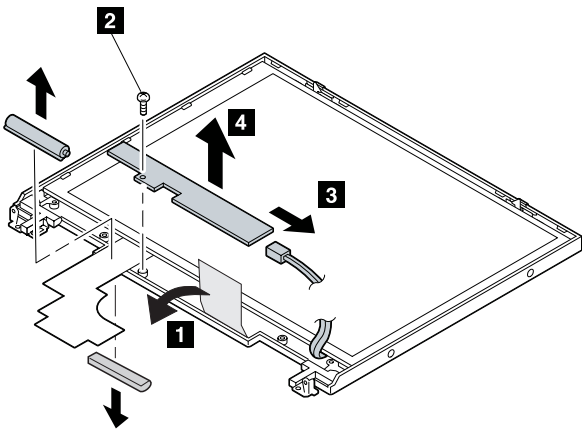

13.1-inch XGA TFT LCD

Step	Screw (Quantity)	Color	Torque
1	M2.5 x 3.5 mm (2)	Silver	4 kgcm

12.1-inch SVGA TFT LCD

Step	Screw (Quantity)	Color	Torque
1	M2.5 x 3.5 mm (4)	Silver	4 kgcm

2020 Inverter card

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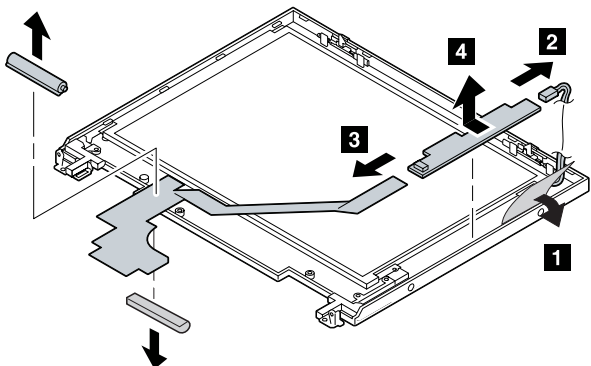- LCD Front bezel **(2010)**

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

13.3-Inch XGA TFT LCD

Step	Screw (Quantity)	Color	Torque
1	M2.5 x 3.5 mm (1)	Silver	4 kgcm

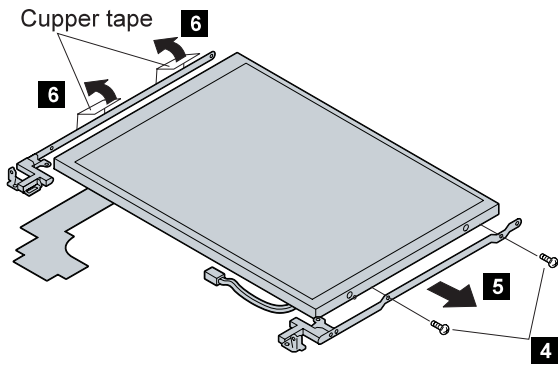### 12.1-inch SVGA TFT LCD

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
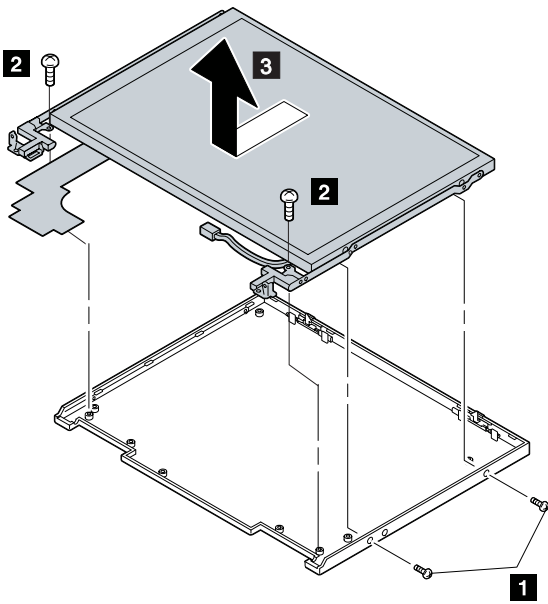
Step	Screw (Quantity)	Color	Torque
1	M2.5 x 3.5 mm (2)	Silver	4 kgcm
3	M2.5 x 3.5 mm (2)	Silver	4 kgcm

Cupper tape

Step	Screw (Quantity)	Color	Torque
4	M2.5 x 3 mm, small head (2)	Yellow	4 kgcm
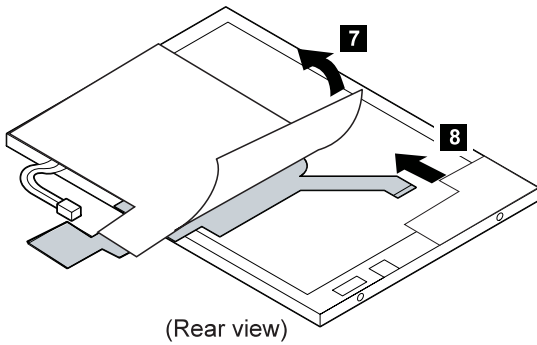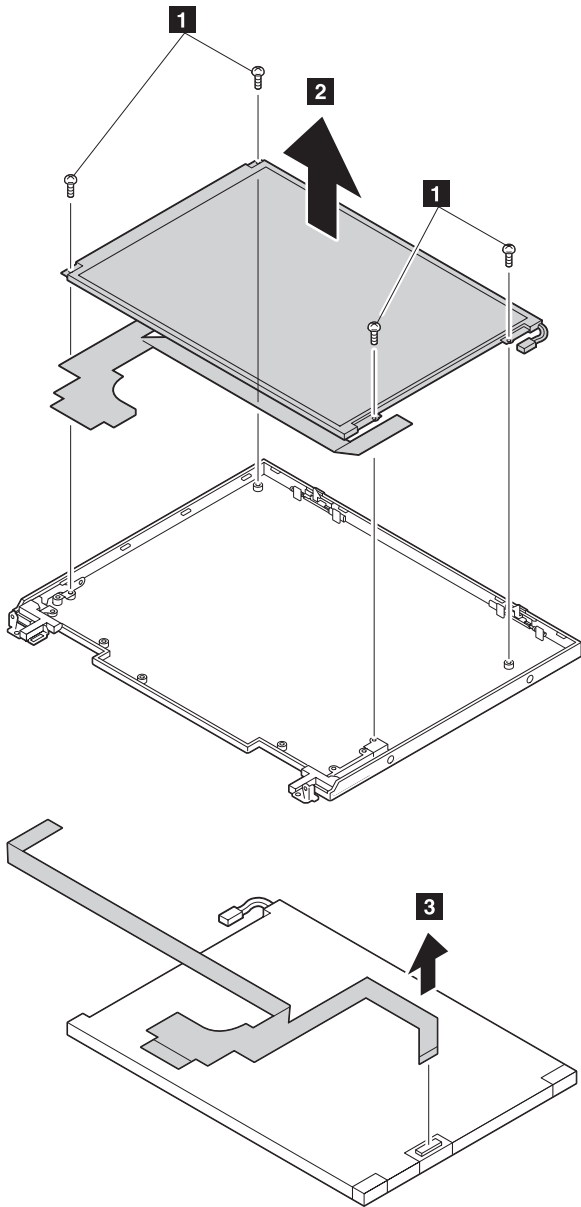
(Rear view)

12.1-inch SVGA TFT LCD

Step	Screw (Quantity)	Color	Torque
1	M2.5 x 3.5 mm (4)	Silver	4 kgcm

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)**

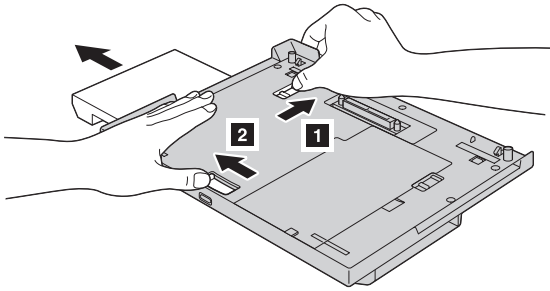**13.3-inch XGA TFT LCD:** See "2030 LCD panel" on page 83.

12.1-inch SVGA TFT LCD
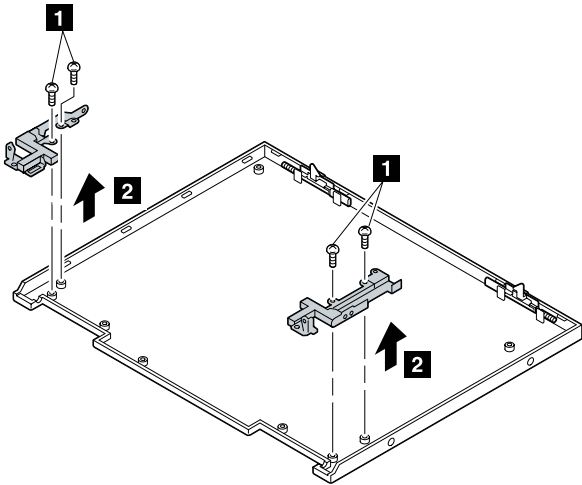
Step	Screw (Quantity)	Color	Torque
1	M2.5 x 3.5 mm (4)	Silver	4 kgcm

3010 Blank bezel in the UltraBase
Blank bezel in the UltraslimBay

Blank bezel in the diskette-drive/battery bay
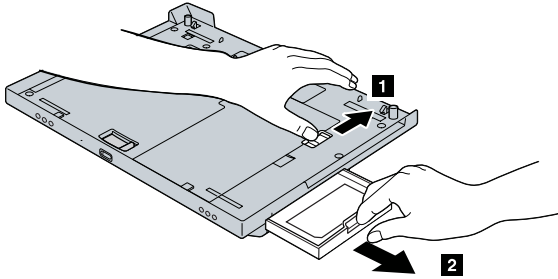
Battery pack in the UltraBase

Locations

Front View

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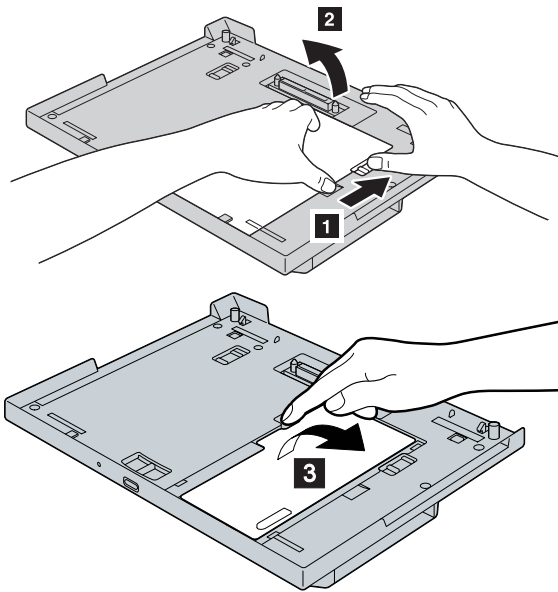- **4** External diskette drive
- **5** Diskette eject button
- **6** Headphone jack
- **7** Line-In jack
- **8** Microphone jack
- **9** Reset switch
- **10** PC Card slots
- **11** PC Card eject button
- **12** Status indicator
- **13** TrackPoint
- **14** Click buttons
- **15** Fn Key
- **16** Suspend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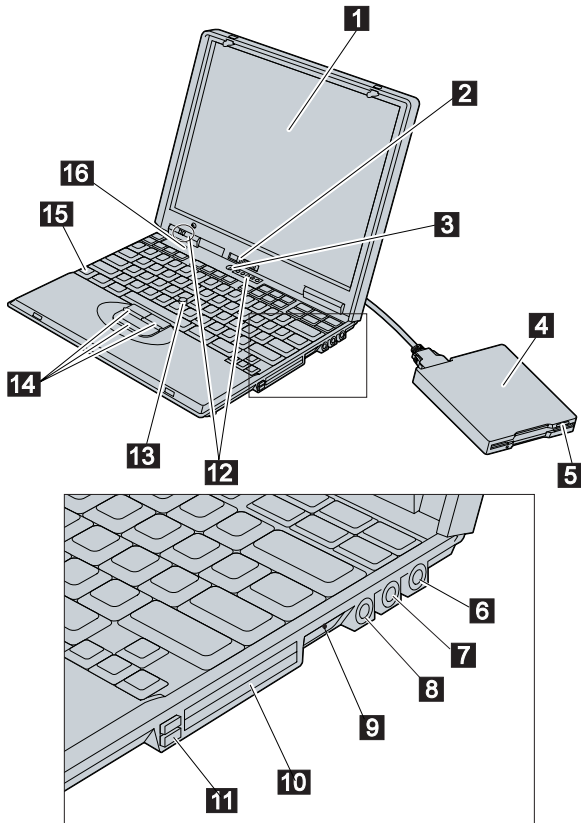
Rear View

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
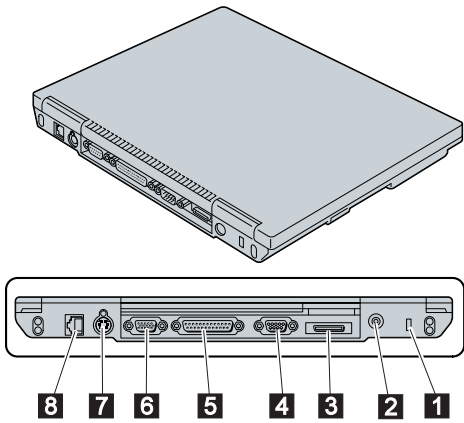
Bottom View

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

Password pads

Jumper
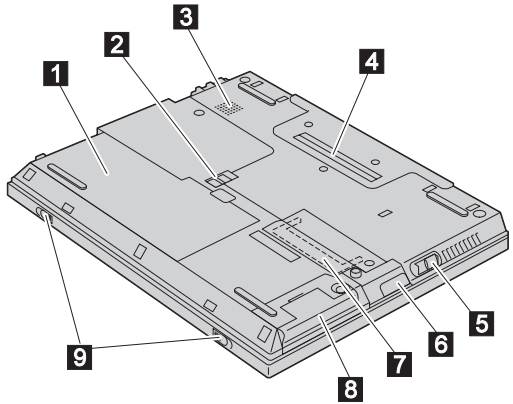
Parts List (ThinkPad 570)

PARTS LIST (THINKPAD 570)
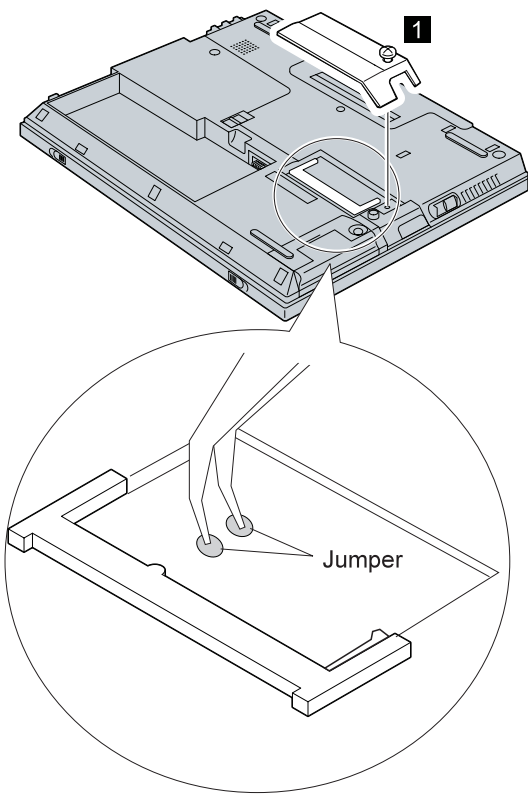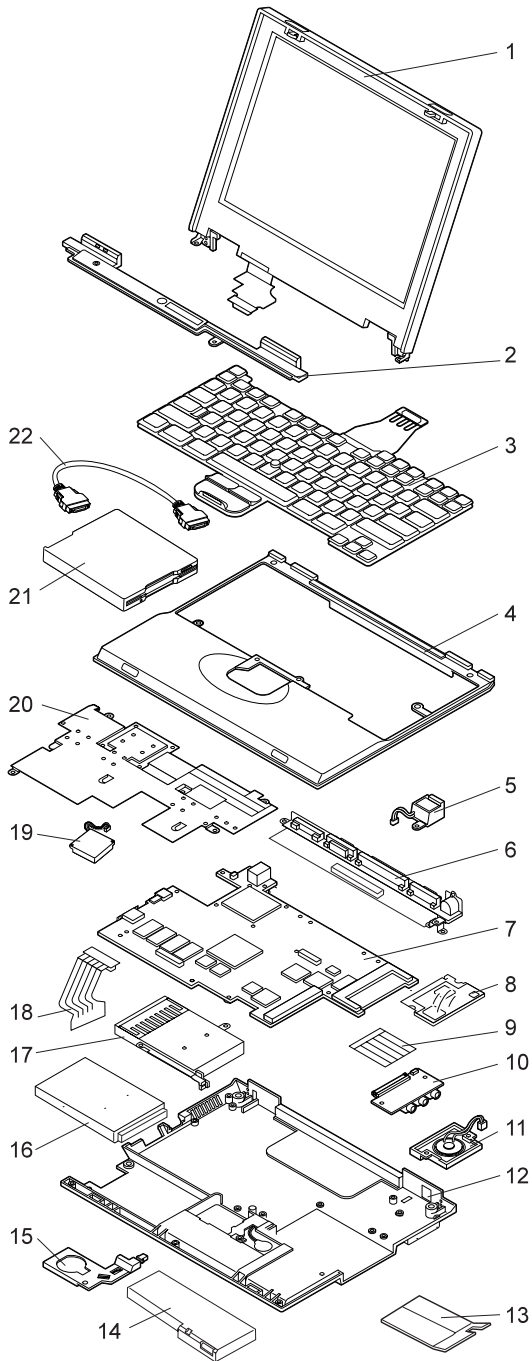
Index	System unit	
1	LCD unit (see "LCD FRU" on page 96.)	
2	Center cover	
	For 12.1-Inch	05K6081
	For 13.3-Inch	05k6082
3	Keyboard (see "Keyboard" on page 98)	
4	Keyboard bezel	05K6070
5	Modem jack (RJ11)	05K2834
	Holder, modem jack	05K6063
6	I/O connector cable	05K2832
7	System board	
	Mobile Pentium II 300 MHz	10L1243
	Mobile Pentium II 333 MHz	10L1299
	Mobile Pentium II 360 MHz	10L1244
8	Modem card	10L1246
9	Cable, audio card	05K2833
10	Audio card	10L1245
11	Speaker	02K4870
12	Base cover	05K6061
	Korea	10L1906
	China	10L1907
	Taiwan	10L1908
13	DIMM cover	05K6071
14	Battery pack	
	Panasonic	02K6573
	Sanyo	02K6574
15	Backup battery	02K6572
	Holder, backup battery	
	(see system misc. parts)	
16	Hard disk drive	
	Hard disk drive (4.0 GB)	22L0018
	Hard disk drive (6.4 GB)	22L0019
17	PC Card slots	05K6068
18	HDD cable	05K2837
	Holder, HDD cable	05K6069
	Cover, hard disk drive	05K6072
19	Fan	05K6065
20	Upper shield	05K6064
21	Diskette drive	
	TEAC	05K8989
	SONY	05K8990
22	Cable, diskette drive	05K2844

Index   System Unit

Screw kit   08K5892
Including nylon-coated screws:
   M2 x 4 mm, pan head (5)
   M2 x 9 mm, flat head (10)
   M2.5 x 3.5 mm, flat head (20)
   M2.5 x 4.8 mm, flat head (30)
   M2.5 x 9 mm, flat head (10)
   M2.5 x 3 mm, flat head small (5)
   M3 x 3 mm, flat head (5)
   Hex stud D-sub (10)
   Screw caps (10)
   Screw caps, front (5)
   Screw caps, side (5)
   Screw caps, rear (5)

System miscellaneous parts   05K6066
   Power switch knob
   Holder, backup battery
   Cover, microphone
   Cover, I/O connector
   LID modem blank
   GND spring , LCD I/F

HDD Screw Kit   05K6073
Hinge Screw Kit   08K5892

LCD FRU
13.3-inch XGA TFT
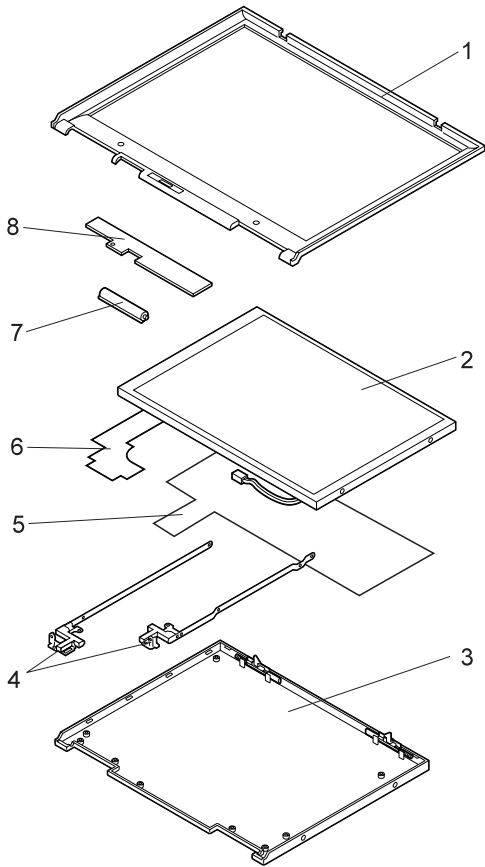
Index	System unit	
	LCD unit	
	DBU	05K9506
	HITACHI	05K9507
1	LCD front bezel	05K6077
2	LCD panel (see LCD Unit)	
3	LCD Rear cover	05K6075
4	Hinges	05K6079
5	Shield	27L6481
6	LCD cables	05K2836
7	LCD miscellaneous parts kit	05K6080
8	Inverter card	10L1249

12.1-inch SVGA TFT
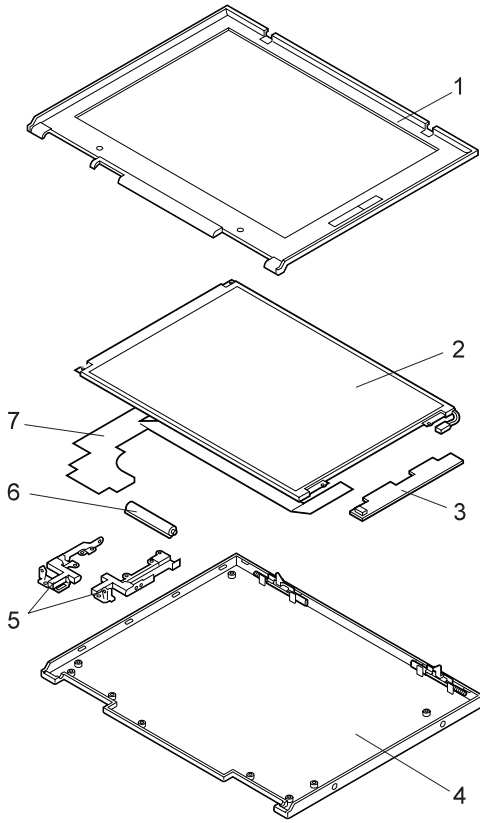
Index	System unit	
	LCD unit	05K9505
1	LCD front bezel	05K6076
2	LCD panel (see LCD unit)	
3	Inverter card	10L1248
4	LCD Rear cover	05K6074
5	Hinges	05K6078
6	LCD miscellaneous parts kit	05K6080
7	LCD cables	05K2835

Keyboard

Belgian	02K6290
Canadian French	02K4872
Chinese, Simplified	02K4875
Chinese, Traditional	02K4877
Danish	02K6295
Dutch	02K6289
French	02K6286
German	02K6285
Hebrew	02K6298
Italian	02K6287
Japanese	02K4874
Korean	02K4876
LA Spanish	02K4873
Norwegian	02K6294
Portuguese	02K6292
Russian	02K6296
Spanish	02K6291
Swedish or Finnish	02K6293
Swiss	02K6288
Turkish	02K6297
U.K. English	02K4878
U.S. English	02K4871

Option list

AC Adapter (56W, Sanken)	02K6555
For Japan	02K6554
AC Adapter (56W, Astec)	02K6557
For Japan	02K6556
TrackPoint III cap	84G6536
Telephone cable	05K2707
UltraBase	05K6001
UltraBase blank bezel kit	05K6211
UltraBase miscellaneous parts kit	05K6203
Quick charger	11J9003
Attachment, quick charger	05K5666
Modem Kit	
For Australia	22L1939
For Austria	22L1863
For Belgium	22L1929
For Denmark	22L1919
For France	22L1909
For Germany	22L1877
For Israel	22L1935
For Italy	22L1915
For Malaysia	27L0425
For Netherlands	22L1917
For New Zealand	22L1937
For Norway/Finland	22L1880
For Portgal	22L1931
For Singapore	22L1941
For Spain	22L1913
For Sweden	22L1881
For Switzerland	22L1925
For Turkey	22L1933
For U.K.	22L1876
UltraslimBay HDD adapter	05K5336
SuperDisk UltraslimBay drive	20L1929
24X-10X IDE CD-ROM drive	12J2471
6.4-GB hard disk drive	02K0518
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 Latin America 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

Common Parts List

Tools

Tri-connector 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	

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

For 2-pin power cords:

P/N	Used in These Countries
13H5273	Japan

For 3-pin power cords:

P/N	Used in These Countries
02K0539	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, Curacao, 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
76H3518	Austria, Belgium, Bosnia-Herzogovina, 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
76H3520	Denmark
76H3522	Bangladesh, Myanmar, Pakistan, South Africa, Sri Lanka
76H3524	Abu Dhabi, Albania, Antigua, Bahrain, Brunei, Dubai, Fiji, Hong Kong, India, Ireland, Kenya, Kuwait, Malaysia, Nigeria, Oman, Qatar, Singapore, United Kingdom
76H3528	Liechtenstein, Switzerland,
76H3530	Chile, Ethiopia, Italy, Libya
76H3532	Israel
76H3535	Korea

PARTS LIST (THINKPAD 570)

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