



**IBM Mobile Systems  
ThinkPad Computer  
Hardware Maintenance Manual**

**May 2003**

**This manual supports:**

**ThinkPad X30, X31**

**(MT 2672/2673/2884/2885/2890/2891)**

**ThinkPad Dock (MT 2631)**

**ThinkPad Dock II (MT 2877)**

**Note**

Before using this information and the product it supports, be sure to read the general information under “Notices” on page 173.

**Third Edition (May 2003)**

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## About this manual

This manual contains service and reference information for IBM ThinkPad X30, X31 (MT 2672, 2673, 2884, 2885, 2890, 2891), ThinkPad Dock (MT 2631), and ThinkPad Dock II (MT 2877) 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 4, “Safety information” on page 16, and “Laser compliance statement” on page 21.



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## Introduction

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### 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.

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## **Diskette compatibility matrix**

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

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

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## **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, Hebrew, 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.

לפני הפעלת המחשב לאחר החלפת FRU יש לוודא שכל הברגים, הקפיצים, וחלקים קטנים אחרים נמצאים במקומם ואינם חופשיים לזוז בתוך המחשב. כדי לוודא זאת, יש לטלטל את המחשב ולהקשיב לגילוי קולות שקשוק. חלקי או שבבי מתכת עלולים לגרום לקצרים חשמליים.

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)

סוללות המתנה מסוימות מכילות כמות קטנה של ניקל וקדמיום. אין לפרק סוללת המתנה, לטעון אותה מחדש, להשליך אותה לאש או למים או לקצר אותה. יש לסלק את הסוללה כנדרש על ידי התקנות והחוקים המקומיים. יש להשתמש רק בסוללה המופיעה ברשימת החלקים המתאימה. שימוש בסוללה לא מתאימה עלול לגרום להצתה או התפוצצות של הסוללה.

**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.

מארז הסוללה מכיל כמות קטנה של ניקל וקדמיום. אין לפרק את מארז הסוללה, להשליך אותו לאש או למים או לקצר אותו. יש לסלק את מארז הסוללה הסוללה כנדרש על ידי התקנות והחוקים המקומיים. יש להשתמש רק בסוללה המופיעה ברשימת החלקים המתאימה בזמן החלפת מארז הסוללה. שימוש בסוללה לא מתאימה עלול לגרום להצתה או התפוצצות של הסוללה.

(continued)

(continuation of safety notice 3)

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

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

**Safety notice 4**



The lithium battery can cause a fire, 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.

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.

(continued)

(continuation of safety notice 4)

סוללת הליתיום עלולה לגרום לשריפה, להתפוצצות או לכוויות קשות. אין לטעון אותה מחדש, לסלק את המחבר המקוטב שלה, לפרק אותה או לחמם אותה לטמפרטורה העולה על 100 מעלות צלזיוס. אין לשרוף את הסוללה ואין לחשוף את תוכן התא למים. יש לסלק את הסוללה כנדרש בתקנות ובחוקים המקומיים. יש להשתמש רק בסוללה המופיעה ברשימת החלקים המתאימים. שימוש בסוללה אחרת עלול לגרום לסכנת שריפה או התפוצצות.

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

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

## Safety notice 5

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

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

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

אם מסך הגביש הנוזלי (LCD) נשבר והנוזל מתוך המסך בא במגע עם עיניכם או ידיכם, שטפו את האזורים הנגועים מיד במים במשך 15 דקות לפחות. פנו לקבלת עזרה רפואית אם תסמינים הנובעים מהמגע עם הנוזל נמשכים לאחר השטיפה.

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.**

**כדי למנוע התחשמלות, אין להסיר את מכסה הפלסטיק המגן על חלקו התחתון של הכרטיס ההפוך.**

**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.**

**אף שהסוללות הראשיות הן בעלות מתח נמוך, סוללה מקוצרת או מוארקת עלולה להפיק זרם מספיק לגרימת כוויות או להצתת חומרים דליקים.**

**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.**

**לפני סילוק FRU כלשהו, יש לכבות את המחשב, לנתק את כל כבלי החשמל משקעי החשמל, להוציא את מארז הסוללה, ואז לנתק כבלי חיבור אחרים אם יש כאלה.**

**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.

- 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.

### *Safety information*

- When using testers, set the controls correctly and use the approved probe leads and accessories for that tester.
- Stand on suitable rubber mats (obtained locally, if necessary) to insulate you from grounds such as metal floor strips and machine frames.

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

- Regularly inspect and maintain your electrical hand tools for safe operational condition.
- Do not use worn or broken tools and testers.
- *Never assume* that power has been disconnected from a circuit. First, *check* that it has been powered off.
- Always look carefully for possible hazards in your work area. Examples of these hazards are moist floors, nongrounded power extension cables, power surges, and missing safety grounds.
- Do not touch live electrical circuits with the reflective surface of a plastic dental mirror. The surface is conductive; such touching can cause personal injury and machine damage.
- Do not service the following parts *with the power on* when they are removed from their normal operating places in a machine:
  - Power supply units
  - Pumps
  - Blowers and fans
  - Motor generators

and similar units. (This practice ensures correct grounding of the units.)

- If an electrical accident occurs:
  - Use caution; do not become a victim yourself.
  - Switch off power.
  - Send another person to get medical aid.

## **Safety inspection guide**

The purpose of this inspection guide is to assist you in identifying potentially unsafe conditions. As each machine was designed and built, required safety items were installed to protect users and service personnel from injury. This guide addresses only those items. You should use good judgment to identify potential safety hazards due to attachment of non-IBM features or options not covered by this inspection guide.

If any unsafe conditions are present, you must determine how serious the apparent hazard could be and whether you can continue without first correcting the problem.

Consider these conditions and the safety hazards they present:

- Electrical hazards, especially primary power (primary voltage on the frame can cause serious or fatal electrical shock)
- Explosive hazards, such as a damaged CRT face or a bulging capacitor
- Mechanical hazards, such as loose or missing hardware

To determine whether there are any potentially unsafe conditions, use the following checklist at the beginning of every service task. Begin the checks with the power off, and the power cord disconnected.

Checklist:

1. Check exterior covers for damage (loose, broken, or sharp edges).
2. Power-off the computer. Disconnect the power cord.
3. Check the power cord for:
  - a. A third-wire ground connector in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and frame ground.
  - b. The power cord should be the type specified in the parts list.
  - c. Insulation must not be frayed or worn.
4. Remove the cover.
5. Check for any obvious non-IBM alterations. Use good judgment as to the safety of any non-IBM alterations.
6. Check inside the unit for any obvious unsafe conditions, such as metal filings, contamination, water or other liquids, or signs of fire or smoke damage.
7. Check for worn, frayed, or pinched cables.
8. Check that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

## **Handling 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

### *Safety information*

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.

*Laser compliance statement*

When a CD-ROM drive, DVD drive or the other laser product is installed, note the following:

 **CAUTION:**

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

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

凡未在这里指明的任何控制用法、调整、行为，都会导致严重后果。

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

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

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

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

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

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

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

Opening the CD-ROM drive, DVD-ROM drive or the other optical storage device could result in exposure to hazardous laser radiation. There are no serviceable parts inside those drives. **Do not open.**

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

**⚠ DANGER**

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

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

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

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

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

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

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

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

**Keď je laserová jednotka otvorená. Vyhnite sa priamemu pohľadu a nehladte 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.**



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## General descriptions

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

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### 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 (for X30 series)”
- “Recovering the hard disk to original contents (for X31 series)” on page 30
- “Passwords” on page 32
- “Power management” on page 35

## 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 (for X30 series)

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 163

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

### *Related service information*

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.
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 30.)

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.

## 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.
  - 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.

#### *Related service information*

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.

## **Recovering the hard disk to original contents (for X31 series)**

### **Recovering the hard disk using Access IBM Predesktop Area**

Hard disk of ThinkPad computer you are servicing has a hidden, protected area for backups. Contained within this area is a complete backup of the hard disk as it was shipped from the factory and a program called the Access IBM Predesktop Area.

You can use the Access IBM Predesktop Area to restore the contents of the hard disk to an earlier state using any of the backup images stored in the protected area. Access IBM Predesktop Area runs independently of the Windows operating system. Therefore, you can start it by pressing the blue Access IBM button when prompted during startup.

After the Access IBM Predesktop Area opens you can perform a recovery operation, even if you are unable to start Windows.

To recover the hard disk to its original contents, do the following:

#### **Note**

The recovery process might take up to 2 hours.

**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.

**Note:** You might need to use a diskette drive in the recovery process. Use a drive that is compatible with the ThinkPad computer you are servicing.

1. If possible, save all the files and shut down the operating system.
2. Turn off the computer.
3. Turn on the computer. Watch the display carefully. When the following message is displayed, press the

blue Access IBM button to open the Access IBM Predesktop Area: "To interrupt normal startup, press the blue Access IBM button."

4. Double-click **Recover to factory contents**.
5. Follow the instructions on the screen.
6. When the recovery process finishes, the computer will restart with the pre-installed operating system, drivers, and software.

## Recovering the hard disk using the recovery CD

### Ordering the recovery CD

When the hard-disk drive is replaced because of a failure, no Access IBM Predesktop Area is on the new hard disk. In this case, you must use the 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 163

To create the service partition and install the factory contents 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. For the proper removal of the Hidden Protected Area (HPA), refer to the white paper at <http://www.pc.ibm.com/qtechinfo/AIBM-TOOLS.html>
3. Boot with the recovery CD (and the boot diskette if required.)
4. Following message is displayed: "**Your computer originally included a Product Recovery program ... Reinstall the Product Recovery program? (Y/N) [ J ]**".

**Note:** If the hard-disk drive contains any partitions, you do not receive this message; go to step 1.

5. 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.

6. 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.

### *Related service information*

- 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:**

7. Boot with the recovery CD (and the boot diskette if required.)
8. 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.
  - To preload the hard-disk drive without installing the service partition, press N key.
9. If you get a message asking which operating system to install, select the proper operating system and press Enter.
10. A message is displayed: **“Full Recovery:”**. Press Enter to select.
11. On each of the next three windows, press the Y key.
12. Follow the prompts to complete the recovery.

## **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 71.

3. Remove the backup battery.

For how to remove the backup battery, see "1050 Backup battery" on page 76.

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:*

#### **For X30 series:**

1. Turn on the computer, and press F1 when three messages (F1, F11, and F12) appear on the screen.
2. Enter the SVP. The IBM BIOS Setup Utility menu appears.

#### *Related service information*

3. Select **Password**, using the cursor keys to move down the menu.
4. Select **Power-On Password**.
5. At the Enter Current Password field, enter the SVP.
6. When the Enter New Password field opens, leave it blank and press Enter twice.
7. In the Changes have been saved window, press Enter.
8. Press F10; then, in the Setup confirmation window, select **Yes** .

#### **For X31 series:**

1. Turn on the computer; then, while the "To interrupt normal startup, press the blue Access IBM button" message is displayed at the lower-left of the screen, press the Access IBM button.
2. Enter the SVP. Select **Start setup utility**.
3. Select **Security**, using the cursor keys to move down the menu.
4. Select **Password**.
5. Select **Power-On Password**.
6. At the Enter Current Password field, enter the SVP.
7. When the Enter New Password field opens, leave it blank and press Enter twice.
8. In the Changes have been saved window, press Enter.
9. 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:

#### **For X30 series:**

1. Turn on the computer, and press F1 when three messages (F1, F11, and F12) appear on the screen.
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.

**For X31 series:**

1. Turn on the computer; then, while the “To interrupt normal startup, press the blue Access IBM button” message is displayed at the lower-left of the screen, press the Access IBM button.
2. Enter the SVP. Select **Start setup utility**.
3. Select **Security**, using the cursor keys to move down the menu.
4. Select **Password**.
5. Select **Hard-disk x password**, where x is the letter of the hard-disk drive. A pop-up window opens.
6. Select **Master HDP**.
7. Enter the master HDP; then leave the New Password field blank and press Enter twice.
8. Press F10.
9. 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.

### **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.
- 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.



**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

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<sup>®</sup> 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 47.

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 device, install it in the Ultrabay Plus slot of the computer.

### Creating the PC-Doctor diagnostics diskette

In X31 series, the PC-Doctor disk can be created by using the Access IBM Predesktop Area.

To create the PC-Doctor disk from the Access IBM Predesktop Area, do as follows:

1. Enter the IBM Predesktop application by pressing the Access IBM button during POST.
2. When the Access IBM application finishes loading, double-click the "Create Diagnostic Diskettes" icon.
3. It will take about 15 seconds to authenticate the digital signature, and then the ThinkPad computer will reboot into PC-DOS.
4. A batch file will automatically start up to prompt the user through creating the boot diskettes. The user will be informed how many diskettes will be needed.
  - a. The user will be prompted to insert each diskette in sequence.
  - b. Typically, the user only needs to press the Enter key for the proper floppy drive to format and create the diskette.
  - c. Each diskette will be erased and formatted with the PC-Doctor DOS boot image.
5. Once all the diskettes have been created, the ThinkPad computer will reboot. The user is asked to remove all diskettes from the drive, or to insert the first diskette created if it is desired to run the diagnostics.

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 42, and check the power sources.

If an error code appears, go to "Symptom-to-FRU index" on page 59.

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

2. The main panel of PC-Doctor appears.

*Checkout guide*

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

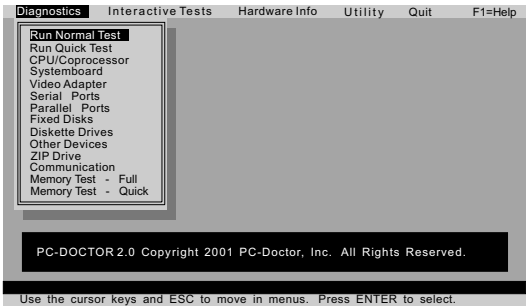
A pull-down menu appears. (Its exact form depends on the model.)

The options on the test menu are as follows:

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

**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.
- **LS-120/240 Drive** test is only for X30.



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

To cancel the test, press Esc.

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

## Detecting system information with PC-Doctor

PC-Doctor can detect the following system information:

### Hardware Info

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

### Utility

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

## Power system checkout

To verify a symptom, do the following:

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

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

- “Checking the ac adapter”
- “Checking operational charging” on page 43
- “Checking the battery pack” on page 43
- “Checking the backup battery” on page 44

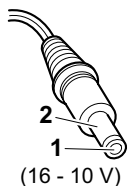
### Checking the ac adapter

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 47.

**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

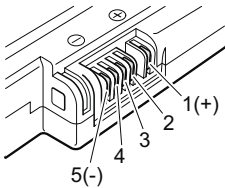
Battery charging does not start until the Power Meter shows that less than 95% of the total power remains; under this condition the battery pack can charge to 100% of its capacity. This protects the battery pack from being overcharged or from having a shortened life.

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.

### Checkout guide

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

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

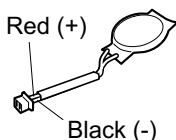
4. If the voltage is more than +11.0 V dc, measure the resistance between battery terminals 4 and 5. The resistance must be 4 to 30 K  $\Omega$ .

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

## Checking the backup battery

Do the following:

1. Power off the computer, and unplug the ac adapter from it.
2. Turn the computer upside down.
3. Remove the battery pack (see "1010 Battery pack" on page 71).
4. Remove the backup battery (see "Checking the battery pack" on page 43).
5. 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.



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# ThinkPad X30, X31

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## Product overview

This section presents the following product-unique information:

- “Specifications”
- “Status indicators for X30” on page 50
- “FRU tests” on page 55
- “Fn key combinations” on page 56

## Specifications

Feature	Description
Processor	<p><b>X30 series</b></p> <ul style="list-style-type: none"> <li>• Mobile Intel® Pentium® III processor 1.06 GHz - M, L2 512 KB cache</li> <li>• Mobile Intel® Pentium® III processor 1.2 GHz - M, L2 512 KB cache</li> </ul> <p><b>X31 series</b></p> <ul style="list-style-type: none"> <li>• Intel® Pentium® M processor 1.3 GHz, L2 512 KB cache</li> <li>• Intel® Pentium® M processor 1.4 GHz, L2 512 KB cache</li> </ul>
Memory (standard)	<p><b>X30 series</b></p> <ul style="list-style-type: none"> <li>• 128 MB SDRAM SO DIMM (PC133) card × 1</li> <li>• 256 MB SDRAM SO DIMM (PC133) card × 1</li> </ul> <p><b>X31 series</b></p> <ul style="list-style-type: none"> <li>• 256 MB DDR SDRAM SO DIMM (PC2100) card × 1</li> <li>• 512 MB DDR SDRAM SO DIMM (PC2100) card × 1</li> </ul>
Memory (optional)	<p><b>X30 series</b></p> <ul style="list-style-type: none"> <li>• 64 MB SDRAM SO DIMM (PC133) card</li> <li>• 128 MB SDRAM SO DIMM (PC133) card</li> <li>• 256 MB SDRAM SO DIMM (PC133) card</li> <li>• 512 MB SDRAM SO DIMM (PC133) card</li> </ul> <p><b>X31 series</b></p> <ul style="list-style-type: none"> <li>• 128 MB DDR SDRAM SO DIMM (PC2100) card</li> <li>• 256 MB DDR SDRAM SO DIMM (PC2100) card</li> <li>• 512 MB DDR SDRAM SO DIMM (PC2100) card</li> </ul> <p>(maximum of 1024 MB)</p>

(continued)

Product overview

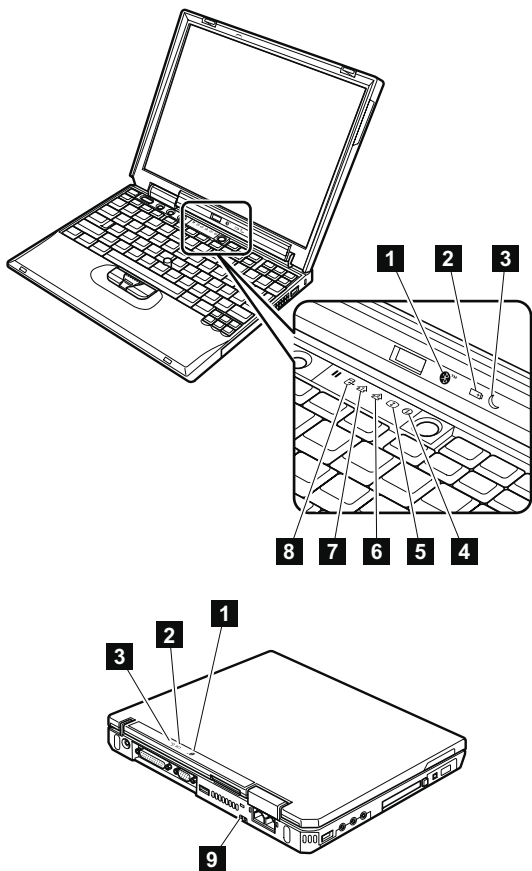
Feature	Description
Bus architecture	<ul style="list-style-type: none"> <li>• HUB link</li> <li>• PCI bus</li> <li>• LPC bus</li> </ul>
Graphic memory	<p><b>X30 series</b> MAX 32 MB DVMT (Dynamic Video Memory Technology)</p> <p><b>X31 series</b> 16 MB Local Video Memory</p>
CMOS RAM	<ul style="list-style-type: none"> <li>• 242 bytes</li> </ul>
Hard-disk drive	<ul style="list-style-type: none"> <li>• 20.0 GB, 2.5-inch, IDE interface</li> <li>• 40.0 GB, 2.5-inch, IDE interface</li> </ul>
Display	<ul style="list-style-type: none"> <li>• 12.1-inch, 16M colors, XGA (1024 × 768 resolution) TFT color LCD</li> </ul>
I/O port (system)	<ul style="list-style-type: none"> <li>• External monitor connector</li> <li>• RJ11</li> <li>• RJ45</li> <li>• Parallel connector</li> <li>• Stereo headphone jack</li> <li>• Monaural microphone jack</li> <li>• Stereo line-in jack</li> <li>• Universal serial bus (USB) connector × 2</li> <li>• Infrared port</li> <li>• Docking connector</li> <li>• DC-in</li> <li>• IEEE 1394 connector</li> </ul>
I/O port (UltraBase)	<ul style="list-style-type: none"> <li>• External monitor connector</li> <li>• RJ11</li> <li>• RJ45</li> <li>• Parallel connector</li> <li>• Serial connector</li> <li>• Keyboard or mouse connector</li> <li>• Universal serial bus (USB) connector</li> <li>• DC-in</li> </ul>
Internal modem	<ul style="list-style-type: none"> <li>• 56.6 Kbps</li> </ul>
Audio	<ul style="list-style-type: none"> <li>• Internal monaural speaker</li> <li>• Software control volume</li> </ul>
Infrared transfer	<ul style="list-style-type: none"> <li>• IrDA 1.1</li> </ul>
Mini PCI adapter	<ul style="list-style-type: none"> <li>• IBM High Rate Wireless LAN Mini-PCI Adapter with Modem II (some models)</li> <li>• Cisco Aironet Wireless 802.11b Mini PCI by IBM (some models)</li> <li>• IBM High Rate Wireless LAN Mini PCI Adapter III (some models)</li> <li>• IBM Dual-Band 11a/b Wi-Fi Wireless Mini PCI Adapter (some models)</li> <li>• Intel® PRO/Wireless LAN 2100 3B Mini PCI Adapter (some models)</li> </ul>


(continued)

<b>Feature</b>	<b>Description</b>
PC Card	<ul style="list-style-type: none"> <li>• One Type-II</li> </ul>
CompactFlash card	<ul style="list-style-type: none"> <li>• One Type-II</li> </ul>
Ultrabay device	Ultrabay Plus (supported by UltraBase X3)
Diskette drive (external)	<ul style="list-style-type: none"> <li>• 1.44 MB (3-mode), 3.5-inch diskette drive</li> </ul>
Communication daughter card (CDC)	<ul style="list-style-type: none"> <li>• V.90 modem daughter card (MDC) (some models)</li> <li>• Bluetooth daughter card (BDC) (some models)</li> <li>• IBM Integrated Bluetooth with 56K Modem (BMDC) (some models)</li> </ul>
AC adapter	<ul style="list-style-type: none"> <li>• 56-watt type</li> </ul>
Battery pack (main)	<ul style="list-style-type: none"> <li>• 6-cell Li-Ion battery pack (4.4 AH)</li> </ul>
Preinstalled operating system	<ul style="list-style-type: none"> <li>• Windows 2000</li> <li>• Windows XP Professional</li> <li>• Windows XP Home edition</li> </ul>








## Status indicators for X30

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




Indicator	Meaning
<b>1</b> Bluetooth status 	<b>Green:</b> The Bluetooth is operational. This indicator is on when the Bluetooth is on and not in suspend mode.

(continued)

Indicator	Meaning
<p><b>2</b> Battery status</p> 	<p><b>Green:</b> The battery is in use and has enough power. The ac adapter has charged the battery completely.</p> <p><b>Blinking green:</b> The battery is being charged, but still has enough power to operate. (At regular intervals, the indicator light turns off briefly.)</p> <p><b>Orange:</b> The battery is being charged, but the battery power is still low.</p> <p><b>Blinking orange:</b> The battery needs to be charged. When the indicator starts blinking orange, the computer beeps three times.</p>
<p><b>3</b> Standby status</p> 	<p><b>Green:</b> The computer is in standby mode.</p> <p><b>Blinking green:</b> The computer is entering standby mode or hibernation mode, or is resuming normal operation.</p>
<p><b>4</b> Power on</p> 	<p><b>Green:</b> 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><b>5</b> Scroll lock</p> 	<p><b>Green:</b> 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><b>6</b> Caps lock</p> 	<p><b>Green:</b> Caps Lock mode is enabled. To enable or disable Caps Lock mode, press the Caps Lock key.</p>
<p><b>7</b> Num lock</p> 	<p><b>Green:</b> 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><b>8</b> Drive in use</p> 	<p><b>Green:</b> 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><b>Note:</b> Do not move the system while the Green drive in use light is on. Sudden physical shock could cause drive errors.</p>

(continued)

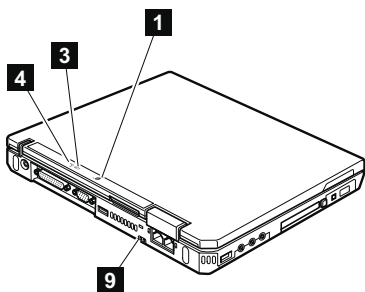
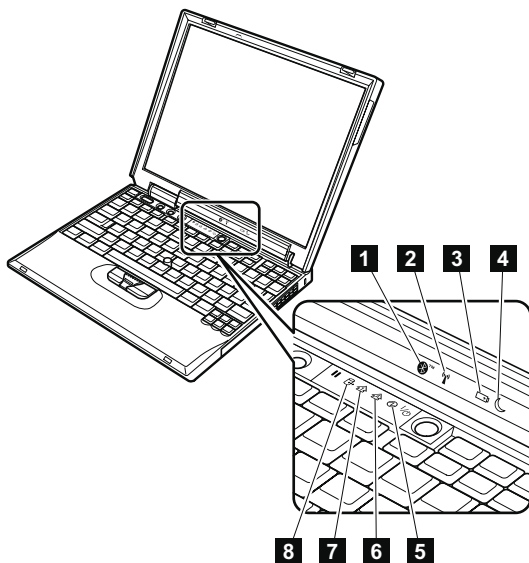
Product overview



Indicator	Meaning
<p data-bbox="101 231 256 291"><b>9</b> Ethernet status</p> 	<p data-bbox="301 231 913 332"><b>Green:</b> The computer connects to a LAN and a session with the network is available.</p> <p data-bbox="301 339 913 399"><b>Blinking yellow:</b> Data is being transmitted.</p>










## Status indicators for X31

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



Indicator	Meaning
<b>1</b> Bluetooth status 	<b>Green:</b> The Bluetooth is operational. This indicator is on when the Bluetooth is on and not in suspend mode.
<b>2</b> Wireless status 	<b>Green:</b> Wireless is operational and radio on state. This indicator is on when the data is transmitted.

(continued)

Indicator	Meaning
<p><b>3</b> Battery status</p> 	<p><b>Green:</b> The battery is in use and has enough power. The ac adapter has charged the battery completely.</p> <p><b>Blinking green:</b> The battery is being charged, but still has enough power to operate. (At regular intervals, the indicator light turns off briefly.)</p> <p><b>Orange:</b> The battery is being charged, but the battery power is still low.</p> <p><b>Blinking orange:</b> The battery needs to be charged. When the indicator starts blinking orange, the computer beeps three times.</p>
<p><b>4</b> Standby status</p> 	<p><b>Green:</b> The computer is in standby mode.</p> <p><b>Blinking green:</b> The computer is entering standby mode or hibernation mode, or is resuming normal operation.</p>
<p><b>5</b> Power on</p> 	<p><b>Green:</b> 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><b>6</b> Caps lock</p> 	<p><b>Green:</b> Caps Lock mode is enabled. To enable or disable Caps Lock mode, press the Caps Lock key.</p>
<p><b>7</b> Num lock</p> 	<p><b>Green:</b> 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><b>8</b> Drive in use</p> 	<p><b>Green:</b> 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><b>Note:</b> Do not move the system while the Green drive in use light is on. Sudden physical shock could cause drive errors.</p>
<p><b>9</b> Ethernet status</p> 	<p><b>Green:</b> The computer connects to a LAN and a session with the network is available.</p> <p><b>Blinking yellow:</b> Data is being transmitted.</p>

## FRU tests

The following table shows the test for each FRU.

FRU	Applicable test
System board	<ol style="list-style-type: none"> <li>1. <b>Diagnostics --&gt; CPU/Coprocessor</b></li> <li>2. <b>Diagnostics --&gt; Systemboard</b></li> </ol>
Power	<b>Diagnostics --&gt; Other Devices --&gt; IBM AC Adapter, IBM Battery 1 (IBM Battery 2)</b>
LCD unit	<ol style="list-style-type: none"> <li>1. <b>Diagnostics --&gt; Video Adapter</b></li> <li>2. <b>Interactive Tests --&gt; Video</b></li> </ol>
Modem, MDC or BMDC	<ol style="list-style-type: none"> <li>1. Make sure the modem is set up correctly.</li> <li>2. Replace the modem jack and the modem card in turn, and run the following test in <b>Diagnostics --&gt; Communication:</b> <ol style="list-style-type: none"> <li>a. Lucent Soft Modem Loopback</li> <li>b. Lucent Soft Modem Dialtone</li> </ol> </li> </ol>
Audio	<ol style="list-style-type: none"> <li>1. <b>Interactive Tests --&gt; Internal Speaker</b></li> <li>2. <b>Diagnostics --&gt; Other Devices --&gt; Analog Devices AC97 CODEC Test</b></li> </ol>
Speaker	<b>Interactive Tests --&gt; Internal Speaker</b>
PC Card slots	<b>Diagnostics --&gt; Systemboard --&gt; PCMCIA, PCMCIA External Loop</b>
Keyboard	<ol style="list-style-type: none"> <li>1. <b>Diagnostics --&gt; Systemboard --&gt; Keyboard</b></li> <li>2. <b>Interactive Tests --&gt; Keyboard</b></li> </ol>
TrackPoint or pointing device	<p>If the TrackPoint does not work, check the configuration in the ThinkPad Configuration program. If the TrackPoint is disabled, select <b>Enable</b> to enable it.</p> <p>After you use the TrackPoint, the pointer 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"> <li>• <b>Interactive Tests --&gt; Mouse</b></li> </ul>
Hard-disk drive	<b>Diagnostics --&gt; Fixed Disks</b>
Diskette drive	<ol style="list-style-type: none"> <li>1. <b>Diagnostics --&gt; Diskette Drives</b></li> <li>2. <b>Interactive Tests --&gt; Diskette</b></li> </ol>
CD-ROM or DVD drive	<ol style="list-style-type: none"> <li>1. <b>Diagnostics --&gt; Other Devices --&gt; CD-ROM/DVD</b></li> <li>2. <b>Interactive Tests --&gt; CD-ROM/DVD Test</b></li> </ol>

(continued)

FRU	Applicable test
Memory	<ol style="list-style-type: none"> <li>1. If two DIMMs are installed, remove one of them and run <b>Diagnostics --&gt; Memory Test - Quick</b>.</li> <li>2. If the problem does not recur, return the DIMM to its place, remove the other one, and run the test again.</li> <li>3. If the test does not detect the error, run <b>Diagnostics --&gt; Memory Test - Full</b>.</li> </ol>
Fan	<ol style="list-style-type: none"> <li>1. Turn on the computer and check the air turbulence at the louver near the power switch.</li> <li>2. Run <b>Diagnostics --&gt; Other Devices --&gt; IBM Fan</b>.</li> </ol>

## 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	<p>Turn standby mode on. To return to normal operation, press the Fn key independently, without pressing a function key.</p> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. This mode is called suspend mode in Windows NT.</li> <li>2. In Windows XP and Windows 2000, this combination of buttons functions as a sleep button. The user can change the setting so that pressing it puts the computer into hibernation mode or even shuts the computer down.</li> </ol>
Fn+F5	<p><b>Note:</b> This function is supported only in X31 series. X30 series does not have this function. Enable or disable the built-in wireless networking features ( the IEEE 802.11 standard) and the Bluetooth features. If this combination of keys are pressed, a list of wireless features is displayed in the Wireless Radio Control window. The user can quickly change the power state of each feature in the list.</p> <p><b>Note:</b> This function is supported in Windows XP, Windows 2000, and Windows 98.</p>

(continued)

Key combination	Description
Fn+F6	Reserved.
Fn+F7	<p><b>Switching a display output location</b> Switch between the computer display and an external monitor (CRT). If an external monitor is attached, computer output is displayed in the following three patterns by turns:</p> <ul style="list-style-type: none"> <li>• CRT display</li> <li>• Computer display + CRT display</li> <li>• Computer display</li> </ul> <p><b>Notes:</b></p> <ol style="list-style-type: none"> <li>1. For any operating system other than Windows XP or Windows 2000, no additional procedure is needed. Just press Fn+F7.</li> <li>2. This function is not supported if different desktop images are displayed on the computer display and the external monitor.</li> <li>3. This function does not work while a DVD movie or a video clip is playing.</li> <li>4. To enable this function in Windows 2000 and Windows XP, do the following: <ol style="list-style-type: none"> <li>a. Start Windows 2000 or Windows XP, and log on to the system.</li> <li>b. Press Fn+F7 and select a display-switching function in the Initial setup window.</li> </ol> </li> </ol> <p><b>Applying a presentation scheme</b> Apply a presentation scheme directly, with no need to start Presentation Director. To enable this function, do the following:</p> <p><b>Note:</b> This function is supported only in Windows 2000 and Windows XP.</p> <ol style="list-style-type: none"> <li>1. Start Windows 2000 or Windows XP, and log on to the system.</li> <li>2. Press Fn+F7. The Initial setup window opens.</li> <li>3. Select a presentation scheme function for the Fn+F7 key combination. The setting window opens.</li> <li>4. Select the optional setting.</li> </ol>
Fn+F8	<p>Turn screen expansion on or off. (There is no symbol on the key.)</p> <p><b>Note:</b> This function is not supported in Windows XP and Windows 2000.</p>

(continued)

Key combination	Description
Fn+F9	<p><b>Note:</b> This function is supported only in X31 series. X30 series does not have this function. Opens the IBM ThinkPad EasyEject Utility screen. Buttons for the following choices are displayed:</p> <ul style="list-style-type: none"> <li>• <b>Eject ThinkPad PC from Dock:</b> This button is displayed only if the ThinkPad computer have been attached to a ThinkPad Dock II or a ThinkPad Dock. You can detach the computer from the ThinkPad Dock II or the ThinkPad Dock.</li> <li>• <b>Eject ThinkPad PC from X3 UltraBase:</b> This button is displayed only if the ThinkPad computer have been attached to X3 UltraBase. You can detach the computer from the X3 UltraBase.</li> <li>• <b>Eject ThinkPad PC from Mini Dock:</b> This button is displayed only if the ThinkPad computer have been attached to ThinkPad Mini Dock and been connected one or more USB devices to the ThinkPad Mini Dock. You can use it to stop and remove all the USB devices.</li> <li>• <b>Run EasyEject Actions:</b> User can select, stop, and remove external devices connected to the ThinkPad computer.</li> <li>• <b>Configure EasyEject Actions:</b> User can open the IBM ThinkPad EasyEject Utility main window.</li> <li>• <b>Fn+F9 Settings:</b> User can configure the settings for the Fn+F9 function.</li> </ul> <p><b>Note:</b> This function is supported only in Windows XP and Windows 2000.</p>
Fn+F10	Reserved.
Fn+F11	Reserved.
Fn+F12	<p>Turn hibernation mode on. To return to normal operation, press the power button for less than four seconds.</p> <p><b>Note:</b> To use Fn+F12 for hibernation in Windows XP and Windows 2000, the IBM PM device driver must have been installed on the computer.</p>
Fn+PgUp	<p>Turn the ThinkLight on or off.</p> <p><b>Note:</b> This function is supported only on the ThinkPad computer that have the ThinkLight. The on or off status of the ThinkLight is shown on the screen for a few seconds when the user press Fn+PgUp.</p>
Fn+Home	The LCD becomes brighter.
Fn+End	The LCD becomes less bright.
Fn+Spacebar	Enable the FullScreen Magnifier function.

## 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 66.

### 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
<b>0175</b> Bad CRC1, stop POST task—The EEPROM checksum is not correct.	<b>System board.</b>
<b>0176</b> System Security—The system has been tampered with.	<ol style="list-style-type: none"> <li><b>Run IBM BIOS Setup Utility, and then save current setting by pressing F10.</b></li> <li>System board.</li> </ol>
<b>0177</b> Bad SVP data, stop POST task—Checksum of the supervisor password in the EEPROM is not correct.	<b>System board</b>
<b>0182</b> Bad CRC2. Enter BIOS Setup and load Setup defaults.—Checksum of the CRS2 setting in the EEPROM is not correct.	<ol style="list-style-type: none"> <li><b>Run IBM BIOS Setup Utility. Press F9, and Enter to load the default setting. Then save current setting by pressing F10.</b></li> <li>System board.</li> </ol>

Symptom or error	FRU or action, in sequence
<b>0185</b> Bad startup sequence settings. Enter BIOS Setup and load Setup defaults.	1. <b>Run IBM BIOS Setup Utility. Press F9, and Enter to load the default setting. Then save current setting by pressing F10.</b>
<b>0187</b> EAIA data access error—The access to EEPROM is failed.	<b>System board.</b>
<b>0188</b> Invalid RFID Serialization Information Area.	<b>System board.</b>
<b>0189</b> Invalid RFID configuration information area—The EEPROM checksum is not correct.	<b>System board.</b>
<b>0190</b> Critical low-battery error	1. <b>Charge the battery pack.</b> 2. Battery pack.
<b>0191</b> System Security—Invalid Remote Change requested.	1. <b>Run IBM BIOS Setup Utility, and then save current setting by pressing F10.</b> 2. System board.
<b>0192</b> System Security—IBM Embedded Security hardware tamper detected.	<b>System board.</b>
<b>0199</b> System Security—IBM Security password retry count exceeded.	1. <b>Run IBM BIOS Setup Utility, and then save current setting by pressing F10.</b> 2. System board.
<b>01C8</b> More than one modem devices are found. Remove one of them. Press <Esc> to continue.	1. <b>Remove either a Mini-PCI Card. Otherwise, press Esc to ignore the warning message.</b> 2. System board.
<b>01C9</b> More than one Ethernet devices are found. Remove one of them. Press <Esc> to continue.	1. <b>Remove the Ethernet device that you installed; or press Esc to ignore the warning message.</b> 2. System board.
<b>0200</b> Hard disk error—The hard disk is not working.	1. <b>Reseat the hard-disk drive.</b> 2. Load Setup Defaults in IBM BIOS Setup Utility. 3. Hard-disk drive. 4. System board.
<b>021x</b> Keyboard error	<b>Run interactive tests of the keyboard and the auxiliary input device.</b>



Symptom or error	FRU or action, in sequence
<b>0220</b> Monitor type error—Monitor type does not match the one specified in CMOS.	<b>Load Setup Defaults in IBM BIOS Setup Utility.</b>
<b>0230</b> Shadow RAM error—Shadow RAM fails at offset nnnn.	<b>System board.</b>
<b>0231</b> System RAM error—System RAM fails at offset nnnn.	1. <b>DIMM.</b> 2. System board.
<b>0232</b> Extended RAM error—Extended RAM fails at offset nnnn.	1. <b>DIMM.</b> 2. System board.
<b>0250</b> System battery error—System battery is dead.	<b>Replace the backup battery and run IBM BIOS Setup Utility to reset the time and date.</b>
<b>0251</b> System CMOS checksum bad—Default configuration used.	<b>Replace the backup battery and run IBM BIOS Setup Utility to reset the time and date.</b>
<b>0252</b> Password checksum bad—The password is cleared.	<b>Reset the password by running IBM BIOS Setup Utility.</b>
<b>0260</b> System timer error	1. <b>Replace the backup battery and run IBM BIOS Setup Utility to reset the time and date.</b> 2. System board.
<b>0270</b> Real time clock error	1. <b>Replace the backup battery and run IBM BIOS Setup Utility to reset the time and date.</b> 2. System board.
<b>0271</b> Date and time error—Neither the date nor the time is set in the computer.	<b>Run IBM BIOS Setup Utility to reset the time and date.</b>
<b>0280</b> Previous boot incomplete—Default configuration used.	1. <b>Load “Setup Default” in IBM BIOS Setup Utility.</b> 2. DIMM. 3. System board.
<b>02B2</b> Incorrect drive A type	1. <b>Diskette drive.</b> 2. External FDD cable. 3. I/O card.
<b>02F4</b> EISA CMOS not writable	1. <b>Load Setup Defaults in IBM BIOS Setup Utility.</b> 2. Replace the backup battery. 3. System board.
<b>02F5</b> DMA test failed	1. <b>DIMM.</b> 2. System board.

Symptom or error	FRU or action, in sequence
<b>02F6</b> Software NMI failed	<ol style="list-style-type: none"> <li><b>DIMM.</b></li> <li>System board.</li> </ol>
<b>02F7</b> Fail-safe timer NMI failed	<ol style="list-style-type: none"> <li><b>DIMM.</b></li> <li>System board.</li> </ol>
<b>1801</b> Attached docking station is not supported	<b>Shut down the computer and remove it from the docking station.</b>
<b>1802</b> Unauthorized network card is plugged in—Power off and remove the miniPCI network card.	<ol style="list-style-type: none"> <li><b>Remove Mini PCI network card.</b></li> <li>System board.</li> </ol>
<b>1803</b> Unauthorized daughter card is plugged in—Power off and remove the daughter card.	<ol style="list-style-type: none"> <li><b>Remove the daughter card that you installed.</b></li> <li>System board.</li> </ol>
<b>1810</b> Hard disk partition layout error	<ol style="list-style-type: none"> <li><b>If the Access IBM Predesktop Area has been previously disabled, then go to the IBM BIOS Setup Utility by pressing F1 to open the IBM BIOS Setup Utility. Select Security-&gt;IBM Predesktop Area-&gt; Access IBM Predesktop Area. Set this item to Disabled. Save and exit.</b></li> <li>If the Access IBM Predesktop Area has not been previously disabled, press Enter to load Access IBM Predesktop Area. Then run <b>RECOVER TO FACTORY CONTENTS</b> in Access IBM Predesktop Area.</li> <li>If item 2 failed, press F3 in welcome screen in <b>RECOVER TO FACTORY CONTENTS</b>. Run <b>FDISK</b>, and then delete all partitions. Run <b>RECOVER TO FACTORY CONTENTS</b> in Access IBM Predesktop Area again.</li> <li>If item 3 failed, select CD-ROM boot in <b>Startup</b> in Access IBM Predesktop Area. Boot from Recovery CD and perform full recovery from it.</li> <li>If item 4 failed, replace the hard-disk drive.</li> </ol>

## Error messages

Symptom or error	FRU or action, in sequence
Device address conflict.	<ol style="list-style-type: none"> <li>1. Load <b>"Setup Defaults"</b> in <b>IBM BIOS Setup Utility</b>.</li> <li>2. Backup battery.</li> <li>3. System board.</li> </ol>
Allocation error for device.	<ol style="list-style-type: none"> <li>1. Load <b>"Setup Defaults"</b> in <b>IBM BIOS Setup Utility</b>.</li> <li>2. Backup battery.</li> <li>3. System board.</li> </ol>
Failing bits: nnnn.	<ol style="list-style-type: none"> <li>1. <b>DIMM</b>.</li> <li>2. System board.</li> </ol>
Invalid system configuration data.	<ol style="list-style-type: none"> <li>1. <b>DIMM</b>.</li> <li>2. System board.</li> </ol>
I/O device IRQ conflict.	<ol style="list-style-type: none"> <li>1. Load <b>"Setup Defaults"</b> in <b>IBM BIOS Setup Utility</b>.</li> <li>2. Backup battery.</li> <li>3. System board.</li> </ol>
Operating system not found.	<ol style="list-style-type: none"> <li>1. Check that the operating system has no failure and is installed correctly.</li> <li>2. <b>Enter IBM BIOS Setup Utility and see whether the hard-disk drive and the diskette drive are properly identified.</b></li> <li>3. Reseat the hard-disk drive.</li> <li>4. Reinstall the operating system.</li> <li>5. Diskette drive.</li> <li>6. Hard-disk drive.</li> <li>7. System board.</li> </ol>
Hibernation error.	<ol style="list-style-type: none"> <li>1. <b>Restore the system configuration to what it was before the computer entered hibernation mode.</b></li> <li>2. If memory size has been changed, re-create the hibernation file.</li> </ol>
Fan error.	<b>Fan.</b>
Thermal sensing error.	<b>System board.</b>
Authentication of system services failed. Press <Esc> to resume.	<b>The IBM Predesktop Area in the HDD is broken. To use the IBM Predesktop Area, get a recovery CD, and recover the IBM Predesktop area using it.</b>

## Beep symptoms

Symptom or error	FRU or action, in sequence
One beep and a blank, unreadable, or flashing LCD.	<ol style="list-style-type: none"> <li>1. <b>Reseat the LCD connector.</b></li> <li>2. LCD assembly.</li> <li>3. External CRT.</li> <li>4. System board.</li> </ol>
One long and two short beeps, and a blank or unreadable LCD.	<ol style="list-style-type: none"> <li>1. <b>System board.</b></li> <li>2. LCD assembly.</li> <li>3. DIMM.</li> </ol>
Two short beeps with error codes.	<b>POST error. See “Numeric error codes” on page 59.</b>
Two short beeps and a blank screen.	<ol style="list-style-type: none"> <li>1. <b>System board.</b></li> <li>2. DIMM.</li> </ol>
Three short beeps, pause, three more short beeps, and one short beep.	<ol style="list-style-type: none"> <li>1. <b>DIMM.</b></li> <li>2. System board</li> </ol>
One short beep, pause, three short beeps, pause, three more short beeps, and one short beep.	
Only cursor appears.	<b>Reinstall operating system.</b>
Four cycles of four short beeps and a blank screen.	<b>System board</b> (IBM security chip)
Five short beeps and a blank screen.	<b>System board</b>

## No-beep symptoms

Symptom or error	FRU or action, in sequence
No beep, power-on indicator on, LCD blank, and no POST.	<ol style="list-style-type: none"> <li>1. <b>Make sure that every connector is connected tightly and correctly.</b></li> <li>2. DIMM.</li> <li>3. System board.</li> </ol>
No beep, power-on indicator on, and LCD blank during POST.	<ol style="list-style-type: none"> <li>1. <b>Reseat DIMM.</b></li> <li>2. System board.</li> </ol>
The power-on password prompt appears.	A power-on password or a supervisor password is set. Type the password and press <b>Enter</b> .
The hard-disk password prompt appears.	A hard-disk password is set. Type the password and press <b>Enter</b> .
The DOS full screen looks smaller.	Start the ThinkPad Configuration program and set the <b>Screen expansion</b> 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.	<b>System board.</b>
<ul style="list-style-type: none"> <li>• LCD backlight not working.</li> <li>• LCD too dark.</li> <li>• LCD brightness cannot be adjusted.</li> <li>• LCD contrast cannot be adjusted.</li> </ul>	<ol style="list-style-type: none"> <li>1. <b>Reseat the LCD connectors.</b></li> <li>2. LCD assembly.</li> <li>3. System board.</li> </ol>
<ul style="list-style-type: none"> <li>• LCD screen unreadable.</li> <li>• Characters missing pixels.</li> <li>• Screen abnormal.</li> <li>• Wrong color displayed.</li> </ul>	<ol style="list-style-type: none"> <li>1. <b>See important note for “LCD-related symptoms.”</b></li> <li>2. Reseat all LCD connectors.</li> <li>3. LCD assembly.</li> <li>4. System board.</li> </ol>
Horizontal or vertical lines displayed on LCD.	<b>LCD assembly.</b>

## **Intermittent problems**

Intermittent system hang problems can be due to a variety of causes that have nothing to do with a hardware defect, such as cosmic radiation, electrostatic discharge, or software errors. FRU replacement should be considered only when a 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 42.)

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.

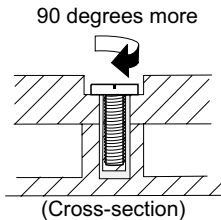
Do the following when you service this machine:

- Keep the screw kit (for the P/N, see “Miscellaneous parts” on page 167) in your tool bag.
- Always use new screws.
- Use a torque screwdriver if you have one.

Tighten screws as follows:

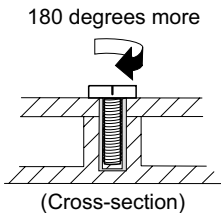
- **Plastic to plastic**

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.

### *FRU replacement notices*

- 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 1.69, 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 1.69 and restart the computer.
2. From the main menu, select **1. Set System Identification**.
3. Select **1. Add S/N data from EEPROM**.  
Follow the instructions on the screen.

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

### **Retaining the UUID**

The Universally Unique Identifier (UUID) is a 128-bit number uniquely assigned to your computer at production



and stored in the EEPROM of your system board. The algorithm that generates the number is designed to provide unique IDs until the year A.D. 3400. No two computers in the world have the same number.

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

1. Install the ThinkPad Hardware Maintenance Diskette Version 1.69, 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 67.
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 138.
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.**

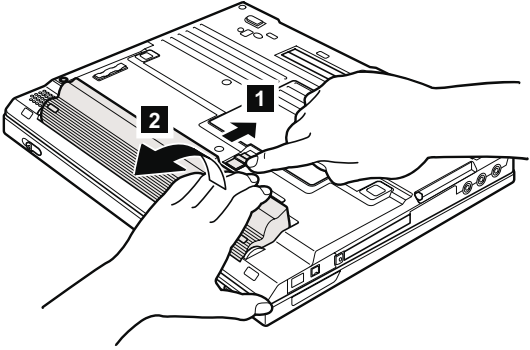
**Attention:** Before the computer is powered on after FRU replacement, make sure that all screws, springs, and other small parts are in place and are not loose inside the computer. Verify this by shaking the computer gently and listening for rattling sounds. Metallic parts or metal flakes can cause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



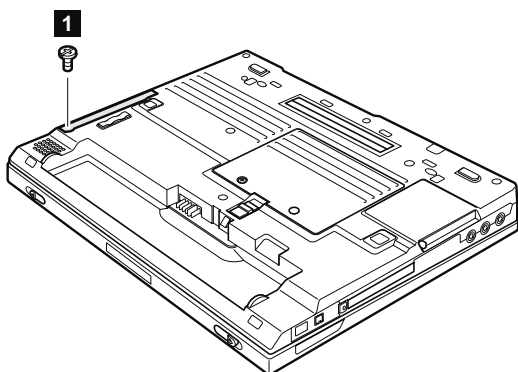
## 1020 Hard-disk drive

### 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:

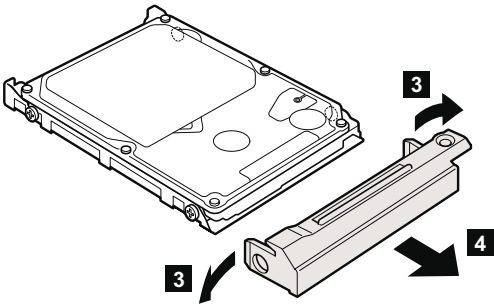
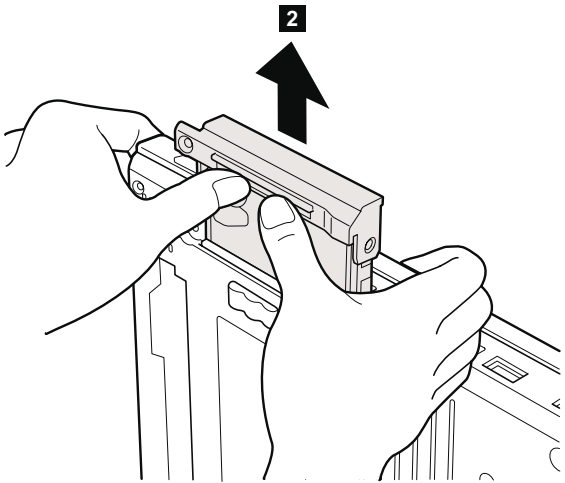
- “1010 Battery pack” on page 71



**Note:** The hard disk is attached to the cover.

Step	Screw (quantity)	Torque
<b>1</b>	M3 x 4 mm, nylon-coated (1)	0.4 Nm (4 kgfcm)

(continued)



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

Removing and replacing a FRU

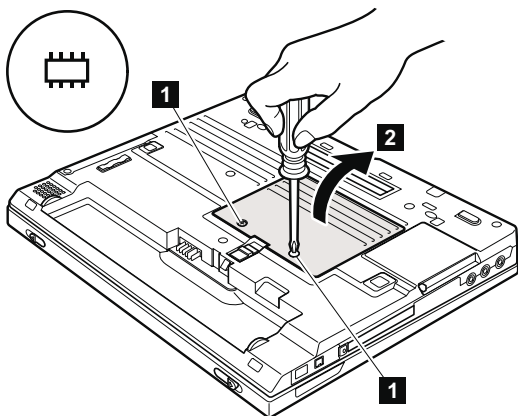
## 1030 DIMM cover

For access, remove following FRU:

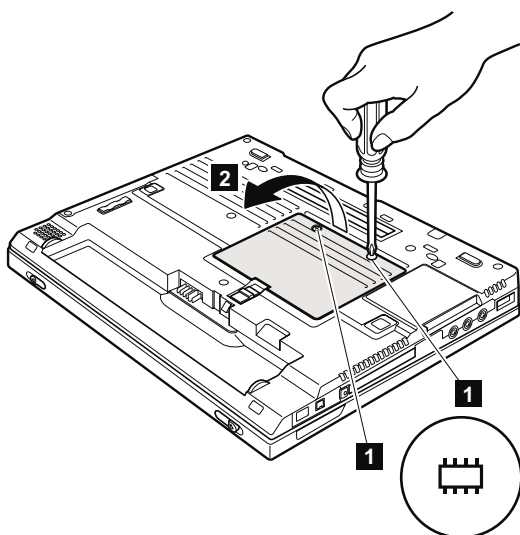
- “1010 Battery pack” on page 71

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

*For X30 series*



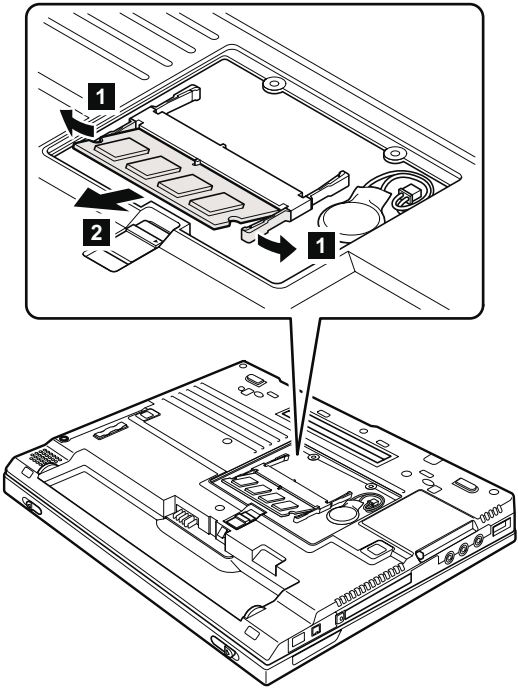
*For X31 series*



## 1040 DIMM

For access, remove following FRUs, in order:

- “1010 Battery pack” on page 71
- “1030 DIMM cover” on page 74



**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.

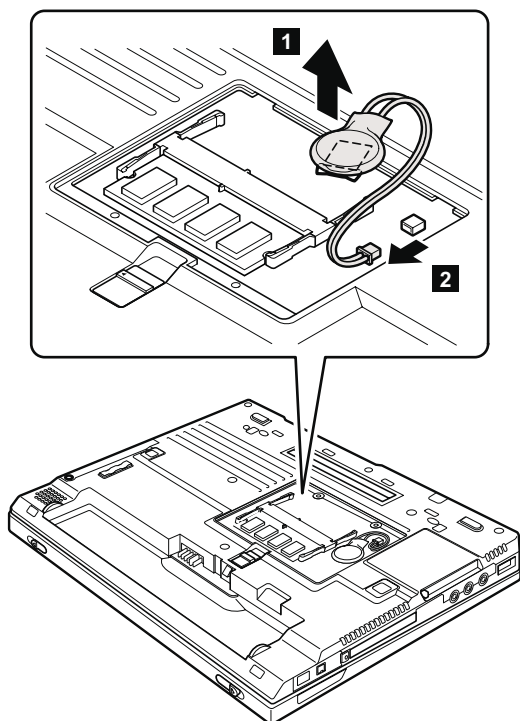
## 1050 Backup battery

**⚠ 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.

For access, remove following FRUs, in order:

- “1010 Battery pack” on page 71
- “1020 Hard-disk drive” on page 72
- “1030 DIMM cover” on page 74



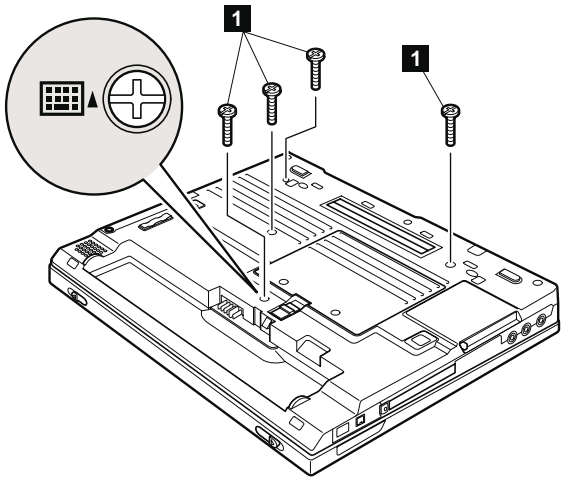
**When installing:** Make sure that the battery connector **4** is attached firmly.



## 1060 Keyboard

For access, remove following FRU:

- “1010 Battery pack” on page 71

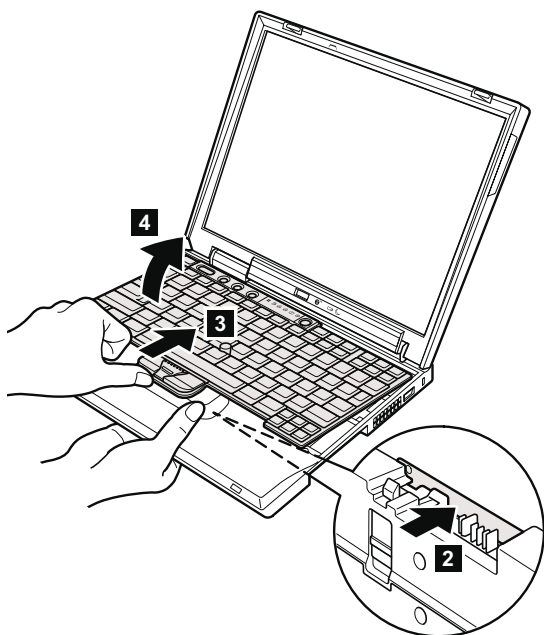


Step	Screw (quantity)	Torque
<b>1</b>	M2 x 6 mm, nylon-coated (4)	0.245 Nm (2.5 kgfcm)

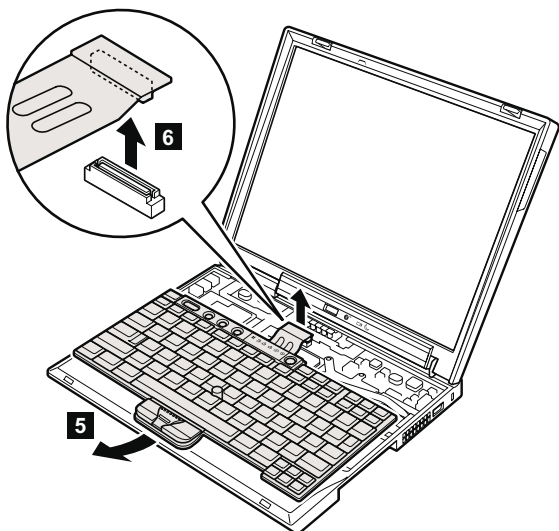
(continued)

### Removing and replacing a FRU

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

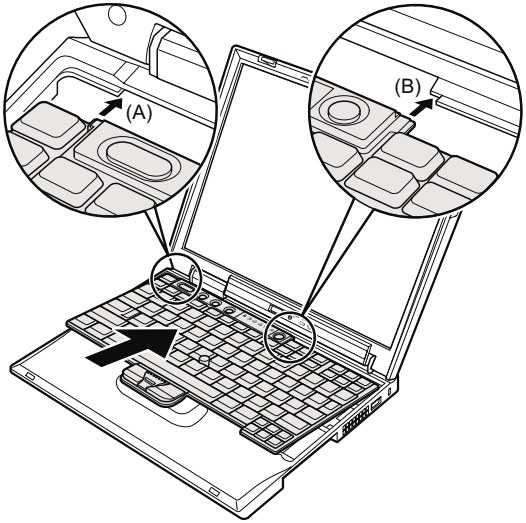


In step **5**, draw the keyboard a little in the direction of the arrow, and then detach the connector **6**.



**When installing:** Install the keyboard, do as follows;

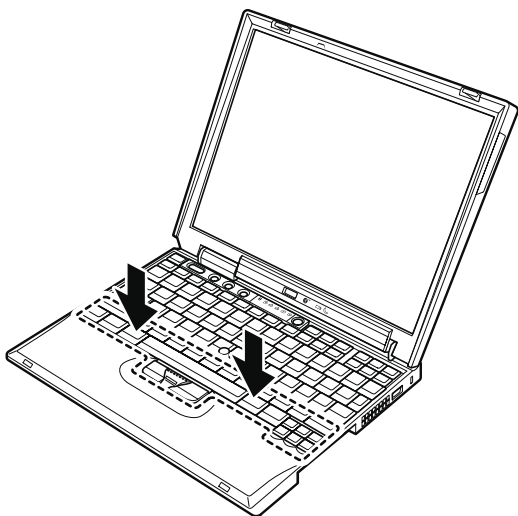
1. Attach the connector.
2. Make sure that the keyboard edges, shown in the figure as **(A)** and **(B)**, are under the frame.



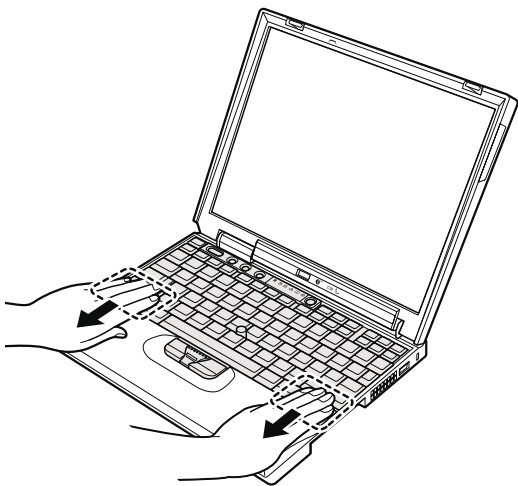
(continued)

*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.



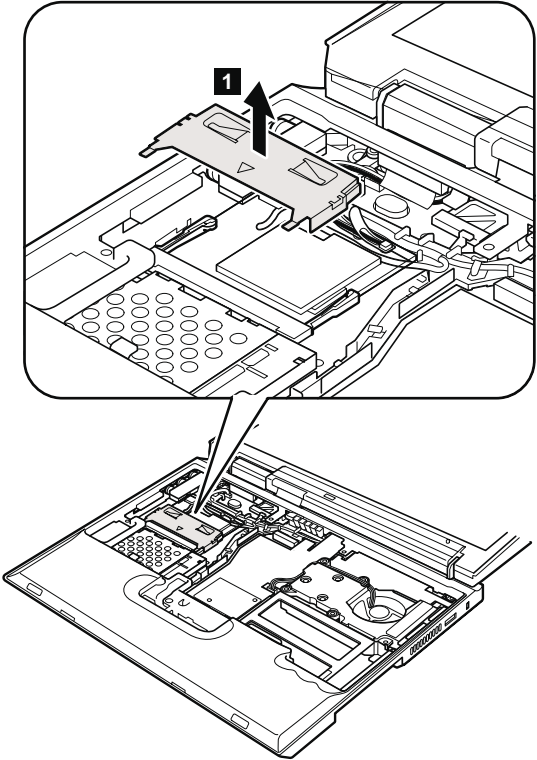
5. Secure the keyboard by tightening the screws from the bottom side of the computer.

## 1070 Mini PCI adapter

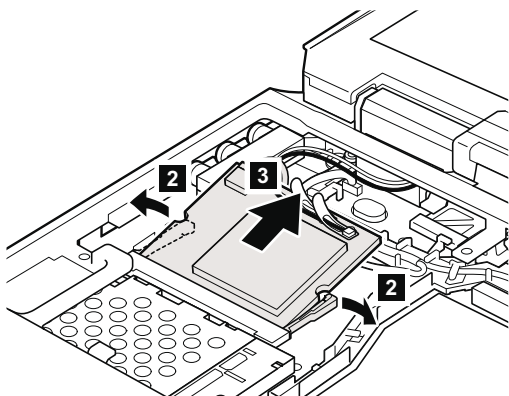
For access, remove following FRUs, in order:

- “1010 Battery pack” on page 71
- “1060 Keyboard” on page 77

## 802.11b wireless LAN/modem combo card

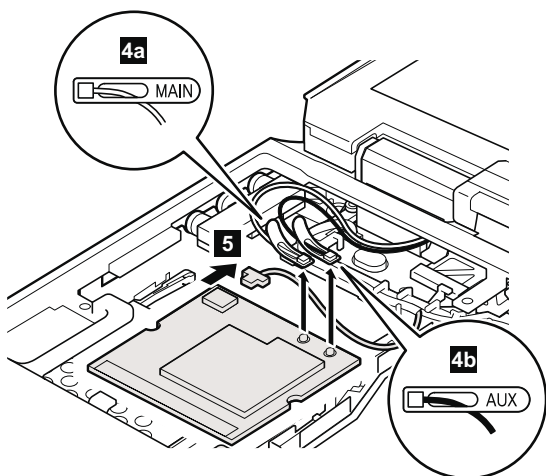


(continued)



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.

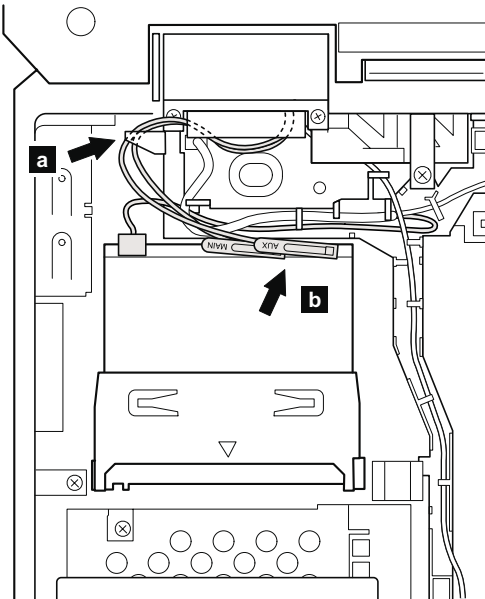


**When installing:**

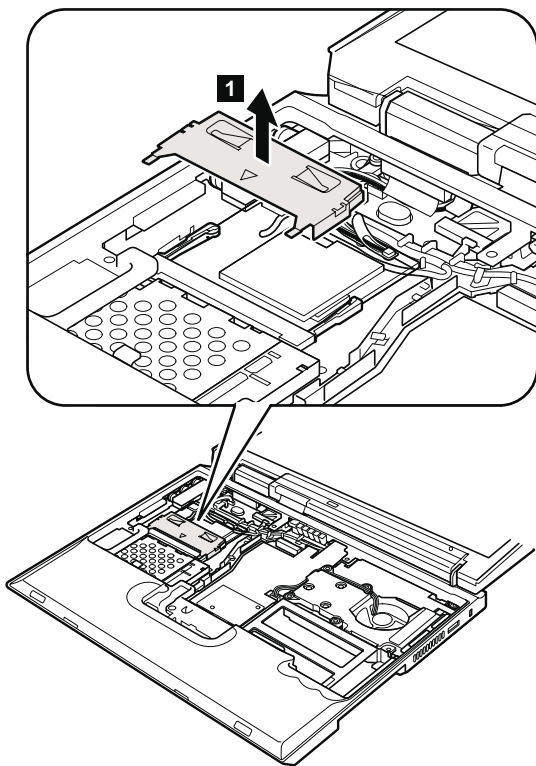
- Make sure that the connector **5** is firmly attached.
- Plug the gray antenna cable with the tab marked “MAIN” (**4a**) into jack *J1*, or *MAIN*, or *M*, and the black antenna cable with the tab marked “AUX” (**4b**) into jack *J2*, or *AUX*, or *A*.
- With the notched end of the card toward the 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 for the 802.11b/modem combo card**

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.

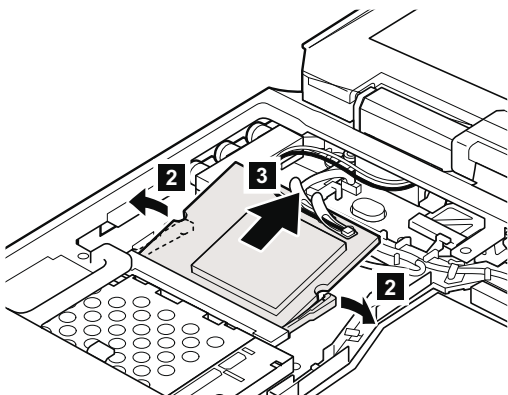


## 802.11b wireless LAN card



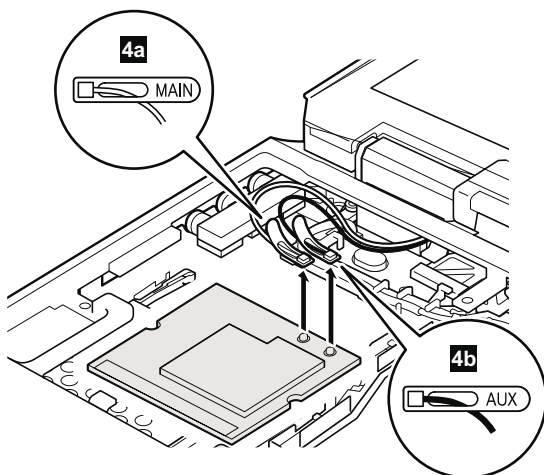
(continued)





Antenna cables **4a** and **4b** in the following illustration are for the wireless LAN 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:**

- Plug the gray antenna cable with the tab marked “MAIN” (**4a**) into jack *J1*, or *MAIN*, or *M*, and the black antenna cable with the tab marked “AUX” (**4b**) into jack *J2*, or *AUX*, or *A*.
- 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.

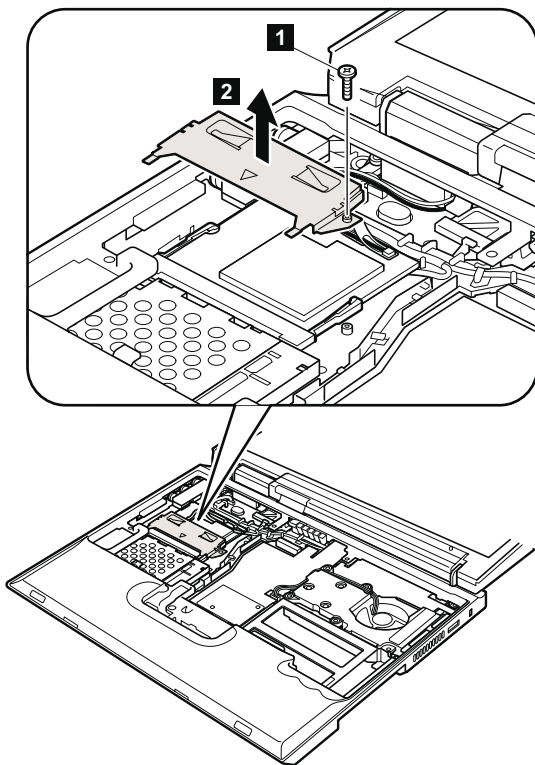
## 802.11a/b wireless LAN card

### Note

This procedure is not applicable for the following model. For the model, the removal procedure is same as in “802.11b wireless LAN card” on page 84 though the model supports 802.11a/b wireless LAN card.

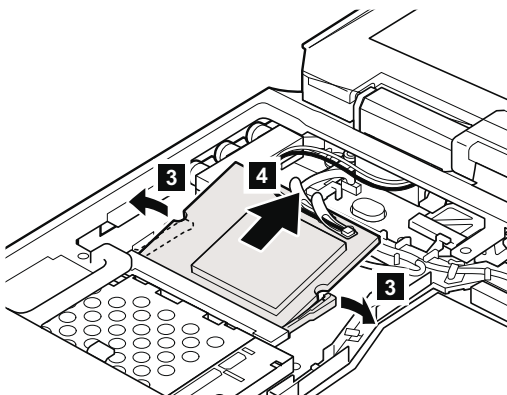
- 2672-JHJ

**Note:** This FRU is secured by using a tamper resistant torx head screw (TR7).



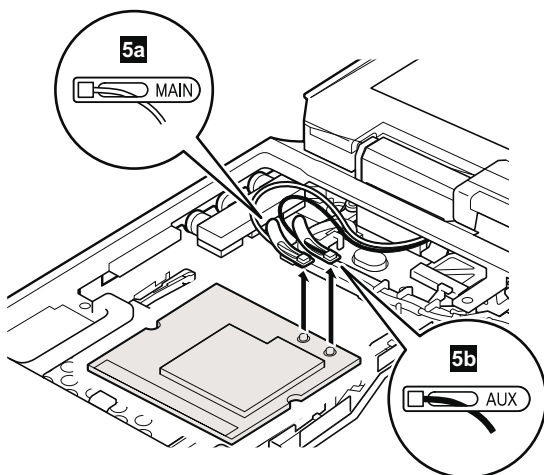
Step	Screw (quantity)	Torque
<b>1</b>	M2 x 3 mm, TR7, nylon-coated (1)	0.245 Nm (2.5 kgfcm)

(continued)



Antenna cables **5a** and **5b** in the following illustration are for the wireless LAN 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.

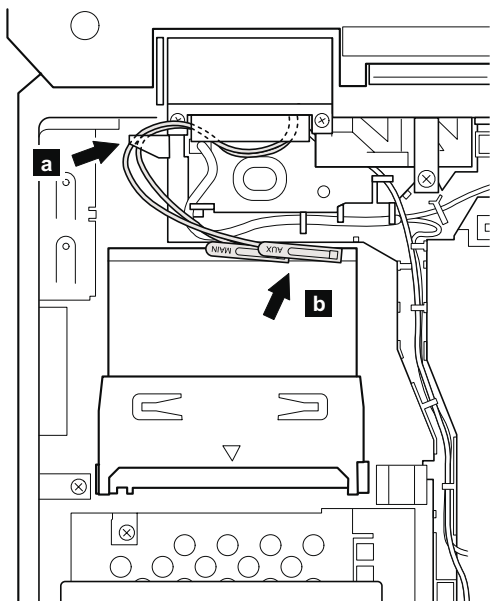


**When installing:**

- Plug the gray antenna cable with the tab marked “MAIN” (**5a**) into jack *J1*, or *MAIN*, or *M*, and the black antenna cable with the tab marked “AUX” (**5b**) into jack *J2*, or *AUX*, or *A*.
- 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 for the 802.11b wireless LAN or 802.11a/b wireless LAN card

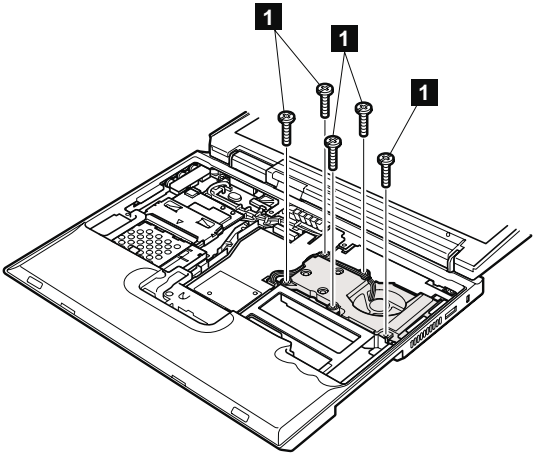
When attaching the Mini PCI adapter, route the antenna cables to go under the cable guide as in **a**, and place the tabs as indicated by arrow **b** in this figure.



## 1080 Fan assembly

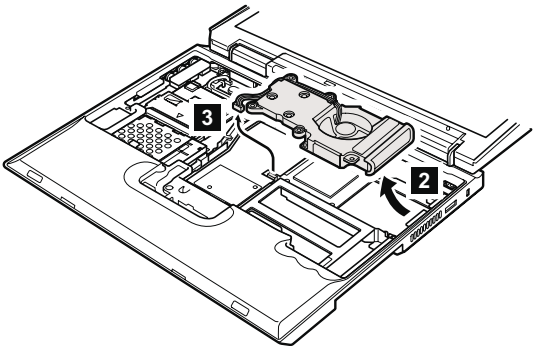
For access, remove following FRUs, in order:

- “1010 Battery pack” on page 71
- “1020 Hard-disk drive” on page 72
- “1060 Keyboard” on page 77



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

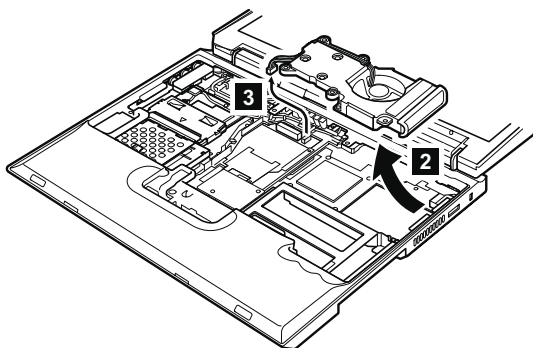
*For X30 series*



(continued)

Removing and replacing a FRU

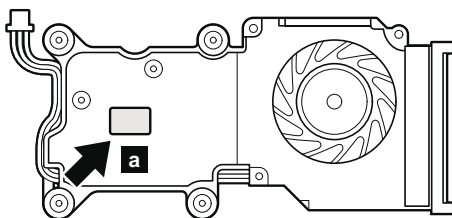
For X31 series



**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.



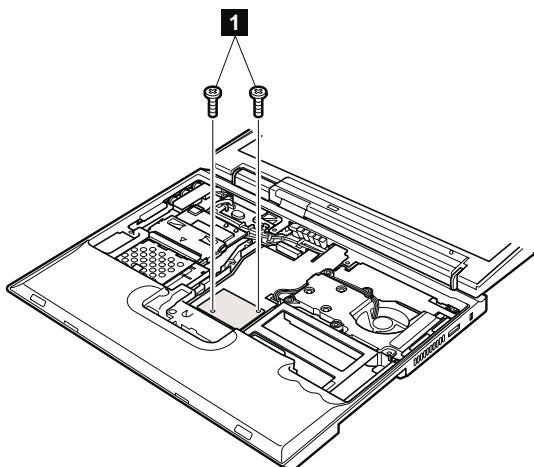
## 1090 Communication daughter card (CDC)

### Note

In X30 series, the CDC slot on some models accepts a Modem Daughter Card (MDC). On other models, the slot accepts a Bluetooth Daughter Card (BDC). In X31 series, the CDC slot on some models accepts a Modem Daughter Card (MDC). On other models, the slot accepts a Bluetooth/Modem Daughter Card (BMDC).

For access, remove following FRUs, in order:

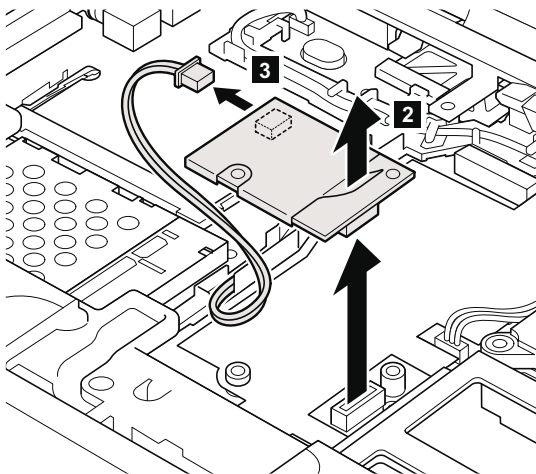
- “1010 Battery pack” on page 71
- “1020 Hard-disk drive” on page 72
- “1060 Keyboard” on page 77



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

(continued)

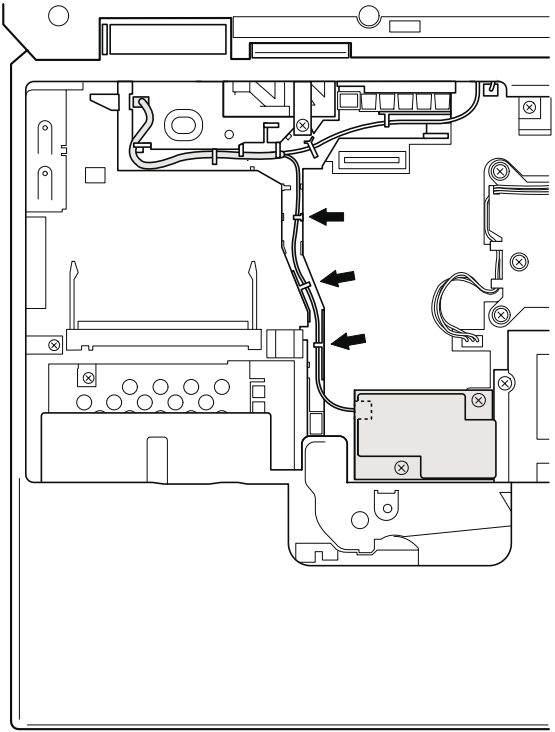
## Modem daughter card (MDC)



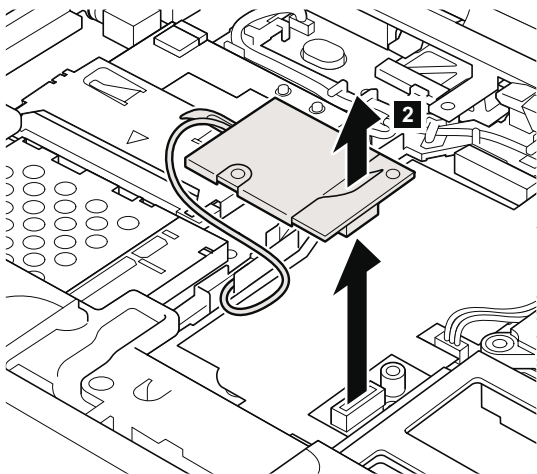
**When installing:** Make sure that connectors **2** and **3** are attached firmly.



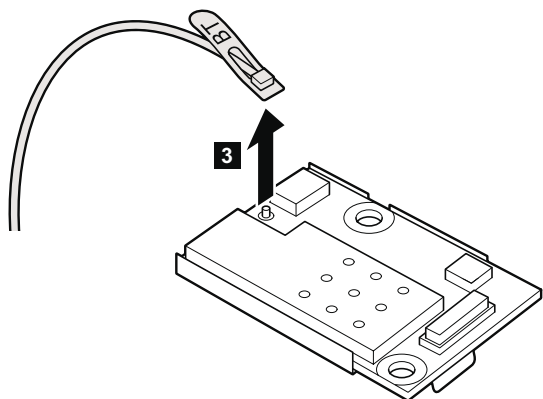
**Cable routing:** When attaching the MDC, route the cable along the cable guides as indicated by the arrows in this figure.



## Bluetooth daughter card (BDC)



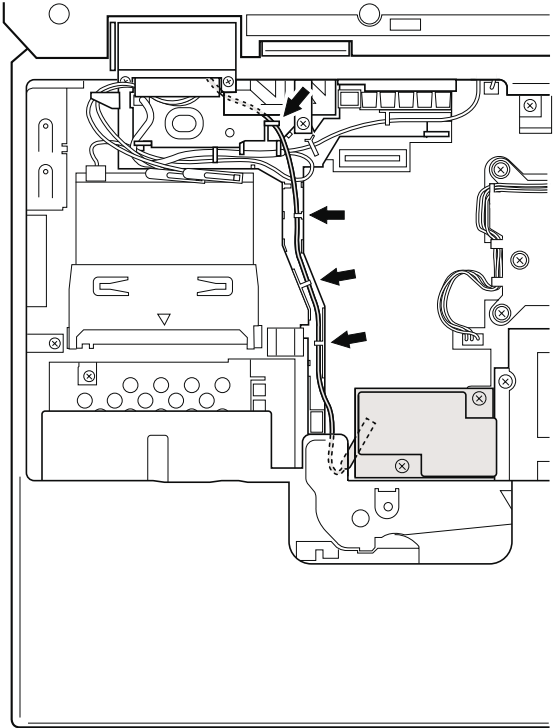
**Note:** When unplugging the Bluetooth antenna jack, do not pull the cable; it might snap. Unplug the jack by pulling the tab with your fingers.



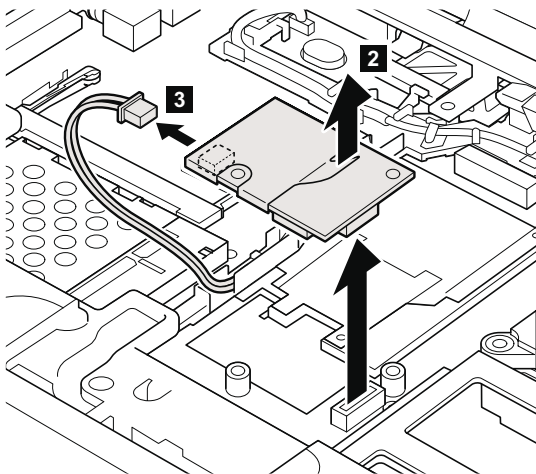
### When installing:

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.

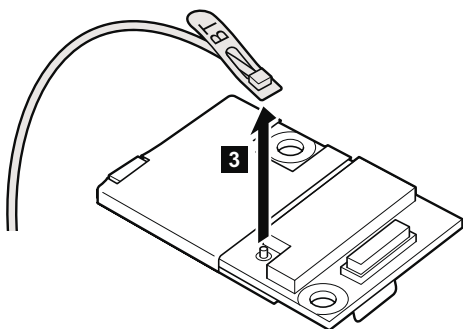
**Cable routing:** When attaching the BDC, route the cable along the cable guides as indicated by the arrows in this figure.



## Bluetooth/Modem daughter card (BMDC)



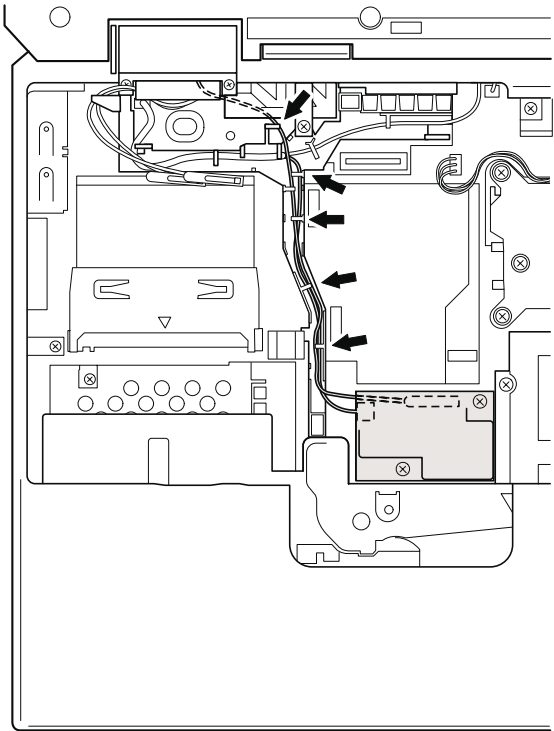
**Note:** When unplugging the Bluetooth antenna jack, do not pull the cable; it might snap. Unplug the jack by pulling the tab with your fingers.



### When installing:

1. Plug the white cable with the tab marked "BT" into the jack on the BMDC.
2. Make sure that the connectors **2** and **3** are attached firmly.

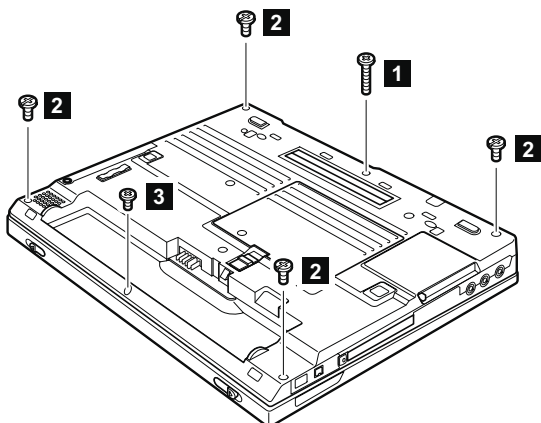
**Cable routing:** When attaching the BDC, route the cable along the cable guides as indicated by the arrows in this figure.



## 1100 Keyboard bezel

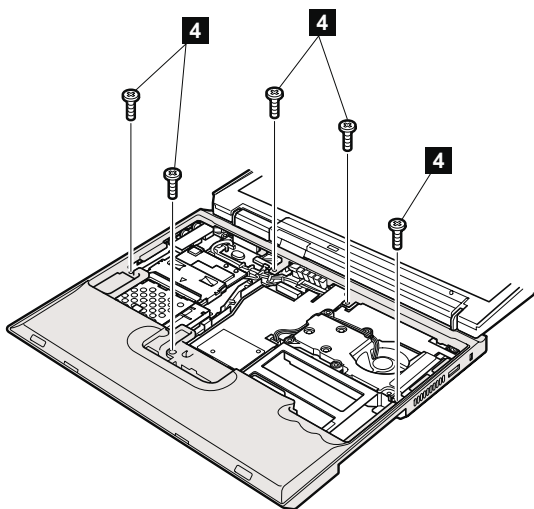
For access, remove following FRUs, in order:

- “1010 Battery pack” on page 71
- “1020 Hard-disk drive” on page 72
- “1030 DIMM cover” on page 74
- “1040 DIMM” on page 75
- “1050 Backup battery” on page 76
- “1060 Keyboard” on page 77

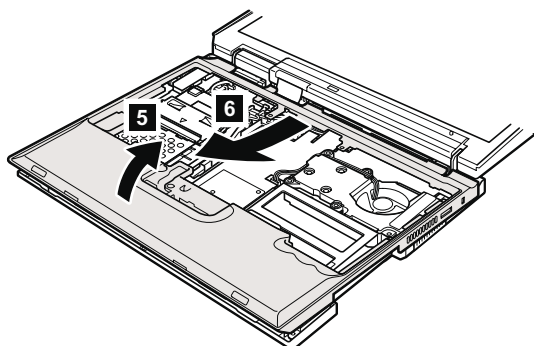


Step	Screw (quantity)	Torque
<b>1</b>	M2 x 13.5 mm, nylon-coated (1)	0.245 Nm (2.5 kgfcm)
<b>2</b>	M2 x 6 mm, nylon-coated (4)	0.245 Nm (2.5 kgfcm)
<b>3</b>	M2 x 4 mm, nylon-coated (1)	0.245 Nm (2.5 kgfcm)

(continued)



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

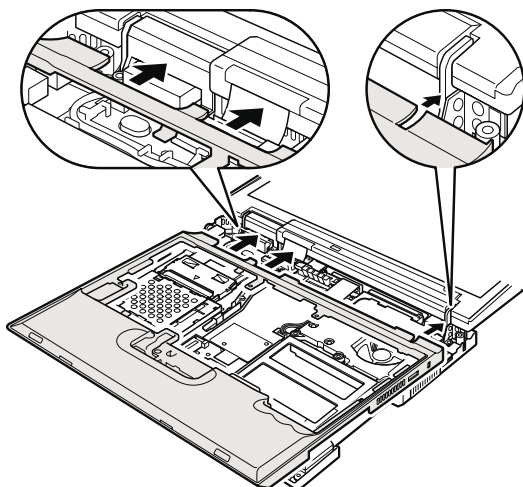


(continued)

### *Removing and replacing a FRU*

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.



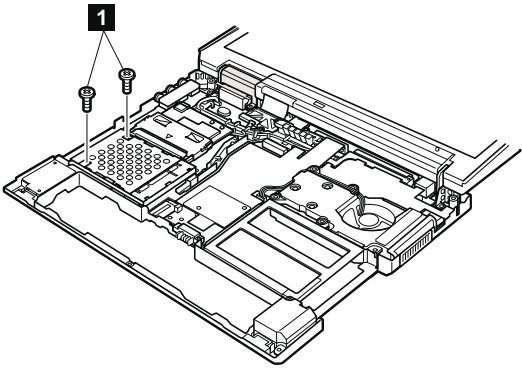
2. Make sure that all of the latches on the front side of the computer are attached firmly.
3. Secure the keyboard bezel with the screws.



## 1110 PC card slot

For access, remove following FRUs, in order:

- “1010 Battery pack” on page 71
- “1020 Hard-disk drive” on page 72
- “1030 DIMM cover” on page 74
- “1040 DIMM” on page 75
- “1050 Backup battery” on page 76
- “1060 Keyboard” on page 77
- “1100 Keyboard bezel” on page 98

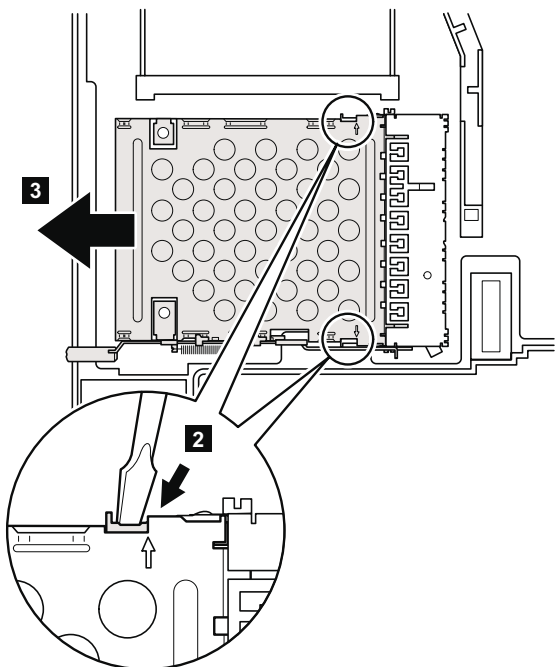


Step	Screw (quantity)	Torque
<b>1</b>	M2 x 4 mm, nylon-coated (2)	0.245 Nm (2.5 kgfcm)

(continued)

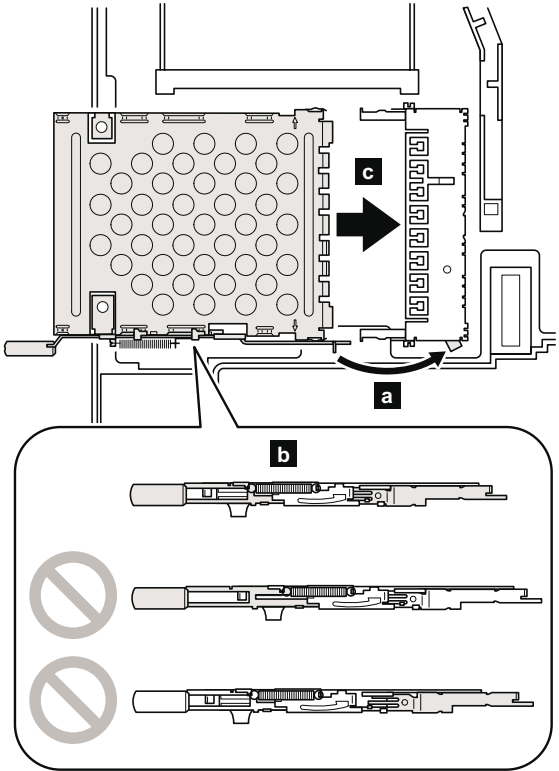
### Removing and replacing a FRU

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**.



**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.

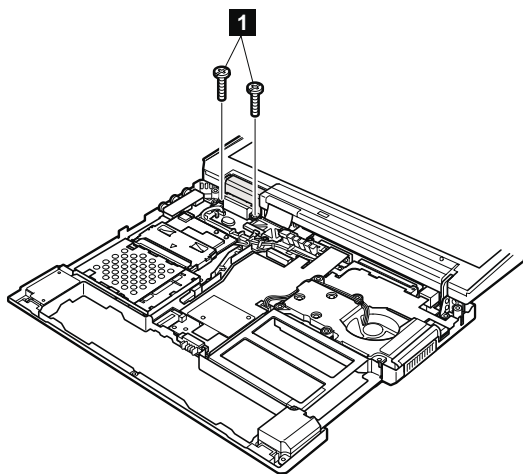


## 1120 Hinge cover and LCD assembly

For access, remove following FRUs, in order:

- “1010 Battery pack” on page 71
- “1020 Hard-disk drive” on page 72
- “1030 DIMM cover” on page 74
- “1040 DIMM” on page 75
- “1050 Backup battery” on page 76
- “1060 Keyboard” on page 77
- “1070 Mini PCI adapter” on page 81
- “1100 Keyboard bezel” on page 98

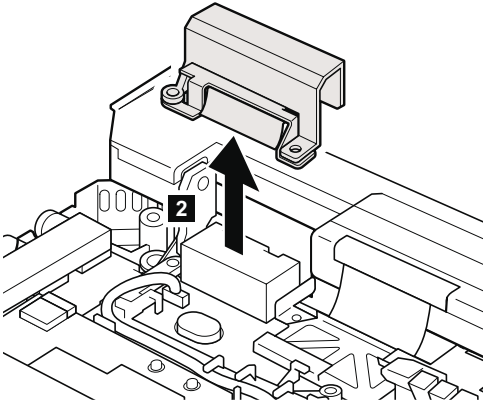
Before removing the LCD assembly, remove the hinge cover first by following steps **1** and **2**.



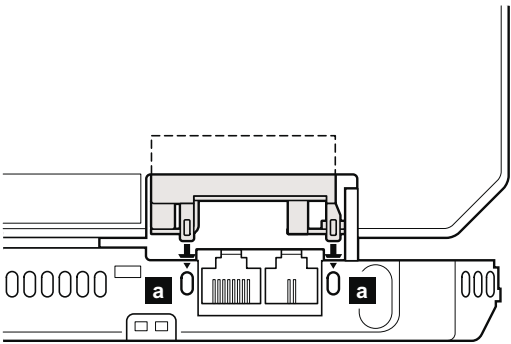
Step	Screw (quantity)	Torque
<b>1</b>	M2 x 9.5 mm, nylon-coated (2)	0.245 Nm (2.5 kgfcm)

(continued)

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**.

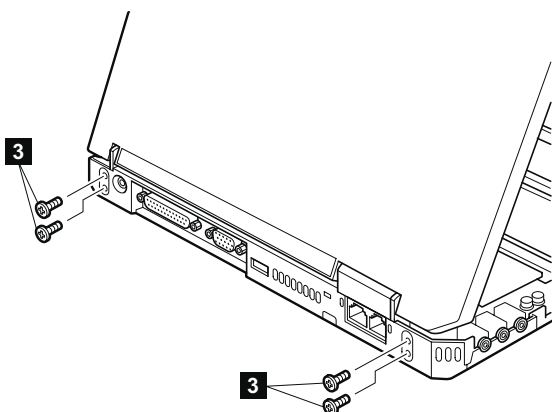


**When installing:** Attach the hinge cover, aligning the two projections on the rear side with the two small square holes in the base cover. (**a**)

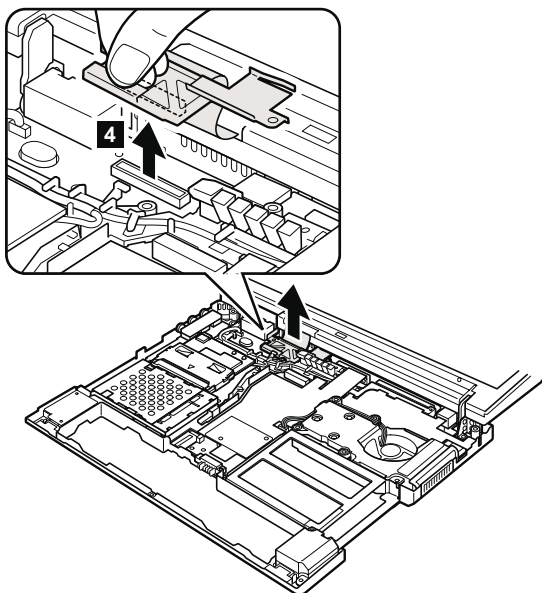


### Removing and replacing a FRU

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

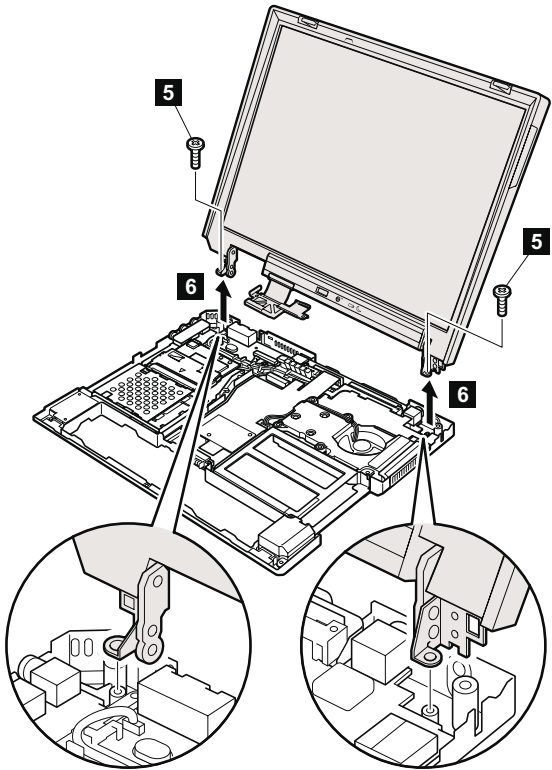


Step	Screw (quantity)	Torque
3	M2.5 x 4.8 mm, nylon-coated (4)	0.392 Nm (4 kgfcm)



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

(continued)



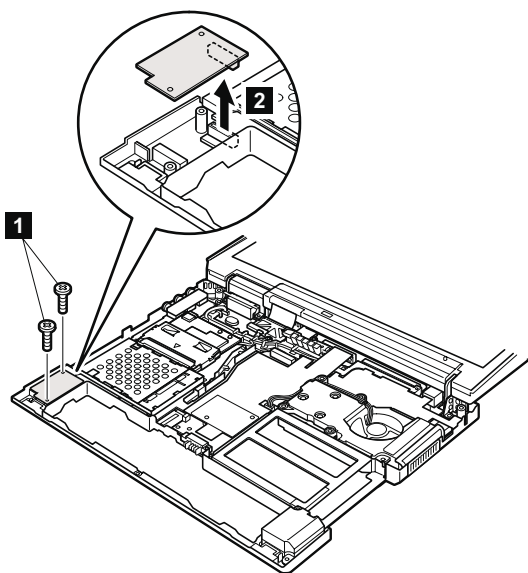
Step	Screw (quantity)	Torque
5	M2.5 × 4.8 mm, nylon-coated (2)	0.392 Nm (4 kgfcm)

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

## 1130 Sub card assembly

For access, remove following FRUs, in order:

- “1010 Battery pack” on page 71
- “1020 Hard-disk drive” on page 72
- “1030 DIMM cover” on page 74
- “1040 DIMM” on page 75
- “1050 Backup battery” on page 76
- “1060 Keyboard” on page 77
- “1100 Keyboard bezel” on page 98



Step	Screw (quantity)	Torque
<b>1</b>	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.



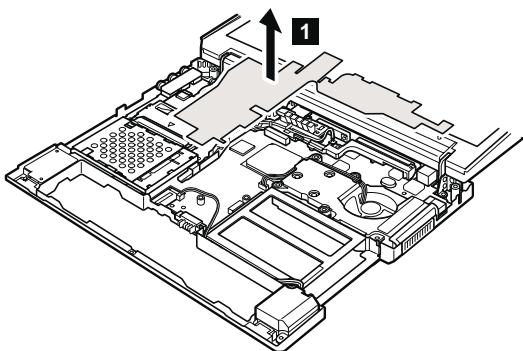
## 1140 Speaker assembly

For access, remove following FRUs, in order:

- “1010 Battery pack” on page 71
- “1020 Hard-disk drive” on page 72
- “1030 DIMM cover” on page 74
- “1040 DIMM” on page 75
- “1050 Backup battery” on page 76
- “1060 Keyboard” on page 77
- “1090 Communication daughter card (CDC)” on page 91 (only for the models with the CDC)
- “1100 Keyboard bezel” on page 98

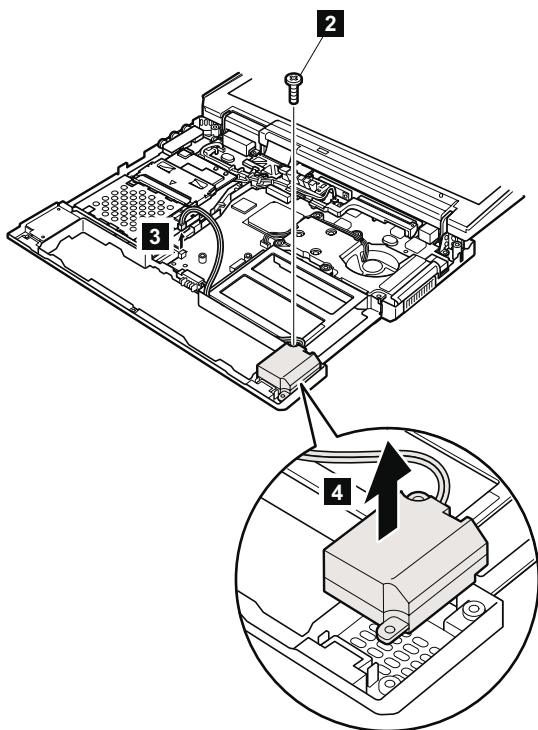
**Note:** Step **1** is only for the X30 series. For the X31 series, skip this step.

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



(continued)

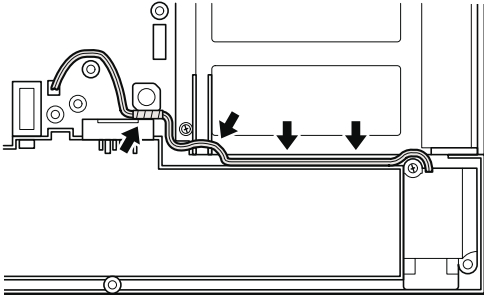
## Removing and replacing a FRU



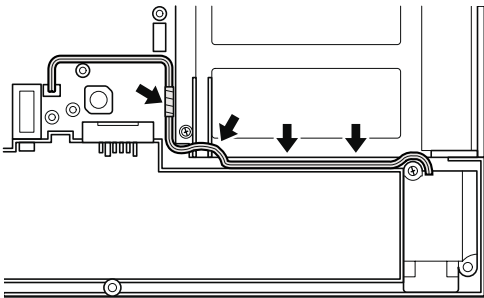
Step	Screw (quantity)	Torque
2	M2 x 14 mm with washer, nylon-coated (1)	0.245 Nm (2.5 kgfcm)

**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.

**For X30 series**



**For X31 series**

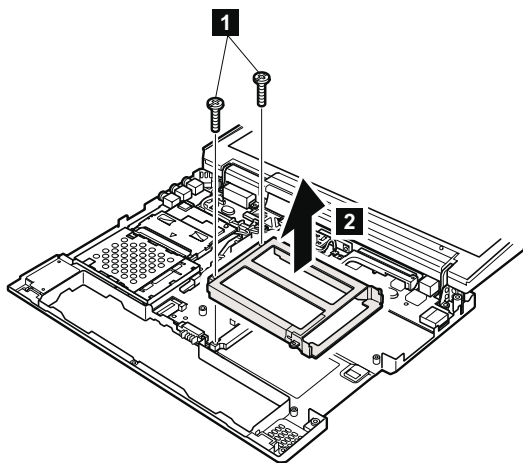


## 1150 System board and base cover

For access, remove following FRUs, in order:

- “1010 Battery pack” on page 71
- “1020 Hard-disk drive” on page 72
- “1030 DIMM cover” on page 74
- “1040 DIMM” on page 75
- “1050 Backup battery” on page 76
- “1060 Keyboard” on page 77
- “1070 Mini PCI adapter” on page 81
- “1080 Fan assembly” on page 89
- “1090 Communication daughter card (CDC)” on page 91
- “1100 Keyboard bezel” on page 98
- “1110 PC card slot” on page 101
- “1120 Hinge cover and LCD assembly” on page 104
- “1130 Sub card assembly” on page 108
- “1140 Speaker assembly” on page 109

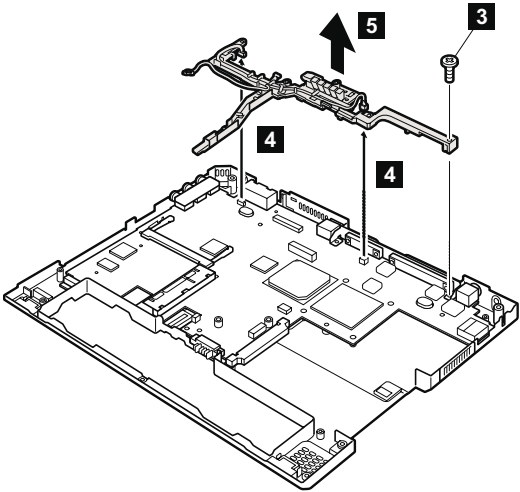
Before removing the system board, remove the hard-disk drive holder (steps **1** and **2**) and the cable guide (steps **3** to **5**).



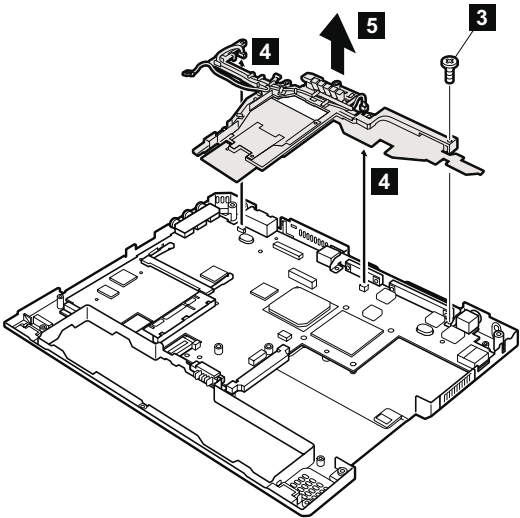
Step	Screw (quantity)	Torque
<b>1</b>	M2 × 9.5 mm, nylon-coated (2)	0.245 Nm (2.5 kgfcm)

(continued)

For X30 series



For X31 series



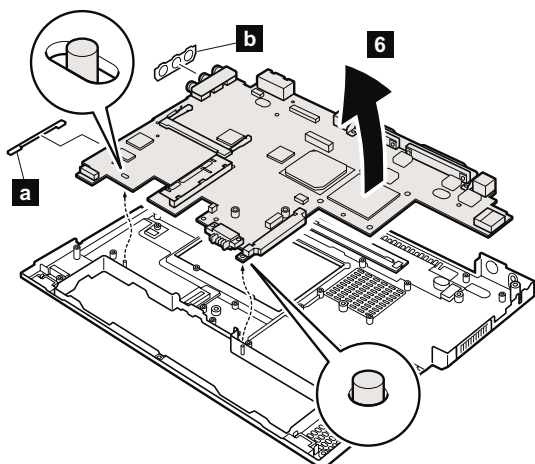
Step	Screw (quantity)	Torque
3	M2 x 9.5 mm, nylon-coated (1)	0.245 Nm (2.5 kgfcm)

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

(continued)

### Removing and replacing a FRU

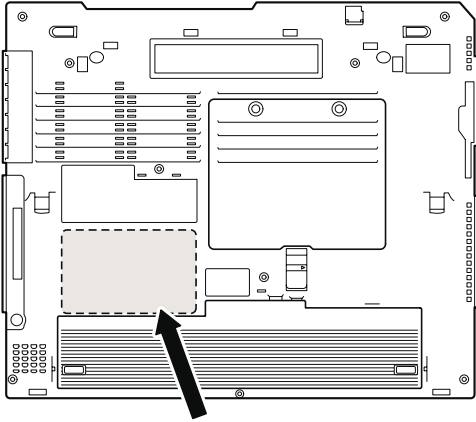
PC Card guide ( **a** ) and audio connector retainer ( **b** ) are attached to the system board. When you replace the system board, reinstall those parts to the new system board FRU.



**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.

**For X31 series**

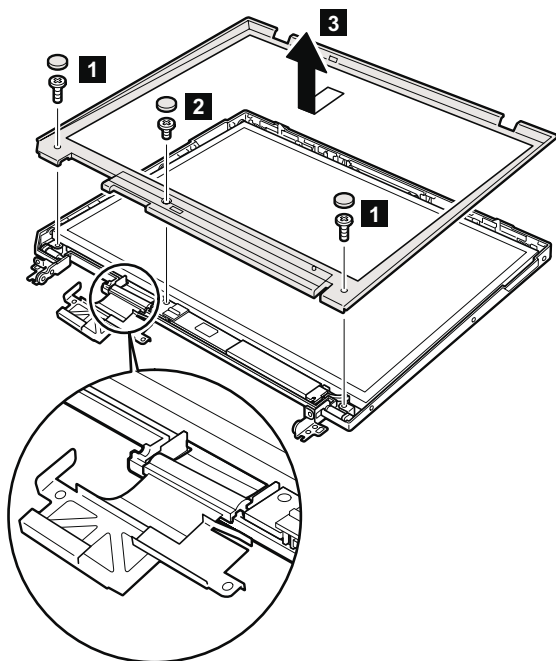
When you order a new base cover, you also need to order the label kit. Check the FRU no. on both FRUs first and order them at same time. Stick the label kit on the new base cover as indicated in the following figure.



## 2010 LCD front bezel

For access, remove following FRUs, in order:

- “1010 Battery pack” on page 71
- “1020 Hard-disk drive” on page 72
- “1030 DIMM cover” on page 74
- “1040 DIMM” on page 75
- “1050 Backup battery” on page 76
- “1060 Keyboard” on page 77
- “1100 Keyboard bezel” on page 98
- “1120 Hinge cover and LCD assembly” on page 104



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

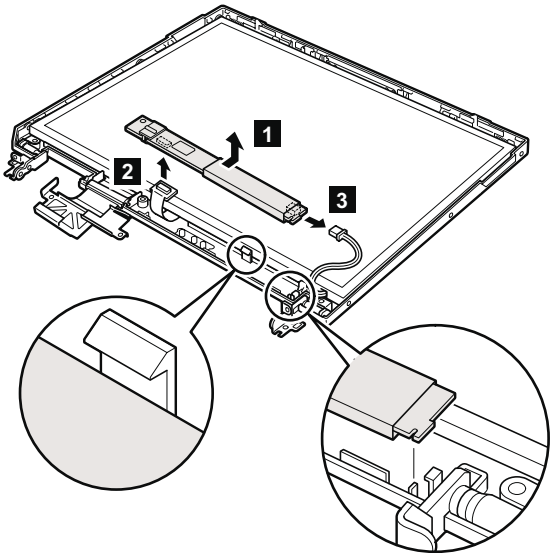
**When installing:** Make sure that all of the latches of the LCD front bezel are firmly attached to the LCD cover. Then secure the bezel with the screws.



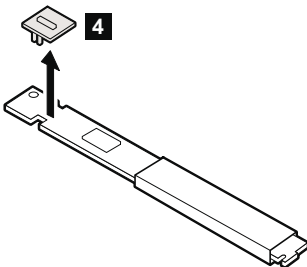
## 2020 Inverter card

For access, remove following FRUs, in order:

- “1010 Battery pack” on page 71
- “1020 Hard-disk drive” on page 72
- “1030 DIMM cover” on page 74
- “1040 DIMM” on page 75
- “1050 Backup battery” on page 76
- “1060 Keyboard” on page 77
- “1100 Keyboard bezel” on page 98
- “1120 Hinge cover and LCD assembly” on page 104
- “2010 LCD front bezel” on page 116



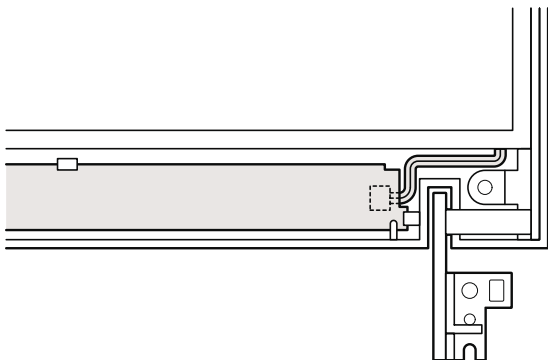
If the ThinkPad computer you are servicing has the Bluetooth features, remove Bluetooth button cover **4** from the defective inverter card and keep the cover for reuse.



**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:

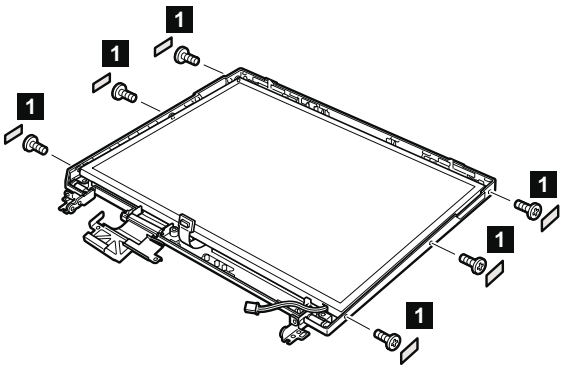


## 2030 LCD panel

For access, remove following FRUs, in order:

- “1010 Battery pack” on page 71
- “1020 Hard-disk drive” on page 72
- “1030 DIMM cover” on page 74
- “1040 DIMM” on page 75
- “1050 Backup battery” on page 76
- “1060 Keyboard” on page 77
- “1100 Keyboard bezel” on page 98
- “1120 Hinge cover and LCD assembly” on page 104
- “2010 LCD front bezel” on page 116
- “2020 Inverter card” on page 117

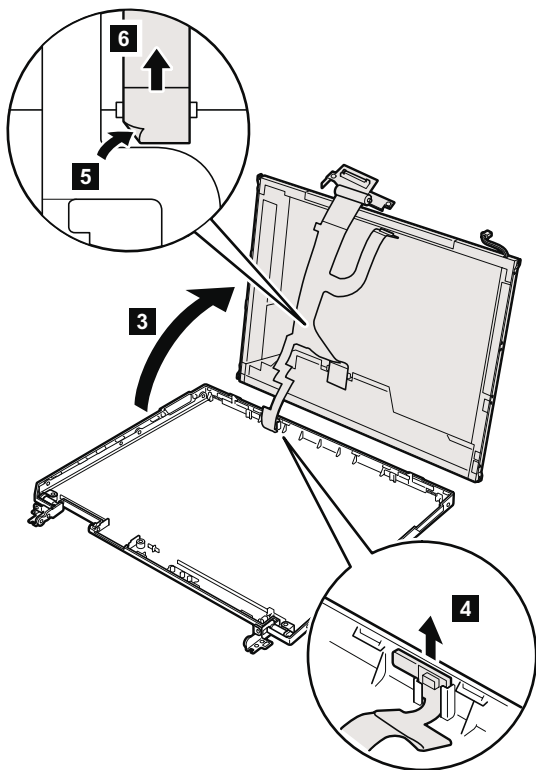
### For models with no wireless LAN antenna



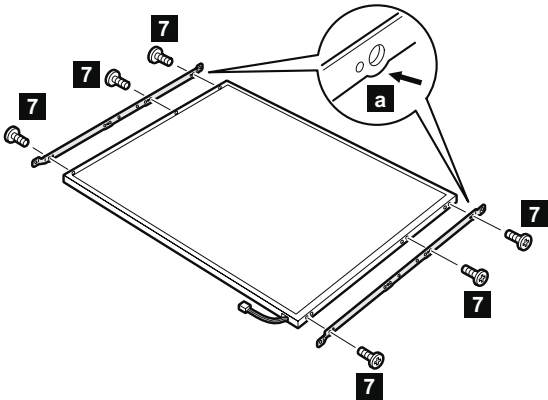
Step	Screw (quantity)	Torque
<b>1</b>	M2 x 4 mm, nylon-coated (6)	0.245 Nm (2.5 kgfcm)

(continued)

Removing and replacing a FRU



(continued)

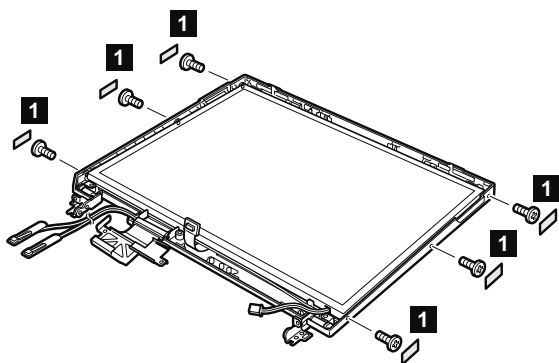


Step	Screw (quantity)	Torque
<b>7</b>	M2 × 3 mm, nylon-coated (6)	0.2 Nm (2 kgfcm)

#### When installing

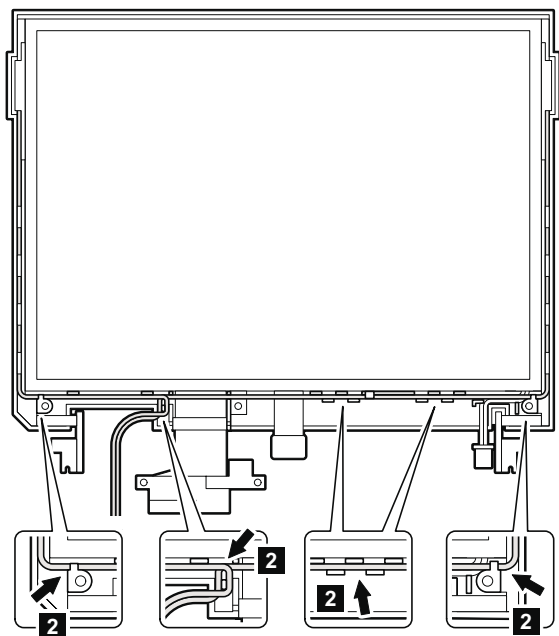
- Do not pinch the antenna cables under the LCD panel.
- Make sure that the antenna cables are firmly routed along the cable guides of the LCD cover.

## For wireless LAN models

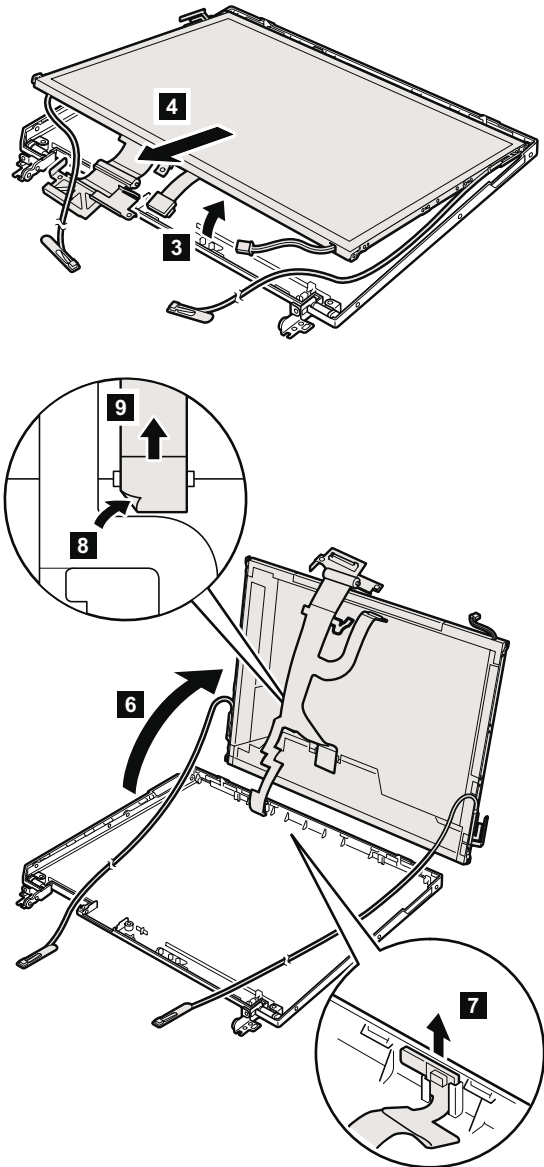


Step	Screw (quantity)	Torque
<b>1</b>	M2 x 4 mm, nylon-coated (6)	0.245 Nm (2.5 kgfcm)

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



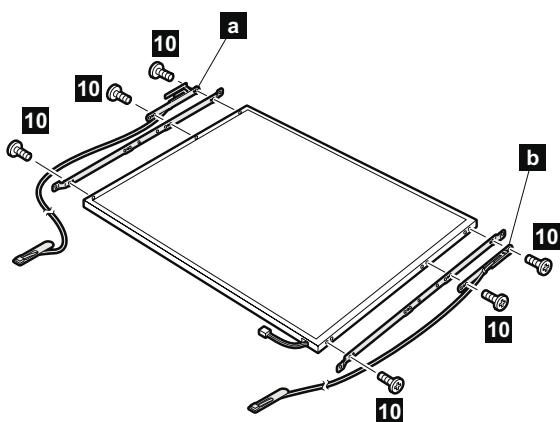
(continued)



(continued)

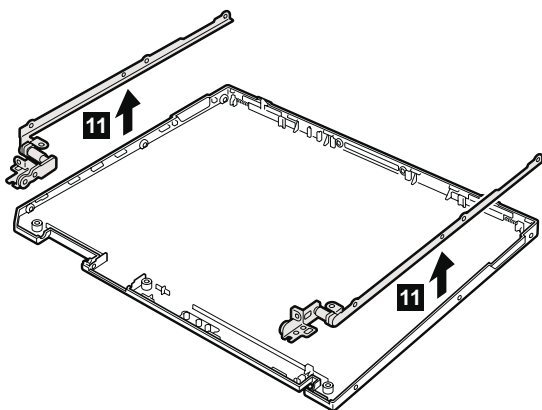
### Removing and replacing a FRU

**Attention:** Do not bend the metal part of the wireless LAN antenna.



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

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

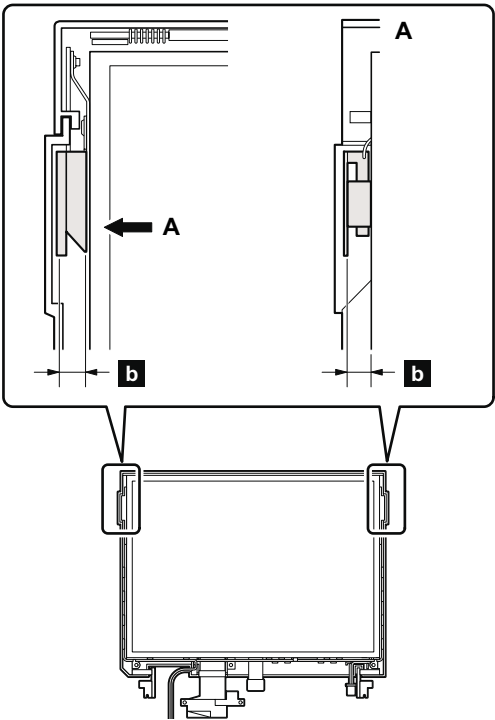


(continued)



**When installing:**

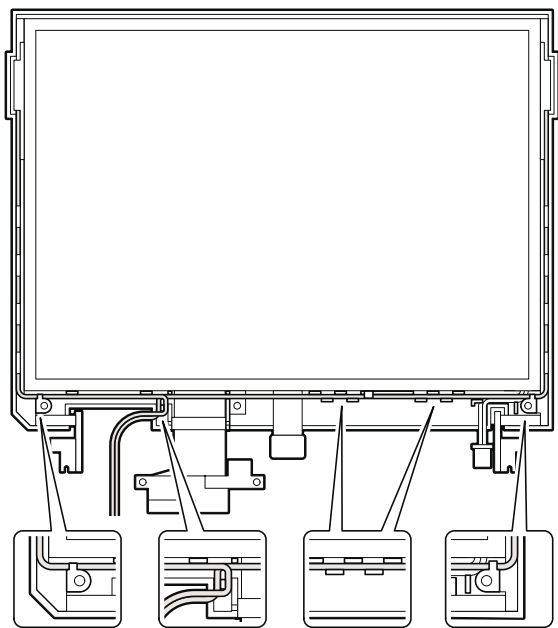
- Make sure that the metal plate of the antenna is not bent.
- The antenna must be placed as in this figure ( **b** should be parallel.)



- Place the FPC connector to pass under the black antenna cable.
- Do not pinch the antenna cables under the LCD panel.  
(continued)

*Removing and replacing a FRU*

- Make sure that the antenna cables are firmly routed along the cable guides of the LCD cover.

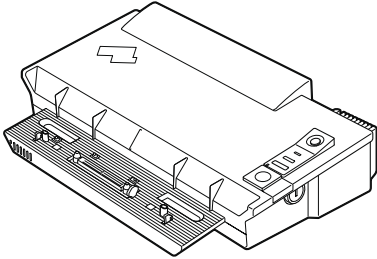


## 3010 ThinkPad Dock PCI cover

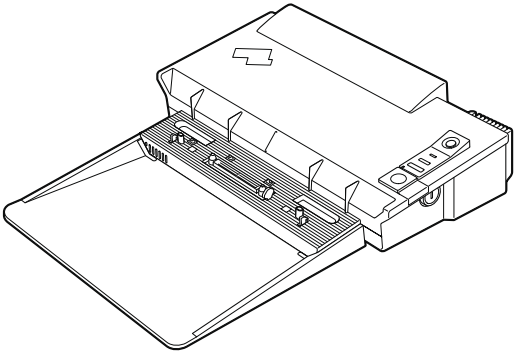
### Before replacing the PCI cover:

There are two types of ThinkPad Dock, as follows:

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



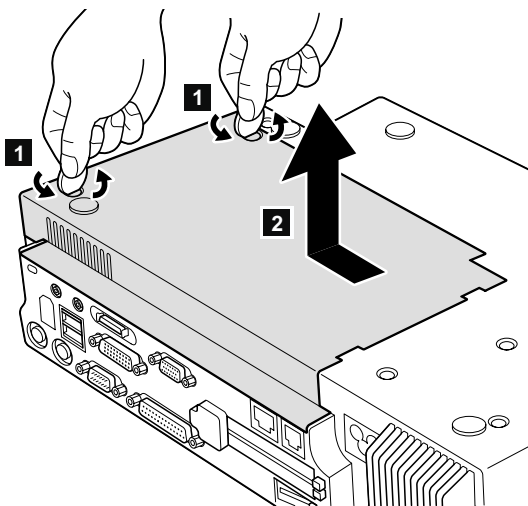
- ThinkPad Dock with extension plate: FRU no. 08N1537 (PCI cover: FRU no. 08N7317)



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).

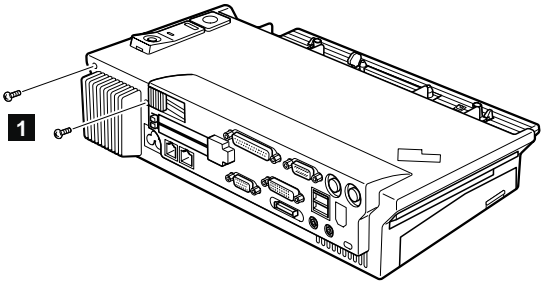


(Bottom view)

## 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) .

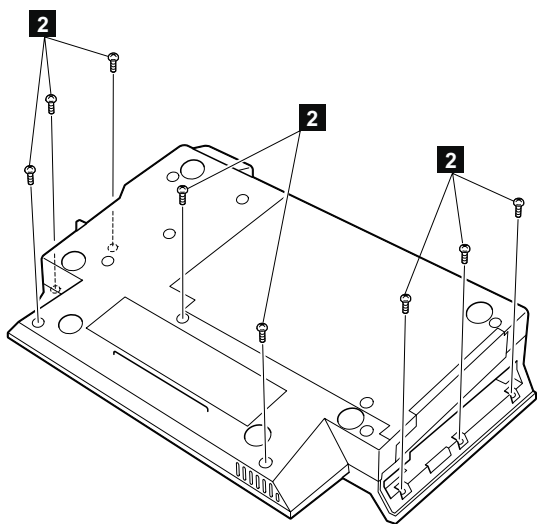


(Rear view)

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

(continued)

## Removing and replacing a FRU

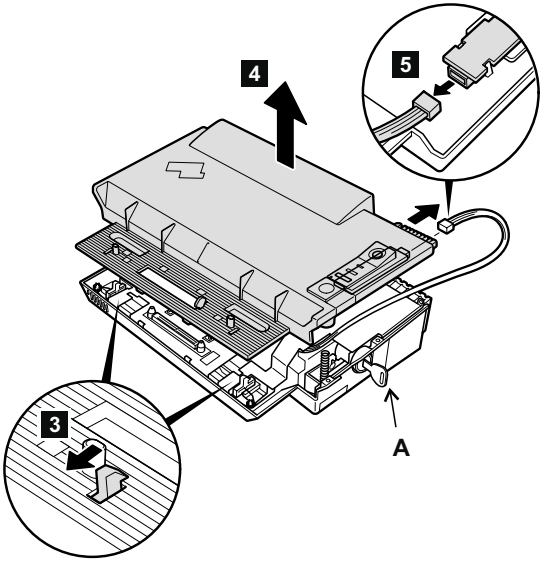


(Bottom view)

Step	Screw (quantity)	Torque
<b>2</b>	M2.5 x 4.8 mm (8)	0.392 Nm (4 kgfcm)

(continued)

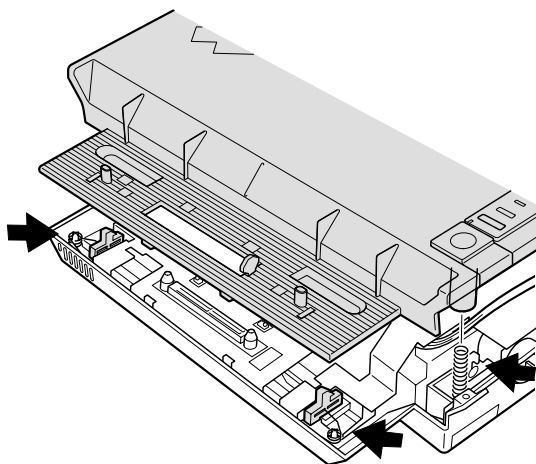
Make sure that the system lock key **A** is set to the Unlock position. Release the front latches in step **3**, and then remove the top cover **4**. For step **5**, see the inside view, shown in the circle.



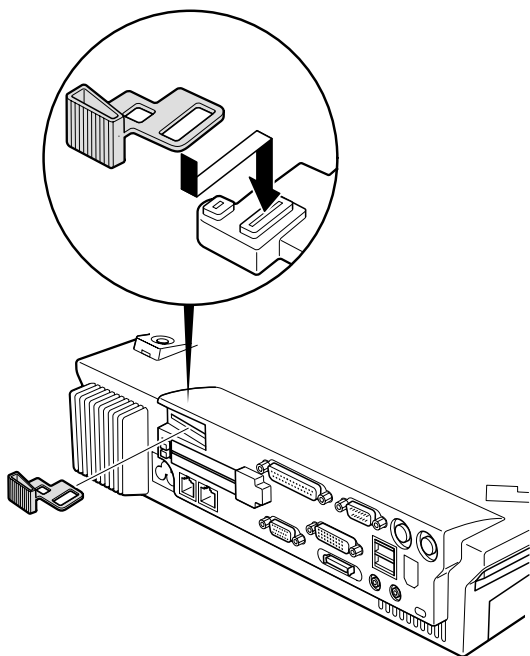
### Removing and replacing a FRU

When replacing the top cover, do the following:

- Make sure that the springs are placed correctly.



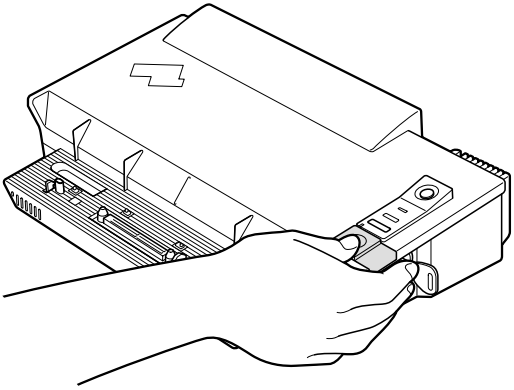
- Make sure that the device release lever is seated correctly.



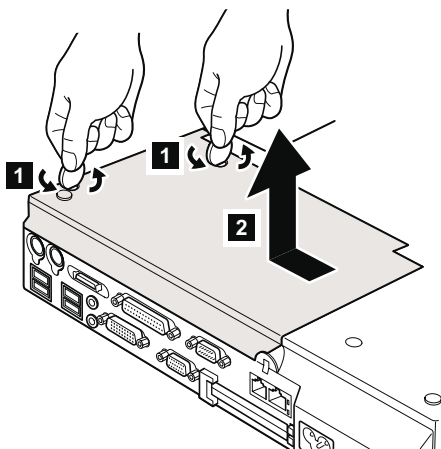
(continued)



- Make sure that the release button works correctly.

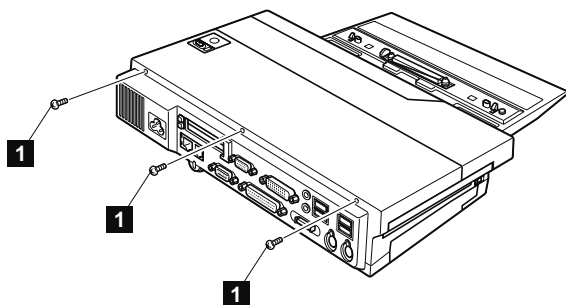


## 4010 ThinkPad Dock II PCI cover



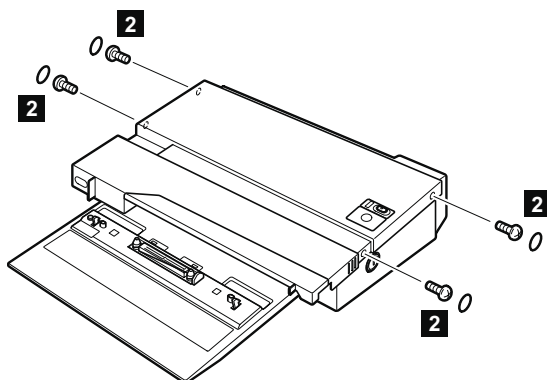
(Bottom view)

## 4020 ThinkPad Dock II top cover



(Rear view)

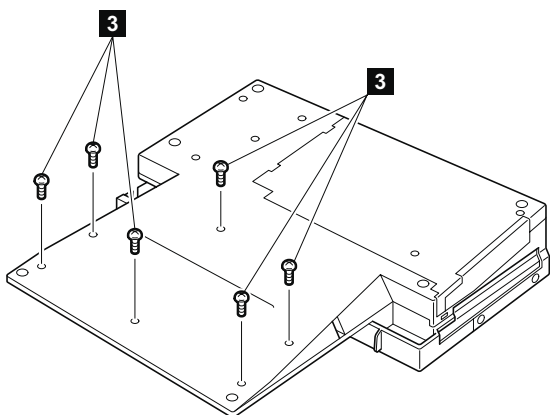
Step	Screw (quantity)	Torque
<b>1</b>	M2.5 × 4.8 mm (3)	0.392 Nm (4 kgfcm)



Step	Screw (quantity)	Torque
<b>2</b>	M2.5 × 4.8 mm (4)	0.392 Nm (4 kgfcm)

(continued)

Removing and replacing a FRU



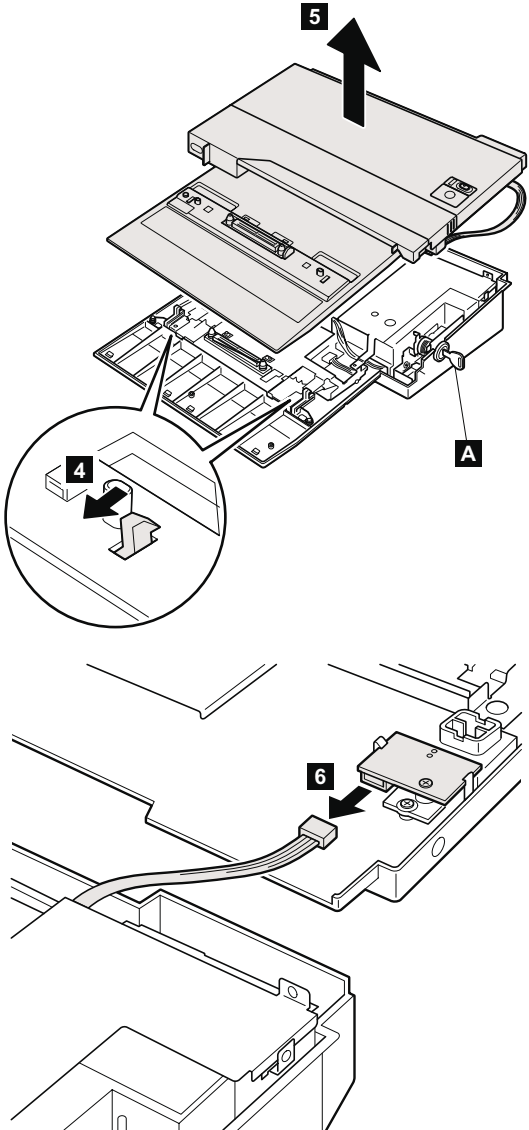
(Bottom view)

Step	Screw (quantity)	Torque
<b>3</b>	M2.5 × 4.8 mm (6)	0.392 Nm (4 kgfcm)

(continued)

*Removing and replacing a FRU*

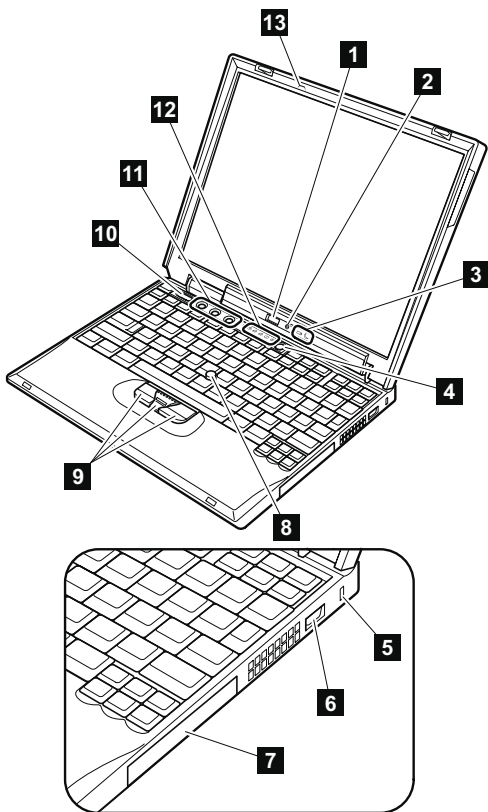
Make sure that the system lock key **A** is set to the Unlock position. Release the front latches in step **4**, and then remove the top cover **5**. Then detach the connector cable **6** as in the figure.



## Locations

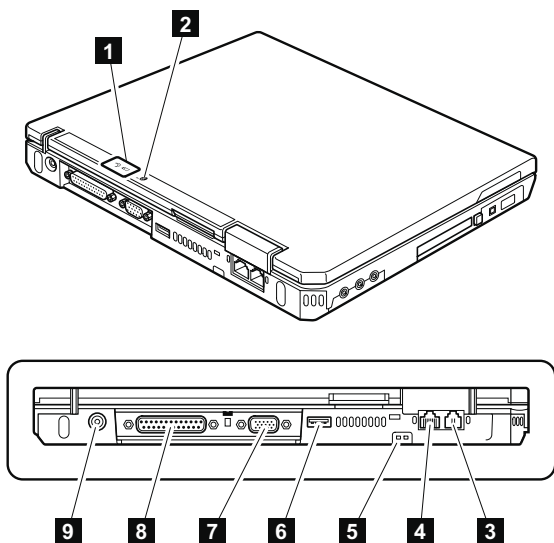
### Front view for X30 series

- 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



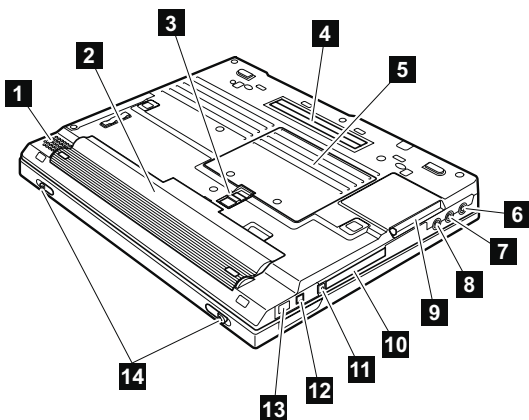
## Rear view for X30 series

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



## Bottom view for X30 series

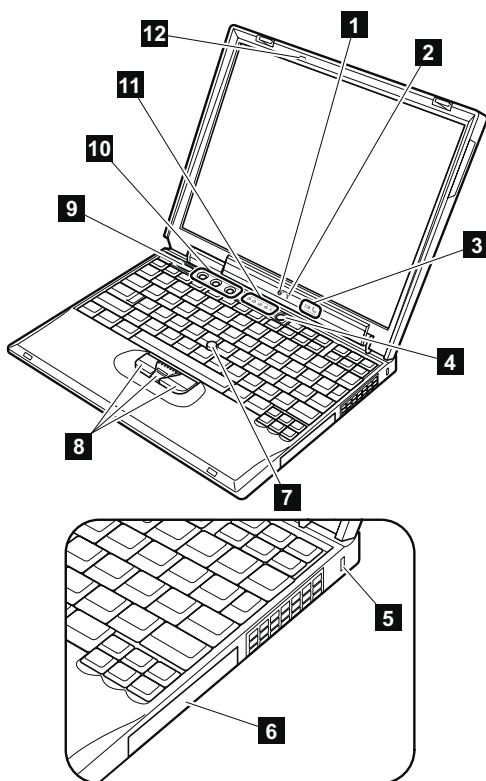
- 1** Built-in speaker
- 2** Battery pack
- 3** Battery pack latches
- 4** Docking connector
- 5** DIMM slots
- 6** Stereo headphone jack
- 7** Stereo line-in jack
- 8** Microphone jack
- 9** CompactFlash card slot or Infrared port
- 10** PC Card slot
- 11** PC Card eject button
- 12** IEEE 1394 connector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





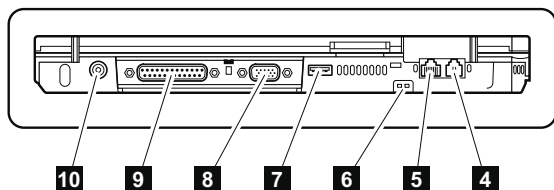
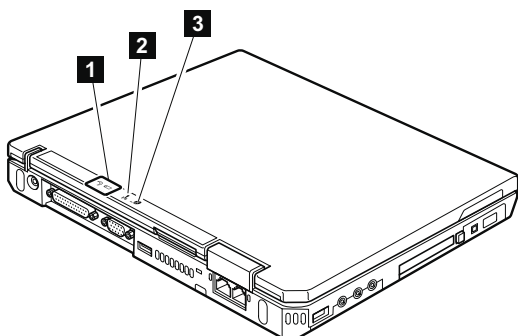
## Front view for X31 series

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



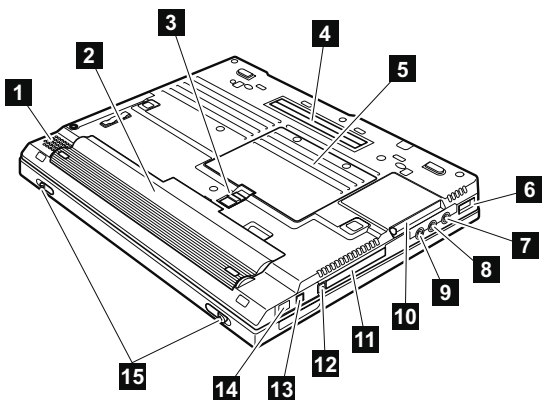
## Rear view for X31 series

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



**Bottom view for X31 series**

- 1** Built-in speaker
- 2** Battery pack
- 3** Battery pack latches
- 4** Docking connector
- 5** DIMM slots
- 6** Universal serial bus (USB) connector
- 7** Stereo headphone jack
- 8** Stereo line-in jack
- 9** Microphone jack
- 10** CompactFlash card slot or Infrared port
- 11** PC Card slot
- 12** PC Card eject button
- 13** IEEE 1394 connector
- 14** Infrared port
- 15** 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 X3 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

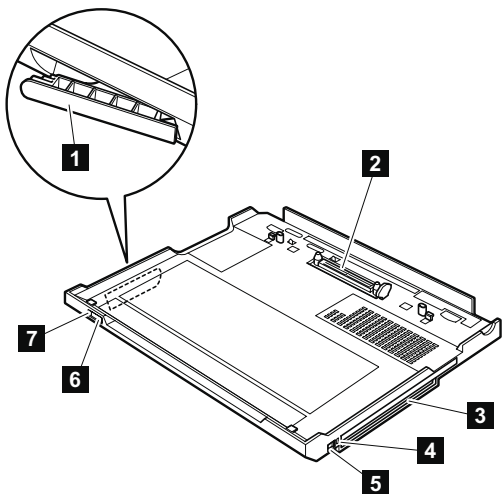
- 6** UltraBase eject button

- 7** UltraBase status indicator

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

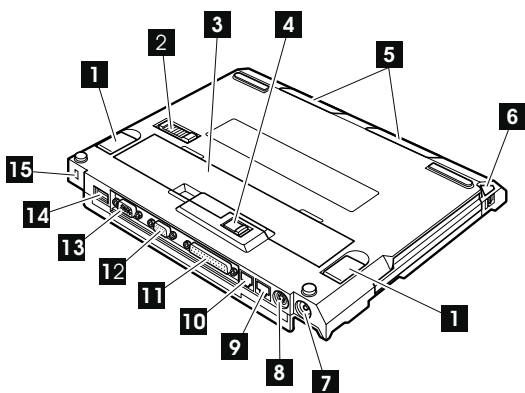
**Turn off:**

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

### X30 and X31 series model matrix

The X30 and X31 series includes several models. The following tables summarize 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 <sup>SC</sup>	—	802.11b/modem	12.1-in. XGA with antenna		
X30 (memory, 256 MB; HDD, 20 GB)					
2672-31x, 32x, 33x	MDC	—	12.1-in. XGA	—	Tual 1.06 G
X30 (memory, 256 MB; HDD, 40 GB)					
2672-41x, 42x, 43x, 45x, 46x, 47x	MDC	—	12.1-in. XGA	—	Tual 1.2 G
2673-42x					
2672-4Nx, 4Px, 4Qx				DVD-ROM	
2672-76x, 7MT				CD-ROM	Tual 1.06 G
2672-4Ax, 4Bx, 4Cx, 4Ex <sup>SC</sup>	—	802.11b/modem	12.1-in. XGA with antenna	—	Tual 1.2 G
2673-4Bx <sup>SC</sup>					
2672-4Rx, 4Sx, 4Tx <sup>SC</sup>				DVD-ROM	
2672-4Fx, 4Gx, 4Hx, 4Jx <sup>SC</sup>	BDC			—	
2672-4Vx, 4Wx <sup>SC</sup>				DVD-ROM	
2672-4Xx	MDC	802.11b		—	

(continued)

Model	CDC	Mini PCI adapter	LCD	Bay device for UltraBase	CPU	
X31 (memory, 256 MB; HDD, 20 GB)						
2672-B1x, B2x, B3x	MDC	—	12.1-in. XGA with antenna	—	Ban 1.3G	
2884-BNx <sup>SC</sup>						
2672-BLx, BMx				CD-ROM		
2672-BAx, BBx, BCx, 2884-BRx <sup>SC</sup>		802.11b		—		
X31 (memory, 256 MB; HDD, 40 GB)						
2672-FQx	MDC	—	12.1-in. XGA with antenna	DVD-ROM	Ban 1.3G	
2672-F2x, F3x				—		
2672-C1x, C3x						Ban 1.4G
2672-C2x, C6x, C7x, C8x, 2673-C2x, 2890-C2x, 2891-C2x <sup>SC</sup>						
2672-CPx, CQx					DVD-ROM	
2672-CAx, CBx, 2673-CBx, 2884-CRx <sup>SC</sup>		802.11b		—		
2672-CDx, CEx, CFx <sup>SC</sup>	BMDC	—				
2672-CKx <sup>SC</sup>		—				
2672-CTx <sup>SC</sup>		802.11b		DVD-ROM		
2672-CSx <sup>SC</sup>	MDC	—				
2672-CXx <sup>SC</sup> , 2673-CXx <sup>SC</sup>		802.11b (Cisco)		—		
2672-CZx <sup>SC</sup>	BMDC	—				
2672-J6x, J7x <sup>SC</sup>	MDC	—			Ban 1.4G (GB) <sup>*1</sup>	
2672-JAx, JBx <sup>SC</sup>		802.11b				
2672-JXx <sup>SC</sup>		802.11b (Cisco)				
2672-JHx, JJx, 2884-JUx <sup>SC</sup>	BMDC	802.11a/b				
2672-JVx <sup>SC</sup>				DVD-ROM		

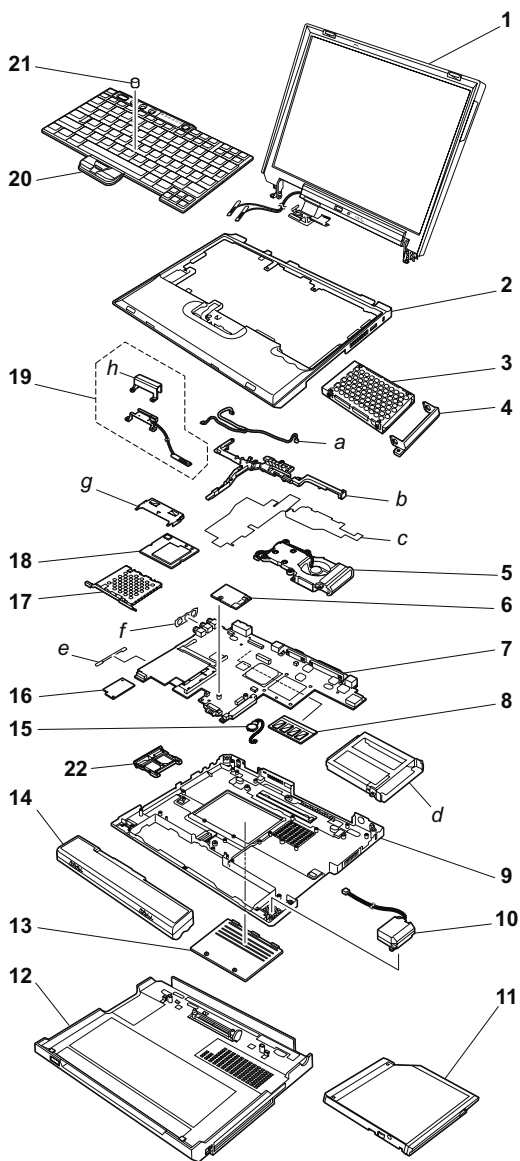
(continued)

Parts list

Model	CDC	Mini PCI adapter	LCD	Bay device for UltraBase	CPU
X31 (memory, 512 MB; HDD, 40 GB)					
2672-KVx <sup>SC</sup>	BMDC	802.11a/b	12.1-in. XGA with antenna	DVD-ROM	Ban 1.4G (GB) *1
Tual xxxG: Mobile Intel® Pentium® III processor - M xxx GHz Ban xxxG: Intel® Pentium® M processor xxx GHz SC: featuring security chip *1: featuring Gigabit Ethernet					



## Overall



Parts list

- Each FRU is available for all types or models, unless specific types or models are specified.
- A CRU (customer-replacable unit) is identified by a single asterisk (\*) or two asterisks (\*\*) in the CRU ID column. An N in the CRU ID column means that the part is not a CRU. A single asterisk (\*) means that the part is a Tier 1 CRU; two asterisks (\*\*) mean that the part is a Tier 2 CRU.

**Tier 1 CRU:**

(Example: Mouse, external keyboard, and hard-disk drive with coin screw)

- NO TOOLS ARE REQUIRED.
- A coin or a thumb screw is acceptable.
- Minimal technical expertise is required.
- Minimal problem determination is required—less than 5 minutes.

**Tier 2 CRU:**

(Example: Adapter card, ThinkPad memory)

- Up to 4 screws or fasteners have to be removed.
  - Some technical experience is required.
  - HelpCenter assistance may be used.
  - Problem determination can be done by the customer, either on site or with HelpCenter assistance.
- FRUs marked with **OP** are available as options.

No.	FRU	P/N	CRU ID
<i>a-h</i>	See "Miscellaneous parts" on page 167.		
1	LCD unit (see "LCD FRUs" on page 159).		
2	Keyboard bezel assembly for X30 • 2672-xxA, xxB, xxC, xxE, xxF, xxG, xxH, xxJ, xxM, xxP, xxS, xxT, xxU, xxX • 2672-4B7 • 2673-xxA, xxB, xxC, xxE, xxF, xxG, xxH, xxJ, xxM, xxP, xxS, xxT, xxU, xxX	91P9779	N
	Keyboard bezel assembly (Korea) for X30 • 2672-xxK • 2673-42K, 4BK	91P9780	N
	Keyboard bezel assembly for X31 • 2672-xxA, xxB, xxC, xxE, xxF, xxG, xxH, xxJ, xxM, xxP, xxS, xxV, xxU, xxY • 2673-xxA, xxB, xxC, xxE, xxF, xxG, xxH, xxJ, xxM, xxP, xxS, xxV, xxU, xxY • 2884-xxU	91P9781	N
	Keyboard bezel assembly (Korea) for X31 • 2672-xxK • 2673-xxK	91P9782	N

(continued)

No.	FRU	P/N	CRU ID
3	Hard-disk drive (20 GB) 9.5 mm 4200 rpm, IBM STD <b>OP</b> <ul style="list-style-type: none"> <li>• 2672-1xx, 3xx</li> <li>• 2672-B1x, B2x, B3x, BAx, BBx, BLx, BMx</li> <li>• 2884-BNx, BRx</li> </ul>	27L4286	*
	Hard-disk drive (20 GB) 9.5 mm 4200 rpm, HITACHI <ul style="list-style-type: none"> <li>• 2672-1xx, 3xx</li> <li>• 2672-B1x, B2x, B3x, BAx, BBx, BLx, BMx</li> <li>• 2884-BNx, BRx</li> </ul>	08K9533	*
	Hard-disk drive (40 GB) 9.5 mm 4200 rpm, IBM STD <ul style="list-style-type: none"> <li>• 2672-4xx, 7xx</li> <li>• 2673-4xx</li> <li>• 2672-C1x, C2x, C3x, C6x, C7x, C8x, CAx, CBx, CDx, CEx, CFx, CKx, CPx, CQx, CSx, CTx, CXx, CZx, F2x, F3x, J6x, J7x, J7x, JAx, JBx, JHx, JJx, JVx, KVx</li> <li>• 2673-C2x, CBx, CXx</li> <li>• 2884-CRx, JUx</li> </ul>	08K9683	*
	Hard-disk drive (40 GB) 9.5 mm 4200 rpm, HITACHI <ul style="list-style-type: none"> <li>• 2672-4xx, 7xx</li> <li>• 2673-4xx</li> <li>• 2672-C1x, C2x, C3x, C6x, C7x, C8x, CAx, CBx, CDx, CEx, CFx, CKx, CPx, CQx, CSx, CTx, CXx, CZx, F2x, F3x, J6x, J7x, J7x, JAx, JBx, JHx, JJx, JVx, KVx</li> <li>• 2673-C2x, CBx, CXx</li> <li>• 2884-CRx, JUx</li> </ul>	08K9767	*
for optional hard-disk drive, see "Optional FRUs" on page 169.			
4	Cover, hard-disk drive	27L6750	*
5	Fan assembly for X30	27L6738	N
	Fan assembly for X31	67P1443	N
6	Modem daughter card (MDC) <ul style="list-style-type: none"> <li>• X30: 2672-x1x, x2x, x3x, x4x, x5x, x6x, x7x, xLx, xMx, xNx, xPx, xQx, xXx, xYx</li> <li>• X31: 2672-x1x, x2x, x3x, x4x, x6x, x7x, x8x, x9x, xAx, xBx, xCx, xLx, xMx, xPx, xQx, xSx, xVx, xXx, xYx</li> <li>• 2673-42x, 4Bx, C2x, CBx, CXx</li> <li>• 2884-BNx, BRx, CRx</li> </ul>	26P8447	**
		26P8256	**

(continued)

Parts list

No.	FRU	P/N	CRU ID
6	Bluetooth daughter card (BDC) • 2672-4Fx, 4Gx, 4Hx, 4Jx, 4Vx	12P3872	**
	IBM Integrated Bluetooth with 56K Modem (BMDC) • 2672-CDx, CEx, CFx, CJx, CKx, CTx, CZx, JHx, JJx, JVx, KVx • 2884-JUx	91P7259	**
7	System board assembly, Tual NV1.06 G • 2672-11x, 12x, 31x, 32x, 33x, 54x, 76x, 7Mx	26P8378	N
	System board assembly, Tual NV1.2 G • 2672-41x, 42x, 43x, 45x, 46x, 4Nx, 4Px, 4Qx, 64x • 2673-42x	26P8379	N
	System board assembly, Tual NV1.06 G (with security) • 2672-1Ax, 1Bx, 5Dx	26P8383	N
	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	N
	System board assembly, Intel® Pentium® M processor 1.3 G • 2672-B1x, B2x, B3x, BLx, BMx, D4x, F2x, F3x, FQx	26P8527	N
	System board assembly, Intel® Pentium® M processor 1.3 G (with security) • 2672-BAx, BBx • 2884-BNx, BRx	26P8528	N
	System board assembly, Intel® Pentium® M processor 1.4 G • 2672-C1x, C2x, C3x, CPx, CQx • 2673-C2x	26P8525	N
	System board assembly, Intel® Pentium® M processor 1.4 G (with security) • 2672-C6x, C7x, C8x, CAx, CBx, CDx, CEx, CFx, CKx, CSx, CTx, CXx, CZx • 2673-CBx, CXx • 2884-CRx	26P8526	N
	System board assembly, Intel® Pentium® M processor 1.4 G (with Gigabit Ethernet, security) • 2672-J6x, J7x, JAx, JBx, JHx, JJx, JVx, JXx, KVx • 2884-JUx	26P8529	N

(continued)

No.	FRU	P/N	CRU ID
8	DIMM card for X30 series		
	128-MB SDRAM SO DIMM (PC133) <b>OP</b> • 2672-1xx	19K4653	*
	256-MB SDRAM SO DIMM (PC133) <b>OP</b> • 2672-3xx, 4xx, 7xx • 2673-4xx	19K4655	*
	DIMM card for X31 series		
	256-MB DDR SDRAM SO DIMM (PC2100) <b>OP</b> • 2672-Bxx, Cxx, Fxx, Jxx • 2673-Cxx • 2884-BNx, BRx, CRx, JUx	10K0031	*
	512-MB DDR SDRAM SO DIMM (PC2100) <b>OP</b> • 2672-KVx	10K0033	*
for optional DIMM, see "Optional FRUs" on page 169.			
9	Base cover assembly for 2672 WW (X30) • 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	N
	Base cover assembly for 2672 WW (X30) 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	N
	Base cover assembly for 2672 WW (X30) 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	N
	Base cover assembly for 2672 WW (X30) Cisco Wireless Mini-PCI • 2672-4XA, 4XB, 4XE, 4XF, 4XG, 4XH, 4XM, 4XU, 4YA	62P4188	N
	Base cover assembly for 2672 Japan (X30) Cisco Wireless Mini-PCI • 2672-4XJ	62P4189	N
	Base cover assembly for 2672 EMEA (X30) Cisco Wireless Mini-PCI • 2672-4XG	62P4190	N

(continued)

Parts list

No.	FRU	P/N	CRU ID
9	Base cover assembly for 2672 Taiwan (X30) • 2672-32T, 33T, 76T, 7MT, 42T, 43T, 46T, 4QT	46P3151	N
	Base cover assembly for 2672 Taiwan (X30) IBM Wireless Mini-PCI • 2672-4BT	46P3152	N
	Base cover assembly for 2672 Taiwan (X30) IBM Wireless Mini-PCI+BT • 2672-4HT, 4JT, 4VT	46P3153	N
	Base cover assembly for 2672 Korea (X30) • 2672-32K, 33K, 42K, 43K, 45K	46P3156	N
	Base cover assembly for 2672 Korea (X30) IBM Wireless Mini-PCI • 2672-4BK, 4CK, 4EK	46P3157	N
	Base cover assembly for 2672 Korea (X30) IBM Wireless Mini-PCI+BT • 2672-4HK, 4JK	46P3158	N
	Base cover assembly for 2672 China (X30) • 2672-33C, 42C, 4NC, 4PC, 4QC	46P3161	N
	Base cover assembly for 2672 China (X30) IBM Wireless Mini-PCI+BT • 2672-4BC, 4RC, 4SC, 4TC, 4VC, 4WC	46P3163	N
	Base cover assembly for 2673 WW (X30) • 2673-42U, 42F, 42P, 42S, 42X, 42G, 42J, 42A, 42H, 42B, 42E, 42M	27L6734	N
	Base cover assembly for 2673 WW (X30) IBM Wireless Mini-PCI • 2673-4BU, 4BF, 4BP, 4BS, 4BX, 4BG, 4BJ, 4BA, 4BH, 4BB, 4BE, 4BM	46P2922	N
	Base cover assembly for 2673 Taiwan (X30) • 2673-42T	46P3154	N
	Base cover assembly for 2673 Taiwan (X30) IBM Wireless Mini-PCI • 2673-4BT	46P3155	N
	Base cover assembly for 2673 Korea (X30) • 2673-42K	46P3159	N
	Base cover assembly for 2673 Korea (X30) IBM Wireless Mini-PCI • 2673-4BK	46P3160	N
	Base cover assembly for 2673 China (X30) • 2673-42C	46P3164	N

(continued)

No.	FRU	P/N	CRU ID
9	Base cover assembly for 2673 China (X30) IBM Wireless Mini-PCI • 2673-4BC	46P3165	N
	Base cover assembly for 2672 WW (X31) • 2672-all (except xxK)	67P1427	N
	Base cover assembly for 2672 Korea (X31) • 2672-xxK	67P1429	N
	Base cover assembly for 2673 WW (X31) • 2673-Cxx except CxK	67P1436	N
	Base cover assembly for 2673 Korea (X31) • 2673-CxK	67P1430	N
	Base cover assembly for 2884 (X31) • 2884-all	13N4994	N
	Base cover assembly for 2890 (X31) • 2890-all except xxK	91P9084	N
	Base cover assembly for 2890 (X31) • 2890-xxK	91P9086	N
	Base cover assembly for 2891 (X31) • 2891-all except xxK	91P9088	N
	Base cover assembly for 2891 (X31) • 2891-xxK	91P9090	N
—	Label kit 802.11b WW • 2672-C2F, CBF, CXF, H2F, HBF, C2P, CBP, CKP, CXP, C2S, CBS, CKS, CXS, C1U, C2U, CAU, CBU, CKU, CXU, H1U, H2U, HAU, HBU, J6U, J7U, JAU, JBU, JXU • 2884-BRU, CRU	67P1428	N
	Label kit 802.11b China • 2672-B3C, C2C, CBC, CPC, CSC, CXC, H2C	67P1432	N
	Label kit 802.11b Korea • 2672-CBK, CFK, CTK	67P1431	N
	Label kit 802.11b Cisco Taiwan • 2672-CXV	67P1438	N
	Label kit 802.11b Actiontec Taiwan • 2672-BAT, BBT, CAT, CBT, CST, HAT, HBT, JAT, JBT	67P1439	N
	Label kit 802.11a/b WW • 2672-JVA, KVA, JHB, JHF, JHG, JJH, JHH, JHM, JHU • 2884-JUU	67P1435	N
	Label kit 802.11a/b China • 2672-JVC	67P1433	N
	Label kit 802.11a/b Japan • 2672-JHJ	67P1434	N

(continued)

Parts list

No.	FRU	P/N	CRU ID
—	Label kit 802.11a/b Taiwan • 2672-JVV	67P1440	N
	Label kit (modem only) Taiwan IIPC • 2672-xxV	91P8359	N
10	Speaker assembly	27L6748	N
11	Ultrabay Plus CD-ROM drive, TEAC <b>OP</b> • 2672-7MT	27L3436	*
	Ultrabay Plus DVD drive, MKE <b>OP</b> • 2672-4QT, 3KC, 4NC, 4PC, 4QC, 4RC, 4SC, 4TC, 4VC, 4WC, 4VT	27L4351	*
	for optional Ultrabay devices, see "Optional FRUs" on page 169.		
12	ThinkPad X3 UltraBase <b>OP</b> • 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 for X30	27L6749	N
	Cover, DIMM slot for X31	67P1452	**
14	Battery pack, Li-Ion (6 cell) PANASONIC <b>OP</b>	08K8039	*
	Battery pack, Li-Ion (6 cell) SANYO <b>OP</b>	08K8040	*
	for optional battery pack, see "Optional FRUs" on page 169.		
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	N
17	PC card slot	27L6737	N
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	**
	IBM High Rate Wireless LAN Mini PCI Adapter III		
• 2672-CBx, Cx, CE, CC, CS, CT, HBx • 2673-CBx, Cx	26P8421	**	

(continued)



No.	FRU	P/N	CRU ID
18	Cisco Aironet Wireless 802.11b Mini-PCI by IBM		
	• 2672-4XU, 4XF, 4XH, 4XA, 4XB, 4XM	26P8435	**
	• 2672-4XG, 4YG	26P8367	**
	• 2672-4XJ, 4XE	26P8369	**
	• 2672-4XC	26P8371	**
	Cisco Aironet Wireless 802.11b		
	• 2672-CBU, CBF, CBP, CBS, CBY, HBU, HBF, HBP, HBS, HBY • 2673-CBU, CBF, CBP, CBS, CBX, CXU, CXF, CXP, CXS, CXX	26P8496	**
	• 2672-CBG, CXG, HBG • 2673-CBG, CXG	26P8498	**
	• 2672-CBJ, CXJ, HBJ • 2673-CBJ, CXJ, CBE, CXE	26P8500	**
	• 2672-CBC, CXC, CSC, CTC • 2673-CBC, CXC	26P8502	**
	Intel® PRO/Wireless LAN 2100 3B Mini PCI Adapter • 2884-BRU, CRU	91P7143	**
		91P7267	**
	IBM Dual-Band 11a/b Wi-Fi Wireless Mini PCI Adapter		
	• 2672-CHx, CJx, CVx, CWx except xxJ • 2884-JUU	91P7263	N
		26P8506	N
	• 2672-CHJ	26P8447	N
• 2672-JVC	91P7265	N	
19	Bluetooth antenna and hinge cover assembly • 2672-4Gx, 4Hx, 4Jx, 4Vx, 4Wx • 2672-CHx, CJx, CVx, CWx	46P2960	N
20	Keyboard* (see "Keyboard" on page 162.)		
21	Pointing stick cap for X30 series	26P9212	*
	Pointing stick caps for X31 series	91P9642	*
22	CompactFlash socket	91P8520	*
—	External diskette drive via USB, TEAC <b>OP</b> • 2672-41J, 4AJ, 11J, 12J, 1AJ, 1BJ, 45J, 4EJ, 43K, 4CK, 4HK, 4JK, 45K, 4EK, 31A, 32A, 41A, 45A, 4AA, 4BA, 4EA, 4GA, 4HA, 33C, 4NC, 4PC, 4QC, 4RC, 4SC, 4TC, 4VC, 4WC	22P7066	*

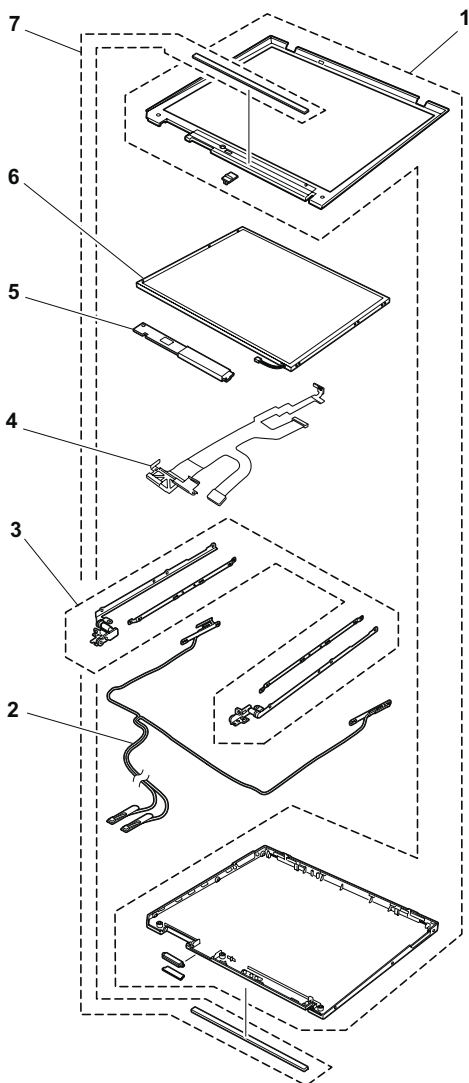
(continued)

Parts list

No.	FRU	P/N	CRU ID
—	External diskette drive via USB, SONY <b>OP</b> • 2672-41J, 4AJ, 11J, 12J, 1AJ, 1BJ, 45J, 4EJ, 43K, 4CK, 4HK, 4JK, 45K, 4EK, 31A, 32A, 41A, 45A, 4AA, 4BA. 4EA, 4GA, 4HA, 33C, 4NC, 4PC, 4QC, 4RC, 4SC, 4TC, 4VC, 4WC	06P5223	*
for optional diskette drive, see "Optional FRUs" on page 169.			
—	Telephone cable	27L0700	*
—	Thermal grease	46L4855	N
—	AC adapter <b>OP</b> (see "AC adapters" on page 161.)		
—	Recovery CD (see "Recovery CDs" on page 163.)		

# LCD FRUs

## 12.1-in. XGA TFT



## Parts list

No.	FRU	P/N	CRU ID
1	LCD cover kit 12.1-in. for X30 series		
	WW • 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	N
	Korea • 2672-32K, 33K, 42K, 43K, 45K • 2673-42K	27L6742	N
	LCD cover kit 12.1-in. with antenna for X30 series		
	WW • 2672-1Ax, 1Bx, 5Dx, 4Ax, 4Bx, 4Cx, 4Ex, 4Rx, 4Sx, 4Tx, 4Yx, 4Xx, 6Dx, 4Gx, 4Hx, 4Jx, 4Vx, 4Wx (except xxK) • 2672-4B7 • 2673-4BU, 4BF, 4BP, 4BS, 4BX, 4BT, 4BG, 4BJ, 4BA, 4BC, 4BH, 4BB, 4BA, 4BE, 4BM	27L6741	N
	Korea • 2672-4BK, 4CK, 4EK, 4HK, 4JK • 2673-4BK	27L6743	N
	10th anniversary model • 2672-4B7	67P1413	N
	LCD cover kit 12.1-in. with antenna for X31		
	WW • 2672-Bxx, Cxx, Dxx, Exx, Fxx, Hxx except xxK • 2673-Cxx except CxK • 2884-Bxx, Cxx • 2890-Cxx except CxK • 2891-Cxx except CxK	91P8900	N
	Korea • 2672-BxK, CxK, DxK, ExK, FxK, HxK • 2673-CxK • 2890-CxK • 2891-CxK	91P8902	N
2	Antenna assembly for X30 • 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	N

(continued)

No.	FRU	P/N	CRU ID
2	Antenna assembly for X31 <ul style="list-style-type: none"> <li>• 2672-CBx, CXx, CHx, CEx, CCx, CSx, CTx, CJx, CVx, CWx, HBx</li> <li>• 2673-CBx, CXx</li> <li>• 2884-Bxx, Cxx</li> <li>• 2890-Cxx</li> <li>• 2891-Cxx</li> </ul>	67P1449	N
3	Hinge assembly	27L6744	N
4	LCD cable assembly 12.1 XGA for X30	27L0698	N
	LCD cable assembly 12.1 XGA for X31	08K4090	N
5	Inverter card (AMBIT)	91P7280	N
	Inverter card (AMBIT)	26P8516	N
6	LCD panel, 12.1 XGA (LG)	11P8224	N
	LCD panel, 12.1 XGA (DBU)	11P8225	N
7	Clear plate for X30	46P3171	N
	Clear plate for X31	67P1448	N

## AC adapters

FRU	P/N	CRU ID
2-pin (56 W), DELTA (models xxE, xxF, xxJ, xxP, xxS, xxU, xxX, xxY)	02K6814	*
2-pin (56 W), LITEON (models xxE, xxF, xxJ, xxP, xxS, xxU, xxX, xxY)	02K6816	
3-pin (56 W), DELTA (models xxA, xxB, xxC, xxG, xxH, xxK, xxM, xxT, xxV)	02K6813	
3-pin (56 W), LITEON (models xxA, xxB, xxC, xxG, xxH, xxK, xxM, xxT, xxV)	02K6815	

**Keyboard**

Language	P/N for X30	P/N for X31	CRU ID
Arabic	02K6162	08K5094	**
Belgian	02K6157	08K5089	
Chinese, Traditional	02K6159	08K5091	
Czech	02K6163	08K5095	
Danish	02K6150	08K5082	
Dutch	02K6147	08K5079	
English, U.K.	02K6141	08K5075	
English, U.S.	02K6139	08K5073	
French, Canadian	02K6144	08K5076	
French, European	02K6146	08K5078	
German	02K6145	08K5077	
Greek	02K6165	08K5097	
Hungarian	02K6164	08K5096	
Hebrew	02K6161	08K5093	
Italian	02K6151	08K5083	
Japanese	02K6140	08K5074	
Korean	02K6156	08K5088	
Norwegian	02K6149	08K5081	
Polish	02K6167	08K5099	
Portuguese	02K6154	08K5086	
Russian	02K6160	08K5092	
Slovak	02K6166	08K5098	
Slovenian	02K6168	08K5100	
Spanish, European	02K6155	08K5087	
Spanish, Latin American	02K6152	08K5084	
Swedish or Finnish	02K6148	08K5080	
Swiss	02K6153	08K5085	
Turkish	02K6158	08K5090	

## Recovery CDs

### For Windows 2000 (X30)

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

- 2672-11x, 1Ax, 21x, 2Ax, 2Gx, 31x, 3Ax, 41x, 4Nx, 4Ax, 4Rx, and 81x

Language	P/N	CRU ID
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.	01R6193	
Finnish	01R5490	
French	01R5485	
German	01R5486	
Greek	01R5498	
Hebrew	01R5495	
Hungarian	01R5499	
Italian	01R5489	
Japanese	01R6865	
Norwegian	01R5492	
Polish	01R5496	
Portuguese	01R5483	
Russian	01R5500	
Spanish	01R5487	
Swedish	01R5488	
Turkish	01R5497	

**For Windows XP professional (X30)**

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

- 2672-12x, 1Bx, 22x, 25x, 2Bx, 2Ex, 2Hx, 2Kx, 32x, 3Bx, 3Lx, 42x, 4Bx, 4Hx, 4Px, 4Sx, 4Vx, 4Yx, 4Zx, and 82x
- 2673-22x, and 2Bx

Language	P/N	CRU ID
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.	01R6196	
Finnish	01R5550	
French	01R5545	
German	01R5546	
Greek	01R5558	
Hebrew	01R5555	
Hungarian	01R5559	
Italian	01R5549	
Japanese	62P8901	
Norwegian	01R5552	
Polish	01R5556	
Portuguese	01R5543	
Russian	01R5560	
Spanish	01R5547	
Swedish	01R5548	
Turkish	01R5557	



## For Windows XP Home Edition (X30)

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

- 2672-33x, 3Kx, 3Mx, 43x, 4Qx, 4Cx, 4Tx, 4Jx, and 4Vx

Language	P/N	CRU ID
Chinese, Simplified	67P4610	*
Chinese, Traditional	67P4607	
Chinese, Traditional (Hong Kong S.A.R.)	67P4613	
English, AP	01R6199	

## For Windows 2000 (X31)

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

- 2672-B1x, BAx, C1x, C6x, CAx, CDx, J6x, and JAx

Language	P/N	CRU ID
Arabic	01R7327	*
Czech	01R7328	
Danish	01R7318	
Dutch	01R7325	
English, U.K.	01R7316	
English, U.S.	01R8226	
Finnish	01R7324	
French	01R7319	
German	01R7320	
Greek	01R7332	
Hebrew	01R7329	
Hungarian	01R7333	
Italian	01R7323	
Japanese	01R8293	
Norwegian	01R7326	
Polish	01R7330	
Portuguese	01R7317	
Russian	01R7334	
Spanish	01R7321	
Swedish	01R7322	
Turkish	01R7331	

**For Windows XP professional (X31)**

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

- 2672-B2x, BBx, BLx, C2x, C7x, C8x, CBx, CEx, CKx, CPx, CSx, CXx, CZx, F2x, J7x, JBx, JHx, JVx, JXx and KVx
- 2673-C2x, CBx, and CXx
- 2884-BNx, BRx, CRx, JUx
- 2890-C2x
- 2891-C2x

Language	P/N	CRU ID
Arabic	01R7367	*
Chinese, Simplified	01R8040	
Chinese, Traditional	01R7699	
Chinese, Traditional (Hong Kong S.A.R.)	01R7705	
Czech	01R7368	
Danish	01R7358	
Dutch	01R7365	
English, U.K.	01R7356	
English, U.S.	01R8240	
Finnish	01R7364	
French	01R7359	
German	01R7360	
Greek	01R7372	
Hebrew	01R7369	
Hungarian	01R7373	
Italian	01R8238	
Japanese	01R8294	
Norwegian	01R7366	
Polish	01R7370	
Portuguese	01R7357	
Russian	01R7374	
Spanish	01R7361	
Swedish	01R7362	
Turkish	01R7371	

## For Windows XP Home Edition (X31)

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

- 2672-B3x, BMx, C3x, CFx, CQx, CTx, F3x, FQx, and JJx

Language	P/N	CRU ID
Chinese, Simplified	01R8038	*
Chinese, Traditional	01R8036	
Chinese, Traditional (Hong Kong S.A.R.)	01R8042	
English, AP	01R8244	

## Miscellaneous parts

FRU	P/N	CRU ID
Screw kit (including nylon-coated screws): <ul style="list-style-type: none"> <li>• M2 x 4 mm, flat head (30)</li> <li>• M2 x 3 mm, flat head (25)</li> <li>• M2.5 x 4.8 mm, flat head (15)</li> <li>• M2 x 13.5 mm, pan head (10)</li> <li>• M2 x 9.5 mm, flat head (20)</li> <li>• M2 x 6 mm, flat head (20)</li> <li>• M3 x 2.8 mm, flat head (25)</li> <li>• M2 x 14 pan head with washer (5)</li> <li>• HDD M3 x 4 (10)</li> <li>• M2 x 3 mm, TR7 (1)</li> <li>• Hex stud, D-sub (10)</li> <li>• Screw caps (painted)</li> <li>• Screw caps (not painted)</li> </ul>	27L6751	N
Base miscellaneous parts for X30: <ul style="list-style-type: none"> <li>• Lid, docking (front)</li> <li>• Lid, docking (rear)</li> <li>• Spring, docking lid</li> <li>• Rubber foot</li> <li>• 5th rubber foot</li> <li>• EMI plate, docking</li> <li>• Holder, docking</li> <li>• Latch, battery lock</li> <li>• Holder, battery lock</li> <li>• Spring, battery lock</li> <li>• EMI finger, front</li> <li>• Fan spacer</li> <li>• IR/1394 cover</li> <li>• Screw caps</li> </ul>	27L6735	

(continued)

Parts list

FRU	P/N	CRU ID
<p>Base miscellaneous parts for X31:</p> <ul style="list-style-type: none"> <li>• Lid, docking (front)</li> <li>• Lid, docking (rear)</li> <li>• Spring, docking lid</li> <li>• Rubber foot</li> <li>• 5th rubber foot</li> <li>• Fan outlet cover</li> <li>• EMI plate, docking</li> <li>• Holder, docking</li> <li>• Latch, battery lock</li> <li>• Holder, battery lock</li> <li>• Spring, battery lock</li> <li>• EMI finger, front</li> <li>• Fan spacer</li> <li>• IR/1394 cover</li> <li>• <b>(22)</b> CompactFlash dummy socket</li> <li>• Screw caps</li> </ul> <p><b>Note:</b> Bold number in parentheses is references to the exploded view on page 149.</p>	67P1453	N
<p>System miscellaneous parts for X30:</p> <ul style="list-style-type: none"> <li>• <i>(a)</i> Cable, RJ11 to system board docking</li> <li>• <i>(b)</i> Cable guide</li> <li>• <i>(c)</i> Keyboard CRU insulator</li> <li>• <i>(d)</i> Hard-disk holder</li> <li>• <i>(e)</i> PC Card guide</li> <li>• <i>(h)</i> Hinge cover</li> <li>• Easy button cover</li> <li>• <i>(f)</i> Retainer, audio connector</li> <li>• Screw caps</li> </ul> <p><b>Note:</b> Italicized letters in parentheses are references to the exploded view on page 149.</p>	27L6739	N
<p>System miscellaneous parts for X31:</p> <ul style="list-style-type: none"> <li>• <i>(a)</i> Cable, RJ11 to system board docking</li> <li>• <i>(b)</i> Cable guide</li> <li>• <i>(d)</i> Hard-disk holder</li> <li>• <i>(e)</i> PC Card guide</li> <li>• <i>(h)</i> Hinge cover</li> <li>• Easy button cover</li> <li>• <i>(f)</i> Retainer, audio connector without plating</li> <li>• Bracket, MiniPCI 802.11a/b with tamper-proof screw</li> <li>• Screw caps</li> </ul> <p><b>Note:</b> Italicized letters in parentheses are references to the exploded view on page 149.</p>	67P1444	N
<p>System board miscellaneous parts for X30:</p> <ul style="list-style-type: none"> <li>• I/O plate</li> </ul>	27L6736	N

(continued)

FRU	P/N	CRU ID
System board miscellaneous parts for X31: <ul style="list-style-type: none"> <li>• I/O plate</li> <li>• Studs, system board</li> <li>• EMI shield, audio USB</li> <li>• Hex studs, D-sub</li> <li>• Latch, keyboard stud</li> <li>• Docking insulator</li> <li>• EMI sheet</li> <li>• Thermal rubber</li> <li>• EMI tape, CompactFlash socket</li> </ul>	67P1442	N

## Optional FRUs

FRU	P/N	CRU ID
64-MB SDRAM SO DIMM (PC133) (for X30 series)	19K4651	**
512-MB SDRAM SO DIMM (PC133) (for X30 series)	19K4657	
128-MB DDR SDRAM SO DIMM (PC2100) (for X31 series)	10K0029	
Hard-disk drive (40 GB) 9.5 mm 5400 rpm, IBM STD	27L4384	*
Hard-disk drive (60 GB) 12.5 mm 5400 rpm, IBM STD	08K9700	
Hard-disk drive (60 GB) 9.5 mm 4200 rpm, HITACHI	08K9833	
AC adapter 2-pin (72 W), ASTEC <ul style="list-style-type: none"> <li>• for models models xxE, xxF, xxJ, xxP, xxS, xxU, xxX</li> </ul>	02K6756	
AC adapter 2-pin (72 W), DELTA <ul style="list-style-type: none"> <li>• for models models xxE, xxF, xxJ, xxP, xxS, xxU, xxX</li> </ul>	02K6753	
AC adapter 2-pin (72 W), SANKEN <ul style="list-style-type: none"> <li>• for models models xxE, xxF, xxJ, xxP, xxS, xxU, xxX</li> </ul>	02K6757	
AC adapter 3-pin (72W), ASTEC <ul style="list-style-type: none"> <li>• for models models xxA, xxB, xxC, xxG, xxH, xxK, xxM, xxT</li> </ul>	02K6751	
AC adapter 3-pin (72W), DELTA <ul style="list-style-type: none"> <li>• for models models xxA, xxB, xxC, xxG, xxH, xxK, xxM, xxT</li> </ul>	02K6754	
Extended life battery pack (6 cell) SANYO <ul style="list-style-type: none"> <li>• for models xxA, xxB, xxC, xxF, xxG, xxH, xxK, xxM, xxP, xxS, xxT, xxU, xxX</li> </ul>	02K7043	
Extended life battery pack (6 cell) SANYO <ul style="list-style-type: none"> <li>• for models xxE, xxJ</li> </ul>	02K7046	

(continued)

Parts list

FRU	P/N	CRU ID
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	N
PCI cover for ThinkPad Dock	08N7317	
Top cover and screw kit for ThinkPad Dock	12P4143	
ThinkPad Dock II	67P9010	*
Top cover and screw kit for ThinkPad Dock II	46P3085	N
ThinkPad Port Replicator	08N1536	
ThinkPad Mini Dock	67P9011	*
AC adapter (2 pin, 120 W), DELTA for ThinkPad Mini Dock	02K7086	
AC adapter (2 pin, 120 W), LITEON for ThinkPad Mini Dock	02K7092	
AC adapter (3 pin, 120 W), LITEON for ThinkPad Mini Dock	02K7094	
AC adapter (3 pin, 120 W), LITEON for ThinkPad Mini Dock	02K7096	
ThinkPad Port Replicator II	74P6735	
Multiple battery charger	02K6642	
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	

## Common parts list

### Tools

Tool	P/N
Triconnector wrap plug	72X8546
PC test card	35G4703
Audio wrap cable	66G5180
USB parallel test cable	05K2580
Screwdriver kit	95F3598
Torque screwdriver	05K4695
5 mm socket wrench	05K4694
Screwdriver	27L8126
1/4" drive spinner handle	1650840
1/4" Sq. to 1/4" hex torx adapter	93F2838
TR7-TR-10 tamper resistant torx bits	00P6967
ThinkPad Hardware Maintenance Diskette Version 1.69 <b>Note:</b> Download the file from the following Web site: <a href="http://www.ibm.com/pc/partner/infotips">http://www.ibm.com/pc/partner/infotips</a>	—

### 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	CRU ID
Canada, U.S.	13H5264	*
Japan	13H5273	
Argentina	36L8870	
Brazil	49P2095	

Parts list

**For 3-pin power cords:**

Region	P/N	CRU ID
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	

**Power cords (ThinkPad Dock and ThinkPad Dock II)**

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

**For 3-pin power cords:**

Region	P/N	CRU ID
Argentina	36L8868	*
Australia, New Zealand	75H8988	
Brazil	49P2101	
Canada, Thailand, U.S.	75H8989	
Denmark	75H8992	
European countries	75H8990	
India, South Africa	75H8993	
Israel	75H8999	
Italy	75H8998	
Japan	75H8996	
Korea	76H3536	
China (P.R.C.) (other than Hong Kong S.A.R.)	02K0540	
Switzerland	75H8997	
U.K.	75H8994	



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