



IBM Mobile Systems
ThinkPad Computer
Hardware Maintenance Manual

July 2002

This manual supports:

ThinkPad X30 (MT 2672/2673)

ThinkPad Dock (MT 2631)

Note

Before using this information and the product it supports, be sure to read the general information under “Notices” on page 133.

First Edition (July 2002)

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About this manual

This manual contains service and reference information for IBM ThinkPad X30 (MT 2672/2673), and ThinkPad Dock (MT2631) products. Use this manual along with the advanced diagnostic tests to troubleshoot problems.

The manual is divided into sections as follows:

- The common sections provide general information, guidelines, and safety information required in servicing computers.
- The product-specific section includes service, reference, and product-specific parts information.

Important

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

Before servicing an IBM ThinkPad product, be sure to review the safety information under “Safety notices: multilingual translations” on page 5, “Safety information” on page 15, and “Laser compliance statement” on page 20.

Introduction

Important service information

Important

BIOS and device driver fixes are customer-installable. The BIOS and device drivers are posted on the IBM support site <http://www.ibm.com/pc/support>

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

Customers in Canada should call IBM HelpPC at 800-565-3344 for assistance or download 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 expense for replacing and servicing FRUs:

- **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 multilingual, translated safety notice found in this section.

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

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 altre parti di piccole dimensioni siano nella corretta posizione e non siano sparse all'interno dell'elaboratore. Verificare ciò scuotendo l'elaboratore e prestando attenzione ad eventuali rumori; eventuali parti o pezzetti metallici possono provocare cortocircuiti pericolosi.

Antes de encender el sistema despues de sustituir una FRU, compruebe que todos los tornillos, muelles y demás piezas pequeñas se encuentran en su sitio y no se encuentran sueltas dentro del sistema.

Compruébelo agitando el sistema y escuchando los posibles ruidos que provocarían. Las piezas metálicas pueden causar cortocircuitos eléctricos.

Safety notice 2



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



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 température supérieure à 100°C, ne la faites pas brûler et n'en exposez pas le contenu à l'eau. Mettez la pile au rebut conformément à la réglementation en vigueur. Une pile inappropriée risque de prendre feu ou d'exploser.

(continued)

(continuation of safety notice 4)

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

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

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

Safety notice 5

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

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

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

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

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

Safety notice 6



To avoid shock, do not remove the plastic cover that 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



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



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 presents 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 object that weighs 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 toolbox 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.

Safety information

- After service, reinstall all safety shields, guards, labels, and ground wires. Replace any safety device that is worn or defective.
- Reinstall all covers correctly before returning the machine to the customer.

Electrical safety

Observe the following rules when working on electrical equipment.

Important

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

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

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

Attention: Another person must be there to switch off the power, if necessary.

- Use only one hand when working with powered-on electrical equipment; keep the other hand in your pocket or behind your back.

Attention: 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.

Safety information

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 devices that are sensitive to electrostatic discharge

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

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

Opening the CD-ROM drive, 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.**

Laser compliance statement

Some CD-ROM drives, DVD-ROM drives, or 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 !.

Aprenendo 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 neľadte 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

Read this first

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

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”
- “Restoring the preloaded system”
- “Passwords” on page 28
- “Power management” on page 30

Service web site

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

Restoring the preloaded system

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.

Ordering the recovery CD

When the hard-disk drive is replaced because of a failure, no Product Recovery program is on the new hard disk. In this case, you must use the Product Recovery CD for the computer. Order the recovery CD and the hard-disk drive at the same time so that you can recover the new hard-disk drive with the pre-installed software when they arrive. For information on which CD to order, see “Recovery CDs” on page 127

The Product Recovery program is in the service partition, a section of the hard-disk drive that is not displayed by Windows Explorer.

Attention: All of the files on the primary hard-disk partition (usually drive C) will be lost in the recovery process. Be sure to back up copies of the files you have saved on your drive C before you begin.

Creating a Recovery Repair diskette

If the operating system cannot boot normally, or if you cannot get access to the Product Recovery program, you can use the Recovery Repair diskette to boot the computer. Make a Recovery Repair diskette and save it for future use. To make a Recovery Repair diskette, do the following:

1. Shut down and restart the computer.

Related service information

2. 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 opens.

Note: If you are prompted to select the operating system, select one you want to recover. Then the Product Recovery program main menu opens.

3. Select **System Utilities** from the main menu. Press Enter.
4. Select **Create a Recovery Repair diskette**. Press Enter.
5. Follow the on-screen instructions.
6. When the process is completed, label the diskette "Recovery Repair diskette" and save it for future use.

Product Recovery program

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. If you are using Windows XP, three messages (F1, F11, and F12) appear on the screen for a few seconds. One of them is "**Press F11 to invoke the IBM Product Recovery program**". While the message is displayed, quickly press F11.

If you are using Windows 2000 or another operating system, the startup screen is displayed first, and then the message "**To start the Product Recovery program, press F11**" at the top of the screen. Here again it appears very briefly; watch for it, and press F11 before it disappears.

Note: If this message is not displayed, you can use a Recovery Repair diskette to get access to the Product Recovery program. (For using a Recovery Repair diskette, see "To use the Recovery Repair diskette:" on page 28.)

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.
6. When the Product Recovery program finishes running, the computer will restart with the pre-installed operating system, drivers, and software.

Note: Network drivers are not automatically restored with Windows NT 4.0; you will need to reinstall them.

Note: If you use Windows 2000 or Windows 98, restart the system by pressing Ctrl+Alt+Del or by turning the computer off and then on again. The computer will restart with the pre-installed operating system, drivers, and software.

Using the recovery CD

To create the service partition and install the preloaded system from the recovery CD, do the following:

To create the service partition:

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 is displayed: **“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. Press Y key. 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 is displayed: **“Your computer originally included a Product Recovery program ... Reinstall the Product Recovery program? (Y/N) []”**.
 - To install the service partition, go to step 4.

Related service information

- To preload the hard-disk drive without installing the service partition, press N key.
8. If you get a message asking which operating system to install, select the proper operating system and press Enter.
 9. A message is displayed: "**Full Recovery:**". Press Enter to select.
 10. On each of the next three windows, press the Y key.
 11. Follow the prompts to complete the recovery.

To use the Recovery Repair diskette:

1. Shut down and turn off the computer.
2. Insert the Recovery Repair diskette into the drive, and then turn on the computer.
3. Follow the on-screen instructions.

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 has 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 does not 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 60.

3. Remove the backup battery.

For how to remove the backup battery, see “1040 Backup battery” on page 64.

4. Turn on the computer and wait until the POST ends.

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.

Related service information

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 NT.
- Standby mode is called *suspend mode* in 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 do not 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.)

Related service information

- 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 the 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.

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.

Note: 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.
- If you are using the ACPI operating system and have defined one of the following actions as the event that causes the system to go into hibernation mode, perform that action.
 - Closing the lid.
 - Pressing the power button.
 - Pressing Fn+F4 keys.

Also, the computer goes into hibernation mode automatically in either of the following conditions:

- If a “hibernation time” has been set on the timer, and the user does not do any operation with the keyboard, the TrackPoint, the hard-disk drive, the parallel connector, or the diskette drive within that time.
- If 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.

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 43.

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 37, and check the power sources.

If an error code appears, go to “Symptom-to-FRU index” on page 49.

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.

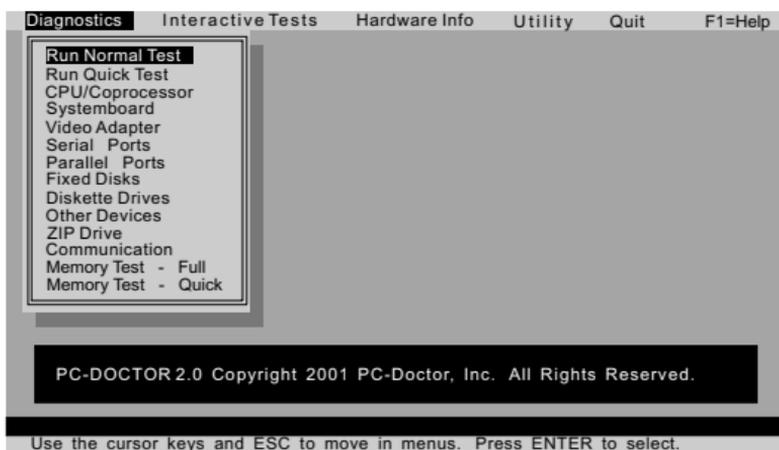
A pull-down menu appears. (Its exact form depends on the model.)

The options on the test menu are as follows:

| Diagnostics | Interactive Tests |
|--|---|
| <ul style="list-style-type: none"> • Run Normal Test • Run Quick Test • CPU/Coprocessor • Systemboard • Video Adapter • Serial Ports • Parallel Ports • Fixed Disks • Diskette Drives • Other Devices • ZIP Drive • LS-120/240 Drive • Communication • Wireless LAN • Memory Test – Full • Memory Test – Quick | <ul style="list-style-type: none"> • Keyboard • Video • Internal Speaker • Mouse • Joystick Test • Diskette • System Load • CD-ROM/DVD Test • Intel Wireless Radio |

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.
- **Video Adapter** test supports only the LCD display on the ThinkPad computer. Before running PC-Doctor DOS, detach the external Monitor.
- To test **ZIP Drive** or **LS-120/240 Drive**, each media is needed to be inserted before start testing.
- To test **Digital Signature Chip**, the chip must be enabled.
- When Legacy Floppy Drives is enabled in the IBM BIOS Setup Utility, **Diskette Drives** test is activated even if no legacy diskette drive is attached to the ThinkPad computer.



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
- PNPIISA 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” on page 38
- “Checking the battery pack” on page 38
- “Checking the backup battery” on page 39

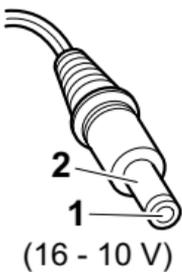
Checking the ac adapter

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

- If the power problem occurs only when the port replicator is used, replace the port replicator.
- If the power-on indicator does not turn on, check the power cord of the ac adapter for correct continuity and installation.
- If the 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:



| 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 43.

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

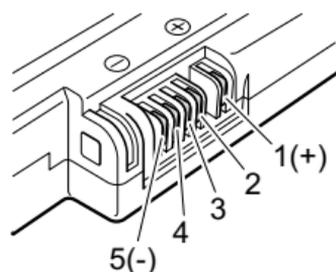
Battery charging does not start until the Power Meter shows that less than 95% of the total power remains; under this condition the battery pack can charge to 100% of its capacity. This protects the battery pack from being overcharged or from having a shortened life.

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.

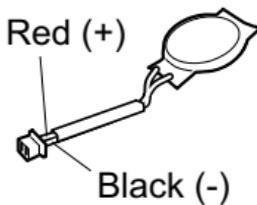
- If the voltage is more than +11.0 V dc, measure the resistance between battery terminals 4 and 5. The resistance must be 4 to 30 K Ω .

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:

- Power off the computer, and unplug the ac adapter from it.
- Turn the computer upside down.
- Remove the battery pack (see "1010 Battery pack" on page 60).
- Remove the backup battery (see "Checking the battery pack" on page 38).
- Measure the voltage of the backup battery. See the following figure.



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

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

ThinkPad X30

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Product overview

This section presents the following product-unique information:

- “Specifications”
- “Status indicators” on page 45
- “FRU tests” on page 47
- “Fn key combinations” on page 48

Specifications

| Feature | Description |
|-------------------|--|
| Processor | <ul style="list-style-type: none"> • Mobile Intel® Pentium® III processor 1.06 GHz - M, L2 512 KB cache • Mobile Intel® Pentium® III processor 1.2 GHz Hz - M, L2 512 KB cache |
| Bus architecture | <ul style="list-style-type: none"> • HUB link • PCI bus • LPC bus |
| Memory (standard) | <ul style="list-style-type: none"> • 128 MB DIMM card × 1 • 256 MB DIMM card × 1 |
| Memory (optional) | <ul style="list-style-type: none"> • 64 MB DIMM card • 128 MB DIMM card • 256 MB DIMM card • 512 MB DIMM card (maximum of 1024 MB) |
| Graphic memory | <ul style="list-style-type: none"> • MAX 32 MB DVMT (Dynamic Video Memory Technology) on system main memory |
| CMOS RAM | <ul style="list-style-type: none"> • 242 bytes |
| Hard-disk drive | <ul style="list-style-type: none"> • 20.0 GB, 2.5-inch, IDE interface • 40.0 GB, 2.5-inch, IDE interface |
| Display | <ul style="list-style-type: none"> • 12.1-inch, 16M colors, XGA (1024 × 768 resolution) TFT color LCD |
| I/O port (system) | <ul style="list-style-type: none"> • External monitor connector • RJ11 • RJ45 • Parallel connector • Stereo headphone jack • Monaural microphone jack • Stereo line-in jack • Universal serial bus (USB) connector × 2 • Infrared port • Docking connector • DC-in • IEEE 1394 connector |

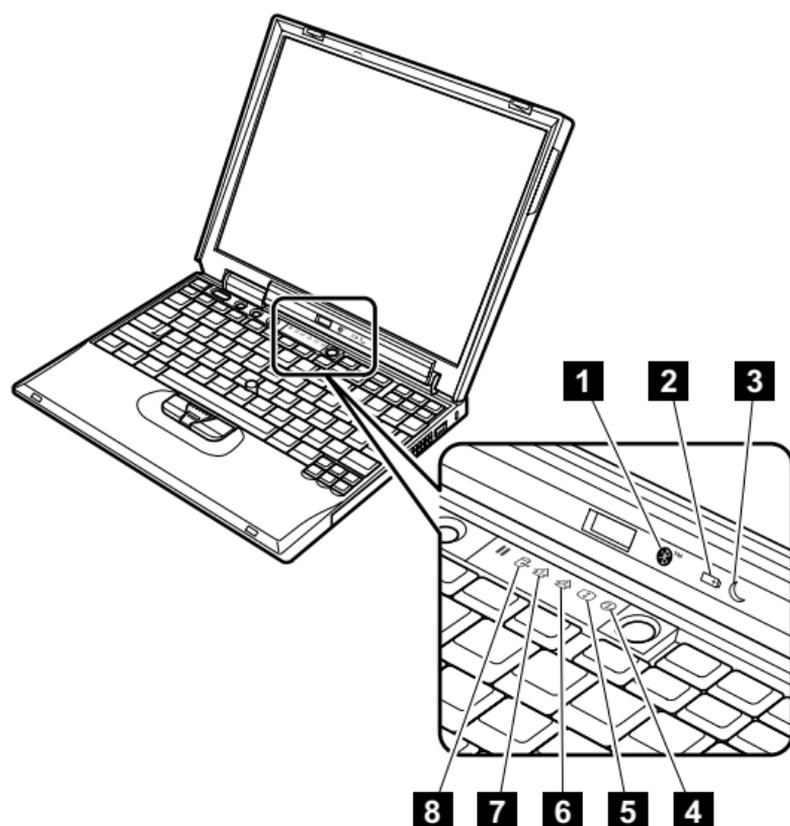
(continued)

Product overview

| Feature | Description |
|-----------------------------------|--|
| I/O port (UltraBase) | <ul style="list-style-type: none"> External monitor connector RJ11 RJ45 Parallel connector Serial connector Keyboard or mouse connector Universal serial bus (USB) connector DC-in |
| Internal modem | <ul style="list-style-type: none"> 56.6 Kbps |
| Audio | <ul style="list-style-type: none"> Internal monaural speaker Software control volume |
| Infrared transfer | <ul style="list-style-type: none"> IrDA 1.1 |
| Mini PCI adapter | <ul style="list-style-type: none"> Mini PCI Type-IIIa IEEE 802.11b wireless LAN/V.90 modem combo card (some models) |
| PC Card | <ul style="list-style-type: none"> One Type-II |
| CompactFlash card | <ul style="list-style-type: none"> One Type-II |
| Ultrabay device | Supported by UltraBase |
| Diskette drive (external) | <ul style="list-style-type: none"> 1.44 MB (3-mode), 3.5-inch diskette drive |
| Communication daughter card (CDC) | <ul style="list-style-type: none"> V.90 modem daughter card (MDC) (some models) Bluetooth daughter card (BDC) (some models) |
| AC adapter | <ul style="list-style-type: none"> 56-watt type |
| Battery pack (main) | <ul style="list-style-type: none"> 6-cell Li-Ion battery pack (4.4 AH) |
| Preinstalled operating system | <p>Models 2672-x1x, xAx, xGx, xNx, xRx, and xUx: Windows 2000</p> <p>Models 2672-x2x, x5x, x6x, xBx, xEx, xHx, xLx, xPx, xSx, xVx, xXx, xYx, 2673-x2x, and xBx: Windows XP Professional</p> <p>Models 2672-x3x, xCx, xJx,xKx, xMx, xTx, xQx, and xWx: Windows XP Home edition</p> |

Status indicators

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



| Indicator | Meaning |
|---------------------------|--|
| 1 Bluetooth status | Green: The Bluetooth is operational. This indicator is on when the Bluetooth is on and not in suspend mode. |
| 2 Battery status | <p>Green: The battery is in use and has enough power. The ac adapter has charged the battery completely.</p> <p>Blinking green: The battery is being charged, but still has enough power to operate. (At regular intervals, the indicator light turns off briefly.)</p> <p>Orange: The battery is being charged, but the battery power is still low.</p> <p>Blinking orange: The battery needs to be charged. When the indicator starts blinking orange, the computer beeps three times.</p> |

(continued)

| Indicator | Meaning |
|--------------------------------|--|
| <p>3 Standby status</p> | <p>Green: The computer is in standby mode. Blinking green: The computer is entering standby mode or hibernation mode, or is resuming normal operation.</p> |
| <p>4 Power on</p> | <p>Green: The computer is on and ready to use. This indicator stays lit whenever the computer is on and is not in standby mode.</p> |
| <p>5 Scroll lock</p> | <p>Green: Scroll Lock mode is enabled. The Arrow keys can be used as screen-scroll function keys. The cursor cannot be moved with the Arrow keys. Not all application programs support this function. To enable or disable Scroll Lock mode, press the ScrLk key.</p> |
| <p>6 Caps lock</p> | <p>Green: Caps Lock mode is enabled. To enable or disable Caps Lock mode, press the Caps Lock key.</p> |
| <p>7 Num lock</p> | <p>Green: The numeric keypad on the keyboard is enabled. To enable or disable the keypad, press and hold the Shift key, and press the NumLk (ScrLk) key.</p> |
| <p>8 Drive in use</p> | <p>Green: Data is being read from or written to the hard-disk drive, the diskette drive, or the drive in the Ultrabay device. When this indicator is on, do not put the computer into standby mode or turn off the computer.</p> <p>Note: Do not move the system while the Green drive in use light is on. Sudden physical shock could cause drive errors.</p> |

FRU tests

The following table shows the test for each FRU.

| FRU | Applicable test |
|-------------------------------|---|
| System board | <ol style="list-style-type: none"> 1. Diagnostics --> CPU/Coprocessor 2. Diagnostics --> Systemboard |
| Power | Diagnostics --> Other Devices --> IBM AC Adapter, IBM Battery 1 (IBM Battery 2) |
| LCD unit | <ol style="list-style-type: none"> 1. Diagnostics --> Video Adapter 2. Interactive Tests --> Video |
| Modem or Modem daughter card | <ol style="list-style-type: none"> 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: <ol style="list-style-type: none"> a. Lucent Soft Modem Loopback b. Lucent Soft Modem Dialtone |
| Audio | <ol style="list-style-type: none"> 1. Interactive Tests --> Internal Speaker 2. Diagnostics --> Other Devices --> Analog Devices AC97 CODEC Test |
| Speaker | Interactive Tests --> Internal Speaker |
| PC Card slots | Diagnostics --> Systemboard --> PCMCIA, PCMCIA External Loop |
| Keyboard | <ol style="list-style-type: none"> 1. Diagnostics --> Systemboard --> Keyboard 2. Interactive Tests --> Keyboard |
| TrackPoint or pointing device | <p>If the TrackPoint does not work, check the configuration in the ThinkPad Configuration program. If the TrackPoint is disabled, select Enable to enable it.</p> <p>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.</p> <p>If enabling the TrackPoint does not correct the problem, continue with the following:</p> <ul style="list-style-type: none"> • Interactive Tests --> Mouse |
| Hard-disk drive | Diagnostics --> Fixed Disks |
| Diskette drive | <ol style="list-style-type: none"> 1. Diagnostics --> Diskette Drives 2. Interactive Tests --> Diskette |
| CD-ROM or DVD drive | <ol style="list-style-type: none"> 1. Diagnostics --> Other Devices --> CD-ROM/DVD 2. Interactive Tests --> CD-ROM/DVD Test |

(continued)

| FRU | Applicable test |
|--------|--|
| Memory | <ol style="list-style-type: none"> 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 | <ol style="list-style-type: none"> 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.

| 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: <ul style="list-style-type: none"> • 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 55.

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. |
| 0176 System Security—The system has been tampered with. | <ol style="list-style-type: none"> 1. Run IBM BIOS Setup Utility, and then save current setting by pressing F10. 2. System board. |
| 0187 EAIA data access error—The access to EEPROM is failed. | System board. |
| 0188 Invalid RFID serialization information area or bad CRC2—The EEPROM checksum is not correct. | System board. |

| Symptom or error | FRU or action, in sequence |
|---|--|
| 0189 Invalid RFID configuration information area—The EEPROM checksum is not correct. | System board. |
| 0190 Critical low-battery error | 1. Charge the battery pack. 2. Battery pack. |
| 0191 System Security—Invalid Remote Change requested. | 1. Run IBM BIOS Setup Utility, and then save current setting by pressing F10. 2. System board. |
| 0192 System Security—IBM Embedded Security hardware tamper detected. | System board. |
| 0197 Invalid remote change requested. | The remote configuration for the security chip has failed. Confirm the operation and try again. |
| 0199 System Security—IBM Security password retry count exceeded. | 1. Run IBM BIOS Setup Utility, and then save current setting by pressing F10. 2. System board. |
| 01C8 More than one modem devices are found. Remove one of them. Press <Esc> to continue. | 1. Remove either a Mini PCI modem card or an modem daughter card; or press Esc to ignore the warning message. 2. System board. |
| 01C9 More than one Ethernet devices are found. Remove one of them. Press <Esc> to continue. | 1. Remove the Ethernet device that you installed; or press Esc to ignore the warning message. 2. System board. |
| 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 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—Shadow RAM fails at offset nnnn. | System board. |

| Symptom or error | FRU or action, in sequence |
|--|---|
| 0231 System RAM error—System RAM fails at offset nnnn. | 1. DIMM. 2. System board. |
| 0232 Extended RAM error—Extended RAM fails 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. |
| 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. |
| 0280 Previous boot incomplete—Default configuration used. | 1. Load “Setup Default” in IBM BIOS Setup Utility. 2. DIMM. 3. System board. |
| 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 DMA test failed | 1. DIMM. 2. System board. |
| 02F6 Software NMI failed | 1. DIMM. 2. System board. |
| 02F7 Fail-safe timer NMI failed | 1. DIMM. 2. System board. |
| 1801 Attached docking station is not supported | Shut down the computer and remove it from the docking station. |

| Symptom or error | FRU or action, in sequence |
|---|---|
| 1802 Unauthorized network card is plugged in—Power off and remove the miniPCI network card. | <ol style="list-style-type: none"> 1. Remove Mini PCI network card. 2. System board. |

Error messages

| Symptom or error | FRU or action, in sequence |
|------------------------------------|--|
| Device address conflict. | <ol style="list-style-type: none"> 1. Load “Setup Defaults” in IBM BIOS Setup Utility. 2. Backup battery. 3. System board. |
| Allocation error for device. | <ol style="list-style-type: none"> 1. Load “Setup Defaults” in IBM BIOS Setup Utility. 2. Backup battery. 3. System board. |
| Failing bits: nnnn. | <ol style="list-style-type: none"> 1. DIMM. 2. System board. |
| Invalid system configuration data. | <ol style="list-style-type: none"> 1. DIMM. 2. System board. |
| I/O device IRQ conflict. | <ol style="list-style-type: none"> 1. Load “Setup Defaults” in IBM BIOS Setup Utility. 2. Backup battery. 3. System board. |
| Operating system not found. | <ol style="list-style-type: none"> 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. | <ol style="list-style-type: none"> 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. |
| Thermal sensing error. | System board. |

Beep symptoms

| Symptom or error | FRU or action, in sequence |
|--|---|
| One beep and a blank, unreadable, or flashing LCD. | <ol style="list-style-type: none"> 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. | <ol style="list-style-type: none"> 1. System board. 2. LCD assembly. 3. DIMM. |
| Two short beeps with error codes. | POST error. See “Numeric error codes” on page 49. |
| Two short beeps and a blank screen. | <ol style="list-style-type: none"> 1. System board. 2. DIMM. |
| Three short beeps, pause, three more short beeps, and one short beep. | <ol style="list-style-type: none"> 1. DIMM. 2. System board |
| One short beep, pause, three short beeps, pause, three more short beeps, and one short beep. | |
| Only cursor appears. | Reinstall operating system. |
| Four cycles of four short beeps and a blank screen. | System board (IBM security chip) |
| Five short beeps and a blank screen. | System board |

No-beep symptoms

| Symptom or error | FRU or action, in sequence |
|--|--|
| No beep, power-on indicator on, LCD blank, and no POST. | <ol style="list-style-type: none"> 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. | <ol style="list-style-type: none"> 1. Reseat DIMM. 2. System board. |
| The power-on password prompt appears. | A power-on password or a supervisor password is set. Type the password and press Enter . |
| The hard-disk password prompt appears. | 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: A bright dot means a pixel is always on (white or color.) A dark dot means a 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. |
| <ul style="list-style-type: none"> • LCD backlight not working. • LCD too dark. • LCD brightness cannot be adjusted. • LCD contrast cannot be adjusted. | <ol style="list-style-type: none"> 1. Reseat the LCD connectors. 2. LCD assembly. 3. System board. |
| <ul style="list-style-type: none"> • LCD screen unreadable. • Characters missing pixels. • Screen abnormal. • Wrong color displayed. | <ol style="list-style-type: none"> 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 37.)

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. CD-ROM and diskette drive in the Ultrabay
 - 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.

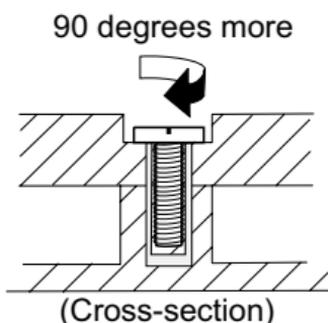
Do the following when you service this machine:

- Keep the screw kit (for the P/N, see “Miscellaneous parts” on page 129) in your tool bag.
- Always use new screws.
- Use a torque screwdriver if you have one.

Tighten screws as follows:

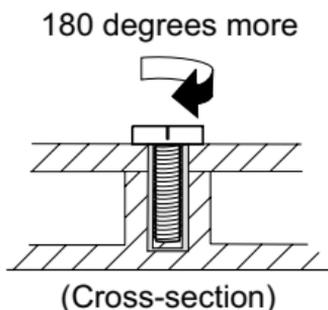
- **Plastic to plastic**

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



- **Logic card to plastic**

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



- **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 1.62, 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 1.62 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

FRU replacement notices

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 1.62, 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 56.
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 112.
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.

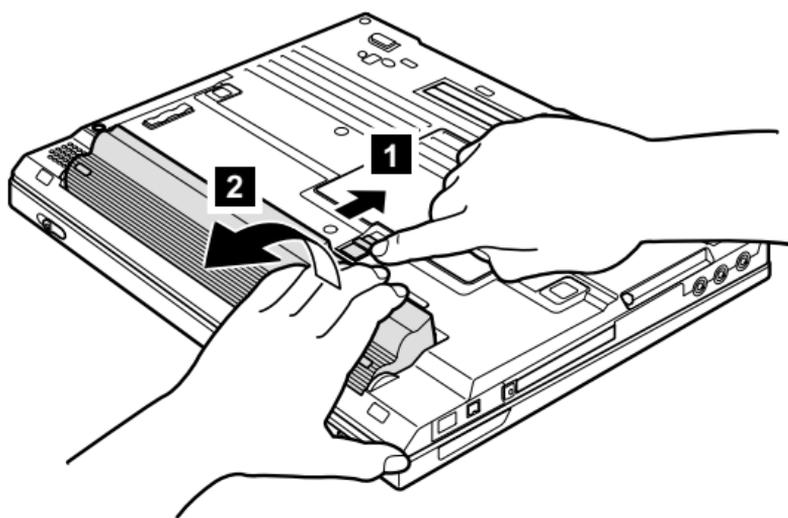
Attention: Before the computer is powered on after FRU replacement, make sure that all screws, springs, and other small parts are in place and are not loose inside the computer. Verify this by shaking the computer gently and listening for rattling sounds. Metallic parts or metal flakes can cause electrical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

1010 Battery pack

 **DANGER**

Use only the battery specified in the parts list for your computer. The use of an incorrect battery can result in ignition or explosion of the battery.



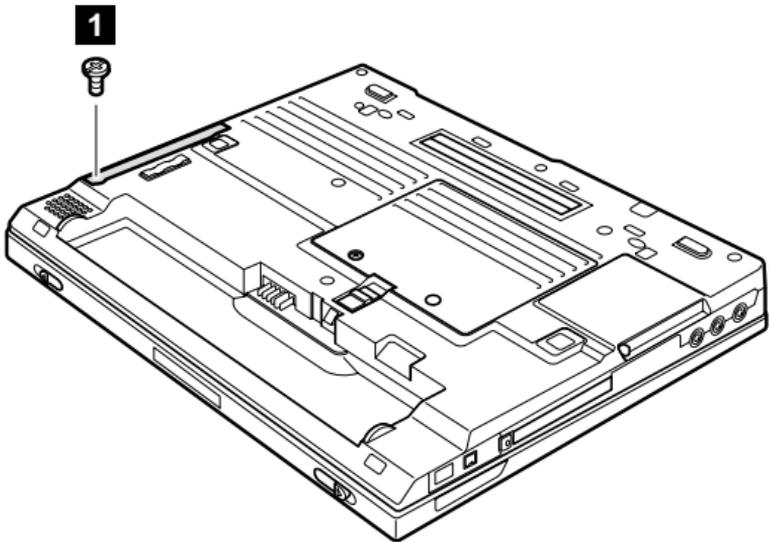
1020 Hard-disk drive

Attention

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

For access, remove following FRU:

- “1010 Battery pack” on page 60

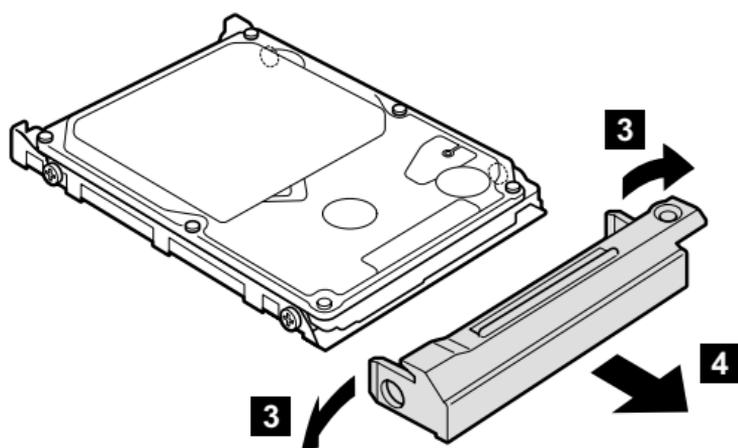
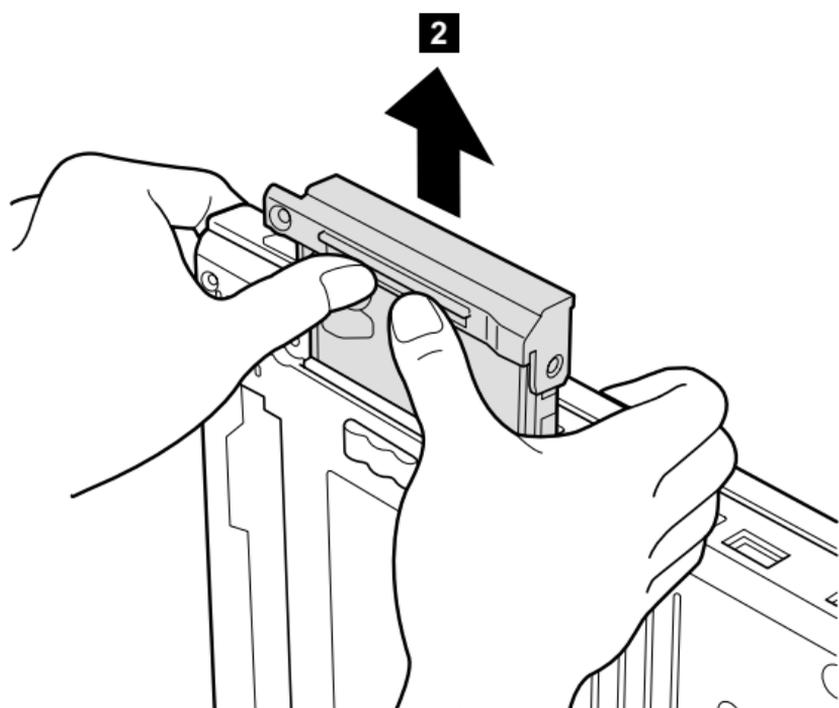


Note: The hard disk is attached to the cover.

| Step | Screw (quantity) | Torque |
|----------|-----------------------------|---------------------|
| 1 | M3 x 4 mm, nylon-coated (1) | 0.4 Nm (4 kgfcm) |

(continued)

Removing and replacing a FRU



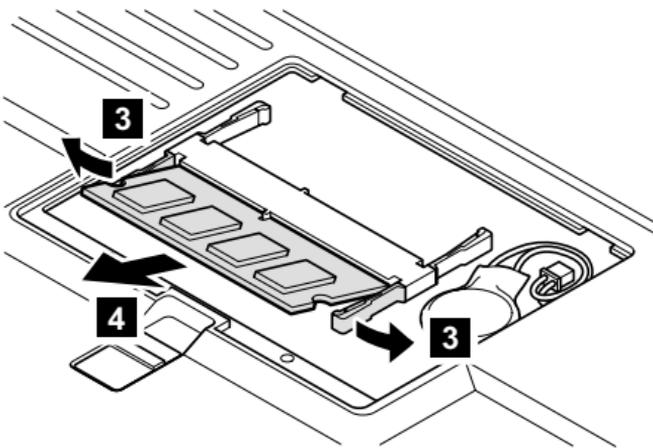
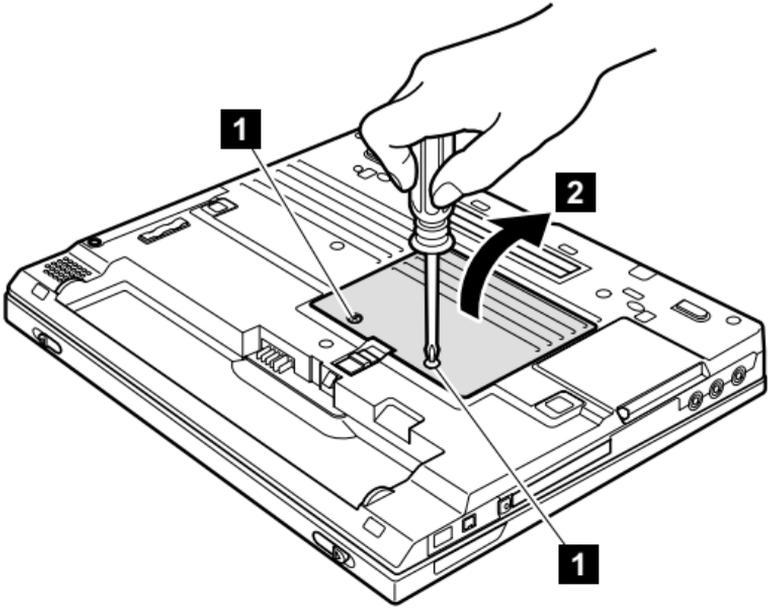
When installing: Make sure that the hard disk is connected firmly.

1030 DIMM

For access, remove following FRU:

- “1010 Battery pack” on page 60

Note: Loosen the screws **1**, but do not remove them.



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.

1040 Backup battery

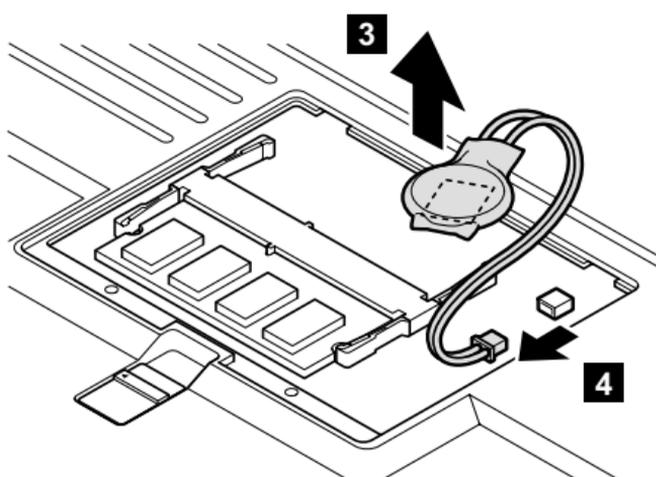
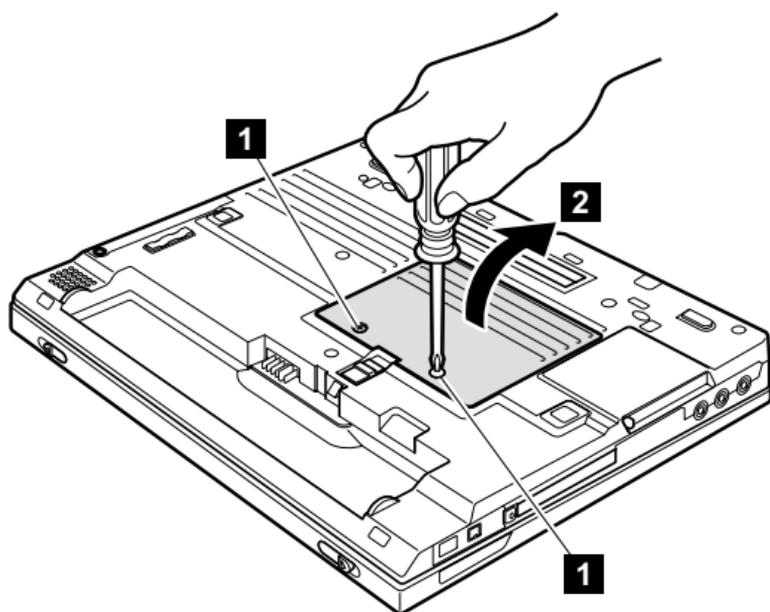


Use only the battery specified in the parts list for your computer. The use of an incorrect battery can result in ignition or explosion of the battery.

For access, remove following FRUs, in order:

- “1010 Battery pack” on page 60
- “1020 Hard-disk drive” on page 61

Note: Loosen the screws **1**, but do not remove them.

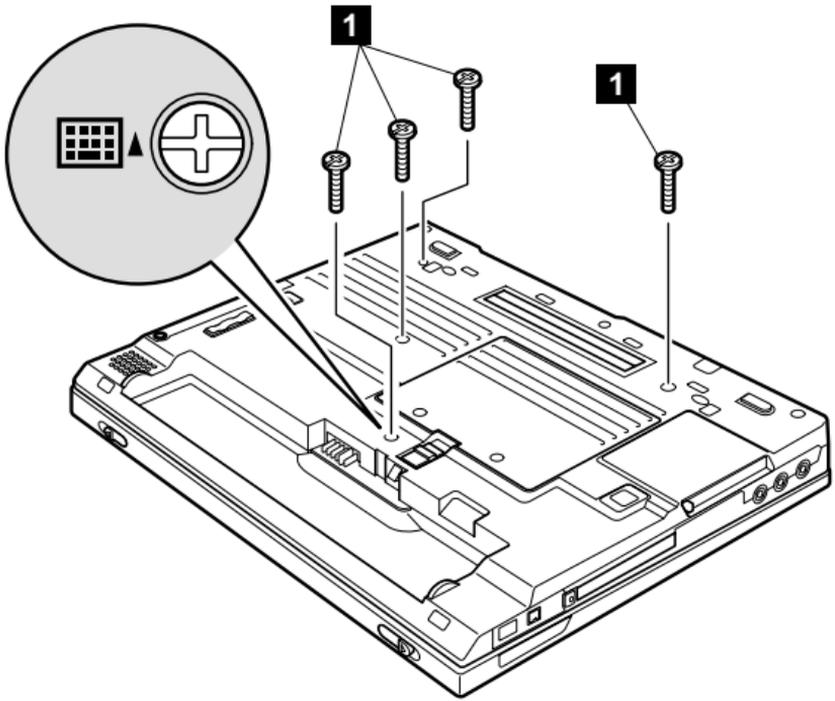


When installing: Make sure that the battery connector **4** is attached firmly.

1050 Keyboard

For access, remove following FRU:

- “1010 Battery pack” on page 60

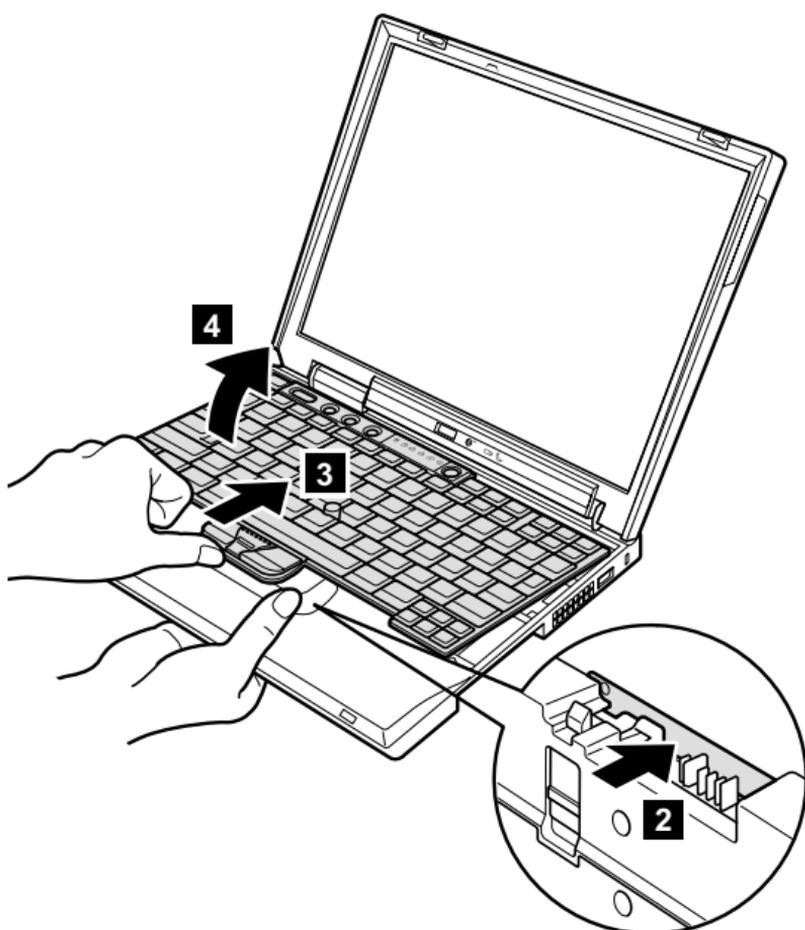


| Step | Screw (quantity) | Torque |
|----------|-----------------------------|-------------------------|
| 1 | M2 × 6 mm, nylon-coated (4) | 0.245 Nm (2.5 kgfcm) |

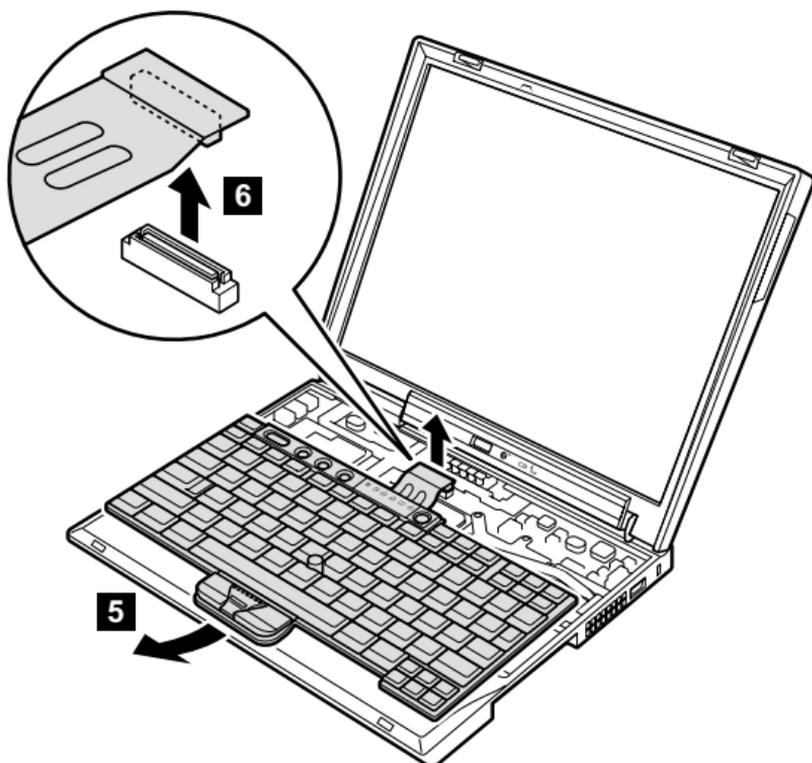
(continued)

Removing and replacing a FRU

In step **4**, open the keyboard slightly in the direction of the arrow.

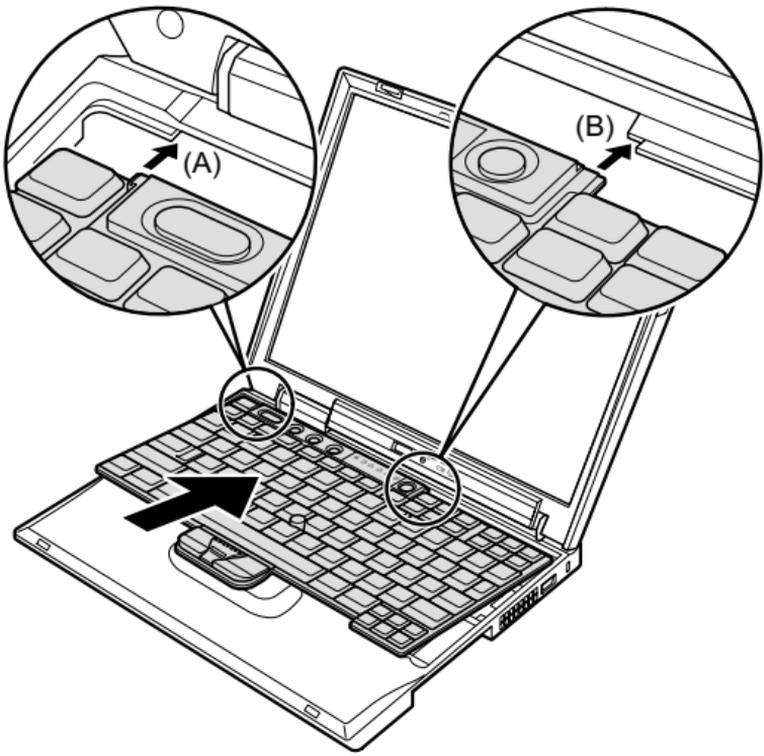


In step **5**, draw the keyboard a little in the direction of the arrow, and then detach the connector **6**.



When installing: Install the keyboard, do as follows;

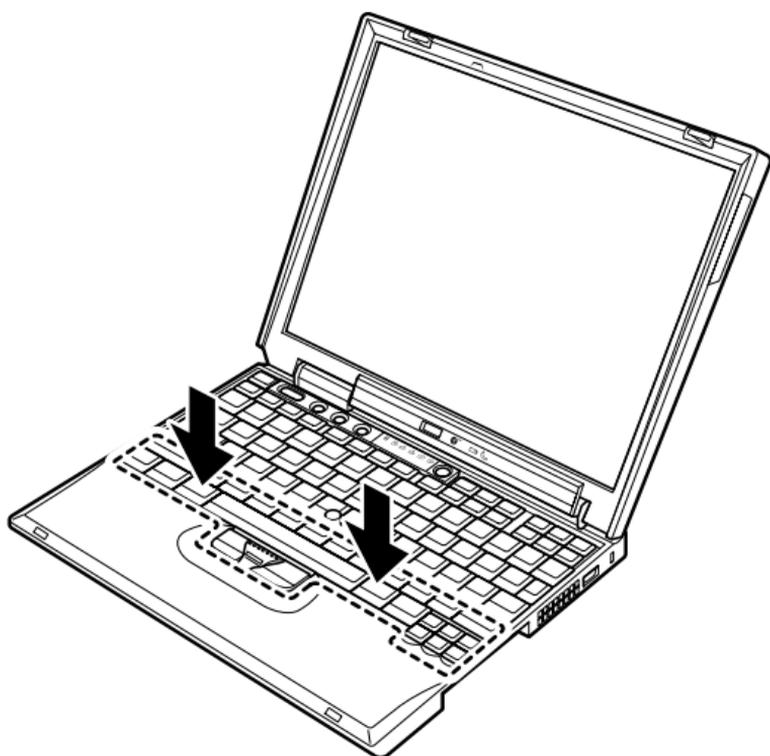
1. Attach the connector.
2. Make sure that the keyboard edges, shown in the figure as **(A)** and **(B)**, are under the frame.



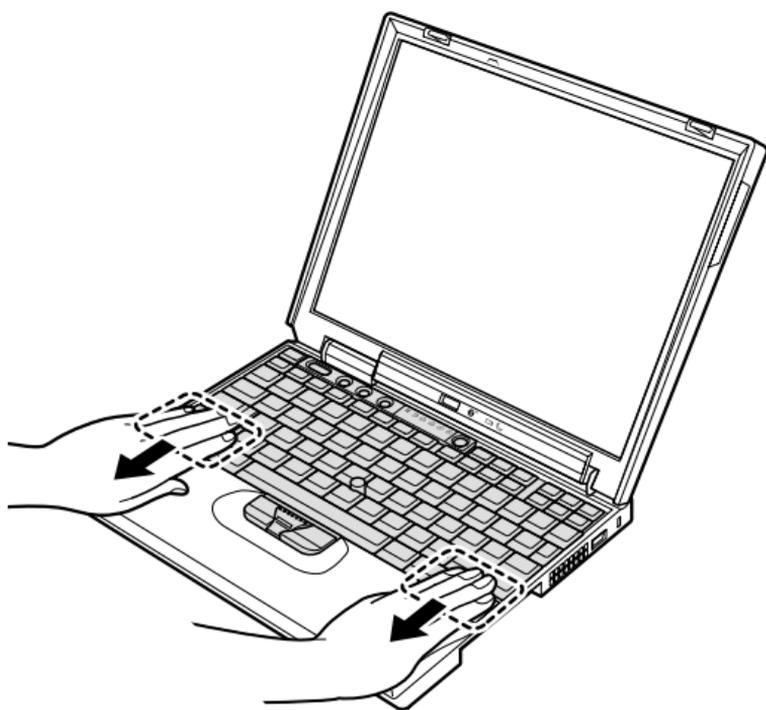
(continued)

Removing and replacing a FRU

3. Press the keys indicated by arrows to latch the keyboard firmly in place.



4. To make sure that the front side of the keyboard is housed firmly, gently press the keys with your thumbs and try to slide the keyboard toward you.



5. Secure the keyboard by tightening the screws from the bottom side of the computer.

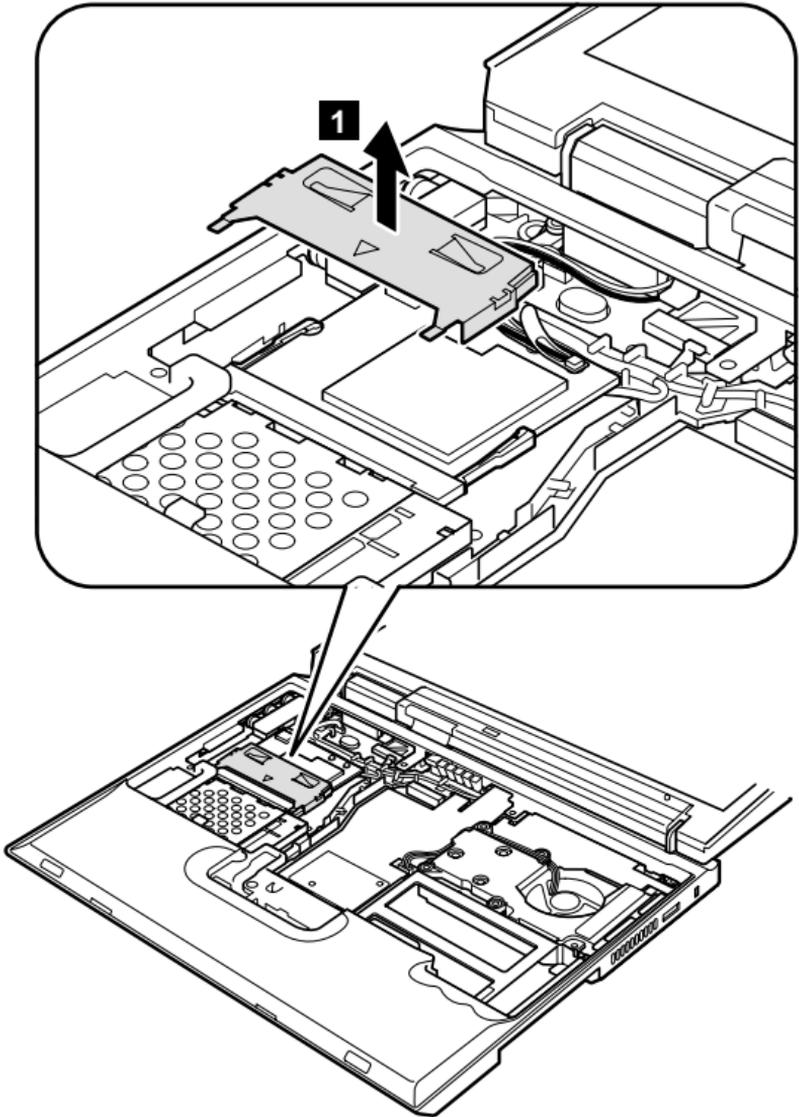
1060 Mini PCI adapter

Note

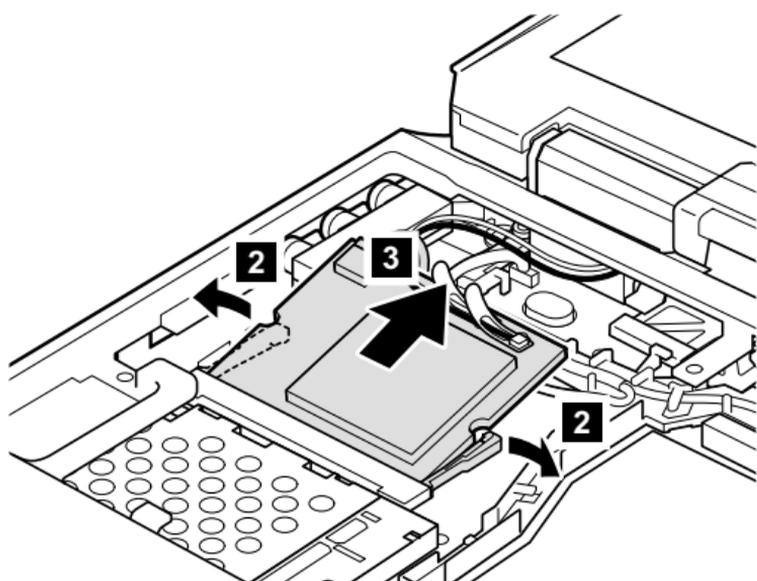
This section is only for the models featuring the Mini PCI combo (wireless LAN and modem) card.

For access, remove following FRUs, in order:

- “1010 Battery pack” on page 60
- “1050 Keyboard” on page 65

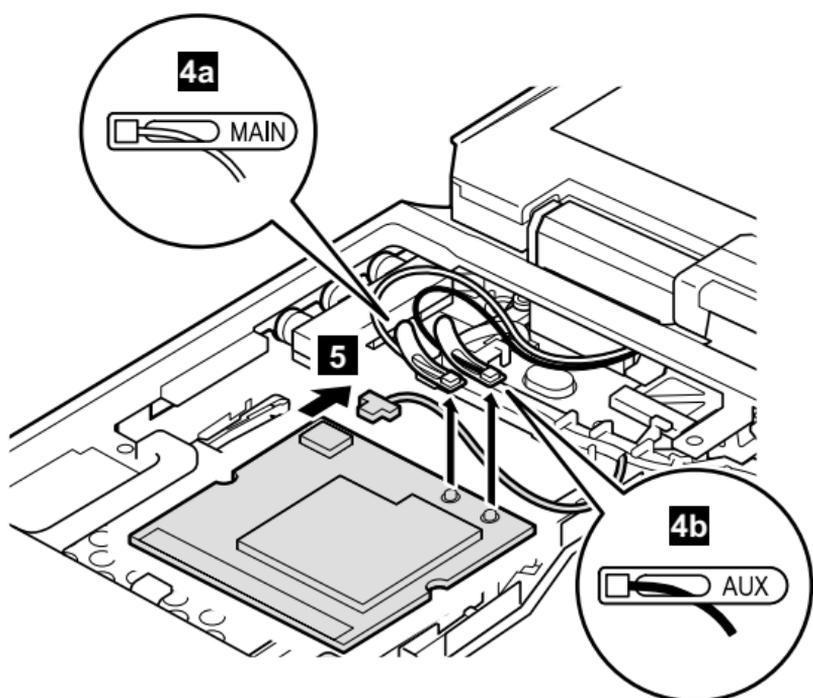


(continued)



Antenna cables **4a** and **4b** in the following illustration are for the wireless LAN feature, and **5** is for the modem feature.

Note: When unplugging the antenna jack, do not pull the cable; it might snap. Unplug the jack by pulling a tab with your fingers.

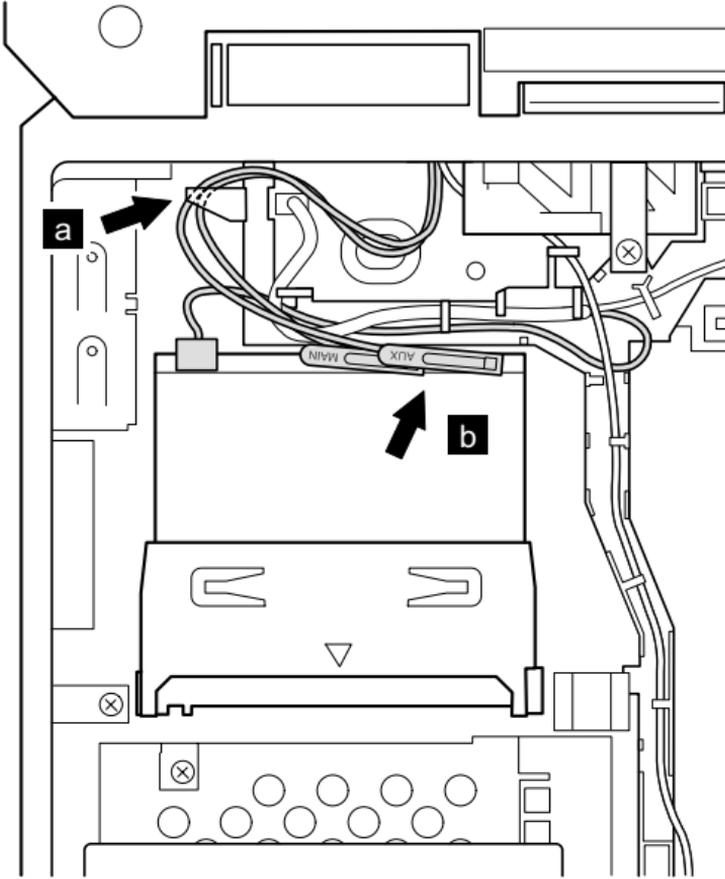


When installing:

- Make sure that the connector **5** is firmly attached.
- Plug the gray antenna cable with the tab marked "MAIN" (**4a**) into jack J1, and the black antenna cable with the tab marked "AUX" (**4b**) into jack J2.
- 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.

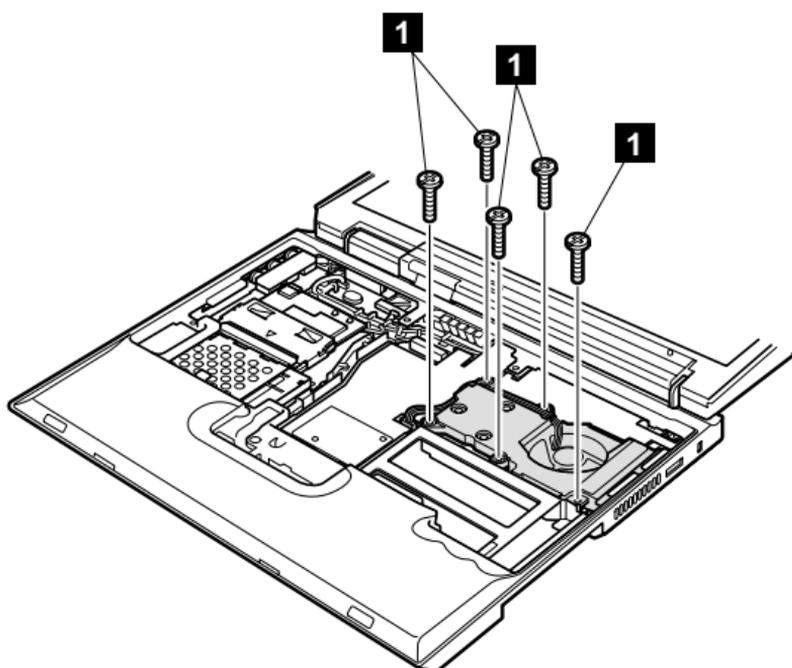
Cable routing: When attaching the Mini PCI adapter, route the antenna cables to go under the cable guide as in **a**, and place the tabs as indicated by arrow **b** in this figure.



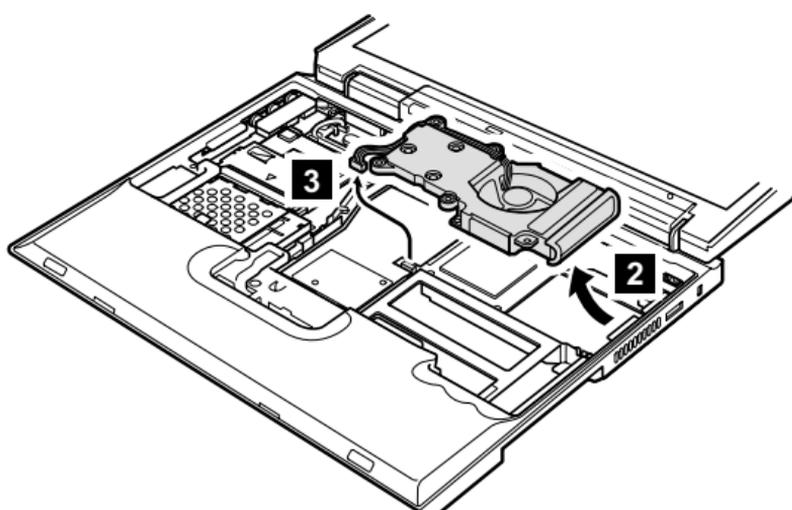
1070 Fan assembly

For access, remove following FRUs, in order:

- “1010 Battery pack” on page 60
- “1020 Hard-disk drive” on page 61
- “1050 Keyboard” on page 65



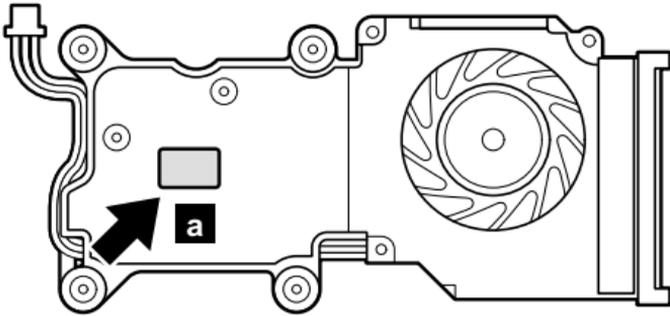
| Step | Screw (quantity) | Torque |
|----------|-------------------------------|-------------------------|
| 1 | M2 x 9.5 mm, nylon-coated (5) | 0.245 Nm (2.5 kgfcm) |



When installing: Make sure that the connector **3** is firmly attached.

Note

Apply thermal grease on the **a**-part of the fan, shown in the following figure.



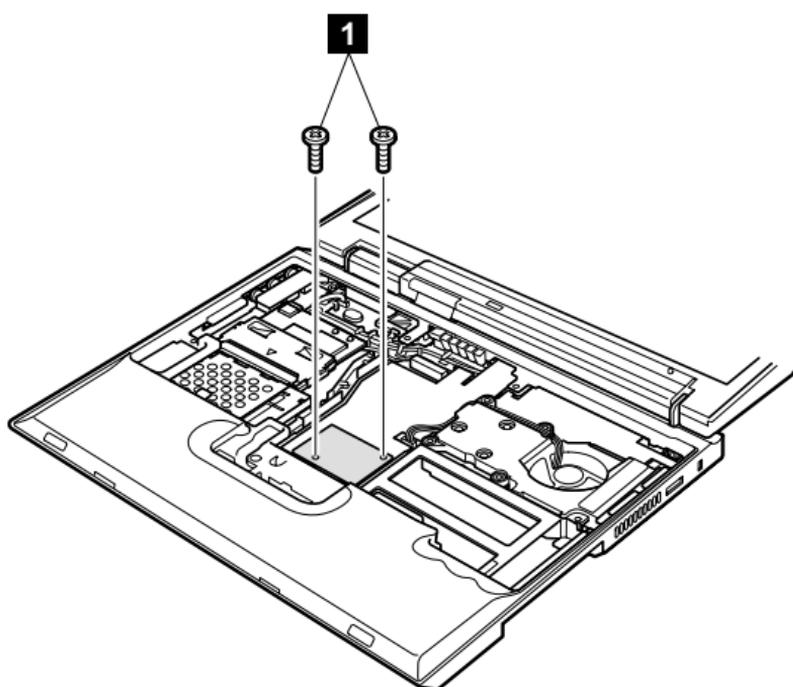
1080 Communication daughter card (CDC)

Note

On some models, the CDC slot accepts a Modem Daughter Card (MDC). On other models, the CDC slot accepts a Bluetooth Daughter Card (BDC).

For access, remove following FRUs, in order:

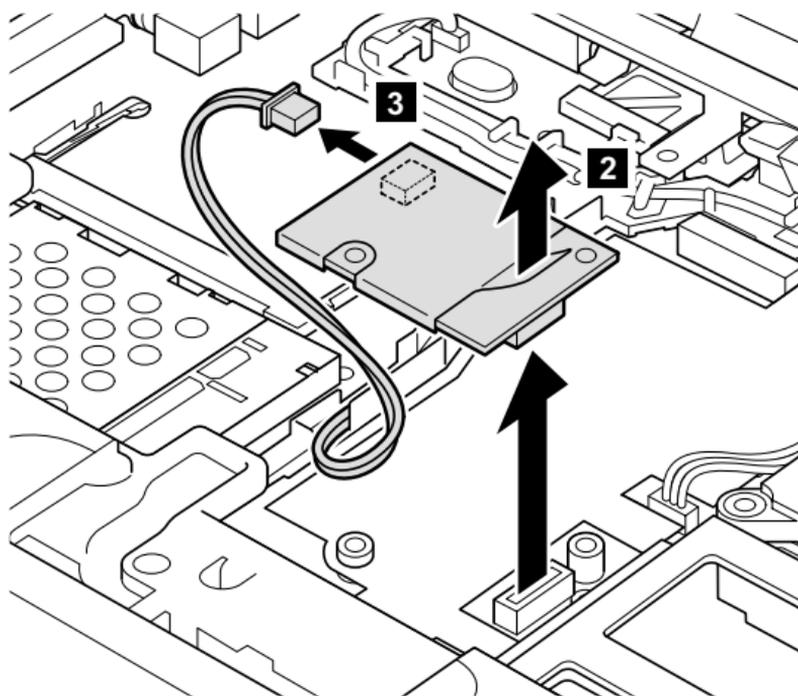
- “1010 Battery pack” on page 60
- “1020 Hard-disk drive” on page 61
- “1050 Keyboard” on page 65



| Step | Screw (quantity) | Torque |
|----------|-------------------------------|-------------------------|
| 1 | M2 x 9.5 mm, nylon-coated (2) | 0.245 Nm (2.5 kgfcm) |

(continued)

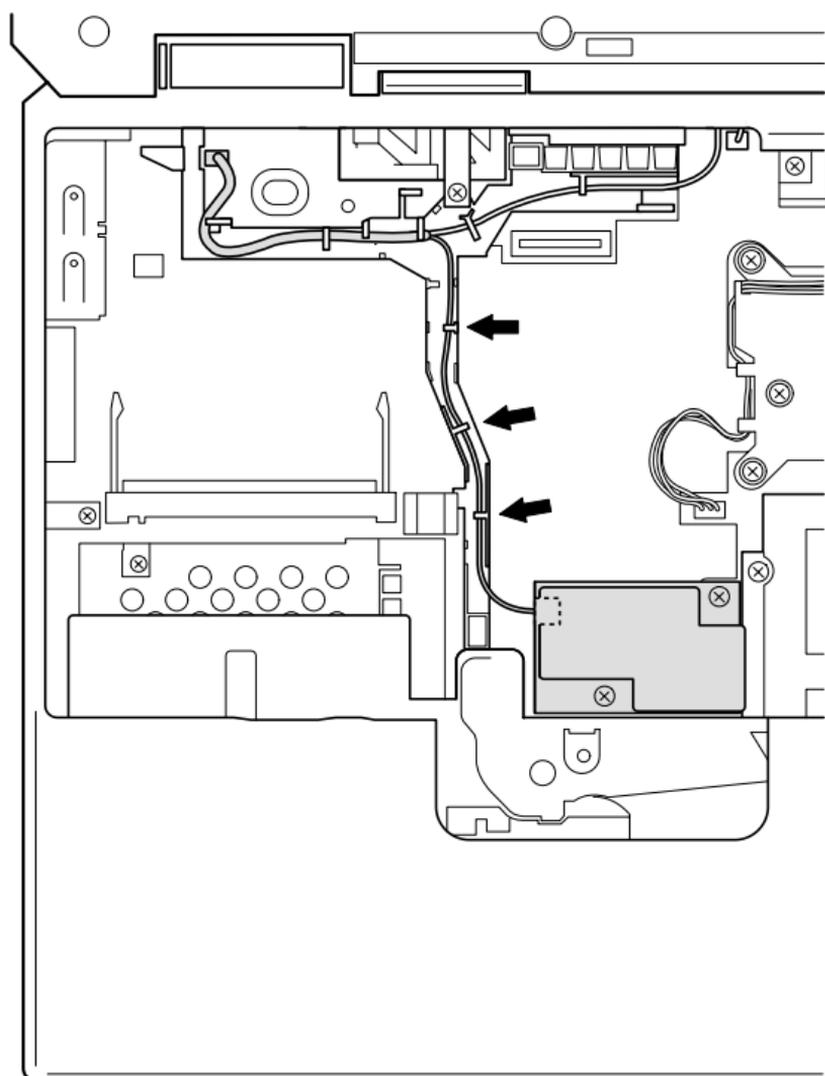
Modem daughter card (MDC)



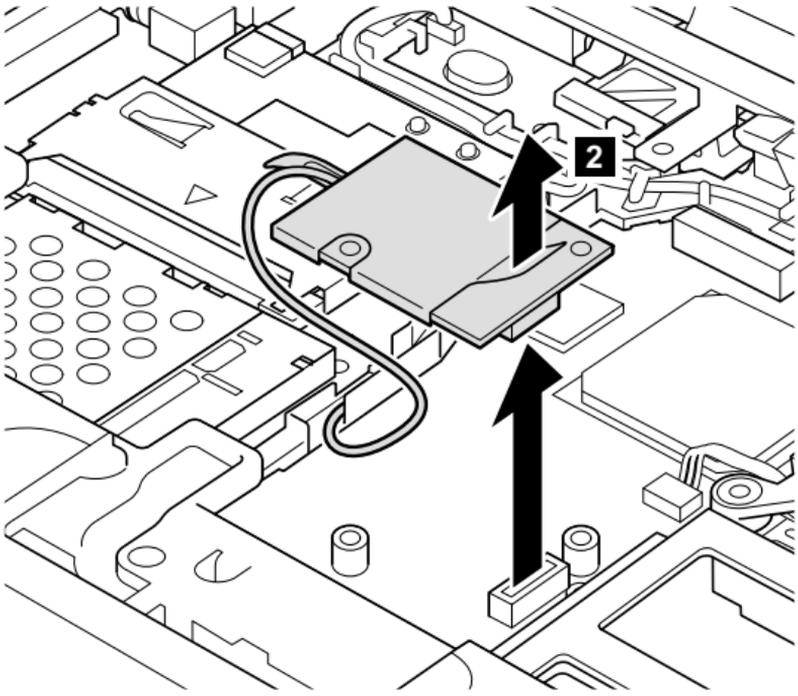
When installing: Make sure that connectors **2** and **3** are attached firmly.

Removing and replacing a FRU

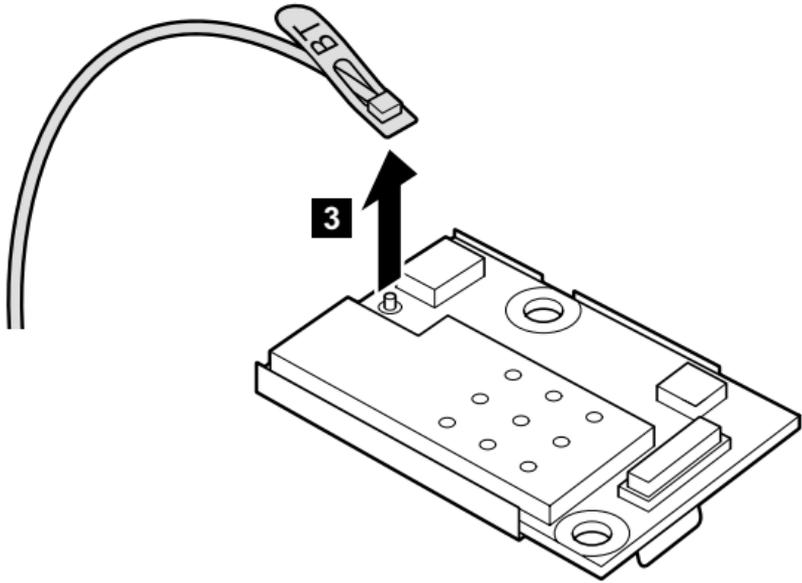
Cable routing: When attaching the MDC, route the cable along the cable guides as indicated by the arrows in this figure.



Bluetooth daughter card (BDC)



Note: When unplugging the Bluetooth antenna jack, do not pull the cable; it might snap. Unplug the jack by pulling the tab with your fingers.

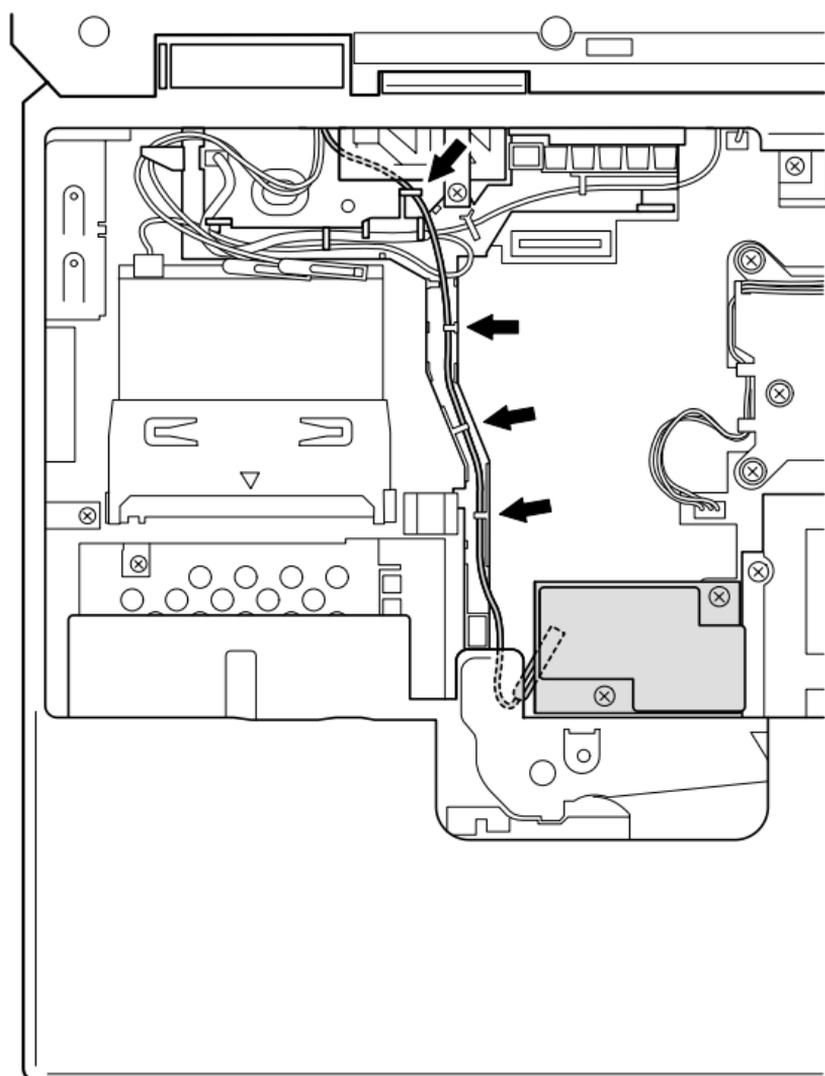


When installing:

1. Plug the white cable with the tab marked "BT" into the jack on the BDC.
2. Make sure that the connector **2** is attached firmly.

Removing and replacing a FRU

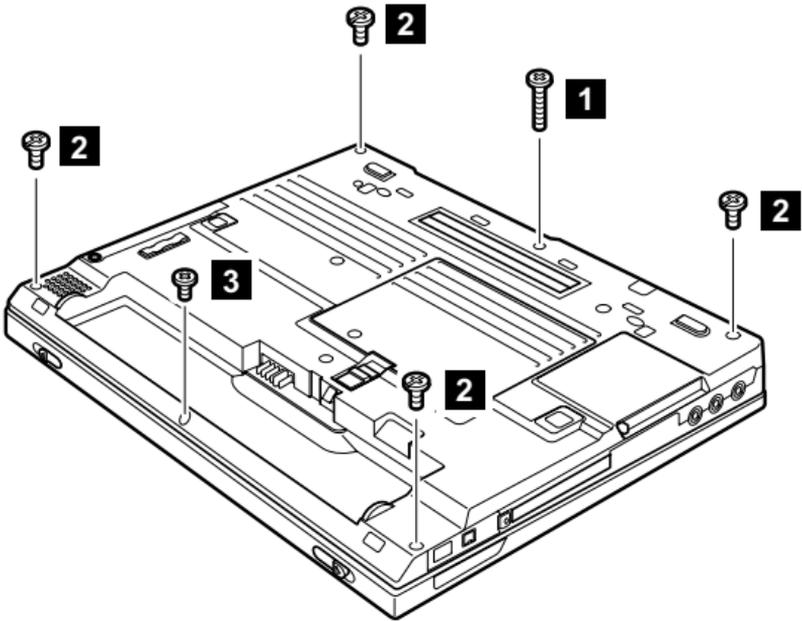
Cable routing: When attaching the BDC, route the cable along the cable guides as indicated by the arrows in this figure.



1090 Keyboard bezel

For access, remove following FRUs, in order:

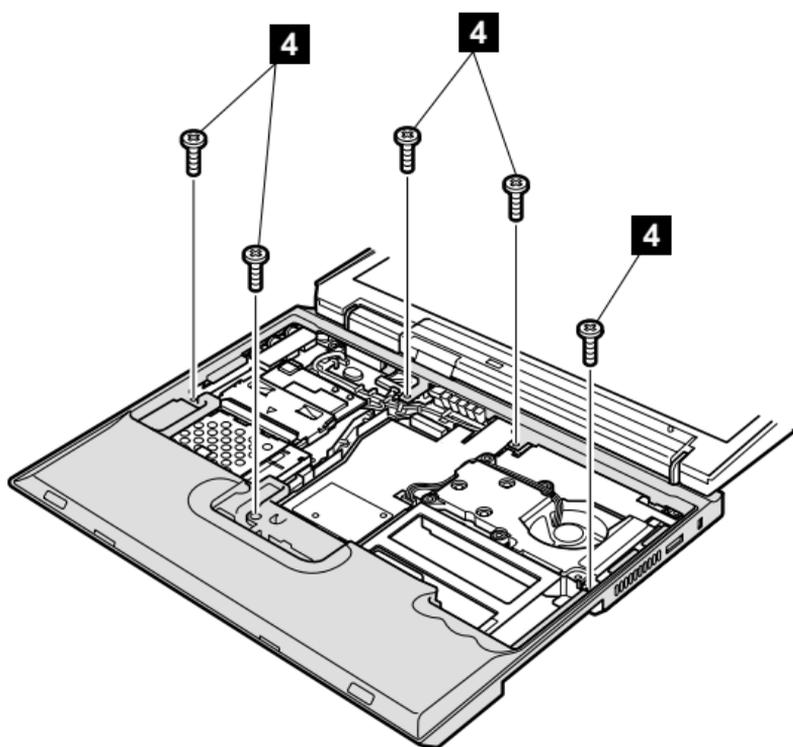
- “1010 Battery pack” on page 60
- “1020 Hard-disk drive” on page 61
- “1030 DIMM” on page 63
- “1040 Backup battery” on page 64
- “1050 Keyboard” on page 65



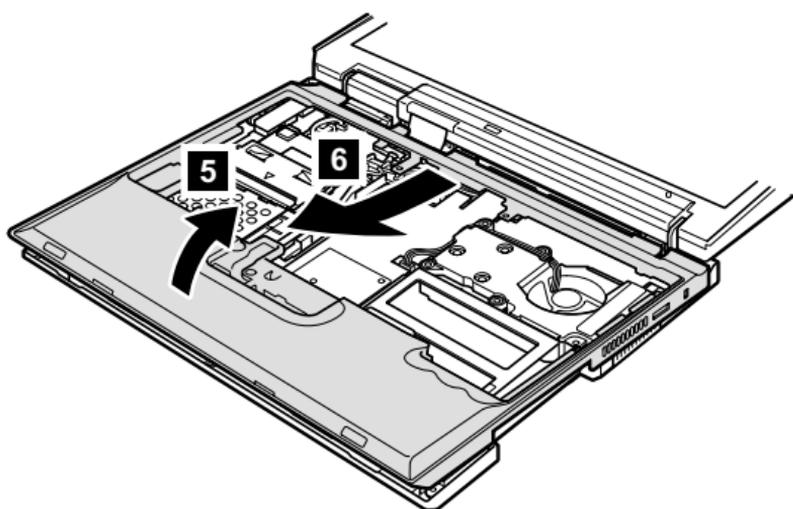
| Step | Screw (quantity) | Torque |
|----------|--------------------------------|-------------------------|
| 1 | M2 × 13.5 mm, nylon-coated (1) | 0.245 Nm (2.5 kgfcm) |
| 2 | M2 × 6 mm, nylon-coated (4) | 0.245 Nm (2.5 kgfcm) |
| 3 | M2 × 4 mm, nylon-coated (1) | 0.245 Nm (2.5 kgfcm) |

(continued)

Removing and replacing a FRU



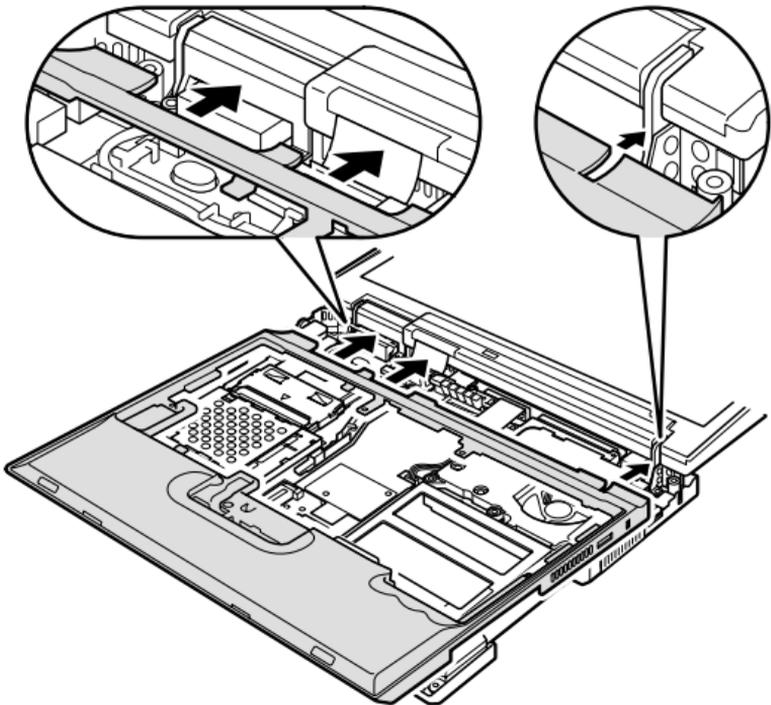
| Step | Screw (quantity) | Torque |
|------|-----------------------------|-------------------------|
| 4 | M2 x 4 mm, nylon-coated (5) | 0.245 Nm (2.5 kgfcm) |



(continued)

When installing the keyboard bezel, do the following:

1. Attach the keyboard bezel to the computer, aligning the two dents of the bezel with the hinges as shown in this figure.

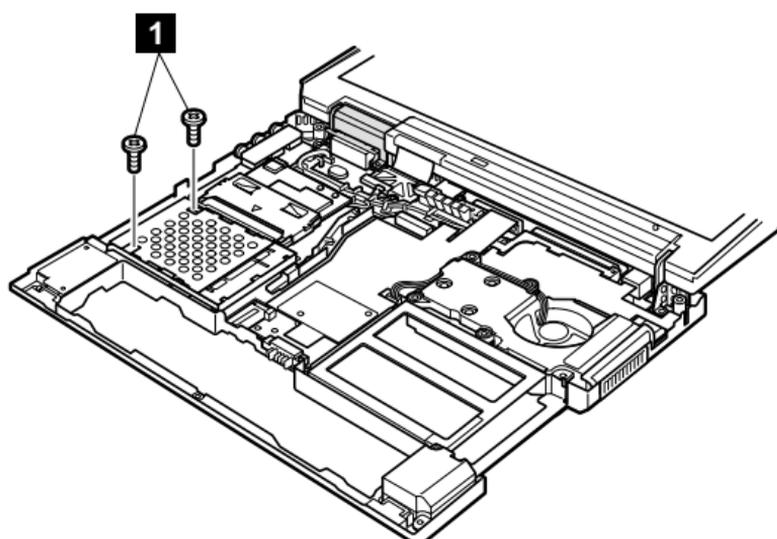


2. Make sure that all of the latches on the front side of the computer are attached firmly.
3. Secure the keyboard bezel with the screws.

1100 PC card slot

For access, remove following FRUs, in order:

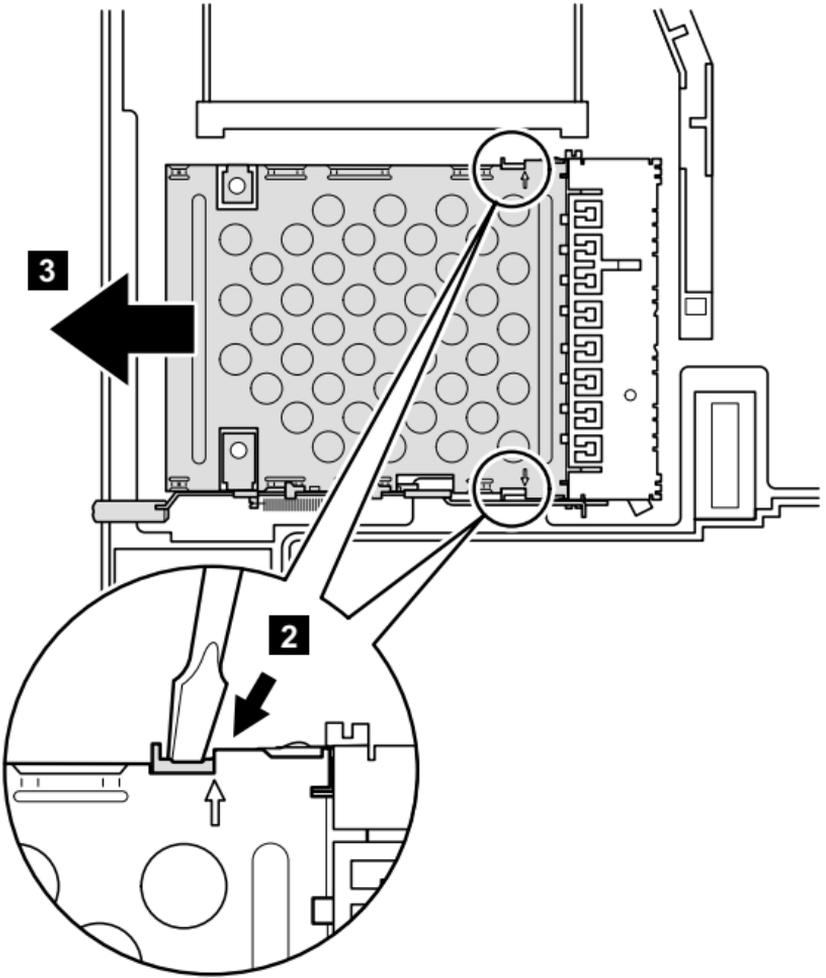
- “1010 Battery pack” on page 60
- “1020 Hard-disk drive” on page 61
- “1030 DIMM” on page 63
- “1040 Backup battery” on page 64
- “1050 Keyboard” on page 65
- “1090 Keyboard bezel” on page 79



| Step | Screw (quantity) | Torque |
|----------|-----------------------------|-------------------------|
| 1 | M2 x 4 mm, nylon-coated (2) | 0.245 Nm (2.5 kgfcm) |

(continued)

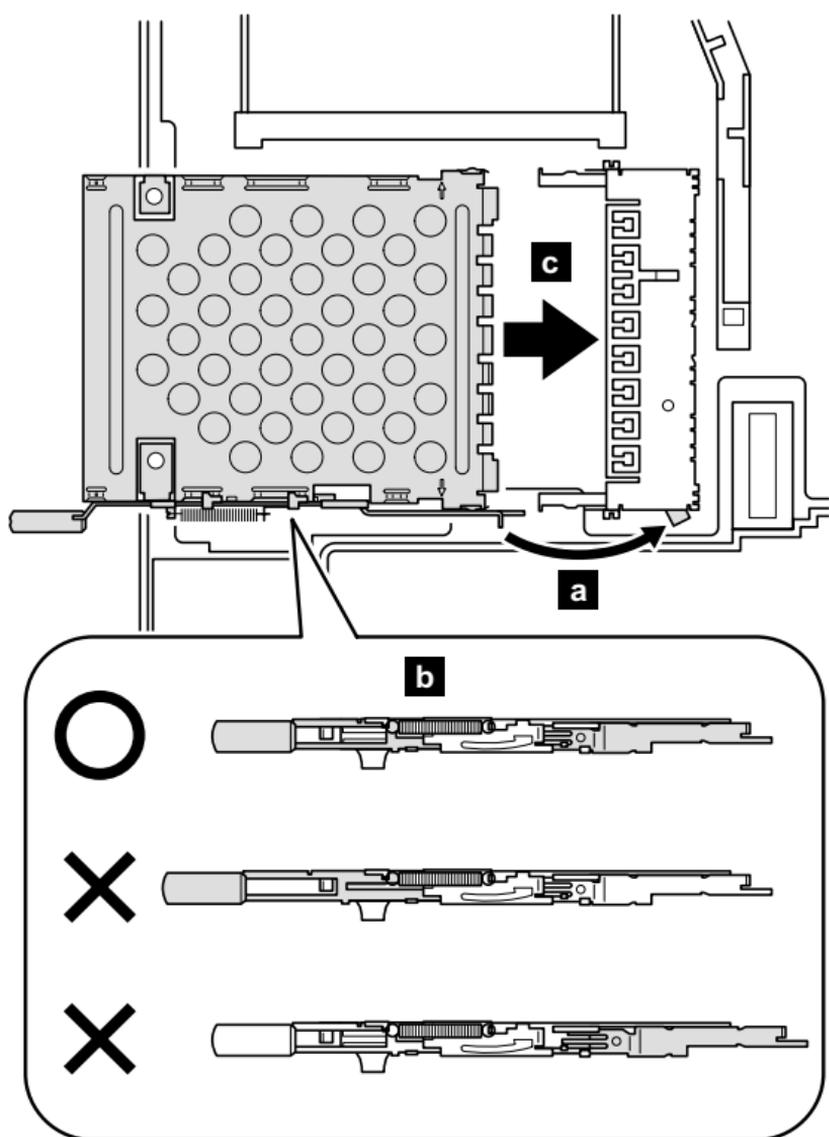
Unlatch the PC Card slot by pressing the two parts indicated by arrow **2**, and then remove the slot in the direction of arrow **3**.



Removing and replacing a FRU

When installing:

1. Make sure that stroke arm (**a**) is placed as indicated by the arrow.
2. Make sure that the eject lever on the front side of the slot is as **b** in this figure.
3. Attach the slot in the direction of arrow **c** , and make sure that both of the latches are attached firmly.
4. Secure the slot with the screws.

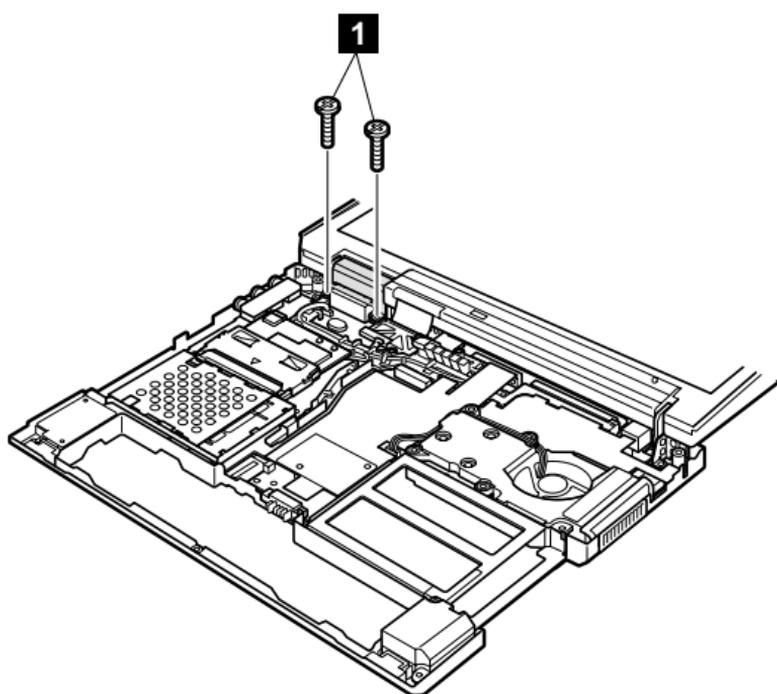


1110 Hinge cover and LCD assembly

For access, remove following FRUs, in order:

- “1010 Battery pack” on page 60
- “1020 Hard-disk drive” on page 61
- “1030 DIMM” on page 63
- “1040 Backup battery” on page 64
- “1050 Keyboard” on page 65
- “1060 Mini PCI adapter” on page 69
- “1090 Keyboard bezel” on page 79

Before removing the LCD assembly, remove the hinge cover first by following steps **1** and **2**.

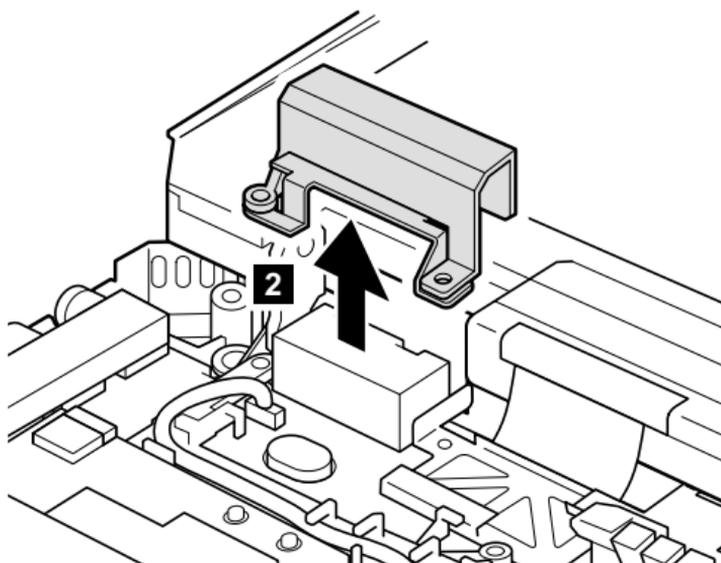


| Step | Screw (quantity) | Torque |
|----------|-------------------------------|-------------------------|
| 1 | M2 x 9.5 mm, nylon-coated (2) | 0.245 Nm (2.5 kgfcm) |

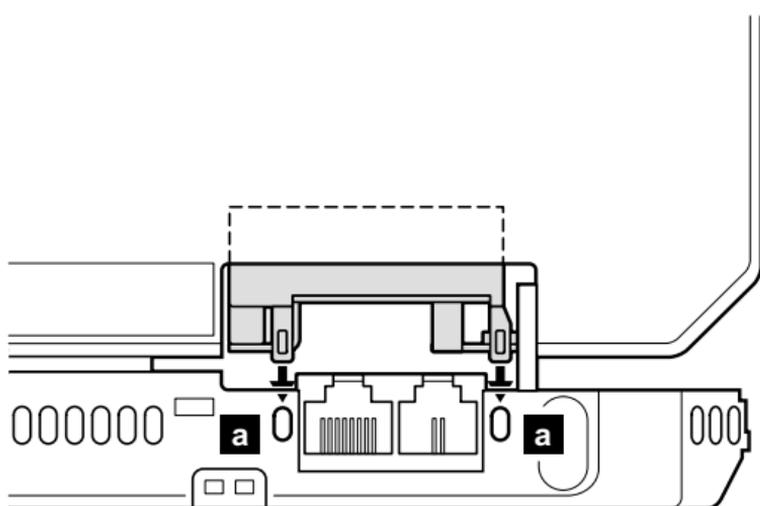
(continued)

Removing and replacing a FRU

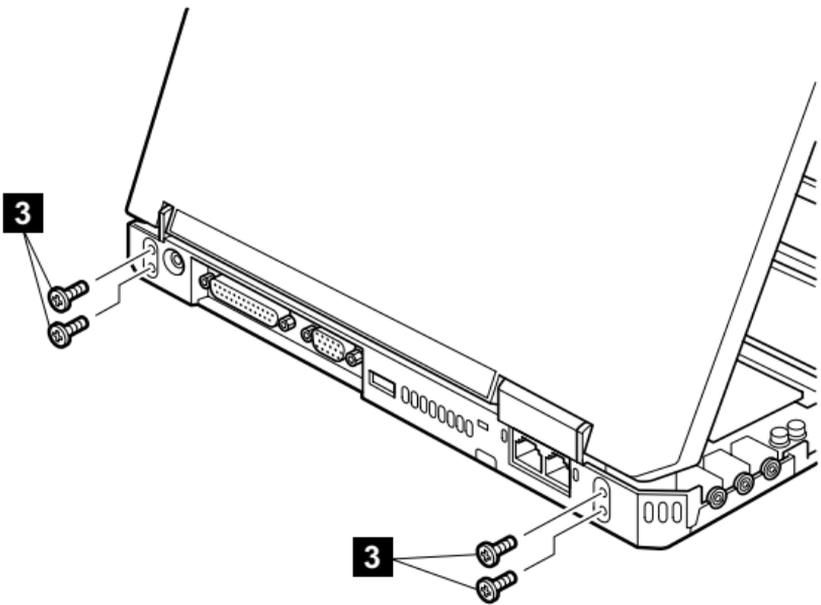
The Bluetooth antenna assembly is attached to the hinge cover in some models. For those models, undo the Bluetooth antenna cable from the cable guides. And then remove the hinge cover and the Bluetooth antenna assembly together in the direction of arrow **2**.



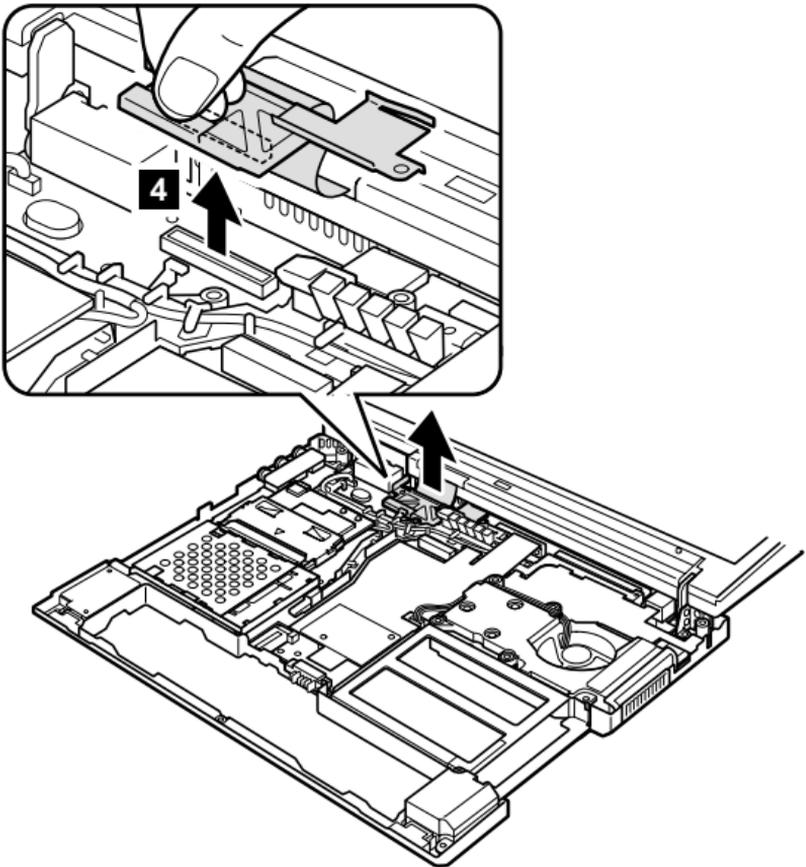
When installing: Attach the hinge cover, aligning the two projections on the rear side with the two small square holes in the base cover. (**a**)



After removing the hinge cover, remove the LCD assembly as follows:



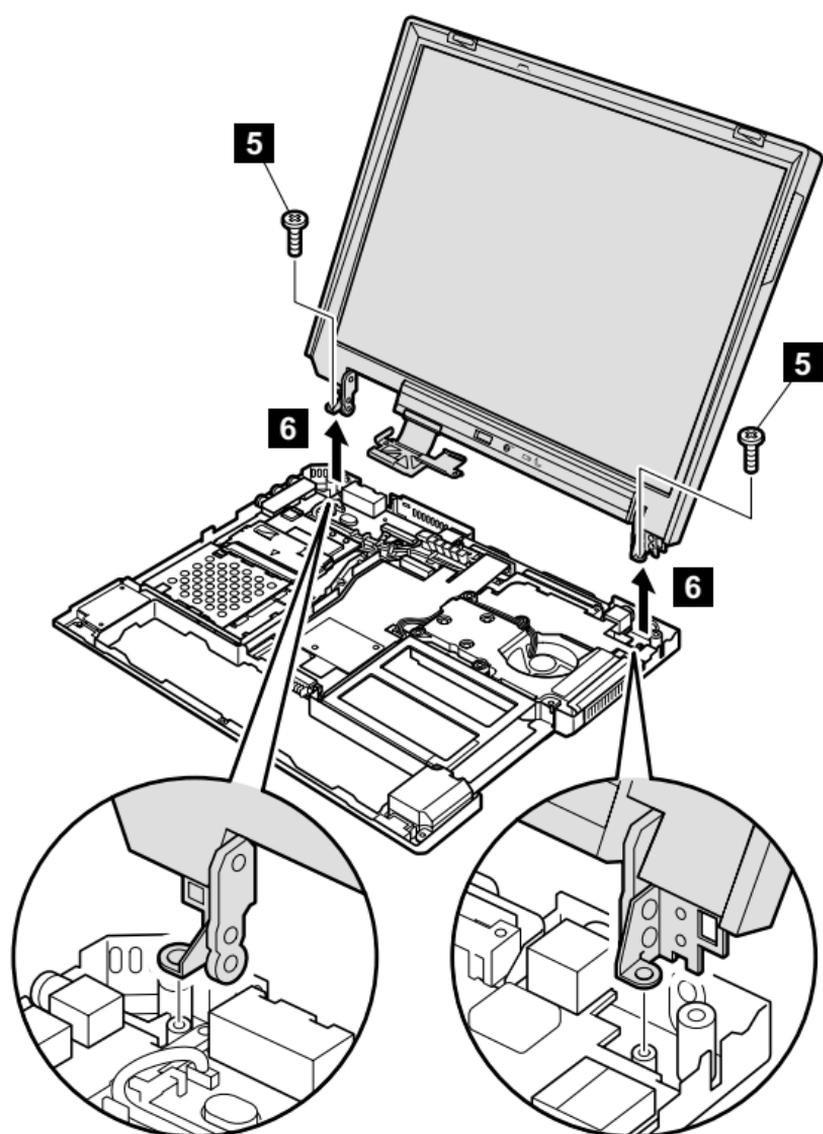
| Step | Screw (quantity) | Torque |
|----------|---------------------------------|-----------------------|
| 3 | M2.5 × 4.8 mm, nylon-coated (4) | 0.392 Nm (4 kgfcm) |



When installing: Make sure that the connector **4** is firmly attached.

(continued)

Removing and replacing a FRU



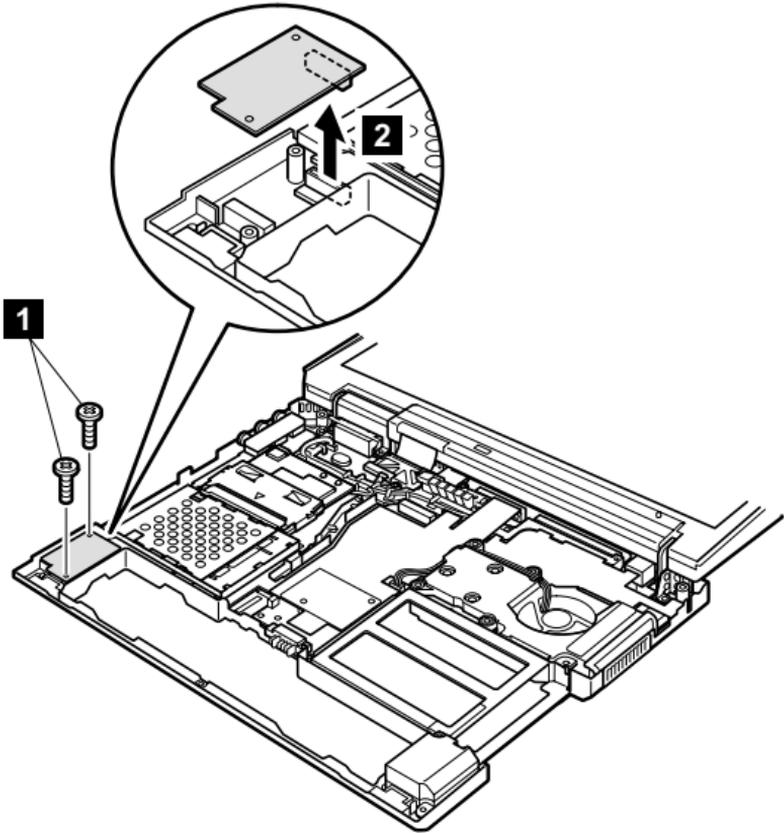
| Step | Screw (quantity) | Torque |
|------|---------------------------------|-----------------------|
| 5 | M2.5 x 4.8 mm, nylon-coated (2) | 0.392 Nm (4 kgfcm) |

Cable routing: After attaching the LCD assembly, route the antenna cables as follows:

1120 Sub card assembly

For access, remove following FRUs, in order:

- “1010 Battery pack” on page 60
- “1020 Hard-disk drive” on page 61
- “1030 DIMM” on page 63
- “1040 Backup battery” on page 64
- “1050 Keyboard” on page 65
- “1090 Keyboard bezel” on page 79



| Step | Screw (quantity) | Torque |
|----------|-----------------------------|-------------------------|
| 1 | M2 x 4 mm, nylon-coated (2) | 0.245 Nm (2.5 kgfcm) |

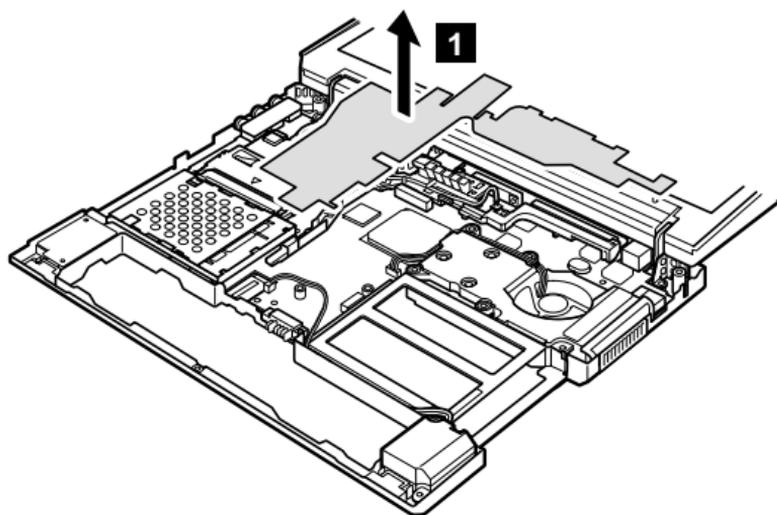
When installing: Make sure that the connector **2** on the bottom side of the card is firmly attached to the system board.

1130 Speaker assembly

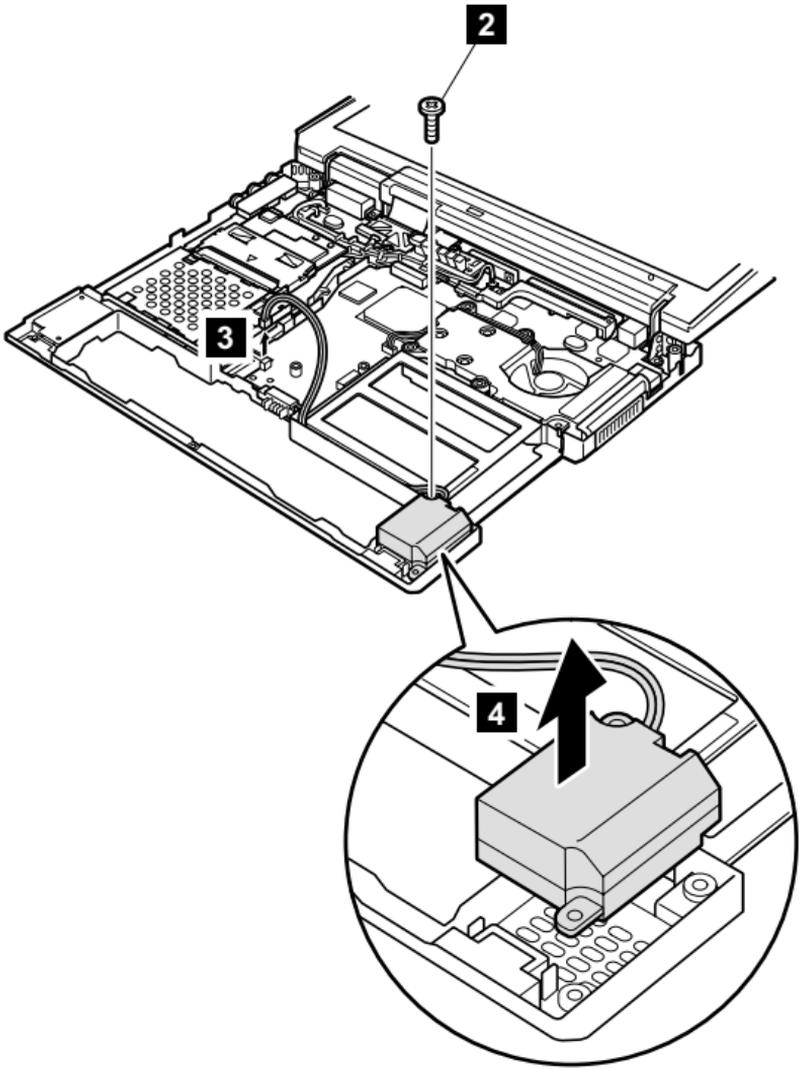
For access, remove following FRUs, in order:

- “1010 Battery pack” on page 60
- “1020 Hard-disk drive” on page 61
- “1030 DIMM” on page 63
- “1040 Backup battery” on page 64
- “1050 Keyboard” on page 65
- “1080 Communication daughter card (CDC)” on page 74 (only for the models with the CDC)
- “1090 Keyboard bezel” on page 79

Before removing the speaker assembly, remove the keyboard CRU insulator **1**.

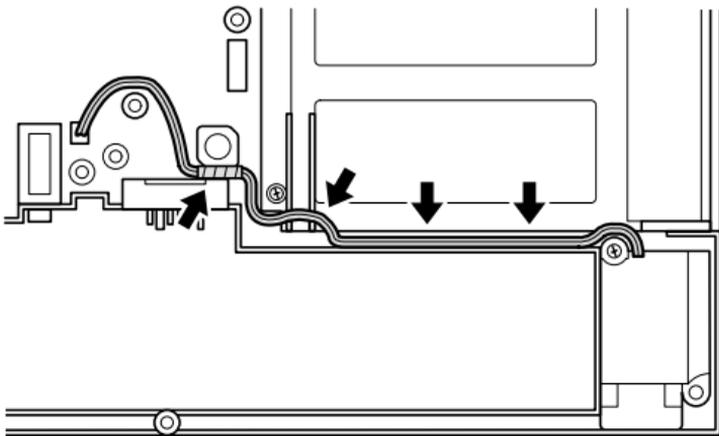


(continued)



| Step | Screw (quantity) | Torque |
|------|--|----------------------|
| 2 | M2 x 14 mm with washer, nylon-coated (1) | 0.245 Nm (2.5 kgfcm) |

Cable routing: When installing the speaker assembly, attach the connector first. Then route the cable along the cable guides of the base cover as indicated by the arrows in this picture.

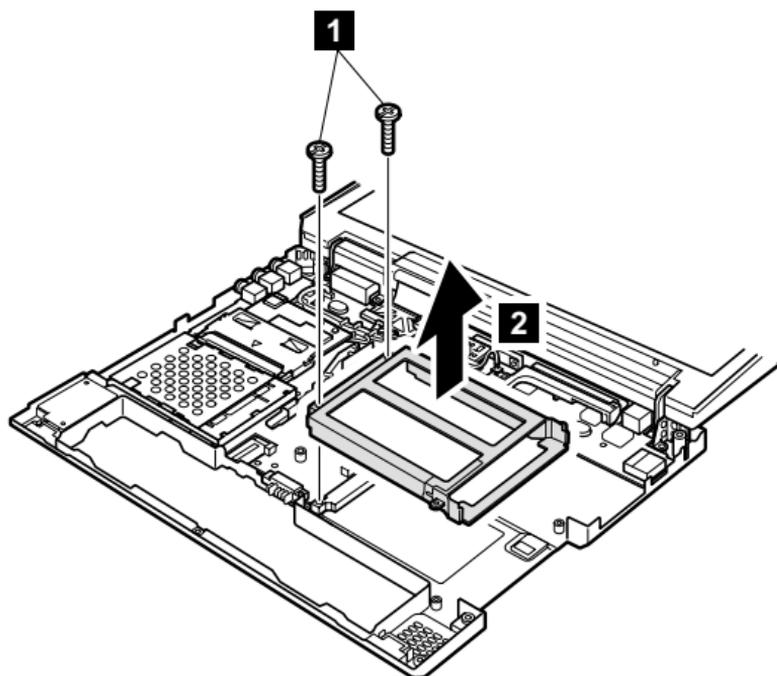


1140 System board

For access, remove following FRUs, in order:

- “1010 Battery pack” on page 60
- “1020 Hard-disk drive” on page 61
- “1030 DIMM” on page 63
- “1040 Backup battery” on page 64
- “1050 Keyboard” on page 65
- “1060 Mini PCI adapter” on page 69
- “1070 Fan assembly” on page 72
- “1080 Communication daughter card (CDC)” on page 74
- “1090 Keyboard bezel” on page 79
- “1100 PC card slot” on page 82
- “1110 Hinge cover and LCD assembly” on page 85
- “1120 Sub card assembly” on page 89
- “1130 Speaker assembly” on page 90

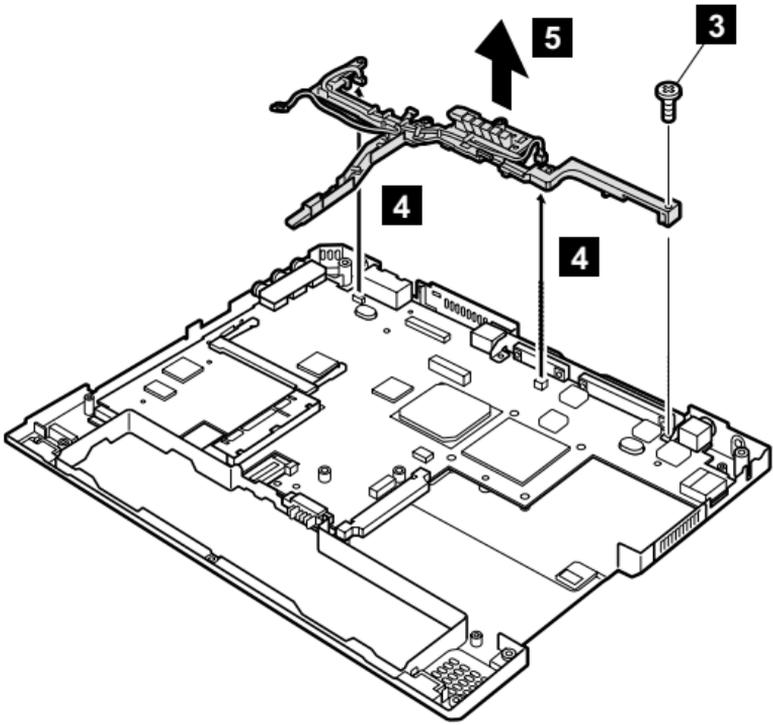
Before removing the system board, remove the hard-disk drive holder (steps **1** and **2**) and the cable guide (steps **3** to **5**).



| Step | Screw (quantity) | Torque |
|----------|-------------------------------|-------------------------|
| 1 | M2 × 9.5 mm, nylon-coated (2) | 0.245 Nm (2.5 kgfcm) |

(continued)

Removing and replacing a FRU



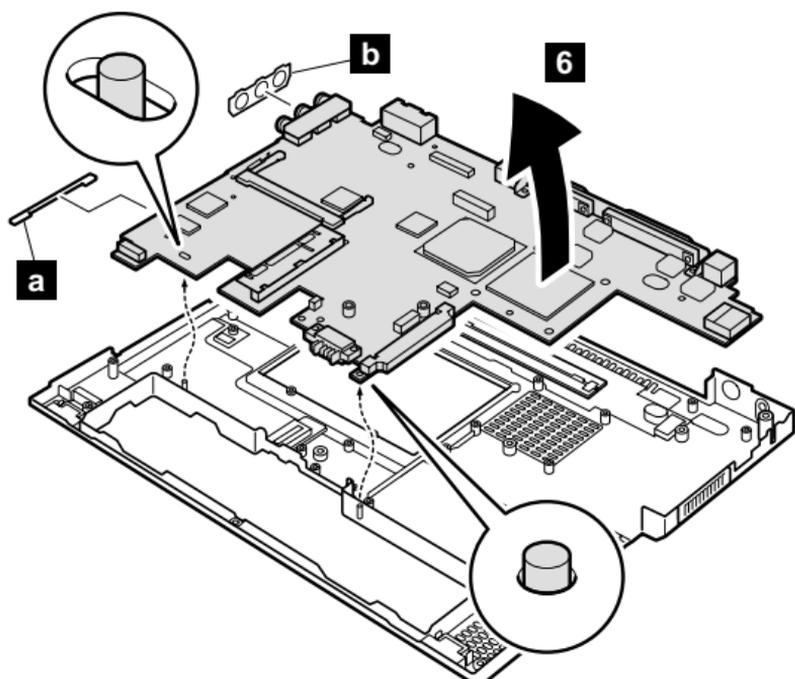
| Step | Screw (quantity) | Torque |
|------|-------------------------------|-------------------------|
| 3 | M2 x 9.5 mm, nylon-coated (1) | 0.245 Nm (2.5 kgfcm) |

When installing: Make sure that the connectors **4** are attached firmly.

(continued)

Removing and replacing a FRU

PC Card guide (**a**) and audio connector retainer (**b**) are attached to the system board. When you replace the system board, reinstall those parts to the new system board FRU.

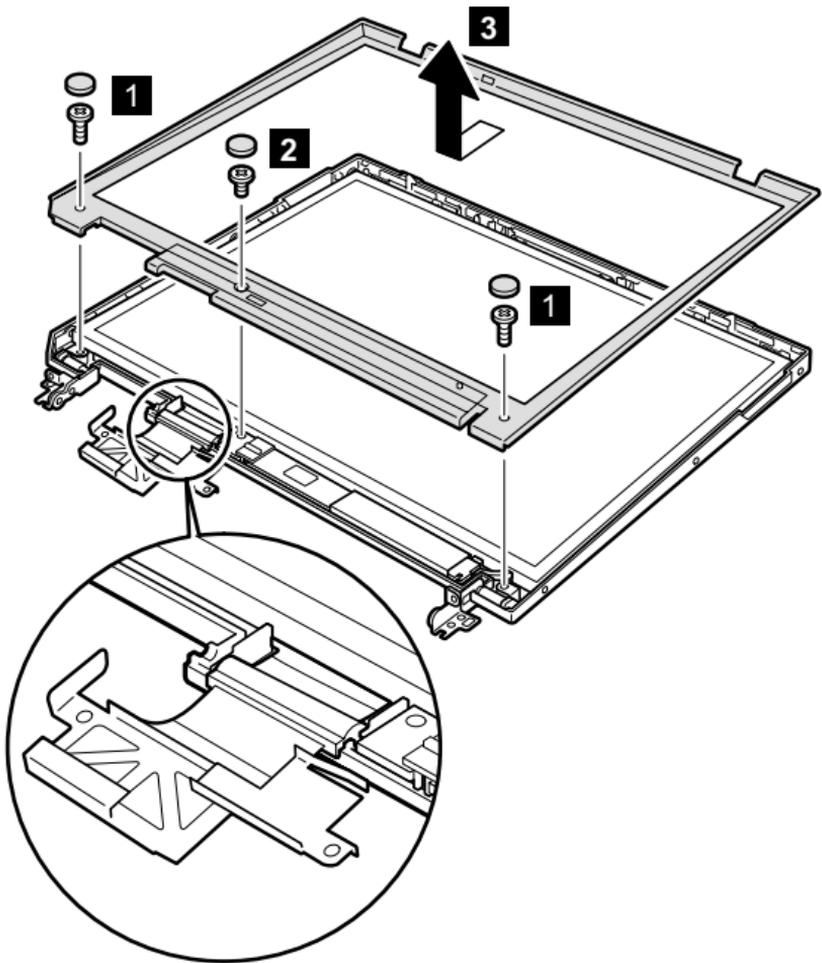


When installing: Attach the system board so that the two small projections on the base cover fit into the holes provided, and then tighten the screws.

2010 LCD front bezel

For access, remove following FRUs, in order:

- “1010 Battery pack” on page 60
- “1020 Hard-disk drive” on page 61
- “1030 DIMM” on page 63
- “1040 Backup battery” on page 64
- “1050 Keyboard” on page 65
- “1090 Keyboard bezel” on page 79
- “1110 Hinge cover and LCD assembly” on page 85



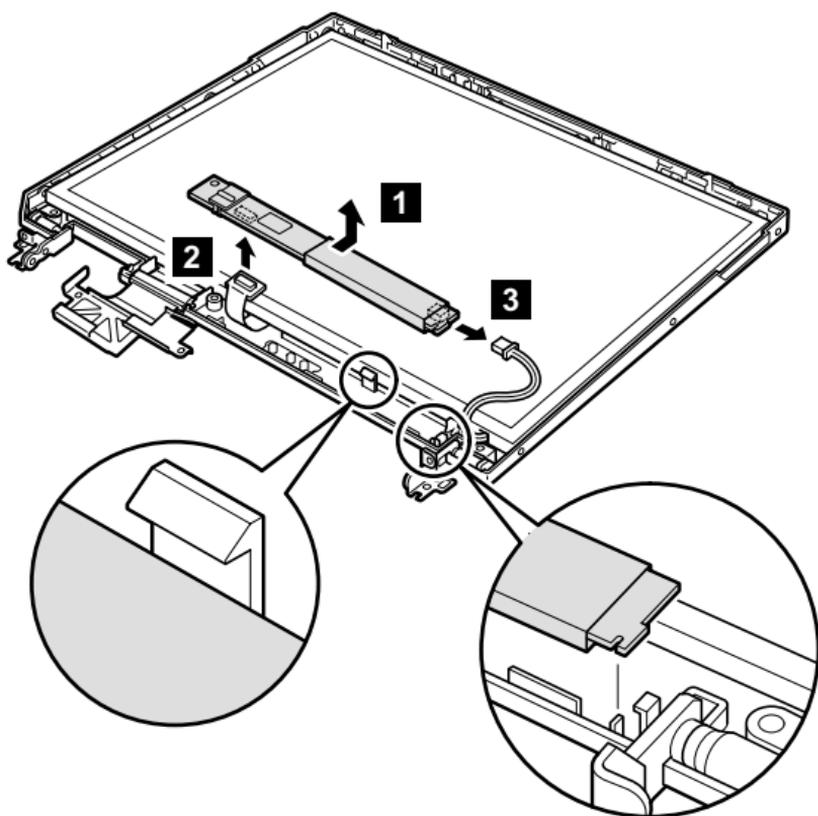
| Step | Screw (quantity) | Torque |
|----------|---------------------------------|-------------------------|
| 1 | M2.5 x 4.8 mm, nylon-coated (2) | 0.392 Nm (4 kgfcm) |
| 2 | M2 x 4 mm, nylon-coated (1) | 0.245 Nm (2.5 kgfcm) |

When installing: Make sure that all of the latches of the LCD front bezel are firmly attached to the LCD cover. Then secure the bezel with the screws.

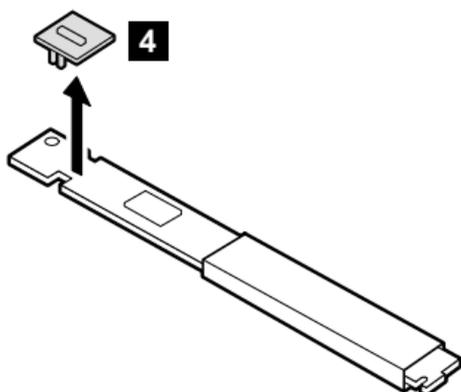
2020 Inverter card

For access, remove following FRUs, in order:

- “1010 Battery pack” on page 60
- “1020 Hard-disk drive” on page 61
- “1030 DIMM” on page 63
- “1040 Backup battery” on page 64
- “1050 Keyboard” on page 65
- “1090 Keyboard bezel” on page 79
- “1110 Hinge cover and LCD assembly” on page 85
- “2010 LCD front bezel” on page 95



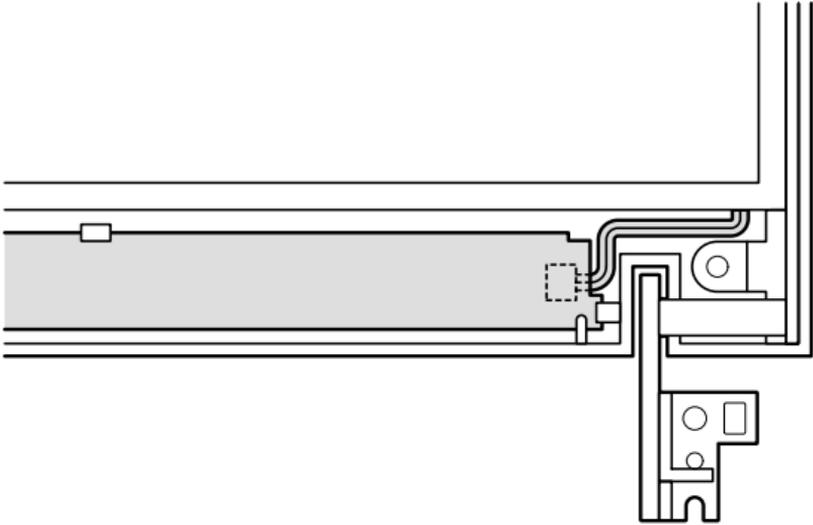
If the ThinkPad computer you are servicing has the Bluetooth features, remove Bluetooth button cover **4** from the defective inverter card and keep the cover for reuse.



When installing:

1. If the ThinkPad computer you are servicing has the Bluetooth features, reattach the Bluetooth button cover before you install the new inverter card FRU to the computer.
2. Make sure that both of the connectors **2** , **3** are attached firmly.

Cable routing: When replacing the inverter card, route the connector cable as in the following figure:

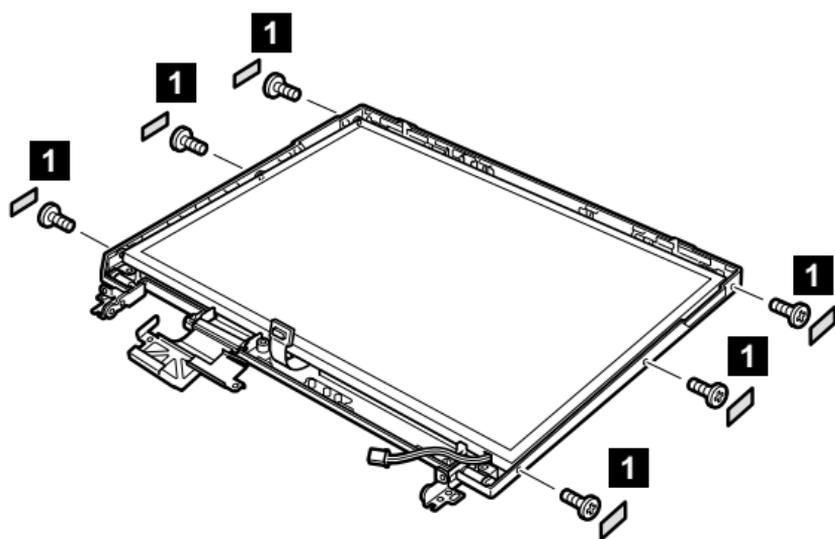


2030 LCD panel

For access, remove following FRUs, in order:

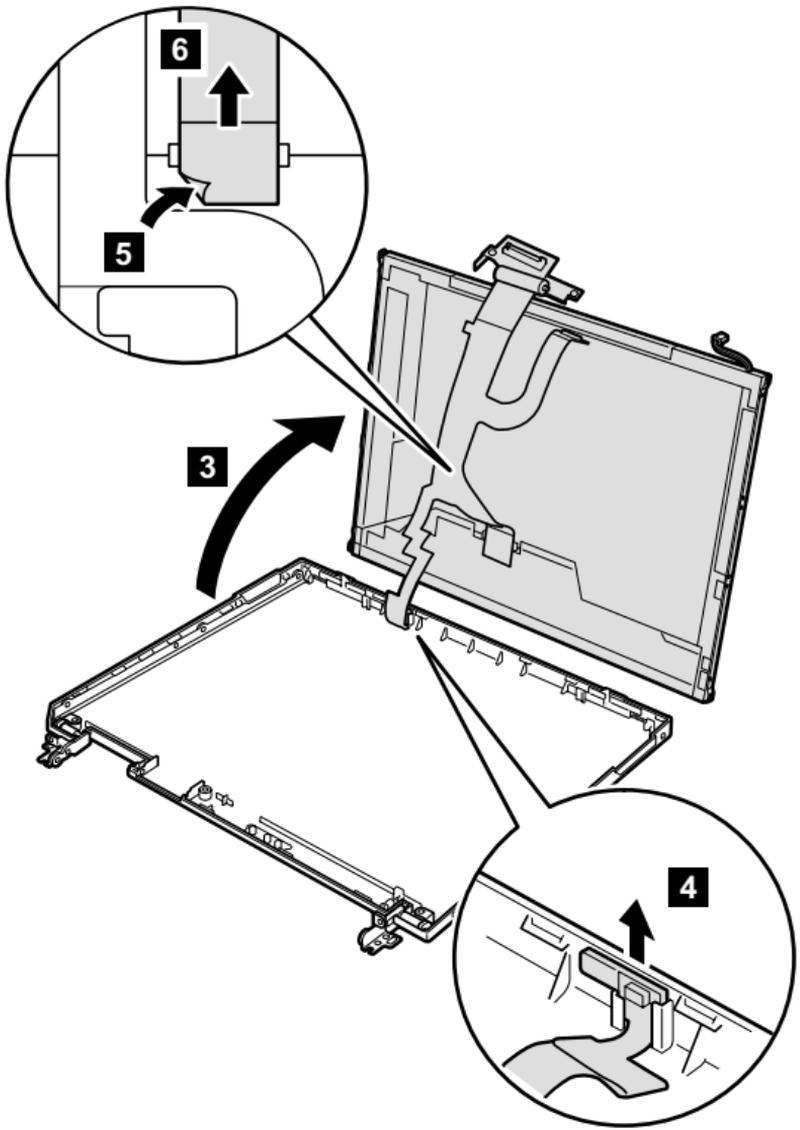
- “1010 Battery pack” on page 60
- “1020 Hard-disk drive” on page 61
- “1030 DIMM” on page 63
- “1040 Backup battery” on page 64
- “1050 Keyboard” on page 65
- “1090 Keyboard bezel” on page 79
- “1110 Hinge cover and LCD assembly” on page 85
- “2010 LCD front bezel” on page 95
- “2020 Inverter card” on page 96

For models with no wireless LAN antenna



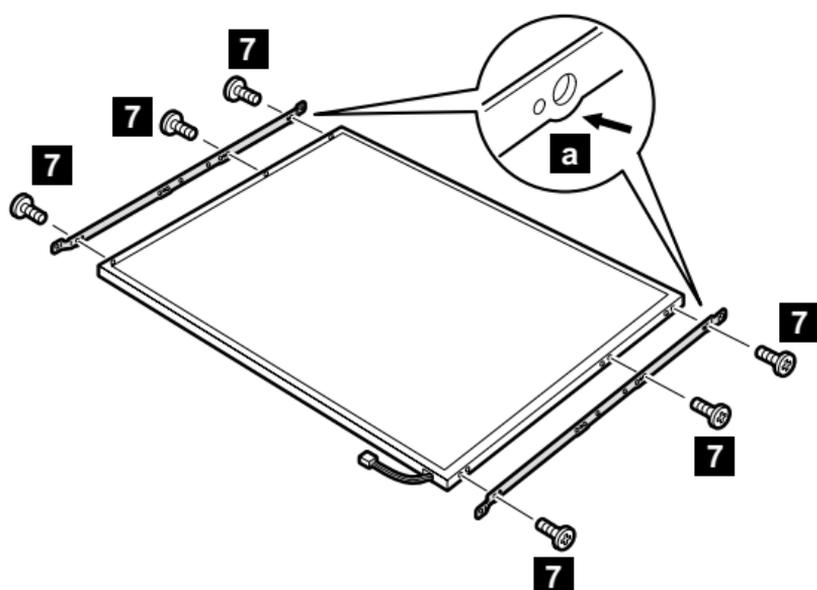
| Step | Screw (quantity) | Torque |
|----------|-----------------------------|-------------------------|
| 1 | M2 x 4 mm, nylon-coated (6) | 0.245 Nm (2.5 kgfcm) |

(continued)



(continued)

Removing and replacing a FRU

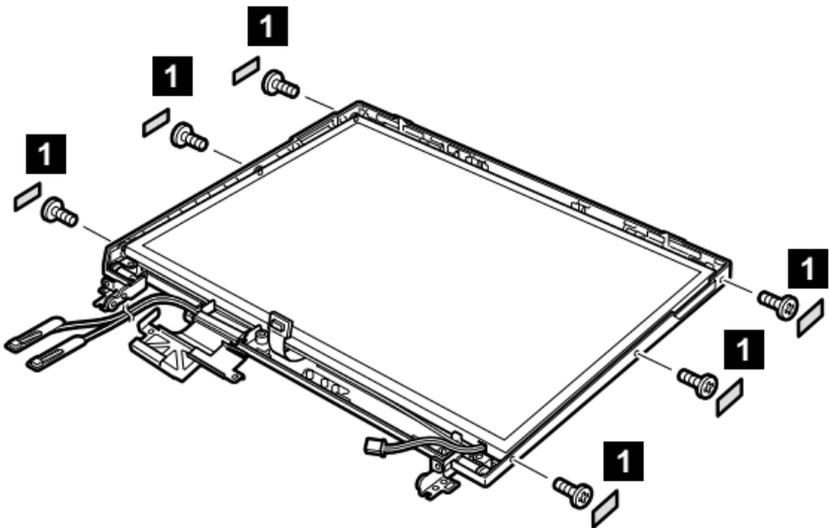


| Step | Screw (quantity) | Torque |
|------|-----------------------------|---------------------|
| 7 | M2 × 3 mm, nylon-coated (6) | 0.2 Nm (2 kgfcm) |

When installing

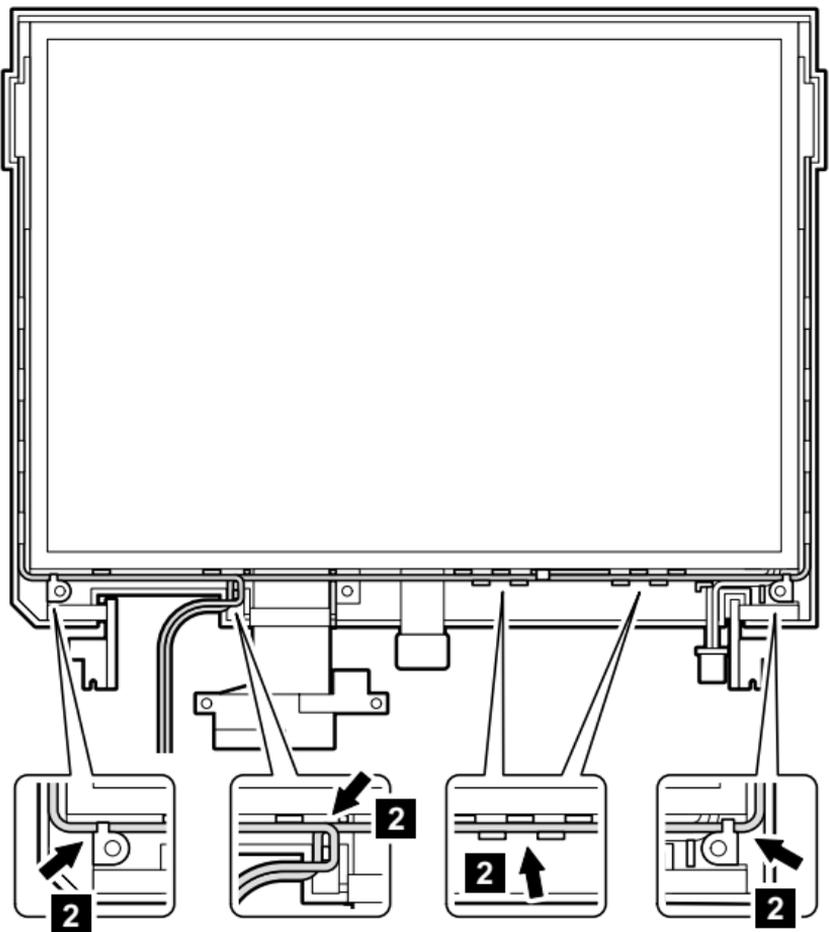
- Do not pinch the antenna cables under the LCD panel.
- Make sure that the antenna cables are firmly routed along the cable guides of the LCD cover.

For wireless LAN models



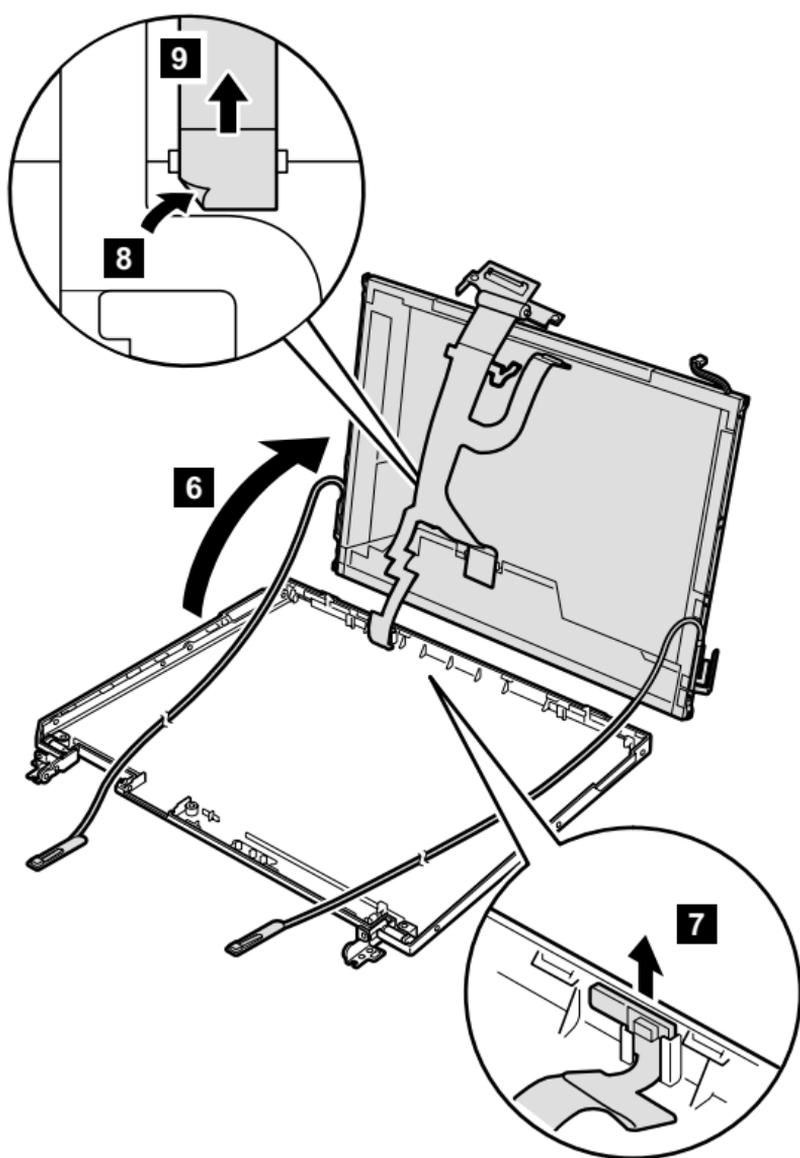
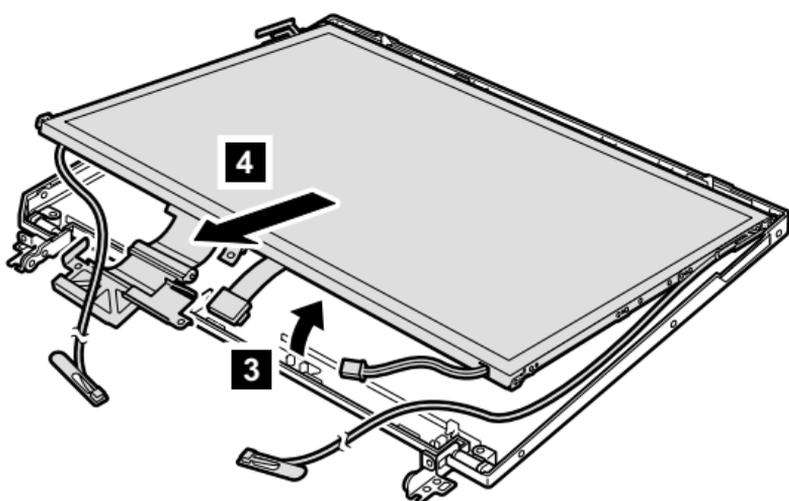
| Step | Screw (quantity) | Torque |
|----------|-----------------------------|-------------------------|
| 1 | M2 x 4 mm, nylon-coated (6) | 0.245 Nm (2.5 kgfcm) |

Release the antenna cables from the cable guides indicated by the arrows **2** in this figure.



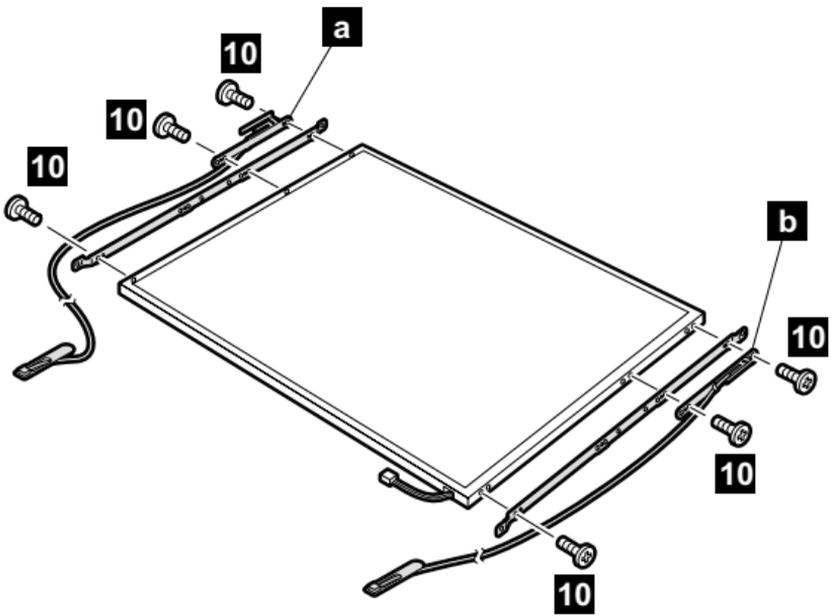
(continued)

Removing and replacing a FRU

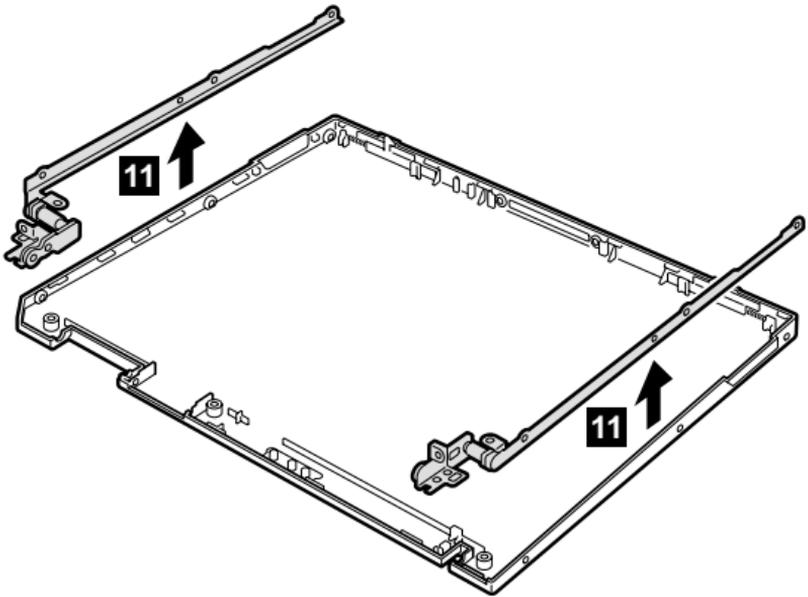


(continued)

Attach the white cable **a** to the right bracket, and attach the black cable **b** to the left bracket.



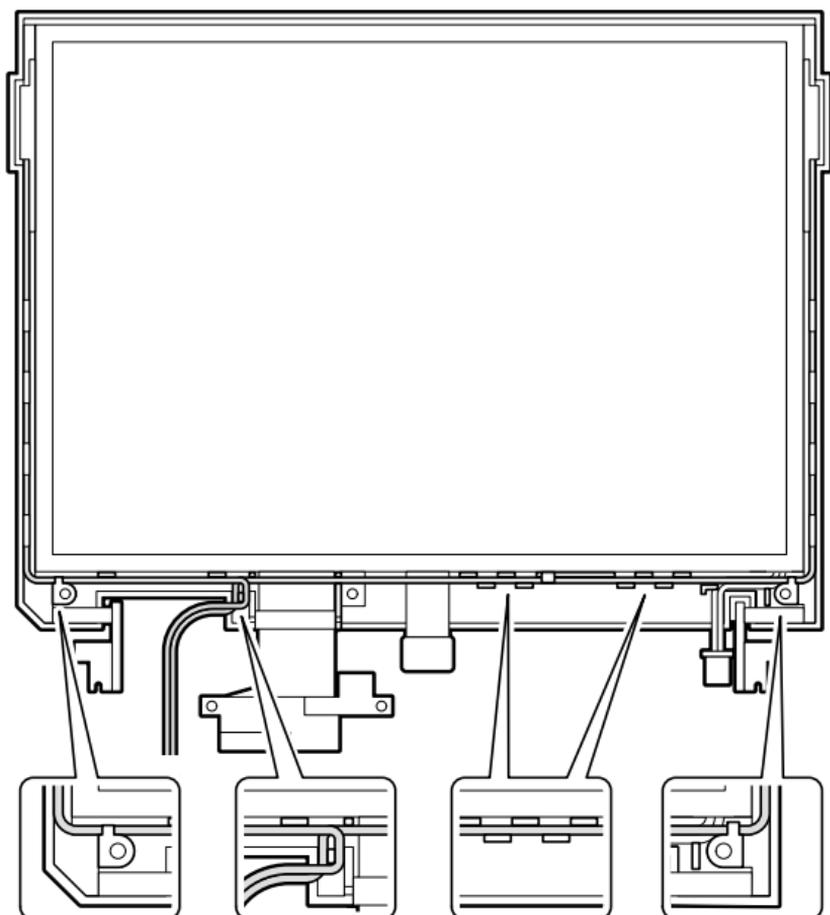
| Step | Screw (quantity) | Torque |
|-----------|-----------------------------|-------------------------|
| 10 | M2 x 3 mm, nylon-coated (6) | 0.245 Nm (2.5 kgfcm) |



(continued)

When installing:

- Place the FPC connector to pass under the black antenna cable.
- Do not pinch the antenna cables under the LCD panel.
- Make sure that the antenna cables are firmly routed along the cable guides of the LCD cover.

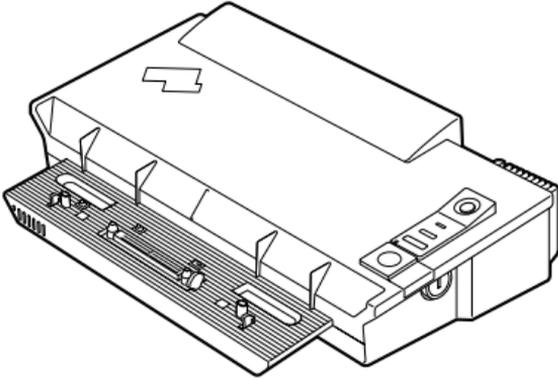


3010 ThinkPad Dock PCI cover

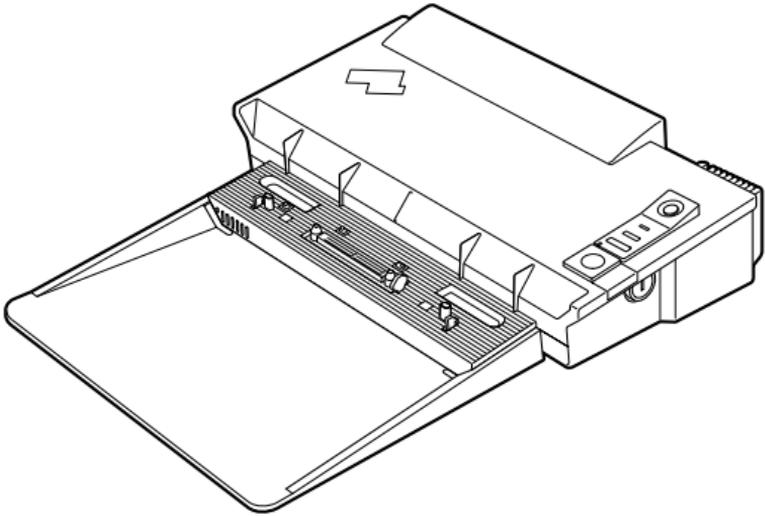
Before replacing the PCI cover:

There are two types of ThinkPad Dock, as follows:

- ThinkPad Dock: FRU no. 08N1546 (PCI cover: FRU no. 05K6246)



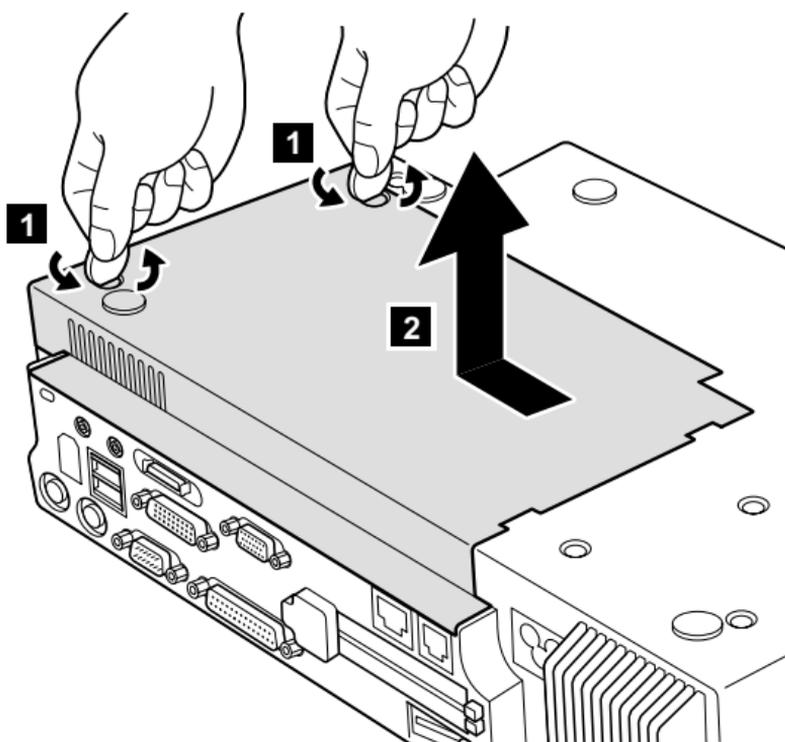
- ThinkPad Dock with extension plate: FRU no. 08N1537 (PCI cover: FRU no. 08N7317)



Confirm the FRU no. of the ThinkPad Dock first and choose the proper PCI cover FRU for the ThinkPad Dock you are servicing.

Removing and replacing a FRU

Note: The following illustration shows how to remove the PCI cover of ThinkPad Dock (FRU no. 08N1546). Do the same to remove the PCI cover of ThinkPad Dock with extension plate (FRU no. 08N1537).

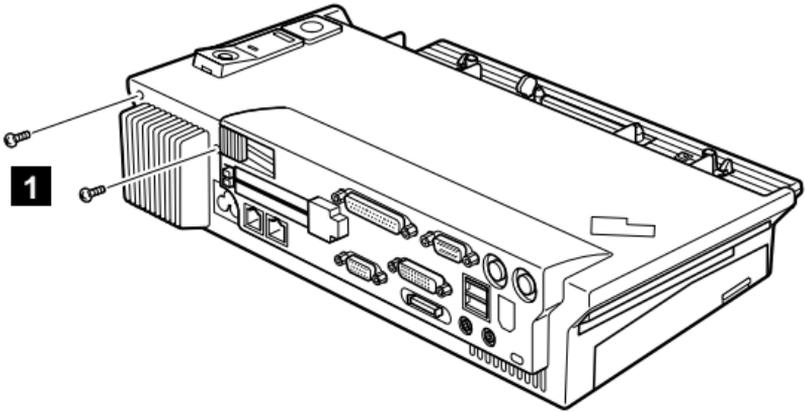


(Bottom view)

3020 ThinkPad Dock top cover

Note

This section is only for the ThinkPad Dock (FRU no. 08N1546). The top cover and screw kit for ThinkPad Dock (FRU no. 12P4143) is not available for the ThinkPad Dock with extension plate (FRU no. 08N1537) .

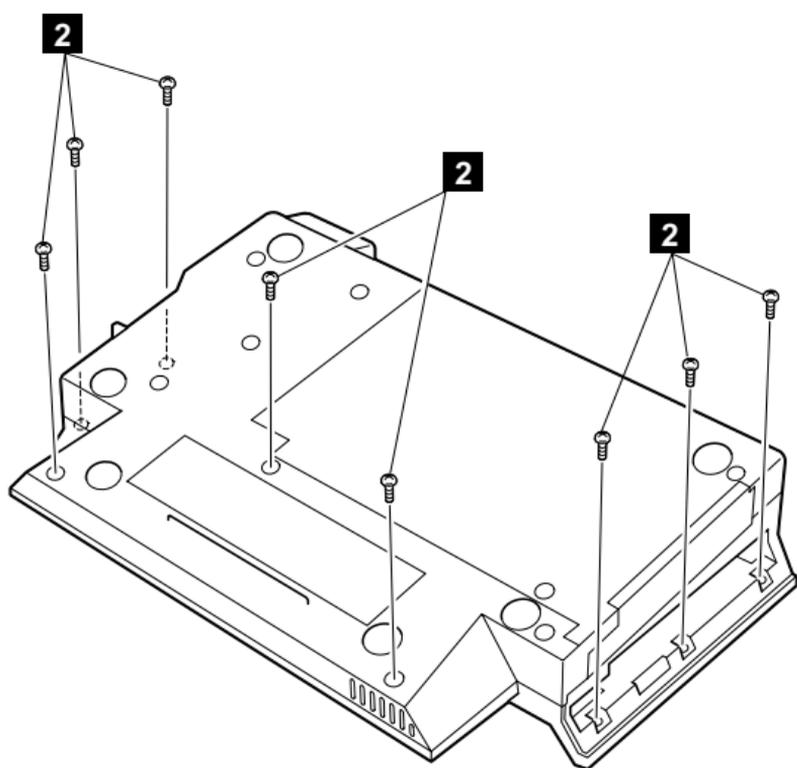


(Rear view)

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

(continued)

Removing and replacing a FRU

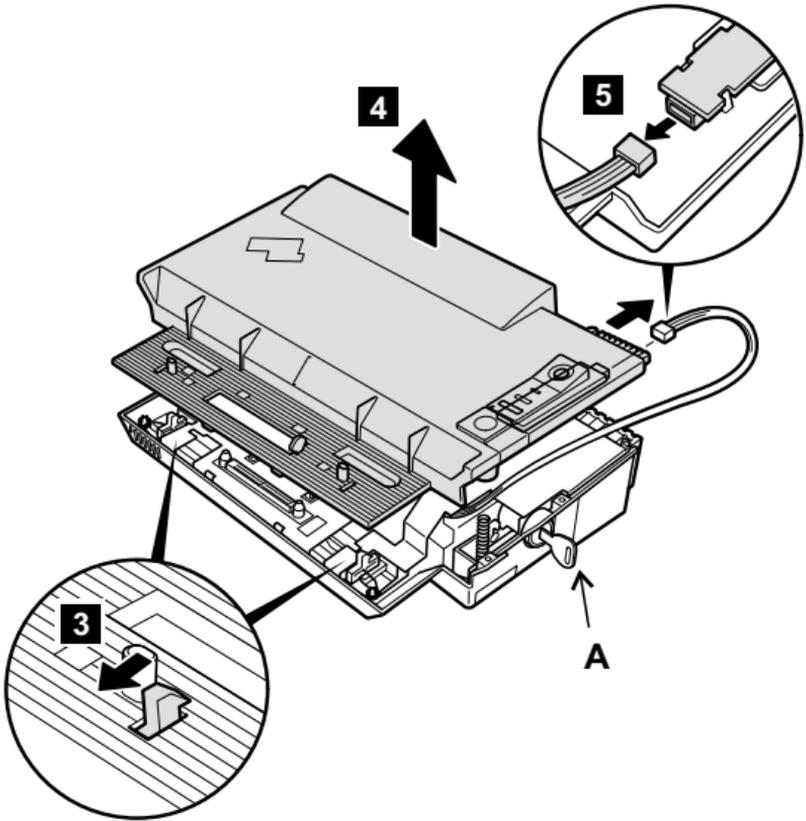


(Bottom view)

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

(continued)

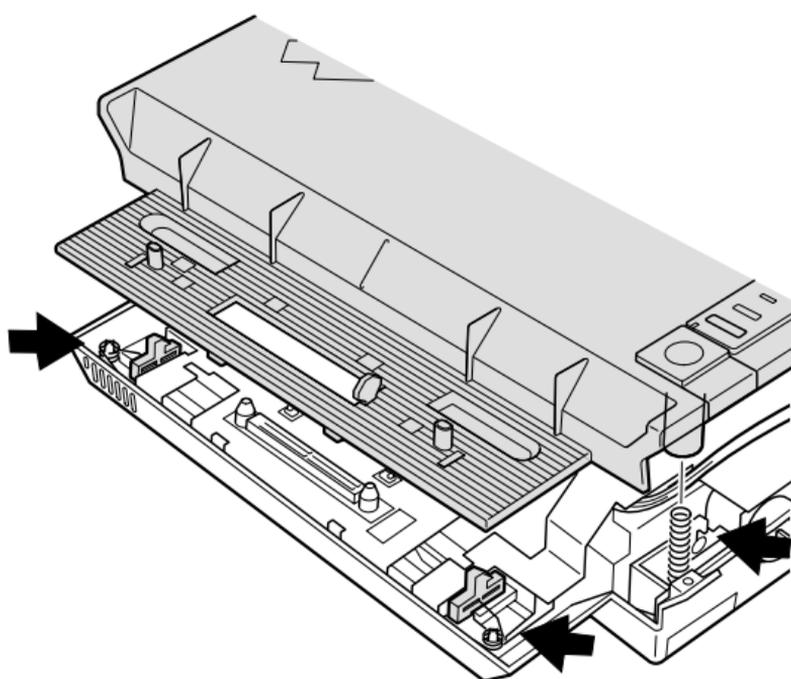
Make sure that the system lock key **A** is set to the Unlock position. Release the front latches in step **3**, and then remove the top cover **4**. For step **5**, see the inside view, shown in the circle.



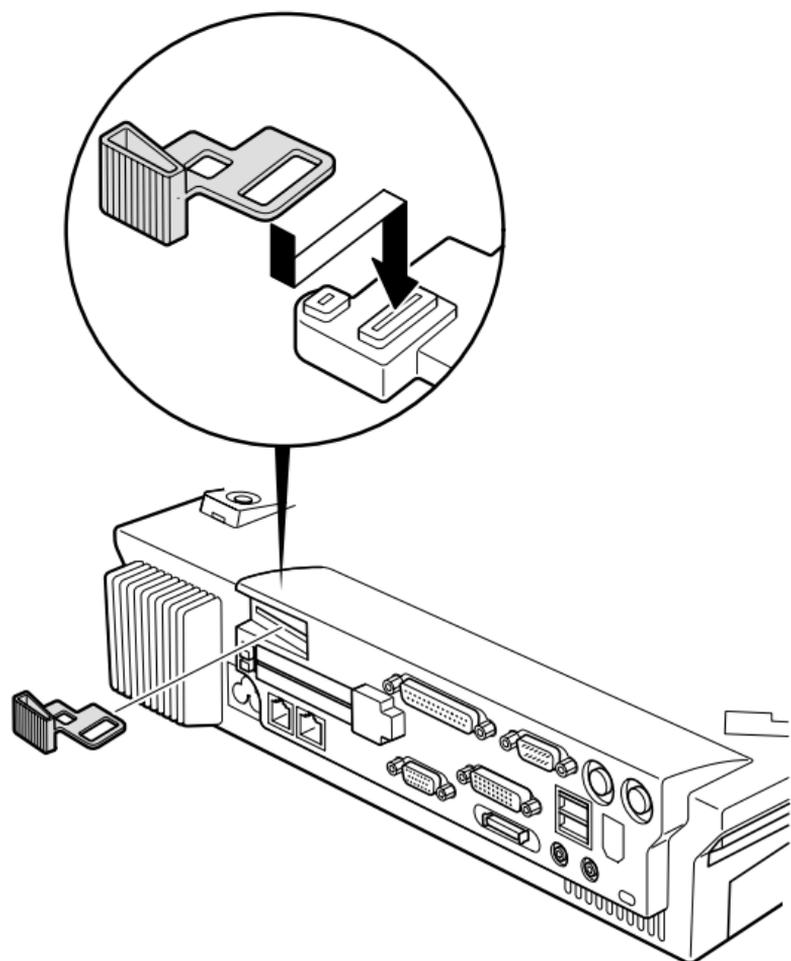
Removing and replacing a FRU

When replacing the top cover, do the following:

- Make sure that the springs are placed correctly.

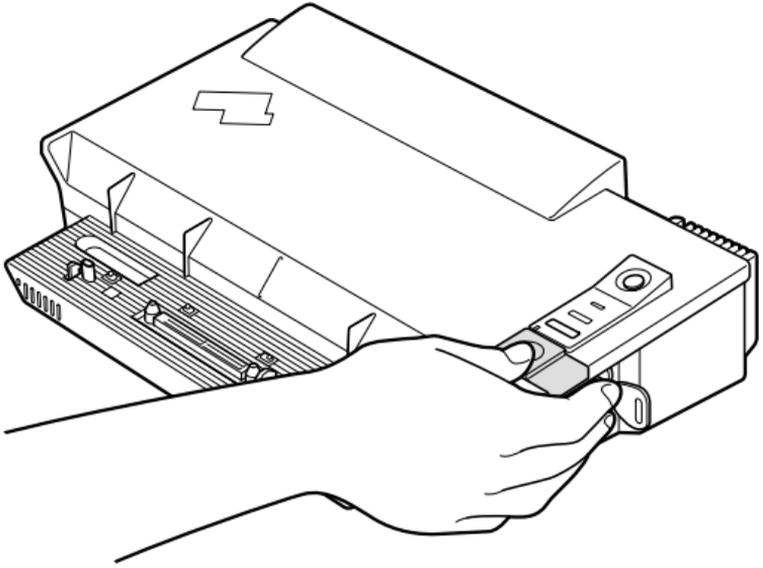


- Make sure that the device release lever is seated correctly.



(continued)

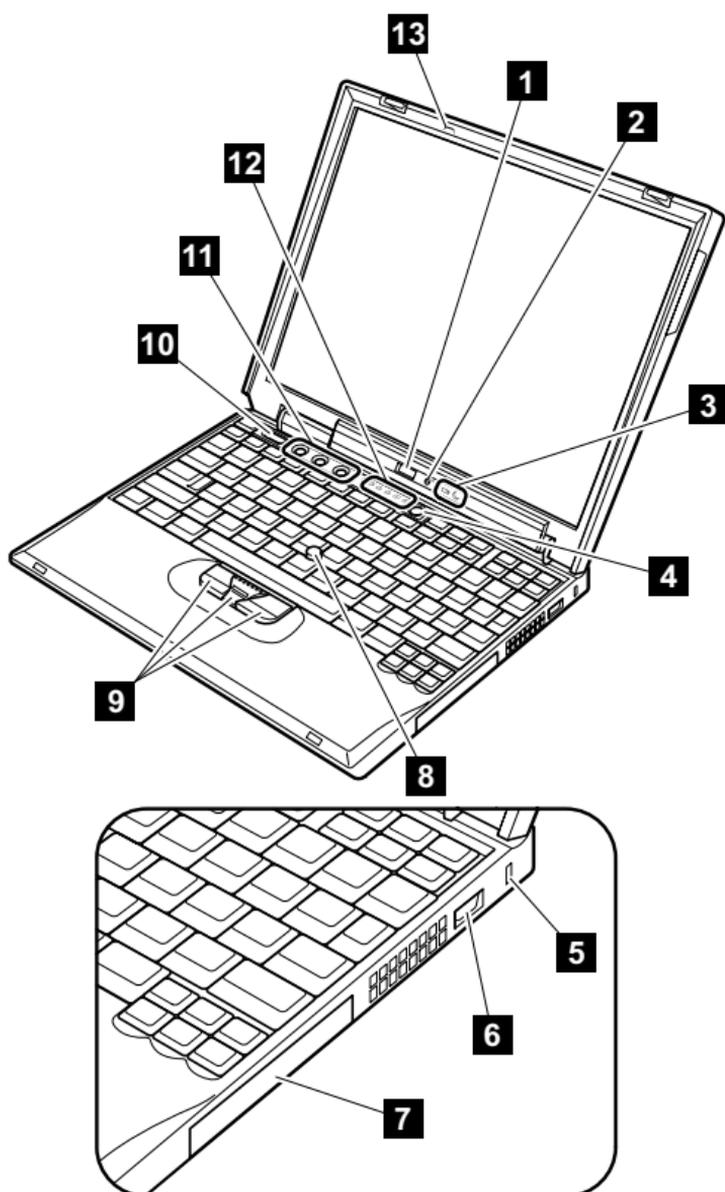
- Make sure that the release button works correctly.



Locations

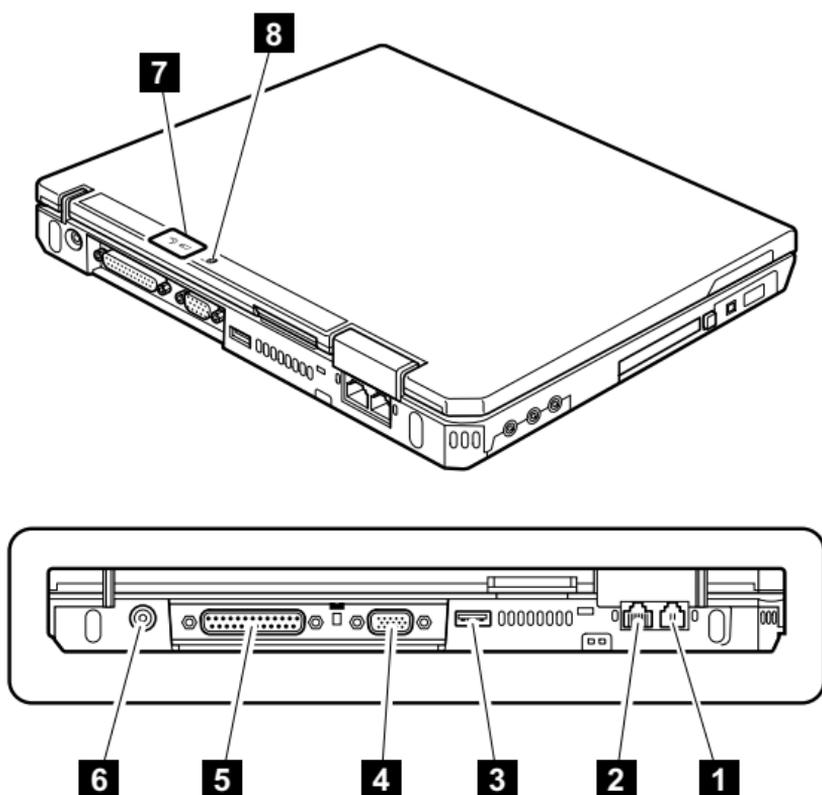
Front view

- 1** Bluetooth button (some models)
- 2** Bluetooth status indicator (some models)
- 3** Power status indicators
- 4** Power switch
- 5** Security keyhole
- 6** Universal serial bus (USB) connector
- 7** Hard-disk drive
- 8** TrackPoint pointer
- 9** TrackPoint buttons
- 10** ThinkPad button
- 11** Volume and mute buttons
- 12** System status indicators
- 13** ThinkLight



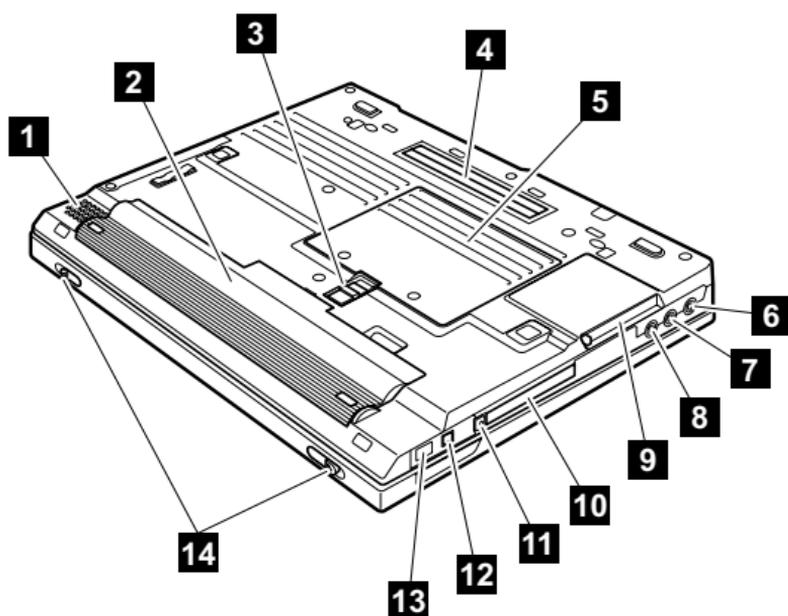
Rear view

- 1** Modem connector
- 2** Ethernet connector
- 3** USB connector
- 4** External-monitor connector
- 5** Parallel connector
- 6** AC power connector
- 7** Power status indicators
- 8** Bluetooth status indicator (some models)



Bottom view

- 1** Built-in speaker
- 2** Battery pack
- 3** Battery pack latches
- 4** Docking connector
- 5** DIMM slots
- 6** Stereo headphone jack
- 7** Stereo line-in jack
- 8** Microphone jack
- 9** CompactFlash card slot or Infrared port
- 10** PC Card slot
- 11** PC Card eject button
- 12** IEEE 1394 connector
- 13** Infrared port
- 14** LCD latches



Locations for UltraBase X3

Some models are shipped with a ThinkPad X3 UltraBase. For those models, refer the following locations.

Front view

- 1** UltraBase release lever
- 2** Docking connector
- 3** Ultrabay Plus

Note: The Ultrabay Plus accepts several storage devices, such as a DVD drive or a CD-ROM drive, and also accepts an Ultrabay Plus carrier.

- 4** Ultrabay status indicator

Green: An Ultrabay device is attached to the computer and in use.

Turn off:

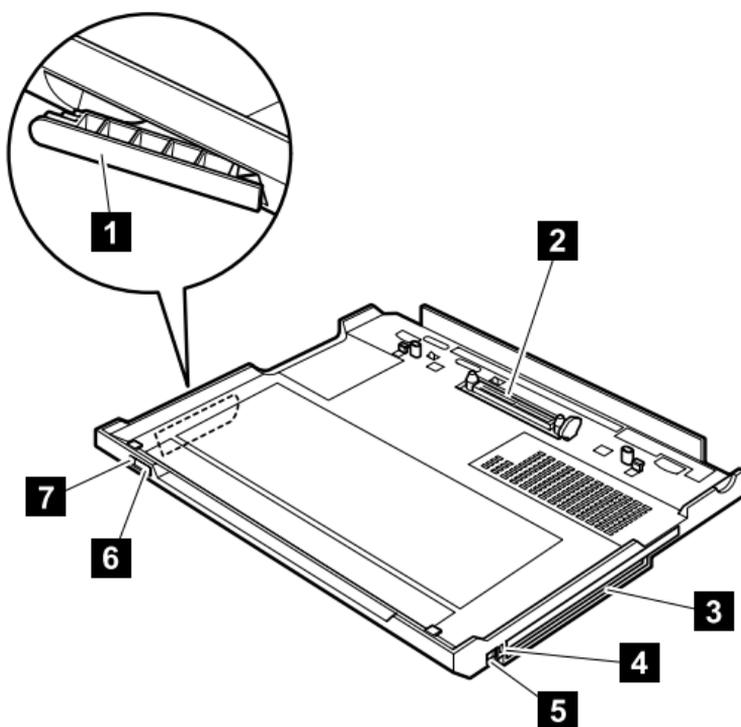
An Ultrabay device is ready to be attached or detached.

- 5** Ultrabay device eject lever
- 6** UltraBase eject button
- 7** UltraBase status indicator

Green: An UltraBase X3 is attached to the computer and in use.

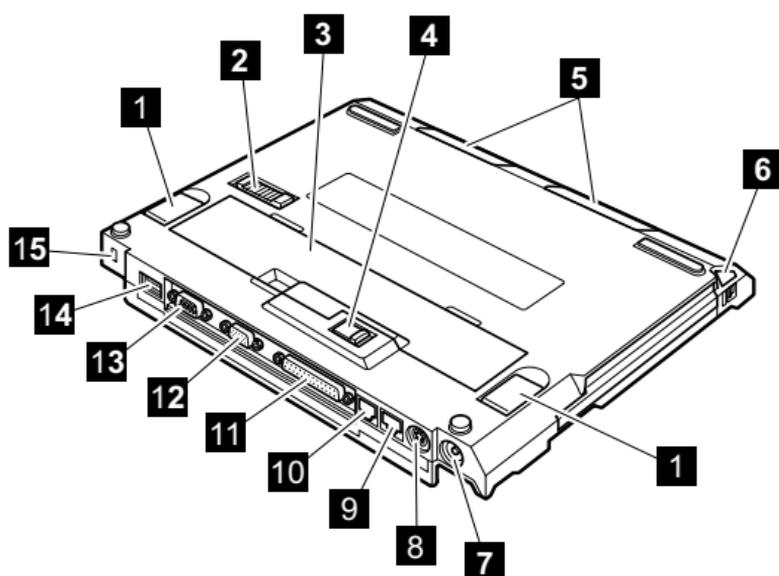
Turn off:

An UltraBase X3 is ready to be attached or detached.



Bottom view

- 1** Foot
- 2** UltraBase latches
- 3** Battery bay
- 4** Battery pack latches
- 5** Built-in stereo speakers
- 6** Ultrabay device eject lever
- 7** AC power connector
- 8** Keyboard or mouse connector
- 9** Ethernet connector
- 10** Modem connector
- 11** Parallel connector
- 12** External monitor connector
- 13** Serial connector
- 14** USB connector
- 15** Security keyhole

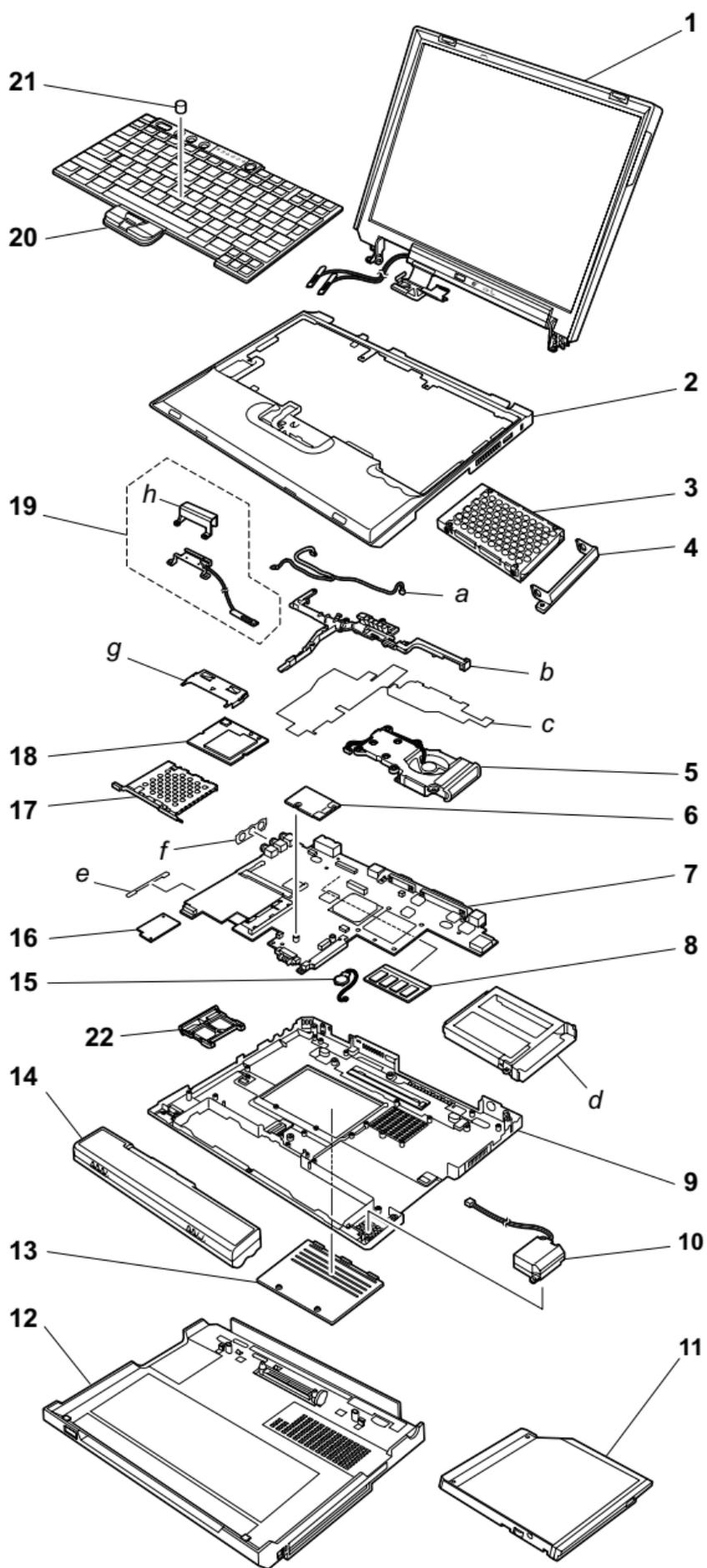


Parts list

The X30 series includes several models. The following table summarizes the characteristics of each model, to help you determine which FRU in the part list meets your need.

| Model | CDC | Mini PCI adapter | LCD | Bay device for UltraBase | CPU |
|--|-----|------------------|---------------------------|--------------------------|-------------|
| X30 (memory, 128 MB; HDD, 20 GB) | | | | | |
| 2672-11x, 12x | MDC | — | 12.1-in. XGA | — | Tual 1.06 G |
| 2672-1Ax, 1Bx ^{SC} | — | 802.11b/Modem | 12.1-in. XGA with antenna | — | |
| X30 (memory, 256 MB; HDD, 20 GB) | | | | | |
| 2672-31x, 32x, 33x, 36x | MDC | — | 12.1-in. XGA | — | Tual 1.06 G |
| 2672-3KC | | | | DVD-ROM | |
| X30 (memory, 256 MB; HDD, 40 GB) | | | | | |
| 2672-41x, 42x, 43x, 45x, 46x | MDC | — | 12.1-in. XGA | — | Tual 1.2 G |
| 2673-42x | | | | DVD-ROM | |
| 2672-4Nx, 4Px, 4Qx | | | | CD-ROM | Tual 1.06 G |
| 2672-7MT | | | | — | |
| 2672-4Ax, 4Bx, 4Cx, 4Ex ^{SC} | — | 802.11b/Modem | 12.1-in. XGA with antenna | — | Tual 1.2 G |
| 2673-4Bx | | | | DVD-ROM | |
| 2672-4Rx, 4Sx, 4Tx ^{SC} | | | | — | |
| 2672-4Gx, 4Hx, 4Jx ^{SC} | | | | BDC | |
| 2672-4Vx, 4Wx ^{SC} | | | | — | |
| 2672-4Xx, 4Yx | | | | MDC | |
| Tual xxxG: Mobile Intel® Pentium® III processor - M xxx GHz SC: featuring security chip | | | | | |

Overall



- Each FRU is available for all types or models, unless specific types or models are given.
- The parts marked with asterisks are CRUs (customer replaceable units.)
- FRUs marked with **OP** are also available as optional FRUs.

| No. | FRU | P/N |
|-------|---|----------|
| a - h | See "Miscellaneous parts" on page 129. | |
| 1 | LCD unit (see "LCD FRUs" on page 124). | |
| 2 | Keyboard bezel assembly • 2672-xxA, xxB, xxC, xxE, xxF, xxG, xxH, xxJ, xxM, xxP, xxS, xxT, xxU, xxX • 2673-xxA, xxB, xxC, xxE, xxF, xxG, xxH, xxJ, xxM, xxP, xxS, xxT, xxU, xxX | 27L6746 |
| | Keyboard bezel assembly (Korea) • 2672-xxK • 2673-42K, 4BK | 27L6747 |
| 3 | Hard-disk drive (20 GB) 9.5 mm 4200 rpm, IBM STD OP • 2672-1xx, 3xx | 27L4286* |
| | Hard-disk drive (20 GB) 9.5 mm 4200 rpm, HITACHI • 2672-1xx, 3xx | 08K9533* |
| | Hard-disk drive (40 GB) 9.5 mm 4200 rpm, IBM STD • 2672-4xx, 7xx • 2673-4xx | 08K9683* |
| | Hard-disk drive (40 GB) 9.5 mm 4200 rpm, HITACHI • 2672-4xx, 7xx • 2673-4xx | 08K9767* |
| | for optional hard-disk drive, see "Optional FRUs" on page 130. | |
| 4 | Cover, hard-disk drive | 27L6750* |
| 5 | Fan assembly | 27L6738 |
| 6 | Modem daughter card (MDC) • 2672-x1x, x2x, x3x, x4x, x5x, x6x, xKx, xLx, xMx, xNx, xPx, xQx, xXx, xYx • 2673-x2x | 26P8256 |
| | Bluetooth daughter card (BDC) • 2672-xGx, xHx, xJx, xUx, xVx, xWx | 12P3872 |
| 7 | System board assembly, Tual NV1.06 G • 2672-11x, 12x, 31x, 32x, 33x, 36x, 3Kx, 54x, 7Mx | 26P8378 |

(continued)

Parts list

| No. | FRU | P/N |
|-----|---|----------|
| 7 | System board assembly, Tual NV1.2 G • 2672-41x, 42x, 43x, 45x, 46x, 4Nx, 4Px, 4Qx, 64x • 2673-42x | 26P8379 |
| | System board assembly, Tual NV1.06 G (with security) • 2672-1Ax, 1Bx, 5Dx | 26P8383 |
| | System board assembly, Tual NV1.2 G (with security) • 2672-4Ax, 4Bx, 4Cx, 4Ex, 4Gx, 4Hx, 4Jx, 4Rx, 4Sx, 4Tx, 4Vx, 4Wx, 4Xx, 4Yx, 6Dx • 2673-4Bx | 26P8384 |
| 8 | 128-MB SDRAM SO DIMM (PC133) OP • 2672-1xx | 19K4653* |
| | 256-MB SDRAM SO DIMM (PC133) OP • 2672-3xx, 4xx, 7xx • 2673-4xx | 19K4655* |
| | for optional DIMM, see "Optional FRUs" on page 130. | |
| 9 | Base cover assembly for 2672 WW • 2672-x1A, x2A, x5A, x1B, x2B, x3B, x2E, x1F, x2F, x1G, x2G, x1H, x2H, x3H, x1J, x2J, x5J, x1M, x2M, x5M, x1P, x2P, x1S, x2S, x1U, x2U, x4U, x1X, x2X | 27L6732 |
| | Base cover assembly for 2672 WW IBM Wireless Mini-PCI • 2672-xAA, xBA, xEA, xBB, xBE, xAF, xBF, xAG, xBG, xAH, xBH, xCH, xAJ, xBJ, xEJ, xAM, xBM, xEM, xAP, xBP, xAS, xBS, xAU, xBU, xDU, xAX, xBX | 27L6733 |
| | Base cover assembly for 2672 WW IBM Wireless Mini-PCI+BT • 2672-4GA, 4HA, 4HF, 4GG, 4HG, 4HH, 4JH, 4HJ, 4HK, 4JK, 4GM, 4HM, 4GP, 4HP, 4GS, 4HS, 4HT, 4JT, 4GU, 4HU, 4GX, 4HX | 46P3147 |
| | Base cover assembly for 2672 WW Cisco Wireless Mini-PCI • 2672-4XA, 4XB, 4XE, 4XF, 4XG, 4XH, 4XM, 4XU, 4YA | 62P4188 |
| | Base cover assembly for 2672 Japan Cisco Wireless Mini-PCI • 2672-4XJ | 62P4189 |
| | Base cover assembly for 2672 EMEA Cisco Wireless Mini-PCI • 2672-4XG | 62P4190 |
| | Base cover assembly for 2672 Taiwan • 2672-32T, 33T, 36T, 7MT, 42T, 43T, 45T, 46T, 4QT | 46P3151 |

(continued)

| No. | FRU | P/N |
|--|--|---------|
| 9 | Base cover assembly for 2672 Taiwan IBM Wireless Mini-PCI • 2672-4BT, 4ET | 46P3152 |
| | Base cover assembly for 2672 Taiwan IBM Wireless Mini-PCI+BT • 2672-4HT, 4JT, 4VT | 46P3153 |
| | Base cover assembly for 2672 Korea • 2672-32K, 33K, 42K, 43K, 45K | 46P3156 |
| | Base cover assembly for 2672 Korea IBM Wireless Mini-PCI • 2672-4BK, 4CK, 4EK | 46P3157 |
| | Base cover assembly for 2672 Korea IBM Wireless Mini-PCI+BT • 2672-4HK, 4JK | 46P3158 |
| | Base cover assembly for 2672 China • 2672-3KC, 42C, 4NC, 4PC, 4QC | 46P3161 |
| | Base cover assembly for 2672 China IBM Wireless Mini-PCI • 2672-4BC, 4RC, 4SC, 4TC | 46P3162 |
| | Base cover assembly for 2672 China IBM Wireless Mini-PCI+BT • 2672-4VC, 4WC | 46P3163 |
| | Base cover assembly for 2673 WW • 2673-42U, 42F, 42P, 42S, 42X, 42G, 42J, 42A, 42H, 42B, 42E, 42M | 27L6734 |
| | Base cover assembly for 2673 WW IBM Wireless Mini-PCI • 2673-4BU, 4BF, 4BP, 4BS, 4BX, 4BG, 4BJ, 4BA, 4BH, 4BB, 4BE, 4BM | 46P2922 |
| | Base cover assembly for 2673 Taiwan • 2673-42T | 46P3154 |
| | Base cover assembly for 2673 Taiwan IBM Wireless Mini-PCI • 2673-4BT | 46P3155 |
| | Base cover assembly for 2673 Korea • 2673-42K | 46P3159 |
| | Base cover assembly for 2673 Korea IBM Wireless Mini-PCI • 2673-4BK | 46P3160 |
| | Base cover assembly for 2673 China • 2673-42C | 46P3164 |
| Base cover assembly for 2673 China IBM Wireless Mini-PCI • 2673-4BC | 46P3165 | |
| 10 | Speaker assembly | 27L6748 |

(continued)

Parts list

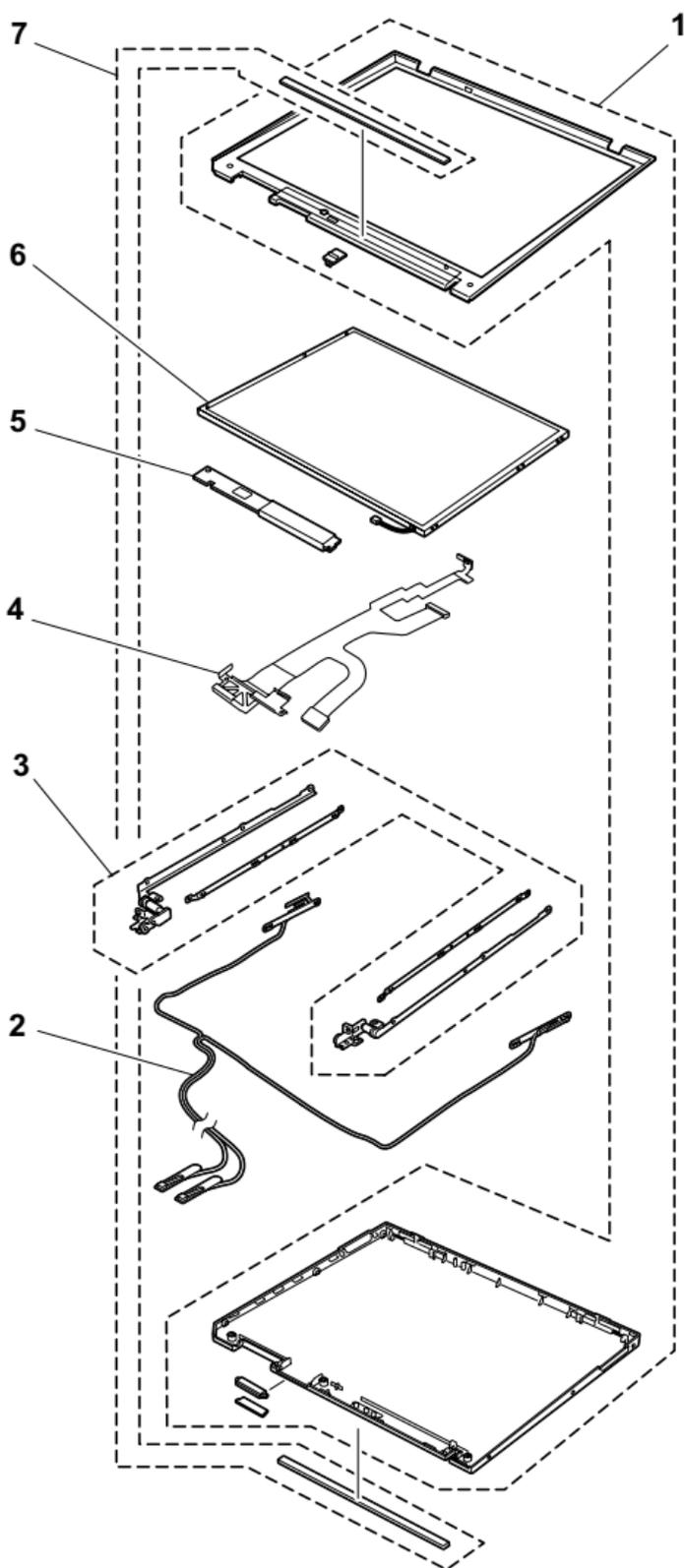
| No. | FRU | P/N |
|-----|--|----------|
| 11 | Ultrabay Plus CD-ROM drive, TEAC OP • 2672-7MT | 27L3436* |
| | Ultrabay Plus DVD drive, MKE OP • 2672-4QT, 3KC, 4NC, 4PC, 4QC, 4RC, 4SC, 4TC, 4VC, 4WC, 4VT | 27L4351* |
| | for optional Ultrabay devices, see "Optional FRUs" on page 130. | |
| 12 | ThinkPad X3 UltraBase OP • 2672-3KC, 4NC, 4PC, 4QC, 4QT, 4RC, 4SC, 4TC, 4VC, 4WC, 4VT, 7MT | 46L4865* |
| — | Security screw • 2672-3KC, 4NC, 4PC, 4QC, 4QT, 4RC, 4SC, 4TC, 4VC, 4WC, 4VT, 7MT | 62P4279* |
| 13 | Cover, DIMM slot | 27L6749* |
| 14 | Battery pack, Li-Ion (6 cell) PANASONIC OP • 2672-xxA, xxB, xxC, xxF, xxG, xxH, xxK, xxM, xxP, xxS, xxT, xxU | 08K8035* |
| | 2672-xxE, xxJ | 08K8039* |
| | Battery pack, Li-Ion (6 cell) SANYO OP • 2672-xxA, xxB, xxC, xxF, xxG, xxH, xxK, xxM, xxP, xxS, xxT, xxU, xxX | 08K8036* |
| | 2672-xxE, xxJ | 08K8040* |
| | for optional battery pack, see "Optional FRUs" on page 130. | |
| 15 | Backup battery | 02K7078* |
| 16 | IR and 1394 sub card assembly • 2672-11x, 12x, 31x, 32x, 33x, 36x, 3Kx, 41x, 42x, 43x, 45x, 46x, 4Nx, 4Px, 4Qx, 54x, 64x, 7Mx • 2673-42x | 26P8215 |
| 17 | PC card slot | 27L6737 |
| 18 | IBM High Rate Wireless LAN Mini-PCI Adapter | |
| | • 2672-1Ax, 1Bx, 4Ax, 4Bx, 4Cx, 4Ex, 4Gx, 4Hx, 4Jx, 4Rx, 4Sx, 4Tx, 4Vx, 4Wx, 5Dx, 6Dx • 2673-4Bx | 26P8437 |
| | | 26P8442 |
| | • 2672-4BC, 4RC, 4SC, 4TC, 4VC, 4WC • 2673-4BC | 26P8313 |
| | Cisco Aironet Wireless 802.11b Mini-PCI by IBM | |
| | • 2672-4XU, 4XF, 4XH, 4XA, 4XB, 4XM | 26P8365 |
| | • 2672-4XG, 4YG | 26P8367 |
| | • 2672-4XJ, 4XE | 26P8369 |
| | • 2672-4XC | 26P8371 |

(continued)

| No. | FRU | P/N |
|-----|--|----------|
| 19 | Bluetooth antenna and hinge cover assembly • 2672-4Gx, 4Hx, 4Jx, 4Vx, 4Wx | 46P2960 |
| 20 | Keyboard* (see "Keyboard" on page 126.) | |
| 21 | Pointing stick cap | 26P9212* |
| 22 | CompactFlash socket | 46P3172* |
| — | External diskette drive via USB, TEAC OP • 2672-4QT, 32T, 33T, 36T, 7MT, 43T, 45T, 4ET, 4HT. 4JT, 41J, 4AJ, 11J, 12J, 1AJ, 1BJ, 45J, 4EJ, 43K, 4CK, 4HK, 4JK, 45K, 4EK, 31A, 32A, 41A, 45A, 4AA, 4BA. 4EA, 4GA, 4HA, 3KC, 4NC, 4PC, 4QC, 4RC, 4SC, 4TC, 4VC, 4WC | 22P7066* |
| | External diskette drive via USB, SONY OP • 2672-4QT, 32T, 33T, 36T, 7MT, 43T, 45T, 4ET, 4HT. 4JT, 41J, 4AJ, 11J, 12J, 1AJ, 1BJ, 45J, 4EJ, 43K, 4CK, 4HK, 4JK, 45K, 4EK, 31A, 32A, 41A, 45A, 4AA, 4BA. 4EA, 4GA, 4HA, 3KC, 4NC, 4PC, 4QC, 4RC, 4SC, 4TC, 4VC, 4WC | 06P5223* |
| | for optional diskette drive, see "Optional FRUs" on page 130. | |
| — | Telephone cable | 27L0700* |
| — | Thermal grease | 46L4855 |
| — | AC adapter OP | |
| | 2-pin (56 W), DELTA (models xxE, xxF, xxJ, xxP, xxS, xxU, xxX) | 02K6814* |
| | 2-pin (56 W), LITEON (models xxE, xxF, xxJ, xxP, xxS, xxU, xxX) | 02K6816* |
| | 3-pin (56 W), DELTA (models xxA, xxB, xxC, xxG, xxH, xxK, xxM, xxT) | 02K6813* |
| | 3-pin (56 W), LITEON (models xxA, xxB, xxC, xxG, xxH, xxK, xxM, xxT) | 02K6815* |
| | for optional AC adapters, see "Optional FRUs" on page 130. | |
| — | Recovery CD (see "Recovery CDs" on page 127.) | |

LCD FRUs

12.1-in. XGA TFT



| No. | FRU | P/N |
|-----|---|---------|
| 1 | LCD cover kit 12.1-in. • 2672-11x, 12x, 54x, 31x, 32x, 33x, 36x, 7Mx, 3Kx, 41x, 42x, 43x, 45x, 46x, 4Nx, 4Px, 4Qx, 64x (except xxK) • 2673-42U, 42F, 42P, 42S, 42X, 42T, 42G, 42J, 42A, 42C, 42H, 42B, 42A, 42E, 42M | 27L6740 |
| | LCD cover kit 12.1-in. (Korea) • 2672-32K, 33K, 42K, 43K, 45K • 2673-42K | 27L6742 |
| | LCD cover kit 12.1-in. with antenna • 2672-1Ax, 1Bx, 5Dx, 4Ax, 4Bx, 4Cx, 4Ex, 4Rx, 4Sx, 4Tx, 4Yx, 4Xx, 6Dx, 4Gx, 4Hx, 4Jx, 4Vx, 4Wx (except xxK) • 2673-4BU, 4BF, 4BP, 4BS, 4BX, 4BT, 4BG, 4BJ, 4BA, 4BC, 4BH, 4BB, 4BA, 4BE, 4BM | 27L6741 |
| | LCD cover kit 12.1-in. with antenna (Korea) • 2672-4BK, 4CK, 4EK, 4HK, 4JK • 2673-4BK | 27L6743 |
| 2 | Antenna assembly • 2672-1Ax, 1Bx, 5Dx, 4Ax, 4Bx, 4Cx, 4Ex, 4Rx, 4Sx, 4Tx, 4Yx, 4Xx, 6Dx, 4Gx, 4Hx, 4Jx, 4Vx, 4Wx • 2673-4BU, 4BF, 4BP, 4BS, 4BX, 4BT, 4BG, 4BJ, 4BA, 4BC, 4BH, 4BB, 4BK, 4BE, 4BM | 27L6745 |
| 3 | Hinge assembly | 27L6744 |
| 4 | LCD cable assembly 12.1 XGA | 27L0698 |
| 5 | Inverter card (AMBIT) | 26P8216 |
| 6 | LCD panel, 12.1 XGA (LG) | 11P8224 |
| | LCD panel, 12.1 XGA (DBU) | 11P8225 |
| 7 | Clear plate | 46P3171 |

Keyboard

| Language | P/N |
|-------------------------|----------|
| Arabic | 02K6162* |
| Belgian | 02K6157* |
| Chinese, Traditional | 02K6159* |
| Czech | 02K6163* |
| Danish | 02K6150* |
| Dutch | 02K6147* |
| English, U.K. | 02K6141* |
| English, U.S. | 02K6139* |
| French, Canadian | 02K6144* |
| French, European | 02K6146* |
| German | 02K6145* |
| Greek | 02K6165* |
| Hungarian | 02K6164* |
| Hebrew | 02K6161* |
| Italian | 02K6151* |
| Japanese | 02K6140* |
| Korean | 02K6156* |
| Norwegian | 02K6149* |
| Polish | 02K6167* |
| Portuguese | 02K6154* |
| Russian | 02K6160* |
| Slovak | 02K6166* |
| Slovenian | 02K6168* |
| Spanish, European | 02K6155* |
| Spanish, Latin American | 02K6152* |
| Swedish or Finnish | 02K6148* |
| Swiss | 02K6153* |
| Turkish | 02K6158* |

Recovery CDs

For Windows 2000

Windows 2000 is preinstalled as the operating system in following models:

- 2672-x1x, xAx, xGx, xNx, xRx, and xUx

| Language | P/N |
|---|----------|
| Arabic | 01R5493* |
| Chinese, Simplified | 67P4609* |
| Chinese, Traditional | 67P4606* |
| Chinese, Traditional (Hong Kong S.A.R.) | 67P4612* |
| Czech | 01R5494* |
| Danish | 01R5484* |
| Dutch | 01R5491* |
| English, U.K. | 01R5482* |
| English, U.S. | 01R5481* |
| Finnish | 01R5490* |
| French, European | 01R5485* |
| German | 01R5486* |
| Greek | 01R5498* |
| Hebrew | 01R5495* |
| Hungarian | 01R5499* |
| Italian | 01R5489* |
| Japanese | 62P8898* |
| Norwegian | 01R5492* |
| Polish | 01R5496* |
| Portuguese | 01R5483* |
| Russian | 01R5500* |
| Spanish, European | 01R5487* |
| Swedish | 01R5488* |
| Turkish | 01R5497* |

For Windows XP professional

Windows XP professional is preinstalled as the operating system in following models:

- 2672-x2x, x5x, x6x, xBx, xEx, xHx, xPx, xSx, xVx and xXx
- 2673-x2x, and xBx

| Language | P/N |
|---|----------|
| Arabic | 01R5553* |
| Chinese, Simplified | 67P4611* |
| Chinese, Traditional | 67P4608* |
| Chinese, Traditional (Hong Kong S.A.R.) | 67P4614* |
| Czech | 01R5554* |
| Danish | 01R5544* |
| Dutch | 01R5551* |
| English, U.K. | 01R5542* |
| English, U.S. | 01R5541* |
| Finnish | 01R5550* |
| French, European | 01R5545* |
| German | 01R5546* |
| Greek | 01R5558* |
| Hebrew | 01R5555* |
| Hungarian | 01R5559* |
| Italian | 01R5549* |
| Japanese | 62P8901* |
| Norwegian | 01R5552* |
| Polish | 01R5556* |
| Portuguese | 01R5543* |
| Russian | 01R5560* |
| Spanish, European | 01R5547* |
| Swedish | 01R5548* |
| Turkish | 01R5557* |

For Windows XP Home Edition

Windows XP Home edition is preinstalled as the operating system in following models:

- 2672-x3x, xCx, xJx, xKx, xMx, xTx, xQx, and xWx

| Language | P/N |
|---|----------|
| Chinese, Simplified | 67P4610* |
| Chinese, Traditional | 67P4607* |
| Chinese, Traditional (Hong Kong S.A.R.) | 67P4613* |
| English, AP | 01R5601* |

Miscellaneous parts

| FRU | P/N |
|---|---------|
| Screw kit (including nylon-coated screws): <ul style="list-style-type: none"> • M2 x 4 mm, flat head (30) • M2 x 3 mm, flat head (25) • M2.5 x 4.8 mm, flat head (15) • M2 x 13.5 mm, pan head (10) • M2 x 9.5 mm, flat head (20) • M2 x 6 mm, flat head (20) • M3 x 2.8 mm, flat head (25) • M2 x 14 pan head with washer (5) • HDD M3 x 4 (10) • Hex stud, D-sub (10) • Screw caps (painted) • Screw caps (not painted) | 27L6751 |
| Base miscellaneous parts: <ul style="list-style-type: none"> • Lid, docking (front) • Lid, docking (rear) • Spring, docking lid • Rubber foot • 5th rubber foot • EMI plate, docking • Holder, docking • Latch, battery lock • Holder, battery lock • Spring, battery lock • EMI finger, front • Fan spacer • IR/1394 cover • Screw caps | 27L6735 |
| System miscellaneous parts: <ul style="list-style-type: none"> • (a) Cable, RJ11 to system board docking • (b) Cable guide • (c) Keyboard CRU insulator • (d) Hard-disk holder • (e) PC Card guide • (h) Hinge cover • Easy button cover • (f) Retainer, audio connector • Screw caps <p>Note: Italicized letters in parentheses are references to the exploded view on page 118.</p> | 27L6739 |
| System board miscellaneous parts: <ul style="list-style-type: none"> • I/O plate | 27L6736 |

Optional FRUs

Ultrabay devices

| FRU | P/N |
|--|----------|
| Diskette drive (TEAC) | 08K9606* |
| Diskette drive (SONY) | 08K9607* |
| DVD/CD-RW combo drive (HLDS) | 08K9820* |
| SuperDisk drive (LS240) | 08K9615* |
| ZIP-250 drive | 22P9115* |
| 2nd HDD adapter | 08K6067* |
| Ultrabay 2000 battery, Li-Ion (SANYO) • for models xxA, xxB, xxC, xxF, xxG, xxH, xxK, xxM, xxP, xxS, xxT, xxU, xxX | 02K6817* |
| Ultrabay 2000 battery, Li-Ion (SANYO) • for models xxE, xxJ | 02K6818* |
| Ultrabay Plus device carrier | 26P9388* |
| Ultrabay Plus numeric keypad | 19K2056* |
| Ultrabay Plus cradle for WorkPad c500 series | 26P9389* |

Other optional FRUs

| FRU | P/N |
|--|----------|
| 64-MB SDRAM SO DIMM (PC133) | 19K4651* |
| 512-MB SDRAM SO DIMM (PC133) | 19K4657* |
| Hard-disk drive (40 GB) 9.5 mm 5400 rpm, IBM STD | 27L4384* |
| Hard-disk drive (60 GB) 12.5 mm 4200 rpm, IBM STD | 08K9700* |
| Hard-disk drive (60 GB) 9.5 mm 4200 rpm, HITACHI | 08K9833* |
| AC adapter 2-pin (72 W), ASTEC • for models models xxE, xxF, xxJ, xxP, xxS, xxU, xxX | 02K6756* |
| AC adapter 2-pin (72 W), DELTA • for models models xxE, xxF, xxJ, xxP, xxS, xxU, xxX | 02K6753* |
| AC adapter 2-pin (72 W), SANKEN • for models models xxE, xxF, xxJ, xxP, xxS, xxU, xxX | 02K6757* |
| AC adapter 3-pin (72W), ASTEC • for models models xxA, xxB, xxC, xxG, xxH, xxK, xxM, xxT | 02K6751* |
| AC adapter 3-pin (72W), DELTA • for models models xxA, xxB, xxC, xxG, xxH, xxK, xxM, xxT | 02K6754* |

(continued)

| FRU | P/N |
|--|----------|
| Extended life battery pack (6 cell) SANYO • for models xxA, xxB, xxC, xxF, xxG, xxH, xxK, xxM, xxP, xxS, xxT, xxU, xxX | 02K7043* |
| Extended life battery pack (6 cell) SANYO • for models xxE, xxJ | 02K7046* |
| UltraPort camera | 02K5153* |
| UltraPort adapter and connector cover | 08K6105* |
| USB cable attachment | 08K6108* |
| USB cable | 27L0542* |
| Bluetooth UltraPort module | 09N9813* |
| ThinkPad Dock with extension plate | 08N1537* |
| PCI cover | 08N7317* |
| Top cover and screw kit for ThinkPad Dock | 12P4143* |
| ThinkPad Port Replicator | 08N1536* |
| Multiple battery charger | 02K6642* |

Common parts list

Tools

| | |
|---|---------|
| Triconnector wrap plug | 72X8546 |
| PC test card | 35G4703 |
| Audio wrap cable | 66G5180 |
| USB parallel test cable | 05K2580 |
| Screwdriver kit | 95F3598 |
| Torque screwdriver | 05K4695 |
| 5 mm socket wrench | 05K4694 |
| Screwdriver | 27L8126 |
| ThinkPad hardware maintenance diskette version 1.62 Note: Download the file from the following Web site: http://www.ibm.com/pc/partner/infotips | — |

Power cords (system)

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

For 2-pin power cords:

| Region | P/N |
|--------------|----------|
| Canada, U.S. | 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 S.A.R.) | 02K0539* |
| Switzerland | 76H3528* |

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