IBM

IBM Mobile Systems
ThinkPad Computer
Hardware Maintenance Manual

November 2001

This manual supports:
   **ThinkPad A22m Wireless models
                          (MT 2628)
     ThinkPad Dock   (MT 2631)**

Second Edition (November 2001)

Contents

Introduction

Important service information

Strategy for replacing FRUs

Before replacing parts

Make sure that all diskette fixes are installed before 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 but the replacement 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 replacing one of them does not correct the problem, reinstall that board, and then replace the other one.
- If an adapter or device consists of more than one FRU, any of the FRUs may be the cause of the error. Before replacing the adapter or device, remove the FRUs, one by one, to see if the symptoms change. Replace only the FRU that changed the symptoms.

Attention: The setup configuration on the computer you are servicing may have been customized. Running Automatic Configuration may alter the settings. Note the current configuration settings (using the View Configuration option); then, when service has been completed, verify that those settings remain in effect.

Strategy for replacing a hard-disk drive

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 may have been changed. Be extremely careful during write operations such as copying, saving, or formatting. If you select an incorrect drive, data or programs can be overwritten.

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. Whatever causes the first error code may also cause false error codes. 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.

Diskette compatibility matrix

The compatibility of each of the drives with the diskettes for it is as follows:

Diskette drive	Diskette capacity	Compatibility
3.5-inch	1.0 MB	Read and write
	2.0 MB	Read and write
	4.0 MB	Not compatible

Safety notices: multilingual 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, and 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

DANGER

Some standby batteries contain a small amount of nickel and cadmium. Do not disassemble a standby battery, 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.

(continued)

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(continuation of safety notice 2)

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

DANGER

> **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.**

(continued)

(continuation of safety notice 3)

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

DANGER

**The lithium battery can cause a fire, an explosion,
or a 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.**

(continued)

(continuation of safety notice 4)

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

Safety notice 5

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

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

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

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

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

Safety notice 6

DANGER

> **To avoid shock, do not remove the plastic cover that protects the lower part 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

DANGER

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

DANGER

> **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.**
>
> **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 toolcase 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. Make sure 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.

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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: An electrical shock can occur only when there is a complete circuit. 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 purpose of this inspection guide is to assist you in identifying potentially unsafe conditions. As each machine was designed and built, required safety items were installed to protect users and service personnel from injury. This guide addresses only those items. You should use good judgment 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 a bulging capacitor

• Mechanical hazards, such as loose or missing hardware

To determine whether there are any potentially unsafe conditions, use the following checklist at the beginning of every service task. 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 type specified in the parts list.
   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 an optical storage device; such as a CD-ROM drive or DVD-ROM drive. They are also sold separately as options. The 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, DVD drive or the other laser product 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, DVD-ROM drive or the other optical storage device could result in exposure to hazardous laser radiation. There are no serviceable parts inside those drives. **Do not open.**

Some CD-ROM drives, DVD-ROM drives or the other optical storage devices contain an embedded Class 3A or Class 3B laser diode. Note the following:

⚠

DANGER

Emits visible and invisible 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.

General descriptions

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

Read this first

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

Important notes

- **Only certified trained personnel should service the computer**.
- **Read the entire FRU removal and replacement page before replacing any FRU**.
- **Use new nylon-coated screws when you replace FRUs**.
- **Be extremely careful during such write operations as copying, saving, or formatting.** Drives in the computer that you are servicing sequence might have been altered. If you select an incorrect drive, data or programs might be overwritten.
- **Replace FRUs only for the correct model.** When you replace a FRU, make sure the model of the machine and the FRU part number are correct by referring to the FRU parts list.
- **A FRU should not be replaced because of a single, unreproducible failure.** Single failures can occur for a variety of reasons that have nothing to do with a hardware defect, such as cosmic radiation, electrostatic discharge, or software errors. Consider replacing a FRU only when a problem recurs. If you suspect that a FRU is defective, clear the error log and run the test again. If the error does not recur, do not replace the FRU.
- **Be careful not to replace a nondefective FRU.**

What to do first

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

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

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__ 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

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.

Before checking problems with the computer, determine whether the damage is covered under the warranty by referring to the following:

The following are not covered under warranty:

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

The following symptoms might indicate damage caused by nonwarranted activities:

- Missing parts might be a symptom of unauthorized service or modification.
- If the spindle of a hard-disk drive becomes noisy, it may have been subjected to excessive force, or dropped.

Related service information

This section provides information about the following:
• "Service Web site"
• "Product recovery program"
• "Passwords" on page 27
• "Power management" on page 30

Service Web site

When the latest maintenance diskette and the system program service diskette are available, a notice will be posted on http://www.ibm.com/pc/partner/infotips

Product recovery program

Restoring the pre-installed software:
If the data on a hard-disk drive is damaged or accidentally erased, you can restore the software that was shipped with the computer. This software includes the pre-installed operating system, applications, and device drivers.

To restore the pre-installed software, you can use either the Product Recovery program or a Recovery CD.

The Product Recovery program is in the Service Partition, a section of the hard-disk drive that is not displayed by Windows Explorer. Use the Recovery CD if it was provided with the computer.

Note: The recovery process might take up to 2 hours.

To use the Product Recovery program to restore the pre-installed software, do the following:
1. Save all files and shut down the desktop.
2. Turn off the computer.
3. Turn on the computer. A message appears on the screen: "**To start the Product Recovery program, press F11**"; or, for Windows XP models, "**Press F11 to invoke the IBM Product Recovery program**". Press F11 quickly; this message is displayed for only a few seconds.

    Note: If this message does not appear, you can use a Recovery Repair diskette to get access to the Product Recovery program. (Directions for making a Recovery Repair diskette are given in "To create a recovery repair diskette" on page 26.)
4. From the list displayed on the screen, select the operating system you want to recover.
5. Select the recovery options you want, and follow the instructions on the screen.

Creating the service partition:

To create the Service Partition and install the preloaded system from the Recovery CD, do the following:

To create the Service Partition (SP):
1. Erase all partitions on the hard-disk drive, using FDISK or a similar application.
2. Boot with the Recovery CD (and the boot diskette if required.)
3. Following message appears: "**Your computer originally included a Product Recovery program ... Reinstall the Product Recovery Program? (Y/N) [ ]**".

    Note: If the hard-disk drive contains any partitions, you do not receive this message ; go to step 1.
4. Enter **Y**. The Service Partition is created and loaded with the Product Recovery program files.

    Note: If you do not want to create the Service Partition, press N key, and then go to step 8.
5. At next window, press Enter to continue.
    - The Service Partition is created. The system automatically reboots during this process.
    - The recovery process copies some files to the Service Partition and, PKUNZIPs others.
    - Follow the prompts. You may be prompted to change CDs.
    - When the process is complete, the system reboots. Continue to step 6 to install preloaded system.

Install preloaded system from CD:
6. Boot with the Recovery CD (and the boot diskette if required.)
7. If the hard-disk drive is blank, the following message appears: "**Your computer originally included a Product Recovery program ... Reinstall the Product Recovery Program? (Y/N) [ ]**".
    - To install the Service Partition, go to step 4.
    - To preload the hard-disk drive without installing the Service Partition, press the N key.
8. If you get a message asking which operating system to install, highlight the proper operating system and press Enter.
9. A message appears: "**Full Recovery:**". Press Enter to select.
10. Enter the **Y** at each of the next three windows.
11. Follow the prompts to complete Recovery.

To create a recovery repair diskette

If the prompt needed for access to the Product Recovery program does not appear, you can recover it by use of the

Recovery Repair diskette. Make a Recovery Repair diskette and save it for future use. To make a Recovery Repair diskette:

1. Shut down and turn off the computer.
2. Attach the external diskette drive to the computer.
3. At the prompt, press F11. (The option to press F11 appears for only a few seconds. You must press F11 quickly.) The Product Recovery program main menu appears.
4. If you are using Windows 2000 Professional, you are prompted to select an operating system. This menu does not appear for Windows 98 SE.
5. From the main menu, select System Utilities. Press Enter.
6. Select Create a Recovery Repair diskette. Press Enter.
7. Follow the on-screen instructions.
8. When the process is completed, label the diskette as the Recovery Repair diskette and save it for future use.

To use the recovery repair diskette:

1. Shut down and turn off the computer.
2. Attach the external diskette drive to the computer.
3. Insert the Recovery Repair diskette into the drive; then turn on the computer.
4. Follow the on-screen instructions.

- **Note**

  Should the hard-disk drive need to be replaced, you must order a Recovery CD with the hard-disk drive so that you can recover the new hard-disk drive with the pre-installed software when it arrives. For information on which CD to order, see"Recovery CDs" on page 128.

Passwords

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

If any of these passwords have been set, a prompt for it appears on the screen whenever the computer is turned on. The computer does not start until the password is entered.

Exception: If only an SVP is installed, the password prompt doesn't appear when the operating system is booted.

Power-on password:
A power-on password (POP) protects the system from
being powered on by an unauthorized person. The
password must be entered before an operating system can
be booted.

Hard-disk password:
There are two hard-disk passwords (HDPs):
• User HDP—for the user
• Master HDP—for the system administrator, who can use
  it to get access to the hard disk even if the user has
  changed the user HDP

Note: There are two modes for the HDP: **User only** and
Master + User. The **Master + User** mode requires
two HDPs; the system administrator enters both in
the same operation. The system administrator then
provides the user HDP to the system user.

Attention: If the user HDP has been forgotten, check
whether a master HDP has been set. If it has, it can be
used for access to the hard-disk drive. If no master HDP is
available, IBM does not provide any services to reset
either the user or the master HDP, or to recover data from
the hard-disk drive. The hard-disk drive can be replaced
for a scheduled fee.

Supervisor password:
A supervisor password (SVP) protects the system
information stored in the IBM BIOS Setup Utility. The SVP
must be entered in order to get access to the IBM BIOS
Setup Utility and make changes to system configuration
settings.

Attention: If the SVP has been forgotten and cannot be
made available to the servicer, there is no service
procedure to reset the password. The system board must
be replaced for a scheduled fee.

How to remove the power-on password
To remove a POP that you have forgotten, do the
following:

(A) If no SVP has been set:
1. Turn off the computer.
2. Remove the battery pack.

   For how to remove the battery pack, see "1010 Battery
   pack" on page 58.
3. Remove the backup battery.

   For how to remove the backup battery, see "1040
   Backup battery" on page 63.
4. Turn on the computer and wait until the POST ends.

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After the POST ends, the password prompt does not appear. The POP has been removed.
5. Reinstall the backup battery and the battery pack.

(B) If an SVP has been set and is known by the servicer:
1. Turn on the computer by pressing and holding F1.
2. Enter the SVP. The IBM BIOS Setup Utility menu appears.
3. Select **Password**, using the cursor keys to move down the menu.
4. Select **Power-On Password**.
5. At the Enter Current Password field, enter the SVP.
6. When the Enter New Password field opens, leave it blank and press Enter twice.
7. In the Changes have been saved window, press Enter.
8. Press F10; then, in the Setup confirmation window, select **Yes** .

How to remove the hard-disk password
Attention: If **User only** mode is selected and the user HDP has been forgotten and cannot be made available to the servicer, IBM does not provide any services to reset the user HDPs or to recover data from the hard-disk drive. The hard-disk drive can be replaced for a scheduled fee.

To remove a user HDP that has been forgotten, when the SVP and the master HDP are known, do the following:
1. Power on the computer by pressing and holding F1.
2. Enter the SVP. The IBM BIOS Setup Utility menu appears.
3. Select **Password**, using the cursor keys to move down the menu.
4. Select **Hard-disk** *x* **password**, where *x* is the letter of the hard-disk drive. A pop-up window opens.
5. Select **Master HDP**.
6. Enter the master HDP; then leave the New Password field blank and press Enter twice.
7. Press F10.
8. Select **Yes** in the Setup Configuration window.

Both user HDP and master HDP will have been removed.

Power management

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

Notes

- Screen blank mode is called *standby mode* in Windows 95 and Windows NT.
- Standby mode is called *suspend mode* in Windows 95 and Windows NT.

Screen blank mode
Screen blank mode has three variants, as follows:
1. If you press Fn+F3, or the time set on the ″LCD off timer″ in IBM BIOS Setup Utility expires,
   - The LCD backlight turns off.
   - The hard-disk drive motor stops.
   - The speaker is muted.
2. If you are using the ACPI operating system and you press Fn+F3,
   - The LCD backlight turns off.
   - The hard-disk drive motor stops.
3. If the time set on the "Turn off monitor" timer in the operating system expires,
   - The LCD backlight turns off.

To end screen blank mode and resume normal operation, press any key.

Standby mode
When the computer enters standby mode, the following events occur in addition to what occurs in screen blank mode:
- The LCD is powered off.
- The hard-disk drive is powered off.
- The CPU stops.

To enter standby mode, press Fn+F4.

Note: You can change the action of Fn+F4, if you are using the ACPI operating system.

In certain circumstances, the computer goes into standby mode automatically:
- If a "suspend time" has been set on the timer, and the user does not do any operation with the keyboard, the TrackPoint, the hard disk, the parallel connector, or the diskette drive within that time.
- If the battery indicator blinks orange, indicating that the battery power is low. (Alternatively, if **Hibernate when**

**battery becomes low has been selected in the
"Power Management Properties" window, the
computer goes into hibernation mode.)**

**Note for the APM operating system:
Even if you don't set the low-battery alarm, the charge
indicator notifies you when the battery is low, and then
the computer enters the power-saving mode
automatically. This default low-battery behavior is
independent of the operating system; so if you have
set the low-battery alarm, the computer may not do
what you specified. It chooses either your setting or
the default setting, whichever is appropriate.**

**If you are using the ACPI operating system, only the
low-battery alarm is available.**

**To cause the computer to return from standby mode
and resume operation, do one of the following:**
• **Press the Fn key.**
• **Open the LCD cover (only if you are using Windows
  Me and you entered standby mode by closing the
  LCD cover).**
• **Turn on the power switch.**
**Also, the computer automatically returns from standby
mode and resumes operation in either of the following
events:**
• **The ring indicator (RI) is signaled by a serial device
  or a PC Card device (Windows 2000 does not
  support ring indicator (RI) resume by PC Card
  device.)**
• **The time set on the resume timer elapses. In
  Windows 98, the Scheduled Tasks setting takes
  priority over the Resume on timer selection in the
  "Power Management Properties" window.**

> **Note:** The computer does not accept any input
> immediately after it enters standby mode. Wait a
> few seconds before taking any action to reenter
> operation mode.

Hibernation mode

Note for Windows NT

If you are using Windows NT in the default format,
NTFS, you cannot create a hibernation file. If you
want to use hibernation mode, you will need to
reinstall Windows NT with FAT format.

Note for OS/2

If you are using OS/2 in the default format, HPFS, you cannot create a hibernation file. If you want to use hibernation mode, you will need to reinstall OS/2 with FAT format.

In hibernation mode, the following occurs:
• The system status, RAM, VRAM, and setup data are stored on the hard disk.
• The system is powered off.

Notes:

1. If you are using the APM operating system ,
   • In the ThinkPad Configuration program, the computer can be set to **Suspend/hibernate while docked**.
   • If you are running the computer on ac power and using a communication PC Card, the computer cannot enter hibernation mode.
2. If the computer enters the hibernation mode while it is docked to the docking station, do not undock it from the docking station before resuming normal operation. If you do undock it and then try to resume normal operation, you will get an error message, and you will have to restart the system.

To cause the computer to enter hibernation mode, do any of the following:
• Press the Fn+F12 keys.
• If you are using the APM operating system and have set the mode to **Power switch mode [Hibernation]**, turn off the power switch.

Also, the computer automatically goes into hibernation mode in either of the following conditions:
• If you are using an operating system other than Windows 98 and the timer conditions are satisfied in suspend mode.
• If you are using the APM operating system and have set the mode to **Hibernate when battery becomes low**, and the battery charge becomes critically low.

Note: If you are using the ACPI operating system, you can define closing the lid, pressing the Power button and pressing Fn+F4 as events that cause the system to go into hibernation mode.

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

Checkout guide

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

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

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

Testing the computer

The ThinkPad computer has a test program called PC-Doctor® DOS (hereafter called *PC-Doctor*). You can detect errors by running the diagnostics test included in PC-Doctor. This section is an overview of the procedure. For details that depend on model-unique functions, refer to "Product overview" on page 41.

For some possible configurations of the computer, PC-Doctor might not run correctly. To avoid this problem, you need to initialize the computer setup by use of the IBM BIOS Setup Utility before you run PC-Doctor. On the IBM BIOS Setup Utility screen, press F9, Enter, F10, and then Enter.

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

PC-Doctor cannot be used to test a device that is in the docking station, even if the computer supports the docking station. To test a USB device, connect it to the USB connector of the computer. To test the Ultrabay 2000 device, install it in the Ultrabay 2000 slot of the computer.

To run the test, do as follows:

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

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

   If the computer cannot be powered on, go to "Power system checkout" on page 35, and check the power sources.

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

On the first screen, select the model and press Enter. Follow the instructions on the screen.
2. The main panel of PC-Doctor appears.
3. Select **Diagnostics** with the arrow keys, and press Enter.

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

The options on the test menu are as follows:

Diagnostics	Interactive Tests
• Run Normal Test	• Keyboard
• Run Quick Test	• Video
• CPU/Coprocessor	• Internal Speaker
• Systemboard	• Mouse
• Video Adapter	• Joystick Test
• Serial Ports	• Diskette
• Parallel Ports	• System Load
• Fixed Disks	• CD-ROM/DVD Test
• Diskette Drives	• Stereo Speaker
• Other Devices	
• ZIP Drive (*)	
• LS-120 Drive (*)	
• Communication	
• Memory Test – Full	
• Memory Test – Quick	

Notes:
- In the **Keyboard** test in **Interactive Tests**, the Fn key is scanned only once. Each key should be held down for at least 2 seconds; otherwise, it cannot be sensed.
- The sound card is not recognized in the **Stereo Speaker** in the **Interactive Tests**. To test it, use the audio device test in the **Other Devices** in the **Diagnostics**.
- **Video Adapter** test supports only the LCD display on ThinkPad. Before running PC-Doctor DOS, detach the external Monitor.
- To test **ZIP Drive** or **LS-120 Drive**, each media is needed to be inserted before start testing.


```
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
 ZIP Drive
 Communication
 Memory Test - Full
 Memory Test - Quick
```

PC-DOCTOR 2.0 Copyright 2000 PC-Doctor, Inc. 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 messages describing it.
6. To exit the test, select **Quit — Exit Diag**.

   To cancel the test, press Esc.

Note: After executing PC-Doctor, check the system time/date and reset them if needed.

Detecting system information with PC-Doctor

PC-Doctor can detect the following system information:

Hardware Info
- System Configuration
- Memory Contents
- Physical Disk Drives
- Logical Disk Drives
- VGA Information
- IDE Drive Info
- PCI Information
- PNPISA Info
- SMBIOS Info
- VESA LCD Info

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

Power system checkout

To verify a symptom, 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 the battery pack supplies power when you power on the computer.

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

- "Checking the ac adapter"
- "Checking operational charging"
- "Checking the battery pack" on page 37
- "Checking the backup battery" on page 37

Checking the ac adapter

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

- If the power problem occurs only when the port replicator is used, replace the port replicator.
- If the power-on indicator does not turn on, check the power cord of the ac adapter for correct continuity and installation.
- If the computer does not charge during operation, go to "Checking operational charging."

To check the ac adapter, do the following:

1. Unplug the ac adapter cable from the computer.
2. Measure the output voltage at the plug of the ac adapter cable. See the following figure:

(16 - 10 V)
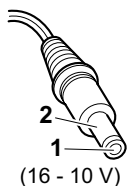
Pin	Voltage (V dc)
1	+15.5 to +17.0
2	Ground

3. If the voltage is not correct, replace the ac adapter.
4. If the voltage is acceptable, do the following:
   - Replace the system board.
   - If the problem persists, go to "Product overview" on page 41.

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

Checking operational charging

To check whether the battery charges properly during operation, 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 it is still not charged, go to the next section.

Checking the battery pack

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

To check the status of your battery, move your cursor to the Power Meter icon in the icon tray of the Windows taskbar and wait for a moment (but do not click), and the percentage of battery power remaining is displayed. To get detailed information about the battery, double-click the Power Meter icon.

Note: If the battery pack becomes hot, it may not be able to charge. Remove it from the computer and leave it at room temperature for a while. After it cools down, reinstall and recharge it.

To check the battery pack, do the following:
1. Power off the computer.
2. Remove the battery pack and measure the voltage between battery terminals 1 (+) and 5 (−). See the following figure:
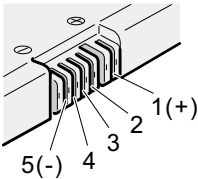
Terminal	Voltage (V dc)
1	+ 0 to + 12.6
5	Ground (−)

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

   Note: Recharging will take at least 3 hours, even if the indicator does not turn on.

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

   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 it.
2. Turn the computer upside down.

3. Remove the battery pack (see "1010 Battery pack" on page 58).
4. Remove the backup battery (see "Checking the battery pack" on page 37).
5. Measure the voltage of the backup battery. See the following figure.

Red (+)
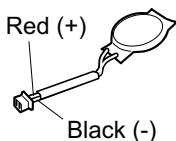
Black (-)

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

ThinkPad A22m wireless models

Product overview

This section presents the following product-unique information:
- "Specifications"
- "Status indicators" on page 42
- "FRU tests" on page 44
- "Fn key combinations" on page 46

Specifications

The following table lists the specifications of the ThinkPad A20m wireless models:

Feature	Description
Processor	• Intel® mobile Pentium® III processor 900 MHz featuring Intel® SpeedStep™ technology • Intel® mobile Pentium® III processor 1 GHz featuring Intel® SpeedStep™ technology
Bus architecture	PCI Bus
Memory (standard)	• 64 MB (64 MB SO-DIMM × 1) • 128 MB (128 MB SO-DIMM × 1)
Memory (optional)	64 MB, 128 MB, or 256 MB DIMM card (maximum of 512 MB)
CMOS RAM	114 bytes + 128 bytes
Display	14.1-inch, 16M colors, XGA (1024×768 resolution) TFT color LCD
Diskette drive	1.44 MB (3-mode), 3.5-inch
Hard-disk drive	• 10.0 GB, 2.5-inch, IDE interface • 30.0 GB, 2.5-inch, IDE interface
I/O port	• External monitor • Line-in • Headphone • Microphone • Mouse or keyboard • Parallel • Port replicator connector • Serial • Universal serial bus (USB) connector • RJ11 • RJ45 • TV-out
Internal modem	56.6 Kbps
Audio	• Internal stereo speaker • Software control volume

(continued)

Feature	Description
Infrared transfer	IrDA 1.1
802.11b	IBM Internal High Rate Wireless LAN PC Card
PC Card	One Type II
AC adapter	72-watt type
Bay device	• 10-24 x CD-ROM drive • 8 x DVD drive

Status indicators

The system status indicators show the status of the computer, as follows:

Indicator	Meaning
1 Battery	**Green:** The battery is fully charged. **Blinking green:** The battery has enough power to operate, but is being charged. **Orange:** The battery power is low. The battery is to being charged. **Blinking orange:** The battery needs to be charged. when the indicator starts blinking orange, the computer beeps three times.
2 Standby status	**Green:** The computer is in standby mode. **Blinking green:** The computer is entering standby mode or hibernation mode, or is resuming normal operation. This indicator does not blink in Windows 2000 and Windows Me.

(continued)

Indicator	Meaning	
3 Drive in use	**Green:**	Data is being read from or written to the hard-disk drive, the diskette drive, or the drive in the Ultrabay 2000. When this indicator is on, do not put the computer into standby mode or turn off the computer. **Note:** Do not move the system while the Green drive in use light is on. Sudden physical shock could cause drive errors.
4 Num lock	**Green:**	The numeric keypad on the keyboard is enabled. To enable or disable the keypad, press and hold the Shift key while pressing the NumLk key.
5 Caps lock	**Green:**	Caps Lock mode is enabled. To enable or disable Caps Lock mode, press Caps Lock key.
6 Scroll lock	**Green:**	Scroll Lock mode is enabled. Arrow keys can be used as screen-scroll function keys, but not to move the cursor. To enable or disable Scroll Lock mode, press ScrLk key. Not all application programs support this function.
7 Power on	**Green:**	This indicator stays lighted whenever the computer is on. If the power-on indicator is on and the standby indicator is off, the system is ready to use. If both the power-on indicator and the standby indicator are on, you can use the computer after it returns from the standby mode and the standby indicator goes off.

FRU tests

The following table shows the test for each FRU.

FRU	Applicable test
System board	1. **Diagnostics --> CPU/Coprocessor** 2. **Diagnostics --> Systemboard**
Power	**Diagnostics --> Other Devices --> IBM AC Adapter**, **IBM Battery 1 (IBM Battery 2)**
LCD unit	1. **Diagnostics --> Video Adapter** 2. **Interactive Tests --> Video**
Modem	1. Make sure the modem is set up correctly. 2. Replace the modem jack and the modem card in turn, and run the following test in **Diagnostics --> Communication**: a. Lucent Modem (M2) Loopback b. Lucent Modem (M2) Dialtone/DTM c. Intel Modem Register d. Intel Modem Loopback/DTMF e. Intel SP Modem Register f. Intel SP Modem Loopback/DTMF g. 3Com MiniPCI Modem Test h. 3Com MiniPCI Dialtone Test
Audio	1. **Interactive Tests --> Internal Speaker** 2. **Diagnostics --> Other Devices --> Crystal SoundFusion™ Test**
Speaker	**Interactive Tests --> Internal Speaker**
PC Card slots	**Diagnostics --> Systemboard --> PCMCIA**, **PCMCIA External Loop**
Keyboard	1. **Diagnostics --> Systemboard --> Keyboard** 2. **Interactive Tests --> Keyboard**
TrackPoint or pointing device	If the TrackPoint does not work, check the configuration in the ThinkPad Configuration program. If the TrackPoint is disabled, select **Enable** to enable it. After you use the TrackPoint, the pointer may drift on the screen for a short time. This drift can occur when a slight, steady pressure is applied to the TrackPoint pointer. This symptom is not a hardware problem. If the pointer stops after a short time, no service action is necessary. If enabling the TrackPoint does not correct the problem, continue with the following: • **Interactive Tests --> Mouse**
Hard-disk drive	**Diagnostics --> Fixed Disks**
Diskette drive	1. **Diagnostics --> Diskette Drives** 2. **Interactive Tests -->Diskette**

(continued)

FRU	Applicable test
CD-ROM or DVD drive	1. **Diagnostics --> Other Devices --> CD-ROM/DVD** 2. **Interactive Tests --> CD-ROM/DVD Test**
Memory	1. If two DIMMs are installed, remove one of them and run **Diagnostics --> Memory Test - Quick**. 2. If the problem does not recur, return the DIMM to its place, remove the other one, and run the test again. 3. If the test does not detect the error, run **Diagnostics --> Memory Test - Full**.
Fan	1. Turn on the computer and check the air turbulence at the louver near the power switch. 2. Run **Diagnostics --> Other Devices --> IBM Fan**.

Fn key combinations

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

The Fn key works independently from the operating system.

Key combination	Description
Fn+F1	Reserved.
Fn+F2	Reserved.
Fn+F3	Turn off the LCD display, leaving the screen blank. To turn the LCD display on again, press any key or the TrackPoint stick.
Fn+F4	Turn standby mode on. To return to normal operation, press the Fn key independently, without pressing a function key.
Fn+F5	Reserved.
Fn+F6	Reserved.
Fn+F7	Switch between the LCD and an external monitor (CRT). If an external monitor is attached, computer output is displayed in the following three patterns by turns: • CRT display • LCD + CRT display • LCD
Fn+F8	Turn screen expansion on or off. (There is no symbol on the key.)
Fn+F9	Reserved.
Fn+F10	Reserved.
Fn+F11	Reserved.
Fn+F12	Turn hibernation mode on. To return to normal operation, press the power button for less than four seconds.
Fn+PgUp	Turn the ThinkLight on or off.
Fn+Home	The LCD becomes brighter.
Fn+End	The LCD becomes less bright.

Symptom-to-FRU index

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

Note: Do the FRU replacement or other actions in the sequence shown in the column headed "FRU or action, in sequence." If replacing a FRU does not solve the problem, put the original part back in the computer. Do not replace a nondefective FRU.

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

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

If no numeric code is displayed, check the narrative descriptions of symptoms. If the symptom is not described there, go to "Intermittent problems" on page 52.

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

Numeric error codes

Symptom or error	FRU or action, in sequence
0175 Bad CRC1, stop POST task — The EEPROM checksum is not correct.	**System board**.
0187 EAIA data access error — The access to EEPROM has failed.	**System board**.
0188 Invalid RFID serialization information area or bad CRC2 — The EEPROM checksum is not correct.	**System board**.
0189 Invalid RFID configuration information area — The EEPROM checksum is not correct.	**System board**.

(continued)

Symptom or error	FRU or action, in sequence
0190 Critical low battery error.	1. **Charge the battery pack**. 2. Battery pack.
0193 RF antenna has been removed.	**Enter the supervisor password**.
0194 The computer has been carried through a security gate.	**Enter the supervisor password**.
0200 Hard disk error — The hard disk is not working.	1. **Reseat the hard-disk drive**. 2. Load Setup Defaults in IBM BIOS Setup Utility. 3. Hard-disk drive. 4. System board.
021x Stuck key — Keyboard error.	**Run interactive tests of the keyboard and the auxiliary input device**.
0220 Monitor type error — Monitor type does not match the one specified in CMOS.	**Load Setup Defaults in IBM BIOS Setup Utility.**
0230 Shadow RAM error — The shadow RAM failure at offset nnnn.	**System board**.
0231 System RAM error — System RAM failure at offset nnnn.	1. **DIMM**. 2. System board.
0232 Extended RAM error — Extended RAM failure at offset nnnn.	1. **DIMM**. 2. System board.
0250 System battery error — System battery is dead.	**Replace the backup battery and run IBM BIOS Setup Utility to reset the time and date**.
0251 System CMOS checksum bad—Default configuration used.	**Replace the backup battery and run IBM BIOS Setup Utility to reset the time and date**.
0252 Password checksum bad — The password is cleared.	**Reset the password by running IBM BIOS Setup Utility.**
0260 System timer error.	1. **Replace the backup battery and run IBM BIOS Setup Utility to reset the time and date**. 2. System board.

(continued)

Symptom or error	FRU or action, in sequence
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.
0271 Date and time error — Neither the date nor the time is set in the computer.	**Run IBM BIOS Setup Utility to reset the time and date**.
02B2 Incorrect drive A type.	1. **Diskette drive**. 2. External FDD cable. 3. I/O card.
02F4 EISA CMOS not writable.	1. **Load Setup Defaults in IBM BIOS Setup Utility**. 2. Replace the backup battery. 3. System board.
02F5 DIMM test failure.	1. **DIMM**. 2. System board.
02F6 Software NMI failure.	1. **DIMM**. 2. System board.
02F7 Fail-safe timer NMI failure.	1. **DIMM**. 2. System board.

Error messages

Symptom or error	FRU or 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. Check that the operating system has no failure and is installed correctly. 2. **Enter IBM BIOS Setup Utility and see whether the hard-disk drive and the diskette drive are properly identified**. 3. Reseat the hard-disk drive. 4. Reinstall the operating system. 5. Diskette drive. 6. Hard-disk drive. 7. System board.
Hibernation error.	1. **Restore the system configuration to what it was before the computer entered hibernation mode**. 2. If memory size has been changed, re-create the hibernation file.
Fan error.	**Fan**.

Beep symptoms

Symptom or error	FRU or action, in sequence
One beep and a blank, unreadable, or flashing LCD.	1. **Reseat the LCD connector**. 2. LCD assembly. 3. External CRT. 4. System board.
One long and two short beeps, and a blank or unreadable LCD.	1. **System board**. 2. LCD assembly. 3. DIMM.
Two short beeps with error codes.	**POST error. See "Numeric error codes" on page 47.**
Two short beeps with blank screen.	1. **System board**. 2. DIMM.
Two or more beeps, or a continuous beep. Operating System starts successfully.	If a mini-PCI Ethernet card is installed, confirm that **Alert On LAN 2** in IBM BIOS Setup Utility is **disabled**.
Three short beeps, pause, three more short beeps, and one short beep.	1. **DIMM**. 2. System board
Only cursor appears.	**Reinstall operating system**.

No beep symptoms

Symptom or error	FRU or action, in sequence
No beep, power-on indicator on, LCD blank, and no POST.	1. **Make sure 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.
The power-on password prompt.	A power-on password or a supervisor password is set. Type the password and press Enter.
The hard-disk password prompt.	A hard-disk password is set. Type the password and press Enter.
The DOS full screen looks smaller.	Start the ThinkPad Configuration program and set the **Screen expansion** function.

LCD-related symptoms

> **Important**
>
> The TFT LCD for the notebook computer contains many thin-film transistors (TFTs). A small number of dots that are missing, discolored, or always lighted is characteristic of TFT LCD technology, but excessive pixel problems can cause viewing concerns. The LCD should be replaced if the number of missing, discolored, or lighted dots in any background is:
> - **XGA:** 8 or more bright dots, 8 or more dark dots, or a total of 9 or more bright and dark dots.
>
> **Note:** Bright dots means pixel is always on (white or color.) Dark dots means pixel is always off (black color.)

Symptom or error	FRU or action, in sequence
No beep, power-on indicator on, and a blank LCD during POST.	**System board**.
• 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 pixels. • Screen abnormal. • Wrong color displayed.	1. **See important note for "LCD-related symptoms"**. 2. Reseat all LCD connectors. 3. LCD assembly. 4. System board.
Horizontal or vertical lines displayed on LCD.	**LCD assembly**.

Intermittent problems

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

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, wrong devices are installed, a short circuit is suspected, or the system is inoperative. Follow these procedures to isolate the failing FRU (do not isolate FRUs that have no defects).

Verify that all attached devices are supported by the computer.

Verify that the power supply being used at the time of the failure is operating correctly. (See "Power system checkout" on page 35.)

1. Power off the computer.
2. Visually check each FRU for damage. Replace any damaged 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. Ultrabay 2000 device
   i. PC Cards
4. Power on the computer.
5. Determine whether the problem has changed.
6. If the problem does not recur, reconnect the removed devices one at a time until you find the failing FRU.
7. If the problem remains, replace the following FRUs one at a time (do not replace a nondefective FRU):
   a. System board
   b. LCD assembly

FRU replacement notices

This section contains notices related to removing and replacing parts. Read this section carefully before replacing any FRU.

Screw notices

Loose screws can cause a reliability problem. In IBM ThinkPad computer, this problem is addressed with special nylon-coated screws that have the following characteristics:
- They maintain tight connections.
- They do not easily come loose, even with shock or vibration.
- They are harder to tighten.
- They should be used only once.

Do the following when you service this machine:
- Keep the screw kit (for the P/N, see "Miscellaneous parts" on page 130) in your tool bag.
- Always use new screws.
- Use a torque screwdriver if you have one.

Tighten screws as follows:
- **Plastic to plastic**

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

  90 degrees more

  (Cross-section)
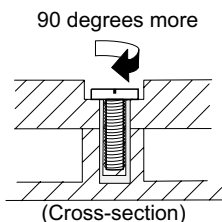
- **Logic card to plastic**

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

  180 degrees more

  (Cross-section)
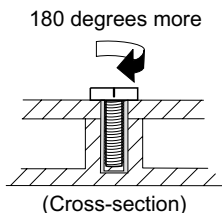
- **Torque driver**

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

• Make sure you use the correct screw. If you have a torque screwdriver, tighten all screws firmly to the torque shown in the table. **Never use a screw that you removed. Use a new one. Make sure the screws are tightened firmly.**

Retaining serial numbers

This section includes the following descriptions:
• "Restoring the serial number of the system unit"
• "Retaining the UUID"

Restoring the serial number of the system unit

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

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

Before replacing the system board, save the original serial number by doing the following:
1. Install the ThinkPad hardware maintenance diskette version 1.61, and restart the computer.
2. From the main menu, select **1. Set System Identification**.
3. Select **2. Read S/N data from EEPROM**.

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

    20: System unit serial number

After you have replaced the system board, restore the serial number by doing the following:
1. Install the ThinkPad hardware maintenance diskette version 1.61 and restart the computer.
2. From the main menu, select **1. Set System Identification**.
3. Select **1. Add S/N data from EEPROM**.

    Follow the instructions on the screen.

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

Retaining the UUID

The Universally Unique Identifier (UUID) is a 128-bit number uniquely assigned to your computer at production and stored in the EEPROM of your system board. The algorithm that generates the number is designed to provide

unique IDs until the year A.D. 3400. No two computers in the world have the same number.

When you replace the system board, you must set the UUID on the new system board as follows:
1. Install the ThinkPad hardware maintenance diskette version 1.61, and restart the computer.
2. From the main menu, select **4. Assign UUID**.

   A new UUID is created and written. If a valid UUID already exists, it is not overwritten.

Removing and replacing a FRU

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

1. Do not try to service any computer unless you have been trained and certified. An untrained person runs the risk of damaging parts.
2. Before replacing any FRU, review "FRU replacement notices" on page 54.
3. Begin by removing any FRUs that have to be removed before the failing FRU. Any such FRUs are listed at the top of the page. Remove them in the order in which they are listed.
4. Follow the correct sequence in the steps for removing the FRU, as indicated in the drawings by the numbers in square callouts.
5. When turning a screw to replace a FRU, turn it in the direction indicated by the arrow in the drawing.
6. When removing the FRU, move it in the direction indicated by the arrow in the drawing.
7. To put the new FRU in place, reverse the removal procedure and follow any notes that pertain to replacement. For information about connecting and arranging internal cables, see "Locations" on page 119.
8. When replacing a FRU, use the correct screw as shown in the procedures.

DANGER

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

Attention: The system board is sensitive to, and can be damaged by, electrostatic discharge. Before touching it, establish personal grounding by touching a ground point with one hand or by using an electrostatic discharge (ESD) strap (P/N 6405959).

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1010 Battery pack

DANGER

Use only the battery in the parts listing for the computer you are servicing. The use of an incorrect battery can result in ignition or explosion of the battery.
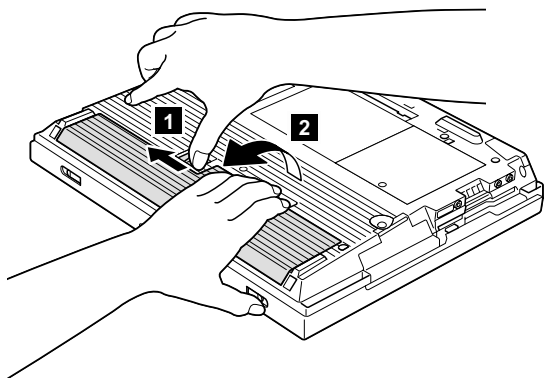
1020 DIMM

For access, remove this FRU:
- "1010 Battery pack" on page 58

Note: Loosen the screw **1** , but do not remove it.
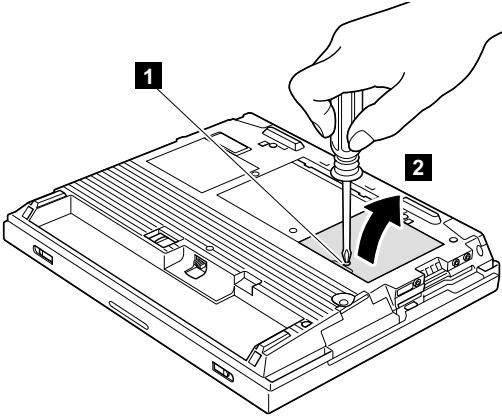
(continued)
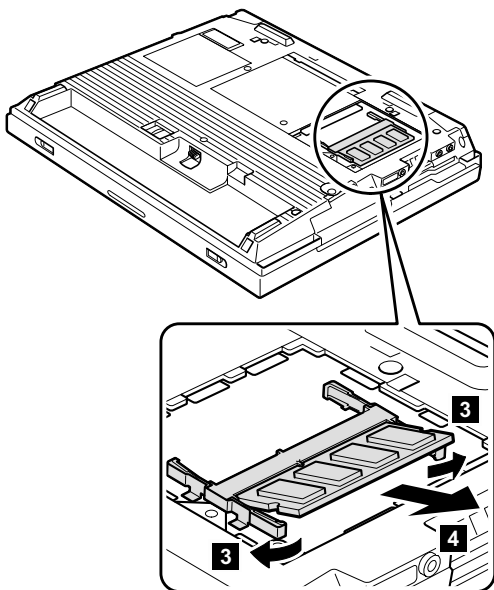
When installing: With the notched end of the DIMM toward the socket, insert the DIMM into the socket, and then press it firmly. Pivot the DIMM until it snaps into place. Make sure that the card is firmly fixed in the slot and does not move easily.

1030 Mini PCI adapter

For access, remove this FRU:
• "1010 Battery pack" on page 58

Note: Loosen the screw **1**, but do not remove it.
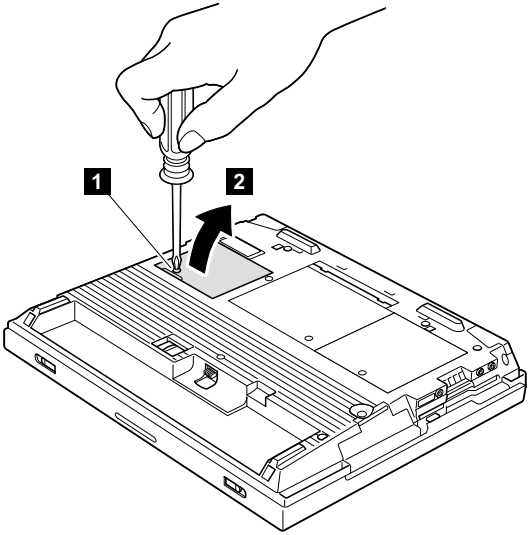
(continued)
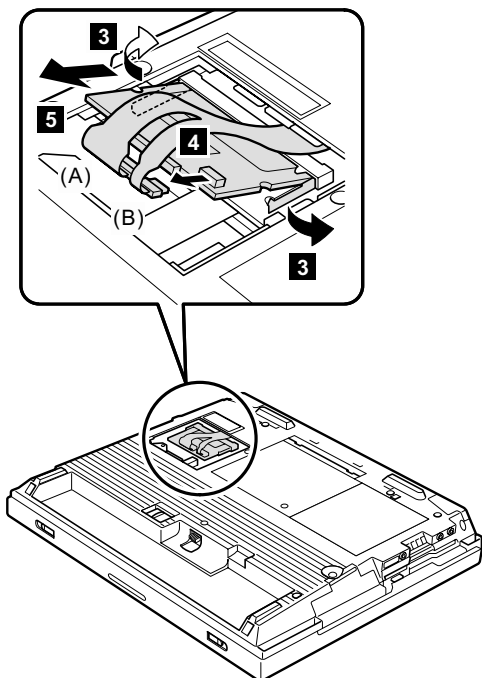
Note: The illustration shows the combo card. Connector **(A)** is for the LAN feature and **(B)** is for the modem feature. This slot also supports a Mini PCI modem card or a Mini PCI network card. Step 4 depends on the card type. Disconnect either **(A)**, **(B)**, or both.

When installing: With the notched end of the card toward the socket, insert the card into the socket, and then press it firmly. Pivot the card until it snaps into place. Make sure that the card is firmly fixed in the slot and does not move easily.

1040 Backup battery

DANGER

Use only the battery in the parts listing for the computer you are servicing. The use of an incorrect battery can result in ignition or explosion of the battery.

For access, remove these FRUs, in order:
- "1010 Battery pack" on page 58
- "1020 DIMM" on page 59
- "1030 Mini PCI adapter" on page 61
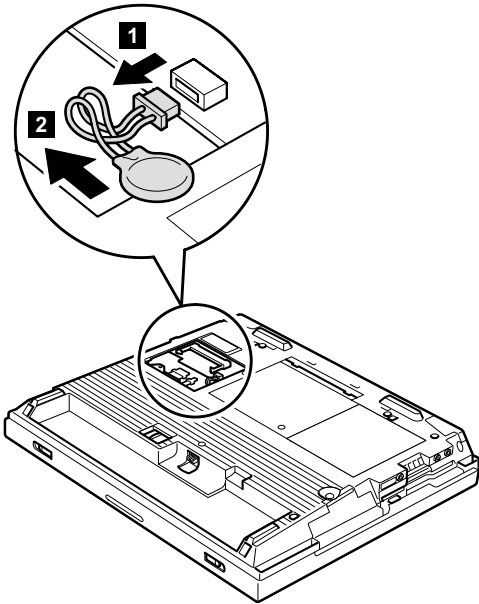
1050 Hard-disk drive or RF ID adapter

> **Attention**
>
> **Do not drop or apply any shock to the hard-disk drive.** The hard-disk drive is sensitive to physical shock. Incorrect handling can cause damage and permanent loss of data.
>
> Before removing the drive, have the user make a backup copy of all the information on the drive if possible.
>
> Never remove the drive while the system is operating or is in suspend mode.

For access, remove this FRU:
• "1010 Battery pack" on page 58
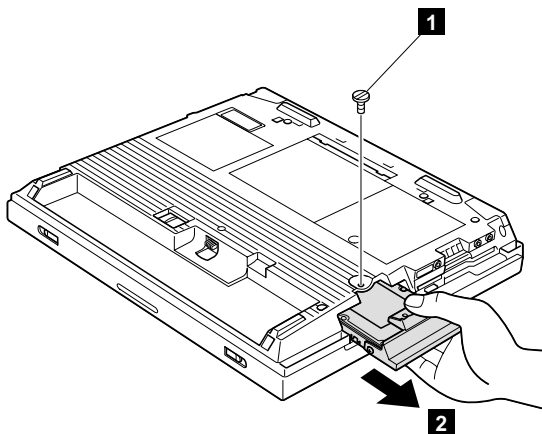
Note: The hard disk is attached to the cover.

Step	Screw (quantity)
1	Coin screw (1) or security screw (1)
Note: Use a 2.5-mm Allen wrench to remove the security screw.	
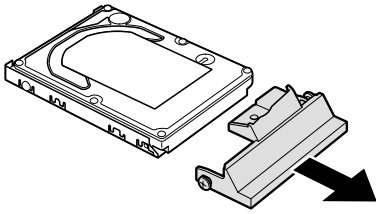
When installing: Make sure that the hard-disk drive connector is firmly seated.

1060 Ultrabay 2000 device

Any of several devices can be inserted into the Ultrabay 2000. The procedure for installing and removing is the same for every device.

Note: When you release the switch in step **1**, the lever pops out. Pull the lever a little in step **2** to release the device from the bay.
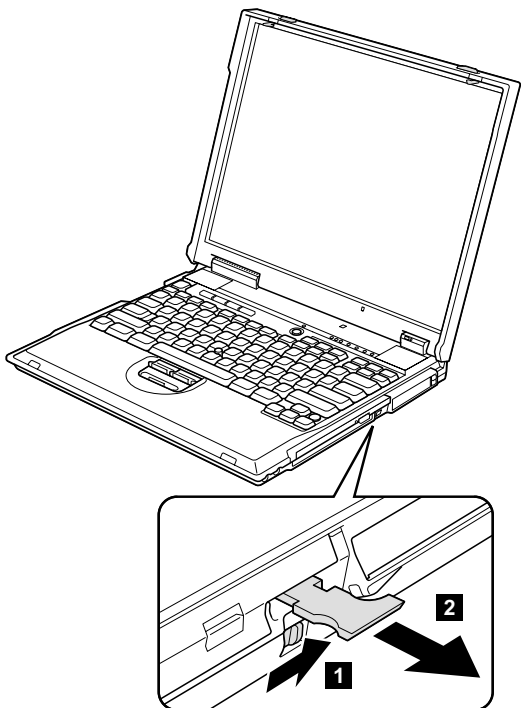
(continued)
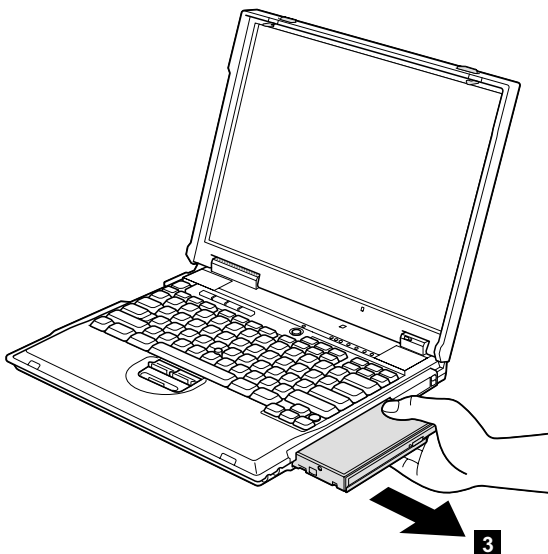
1070 Dummy card

Push the release button once, then the release button pops out.
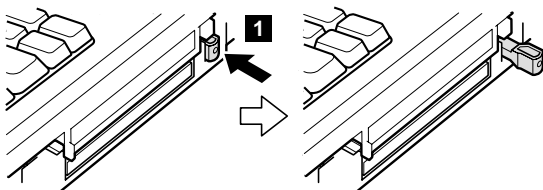
Push the release button again into the slot, then the dummy card pops out.
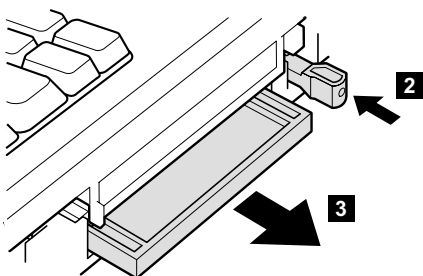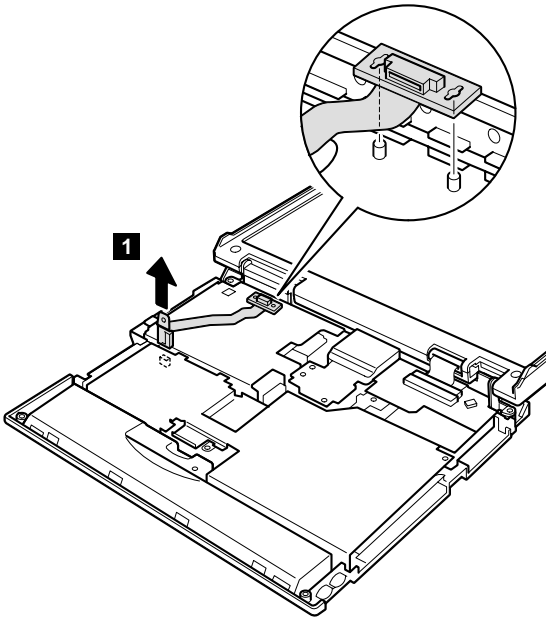
1080 Keyboard

For access, remove these FRUs, in order:
- "1010 Battery pack" on page 58
- "1050 Hard-disk drive or RF ID adapter" on page 64
- "1060 Ultrabay 2000 device" on page 66
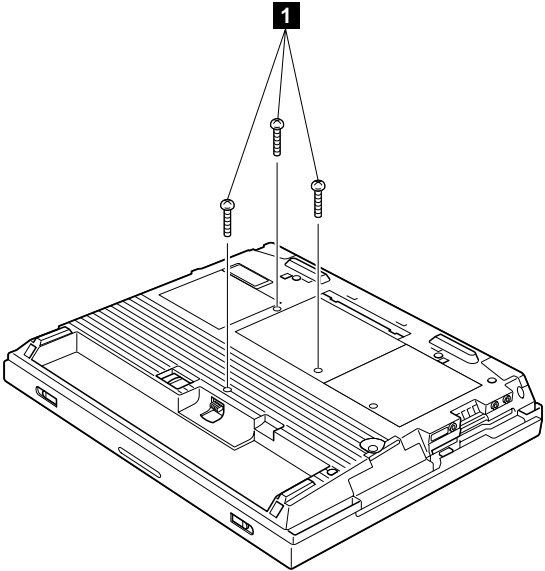
Step	Screw (quantity)	Torque
1	M2.5 × 15 mm, nylon-coated (3)	0.392 Nm (4 kgfcm)

(continued)

(continued)

Removing and replacing a FRU
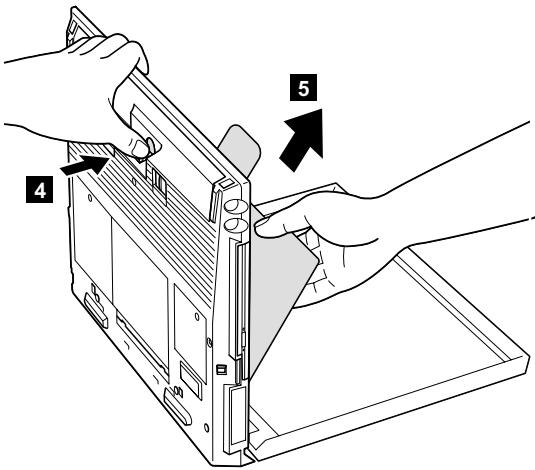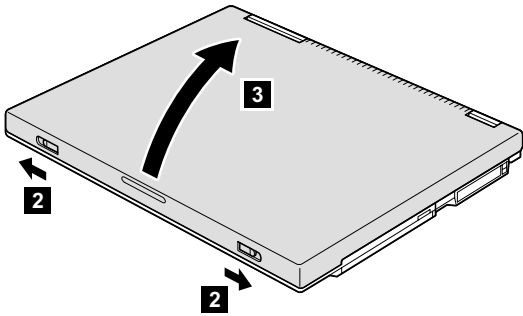
When installing: When installing the keyboard, do as follows:

1. Make sure that the keyboard edges, shown as **(A)**, **(B)**, and **(C)** in the figure, are under the frame.
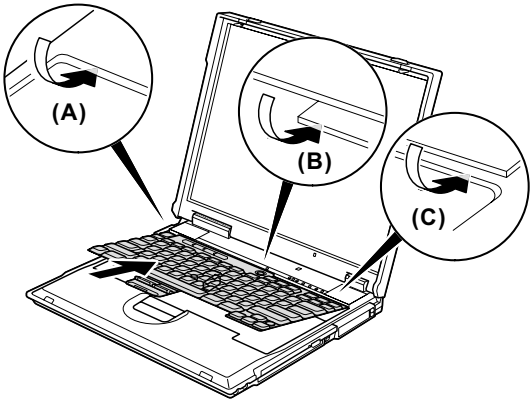
2. Press the **Y** key **1** to connect the keyboard to the connector on the underside of the key; then press the frame of the keyboard **2** to latch the latches.
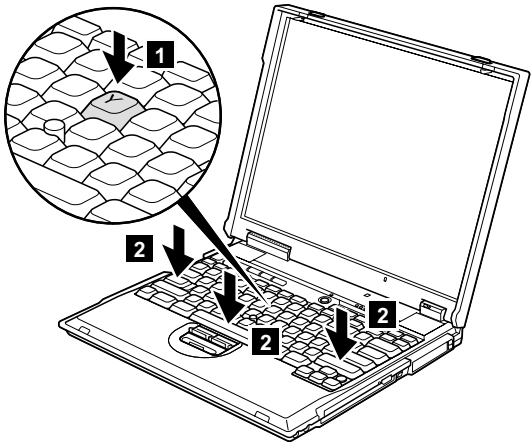
3. After fastening the three screws of bottom side, press the **Y** key again to connect the keyboard firmly to the connector under that key.

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1090 Keyboard CRU insulator

For access, remove these FRUs, in order:

- "1010 Battery pack" on page 58
- "1050 Hard-disk drive or RF ID adapter" on page 64
- "1060 Ultrabay 2000 device" on page 66
- "1080 Keyboard" on page 69
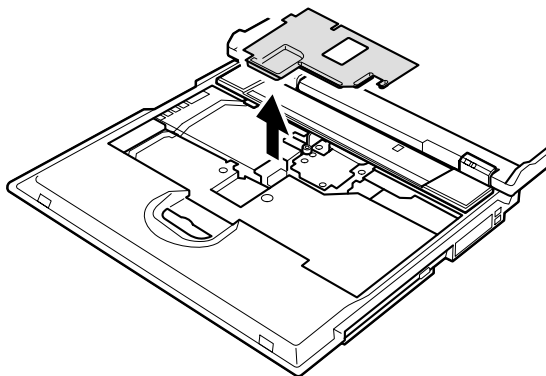
1100 Hinge cover and clear sheet icon

For access, remove these FRUs, in order:
- "1010 Battery pack" on page 58
- "1050 Hard-disk drive or RF ID adapter" on page 64
- "1060 Ultrabay 2000 device" on page 66
- "1080 Keyboard" on page 69
- "1090 Keyboard CRU insulator" on page 72
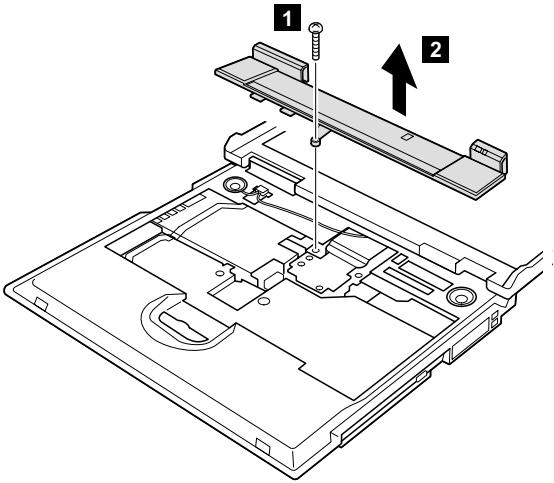
Step	Screw (quantity)	Torque
1	M2.5 × 15 mm, nylon-coated (1)	0.392 Nm (4 kgfcm)

When installing: Stick the new clear sheet icon onto the new hinge cover and then attach the hinge cover to the computer.

ThinkPad A22m wireless models **73**
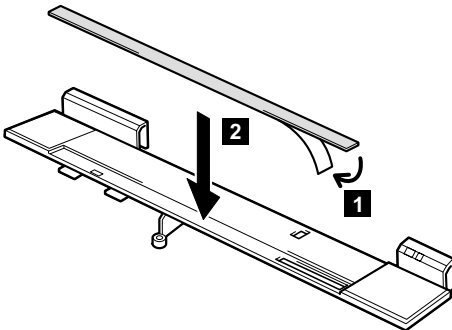
1110 Keyboard bezel and speaker

For access, remove these FRUs, in order:
- "1010 Battery pack" on page 58
- "1050 Hard-disk drive or RF ID adapter" on page 64
- "1060 Ultrabay 2000 device" on page 66
- "1080 Keyboard" on page 69
- "1090 Keyboard CRU insulator" on page 72
- "1100 Hinge cover and clear sheet icon" on page 73
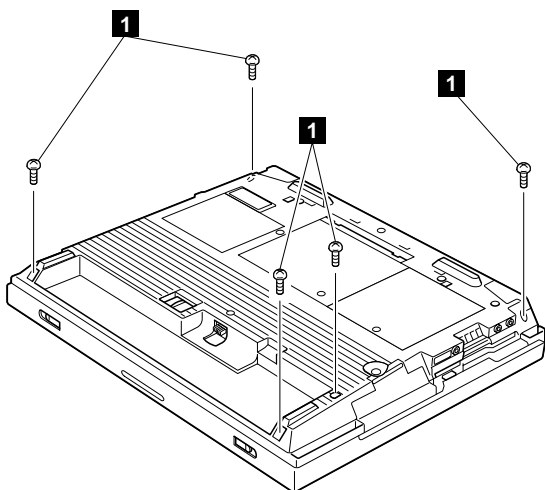
Step	Screw (quantity)	Torque
1	M2.5 × 4.8 mm, nylon-coated (5)	0.392 Nm (4 kgfcm)

(continued)
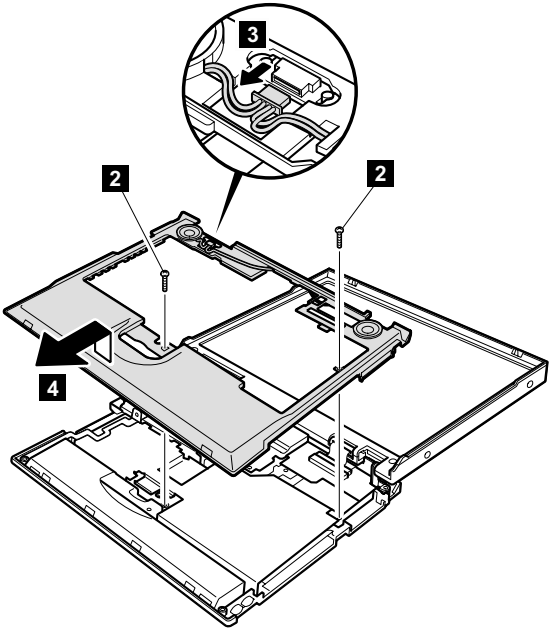
Step	Screw (quantity)	Torque
2	M2.5 × 15 mm, nylon-coated (2)	0.392 Nm (4 kgfcm)
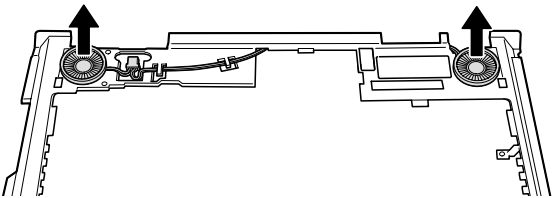
Cable routing: When replacing the cable, see the figure for its routing.

When installing: When attaching the keyboard bezel onto the unit, do as shown in the following figure.
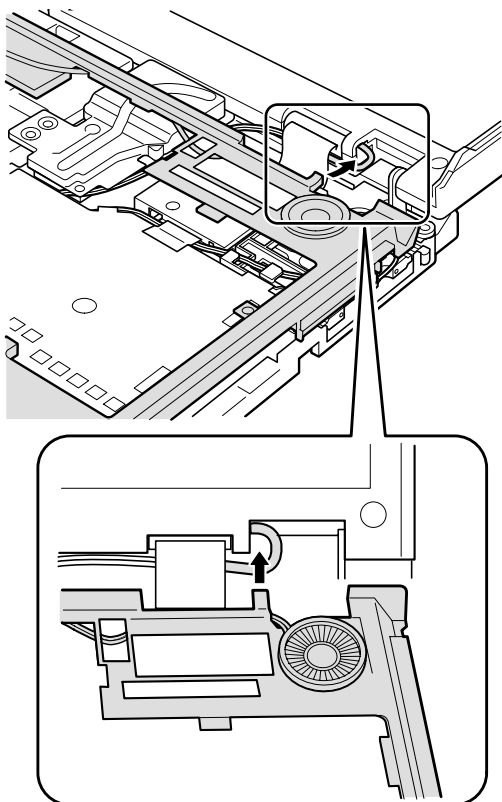
1120 Speaker cable

For access, remove these FRUs, in order:
- "1010 Battery pack" on page 58
- "1050 Hard-disk drive or RF ID adapter" on page 64
- "1060 Ultrabay 2000 device" on page 66
- "1080 Keyboard" on page 69
- "1090 Keyboard CRU insulator" on page 72
- "1100 Hinge cover and clear sheet icon" on page 73
- "1110 Keyboard bezel and speaker" on page 74

When installing: Make sure that you fasten the connector firmly.

1130 Wireless PC Card and sub card

For access, remove these FRUs, in order:
- "1010 Battery pack" on page 58
- "1050 Hard-disk drive or RF ID adapter" on page 64
- "1060 Ultrabay 2000 device" on page 66
- "1070 Dummy card" on page 68
- "1080 Keyboard" on page 69
- "1090 Keyboard CRU insulator" on page 72
- "1100 Hinge cover and clear sheet icon" on page 73
- "1110 Keyboard bezel and speaker" on page 74

Strip off the two insulation tapes (**1**) that secure the cable.
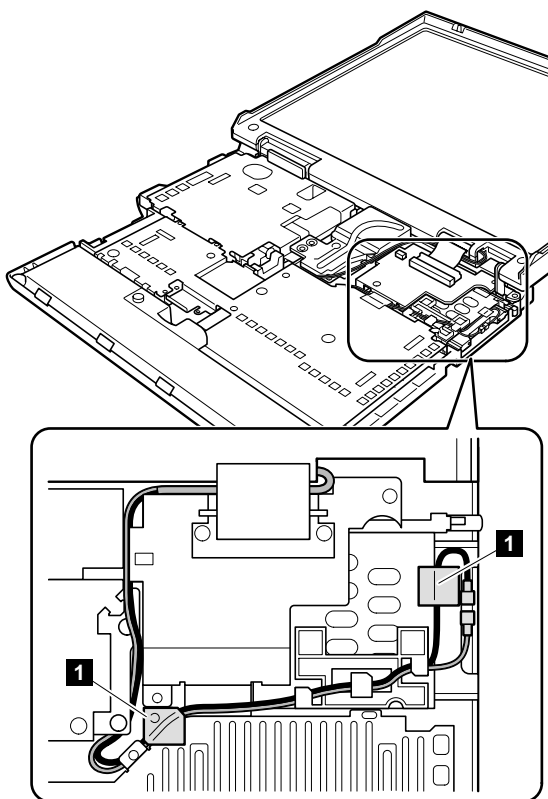
(continued)

Note: When unplugging the antenna jack from the wireless PC Card, do not pull the cable; it might snap. Unplug the jack by grapping it with your fingers.
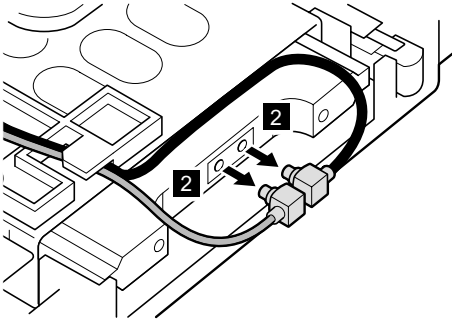
Pull the wireless PC Card out with your fingers.
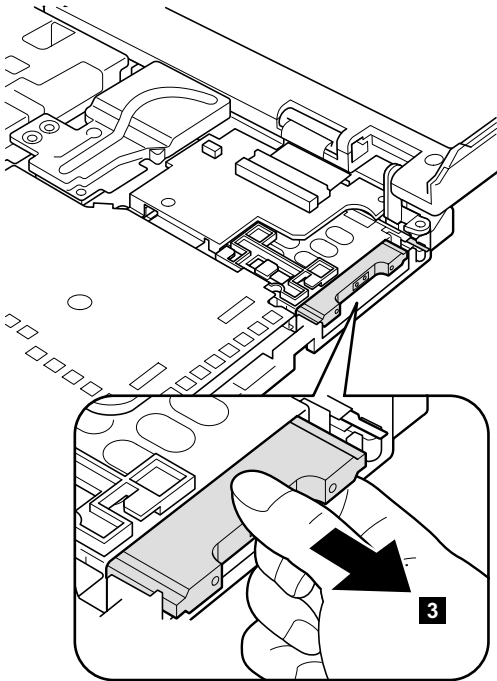
(continued)

If you cannot pull the card out with your fingers, do as follows:

1. Push the release button for the upper slot once a, using a tapering stick; then the release button pops out.
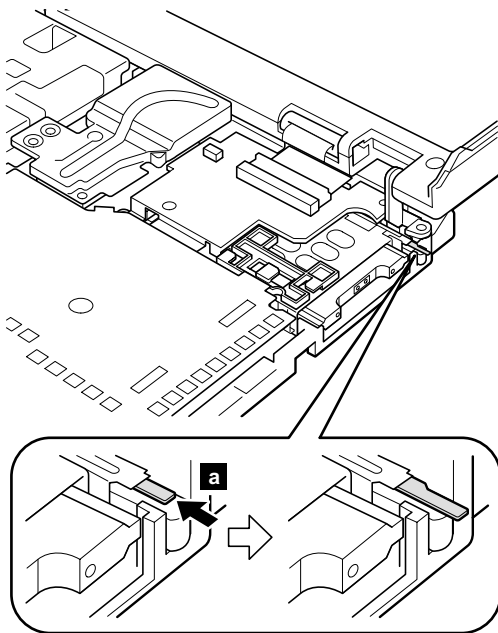
(continued)

2. Push the release button of the upper slot again **b** ; the wireless PC Card pops out **3a** .
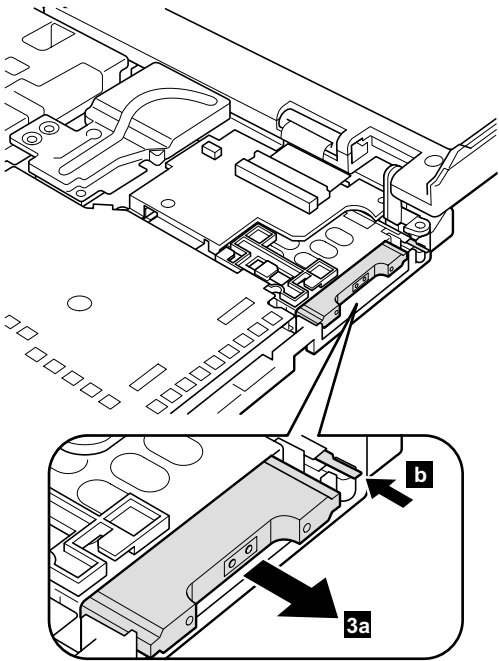
Note: After removing the wireless PC Card, be sure to push the release button back into the slot.
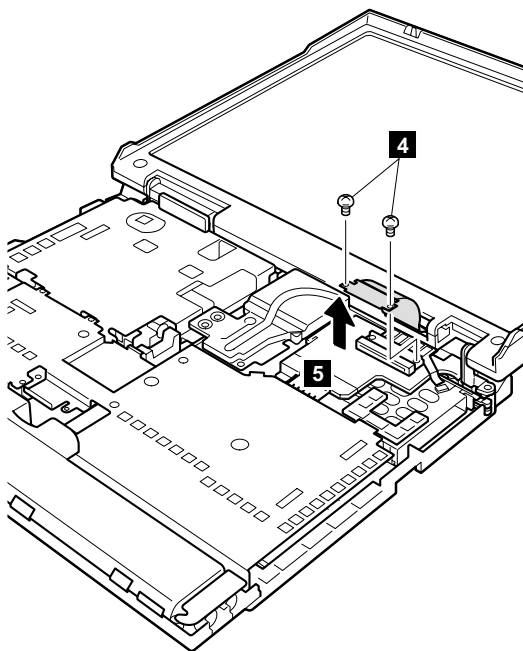
Step	Screw (quantity)	Torque
4	M2.6 × 2.8 mm, nylon-coated (2)	0.392 Nm (4 kgfcm)

(continued)
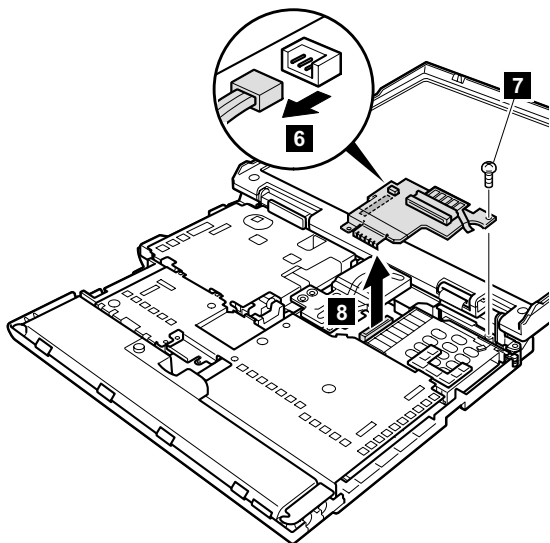
Step	Screw (quantity)	Torque
7	M2.5 × 4.8 mm, nylon-coated (1)	0.392 Nm (4 kgfcm)

When installing:

1. Install the sub card. Make sure that both of the connectors (steps **6** and **8** in the removal procedure) are firmly attached.
2. Insert the wireless PC Card into the upper slot of the PC Card slot. Make sure that the label on the wireless PC Card faces the bottom side of the computer and that the card is firmly attached.
3. Plug the black antenna cable into jack **a** (AUX), and the gray antenna cable into jack **b** (MAIN).
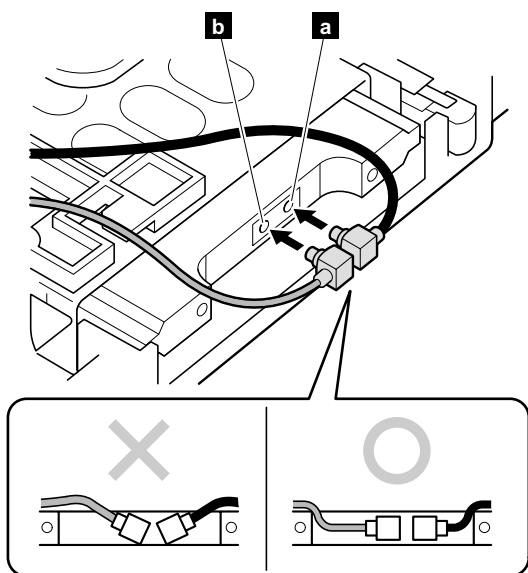
(continued)

4. Secure the black cable with insulation tape as follows:
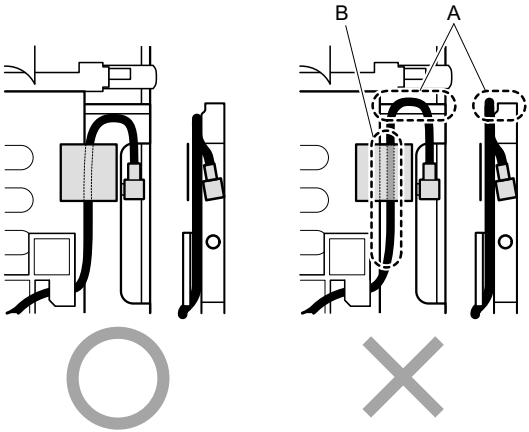
Notes:

a. Make sure that the cable does not jut out from the edge of the wireless PC Card as shown in **A** in the figure. Route the cable as shown in the left figure above.

b. Route the cable along the edge of the PC Card slot as shown in the left figure above. Do not secure the cable separately from the edge of the PC Card slot as shown in **B** in the figure.

5. Route the cables as follows:
   a. Route the black cable and the gray cable one through the cable guide.
   b. Route the cables along the edge of the upper shield and secure them with the insulation tape **a**.
   c. Route the cable under LCD flexible cable **(A)** and alongside the LCD. (**b**)
   d. Route the cable between the fan assembly and the sub card. (**c**)
   e. Route the cable between the system board and the stiffener. Only at this point can any extra bend of the cables be allowed. (**d**)
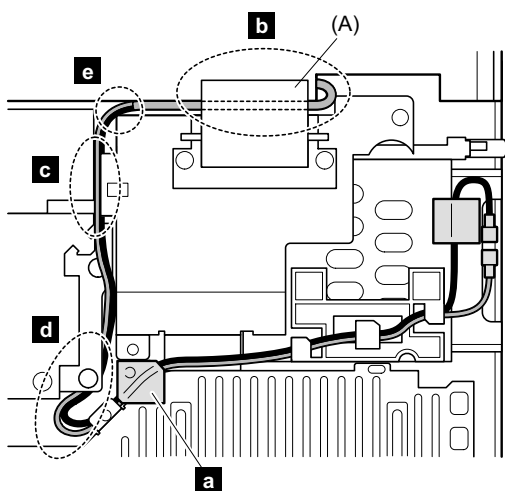
Note: Make sure that the cable is not on the sub card in **e** -part in the figure.

6. Attach the flexible cable to the sub card and tighten the screws.

1140 PC Card slot assembly

For access, remove these FRUs, in order:
- "1010 Battery pack" on page 58
- "1050 Hard-disk drive or RF ID adapter" on page 64
- "1060 Ultrabay 2000 device" on page 66
- "1070 Dummy card" on page 68
- "1080 Keyboard" on page 69
- "1090 Keyboard CRU insulator" on page 72
- "1100 Hinge cover and clear sheet icon" on page 73
- "1110 Keyboard bezel and speaker" on page 74
- "1130 Wireless PC Card and sub card" on page 78
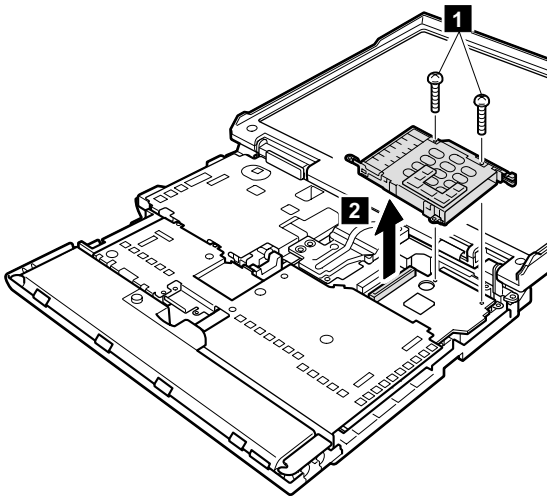
Step	Screw (quantity)	Torque
1	M2.0 x 9.5 mm, nylon-coated (2)	0.245 Nm (2.5 kgfcm)

When installing:

Before installing the new PC card slot assembly, do the following.

1. Pull the release button cover of the upper slot out with your fingers as shown in the figure below.
2. Push both of the upper and the lower release buttons into each slot.
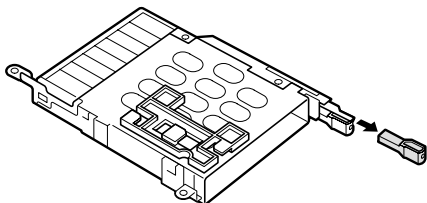
1150 Fan assembly

For access, remove these FRUs, in order:
- "1010 Battery pack" on page 58
- "1050 Hard-disk drive or RF ID adapter" on page 64
- "1060 Ultrabay 2000 device" on page 66
- "1080 Keyboard" on page 69
- "1090 Keyboard CRU insulator" on page 72
- "1100 Hinge cover and clear sheet icon" on page 73
- "1110 Keyboard bezel and speaker" on page 74
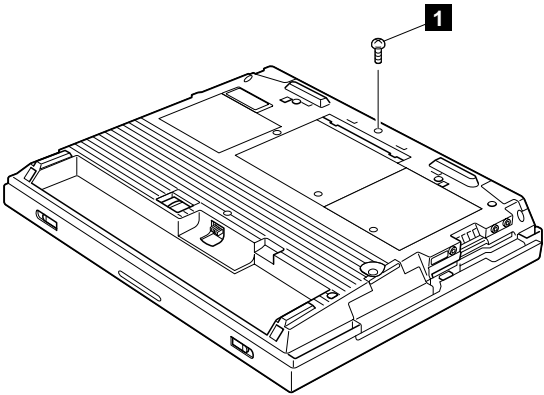
Step	Screw (quantity)	Torque
1	M2.5 × 4.8 mm, nylon-coated (1)	0.392 Nm (4 kgfcm)

(continued)
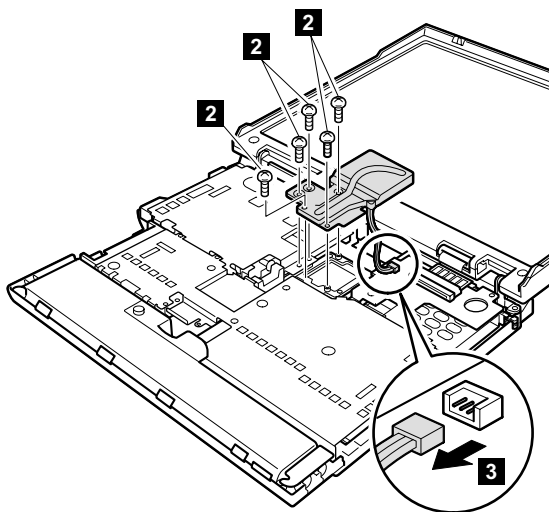
Step	Screw (quantity)	Torque
2	M2.5 × 4.8 mm, nylon-coated (5)	0.392 Nm (4 kgfcm)

When installing: Apply thermal grease on the a -part of the fan assembly as in this figure.
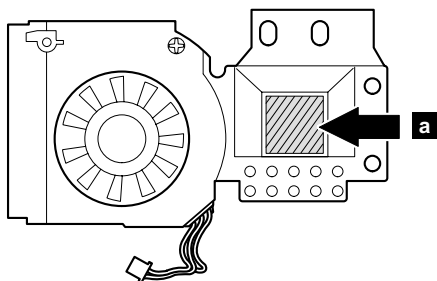
1160 Diskette drive

For access, remove these FRUs, in order:
- "1010 Battery pack" on page 58
- "1050 Hard-disk drive or RF ID adapter" on page 64
- "1060 Ultrabay 2000 device" on page 66
- "1080 Keyboard" on page 69
- "1090 Keyboard CRU insulator" on page 72
- "1100 Hinge cover and clear sheet icon" on page 73
- "1110 Keyboard bezel and speaker" on page 74
- "1120 Speaker cable" on page 77
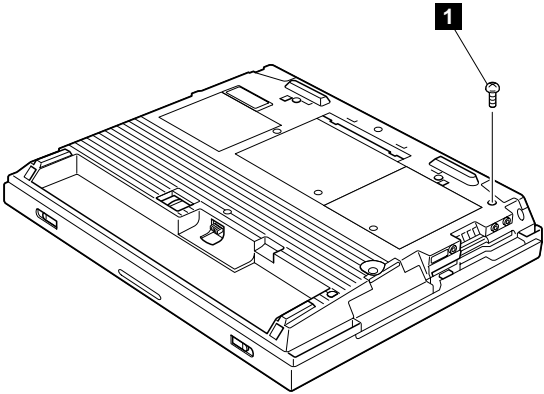
Step	Screw (quantity)	Torque
1	M2.5 × 4.8 mm, nylon-coated (1)	0.392 Nm (4 kgfcm)
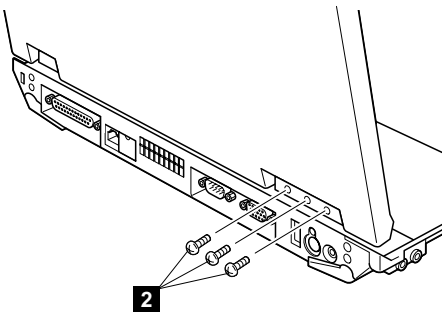
Step	Screw (quantity)	Torque
2	M2.5 × 4.8 mm, nylon-coated (3)	0.392 Nm (4 kgfcm)

(continued)
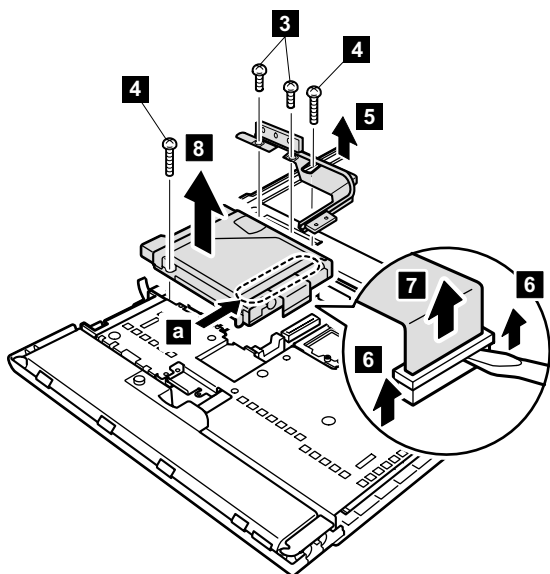
Step	Screw (quantity)	Torque
3	M2.5 × 4.8 mm, nylon-coated (2)	0.392 Nm (4 kgfcm)
4	M2.5 × 15 mm, nylon-coated (2)	0.392 Nm (4 kgfcm)

When installing: Do not press the part of the diskette drive marked a . To do so could damage the drive.

1170 Upper shield

For access, remove these FRUs, in order:
- "1010 Battery pack" on page 58
- "1050 Hard-disk drive or RF ID adapter" on page 64
- "1060 Ultrabay 2000 device" on page 66
- "1070 Dummy card" on page 68
- "1080 Keyboard" on page 69
- "1090 Keyboard CRU insulator" on page 72
- "1100 Hinge cover and clear sheet icon" on page 73
- "1110 Keyboard bezel and speaker" on page 74
- "1120 Speaker cable" on page 77
- "1130 Wireless PC Card and sub card" on page 78
- "1140 PC Card slot assembly" on page 87
- "1150 Fan assembly" on page 89
- "1160 Diskette drive" on page 91
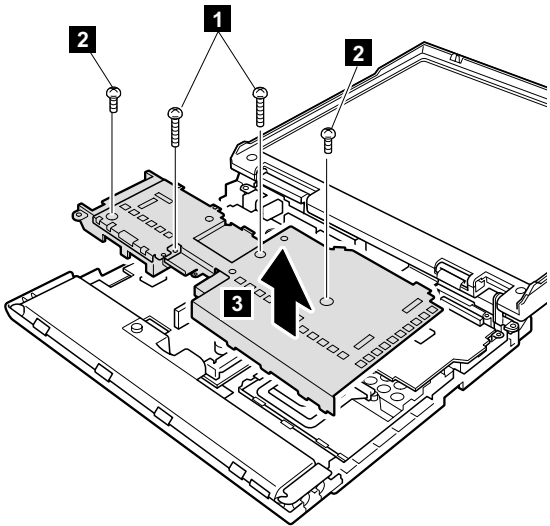
Step	Screw (quantity)	Torque
1	M2.5 × 15 mm, nylon-coated (2)	0.392 Nm (4 kgfcm)
2	M2.5 × 4.8 mm, nylon-coated (2)	0.392 Nm (4 kgfcm)

1180 TV card

For access, remove these FRUs, in order:

Cable routing: When reinstalling the modem cable, route it as in this figure.

1190 CPU socket and CPU

For access, remove these FRUs, in order:

Rotate the screw head (**A**) 180° in the direction of the arrow **a** to release the lock; then remove the CPU.

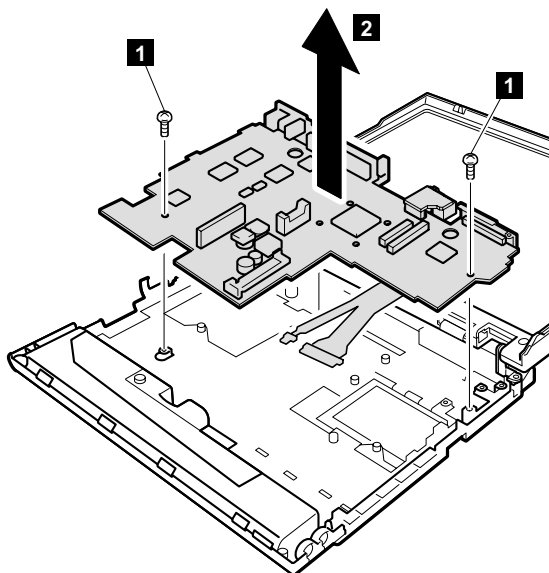| Step	Screw (quantity)	Torque
1	M2.5 × 15 mm, nylon-coated (3)	0.392 Nm (4 kgfcm)

When installing the CPU, do as shown in the figure.
- Rotate the screw head (**A**) 180° in the direction of the arrow **b** to lock the CPU.
- When attaching the CPU to the socket, do as shown in step **c**.
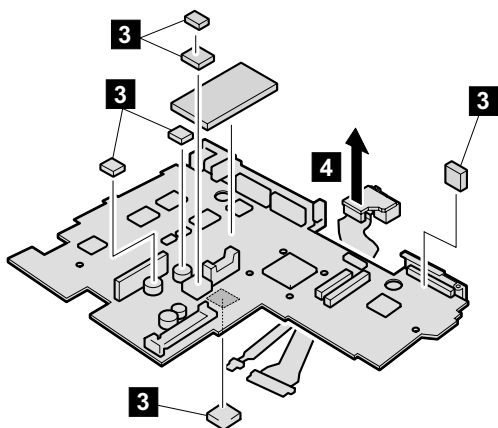
1200 System board and RJ45/11 connector assembly

For access, remove these FRUs, in order:

- "1010 Battery pack" on page 58
- "1020 DIMM" on page 59
- "1030 Mini PCI adapter" on page 61
- "1040 Backup battery" on page 63
- "1050 Hard-disk drive or RF ID adapter" on page 64
- "1060 Ultrabay 2000 device" on page 66
- "1070 Dummy card" on page 68
- "1080 Keyboard" on page 69
- "1090 Keyboard CRU insulator" on page 72
- "1100 Hinge cover and clear sheet icon" on page 73
- "1110 Keyboard bezel and speaker" on page 74
- "1120 Speaker cable" on page 77
- "1130 Wireless PC Card and sub card" on page 78
- "1140 PC Card slot assembly" on page 87
- "1150 Fan assembly" on page 89
- "1160 Diskette drive" on page 91
- "1170 Upper shield" on page 93
- "1180 TV card" on page 94
- "1190 CPU socket and CPU" on page 95

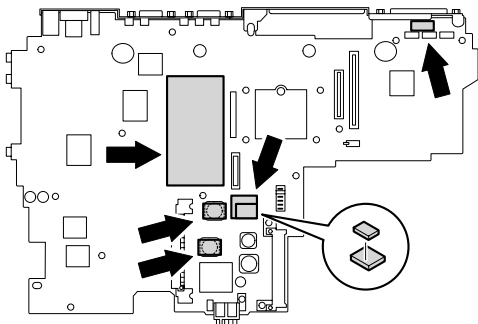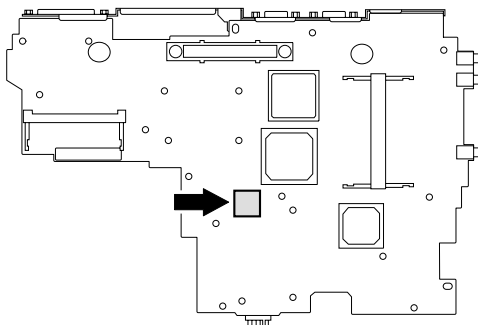| Step	Screw (quantity)	Torque
1	M2.5 × 4.8 mm, nylon-coated (2)	0.392 Nm (4 kgfcm)

(continued)

When installing: Before reinstalling the system board, do the following.

- Make sure that all of the thermal rubbers removed in step **3** are placed on the new system board as shown in the figures below.

  Upper side of the system board

 **Bottom side of the system board**

- When installing the new RJ45/11 connector assembly onto the system board, make sure that the connector is firmly seated.

2010 LCD assembly

For access, remove these FRUs, in order:
- "1010 Battery pack" on page 58
- "1050 Hard-disk drive or RF ID adapter" on page 64
- "1060 Ultrabay 2000 device" on page 66
- "1080 Keyboard" on page 69
- "1090 Keyboard CRU insulator" on page 72
- "1100 Hinge cover and clear sheet icon" on page 73
- "1110 Keyboard bezel and speaker" on page 74

Strip off the two insulation tapes (**1**) securing the cable.
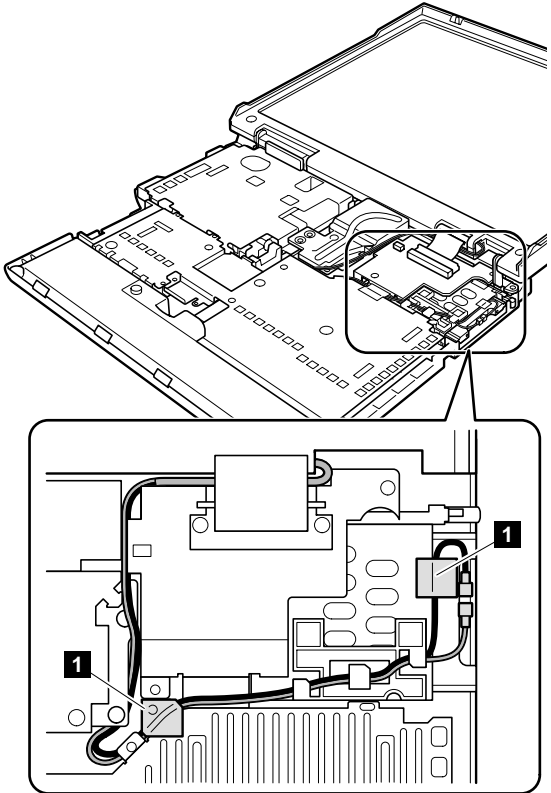
(continued)

Note: When unplugging the antenna jack from the wireless PC Card, do not pull the cable; it might snap. Unplug the jack by gripping it with your fingers.
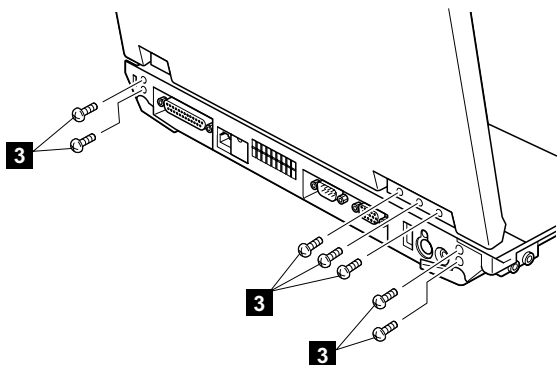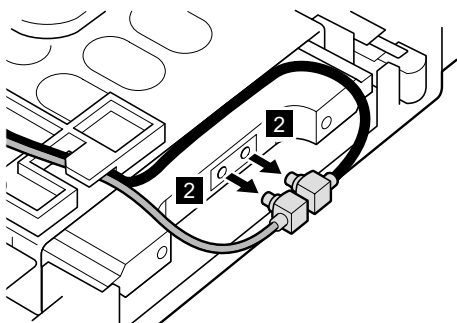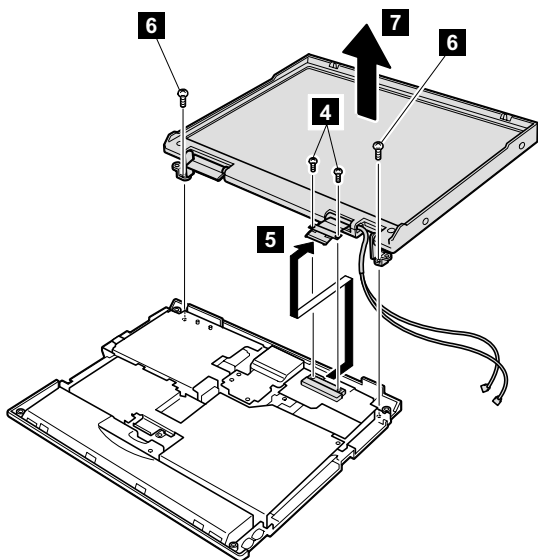

Step	Screw (quantity)	Torque
3	M2.5 × 4.8 mm, nylon-coated (7)	0.392 Nm (4 kgfcm)

(continued)

| Step	Screw (quantity)	Torque
4	M2.6 × 2.8 mm, nylon-coated (2)	0.392 Nm (4 kgfcm)
6	M2.5 × 4.8 mm, nylon-coated (2)	0.392 Nm (4 kgfcm)

When installing: After fixing the LCD assembly onto the
base cover with tightening the screws,
do the following procedure.

1. Plug the black antenna cable into jack **a** (AUX) of the
   wireless PC Card, and the gray antenna cable into jack
   b (MAIN).
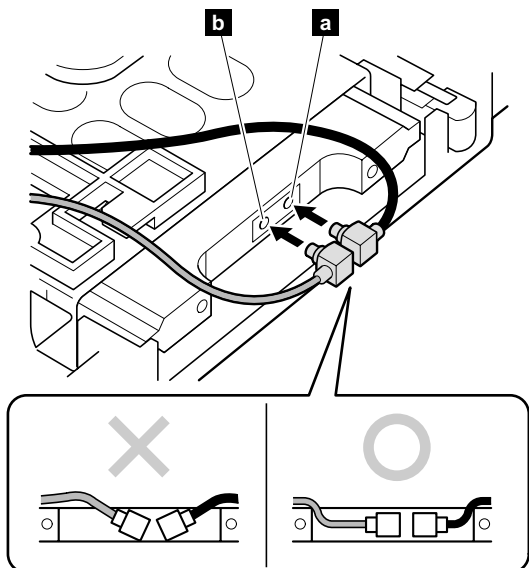
(continued)

2. Secure the black cable with insulation tape as follows:
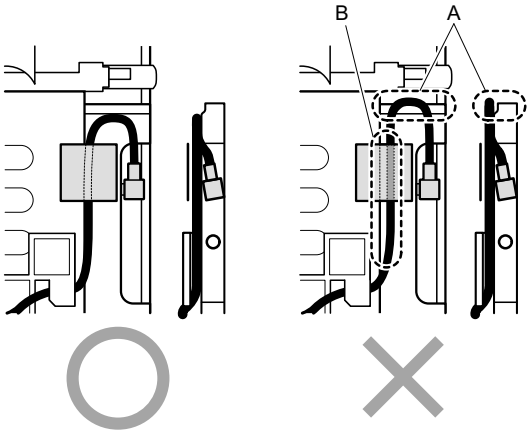

Notes:

a. Make sure that the cable does not jut out from the edge of the wireless PC Card as shown in **A** in the figure. Route the cable as shown in the left figure above.

b. Route the cable along the edge of the PC Card slot as shown in the left figure above. Do not secure the cable separately from the edge of the PC Card slot as shown in **B** in the figure.

(continued)

3. Route the cables as follows:
   a. Route the black cable and the gray cable one through the cable guide.
   b. Route the cables along the edge of the upper shield and secure them with the insulation tape `a`.
   c. Route the cable under LCD flexible cable **(A)** and alongside the LCD. (`b`)
   d. Route the cable between the fan assembly and the sub card. (`c`)
   e. Route the cable between the system board and the stiffener. Only at this point can any extra bend of the cables be allowed. (`d`)
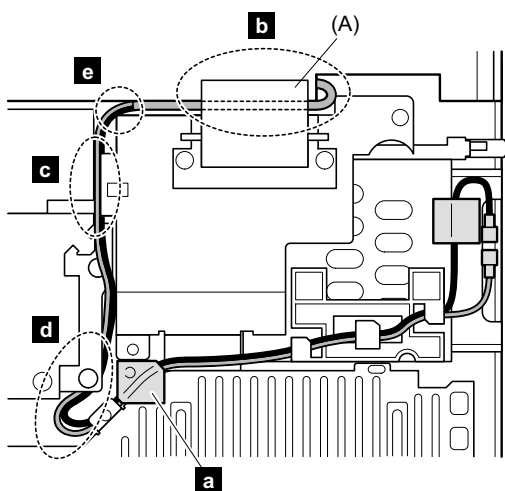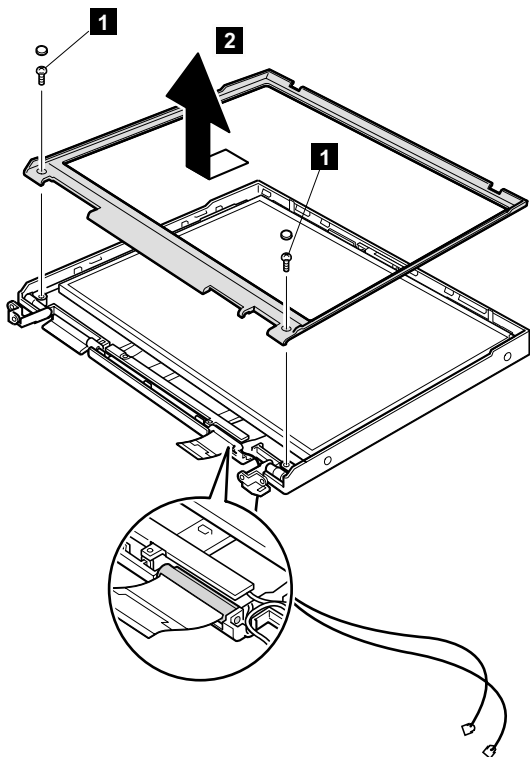

Note: Make sure that the cable is not on the sub card in `e` -part in the figure.

2020 Front bezel

For access, remove these FRUs, in order:
- "1010 Battery pack" on page 58
- "1050 Hard-disk drive or RF ID adapter" on page 64
- "1060 Ultrabay 2000 device" on page 66
- "1080 Keyboard" on page 69
- "1090 Keyboard CRU insulator" on page 72
- "1100 Hinge cover and clear sheet icon" on page 73
- "1110 Keyboard bezel and speaker" on page 74
- "2010 LCD assembly" on page 99

Step	Screw (quantity)	Torque
1	M2.5 × 4.8 mm, nylon-coated (2)	0.392 Nm (4 kgfcm)

2030 Inverter card

For access, remove these FRUs, in order:
- "1010 Battery pack" on page 58
- "1050 Hard-disk drive or RF ID adapter" on page 64
- "1060 Ultrabay 2000 device" on page 66
- "1080 Keyboard" on page 69
- "1090 Keyboard CRU insulator" on page 72
- "1100 Hinge cover and clear sheet icon" on page 73
- "1110 Keyboard bezel and speaker" on page 74
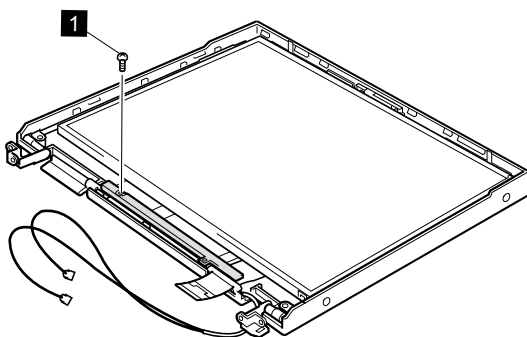- "2010 LCD assembly" on page 99
- "2020 Front bezel" on page 105

Step	Screw (quantity)	Torque
1	M2.5 × 4.8 mm, nylon-coated (1)	0.392 Nm (4 kgfcm)
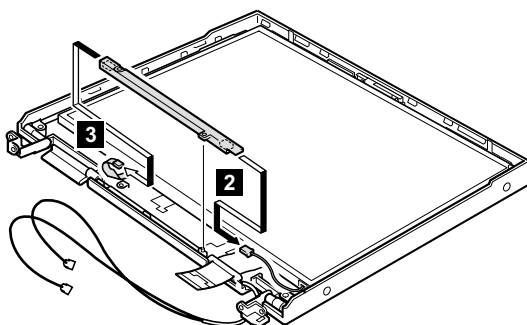
2040 LCD panel

For access, remove these FRUs, in order:

Step	Screw (quantity)	Torque
1	M2.0 × 5.7 mm, nylon-coated (4)	0.167 Nm (1.7 kgfcm)

(continued)

Strip off the insulation tape securing the cable (**2**) and then release the cable from the cable guides (**3**) of the LCD cover.
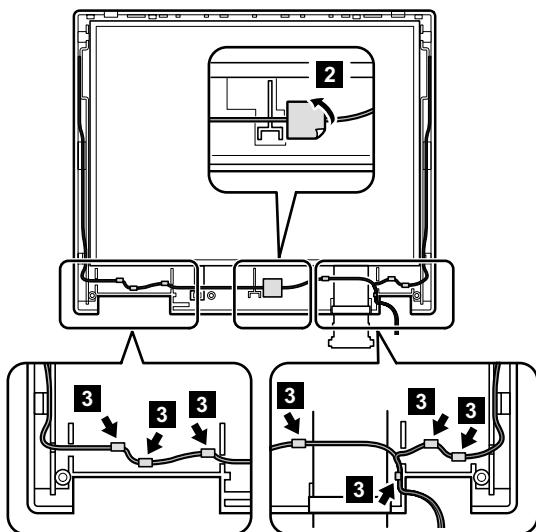
When installing: Make sure that the cables are firmly routed as preceding figure.

(continued)
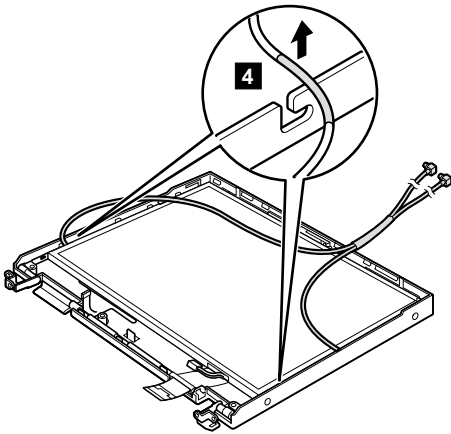
When installing: Make sure that both of the cables are firmly attached each notch of the hinges.

Note: The LCD cable is taped onto the connector. Before disconnecting the LCD cable in step 8, strip off the tape in the direction of the arrow 7 in the figure.
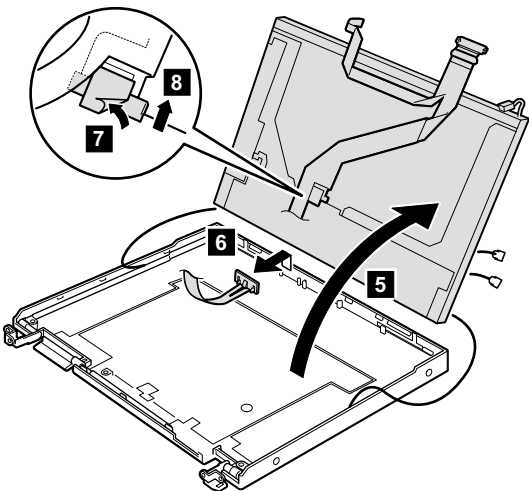
2050 Antenna assembly

For access, remove these FRUs, in order:
- "1010 Battery pack" on page 58
- "1050 Hard-disk drive or RF ID adapter" on page 64
- "1060 Ultrabay 2000 device" on page 66
- "1080 Keyboard" on page 69
- "1090 Keyboard CRU insulator" on page 72
- "1100 Hinge cover and clear sheet icon" on page 73
- "1110 Keyboard bezel and speaker" on page 74
- "2010 LCD assembly" on page 99
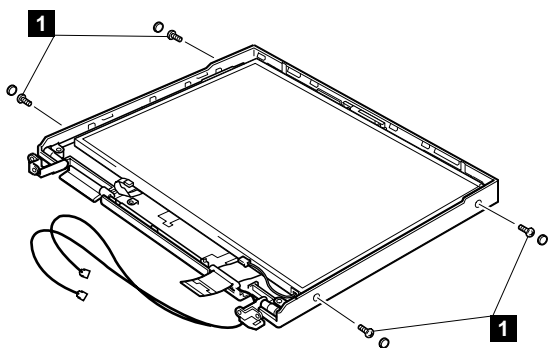- "2020 Front bezel" on page 105
- "2030 Inverter card" on page 106
- "2040 LCD panel" on page 107
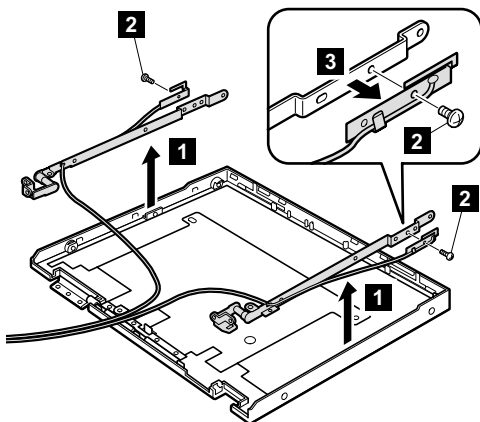
Step	Screw (quantity)	Torque
2	M2.0 × 3.6 mm, nylon-coated (2)	0.167 Nm (1.7 kgfcm)

When installing:
1. Attach the gray antenna cable to the left hinge and the black antenna cable to the right hinge.
2. Attach the left and right hinges as in this figure.
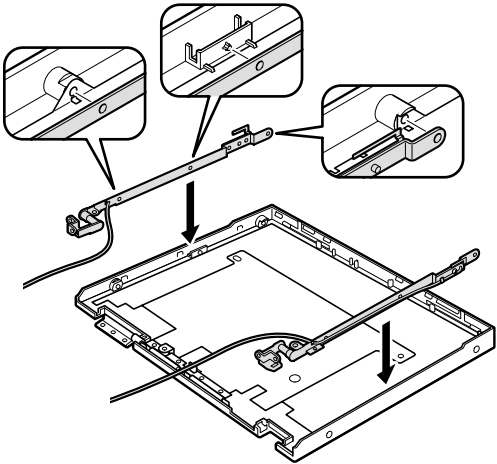
3010 ThinkPad Dock PCI cover

Before replacing the PCI cover:

There are two types of ThinkPad Dock as follows:

- ThinkPad Dock: FRU part no. 08N1546 (PCI cover: FRU part no. 05K6246)
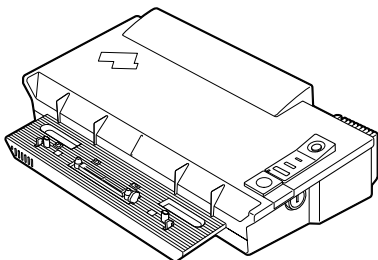
- ThinkPad Dock with extension plate: FRU part no. 08N1537 (PCI cover: FRU part no. 08N7317)
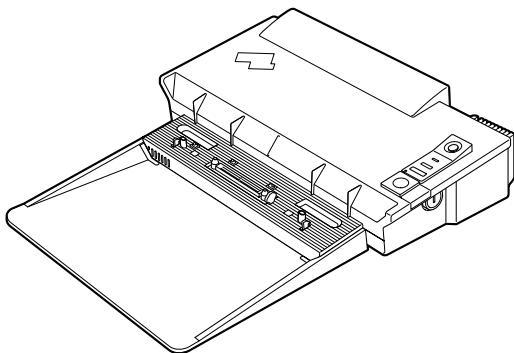
Make sure that the PCI cover FRU suits the ThinkPad Dock you are servicing.

Note: Following illustration shows the PCI cover removal of ThinkPad Dock (FRU no. 08N1546.) Do the same procedure for the PCI cover removal of ThinkPad Dock with extension plate (FRU part no. 08N1537.)
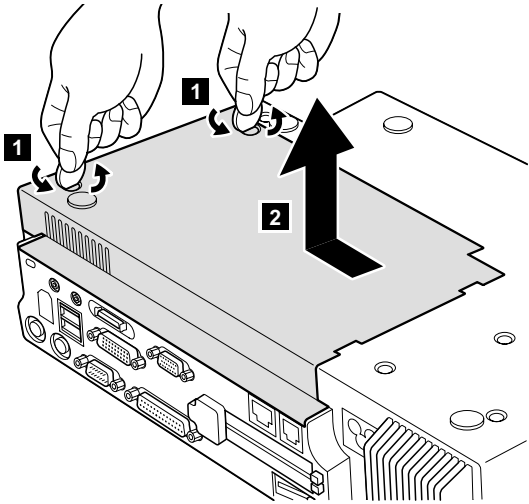
(Bottom view)

3020 ThinkPad Dock top cover

> **Note**
>
> This section is only for the ThinkPad Dock (FRU no. 08N1546.) Top cover and screw kit for ThinkPad Dock (FRU part no. 12P4143) is not available for the ThinkPad Dock with extension plate (FRU part no. 08N1537.)
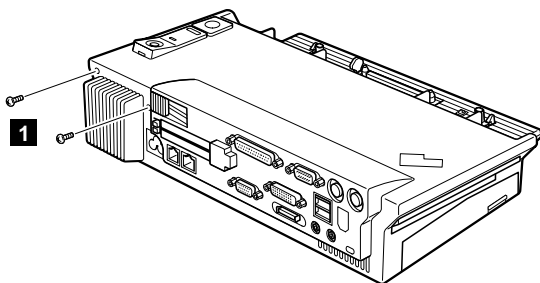
(Rear view)

Step	Screw (quantity)	Torque
1	M2.5 × 4.8 mm (2)	0.392 Nm (4 kgfcm)

(continued)
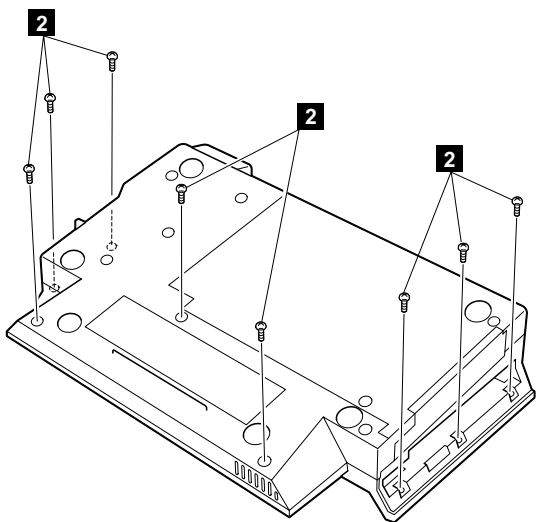
(Bottom view)

Step	Screw (quantity)	Torque
2	M2.5 × 4.8 mm (8)	0.392 Nm (4 kgfcm)

(continued)

Make sure that the system lock key **A** is set to the Unlock position. Release the front latches in step **3**, and then remove the top cover **4**. For step **5**, see the inside view, shown in the circle.
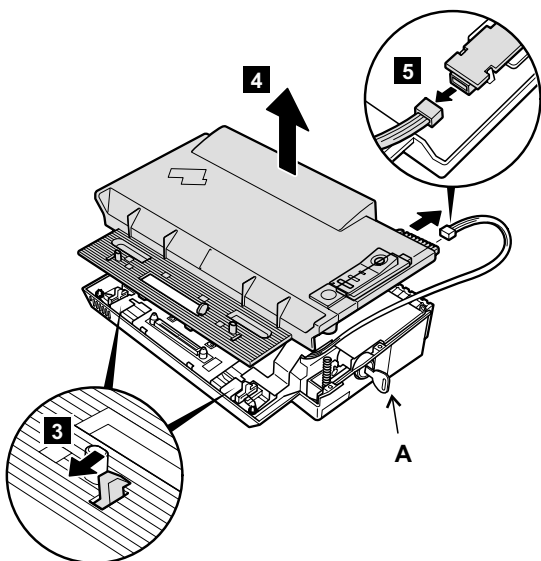
When replacing the top cover, do the following:

• Make sure that the springs placed correctly.
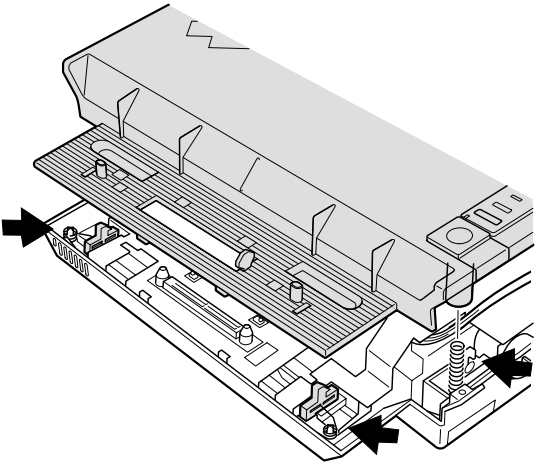
• Make sure that the device release lever is seated correctly.
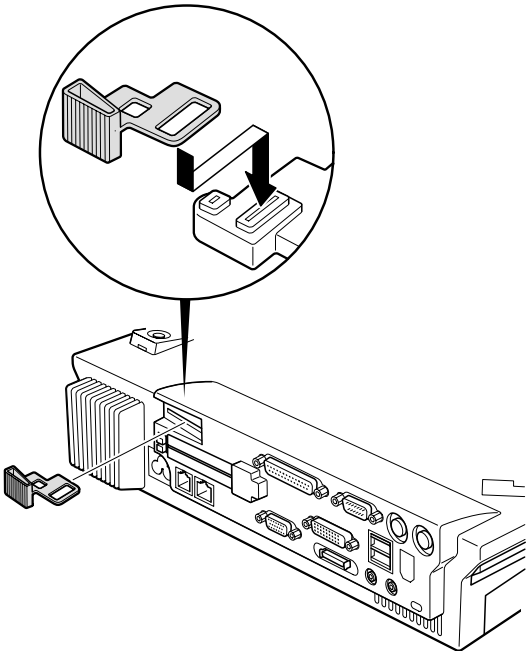
(continued)

- Make sure that the release button works correctly.
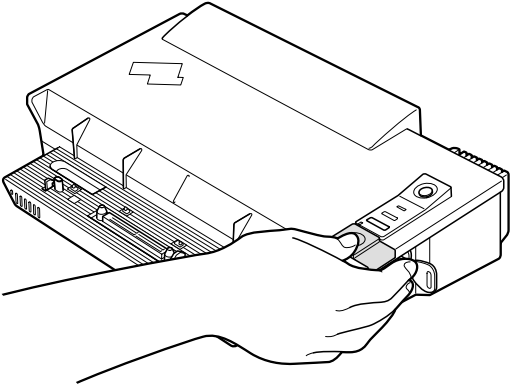
Locations

Front view

1	System status indicators
2	Battery and standby mode status indicators
3	Built-in stereo speakers
4	PC Card eject button
5	PC Card slots
6	Bay latch
7	Eject button
8	Ultrabay 2000 device

> **Note:** The Ultrabay 2000 accepts storage devices, such as a DVD drive or a CD-ROM drive.

9	Video-out connector
10	Video-in connector
11	TrackPoint pointing stick
12	TrackPoint buttons
13	ThinkPad button
14	Volume and mute buttons
15	Power switch
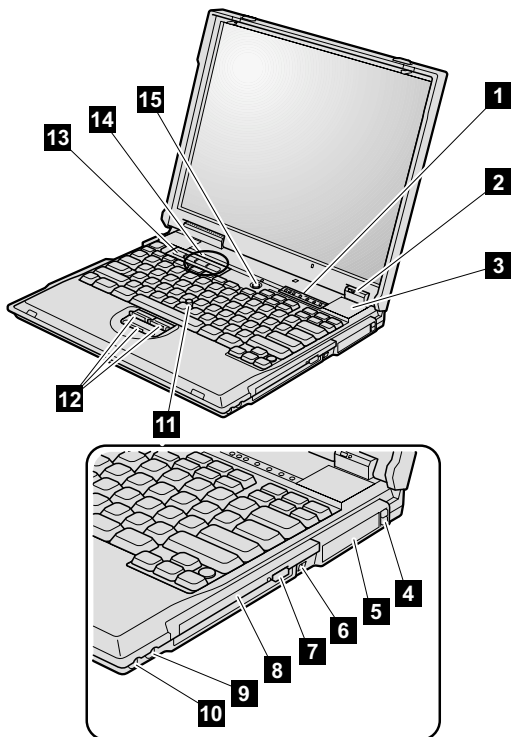
Rear view

1	Security keyhole
2	Parallel connector
3	Modem connector
4	Network connector
5	Serial connector
6	External-monitor connector
7	Universal serial bus (USB) connector
8	External-input-device connector
9	Power jack
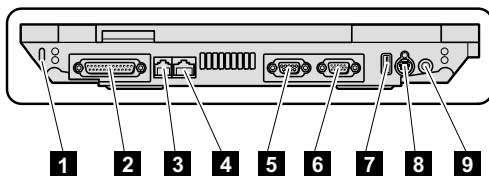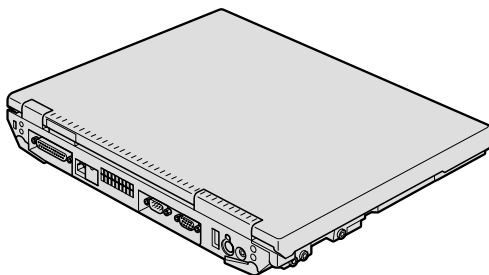
Bottom view

1. Battery pack
2. Battery pack latches
3. Mini PCI card slot
4. Docking connector
5. DIMM slot
6. Stereo headphone jack
7. Stereo line-in jack
8. Diskette drive
9. Microphone jack
10. Infrared port
11. Hard-disk drive
12. LCD latches
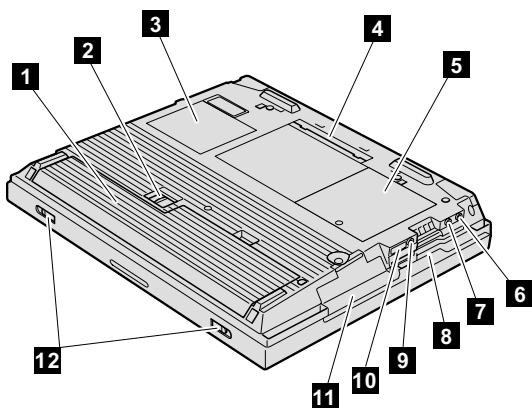
Parts list

Overall
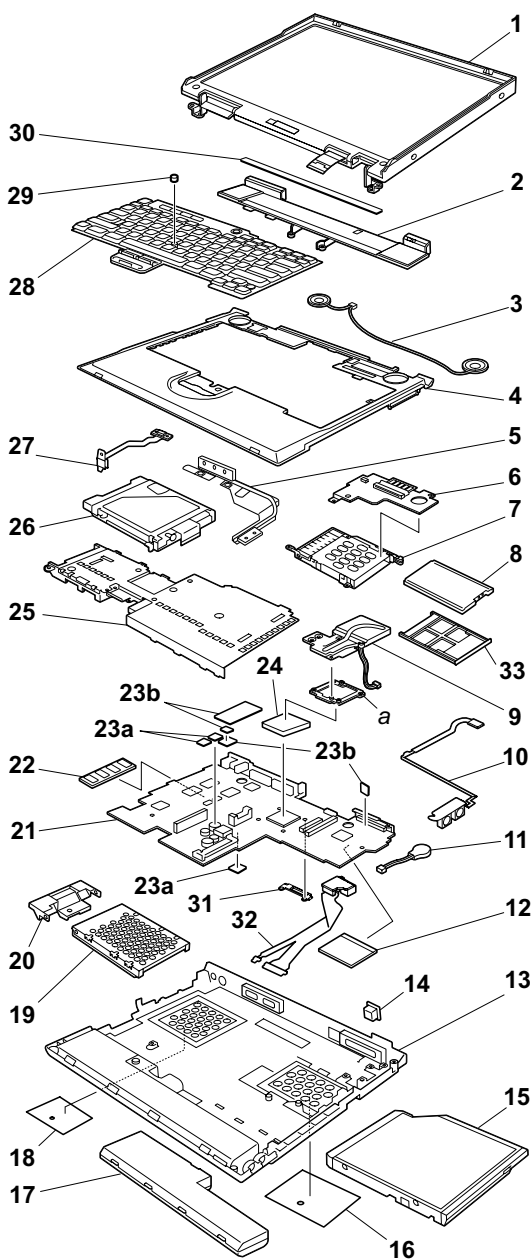
- Each FRU is available for all types/models, unless specific types or models are given.
- The FRUs marked with asterisk are CRU (customer replacable unit).
- The FRUs marked with **OP** are also available as optional FRU.

No.	FRU	P/N
a	See "Miscellaneous parts" on page 130.	
1	LCD unit (see "LCD FRUs" on page 126.)	
2	Hinge cover assembly	26P9492
3	Speaker assembly	02K5007
4	Keyboard bezel	26P9497
5	Heatpipe hinge, lower	08K7287
6	Sub card	08K3306
7	PC Card slots	04P3523
8	PC Card, wireless	26P8087
9	Fan assembly	26P9207
10	TV card (out)	08K3259
11	Backup battery	02K6572
12	Mini PCI combo card (Intel) for 2628-VSx, VTx, WSx, WTx **OP**	06P3809*
	Mini PCI Ethernet card (Intel) 3.0 for 2628-x1J, x2J, x1K, x2K	08K3348*
	Mini PCI modem card (IBM CR) for 2628-x1x, x2x except xxJ, xxK	08K3383*
	for other optional Mini PCI adapter, see "Optional FRUs" on page 131.	
13	Base cover assembly	
	for 2628-Vxx, Wxx except VxT, WxT	26P9485
	for 2628-VxC	26P9706
	for 2628-VxT, VxT	26P9487
14	Blank cap RJ45	04P3975
15	Ultrabay 2000 CD-ROM drive (LG) for 2628-Vxx **OP**	08K9545*
	Ultrabay 2000 CD-ROM drive (TEAC) for 2628-Vxx **OP**	27L3436*
	Ultrabay 2000 DVD-ROM drive (MKE) for 2628-Wxx **OP**	27L3447*
	Ultrabay 2000 DVD-ROM drive (Hitachi) for 2628-Wxx **OP**	27L4087*
	for other optional Ultrabay 2000 device, see "Optional FRUs" on page 131.	

(continued)

No.	FRU	P/N
16	Cover, Mini PCI adapter slot	08K7294*
17	Battery pack (Li-Ion) 6 cell, Panasonic for models except 2628-xxJ, xxE	02K6614*
	Battery pack (Li-Ion) 6 cell, SANYO for models except 2628-xxJ, xxE	02K6618*
	Battery pack (Li-Ion) 6 cell ECO, Panasonic for 2628-xxJ, xxE	02K6769*
	Battery pack (Li-Ion) 6 cell ECO, SANYO for 2628-xxJ, xxE	02K6770*
18	Cover, DIMM slot	08K7295
19	Hard-disk drive (10.0 GB), Hitachi for 2628-Vxx `OP`	08K9531
	Hard-disk drive (10.0 GB), STD for 2628-Vxx `OP`	08K9508
	Hard-disk drive (10.0 GB), STD for 2628-Vxx `OP`	08K9638
	Hard-disk drive (30.0 GB), STD for 2628-Wxx `OP`	08K9564
	Hard-disk drive (30.0 GB), STD for 2628-Wxx `OP`	08K9590
	Hard-disk drive (30.0 GB), Hitachi for 2628-Wxx `OP`	08K9592
	for other optional hard-disk drive, see "Optional FRUs" on page 131.	
20	Cover, hard-disk drive	08K5675
—	Asset ID RF adapter (see "Optional FRUs" on page 131)	
21	System board with video memory 8 MB	26P8102
22	64-MB SDRAM SO DIMM (PC100) for 2628-Vxx `OP`	20L0264*
	128-MB SDRAM SO DIMM (PC100) for 2628-Wxx `OP`	20L0265*
23a	Thermal rubbers (MC2)	08K7157
23b	Thermal rubbers (MC3)	26P9337
24	CPU, Pentium III 900 MHz with SpeedStep technology for 2628-Vxx	26P8126
	CPU, Pentium III 1 GHz with SpeedStep technology for 2628-Wxx	08K3392
25	Upper shield assembly, front	08K7286
26	Diskette drive (TEAC)	05K9157
	Diskette drive (SONY)	08K9552
27	Speaker cable	27L0601

(continued)

No.	FRU	P/N
28	Keyboard* (see "Keyboard" on page 127)	
29	Pointing stick cap	26P9212
30	Clear sheet LED icon	08K7304
31	Fan duct	26P9208
32	RJ45/11 connector assembly	27L0645
33	Dummy card	26P9494
—	Telephone cable for 2628-xxA, xxC, xxE, xxF, xxG, xxH, xxP, xxS, xxT, xxU, xxX, xxY	05K2707
—	AC adapter (72 W), 2-pin (DELTA) for 2628-xxE, xxF, xxJ, xxP, xxS, xxU, xxX **OP**	02K6673*
	AC adapter (72 W), 2-pin (SANKEN) for 2628-xxE, xxF, xxJ, xxP, xxS, xxU, xxX **OP**	02K6677*
	AC adapter (72 W), 3-pin (DELTA) for 2628-xxC, xxG, xxH, xxK, xxT, xxY **OP**	02K6670*
	for other optional AC adapter, see "Optional FRUs" on page 131.	
—	Recovery CD (see "Recovery CDs" on page 128.)	

LCD FRUs

14.1-in. XGA TFT
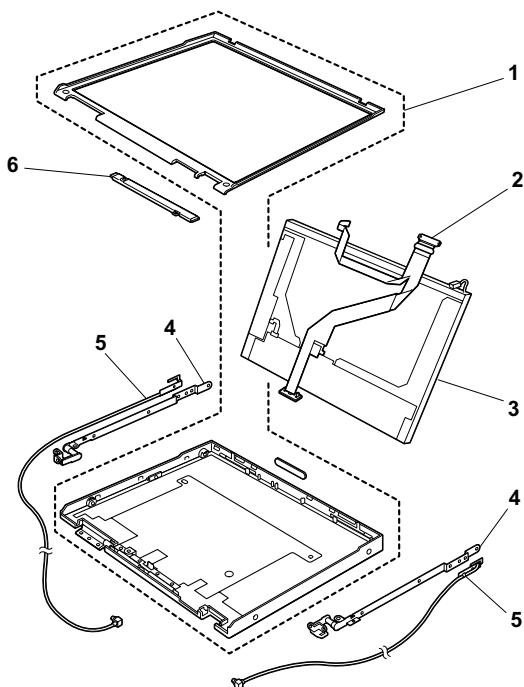
No.	FRU	P/N
1	LCD cover assembly 14.1 XGA with heatpipe	12P4216
2	LCD cable 14.1 XGA wireless	27L0658
3	LCD panel 14.1 XGA (DBU)	05K9578
	LCD panel 14.1 XGA (SAMSUNG)	05K9588
4	Hinges 14.1 wireless	26P9491
5	Antenna assembly	26P9493
6	Inverter card (slim)	12P3053

Keyboard

All of the keyboards listed below are CRUs (customer replaceable units.)

Language	P/N
Arabic	02K5476
Belgian	02K5470
Chinese, Traditional	02K5459
Czech	02K5480
Danish	02K5467
Dutch	02K5464
English, U.K.	02K5461
English, U.S.	02K5455
French, Canadian	02K5456
French, European	02K5463
German	02K5462
Greek	02K5473
Hungarian	02K5479
Hebrew	02K5474
Italian	02K5468
Japanese	02K5458
Korean	02K5460
Norwegian	02K5466
Polish	02K5481
Portuguese	02K5472
Russian	02K5477
Slovak	02K5478
Slovenian	02K5482
Spanish, European	02K5469
Spanish, Latin American	02K5457
Swedish or Finnish	02K5465
Swiss	02K5471
Turkish	02K5475
Thai	02K5759

Recovery CDs

For Windows 98

Language	P/N
Arabic	23P9868
Arabic, localized	23P9869
Czech	23P9870
Danish	23P9847
Dutch	23P9854
English, U.K.	23P9845
English, U.S.	23P9844
Finnish	23P9853
French, European/Canadian	23P9848
German	23P9849
Greek	23P9874
Hebrew	23P9871
Hungarian	23P9875
Italian	23P9852
Japanese	27P1958
Norwegian	23P9855
Polish	23P9872
Portuguese	23P9846
Russian	23P9876
Slovak	23P9878
Slovenian	23P9877
Spanish, European/Latin American	23P9850
Swedish	23P9851
Thai	23P9879
Turkish	23P9873

For Windows 2000

Language	P/N
Arabic	23P9881
Arabic, localized	23P9336
Czech	23P9337
Greek	23P9341
Hebrew	23P9338
Polish	23P9339
Russian	23P9343
Slovak	23P9345
Slovenian	23P9344
Thai	23P9346
Turkish	23P9340

For Windows 2000/Windows NT

Language	P/N
Danish	23P9316
Dutch	23P9323
English, U.K.	23P9314
English, U.S.	23P9361
French, Canadian/European	23P9317
Finnish	23P9322
German	23P9318
Hungarian	23P9324
Italian	23P9321
Japanese	27P1960
Norwegian	23P9324
Portuguese	23P9315
Spanish, European/Latin American	23P9319
Swedish	23P9320

Miscellaneous parts

FRU	P/N
Screw kit (including nylon-coated screws): • M2 x 3.6 mm, flat head (3) • M2 x 5.1 mm, flat head (5) • M2 x 5.7 mm, flat head (5) • M2 x 16 mm, bind head (3) • M2.5 x 4.8 mm, flat head (42) • M2.5 x 5.5 mm, flat head (2) • M2.5 x 15 mm, flat head (15) • M2.6 x 2.8 mm, bind head (7) • M3 x 2.8 mm, small head (5) • Coin screw (1) • Security screw (1) • Screw caps (14)	04P3973
Base miscellaneous parts: • Lens, IR • Lens, Ultrabay 2000 LES • Lock, battery • Spring, battery lock • Lid, docking FR • Lid, docking RR • Spring, lid docking • Rubber foot • Sponge • Sponge, shield lower • Sponge, small • Blank cap, battery • Screw caps • Cu tape	08K5647
System miscellaneous parts: • Keyboard stopper • Door, PC card slots • Door, PC card 1 slot • Spring, PC card slots door • Lens, LED hinge • Blank cap, TV connector • Eject knob, Ultrabay 2000 • Lock lever, Ultrabay 2000 • Spring 1, Ultrabay 2000 • Spring 2, Ultrabay 2000 • Insulator, hard-disk drive • Insulator, keyboard CRU • Mini PCI guide • (*a*) Stiffner, CPU socket - upper • Screw caps	26P9496

(continued)

FRU	P/N
Miscellaneous parts, for system board: • I/O bracket (right/left) • Guide, keyboard connector • Hex stud • I/O bracket spacer • FDD sponge • Docking hole cap • Flat head screw (M2.5 x 4.8) • Screw caps	26P9335
Miscellaneous parts, for diskette drive: • Bezel • Bezel without icon • Bracket • Flexible cable • Screw caps	26P9336
Miscellaneous parts, for LCD: • Latch (right/left) • Spring • Spacer (for 15.0-in.) • Blank cap, UltraPort • Screw caps	04P3968

Optional FRUs

FRU	P/N
Ultrabay 2000 CD-ROM drive (24x) (LG)	27L4141
Ultrabay 2000 CD-ROM drive (24x) (TOSHIBA)	27L3973
Ultrabay 2000 CD-RW drive (SONY)	27L4221
Ultrabay 2000 DVD-ROM drive (6x) (MKE)	05K9188
Ultrabay 2000 DVD-ROM drive (6x) (TOSHIBA)	05K9160
Ultrabay 2000 DVD-ROM drive (8x) (MKE)	27L4241
Ultrabay 2000 DVD-ROM drive (8x) (Hitachi)	27L4236
Ultrabay 2000 SuperDisk drive (LS120)	05K9235
Ultrabay 2000 SuperDisk drive (LS120 2x)	27L3450
Ultrabay 2000 ZIP-250 drive	00N8254
Ultrabay 2000 battery	02K6645
Ultrabay 2000 2nd HDD adapter	08K6067
Hard-disk drive (6.0 GB), STD	05K9227
Hard-disk drive (6.0 GB), Hitachi	05K9228
Hard-disk drive (10.0 GB), STD	08K9508

(continued)

FRU	P/N
Hard-disk drive (12.0 GB), STD	05K9229
Hard-disk drive (12.0 GB), Hitachi	05K9230
Hard-disk drive (18.0 GB), STD	27L4073
Hard-disk drive (20.0 GB), STD	27L4286
Hard-disk drive (20.0 GB), Hitachi	08K9533
Hard-disk drive (32.0 GB), STD	08K9509
Hard-disk drive (48.0 GB), STD	08K9599
Mini PCI combo card (Intel)	08K9509
Mini PCI combo card (3Com)	22P6753
Mini PCI combo card (Ambit)	08K4855
Mini PCI combo card (M2) (IBM)	08K3429
Battery pack (Li-Ion) 9 cell, Panasonic	02K6615
Battery pack (Li-Ion) 9 cell, SANYO	02K6619
Multiple battery charger	02K6642
Multiple battery charger (Ni-HM)	02K6718
AC adapter (72 W), 3-pin (ASTEC)	02K6666
AC adapter (72 W), 2-pin (ASTEC)	02K6669
Asset ID RF adapter	08K6065
ThinkPad Dock	08N1546
PCI cover	05K6246
ThinkPad Dock with extension plate	08N1537
PCI cover with foot	08K7317
Top cover and screw kit for ThinkPad Dock	12P4143
ThinkPad Port Replicator	08N1536
Diskette drive cable	27L0525
Conversion adapter for diskette drive cable	08K6360
Video cable	27L0531

Common parts list

Tools

Tools	P/N
Triconnector wrap plug	72X8546
PC test card	35G4703
Audio wrap cable	66G5180
USB parallel test cable	05K2580
Screwdriver kit	95F3598
Torque screwdriver	05K4695
5 mm socket wrench	05K4694
Screwdriver	27L8126
ThinkPad hardware maintenance diskette version 1.61 **Note:** Download the file from the Web site.	—

Power cords (system)
IBM power cords for a specific country are usually available only in that region:

For 2-pin power cords:

Region	P/N
Canada, United States of America	13H5264
Japan	13H5273
Argentina	36L8870

For 3-pin power cords:

Region	P/N
Australia, New Zealand	76H3514
Taiwan, Thailand	76H3516
Italy	76H3530
Denmark	76H3520
U.K., China (Hong Kong S.A.R.)	76H3524
European countries	76H3518
India, South Africa	76H3522
Israel	76H3532
Korea	76H3535
China (P.R.C.) (other than Hong Kong)	02K0539
Switzerland	76H3528

Power cords (docking station)

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

For 3-pin power cords:

Region	P/N
Argentina	36L8868
Australia, New Zealand	75H8988
Canada, Thailand, United States of America	75H8989
Denmark	75H8992
European countries	75H8990
India, South Africa	75H8993
Israel	75H8999
Italy	75H8998
Japan	75H8996
Korea	76H3536
People's Republic of China (other than Hong Kong)	02K0540
Switzerland	75H8997
United Kingdom	75H8994

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