



IBM Mobile Systems
ThinkPad Computer
Hardware Maintenance Manual

June 2004

This manual supports:

ThinkPad R50e series (MT 1834, 1842)

Note

Before using this information and the product it supports, be sure to read the general information under “Notices” on page 162.

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About this manual

This manual contains service and reference information for IBM ThinkPad R50e series (MT1834, 1842) 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 22.

Introduction

Important service information

Important

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

Advise customers to contact the IBM Support Center at 800-426-7378 (800-IBM-Serv) if they need assistance in obtaining or installing any diskette fixes.

Customers in Canada should call IBM Support Center 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 a 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 whether the error symptom is listed in the Symptom-to-FRU Index for the computer you are servicing.

Diskette compatibility matrix

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

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

Safety notices: multilingual translations

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

The following safety notices are provided in English, French, German, 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 safety information with which you need to be familiar before you service 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. Make sure that 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 that you think is 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, make sure 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, about 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.
- Fan louvers on the machine help to prevent overheating of internal components. Do not obstruct fan louvers or cover them with labels or stickers.

WARNING

Handling the cord on this product or cords associated with accessories sold with this product will expose you to lead, a chemical known to the State of California to cause cancer, and birth defects or other reproductive harm. ***Wash hands after handling.***

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:

Safety information

- Ensure that another person, familiar with the power-off controls, is near you.

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

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

Attention: An electrical shock can occur only when there is a complete circuit. By observing the above rule, you may prevent a current from passing through your body.

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

Observe the special safety precautions when you work with very high voltages; Instructions for these precautions 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 the frame ground.
 - b. The power cord should be the type specified in the parts list.
 - c. Insulation must not be frayed or worn.
4. Remove the cover.
5. Check for any obvious non-IBM alterations. Use good judgment as to the safety of any non-IBM alterations.
6. Check inside the unit for any obvious unsafe conditions, such as metal filings, contamination, water or other liquids, or signs of fire or smoke damage.
7. Check for worn, frayed, or pinched cables.

8. Check that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

Handling devices that are sensitive to electrostatic discharge

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

Notes

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

When handling ESD-sensitive parts:

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

Note

The use of a grounding system to guard against ESD damage is desirable but not necessary.

- Attach the ESD ground clip to any frame ground, ground braid, or green-wire ground.
- When working on a double-insulated or battery-operated system, use an ESD common ground or reference point. 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. Such devices are also sold separately as options. If one of these drives is installed, it 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.

If a CD-ROM drive, a DVD-ROM drive, or another laser device is installed, note the following:

⚠ CAUTION:

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

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

凡未在这里指明的任何控制用法、调整、行为，都会导致严重后果。

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

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

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

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

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

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

A CD-ROM drive, a DVD-ROM drive, or any other storage device installed may 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 !.

Aperto 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.

General descriptions

The descriptions in this chapter apply to any ThinkPad model that has the PC-Doctor® DOS diagnostics program. Some descriptions might not apply to your particular computer.

Read this first

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

Important notes

- **Only certified trained personnel should service the computer.**
- **Before replacing any FRU, read the entire page on removing and replacing FRUs.**
- **When you replace FRUs, use new nylon-coated screws.**
- **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 an FRU only with another FRU of the correct model.** When you replace a FRU, make sure that 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

Read this first

- ___ 2. Date of service
- ___ 3. Date on which the machine failed
- ___ 4. Date of purchase
- ___ 5. Failure symptoms, error codes appearing on the display, and beep symptoms
- ___ 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. Following is a list of 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 list:

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
- Plastic parts, latches, pins, or connectors that have been cracked or broken 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
- Diskette drive damage caused by pressure on the diskette drive cover, foreign material in the drive, or 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 pre-installed system”
- “Passwords” on page 29
- “Power management” on page 32

Service web site

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

Restoring the pre-installed system

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 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 155

Recovery to Factory Contents by using Product Recovery CDs

To create the service partition and install the factory contents from the recovery CD, do the following:

Note

The recovery process might take up to 2 hours.
--

1. Insert the recovery CD into the CD or DVD drive, then restart the computer.
2. Following message is displayed: **“Your computer originally included a Product Recovery program ... Reinstall the Product Recovery program? (Y/N) []”**.
3. Press Y key. The service partition is created and loaded with the Product Recovery program files.
4. 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.

Related service information

5. If you get a message asking which operating system to install, select the proper operating system and press Enter.
6. A message is displayed: "**Full Recovery:**". Press Enter to select.
7. On each of the next three windows, press the Y key.
8. 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 user must enter the SVP in order to get access to the IBM BIOS Setup Utility and change the system configuration.

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 65.

3. Remove the backup battery.

For how to remove the backup battery, see “1120 Backup battery” on page 85.

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

After the POST ends, the password prompt does not appear. The POP has been removed.

5. Reinstall the backup battery and the battery pack.

(B) If an SVP has been set and is known by the servicer:

1. Turn on the computer; 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. IBM Rescue and Recovery screen opens.

For models supporting the Passphrase function, press F1 while POP icon is appearing on the screen; then enter the POP. For the other models, enter the POP.

Note: To check whether the ThinkPad computer supports the Passphrase function, enter IBM BIOS Setup Utility and go to **Security** --> **Password**. If **Using Passphrase** item is displayed in the menu, this function is available on the ThinkPad computer.

2. Click **Access BIOS**. The system Restart Required window is displayed.
3. Click **Yes**. The computer restarts, and the IBM BIOS Setup Utility screen opens.
4. Select **Security**, using the cursor directional keys to move down the menu.
5. Select **Password**.
6. Select **Power-On Password**.
7. Type the current SVP in the **Enter Current Password** field. then leave the **Enter New Password** field 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:

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. IBM Rescue and Recovery screen opens.

For models supporting the Passphrase function, press F1 while HDP icon is appearing on the screen; then enter the master HDP. For the other models, enter the master HDP.

Note: To check whether the ThinkPad computer supports the Passphrase function, enter IBM BIOS Setup Utility and go to **Security --> Password**. If **Using Passphrase** item is displayed in the menu, this function is available on the ThinkPad computer.

2. Click **Access BIOS**. The system Restart Required window is displayed.
3. Click **Yes**. The computer restarts, and the IBM BIOS Setup Utility screen opens.
4. Select **Security**, using the cursor directional keys to move down the menu.
5. Select **Password**.
6. Select **Hard-disk x password**, where *x* is the letter of the hard disk drive. A pop-up window opens.
7. Select **Master HDP**.
8. Type the current master HDP in the **Enter Current Password** field. then leave the **Enter New Password** field blank, and press Enter twice.
9. Press F10.
10. 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 if 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: If you are using the ACPI operating system, you can change the action of Fn+F4.s

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.)

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, in either of the following events, the computer automatically returns from standby mode and resumes operation:

- The ring indicator (RI) is signaled by a serial device or a 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 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 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 if 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.

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

Checkout guide

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

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

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

Testing the computer

The ThinkPad computer has a test program called PC-Doctor[®] DOS (hereafter called *PC-Doctor*.) You can detect errors by running the diagnostics test included in PC-Doctor. This section is an overview of the procedure. For details that depend on model-unique functions, refer to “Product overview” on page 43.

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

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

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

Creating the PC-Doctor diagnostics diskette

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. Authenticating the digital signature takes about 15 seconds; then the ThinkPad computer will reboot into PC-DOS.

4. A batch file automatically starts up to prompt you through the process of creating diskettes. You are notified of how many diskettes you will need.
 - a. You are prompted to insert each diskette in sequence.
 - b. Typically, all you need to do is to press the Enter key for the floppy drive; the system then formats and creates the diskette.
 - c. Each diskette is erased and formatted with the PC-Doctor DOS boot image.
5. As soon as all the diskettes have been created, the ThinkPad computer reboots. You then receive a message asking you to remove the last diskette from the drive or, if you want to run the diagnostics, to insert the first diskette.

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 pointer. Instead of pressing Enter, click the left button.

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

If the computer cannot be powered on, go to “Power system checkout” on page 37, and check the power sources.

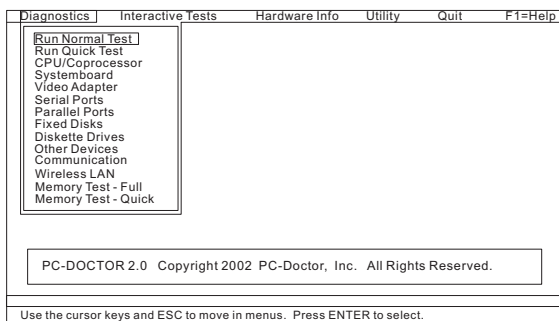
If an error code appears, go to “Symptom-to-FRU index” on page 51.

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

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

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

Note: PC-Doctor menu does not mean the formal support device list. Some unsupported device names may appear in the PC-Doctor menu.



The options on the test menu are as follows:

Diagnostics	Interactive Tests
<ul style="list-style-type: none"> • Run Normal Test • Run Quick Test • CPU/Coprocessor • Systemboard • Video Adapter • Parallel Ports • Fixed Disks • Diskette Drives • Other Devices • Communication • Wireless LAN • Memory Test – Full • Memory Test – Quick 	<ul style="list-style-type: none"> • Keyboard • Video • Internal Speaker • Mouse • Diskette • System Load • CD-ROM/DVD Test • Intel Wireless Radio
<p>Notes:</p> <ul style="list-style-type: none"> • In the Keyboard test in Interactive Tests, the Fn 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. If you have an external monitor attached to your computer, detach it before running PC-Doctor DOS. 	

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 running PC-Doctor, check the time and date on the system and reset them if they are incorrect.

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

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

- “Checking the ac adapter”
- “Checking operational charging” on page 38
- “Checking the battery pack” on page 38
- “Checking the backup battery” on page 39

Checking the ac adapter

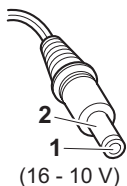
You are here because the computer fails only when the ac adapter is used.

Checkout guide

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

To check the ac adapter, do the following:

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



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

3. If the voltage is not correct, replace the ac adapter.
4. If the voltage is acceptable, do the following:
 - Replace the system board.
 - If the problem persists, go to "Product overview" on page 43.

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

Checking operational charging

To check whether the battery charges properly during operation, use a discharged battery pack or a battery pack that has less than 50% of the total power remaining when installed in the computer.

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

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

Checking the battery pack

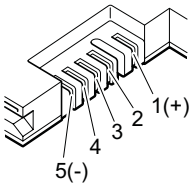
Battery charging does not start until the Power Meter shows that less than 95% of the total power remains; under this condition the battery pack can charge to 100% of its capacity. This protects the battery pack from being overcharged or from having a shortened life.

To check 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. Turn off the computer.
2. Remove the battery pack and measure the voltage between battery terminals 1 (+) and 5 (-). See the following figure:



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

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

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

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

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

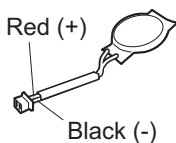
If the resistance is not correct, replace the battery pack. If the resistance is correct, replace the system board.

Checking the backup battery

Do the following:

1. Turn 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 65).
4. Remove the backup battery (see “Checking the battery pack” on page 38).
5. Measure the voltage of the backup battery. See the following figure.

Checkout guide



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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Product overview

This section presents the following product-unique information:

- “Specifications”
- “Status indicators” on page 45
- “FRU tests” on page 47
- “Fn key combinations” on page 49

Specifications

The following table lists the specifications of the ThinkPad R50e series:

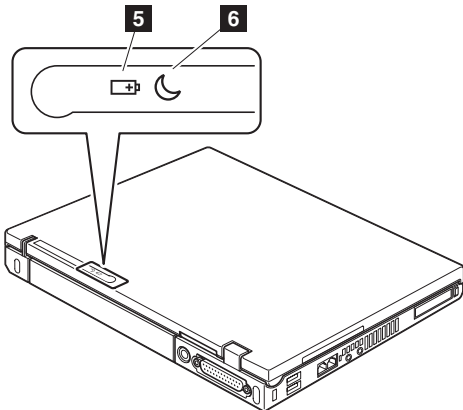
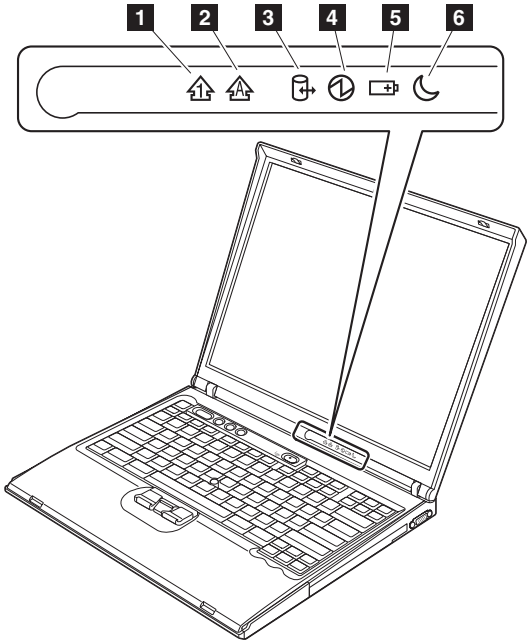
Feature	Description
Processor	<ul style="list-style-type: none"> • Mobile Intel® Celeron® processor 1.2 GHz, L2 512-KB cache • Mobile Intel® Celeron® processor 1.3 GHz, L2 512-KB cache • Intel® Celeron® M processor 330 (1.4 GHz), L2 512-KB cache • Intel® Pentium® M processor 1.4 GHz, L2 1-MB cache • Intel® Pentium® M processor 1.5 GHz, L2 1-MB cache • Intel® Pentium® M processor 1.6 GHz, L2 1-MB cache • Intel® Pentium® M processor 705 (1.5 GHz), L2 1-MB cache • Intel® Pentium® M processor 715 (1.5 GHz), L2 2-MB cache • Intel® Pentium® M processor 725 (1.6 GHz), L2 2-MB cache
Standard memory	<ul style="list-style-type: none"> • 128 MB DDR SDRAM SO-DIMM (PC2700) card × 1 • 256 MB DDR SDRAM SO-DIMM (PC2700) card × 1 • 512 MB DDR SDRAM SO-DIMM (PC2700) card × 1
Optional memory	<ul style="list-style-type: none"> • 128 MB DDR SDRAM SO-DIMM (PC2700) card • 256 MB DDR SDRAM SO-DIMM (PC2700) card • 512 MB DDR SDRAM SO-DIMM (PC2700) • 1 GB DDR SDRAM SO-DIMM (PC2700) (maximum of 2048 MB)
Bus architecture	<ul style="list-style-type: none"> • 400 MHz PSB (Processor System Bus) • 266 MHz DDR (Double Data Rate) SDRAM (Synchronous DRAM) (PC2700) • HUB link • PCI bus • LPC bus







(continued)

Feature	Description
Graphic memory chip	<ul style="list-style-type: none"> Intel 855GM (total video memory: UMA, 64 MB)
CMOS RAM	<ul style="list-style-type: none"> 242 bytes
Hard disk drive	<ul style="list-style-type: none"> 20.0 GB, 4200 rpm, 12.7 mm high, IDE interface 30.0 GB, 4200 rpm, 12.7 mm high, IDE interface 40.0 GB, 4200 rpm, 12.7 mm high, IDE interface 60.0 GB, 4200 rpm, 12.7 mm high, IDE interface
Integrated wireless LAN feature (for some models)	<ul style="list-style-type: none"> 802.11b/g
Mini PCI adapter	<ul style="list-style-type: none"> Intel® PRO Wireless 2200BG Mini-PCI Adapter
Fixed optical device	<ul style="list-style-type: none"> CD-ROM drive, 12.7 mm high DVD drive, 12.7 mm high DVD/CD-RW combo drive, 12.7 mm high
Display	<ul style="list-style-type: none"> 14.1-inch, 16M colors, XGA (1024 × 768 resolution) TFT color LCD 15.0-inch, 16M colors, XGA (1024 × 768 resolution) TFT color LCD
I/O port	<ul style="list-style-type: none"> External monitor connector Stereo headphone jack Monaural microphone jack Parallel connector RJ11 connector RJ45 connector Universal serial bus (USB) 2.0 connector × 2 (compatible with USB 1.1 and 2.0)
Internal modem	<ul style="list-style-type: none"> 56.6 Kbps
Audio	<ul style="list-style-type: none"> 1 W built-in monaural speaker Software control volume
PC Card	<ul style="list-style-type: none"> One Type-III One Type-II
Ethernet (on the system board)	<ul style="list-style-type: none"> 10/100Base Ethernet
Communication daughter card (CDC)	<ul style="list-style-type: none"> IBM Integrated 56K Modem (MDC-2)
ThinkLight	Yes
Battery	<ul style="list-style-type: none"> Li-ion battery (6 cells)
AC adapter	<ul style="list-style-type: none"> 72-watt type
Preinstalled operating system	<ul style="list-style-type: none"> Windows XP Professional Windows XP Home Edition

Status indicators

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



Indicator	Meaning
1 Num lock 	Green: The numeric keypad on the keyboard is enabled. To enable or disable the keypad, press and hold the Shift key, and press the NumLk (ScrLk) key.
2 Caps lock 	Green: Caps Lock mode is enabled. To enable or disable Caps Lock mode, press the Caps Lock key.
3 Drive in use 	Green: Data is being read from or written to the hard disk drive, the diskette drive, or the drive in the Ultrabay Enhanced device. When this indicator is on, do not put the computer into standby mode or turn off the computer. Note: Do not move the system while the green drive-in-use light is on. Sudden physical shock could cause drive errors.
4 Power-on 	Green: The computer is on and ready to use. This indicator stays lit whenever the computer is on and is not in standby mode.
5 Battery status 	Green: The battery is in use and has enough power. The ac adapter has charged the battery completely. Blinking green: The battery is being charged, but still has enough power to operate. (At regular intervals, the indicator light turns off briefly.) Orange: The battery is being charged, but the battery power is still low. Blinking orange: The battery needs to be charged. When the indicator starts blinking orange, the computer beeps three times.
6 Standby status 	Green: The computer is in standby mode. Blinking green: The computer is entering standby mode or hibernation mode, or is resuming normal operation.

FRU tests

The following table shows the test for each FRU.

FRU	Applicable test
System board	<ol style="list-style-type: none"> 1. Diagnostics --> CPU/Coprocessor 2. Diagnostics --> Systemboard
Power	Diagnostics --> Other Devices --> IBM AC Adapter, IBM Battery 1
LCD unit	<ol style="list-style-type: none"> 1. Diagnostics --> Video Adapter 2. Interactive Tests --> Video
Modem daughter card (MDC-2)	<ol style="list-style-type: none"> 1. Make sure the modem is set up correctly. 2. Replace the modem jack and the modem card in turn, and run the following tests in Diagnostics --> Communication: <ol style="list-style-type: none"> a. Conexant Smart Modem Interrupt b. Conexant Smart Modem Dialtone
Audio	<ol style="list-style-type: none"> 1. Interactive Tests --> Internal Speaker 2. Diagnostics --> Other Devices --> Analog Devices AC97 CODEC Test
Speaker	Interactive Tests --> Internal Speaker
PC Card slots	<ol style="list-style-type: none"> 1. Diagnostics --> Systemboard --> PCMCIA 2. Insert a PC Card Wrap Plug into every PC Card slot, and run Diagnostics --> Systemboard --> PCMCIA External Loop
Keyboard	<ol style="list-style-type: none"> 1. Diagnostics --> Systemboard --> Keyboard 2. Interactive Tests --> Keyboard
Hard-disk drive	Diagnostics --> Fixed Disks
Diskette drive	<ol style="list-style-type: none"> 1. Diagnostics --> Diskette Drives 2. Interactive Tests --> Diskette
DVD drive or DVD/CD-RW combo drive	<ol style="list-style-type: none"> 1. Diagnostics --> Other Devices --> CD-ROM/DVD 2. Interactive Tests --> CD-ROM/DVD Test

(continued)

FRU	Applicable test
Memory	<ol style="list-style-type: none"> 1. If two DIMMs are installed, remove one of them and run Diagnostics --> Memory Test—Quick. 2. If the problem does not recur, return the DIMM to its place, remove the other one, and run the test again. 3. If the test does not detect the error, run Diagnostics --> Memory Test—Full.
Fan	<ol style="list-style-type: none"> 1. Turn on the computer and check the air turbulence at the louver near the PC Card slot. 2. Run Diagnostics --> Other Devices --> IBM Fan.
TrackPoint or pointing device	<p>If the TrackPoint does not work, check the configuration as specified in the ThinkPad Configuration program. If the TrackPoint is disabled, select Enable to enable it.</p> <p>After you use the TrackPoint, the pointer may drift on the screen for a short time. This drift can occur when a slight, steady pressure is applied to the TrackPoint pointer. This symptom is not a hardware problem. If the pointer stops after a short time, no service action is necessary.</p> <p>If enabling the TrackPoint does not correct the problem, continue with the following:</p> <ul style="list-style-type: none"> • Interactive Tests --> Mouse

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 computer display, leaving the screen blank. To turn the computer display on again, press any key or press the TrackPoint pointing stick.
Fn+F4	Put the computer in standby mode. To return to normal operation, press the Fn key only, without pressing a function key. Note: This combination of keys functions as a sleep button. The setting can be changed so that pressing it puts the computer into hibernation mode or even shuts the computer down.
Fn+F5	Control the power source of the built-in <i>Bluetooth</i> wireless device. This combination of the keys functions as a toggle switch of the power state. Note: In Windows 2000 or Windows XP, this combination of keys enables or disables the built-in wireless networking features (the IEEE 802.11 standard) and the <i>Bluetooth wireless</i> features. To use this function, the following drivers must be installed. <ul style="list-style-type: none"> • IBM ThinkPad Power Management driver • OnScreen Display utility • Wireless device drivers
Fn+F6	Reserved.
Fn+F7	Switch a display output location <ul style="list-style-type: none"> • External monitor (CRT display) • Computer display and external monitor (LCD + CRT display) • Computer display (LCD) Note: For any operating system other than Windows 2000 or Windows XP, no additional procedure is needed; just press Fn+F7. Notes: <ol style="list-style-type: none"> 1. This function does not work when different desktop images are displayed on the computer display and the external monitor (the Extend desktop function). 2. This function does not work while a DVD movie or a video clip is playing. 3. For Windows 2000 or Windows XP, a hotkey application might take over the switching function.

(continued)

Key combination	Description
Fn+F8	If the image displayed on the computer is smaller than the physical display, switch the computer screen size between expanded mode and normal mode.
Fn+F9	<p>Open the IBM ThinkPad EasyEject Utility screen. Buttons for the following choices are displayed:</p> <ul style="list-style-type: none"> • Eject ThinkPad PC from Dock: This button is displayed only if the ThinkPad computer has been attached to a ThinkPad Dock II. The computer can be detached from the ThinkPad Dock II. • Eject ThinkPad PC from Mini Dock: This button is displayed only if the ThinkPad computer has been docked in a ThinkPad Mini Dock and one or more USB devices have been connected to the ThinkPad Mini Dock. You can stop and remove all the USB devices safely by clicking the button. Note: If a diskette drive is connected to the external-diskette-drive connector of the ThinkPad Mini Dock, you cannot connect a USB diskette drive. • Run EasyEject Actions: This button is used to select, stop, or remove external devices connected to the ThinkPad computer. • Configure EasyEject Actions: Opens the IBM ThinkPad EasyEject Utility main window. • Fn+F9 Settings: Configures the settings for the Fn+F9 function. <p>You can use this utility to stop and remove all ejectable devices connected to the ThinkPad computer, the ThinkPad Mini Dock, or the ThinkPad Port Replicator II. You cannot use it to detach the computer from the ThinkPad Mini Dock or the ThinkPad Port Replicator II.</p>
Fn+F10	Reserved.
Fn+F11	Reserved.
Fn+F12	<p>Put the computer into hibernation mode. To return to normal operation, press the power button for less than four seconds.</p> <p>Note: To use Fn+F12 for hibernation, you must have the IBM PM device driver installed on the computer.</p>
Fn+PgUp	<p>Turn the ThinkLight on or off.</p> <p>Note: This function is supported only on the ThinkPad computers that have the ThinkLight. The on or off status of the ThinkLight is shown on the screen for a few seconds when you press Fn+PgUp.</p>
Fn+Home	The computer display becomes brighter.
Fn+End	The computer display becomes dimmer.
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 59.

Note

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

Numeric error codes

Symptom or error	FRU or action, in sequence
0175 Bad CRC1, stop POST task—The EEPROM checksum is not correct.	System board.
0176 System Security—The system has been tampered with.	<ol style="list-style-type: none"> Run IBM BIOS Setup Utility, and save the current setting by pressing F10. System board.
0177 Bad SVP data, stop POST task—The checksum of the supervisor password in the EEPROM is not correct.	System board

Symptom or error	FRU or action, in sequence
0182 Bad CRC2. Enter BIOS Setup and load Setup defaults.—The checksum of the CRS2 setting in the EEPROM is not correct.	<ol style="list-style-type: none"> 1. Run IBM BIOS Setup Utility. Press F9, and Enter to load the default setting. Then save the current setting by pressing F10. 2. System board.
0185 Bad startup sequence settings. Enter BIOS Setup and load Setup defaults.	<ol style="list-style-type: none"> 1. Run IBM BIOS Setup Utility. Press F9, and Enter to load the default setting. Then save the current setting by pressing F10.
0187 EAIA data access error—The access to EEPROM is failed.	System board.
0188 Invalid RFID Serialization Information Area.	System board.
0189 Invalid RFID configuration information area—The EEPROM checksum is not correct.	System board.
0190 Critical low-battery error	<ol style="list-style-type: none"> 1. Charge the battery pack. 2. Battery pack.
0191 System Security—Invalid Remote Change requested.	<ol style="list-style-type: none"> 1. Run IBM BIOS Setup Utility, and then save current setting by pressing F10. 2. System board.
0192 System Security—IBM Embedded Security hardware tamper detected.	System board.
0199 System Security—IBM Security password retry count exceeded.	<ol style="list-style-type: none"> 1. Run IBM BIOS Setup Utility, and then save the current setting by pressing F10. 2. System board.
01C8 Two or more modem devices are found. Remove all but one of them. Press <Esc> to continue.	<ol style="list-style-type: none"> 1. Remove either a Mini-PCI Card or a modem daughter card. Otherwise, press Esc to ignore the warning message. 2. System board.
01C9 More than one Ethernet devices are found. Remove one of them. Press <Esc> to continue.	<ol style="list-style-type: none"> 1. Remove the Ethernet device that you installed; or press Esc to ignore the warning message. 2. System board.

Symptom or error	FRU or action, in sequence
0200 Hard disk error—The hard disk is not working.	<ol style="list-style-type: none"> 1. Reseat the hard disk drive. 2. Load Setup Defaults in IBM BIOS Setup Utility. 3. Hard disk drive. 4. System board.
021x Keyboard error.	Run interactive tests of the keyboard and the auxiliary input device.
0220 Monitor type error—Monitor type does not match the one specified in CMOS.	Load Setup Defaults in IBM BIOS Setup Utility.
0230 Shadow RAM error—Shadow RAM fails at offset nnnn.	System board.
0231 System RAM error—System RAM fails at offset nnnn.	<ol style="list-style-type: none"> 1. DIMM. 2. System board.
0232 Extended RAM error—Extended RAM fails at offset nnnn.	<ol style="list-style-type: none"> 1. DIMM. 2. System board.
0250 System battery error—System battery is dead.	Replace the backup battery and run IBM BIOS Setup Utility to reset the time and date.
0251 System CMOS checksum bad— Default configuration used.	Replace the backup battery and run IBM BIOS Setup Utility to reset the time and date.
0252 Password checksum bad—The password is cleared.	Reset the password by running IBM BIOS Setup Utility.
0260 System timer error.	<ol style="list-style-type: none"> 1. Replace the backup battery and run IBM BIOS Setup Utility to reset the time and date. 2. System board.
0270 Real-time clock error.	<ol style="list-style-type: none"> 1. Replace the backup battery and run IBM BIOS Setup Utility to reset the time and date. 2. System board.
0271 Date and time error—Neither the date nor the time is set in the computer.	Run IBM BIOS Setup Utility to reset the time and date.
0280 Previous boot incomplete—Default configuration used.	<ol style="list-style-type: none"> 1. Load “Setup Default” in IBM BIOS Setup Utility. 2. DIMM. 3. System board.

Symptom or error	FRU or action, in sequence
02F4 EISA CMOS not writable.	<ol style="list-style-type: none"> 1. Load Setup Defaults in IBM BIOS Setup Utility. 2. Replace the backup battery. 3. System board.
02F5 DMA test failed.	<ol style="list-style-type: none"> 1. DIMM. 2. System board.
02F6 Software NMI failed	<ol style="list-style-type: none"> 1. DIMM. 2. System board.
02F7 Fail-safe timer NMI failed	<ol style="list-style-type: none"> 1. DIMM. 2. System board.
1802 Unauthorized network card is plugged in—Turn off and remove the miniPCI network card.	<ol style="list-style-type: none"> 1. Remove Mini PCI network card. 2. System board.
1803 Unauthorized daughter card is plugged in—Turn off and remove the daughter card.	<ol style="list-style-type: none"> 1. Remove the daughter card that you installed. 2. System board.

Symptom or error	FRU or action, in sequence
<p>1810 Hard disk partition layout error.</p>	<ol style="list-style-type: none"> 1. 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 --> IBM Predesktop Area --> Access IBM Predesktop Area. Set this item to Disabled. Save and exit. 2. If the Access IBM Predesktop Area has not been previously disabled, press Enter to load Access IBM Predesktop Area. Then run RECOVER TO FACTORY CONTENTS in Access IBM Predesktop Area. 3. If item 2 failed, press F3 in the Welcome screen in RECOVER TO FACTORY CONTENTS. Run FDISK, and then delete all partitions. Run RECOVER TO FACTORY CONTENTS in Access IBM Predesktop Area again. 4. If item 3 failed, select CD-ROM boot in Startup in Access IBM Predesktop Area. Boot from the Recovery CD and perform full recovery from it. 5. If item 4 failed, replace the hard disk drive.

Error messages

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

Beep symptoms

Symptom or error	FRU or action, in sequence
One beep and a blank, unreadable, or flashing LCD.	<ol style="list-style-type: none"> 1. Reseat the LCD connector. 2. LCD assembly. 3. External CRT. 4. System board.
One long and two short beeps, and a blank or unreadable LCD.	<ol style="list-style-type: none"> 1. System board. 2. LCD assembly. 3. DIMM.
Two short beeps with error codes.	POST error. See “Numeric error codes” on page 51.
Two short beeps and a blank screen.	<ol style="list-style-type: none"> 1. System board. 2. DIMM.
Three short beeps, pause, three more short beeps, and one short beep.	<ol style="list-style-type: none"> 1. DIMM. 2. System board
One short beep, pause, three short beeps, pause, three more short beeps, and one short beep.	
Only the cursor appears.	Reinstall the operating system.
Four cycles of four short beeps and a blank screen.	System board (IBM security chip)
Five short beeps and a blank screen.	System board

No-beep symptoms

Symptom or error	FRU or action, in sequence
No beep, power-on indicator on, LCD blank, and no POST.	<ol style="list-style-type: none"> 1. Make sure that every connector is connected tightly and correctly. 2. DIMM. 3. System board.
No beep, power-on indicator on, and LCD blank during POST.	<ol style="list-style-type: none"> 1. Reseat DIMM. 2. System board.
The power-on password prompt appears.	A power-on password or a supervisor password is set. Type the password and press Enter .
The hard-disk password prompt appears.	A hard-disk password is set. Type the password and press Enter .
The DOS full screen looks smaller than it should.	Start the ThinkPad Configuration program and set the Screen expansion function.

LCD-related symptoms

Important

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

- **XGA:** 8 or more bright dots, 8 or more dark dots, or a total of 9 or more bright and dark dots.

Note: A bright dot means a pixel is always on (white or color.) A dark dot means a pixel is always off (black color.)

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

Intermittent problems

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

When analyzing an intermittent problem, do the following:

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

Undetermined problems

If the diagnostic tests did not identify the adapter or device that has failed, if wrong devices are installed, or if the system simply is not operating, follow these procedures to isolate the failing FRU (do not isolate FRUs that have no defects).

Verify that all attached devices are supported by the computer.

Verify that the power supply being used at the time of the failure is operating correctly. (See “Power system checkout” on page 37.)

1. Turn 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. Turn on the computer.
5. Determine whether the problem has been solved.
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 the 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.
- Each one should be used only once.

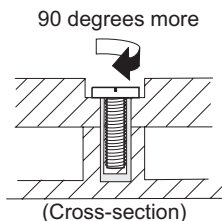
Do the following when you service this machine:

- Keep the screw kit (for the P/N, see “Miscellaneous parts” on page 157) in your tool bag.
- Always use new screws.
- Use a torque screwdriver if you have one.

Tighten screws as follows:

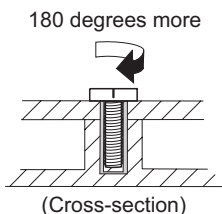
- **Plastic to plastic**

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



- **Logic card to plastic**

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



- **Torque driver**

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

- Make sure that 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 that all of 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” on page 62
- “Reading or writing the ECA information” on page 62

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 1.71 or later, 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 of each device in your computer is displayed; the serial number of the system unit is listed as follows:

20: Serial number

Write down that number.

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

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

1. Install the ThinkPad Hardware Maintenance Diskette Version 1.71 or later 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.

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 1.71 or later, 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.

Reading or writing the ECA information

Information on Engineering Change Announcements (ECA) are stored in the EEPROM of the system board. The electronic storage of this information simplifies the procedure to check if the ECA has been previously applied to a machine. The machine does not need to be disassembled to check for the ECA application.

To check what ECAs have been previously applied to the machine, use the ECA Information Read/Write function on the ThinkPad Hardware Maintenance Diskette Version 1.71 or later.

1. Insert the ThinkPad Hardware Maintenance Diskette Version 1.71 or later, and restart the computer.
2. From the main menu, select **6. Set ECA Information**.
3. To read ECA information, select **2. Read ECA/rework number from EEPROM** and follow the instruction.
4. To read box build date, select **5. Read box build date from EEPROM**, and follow the instruction on the screen.

After an ECA has been applied to the machine, the EEPROM must be updated to reflect the ECA's application. Use the ThinkPad Hardware Maintenance Diskette Version 1.71 or later to update the EEPROM.

Note: Only the ECA number is stored in the EEPROM.

The machine type of the ECA is assumed be the same as the machine type of the machine that had the ECA applied to it.

1. Insert the ThinkPad Hardware Maintenance Diskette Version 1.71 or later, and restart the computer.
2. From the main menu, select **6. Set ECA Information**.

3. To write ECA information, select **1. Write ECA/rework number from EEPROM**, and follow the instruction.
4. To write box build date, select **4. Write box build date from EEPROM**, and follow the instruction on the screen.

If the system board is being replaced, try to read the ECA information from the old system board and transfer the information to the new system. If the system board is inoperable, this will not be possible.

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 60.
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 given in the drawings by the numbers in square callouts.
5. When turning a screw to replace a FRU, turn it in the direction as given by the arrow in the drawing.
6. When removing the FRU, move it in the direction as given 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 124.
8. When replacing a FRU, use the correct screw as shown in the procedures.

DANGER

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

Attention: After replacing a FRU, do not turn on the computer until you have made sure that all screws, springs, and other small parts are in place and none are 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.

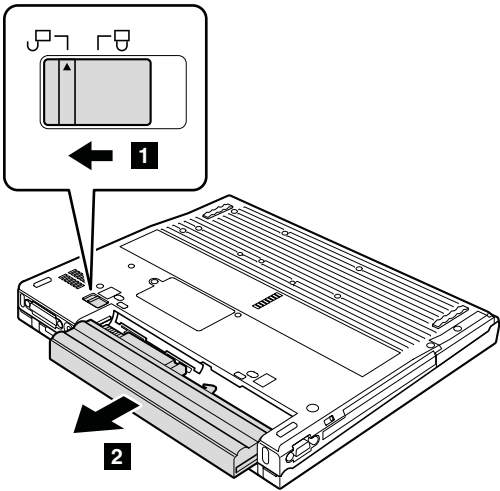
Attention: The system board is sensitive to, and can be damaged by, electrostatic discharge. Before touching it, establish personal grounding by touching a ground point with one hand or by using an electrostatic discharge (ESD) strap (P/N 6405959).

1010 Battery pack

! DANGER

Use only the battery specified in the parts list for your computer. Any other battery could ignite or explode.

Holding the battery release lever in the unlocked position **1**, remove the battery pack **2**.



When installing: Install the battery pack along the slide rails on the left and right sides of the battery-pack slot. Then make sure that the battery latch is locked.

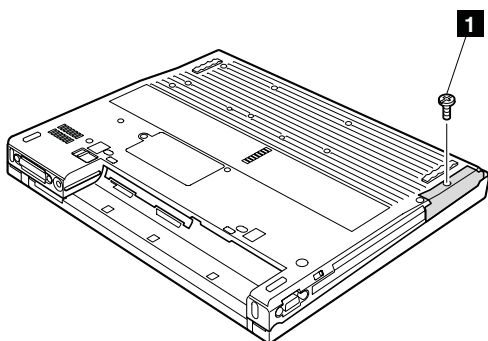
1020 Hard disk drive

Attention

- **Do not drop the hard disk drive or apply any physical shock to it.** The hard disk drive is sensitive to physical shock. Improper 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 it if possible.
- Never remove the drive while the system is operating or is in suspend mode.

For access, remove this FRU:

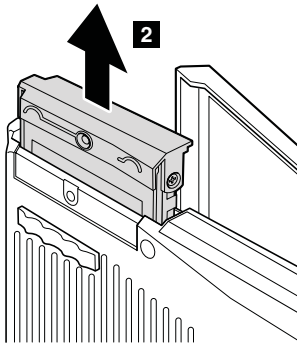
- “1010 Battery pack” on page 65



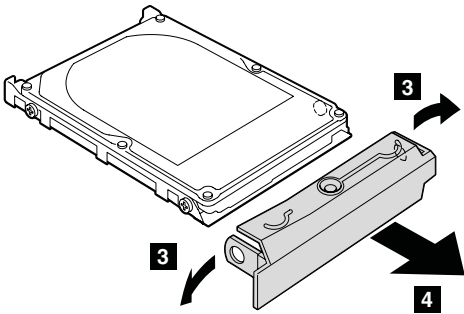
Note: The hard disk is attached to the cover.

Step	Screw (quantity)
1	HDD screw (1) or security screw (1)
Note: Use a 2.5-mm Allen wrench to remove the security screw.	

(continued)



When installing: Make sure that the hard-disk connector is attached firmly.

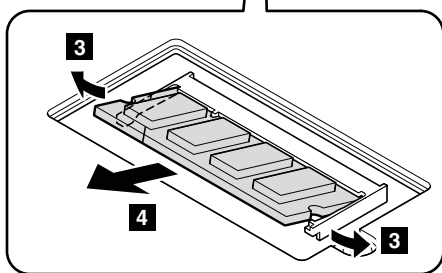
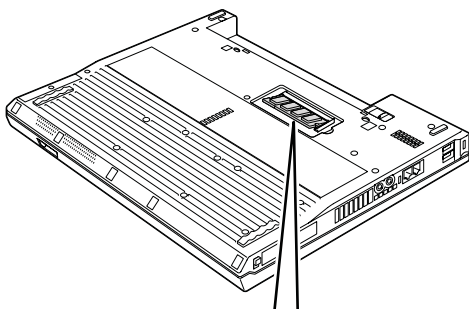
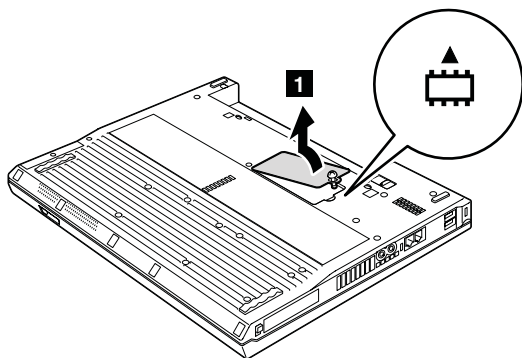


1030 DIMM (optional)

For access, remove this FRU:

- “1010 Battery pack” on page 65

Note: Loosen the screw **1**, but do not remove it.

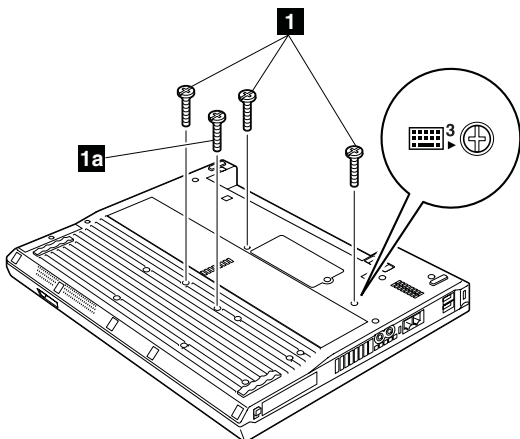


When installing: Insert the notched end of the DIMM into the socket. Press the DIMM firmly, and pivot it until it snaps into the place. Make sure that it is firmly fixed in the slot and does not move easily.


1040 Keyboard

For access, remove this FRU:

- “1010 Battery pack” on page 65



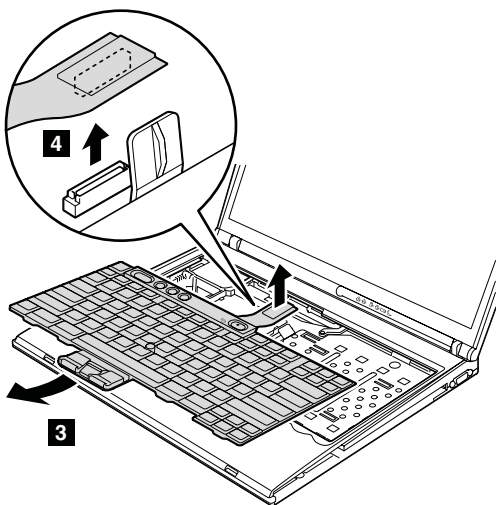
Screw **1a** is only for the models with 14.1-in. LCD.

Step	Icon	Screw (quantity)	Color	Torque
1		M2 × 12 mm, bind-head, nylon-coated (3)	Black	0.245 Nm (2.5 kgfcm)
1a		M2 × 12 mm, bind-head, nylon-coated (1)	Black	0.245 Nm (2.5 kgfcm)

(continued)

Removing and replacing a FRU

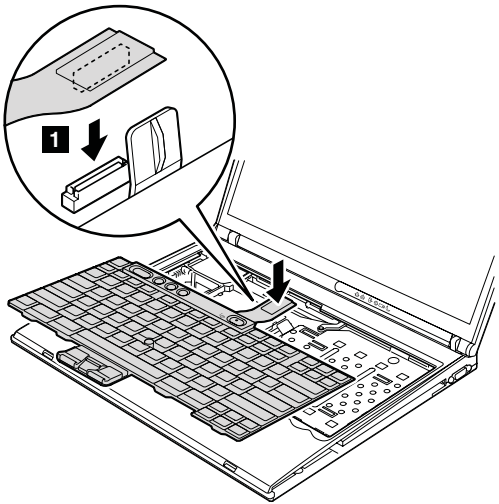
Press the part indicated by the arrow **2** in the direction of the arrow. This releases the latches of the keyboard from the frame, so that the front side of the keyboard pops out.



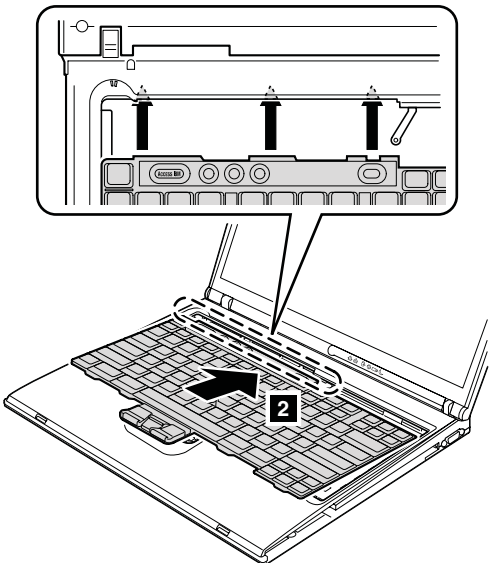
When installing: Make sure that the connector **4** is firmly attached.

When installing:

1. Attach the connector **1**.



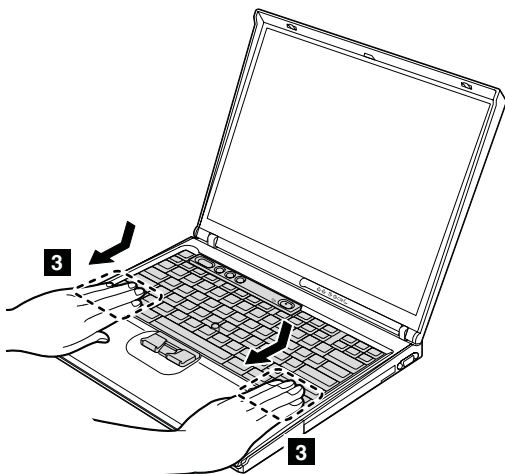
2. Install the keyboard so that the keyboard edges are under the frame.



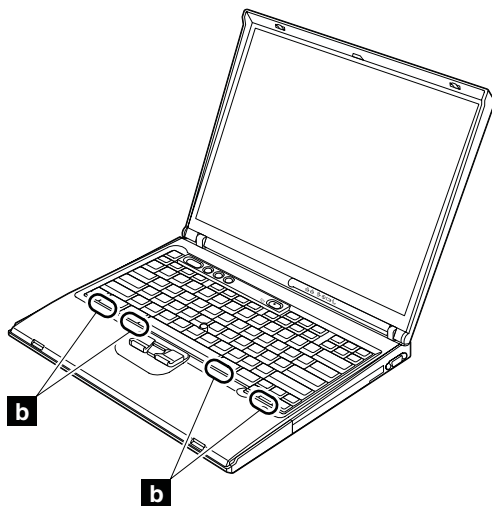
(continued)

Removing and replacing a FRU

3. To make sure that the front edge of the keyboard is housed firmly, gently press the keys with your fingers and try to slide the keyboard towards you.



4. Make sure that all the projections on the front side of the keyboard **b** are firmly attached under the frame.



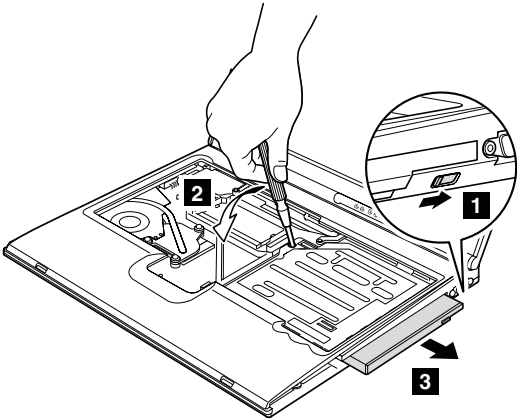
5. Secure the keyboard from the underside of the computer, using the new screws provided with the keyboard.

1050 Ultrabay device

For access, remove these FRUs in order:

- “1010 Battery pack” on page 65
- “1040 Keyboard” on page 69

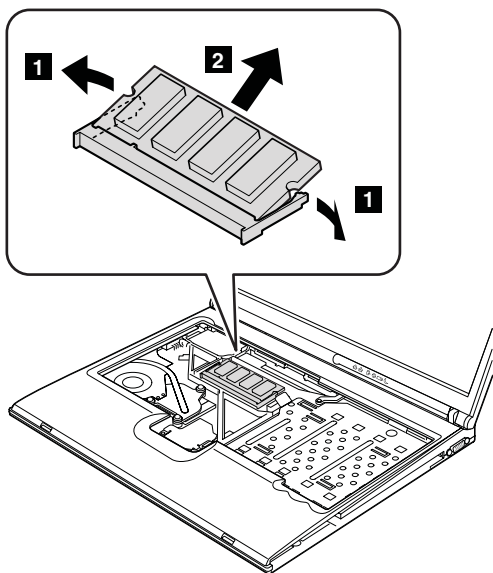
Holding the switch in the direction of arrow **1**, and push the Ultrabay device out from the bay by using a screwdriver **2** as in this figure. Then pull out the Ultrabay device with your hand **3**.



1060 DIMM (standard)

For access, remove these FRUs in order:

- “1010 Battery pack” on page 65
- “1040 Keyboard” on page 69

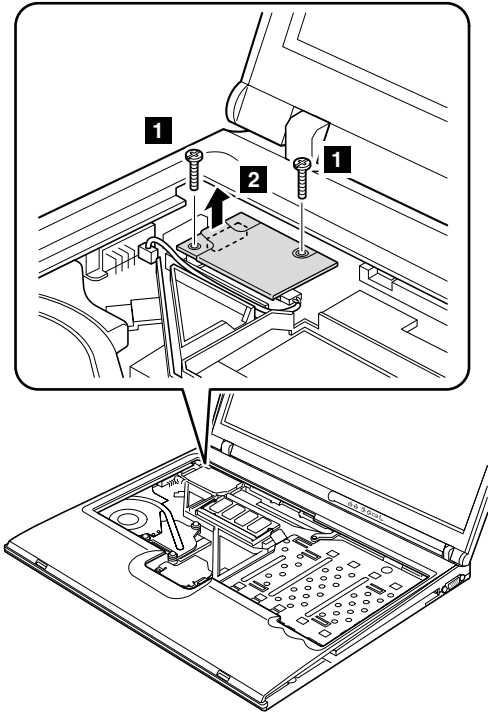


When installing: Insert the notched end of the DIMM into the socket. Press the DIMM firmly, and pivot it until it snaps into the place. Make sure that it is firmly fixed in the slot and does not move easily.

1070 Modem daughter card (MDC-2)

For access, remove these FRUs in order:

- “1010 Battery pack” on page 65
- “1040 Keyboard” on page 69



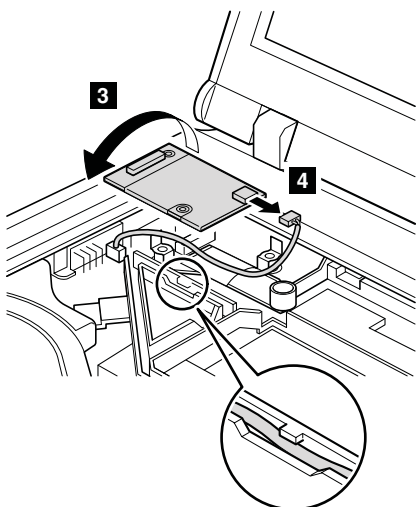
Step	Screw (quantity)	Color	Torque
1	M2 × 12 mm, bind-head, nylon-coated (2)	Black	0.245 Nm (2.5 kgfcm)

In step **2**, remove the card by pulling the tab with your fingers in the direction of the arrow.

(continued)

Removing and replacing a FRU

Turn the card over **3**, and detach the modem connector **4**.

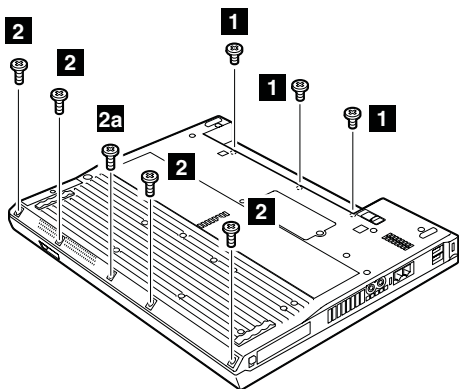


When installing: Make sure that connector **4** and the connector on the underside of the card are firmly attached. Then place the cable to fit in the cable guide as in the figure.

1080 Keyboard bezel

For access, remove these FRUs in order:

- “1010 Battery pack” on page 65
- “1040 Keyboard” on page 69

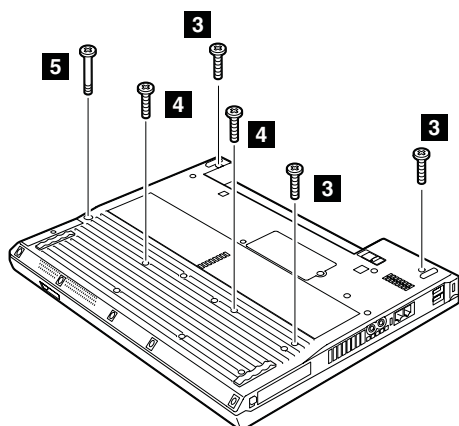


Screw **2a** is only for the models with 15.0-in. LCD.

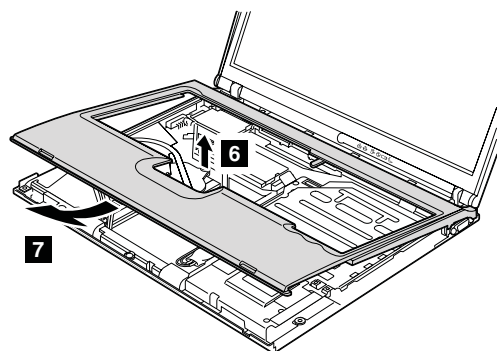
Step	Screw (quantity)	Color	Torque
1	M2 × 3 mm, small-head, nylon-coated (3)	Silver	0.245 Nm (2.5 kgfcm)
2	M2 × 6 mm, bind-head, nylon-coated (4)	Black	0.245 Nm (2.5 kgfcm)
2a	M2 × 6 mm, bind-head, nylon-coated (1)	Black	0.245 Nm (2.5 kgfcm)

(continued)

Removing and replacing a FRU

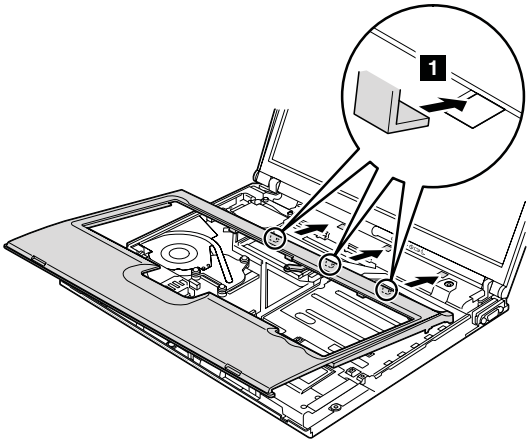


Step	Screw (quantity)	Color	Torque
3	M2 × 12 mm, bind-head, nylon-coated (3)	Silver	0.245 Nm (2.5 kgfcm)
4	M2 × 12 mm, bind-head, nylon-coated (2)	Silver	0.245 Nm (2.5 kgfcm)
5	M2 × 18.9 mm, special (1)	Silver	0.245 Nm (2.5 kgfcm)

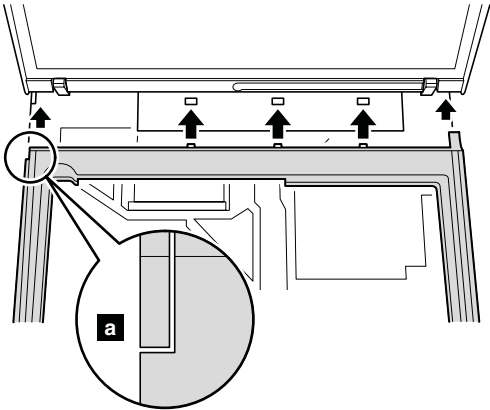


When installing:

1. Place the keyboard bezel so that the three latches are fixed in place **1**.



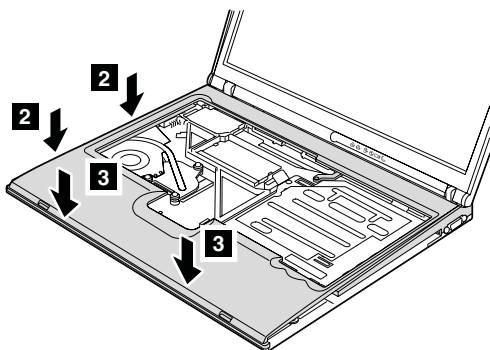
While inserting the three latches, align the top-left corner of the keyboard bezel as in figure **a**.



(continued)

Removing and replacing a FRU

2. Press the left edges **2** and the front edges **3** of the keyboard bezel until the latches are snapped.

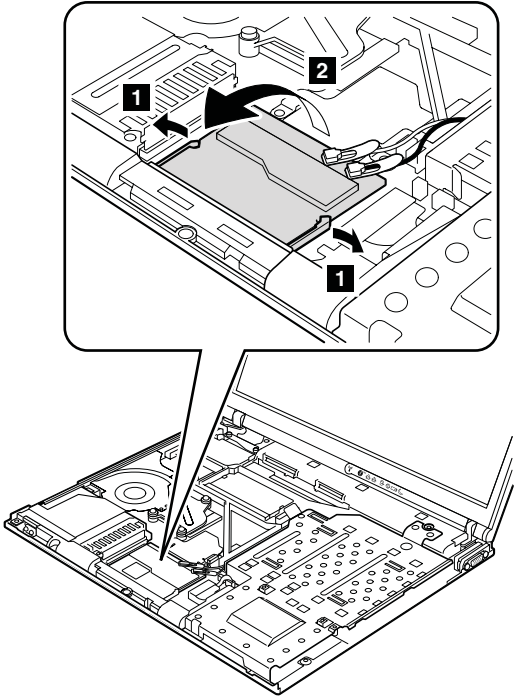


3. Secure the keyboard bezel from the underside of the computer with the screws.

1090 Mini PCI adapter (only for wireless models)

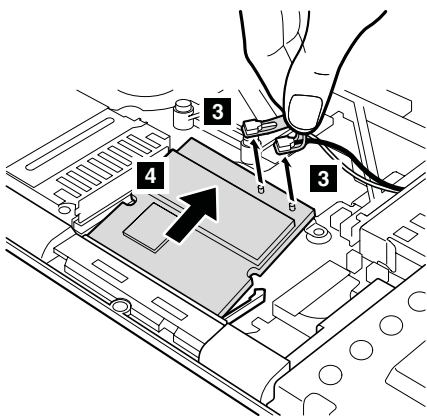
For access, remove these FRUs in order:

- “1010 Battery pack” on page 65
- “1020 Hard disk drive” on page 66
- “1040 Keyboard” on page 69
- “1080 Keyboard bezel” on page 77



(continued)

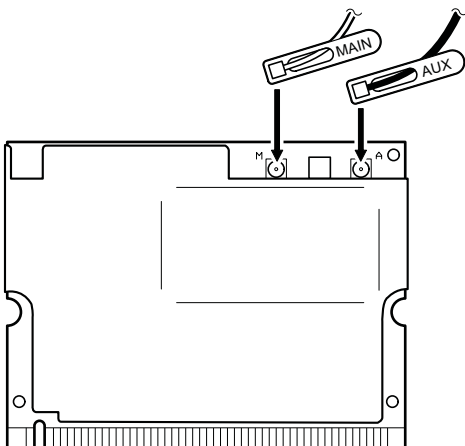
Note: When unplugging the antenna jack, do not pull the cable; it might snap. Unplug the jack by pulling the tab with your fingers.



When installing: Plug in the wireless antenna cable as follows:

Intel® PRO Wireless 2200BG Mini-PCI Adapter

Plug the gray antenna cable with the tab marked **MAIN** into jack **M**, and the black antenna cable with the tab marked **AUX** into jack **A**.

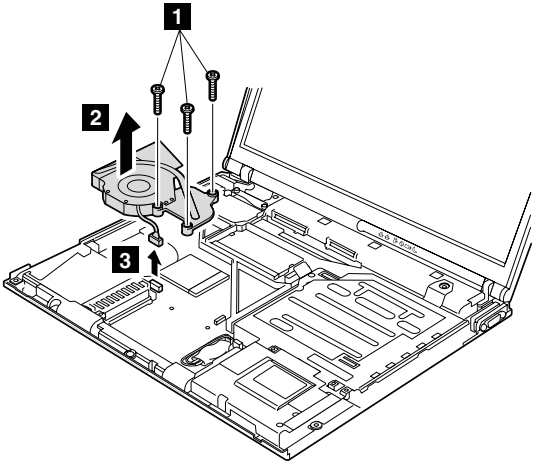


Insert the notched end of the card into the socket, and then press the card firmly. Pivot the card until it snaps into place. Make sure that it is firmly fixed in the slot and does not move easily.

1100 Fan assembly

For access, remove these FRUs in order:

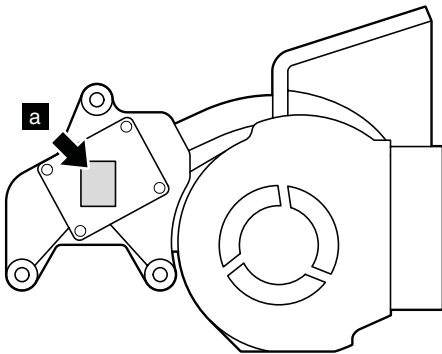
- “1010 Battery pack” on page 65
- “1020 Hard disk drive” on page 66
- “1040 Keyboard” on page 69
- “1080 Keyboard bezel” on page 77



Step	Screw (quantity)	Color	Torque
1	M2 × 10 mm, flat-head, nylon-coated (3)	Black	0.245 Nm (2.5 kgfcm)

When installing:

1. Make sure that the connector **3** is firmly attached.
2. Apply thermal grease on the part marked **a** in this figure.



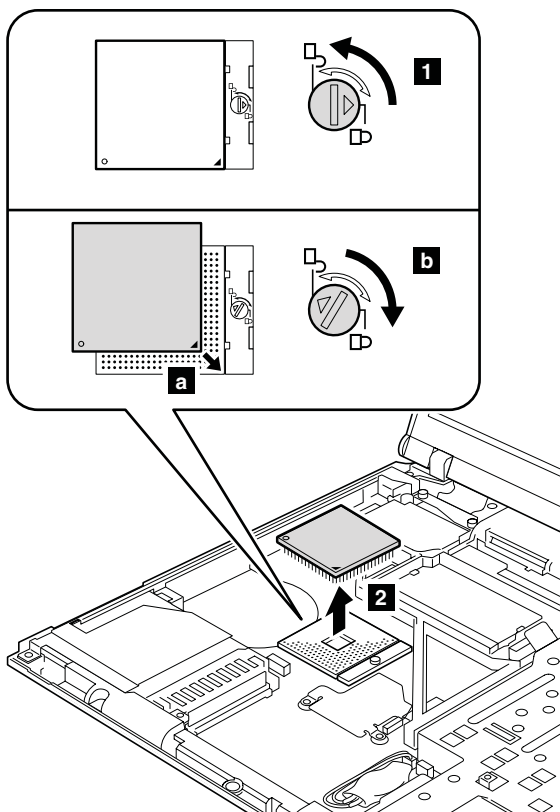
(Bottom view of the fan assembly)

1110 CPU

For access, remove these FRUs in order:

- “1010 Battery pack” on page 65
- “1020 Hard disk drive” on page 66
- “1040 Keyboard” on page 69
- “1080 Keyboard bezel” on page 77
- “1100 Fan assembly” on page 83

Rotate the head of the screw in the direction of arrow **1** to release the lock; then remove the CPU **2**.



When installing: Place the CPU on the CPU socket **a**, and then rotate the head of the screw in the direction of arrow **b** to secure the CPU.

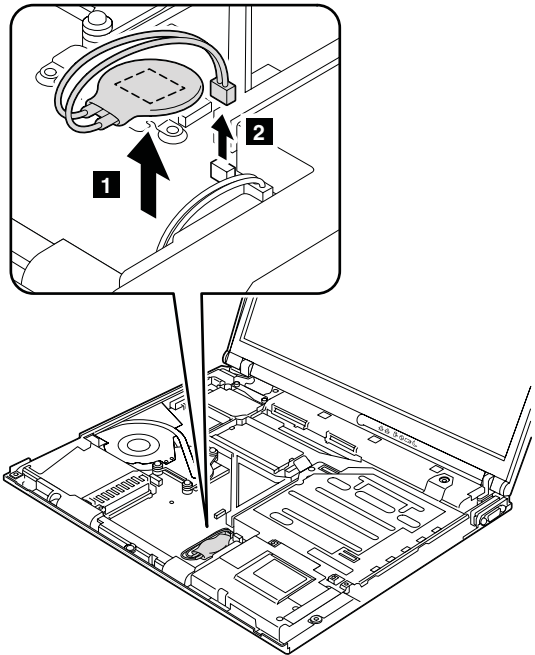
1120 Backup battery

! DANGER

Use only the battery specified in the parts list for your computer. Any other battery could ignite or explode.

For access, remove these FRUs in order:

- “1010 Battery pack” on page 65
- “1020 Hard disk drive” on page 66
- “1040 Keyboard” on page 69
- “1080 Keyboard bezel” on page 77

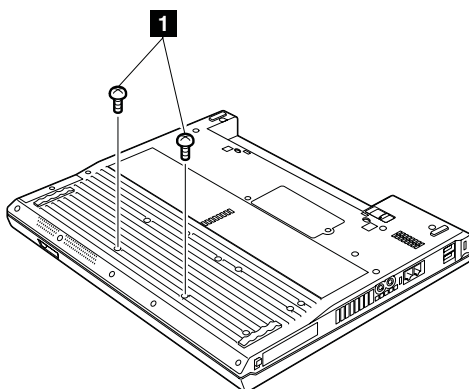


When installing: Make sure that the battery connector **2** is firmly attached.

1130 Speaker assembly

For access, remove these FRUs in order:

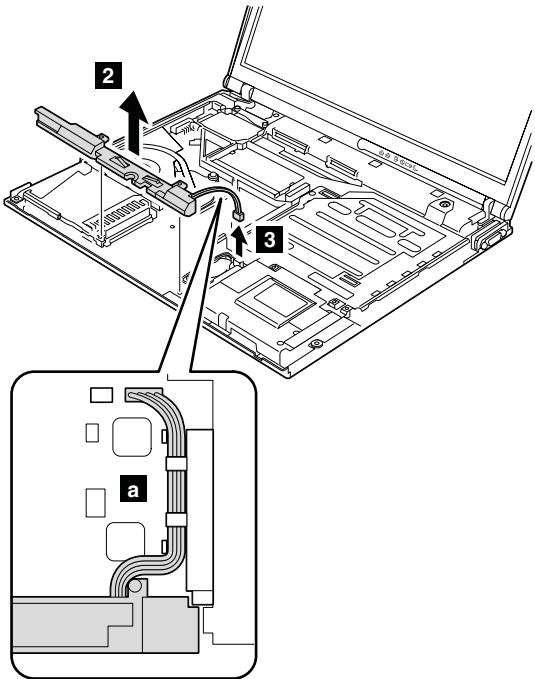
- “1010 Battery pack” on page 65
- “1020 Hard disk drive” on page 66
- “1040 Keyboard” on page 69
- “1080 Keyboard bezel” on page 77



Step	Screw (quantity)	Color	Torque
1	M2 × 12 mm, bind-head, nylon-coated (2)	Black	0.245 Nm (2.5 kgfcm)

(continued)

In step **3**, release the speaker cables from the cable guide **a**.

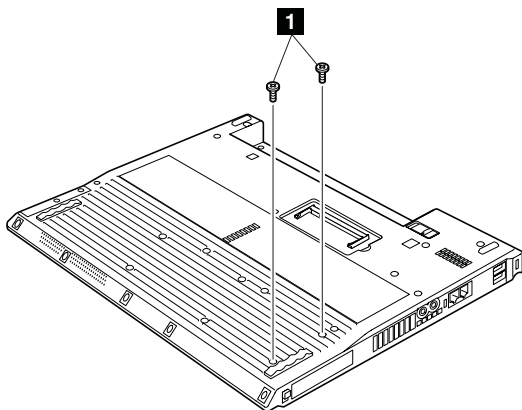


When installing: Make sure that the connector **3** is firmly attached. Then route the cable as in **a**.

1140 PC Card slot assembly

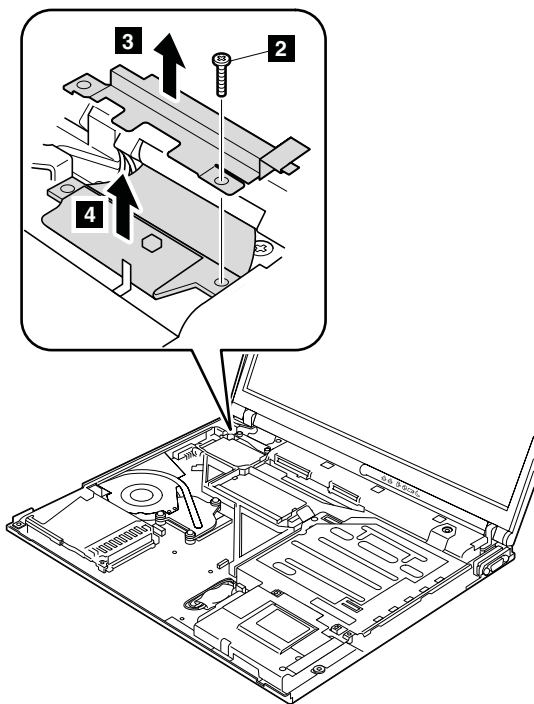
For access, remove these FRUs in order:

- “1010 Battery pack” on page 65
- “1020 Hard disk drive” on page 66
- “1040 Keyboard” on page 69
- “1080 Keyboard bezel” on page 77
- “1130 Speaker assembly” on page 86



Step	Screw (quantity)	Color	Torque
1	M2 × 4 mm, flat-head, nylon-coated (2)	Black	0.245 Nm (2.5 kgfcm)

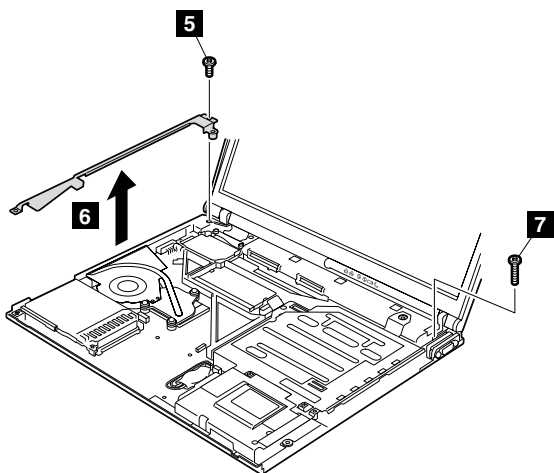
(continued)



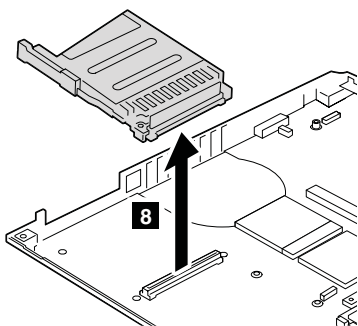
Step	Screw (quantity)	Color	Torque
2	M2 × 12 mm, bind-head, nylon-coated (1)	Black	0.245 Nm (2.5 kgfcm)

(continued)

Removing and replacing a FRU



Step	Screw (quantity)	Color	Torque
5	M2 × 6 mm, bind-head, nylon-coated (1)	Black	0.245 Nm (2.5 kgfcm)
7	M2 × 12 mm, bind-head, nylon-coated (1)	Black	0.245 Nm (2.5 kgfcm)



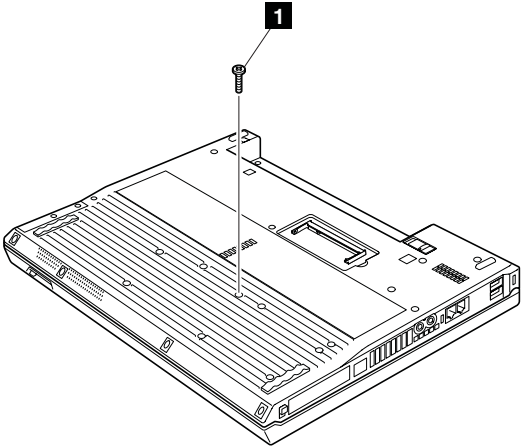
When installing: Make sure that the connector **8** is firmly attached to the system board. Then, secure the screws from the underside of the computer.

1150 Ultrabay Enhanced shield kit

For access, remove these FRUs in order:

- “1010 Battery pack” on page 65
- “1020 Hard disk drive” on page 66
- “1040 Keyboard” on page 69
- “1050 Ultrabay device” on page 73
- “1080 Keyboard bezel” on page 77

Note: Step **1** is only for the models with 15.0-in. LCD.
For the other models, skip this step.

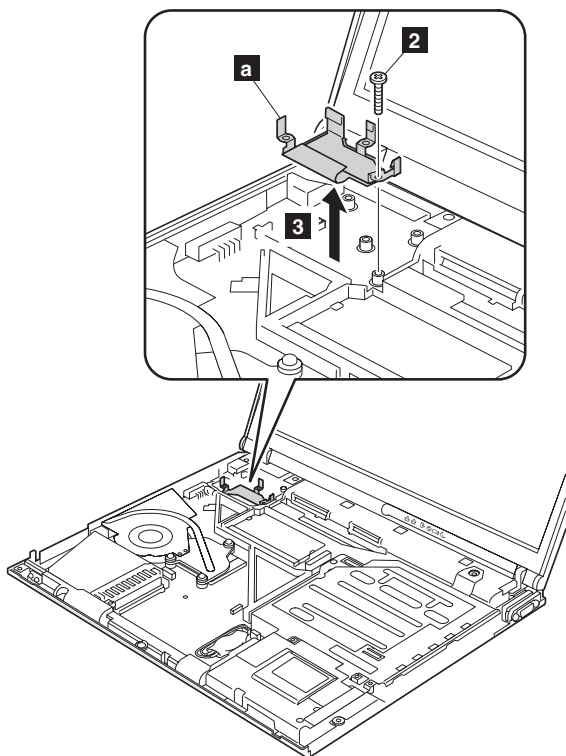


Step	Screw (quantity)	Color	Torque
1	M2 × 12 mm, bind-head, nylon-coated (1)	Black	0.245 Nm (2.5 kgfcm)

(continued)

Removing and replacing a FRU

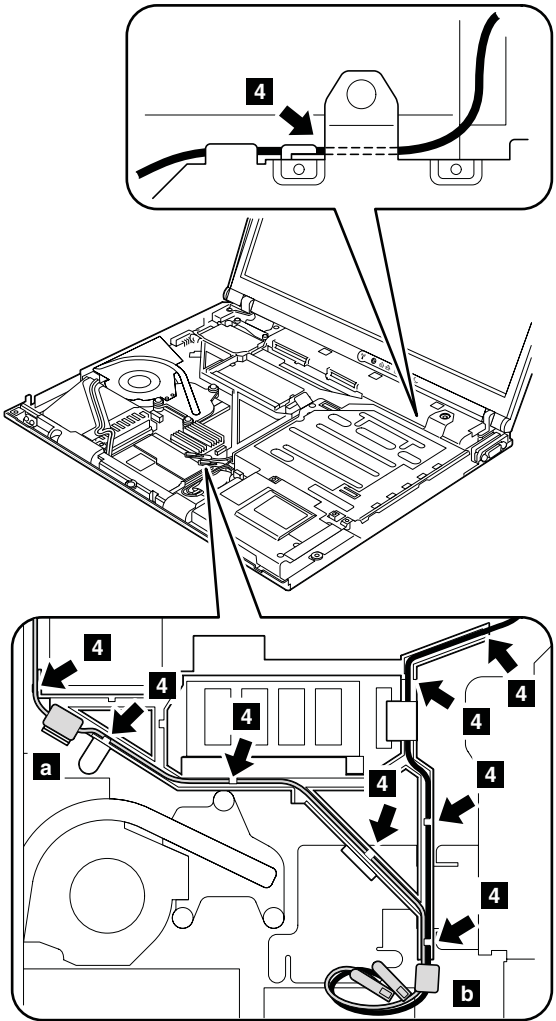
Remove EMI spring for the CDC **a** before removing the Ultrabay Enhanced shield kit.



Step	Screw (quantity)	Color	Torque
2	M2 × 12 mm, bind-head, nylon-coated (1)	Black	0.245 Nm (2.5 kgfcm)

(continued)

For wireless models, release the antenna cables from the cable guide **4**. For the other models, skip this step.

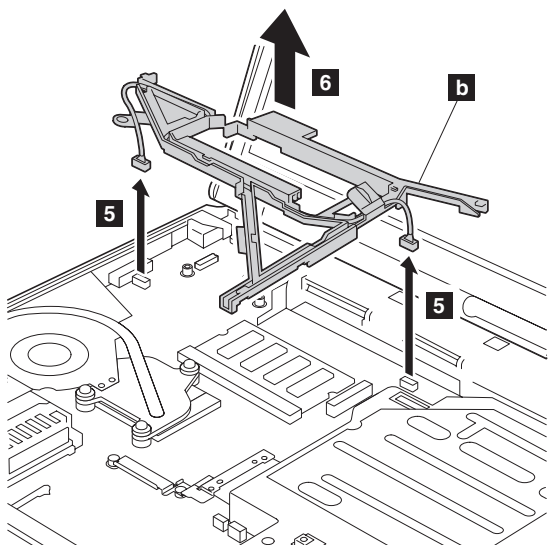


When installing: Make sure that the antenna cables and the two ferrite cores **a** and **b** (with sponge) are correctly routed and securely in place.

(continued)

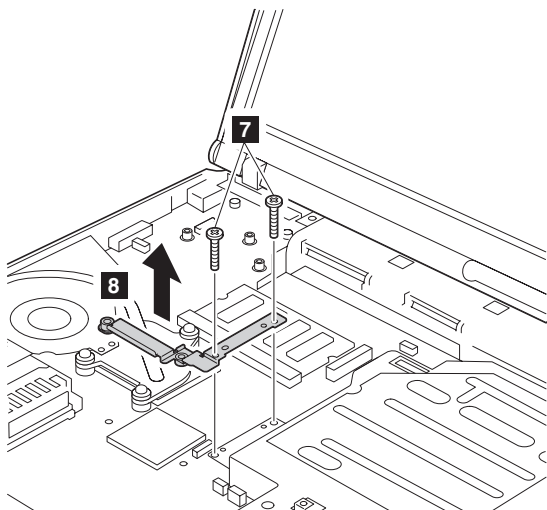
Removing and replacing a FRU

Remove the cable guide **b**.



When installing: Make sure that the connectors **5** are firmly attached.

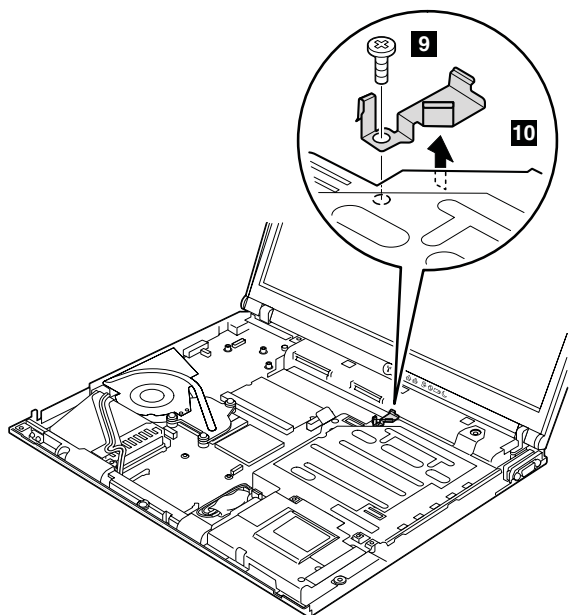
(continued)



Step	Screw (quantity)	Color	Torque
6	M2 × 12 mm, bind-head, nylon-coated (2)	Black	0.245 Nm (2.5 kgfcm)

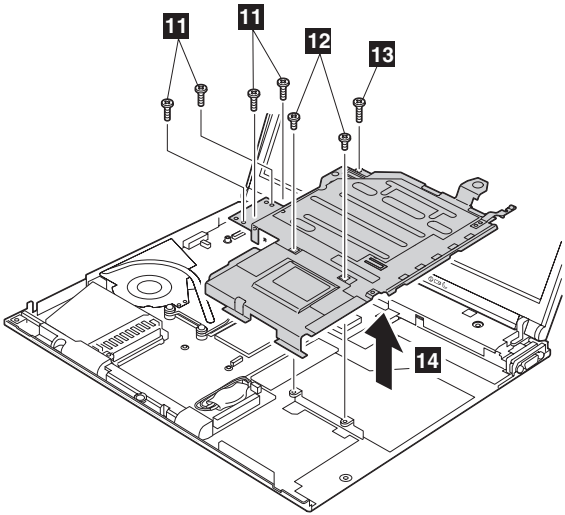
(continued)

Removing and replacing a FRU



Step	Screw (quantity)	Color	Torque
9	M2 × 12 mm, bind-head, nylon-coated (1)	Black	0.245 Nm (2.5 kgfcm)

(continued)



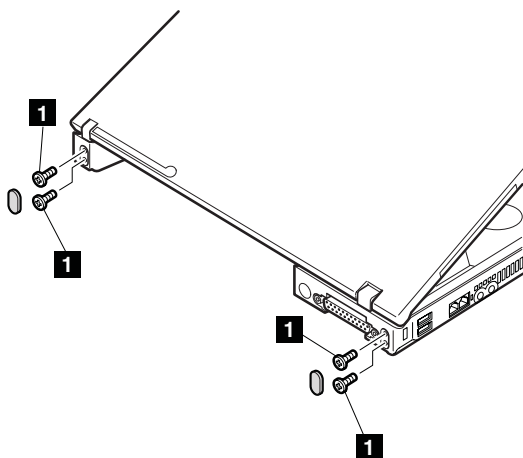
Screws **11** are only for the models with 15.0-in. LCD. For the other models, skip the step.

Step	Screw (quantity)	Color	Torque
11	M2 × 10 mm, flat-head, nylon-coated (4)	Black	0.245 Nm (2.5 kgfcm)
12	M2 × 3 mm, small-head, nylon-coated (2)	Black	0.245 Nm (2.5 kgfcm)
13	M2 × 6 mm, bind-head, nylon-coated (1)	Black	0.245 Nm (2.5 kgfcm)

1160 LCD assembly

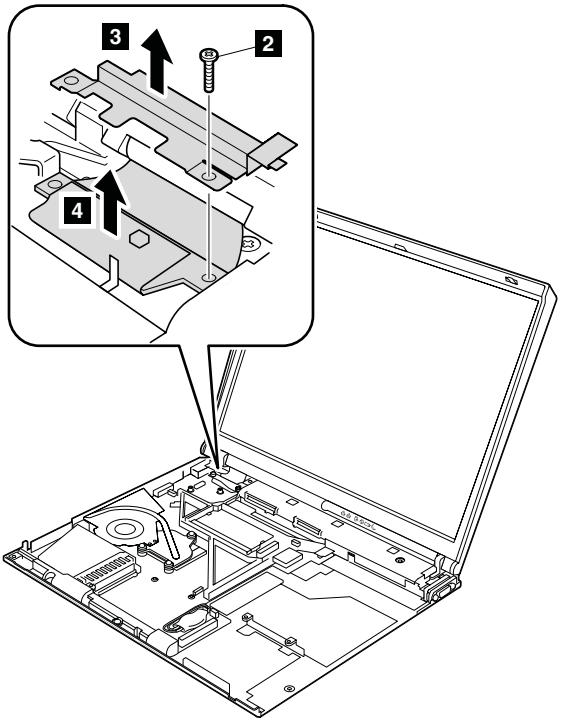
For access, remove these FRUs in order:

- “1010 Battery pack” on page 65
- “1040 Keyboard” on page 69
- “1050 Ultrabay device” on page 73
- “1070 Modem daughter card (MDC-2)” on page 75
- “1080 Keyboard bezel” on page 77
- “1090 Mini PCI adapter (only for wireless models)” on page 81
- “1150 Ultrabay Enhanced shield kit” on page 91



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

(continued)

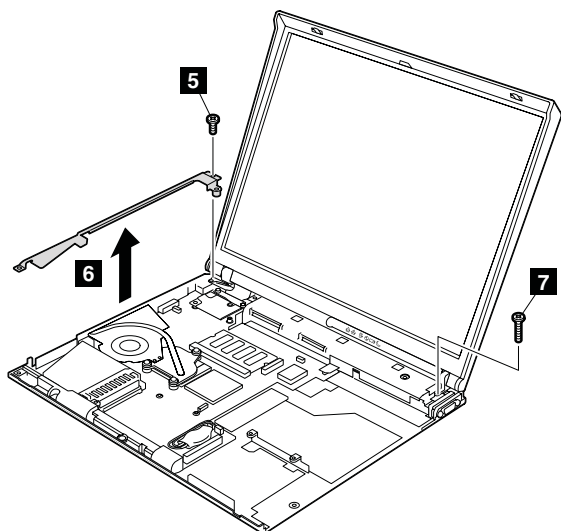


Step	Screw (quantity)	Color	Torque
2	M2 × 12 mm, bind-head, nylon-coated (1)	Black	0.245 Nm (2.5 kgfcm)

When installing: Make sure that the connector **4** and the LCD cable retainer **3** are firmly attached, and then secure them with the screw.

(continued)

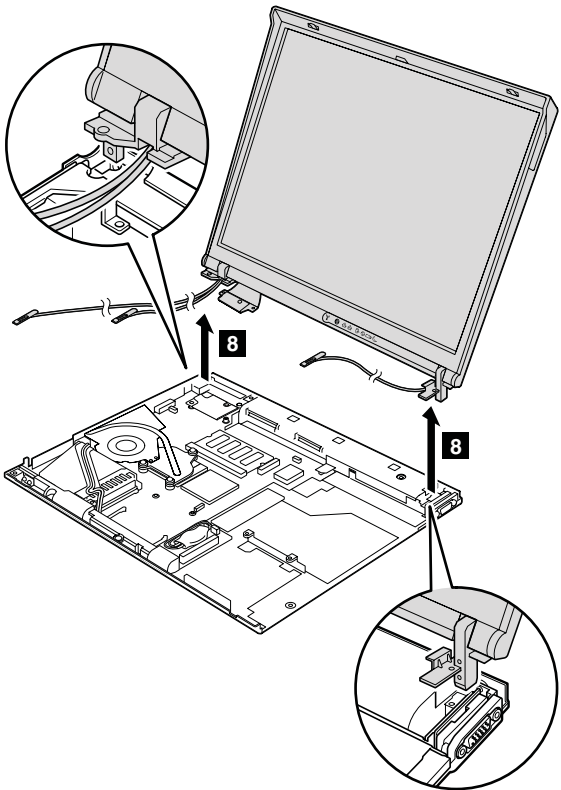
Removing and replacing a FRU



Step	Screw (quantity)	Color	Torque
5	M2 × 6 mm, bind-head, nylon-coated (1)	Black	0.245 Nm (2.5 kgfcm)
7	M2 × 12 mm, bind-head, nylon-coated (1)	Black	0.245 Nm (2.5 kgfcm)

(continued)

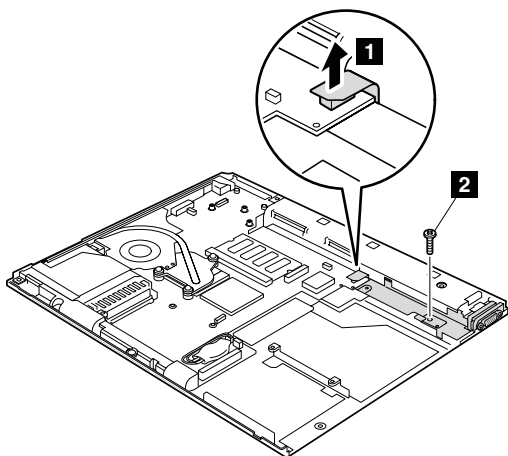
Note: Some models may not have the wireless LAN antenna cables.



1170 VGA and Ultrabay Enhanced device eject button cable

For access, remove these FRUs in order:

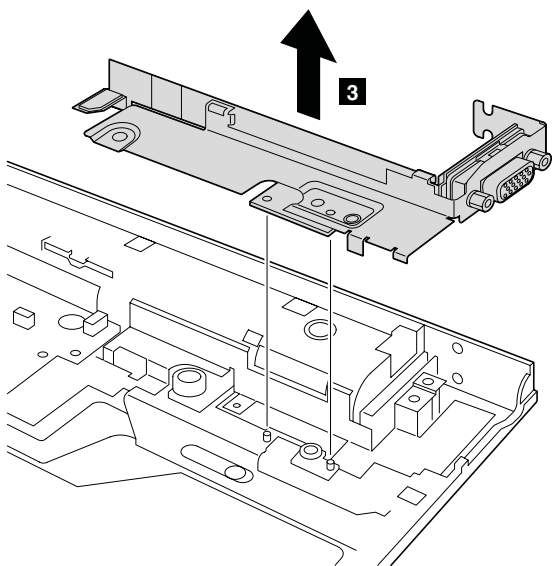
- “1010 Battery pack” on page 65
- “1050 Ultrabay device” on page 73
- “1020 Hard disk drive” on page 66
- “1040 Keyboard” on page 69
- “1080 Keyboard bezel” on page 77
- “1090 Mini PCI adapter (only for wireless models)” on page 81
- “1150 Ultrabay Enhanced shield kit” on page 91
- “1160 LCD assembly” on page 98



Step	Screw (quantity)	Color	Torque
2	M2 × 4 mm, flat-head, nylon-coated (1)	Black	0.245 Nm (2.5 kgfcm)

When installing: Make sure that the connector **1** is firmly attached.

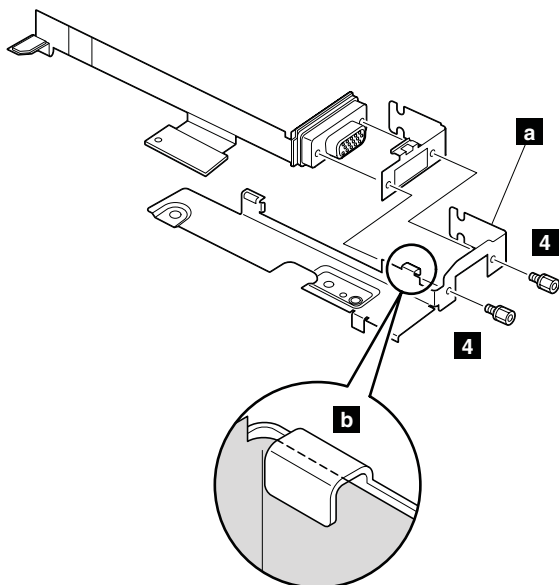
(continued)



(continued)

Removing and replacing a FRU

VGA and Ultrabay Enhanced device eject button cable is attached to S-Video gasket **a**. When re-installing the cable, attach the cable as shown in figure **b**.



Step	Screw (quantity)	Color	Torque
4	Hex stud (2)	Silver	0.392 Nm (4 kgfcm)

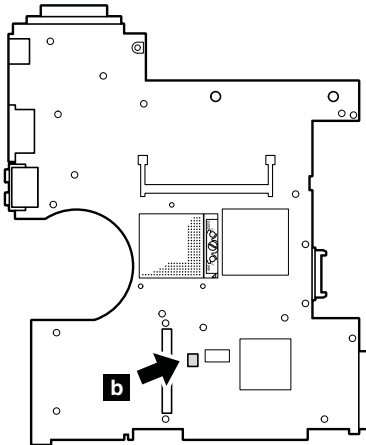
1180 System board, interposer card, and base cover

For access, remove these FRUs, in order:

- “1010 Battery pack” on page 65
- “1020 Hard disk drive” on page 66
- “1030 DIMM (optional)” on page 68
- “1040 Keyboard” on page 69
- “1050 Ultrabay device” on page 73
- “1060 DIMM (standard)” on page 74
- “1070 Modem daughter card (MDC-2)” on page 75
- “1080 Keyboard bezel” on page 77
- “1090 Mini PCI adapter (only for wireless models)” on page 81
- “1100 Fan assembly” on page 83
- “1110 CPU” on page 84
- “1120 Backup battery” on page 85
- “1130 Speaker assembly” on page 86
- “1140 PC Card slot assembly” on page 88
- “1150 Ultrabay Enhanced shield kit” on page 91
- “1160 LCD assembly” on page 98
- “1170 VGA and Ultrabay Enhanced device eject button cable” on page 102

Important notice for handling the system board:

In ThinkPad R50e series, an accelerometer chip for the IBM HDD Active Protection System **b** is soldered on the topside of the system board.



(continued)

Important

When handling the system board, bear the following in mind.

- The system board of the ThinkPad R50e series has an accelerometer, which can be broken by applying several thousands of G-forces.

Note: Dropping a system board from a height of as little as 6 inches so that it falls flat on a hard bench can subject the accelerometer to as much as 6,000 G's of shock.

- Be careful not to drop the system board on a bench top that has a hard surface, such as metal, wood, or composite.
- If a system board is dropped, you must test it, using PC-Doctor DOS, to make sure that the IBM HDD Active Protection still functions (see below).

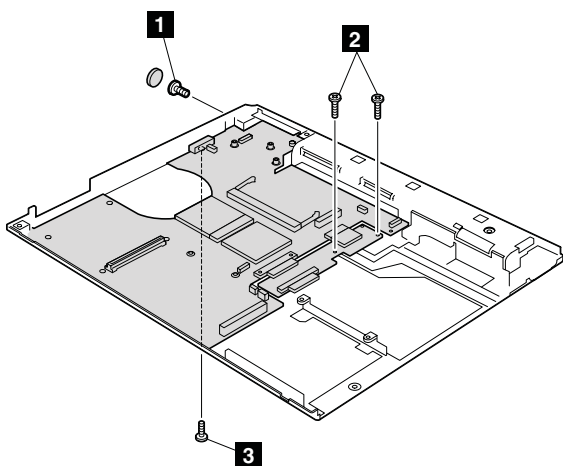
Note: If the test shows that IBM HDD Active Protection is not functioning, be sure to document the drop in any reject report, and replace the system board.

- Avoid rough handling of any kind.
- At every point in the process, be sure not to drop or stack the system board.
- If you put a system board down, be sure to put it only on a padded surface such as an ESD mat or conductive corrugated material.

After replacing the system board, run PC-Doctor DOS to make sure that IBM HDD Active Protection still functions. The procedure is as follows:

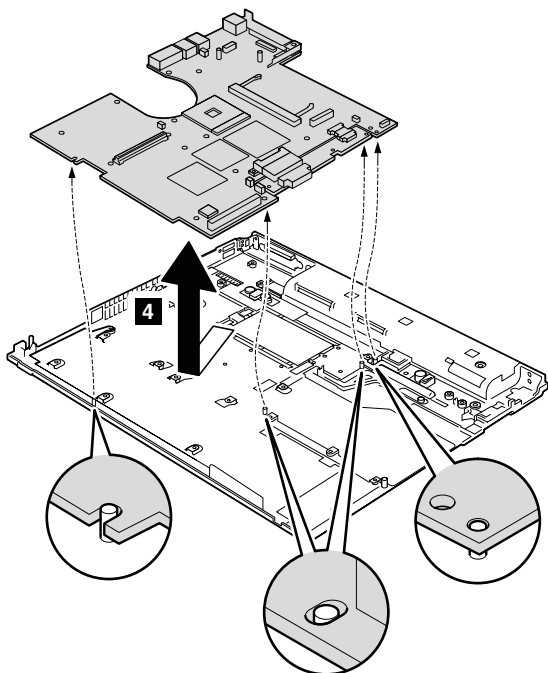
1. Place the computer on a horizontal surface.
2. Run **Diagnostics --> Other Devices --> IBM HDD Active Protection Test**.

Attention: Do not apply physical shock to the computer while the test is running.



Step	Screw (quantity)	Color	Torque
1	M2.5 × 4.8 mm, flat-head, nylon-coated (1)	Silver	0.392 Nm (4 kgfcm)
2	M2 × 4 mm, flat-head, nylon-coated (2)	Black	0.245 Nm (2.5 kgfcm)
3	M2 × 12 mm, bind-head, nylon-coated (1)	Black	0.245 Nm (2.5 kgfcm)

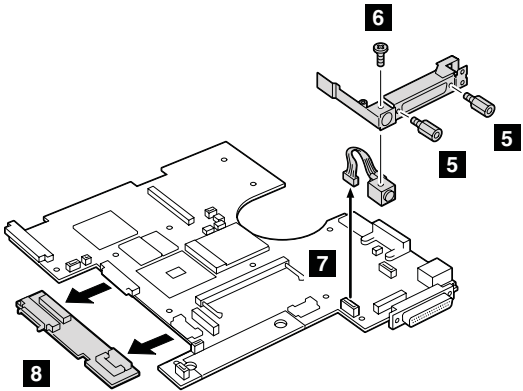
(continued)



When installing: Make sure that the all the guide holes of the system board are firmly attached to the base cover.

(continued)

Remove the connector bracket from the system board by removing screws **5** and **6**. Then remove the ac connector from the system board by disconnecting the cables **7**. Step **8** is only for the models with 15.0-in. LCD. Other models do not have the interposer card.



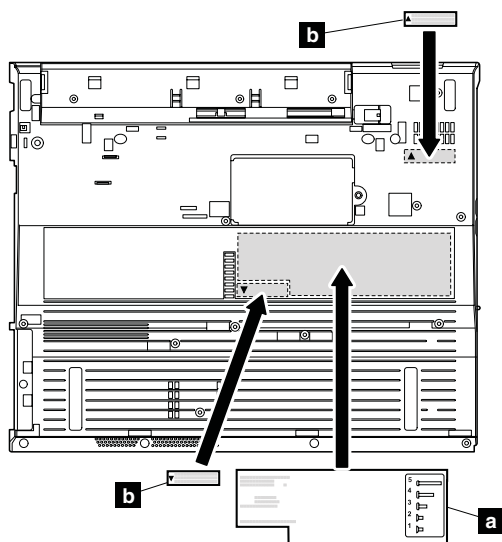
Step	Screw (quantity)	Color	Torque
5	Hex stud (2)	Silver	0.392 Nm (4 kgfcm)
6	M2.5 × 3 mm, flat-head, nylon-coated (1)	Black	0.392 Nm (4 kgfcm)

Note for sticking a label kit on the base cover

New base cover FRU is shipped with several kinds of label kit. When you replace the base cover, you need to stick a homologation label **a** which has the same part no. with the label on the old base cover (defective FRU) on the new base cover.

In some models, you also need to stick one or two FCC labels **b**. Check the old base cover and if there is one or two FCC labels on it, find the same one from the label kit and stick it on the new base cover.

Stick the labels on the new base cover as shown in this figure.

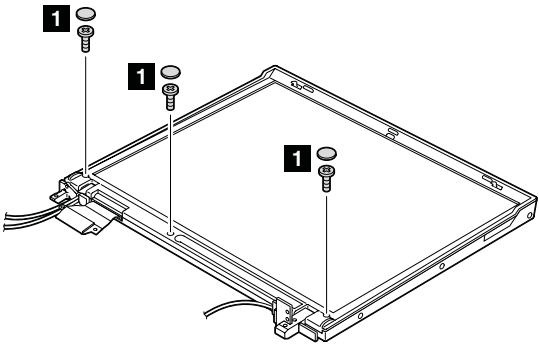



2010 LCD front bezel

For access, remove these FRUs in order:

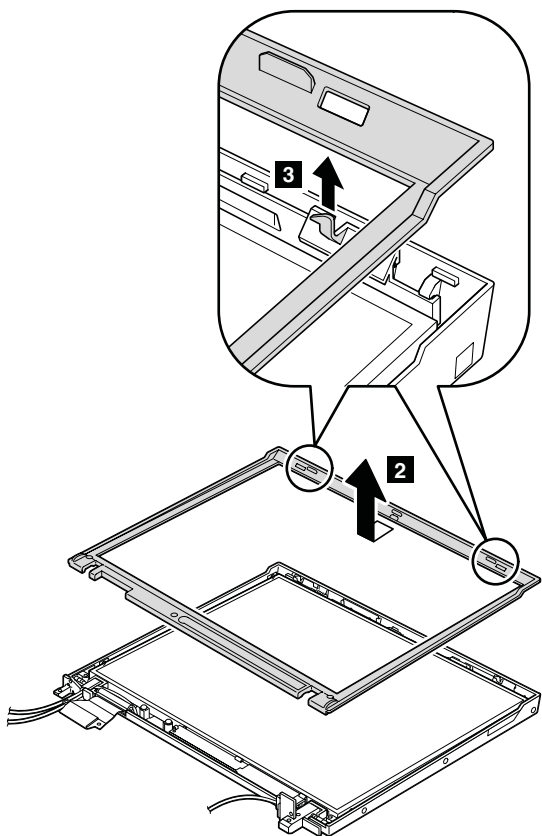
- “1010 Battery pack” on page 65
- “1020 Hard disk drive” on page 66
- “1040 Keyboard” on page 69
- “1050 Ultrabay device” on page 73
- “1080 Keyboard bezel” on page 77
- “1090 Mini PCI adapter (only for wireless models)” on page 81
- “1150 Ultrabay Enhanced shield kit” on page 91
- “1160 LCD assembly” on page 98

Note: Some models may not have the wireless LAN antenna cables.



Step	Screw cap	Screw (quantity)	Color	Torque
1		M2.5 × 4.8 mm, bind-head, nylon-coated (3)	Black	0.392 Nm (4 kgfcm)

(continued)

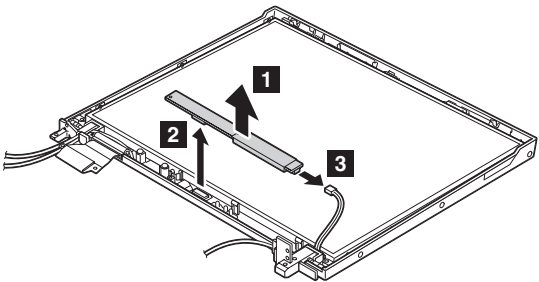


2020 Inverter card

For access, remove these FRUs in order:

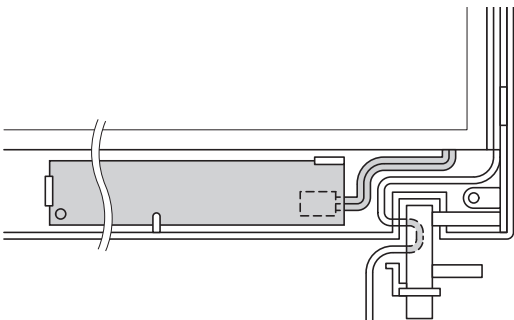
- “1010 Battery pack” on page 65
- “1020 Hard disk drive” on page 66
- “1040 Keyboard” on page 69
- “1080 Keyboard bezel” on page 77
- “1090 Mini PCI adapter (only for wireless models)” on page 81
- “1150 Ultrabay Enhanced shield kit” on page 91
- “1160 LCD assembly” on page 98
- “2010 LCD front bezel” on page 111

Note: Some models may not have the wireless LAN antenna cables.



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

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



2030 LCD panel, LCD cable assembly, wireless LAN antenna assembly, hinges, and LCD cover

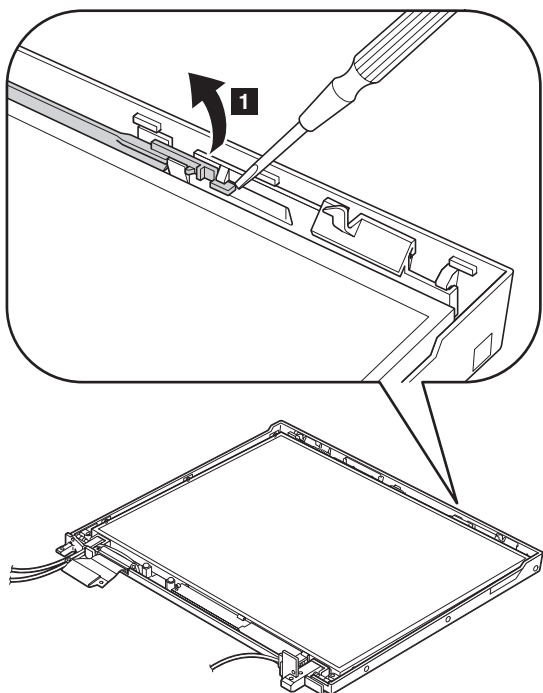
For access, remove these FRUs in order:

- “1010 Battery pack” on page 65
- “1020 Hard disk drive” on page 66
- “1040 Keyboard” on page 69
- “1050 Ultrabay device” on page 73
- “1080 Keyboard bezel” on page 77
- “1090 Mini PCI adapter (only for wireless models)” on page 81
- “1150 Ultrabay Enhanced shield kit” on page 91
- “1160 LCD assembly” on page 98
- “2010 LCD front bezel” on page 111
- “2020 Inverter card” on page 113

Note: Some models may not have the wireless LAN antenna cables.

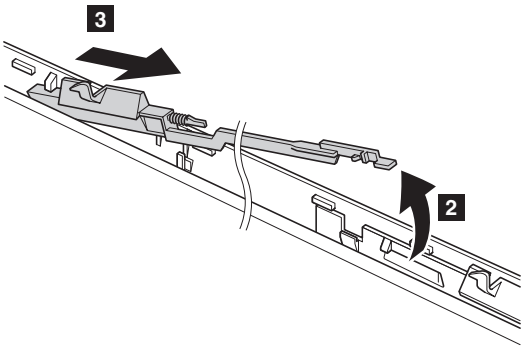
Before removing the LCD panel, remove the left latch first.

In step **1**, unlatch the latch bar as in this figure.

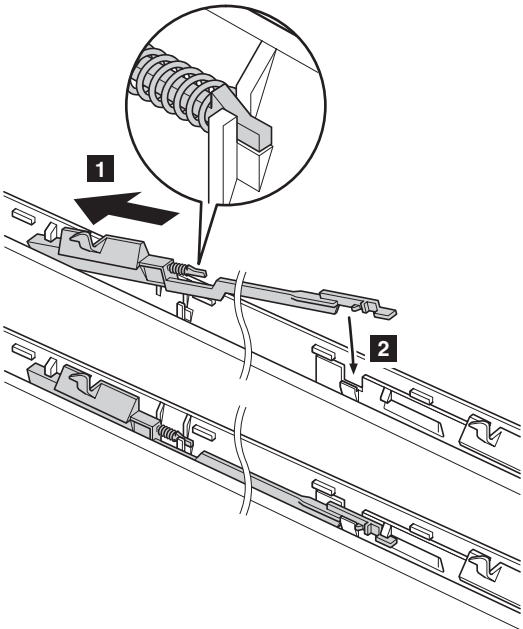


(continued)

Lift the latch bar in the direction of the arrow **2**, and then remove the left latch in the direction of the arrow **3**.

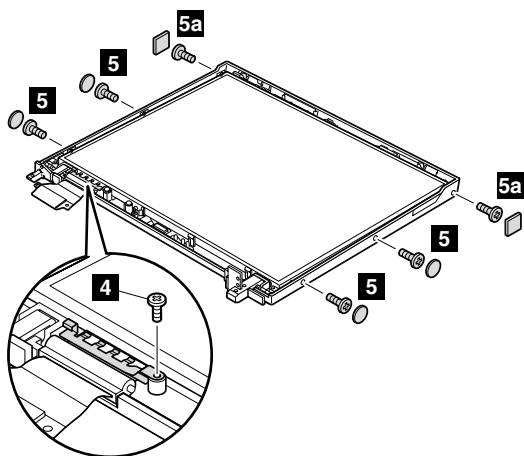


When installing: Attach the left latch to the LCD cover as in this figure.



(continued)

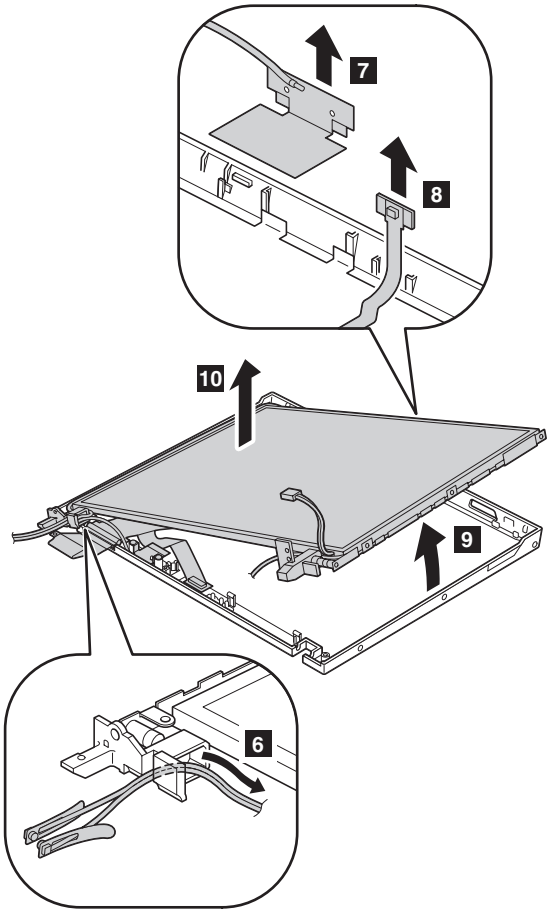
Removing and replacing a FRU



Step	Screw cap	Screw (quantity)	Color	Torque
4	—	M2.5 × 4.8 mm, bind-head, nylon-coated (1)	Black	0.392 Nm (4 kgfcm)
5	○	M2 × 4 mm, bind-head, nylon-coated (4)	Black	0.245 Nm (2.5 kgfcm)
5a	□	M2 × 4 mm, bind-head, nylon-coated (2)	Black	0.245 Nm (2.5 kgfcm)

(continued)

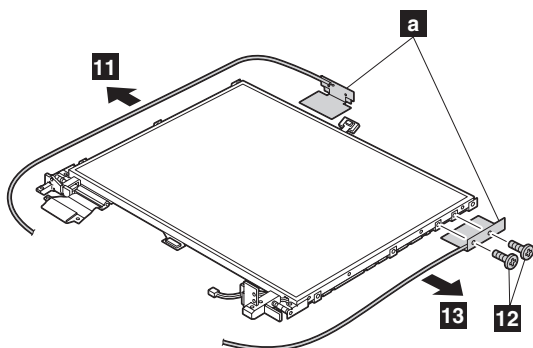
Note: Step **6** and step **7** are only for the models with the wireless LAN antenna cables. For the other models, skip these steps.



(continued)

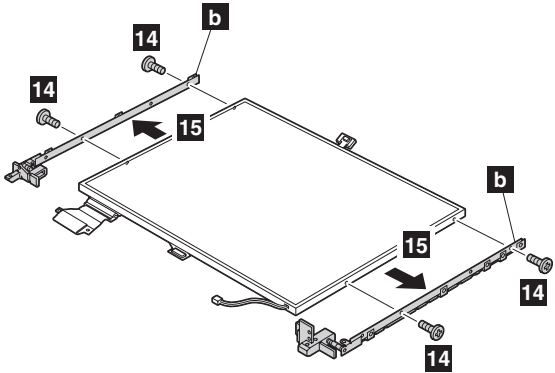
Removing and replacing a FRU

For the models with the wireless LAN antenna cables, remove the antenna assembly (**a**). For the other models, skip steps from **11** to **13** .



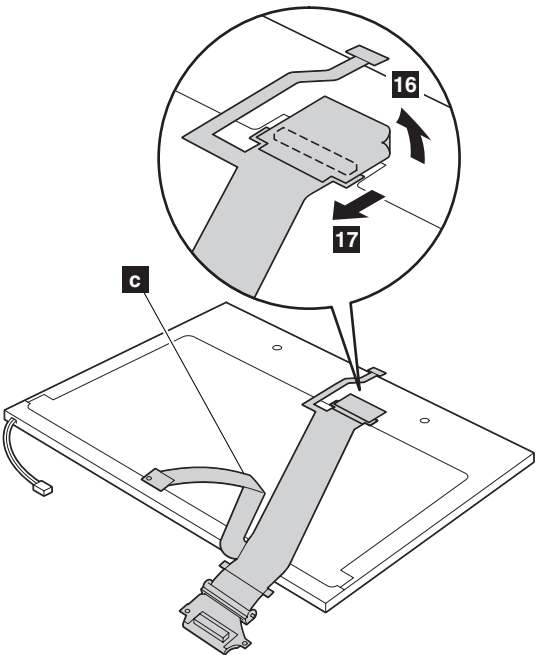
(continued)

Remove the hinges (**b**) from the LCD assembly.



Step	Screw (quantity)	Color	Torque
14	M2 × 3 mm, small-head, nylon-coated (4)	Silver	0.245 Nm (2.5 kgfcm)

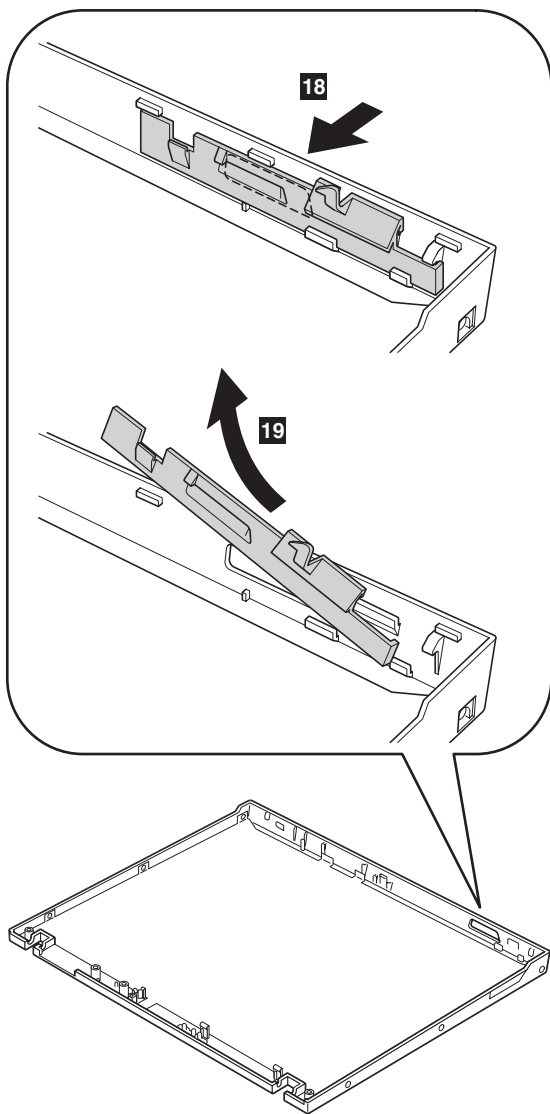
Turn over the LCD panel and strip off the tape **16** securing the FPC (**c**). Then detach the connector **17** in the direction of the arrow.



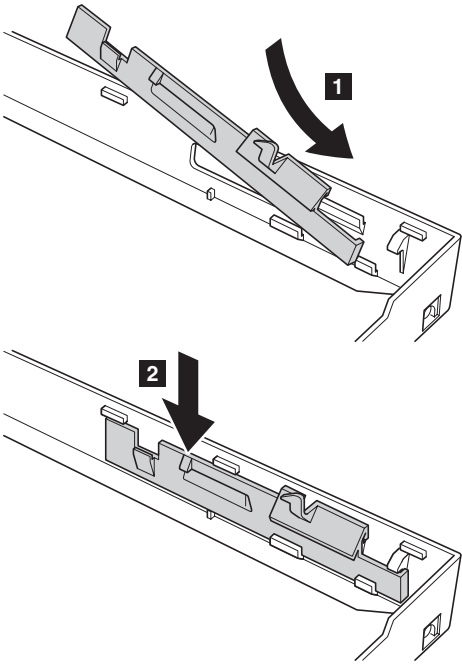
(continued)

Removing and replacing a FRU

Remove the right latch from the LCD cover.

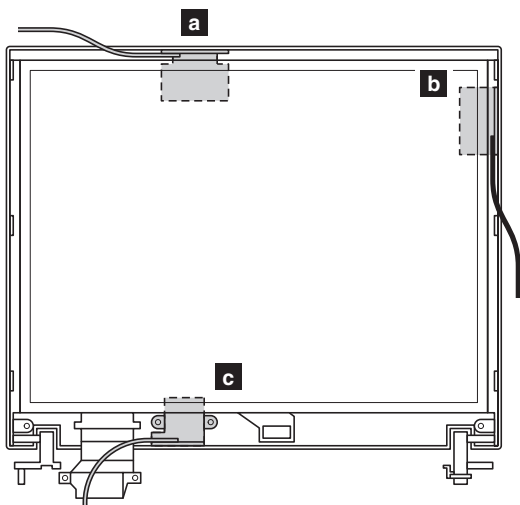


When installing: Attach the right latch to the LCD cover as in this figure.

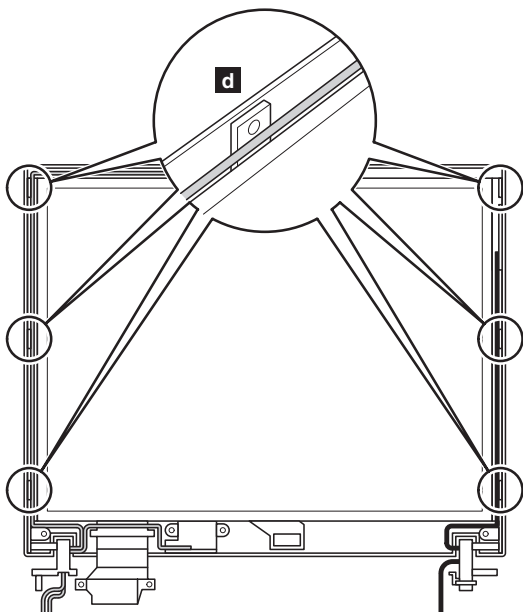


Routing the cables of the wireless LAN antenna (only for the wireless models):

1. Place the wireless LAN antennas **a** and **b**, and the Bluetooth wireless antenna **c** under the LCD panel.

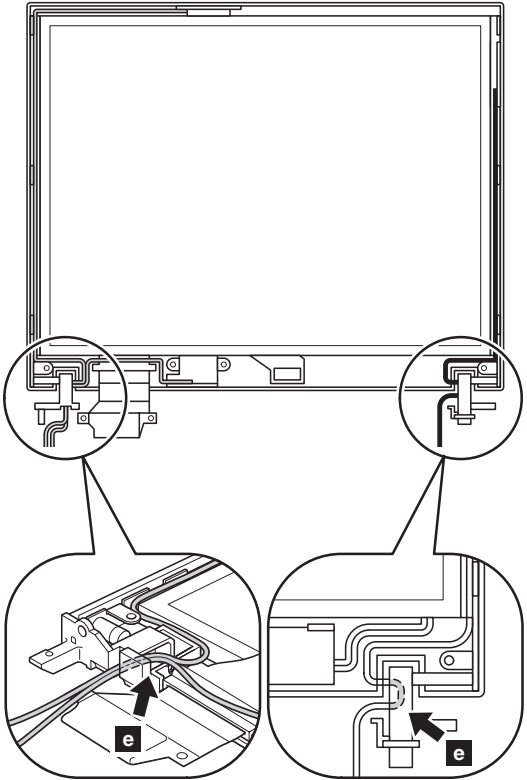


2. Route the antenna cables as in the following drawings:



(continued)

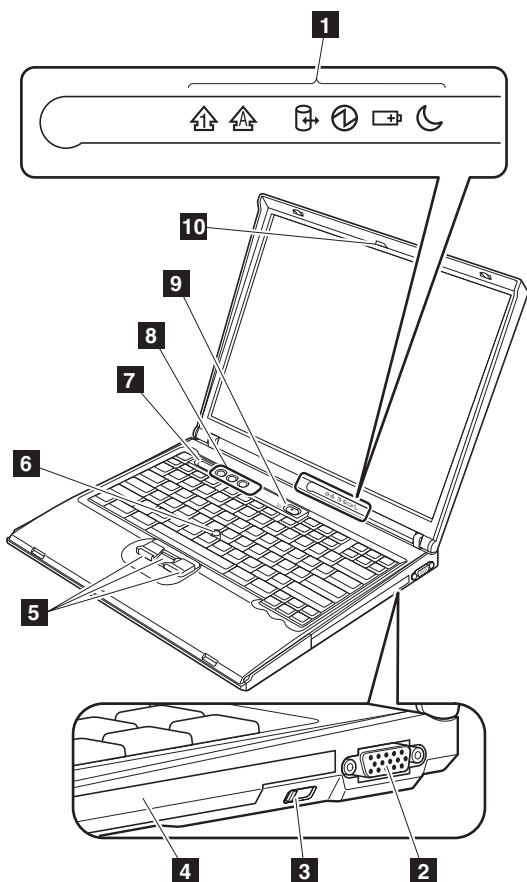
3. Route the cables as in the figure below.



Locations

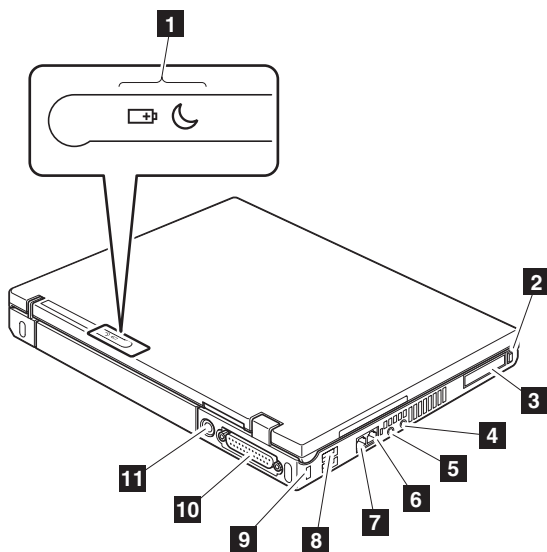
Front view

- 1** System and power status indicators
- 2** External monitor connector
- 3** Ultrabay Enhanced latch
- 4** Ultrabay Enhanced
- 5** TrackPoint buttons
- 6** TrackPoint pointing stick
- 7** Access IBM button
- 8** Volume control buttons
- 9** Power switch
- 10** ThinkLight



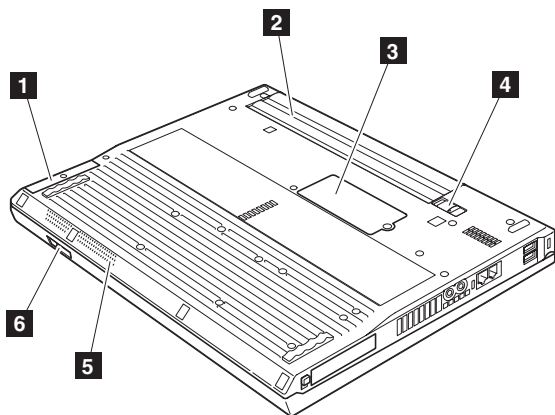
Rear view

- 1** Power status indicators
- 2** PC Card eject button
- 3** PC Card slot
- 4** Microphone jack
- 5** Stereo headphone jack
- 6** RJ-45 (Ethernet) connector
- 7** RJ-11 (modem) connector
- 8** Universal serial bus (USB) connectors
- 9** Security keyhole
- 10** Parallel connector
- 11** AC power connector



Bottom view

- 1** Hard disk drive
- 2** Battery pack
- 3** Optional DIMM slot
- 4** Battery pack latch
- 5** Built-in monaural speaker
- 6** LCD latch



Parts list

R50e series model matrix

The R50e series includes several models. The following table summarizes the characteristics of each model, to help you determine which FRU in the part list meets your need.

Model	Bay device	Mini PCI adapter	Ethernet	CDC	HDD
R50e (CPU, Cel 1.2G; memory, 128 MB; video chip, Intel 855GME; LCD, 14.1-in. XGA)					
1834-44x	CD-ROM (12.7)	—	10/100	MDC2	20 GB, 4,200 rpm
R50e (CPU, Cel 1.3G; memory, 128 MB; video chip, Intel 855GME; LCD, 14.1-in. XGA)					
1834-4Ex	CD-ROM (12.7)	—	10/100	MDC2	20 GB, 4,200 rpm
1834-49x	DVD/CD-RW combo (12.7)				30 GB, 4,200 rpm
R50e (CPU, Cel 1.3G; memory, 256 MB; video chip, Intel 855GME; LCD, 14.1-in. XGA)					
1834-45x, 46x, 62x	CD-ROM (12.7)	—	10/100	MDC2	30 GB, 4,200 rpm
1834-47x, 48x	DVD-ROM (12.7)				
1834-2Kx, 4Ax, 63x, 64x	DVD/CD-RW combo (12.7)				
1834-4Bx	Travel cover				40 GB, 4,200 rpm
1834-4Cx	DVD-ROM (12.7)				
1834-4Dx	DVD/CD-RW combo (12.7)				

(continued)

Parts list

Model	Bay device	Mini PCI adapter	Ethernet	CDC	HDD
R50e (CPU, Ban 1.4G; memory, 256 MB; video chip, Intel 855GME; LCD, 14.1-in. XGA)					
1834-4Yx	CD-ROM (12.7)	—	10/100	MDC2	30 GB, 4,200 rpm
1834-4Zx	DVD-ROM (12.7)	802.11 b/g (Intel)			
1834-65x					
R50e (CPU, Ban 1.5G; memory, 256 MB; video chip, Intel 855GME; LCD, 14.1-in. XGA)					
1834-4Rx, 4Sx	CD-ROM (12.7)	—	10/100	MDC2	30 GB, 4,200 rpm
1834-4Tx, 4Ux	DVD-ROM (12.7)	802.11 b/g (Intel)			
1834-66x					
1834-4Vx, 4Wx	DVD/CD-RW combo (12.7)	—			40 GB, 4,200 rpm
1834-4Xx					
R50e (CPU, Ban 1.6G; memory, 128 MB; video chip, Intel 855GME; LCD, 14.1-in. XGA)					
1834-4Fx	CD-ROM (12.7)	—	10/100	MDC2	30 GB, 4,200 rpm
R50e (CPU, Ban 1.6G; memory, 256 MB; video chip, Intel 855GME; LCD, 14.1-in. XGA)					
1834-4Gx, 4Hx	CD-ROM (12.7)	—	10/100	MDC2	30 GB, 4,200 rpm
1834-4Jx, 4Kx	DVD-ROM (12.7)	802.11 b/g (Intel)			
1834-67x					
1834-4Lx, 4Mx	DVD/CD-RW combo (12.7)	—			40 GB, 4,200 rpm
1834-4Px, 4Qx					

(continued)

Model	Bay device	Mini PCI adapter	Ethernet	CDC	HDD
R50e (CPU, Cel 1.3G; memory, 128 MB; video chip, Intel 855GME; LCD, 15.0-in. XGA)					
1834-5Bx	CD-ROM (12.7)	—	10/100	MDC2	20 GB, 4,200 rpm
1834-55x	DVD/CD-RW combo (12.7)				30 GB, 4,200 rpm
R50e (CPU, Cel 1.3G; memory, 256 MB; video chip, Intel 855GME; LCD, 15.0-in. XGA)					
1834-52x, 53x	CD-ROM (12.7)	—	10/100	MDC2	30 GB, 4,200 rpm
1834-54x, 5Zx	DVD-ROM (12.7)				
1834-2Lx, 56x, 57x, 73x	DVD/CD-RW combo (12.7)				
1834-58x	DVD-ROM (12.7)				40 GB, 4,200 rpm
1834-59x, 5Ax	DVD/CD-RW combo (12.7)				
R50e (CPU, Cel 1.3G; memory, 512 MB; video chip, Intel 855GME; LCD, 15.0-in. XGA)					
1834-2Px	DVD/CD-RW combo (12.7)	—	10/100	MDC2	40 GB, 4,200 rpm
R50e (CPU, Ban 1.4G; memory, 256 MB; video chip, Intel 855GME; LCD, 15.0-in. XGA)					
1834-51x	DVD-ROM (12.7)	—	10/100	MDC2	40 GB, 4,200 rpm
1834-74x		802.11 b/g (Intel)			
R50e (CPU, 705 (Ban 1.5); memory, 128 MB; video chip, Intel 855GME; LCD, 14.1-in. XGA)					
1834-NEx	CD-ROM (12.7)	802.11 b/g (Intel)	10/100	MDC2	30 GB, 4,200 rpm

(continued)

Parts list

Model	Bay device	Mini PCI adapter	Ethernet	CDC	HDD
R50e (CPU, Ban 1.5G; memory, 256 MB; video chip, Intel 855GME; LCD, 15.0-in. XGA)					
1834-5Px	DVD-ROM (12.7)	—	10/100	MDC2	30 GB, 4,200 rpm
1834-5Qx	DVD/CD-RW combo (12.7)				
1834-5Rx, 5Wx	CD-ROM (12.7)				
1834-5Sx, 5Tx	DVD-ROM (12.7)				802.11 b/g (Intel)
1834-75x					
1834-5Ux, 5Vx, 72x	DVD/CD-RW combo (12.7)	—			40 GB, 4,200 rpm
R50e (CPU, Ban 1.5G; memory, 512 MB; video chip, Intel 855GME; LCD, 15.0-in. XGA)					
1834-5Xx	CD-ROM (12.7)	—	10/100	MDC2	40 GB, 4,200 rpm
1834-5Yx, 77x	DVD/CD-RW combo (12.7)				
R50e (CPU, Ban 1.6G; memory, 256 MB; video chip, Intel 855GME; LCD, 15.0-in. XGA)					
1834-5Dx	DVD-ROM (12.7)	—	10/100	MDC2	30 GB, 4,200 rpm
1834-5Ex	DVD/CD-RW combo (12.7)				
1834-5Fx	CD-ROM (12.7)				
1834-5Jx, 5Kx	DVD-ROM (12.7)				802.11 b/g (Intel)
1834-76x					
1834-5Lx, 5Mx	DVD/CD-RW combo (12.7)				—

(continued)

Model	Bay device	Mini PCI adapter	Ethernet	CDC	HDD
R50e (CPU, Ban 1.6G; memory, 512 MB; video chip, Intel 855GME; LCD, 15.0-in. XGA)					
1834-5Hx	CD-ROM (12.7)	—	10/100	MDC2	40 GB, 4,200 rpm
1834-5Nx	DVD/CD-RW combo (12.7)				
R50e (CPU, 330 (Cel-M 1.4); memory, 256 MB; video chip, Intel 855GME; LCD, 14.1-in. XGA)					
1834-82x, 83x	CD-ROM (12.7)	—	10/100	MDC2	30 GB, 4,200 rpm
1834-A2x, A3x		802.11 b/g (Intel)			
1834-84x	DVD-ROM (12.7)	—			
1834-A4x		802.11 b/g (Intel)			
1834-A5x		802.11 b/g (Intel)			
1834-85x, 86x	DVD/CD-RW combo (12.7)	—			
1834-A6x, A7x		802.11 b/g (Intel)			
1834-87x		—			
1834-A9x		802.11 b/g (Intel)			
R50e (CPU, 330 (Cel-M 1.4); memory, 256 MBx2; video chip, Intel 855GME; LCD, 14.1-in. XGA)					
1834-A8x	DVD/CD-RW combo (12.7)	802.11 b/g (Intel)	10/100	MDC2	30 GB, 4,200 rpm

(continued)

Parts list

Model	Bay device	Mini PCI adapter	Ethernet	CDC	HDD
R50e (CPU, 330 (Cel-M 1.4); memory, 256 MB; video chip, Intel 855GME; LCD, 15.0-in. XGA)					
1834-92x	CD-ROM (12.7)	—	10/100	MDC2	30 GB, 4,200 rpm
1834-B2x		802.11 b/g (Intel)			
1834-93x	DVD-ROM (12.7)	—			
1834-94x, 95x		DVD/CD-RW combo (12.7)			
1834-B3x, B4x					—
1834-96x	DVD/CD-RW combo (12.7)	802.11 b/g (Intel)			40 GB, 4,200 rpm
1834-B6x		—			
R50e (CPU, 330 (Cel-M 1.4); memory, 256 MB×2; video chip, Intel 855GME; LCD, 15.0-in. XGA)					
1834-B5x	DVD/CD-RW combo (12.7)	802.11 b/g (Intel)	10/100	MDC2	30 GB, 4,200 rpm
R50e (CPU, 705 (Ban 1.5); memory, 256 MB; video chip, Intel 855GME; LCD, 14.1-in. XGA)					
1834-N7x	DVD-ROM (12.7)	—	10/100	MDC2	30 GB, 4,200 rpm
1834-N6x		802.11 b/g (Intel)			40 GB, 4,200 rpm

(continued)

Model	Bay device	Mini PCI adapter	Ethernet	CDC	HDD
R50e (CPU, 705 (Ban 1.5); memory, 256 MB; video chip, Intel 855GME; LCD, 15.0-in. XGA)					
1834-N9x	DVD-ROM (12.7)	—	10/100	MDC2	30 GB, 4,200 rpm
1834-N8x	DVD/CD-RW combo (12.7)				
1834-NAx	DVD-ROM (12.7)				40 GB, 4,200 rpm
1834-N2x, N3x, NCx	DVD/CD-RW combo (12.7)				
1834-NBx, NDx					
R50e (CPU, 705 (Ban 1.5); memory, 512 MB; video chip, Intel 855GME; LCD, 15.0-in. XGA)					
1834-N4x, N5x	DVD/CD-RW combo (12.7)	—	10/100	MDC2	40 GB, 4,200 rpm
R50e (CPU, 715 (Dot 1.5); memory, 128 MB; video chip, Intel 855GME; LCD, 14.1-in. XGA)					
1834-ARx	CD-ROM (12.7)	802.11 b/g (Intel)	10/100	MDC2	20 GB, 4,200 rpm
R50e (CPU, 715 (Dot 1.5); memory, 256 MB; video chip, Intel 855GME; LCD, 14.1-in. XGA)					
1834-88x, 89x	CD-ROM (12.7)	—	10/100	MDC2	30 GB, 4,200 rpm
1834-AAx, ABx		802.11 b/g (Intel)			
1834-8Bx, 8Cx	DVD-ROM (12.7)	—			
1834-ACx		802.11 b/g (Intel)			
1834-8Dx, 8Ex	DVD/CD-RW combo (12.7)	—			
1834-AEx, AFx		802.11 b/g (Intel)			

(continued)

Parts list

Model	Bay device	Mini PCI adapter	Ethernet	CDC	HDD		
R50e (CPU, 715 (Dot 1.5); memory, 256 MB; video chip, Intel 855GME; LCD, 14.1-in. XGA)							
1834-8Ax	CD-ROM (12.7)	—	10/100	MDC2	40 GB, 4,200 rpm		
1834-ADx	DVD-ROM (12.7)	802.11 b/g (Intel)					
1834-8Fx	DVD/CD-RW combo (12.7)	—					
1834-AHx, AJx		802.11 b/g (Intel)					
R50e (CPU, 715 (Dot 1.5); memory, 256 MBx2; video chip, Intel 855GME; LCD, 14.1-in. XGA)							
1834-AGx	DVD/CD-RW combo (12.7)	802.11 b/g (Intel)	10/100	MDC2	30 GB, 4,200 rpm		
R50e (CPU, 715 (Dot 1.5); memory, 256 MB; video chip, Intel 855GME; LCD, 15.0-in. XGA)							
1834-B8x	DVD-ROM (12.7)	802.11 b/g (Intel)	10/100	MDC2	30 GB, 4,200 rpm		
1834-97x	CD-ROM (12.7)	—					
1834-B7x		802.11 b/g (Intel)					
1834-99x	DVD-ROM (12.7)	—					
1834-B9x		802.11 b/g (Intel)					
1834-9Ax, 9Bx	DVD/CD-RW combo (12.7)	—					
1834-BAx, BBx		802.11 b/g (Intel)					
R50e (CPU, 715 (Dot 1.5); memory, 256 MBx2; video chip, Intel 855GME; LCD, 15.0-in. XGA)							
1834-BCx	DVD/CD-RW combo (12.7)	802.11 b/g (Intel)			10/100	MDC2	40 GB, 4,200 rpm

(continued)

Model	Bay device	Mini PCI adapter	Ethernet	CDC	HDD
R50e (CPU, 715 (Dot 1.5); memory, 512 MB; video chip, Intel 855GME; LCD, 15.0-in. XGA)					
1834-9Cx, 9Dx	DVD/CD-RW combo (12.7)	—	10/100	MDC2	40 GB, 4,200 rpm
R50e (CPU, 725 (Dot 1.6); memory, 128 MB; video chip, Intel 855GME; LCD, 14.1-in. XGA)					
1834-8Gx	CD-ROM (12.7)	—	10/100	MDC2	30 GB, 4,200 rpm
R50e (CPU, 725 (Dot 1.6); memory, 256 MB; video chip, Intel 855GME; LCD, 14.1-in. XGA)					
1834-8Hx, 8Jx	CD-ROM (12.7)	802.11 b/g (Intel)	10/100	MDC2	30 GB, 4,200 rpm
1834-8Kx, 8Lx	DVD-ROM (12.7)				
1834-8Mx	DVD/CD-RW combo (12.7)				
1834-8Nx					
1834-AKx, ALx					40 GB, 4,200 rpm
R50e (CPU, 725 (Dot 1.6); memory, 256 MB; video chip, Intel 855GME; LCD, 15.0-in. XGA)					
1834-9Ex, 9Fx	DVD-ROM (12.7)	802.11 b/g (Intel)	10/100	MDC2	40 GB, 4,200 rpm
1834-9Gx, 9Hx	DVD/CD-RW combo (12.7)				
1834-BDx					
R50e (CPU, 725 (Dot 1.6); memory, 512 MB; video chip, Intel 855GME; LCD, 15.0-in. XGA)					
1834-9Jx, 9Kx	DVD/CD-RW combo (12.7)	—	10/100	MDC2	60 GB, 4,200 rpm
Cel xxx G: Mobile Intel® Celeron® processor xxx GHz, L2 512-KB cache Ban xxx G: Intel® Pentium® M processor xxx GHz, L2 1-MB cache nnn (Cel-M xxx): Mobile Intel® Celeron® processor xxx GHz, L2 512-KB cache nnn (Dot xxx): Intel® Pentium® M processor nnn (xxx GHz), L2 2-MB cache					

ThinkPad Express models

Model	Bay device	Mini PCI adapter	Ethernet	CDC	HDD
R50e (CPU, Cel 1.3G; memory, 256 MB; video chip, Intel 855GME; LCD, 14.1-in. XGA)					
1842-2Mx	CD-ROM (12.7)	—	10/100	MDC2	30 GB, 4,200 rpm
R50e (CPU, Cel 1.3G; memory, 256 MB; video chip, Intel 855GME; LCD, 15.0-in. XGA)					
1842-2Qx	CD-ROM (12.7)	—	10/100	MDC2	20 GB, 4,200 rpm
1842-2Nx					30 GB, 4,200 rpm
1842-2Rx	DVD/CD-RW combo (12.7)				
R50e (CPU, 715 (Dot 1.5); memory, 256 MB; video chip, Intel 855GME; LCD, 15.0-in. XGA)					
1842-BJx	DVD/CD-RW combo (12.7)	802.11 b/g (Intel)	10/100	MDC2	30 GB, 4,200 rpm
Cel xxx G: Mobile Intel® Celeron® processor xxx GHz, L2 512-KB cache nnn (Dot xxx): Intel® Pentium® M processor nnn (xxx GHz), L2 2-MB cache					

Odyssey/Open bay models

Model	Bay device	Mini PCI adapter	Ethernet	CDC	HDD
R50e (CPU, Cel 1.3G; memory, —; video chip, Intel 855GME; LCD, 14.1-in. XGA)					
1834-22x	CD-ROM (12.7)	—	10/100	—	—
1834-23x	DVD/CD-RW combo (12.7)				
R50e (CPU, Cel 1.3G; memory, —; video chip, Intel 855GME; LCD, 15.0-in. XGA)					
1834-24x	CD-ROM (12.7)	—	10/100	—	—
1834-25x	DVD/CD-RW combo (12.7)				
R50e (CPU, Ban 1.4G; memory, —; video chip, Intel 855GME; LCD, 15.0-in. XGA)					
1834-28x	CD-ROM (12.7)	—	10/100	—	—
R50e (CPU, Ban 1.5G; memory, —; video chip, Intel 855GME; LCD, 15.0-in. XGA)					
1834-29x	CD-ROM (12.7)	—	10/100	—	—
1834-2Ax	DVD/CD-RW combo (12.7)				
R50e (CPU, Ban 1.6G; memory, —; video chip, Intel 855GME; LCD, 15.0-in. XGA)					
1834-26x	CD-ROM (12.7)	—	10/100	—	—
1834-27x	DVD/CD-RW combo (12.7)				

(continued)

Parts list

Model	Bay device	Mini PCI adapter	Ethernet	CDC	HDD
R50e (CPU, 330 (Cel-M 1.4G); memory, —; video chip, Intel 855GME; LCD, 14.1-in. XGA)					
1834-AMx	CD-ROM (12.7)	802.11 b/g (Intel)	10/100	—	—
1834-ANx	DVD/CD-RW combo (12.7)				
R50e (CPU, 330 (Cel-M 1.4G); memory, —; video chip, Intel 855GME; LCD, 15.0-in. XGA)					
1834-BEx	CD-ROM (12.7)	802.11 b/g (Intel)	10/100	—	—
1834-BFx	DVD/CD-RW combo (12.7)				
R50e (CPU, 715 (Dot 1.5G); memory, —; video chip, Intel 855GME; LCD, 14.1-in. XGA)					
1834-APx	CD-ROM (12.7)	802.11 b/g (Intel)	10/100	—	—
1834-AQx	DVD/CD-RW combo (12.7)				
R50e (CPU, 715 (Dot 1.5G); memory, —; video chip, Intel 855GME; LCD, 15.0-in. XGA)					
1834-BGx	CD-ROM (12.7)	802.11 b/g (Intel)	10/100	—	—
1834-BHx	DVD/CD-RW combo (12.7)				
Cel xxx G: Mobile Intel® Celeron® processor xxx GHz, L2 512-KB cache Ban xxx G: Intel® Pentium® M processor xxx GHz, L2 1-MB cache nnn (Cel-M xxx): Mobile Intel® Celeron® processor xxx GHz, L2 512-KB cache nnn (Dot xxx): Intel® Pentium® M processor nnn (xxx GHz), L2 2-MB cache					

- Each FRU is available for all types or models, unless specific types or models are specified.
- A CRU (customer-replaceable 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)

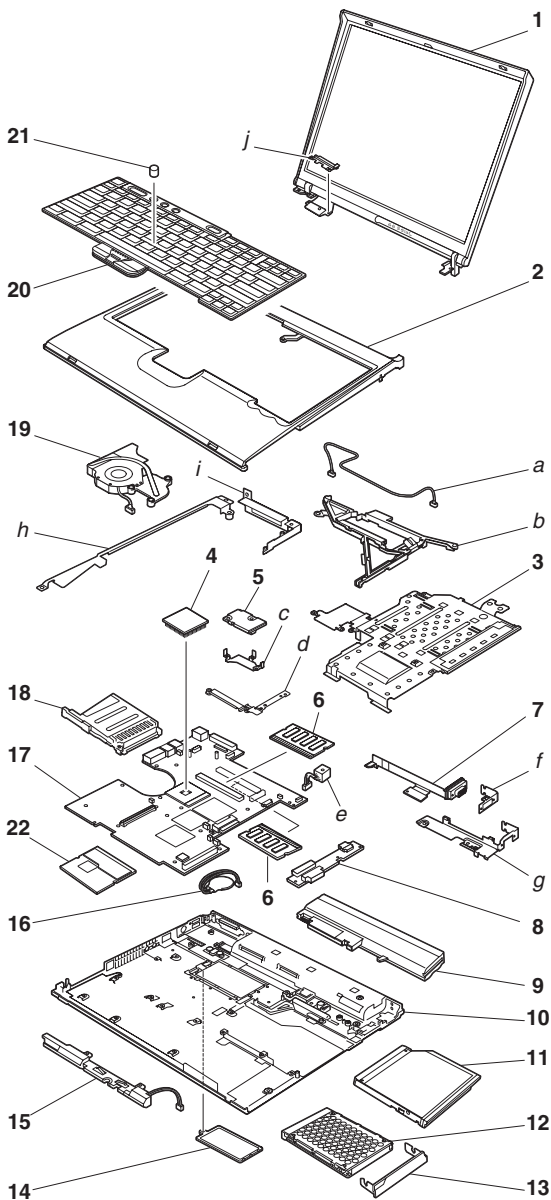
- NO TOOLS ARE REQUIRED.
- A coin or a thumb screw is acceptable.
- Minimal technical expertise is required.
- Minimal problem determination is required—less than 5 minutes.

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.

Overall



No.	FRU	P/N	CRU ID
a- j	See "Miscellaneous parts" on page 157.		
1	LCD unit (see "LCD FRUs" on page 149).		N
2	Keyboard bezel assembly for models with 14.1-in. LCD (WW) <ul style="list-style-type: none"> • 1834-22x, 23x, 2Kx, 45x, 46x, 47x, 48x, 4Ax,, 4Cx, 4Dx, 4Ex, 4Fx, 4Gx, 4Hx, 4Jx, 4Kx, 4Lx, 4Mx, 4Px, 4Qx, 4Rx, 4Sx, 4Tx, 4Ux, 4Vx, 4Wx, 4Xx, 4Yx, 4Zx, 62x, 63x, 64x, 65x, 66x, 67x • 1834-82x, 83x, 84x, 85x, 86x, 87x, 88x, 89x, 8Ax, 8Bx, 8Cx, 8Dx, 8Ex, 8Fx, 8Gx, 8Hx, 8Jx, 8Kx, 8Lx, 8Mx, 8Nx, A2x, A3x, A4x, A5x, A6x, A7x, A8x, A9x, AAx, ABx, ACx, ADx, AEx, AFx, AGx, AHx, AJx, AKx, ALx, AMx, ANx, APx, AQx, ARx, N6x, N7x, NEx 	13N5581	N
	Keyboard bezel assembly for models with 15.0-in. LCD (WW) <ul style="list-style-type: none"> • 1834-24x, 25x, 28x, 29x, 2Ax, 2Lx, 2Px, 51x, 52x, 53x, 54x, 56x, 57x, 58x, 59x, 5Ax, 5Bx, 5Dx, 5Ex, 5Jx, 5Kx, 5Lx, 5Mx, 5Px, 5Qx, 5Rx, 5Sx, 5Tx, 5Ux, 5Vx, 5Wx, 5Xx, 5Yx, 5Zx, 72x, 73x, 74x, 75x, 76x, 77x • 1834-92x, 93x, 94x, 95x, 96x, 97x, 98x, 99x, 9Ax, 9Bx, 9Cx, 9Dx, 9Ex, 9Fx, 9Gx, 9Hx, 9Jx, 9Kx, B2x, B3x, B4x, B5x, B6x, B7x, B8x, B9x, BAx, BBx, BCx, BDx, BEx, BFx, BGx, BHx, N2x, N3x, N4x, N5x, N8x, N9x, NAx, NBx, NCx, NDx • 1842-2Qx, 2Rx • 1842-BJx 	13N5584	N
3	Ultrabay Enhanced shield kit for 14.1-in. <ul style="list-style-type: none"> • 1834-22x, 23x, 2Kx, 45x, 46x, 47x, 48x, 4Ax,, 4Cx, 4Dx, 4Ex, 4Fx, 4Gx, 4Hx, 4Jx, 4Kx, 4Lx, 4Mx, 4Px, 4Qx, 4Rx, 4Sx, 4Tx, 4Ux, 4Vx, 4Wx, 4Xx, 4Yx, 4Zx, 62x, 63x, 64x, 65x, 66x, 67x • 1834-82x, 83x, 84x, 85x, 86x, 87x, 88x, 89x, 8Ax, 8Bx, 8Cx, 8Dx, 8Ex, 8Fx, 8Gx, 8Hx, 8Jx, 8Kx, 8Lx, 8Mx, 8Nx, A2x, A3x, A4x, A5x, A6x, A7x, A8x, A9x, AAx, ABx, ACx, ADx, AEx, AFx, AGx, AHx, AJx, AKx, ALx, AMx, ANx, APx, AQx, ARx, N6x, N7x, NEx 	13R2300	N

(continued)

Parts list

No.	FRU	P/N	CRU ID
3	Ultrabay Enhanced shield kit for 15.0-in. <ul style="list-style-type: none"> • 1834-24x, 25x, 28x, 29x, 2Ax, 2Lx, 2Px, 51x, 52x, 53x, 54x, 56x, 57x, 58x, 59x, 5Ax, 5Bx, 5Dx, 5Ex, 5Jx, 5Kx, 5Lx, 5Mx, 5Px, 5Qx, 5Rx, 5Sx, 5Tx, 5Ux, 5Vx, 5Wx, 5Xx, 5Yx, 5Zx, 72x, 73x, 74x, 75x, 76x, 77x • 1834-92x, 93x, 94x, 95x, 96x, 97x, 98x, 99x, 9Ax, 9Bx, 9Cx, 9Dx, 9Ex, 9Fx, 9Gx, 9Hx, 9Jx, 9Kx, B2x, B3x, B4x, B5x, B6x, B7x, B8x, B9x, BAx, BBx, BCx, BDx, BEx, BFx, BGx, BHx, N2x, N3x, N4x, N5x, N8x, N9x, NAx, NBx, NCx, NDx • 1842-2Qx, 2Rx • 1842-BJx 	13N2302	N
4	CPU assembly, Mobile Intel® Celeron® processor, 1.2 GHz, L2 512-KB cache <ul style="list-style-type: none"> • Supported by CTO 	93P4203	N
	CPU assembly, Mobile Intel® Celeron® processor, 1.3 GHz, L2 512-KB cache <ul style="list-style-type: none"> • 1834-22x, 23x, 24x, 25x, 2Kx, 2Lx, 2Px, 45x, 46x, 47x, 48x, 4Ax, 4Cx, 4Dx, 4Ex, 52x, 53x, 54x, 56x, 57x, 58x, 59x, 5Ax, 5Bx, 5Zx, 62x, 63x, 64x, 73x • 1842-2Qx, 2Rx 	93P4204	N
	CPU assembly, Intel® Pentium® M processor, 1.4 GHz, L2 1-MB cache <ul style="list-style-type: none"> • 1834-82x, 83x, 84x, 85x, 86x, 87x, 92x, 93x, 94x, 95x, 96x, A2x, A3x, A4x, A5x, A6x, A7x, A8x, A9x, AMx, ANx, B2x, B3x, B4x, B5x, B6x, BEx, BFx 	26P8482	N
	CPU assembly, Intel® Pentium® M processor, 1.5 GHz, L2 1-MB cache <ul style="list-style-type: none"> • 1834-29x, 2Ax, 4Rx, 4Sx, 4Tx, 4Ux, 4Vx, 4Wx, 4Xx, 5Px, 5Qx, 5Rx, 5Sx, 5Tx, 5Ux, 5Vx, 5Wx, 5Xx, 5Yx, 66x, 72x, 75x, 77x 	26P8533	N
	CPU assembly, Intel® Pentium® M processor 705 (1.5 GHz), L2 1-MB cache <ul style="list-style-type: none"> • 1834-N2x, N3x, N4x, N5x, N6x, N7x, N8x, N9x, NAx, NBx, NCx, NDx, NEx 	93P4269	N
	CPU assembly, Intel® Pentium® M processor, 1.6 GHz, L2 1-MB cache <ul style="list-style-type: none"> • 1834-4Fx, 4Gx, 4Hx, 4Jx, 4Kx, 4Lx, 4Mx, 4Px, 4Qx, 5Dx, 5Ex, 5Jx, 5Kx, 5Lx, 5Mx, 67x, 76x 	26P8483	N

(continued)

No.	FRU	P/N	CRU ID
4	CPU assembly, Intel® Pentium® M processor, 1.7 GHz, L2 1-MB cache • Supported by CTO	91P7387	N
	CPU assembly, Intel® Pentium® M processor 715 (1.5 GHz) • 1834-88x, 89x, 8Ax, 8Bx, 8Cx, 8Dx, 8Ex, 8Fx, 97x, 98x, 99x, 9Ax, 9Bx, 9Cx, 9Dx, AAx, ABx, ACx, ADx, AEx, AFx, AGx, AHx, AJx, APx, AQx, ARx, B7x, B8x, B9x, BAx, BBx, BCx, BGx, BHx • 1842-BJx	93P4261	N
	CPU assembly, Intel® Pentium® M processor 725 (1.6 GHz) • 1834-8Gx, 8Hx, 8Jx, 8Kx, 8Lx, 8Mx, 8Nx, 9Ex, 9Fx, 9Gx, 9Hx, 9Jx, 9Kx, AKx, ALx, BDx	91P7434	N
5	IBM Integrated 56K Modem (MDC-2)	91P7321	**
6	128-MB DDR SDRAM SO DIMM (PC2700) OP • 1834-4Fx, 4Ex, 5Bx • 1834-8Gx, ARx, NEx	31P9829	*
	256-MB DDR SDRAM SO DIMM (PC2700) OP • 1834-2Kx, 2Lx, 45x, 46x, 47x, 48x, 4Ax, 4Cx, 4Dx, 4Gx, 4Hx, 4Jx, 4Kx, 4Lx, 4Mx, 4Px, 4Qx, 4Rx, 4Sx, 4Tx, 4Ux, 4Vx, 4Wx, 4Xx, 4Yx, 4Zx, 52x, 53x, 54x, 56x, 57x, 58x, 59x, 5Ax, 5Dx, 5Ex, 5Px, 5Qx, 5Rx, 5Sx, 5Tx, 5Ux, 5Vx, 5Wx, 5Zx, 62x, 63x, 64x, 65x, 66x, 67x, 72x, 73x, 74x, 75x, 76x • 1834-82x, 83x, 84x, 85x, 86x, 87x, 88x, 89x, 8Ax, 8Bx, 8Cx, 8Dx, 8Ex, 8Fx, 8Hx, 8Jx, 8Kx, 8Lx, 8Mx, 8Nx, 92x, 93x, 94x, 95x, 96x, 97x, 98x, 99x, 9Ax, 9Bx, 9Ex, 9Fx, 9Gx, 9Hx, A2x, A3x, A4x, A5x, A6x, A7x, A8x, A9x, AAx, ABx, ACx, ADx, AEx, AFx, AGx, AHx, AJx, AKx, ALx, B2x, B3x, B4x, B5x, B6x, B7x, B8x, B9x, BAx, BBx, BCx, BDx, N2x, N3x, N6x, N7x, N8x, N9x, NAx, NBx, NCx, NDx • 1842-2Qx, 2Rx • 1842-BJx	31P9831	*

(continued)

Parts list

No.	FRU	P/N	CRU ID
6	512-MB DDR SDRAM SO DIMM (PC2700) OP <ul style="list-style-type: none"> • 1834-2Px, 5Xx, 5Yx, 77x • 1834-9Cx, 9Dx, 9Jx, 9Kx, N4x, N5x 	31P9833	**
	1-GB DDR SDRAM SO DIMM (PC2700) OP <ul style="list-style-type: none"> • Supported by CTO 	31P9835	**
	For optional DIMMs, see "Optional FRUs" on page 159.		
7	VGA and Ultrabay eject button cable	91P6834	N
8	Interposer card <ul style="list-style-type: none"> • 1834-24x, 25x, 28x, 29x, 2Ax, 2Lx, 2Px, 51x, 52x, 53x, 54x, 56x, 57x, 58x, 59x, 5Ax, 5Bx, 5Dx, 5Ex, 5Jx, 5Kx, 5Lx, 5Mx, 5Px, 5Qx, 5Rx, 5Sx, 5Tx, 5Ux, 5Vx, 5Wx, 5Xx, 5Yx, 5Zx, 72x, 73x, 74x, 75x, 76x, 77x • 1834-92x, 93x, 94x, 95x, 96x, 97x, 98x, 99x, 9Ax, 9Bx, 9Cx, 9Dx, 9Ex, 9Fx, 9Gx, 9Hx, 9Jx, 9Kx, B2x, B3x, B4x, B5x, B6x, B7x, B8x, B9x, BAx, BBx, BCx, BDx, BEx, BFx, BGx, BHx, N2x, N3x, N4x, N5x, N8x, N9x, NAx, NBx, NCx, NDx • 1842-2Qx, 2Rx • 1842-BJx 	91P7413	N
9	Battery pack, Li-ion (6 cell), 4.4 Ah SANYO OP	08K8193	*
10	Base cover assembly 1834		
	14.1-in. WW <ul style="list-style-type: none"> • 1834-22x, 23x, 2Kx, 45x, 46x, 47x, 48x, 4Ax,, 4Cx, 4Dx, 4Ex, 4Fx, 4Gx, 4Hx, 4Jx, 4Kx, 4Lx, 4Mx, 4Px, 4Rx, 4Sx, 4Tx, 4Ux, 4Vx, 4Wx, 4Xx, 4Yx except 4YK, 4Zx, 62x, 63x, 64x, 65x, 66x, 67x • 1834-82x, 83x except 83K, 84x, 85x, 86x, 88x, 89x except 89K, 8Ax except 8AK, 8Bx, 8Cx, 8Dx, 8Ex, 8Gx, 8Hx, 8Jx, 8Kx, 8Lx, 8Mx, A2x, A3x, A4x, A5x, A6x, A7x, A8x, A9x, AAx, ABx, ACx, ADx, AEx, AFx, AGx, AHx, AJx, AKx, ALx, AMx, ANx, APx, AQx, ARx, N6x, N7x, NEx 	13R2670	N
	14.1-in. Korea <ul style="list-style-type: none"> • 1834-4QK, 4XK, 4YK • 1834-83K, 87K, 89K, 8AK, 8FK, 8NK 	13R2671	N

(continued)

No.	FRU	P/N	CRU ID
10	Base cover assembly 1834		
	15.0-in. WW <ul style="list-style-type: none"> • 1834-24x, 25x, 28x, 29x, 2Ax, 2Lx, 2Px, 51x, 52x, 53x, 54x, 56x, 57x, 58x, 59x, 5Bx, 5Dx, 5Ex, 5Jx, 5Kx, 5Lx, 5Mx except 5MK, 5Px, 5Qx, 5Sx, 5Tx, 5Ux, 5Vx except 5VK, 5Wx, 5Xx, 5Yx, 5Zx, 72x, 73x, 74x, 75x, 76x, 77x • 1834-92x, 93x, 94x except 94K, 95x, 98x, 99x, 9Ax except 9AK, 9Bx except 9BK, 9Cx, 9Dx, 9Ex, 9Fx, 9Gx except 9GK, 9Hx, 9Jx, 9Kx, B2x, B3x, B4x, B5x, B6x, B7x, B8x, B9x, BAx, BBx, BCx, BDx, BEx, BFx, BGx, BHx, N2x, N3x, N4x, N5x, N6x, N7x, N8x, N9x, NAx, NBx, NCx, NDx 	13R2674	N
	15.0-in. Korea <ul style="list-style-type: none"> • 1834-5AK, 5MK, 5RK, 5VK • 1834-94K, 96K, 97K, 9AK, 9BK, 9GK 	13R2675	N
	Base cover assembly 1842		
	14.1-in. WW <ul style="list-style-type: none"> • 1842-2Mx • 1842-ARx 	13R2672	N
	15.0-in. WW <ul style="list-style-type: none"> • 1842-2Qx, 2Rx • 1842-BJx 	13R2676	N
11	CD-ROM drive, 12.7 mm <ul style="list-style-type: none"> • 1834-22x, 24x, 28x, 29x, 45x, 46x, 4Ex, 4Fx, 4Gx, 4Hx, 4Rx, 4Sx, 4Yx, 52x, 53x, 5Bx, 5Rx, 5Wx, 5Xx, 62x • 1834-82x, 83x, 88x, 89x, 8Ax, 8Gx, 8Hx, 8Jx, 92x, 97x, A2x, A3x, AAx, ABx, AMx, APx, ARx, B2x, B7x, BEx, BGx, NEx • 1842-2Qx 		
	HLDS (CRN-8245B-AIBMJ0)	92P6565	*
	TEAC (CD-224E-C)	92P6561	*
	DVD-ROM drive, 12.7 mm <ul style="list-style-type: none"> • 1834-47x, 48x, 4Cx, 4Jx, 4Kx, 4Tx, 4Ux, 4Zx, 51x, 54x, 58x, 5Dx, 5Jx, 5Kx, 5Px, 5Sx, 5Tx, 5Zx, 65x, 66x, 67x, 74x, 75x, 76x • 1834-84x, 8Bx, 8Cx, 8Kx, 8Lx, 93x, 98x, 99x, 9Ex, 9Fx, A4x, A5x, ACx, ADx, B8x, B9x, N6x, N7x, N9x, NAx 		
	HLDS (GDR-8082N-IMJ0)	92P6567	*
	KME (MKE SR-8177)	92P6571	*

(continued)

Parts list

No.	FRU	P/N	CRU ID
13	DVD/CD-RW combo drive, 12.7 mm <ul style="list-style-type: none"> • 1834-23x, 25x, 2Ax, 2Kx, 2Lx, 2Px, 4Ax, 4Dx, 4Lx, 4Mx, 4Px, 4Qx, 4Vx, 4Wx, 4Xx, 56x, 57x, 59x, 5Ax, 5Ex, 5Lx, 5Mx, 5Qx, 5Ux, 5Vx, 5Yx, 63x, 64x, 72x, 73x, 77x • 1834-85x, 86x, 87x, 8Dx, 8Ex, 8Fx, 8Mx, 8Nx, 94x, 95x, 96x, 9Ax, 9Bx, 9Cx, 9Dx, 9Gx, 9Hx, 9Jx, 9Kx, A6x, A7x, A8x, A9x, AEx, AFx, AGx, AHx, AJx, AKx, ALx, ANx, AQx, B3x, B4x, B5x, B6x, BAx, BBx, BCx, BDx, BFx, BHx, N2x, N3x, N4x, N5x, N8x, NBx, NCx, NDx • 1842-2Rx • 1842-BJx 		
	TEAC (DW-225)	92P6563	*
	HLDS (GCC-4241N-IMJ0)	92P6569	*
	KME (UJDA750)	92P6573	*
	Travel cover <ul style="list-style-type: none"> • Supported by CTO 	13N5354	*
12	Hard disk drive, 20 GB, 9.5 mm, 4,200 rpm <ul style="list-style-type: none"> • 1834-4Ex, 5Bx • 1834-ARx • 1842-2Qx 		
	FUJITSU	27L4385	*
	HGST	13N6701	*
	Hard disk drive, 30 GB, 9.5 mm, 4,200 rpm <ul style="list-style-type: none"> • 1834-2Kx, 2Lx, 45x, 46x, 47x, 48x, 4Ax, 4Fx, 4Gx, 4Hx, 4Jx, 4Kx, 4Lx, 4Mx, 4Rx, 4Sx, 4Tx, 4Ux, 4Vx, 4Wx, 4Yx, 4Zx, 52x, 53x, 54x, 56x, 57x, 5Dx, 5Ex, 5Px, 5Qx, 5Zx, 62x, 63x, 64x, 65x, 66x, 67x, 73x • 1834-82x, 83x, 84x, 85x, 86x, 88x, 89x, 8Bx, 8Cx, 8Dx, 8Ex, 8Gx, 8Hx, 8Jx, 8Kx, 8Lx, 8Mx, 92x, 93x, 94x, 95x, A2x, A3x, A4x, A6x, A7x, A8x, AAx, ABx, ACx, AEx, AFx, AGx, B2x, B3x, B4x, B5x, B8x, N7x, N8x, N9x, NEx • 1842-2Rx • 1842-BJx 		
	FUJITSU	92P6036	*
	HGST	13N6703	*
	Hard disk drive, 40 GB, 9.5 mm, 4,200 rpm <ul style="list-style-type: none"> • 1834-2Px, 4Cx, 4Dx, 4Px, 4Qx, 4Xx, 51x, 58x, 59x, 5Ax, 5Jx, 5Kx, 5Lx, 5Mx, 5Rx, 5Sx, 5Tx, 5Ux, 5Vx, 5Wx, 5Xx, 5Yx, 72x, 74x, 75x, 76x, 77x • 1834-87x, 8Ax, 8Fx, 8Nx, 96x, 97x, 98x, 99x, 9Ax, 9Bx, 9Cx, 9Dx, 9Ex, 9Fx, 9Gx, 9Hx, A5x, A9x, ADx, AHx, AJx, AKx, ALx, B6x, B7x, B9x, BAx, BBx, BCx, BDx, N2x, N3x, N4x, N5x, N6x, NAx, NBx, NCx, NDx 		
	FUJITSU	27L4389	*
	HGST	13N6705	*

(continued)

No.	FRU	P/N	CRU ID
12	Hard disk drive, 60 GB, 9.5 mm, 4,200 rpm • 1834-9Jx, 9Kx		
	FUJITSU	92P6557	*
	HGST	13N6707	*
	Hard disk drive, 80 GB, 9.5 mm, 4,200 rpm, FUJITSU • Supported by CTO	92P6559	*
	Hard disk drive, 40 GB, 9.5 mm, 5,400 rpm, HGST • Supported by CTO	13N6801	
13	Cover, hard disk drive for models with 14.1-in. LCD • 1834-22x, 23x, 2Kx, 45x, 46x, 47x, 48x, 4Ax,, 4Cx, 4Dx, 4Ex, 4Fx, 4Gx, 4Hx, 4Jx, 4Kx, 4Lx, 4Mx, 4Px, 4Qx, 4Rx, 4Sx, 4Tx, 4Ux, 4Vx, 4Wx, 4Xx, 4Yx, 4Zx, 62x, 63x, 64x, 65x, 66x, 67x • 1834-82x, 83x, 84x, 85x, 86x, 87x, 88x, 89x, 8Ax, 8Bx, 8Cx, 8Dx, 8Ex, 8Fx, 8Gx, 8Hx, 8Jx, 8Kx, 8Lx, 8Mx, 8Nx, A2x, A3x, A4x, A5x, A6x, A7x, A8x, A9x, AAx, ABx, ACx, ADx, AEx, AFx, AGx, AHx, AJx, AKx, ALx, AMx, ANx, APx, AQx, ARx, N6x, N7x, NEx	13N5189	*
	Cover, hard disk drive for models with 15.1-in. LCD • 1834-24x, 25x, 28x, 29x, 2Ax, 2Lx, 2Px, 51x, 52x, 53x, 54x, 56x, 57x, 58x, 59x, 5Ax, 5Bx, 5Dx, 5Ex, 5Jx, 5Kx, 5Lx, 5Mx, 5Px, 5Qx, 5Rx, 5Sx, 5Tx, 5Ux, 5Vx, 5Wx, 5Xx, 5Yx, 5Zx, 72x, 73x, 74x, 75x, 76x, 77x • 1834-92x, 93x, 94x, 95x, 96x, 97x, 98x, 99x, 9Ax, 9Bx, 9Cx, 9Dx, 9Ex, 9Fx, 9Gx, 9Hx, 9Jx, 9Kx, B2x, B3x, B4x, B5x, B6x, B7x, B8x, B9x, BAx, BBx, BCx, BDx, BEx, BFx, BGx, BHx, N2x, N3x, N4x, N5x, N8x, N9x, NAx, NBx, NCx, NDx • 1842-2Qx, 2Rx • 1842-BJx	13N5190	*
14	Cover, DIMM slot	13N5188	*
15	Speaker assembly (monaural)	93P4720	N
16	Backup battery	02K7078	N

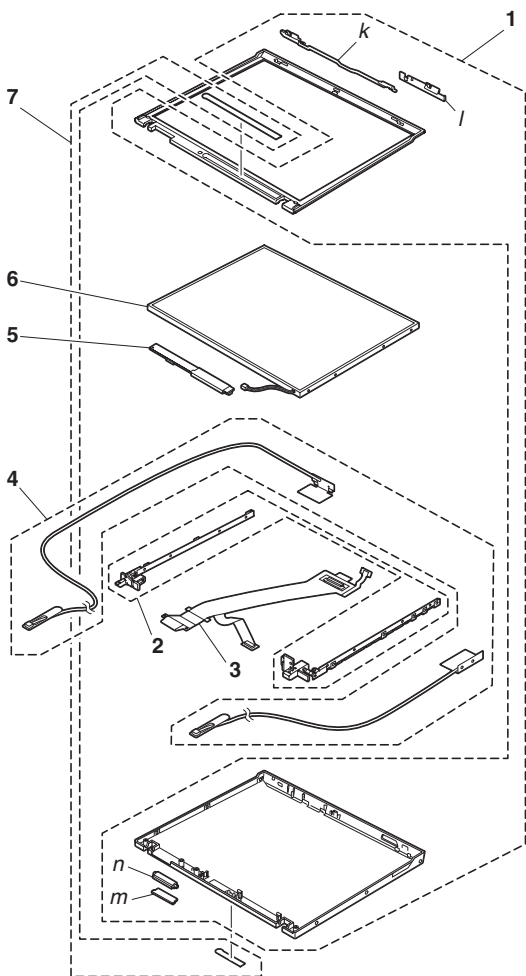
(continued)

No.	FRU	P/N	CRU ID
17	System board assembly with 10/100 Ethernet <ul style="list-style-type: none"> 1834-22x, 23x, 24x, 25x, 28x, 29x, 2Ax, 2Kx, 2Lx, 2Px, 45x, 46x, 47x, 48x, 4Ax, 4Cx, 4Dx, 4Ex, 4Fx, 4Gx, 4Hx, 4Jx, 4Kx, 4Lx, 4Mx, 4Px, 4Qx, 4Rx, 4Sx, 4Tx, 4Ux, 4Vx, 4Wx, 4Xx, 4Yx, 4Zx, 51x, 52x, 53x, 54x, 56x, 57x, 58x, 59x, 5Ax, 5Bx, 5Dx, 5Ex, 5Jx, 5Kx, 5Lx, 5Mx, 5Px, 5Qx, 5Rx, 5Sx, 5Tx, 5Ux, 5Vx, 5Wx, 5Xx, 5Yx, 5Zx, 62x, 63x, 64x, 72x, 73x, 77x, N2x, N3x, N4x, N5x, N7x, N8x, N9x, NAx, NCx 1842-2Qx, 2Rx 	91P7431	N
	System board assembly with 10/100 Ethernet, wireless <ul style="list-style-type: none"> 1834-65x, 66x, 67x, 74x, 75x, 76x, N6x, NBx, NDx, NEx 	93P4226	N
18	PC Card slot	13N5181	N
19	Fan	13N5182	N
20	Keyboard (see "Keyboard" on page 153)		**
21	TrackPoint stick caps	91P9642	*
22	Intel® PRO Wireless 2200BG Mini-PCI Adapter <ul style="list-style-type: none"> 1834-65x, 66x, 67x, 74x, 75x, 76x, N6x, NBx, NDx, NEx 	91P4168	N
—	Telephone cable (SAN TAI)	27L0700	*
—	Thermal grease	46L4855	N
—	AC adapter (see "AC adapters")		*

AC adapters

FRU	P/N	CRU ID
2-pin (72W) slim adapter for non-PFC model (models xxE, xxF, xxJ, xxP, xxS, xxU, xxY)		
ASTEC OP	08K8205	*
DELTA OP	08K8209	*
SANKEN OP	08K8213	*
3-pin (72W) slim adapter for PFC model (models xxA, xxB, xxC, xxG, xxH, xxK, xxM, xxV)		
ASTEC OP	08K8203	*
DELTA OP	08K8207	*
SANKEN OP	08K8211	*

LCD FRUs



14.1-in. XGA TFT

No.	FRU	P/N	CRU ID
<i>k- n</i>	See "Miscellaneous parts" on page 157.		
1	LCD cover kit, 14.1-in. (WW) <ul style="list-style-type: none"> • 1834-22x, 23x, 2Kx, 45x, 46x, 47x, 48x, 4Ax,, 4Cx, 4Dx, 4Ex, 4Fx, 4Gx, 4Hx, 4Jx, 4Kx, 4Lx, 4Mx, 4Px, 4Qx, 4Rx, 4Sx, 4Tx, 4Ux, 4Vx, 4Wx, 4Xx, 4Yx, 4Zx, 62x, 63x, 64x, 65x, 66x, 67x • 1834-82x, 83x, 84x, 85x, 86x, 87x, 88x, 89x, 8Ax, 8Bx, 8Cx, 8Dx, 8Ex, 8Fx, 8Gx, 8Hx, 8Jx, 8Kx, 8Lx, 8Mx, 8Nx, A2x, A3x, A4x, A5x, A6x, A7x, A8x, A9x, AAx, ABx, ACx, ADx, AEx, AFx, AGx, AHx, AJx, AKx, ALx, AMx, ANx, APx, AQx, ARx, N6x, N7x, NEx 	13N5593	N
2	Hinges, 14.1-in. <ul style="list-style-type: none"> • 1834-22x, 23x, 2Kx, 45x, 46x, 47x, 48x, 4Ax,, 4Cx, 4Dx, 4Ex, 4Fx, 4Gx, 4Hx, 4Jx, 4Kx, 4Lx, 4Mx, 4Px, 4Qx, 4Rx, 4Sx, 4Tx, 4Ux, 4Vx, 4Wx, 4Xx, 4Yx, 4Zx, 62x, 63x, 64x, 65x, 66x, 67x • 1834-82x, 83x, 84x, 85x, 86x, 87x, 88x, 89x, 8Ax, 8Bx, 8Cx, 8Dx, 8Ex, 8Fx, 8Gx, 8Hx, 8Jx, 8Kx, 8Lx, 8Mx, 8Nx, A2x, A3x, A4x, A5x, A6x, A7x, A8x, A9x, AAx, ABx, ACx, ADx, AEx, AFx, AGx, AHx, AJx, AKx, ALx, AMx, ANx, APx, AQx, ARx, N6x, N7x, NEx 	13R2982	N
3	LCD cable assembly 14.1-in. XGA <ul style="list-style-type: none"> • 1834-22x, 23x, 2Kx, 45x, 46x, 47x, 48x, 4Ax,, 4Cx, 4Dx, 4Ex, 4Fx, 4Gx, 4Hx, 4Jx, 4Kx, 4Lx, 4Mx, 4Px, 4Qx, 4Rx, 4Sx, 4Tx, 4Ux, 4Vx, 4Wx, 4Xx, 4Yx, 4Zx, 62x, 63x, 64x, 65x, 66x, 67x • 1834-82x, 83x, 84x, 85x, 86x, 87x, 88x, 89x, 8Ax, 8Bx, 8Cx, 8Dx, 8Ex, 8Fx, 8Gx, 8Hx, 8Jx, 8Kx, 8Lx, 8Mx, 8Nx, A2x, A3x, A4x, A5x, A6x, A7x, A8x, A9x, AAx, ABx, ACx, ADx, AEx, AFx, AGx, AHx, AJx, AKx, ALx, AMx, ANx, APx, AQx, ARx, N6x, N7x, NEx 	91P6825	N
4	802.11 a/g antenna, 14 <ul style="list-style-type: none"> • 1834-65x, 66x, 67x, N6x, NEx 	13N5177	N
5	Inverter card, XGA	91P7335	N

(continued)

No.	FRU	P/N	CRU ID
6	LCD panel, 14.1-in. XGA <ul style="list-style-type: none"> • 1834-22x, 23x, 2Kx, 45x, 46x, 47x, 48x, 4Ax,, 4Cx, 4Dx, 4Ex, 4Fx, 4Gx, 4Hx, 4Jx, 4Kx, 4Lx, 4Mx, 4Px, 4Qx, 4Rx, 4Sx, 4Tx, 4Ux, 4Vx, 4Wx, 4Xx, 4Yx, 4Zx, 62x, 63x, 64x, 65x, 66x, 67x • 1834-82x, 83x, 84x, 85x, 86x, 87x, 88x, 89x, 8Ax, 8Bx, 8Cx, 8Dx, 8Ex, 8Fx, 8Gx, 8Hx, 8Jx, 8Kx, 8Lx, 8Mx, 8Nx, A2x, A3x, A4x, A5x, A6x, A7x, A8x, A9x, AAx, ABx, ACx, ADx, AEx, AFx, AGx, AHx, AJx, AKx, ALx, AMx, ANx, APx, AQx, ARx, N6x, N7x, NEx 		
	SAMSUNG	11P8352	N
	HYDIS	92P6705	N
	SAMSUNG (440)	92P6717	N
7	Clear plate	13N5599	N

15.0-in. XGA TFT

No.	FRU	P/N	CRU ID
<i>k- n</i>	See "Miscellaneous parts" on page 157.		
1	LCD cover kit, 15.0-in. (WW) <ul style="list-style-type: none"> • 1834-24x, 25x, 28x, 29x, 2Ax, 2Lx, 2Px, 51x, 52x, 53x, 54x, 56x, 57x, 58x, 59x, 5Ax, 5Bx, 5Dx, 5Ex, 5Jx, 5Kx, 5Lx, 5Mx, 5Px, 5Qx, 5Rx, 5Sx, 5Tx, 5Ux, 5Vx, 5Wx, 5Xx, 5Yx, 5Zx, 72x, 73x, 74x, 75x, 76x, 77x • 1834-92x, 93x, 94x, 95x, 96x, 97x, 98x, 99x, 9Ax, 9Bx, 9Cx, 9Dx, 9Ex, 9Fx, 9Gx, 9Hx, 9Jx, 9Kx, B2x, B3x, B4x, B5x, B6x, B7x, B8x, B9x, BAx, BBx, BCx, BDx, BEx, BFx, BGx, BHx, N2x, N3x, N4x, N5x, N8x, N9x, NAx, NBx, NCx, NDx • 1842-2Qx, 2Rx • 1842-BJx 	13N5596	N

(continued)

Parts list

No.	FRU	P/N	CRU ID
2	Hinges, 15.0-in. <ul style="list-style-type: none"> • 1834-24x, 25x, 28x, 29x, 2Ax, 2Lx, 2Px, 51x, 52x, 53x, 54x, 56x, 57x, 58x, 59x, 5Ax, 5Bx, 5Dx, 5Ex, 5Jx, 5Kx, 5Lx, 5Mx, 5Px, 5Qx, 5Rx, 5Sx, 5Tx, 5Ux, 5Vx, 5Wx, 5Xx, 5Yx, 5Zx, 72x, 73x, 74x, 75x, 76x, 77x • 1834-92x, 93x, 94x, 95x, 96x, 97x, 98x, 99x, 9Ax, 9Bx, 9Cx, 9Dx, 9Ex, 9Fx, 9Gx, 9Hx, 9Jx, 9Kx, B2x, B3x, B4x, B5x, B6x, B7x, B8x, B9x, BAx, BBx, BCx, BDx, BEx, BFx, BGx, BHx, N2x, N3x, N4x, N5x, N8x, N9x, NAx, NBx, NCx, NDx • 1842-2Qx, 2Rx • 1842-BJx 	13N5176	N
3	LCD cable assembly, 15.0-in. XGA <ul style="list-style-type: none"> • 1834-24x, 25x, 28x, 29x, 2Ax, 2Lx, 2Px, 51x, 52x, 53x, 54x, 56x, 57x, 58x, 59x, 5Ax, 5Bx, 5Dx, 5Ex, 5Jx, 5Kx, 5Lx, 5Mx, 5Px, 5Qx, 5Rx, 5Sx, 5Tx, 5Ux, 5Vx, 5Wx, 5Xx, 5Yx, 5Zx, 72x, 73x, 74x, 75x, 76x, 77x • 1834-92x, 93x, 94x, 95x, 96x, 97x, 98x, 99x, 9Ax, 9Bx, 9Cx, 9Dx, 9Ex, 9Fx, 9Gx, 9Hx, 9Jx, 9Kx, B2x, B3x, B4x, B5x, B6x, B7x, B8x, B9x, BAx, BBx, BCx, BDx, BEx, BFx, BGx, BHx, N2x, N3x, N4x, N5x, N8x, N9x, NAx, NBx, NCx, NDx • 1842-2Qx, 2Rx • 1842-BJx 	91P6826	N
4	802.11 a/g antenna, 15 <ul style="list-style-type: none"> • 1834-74x, 75x, 76x, NBx, NDx 	13N5178	N
5	Inverter card, XGA	91P7335	N
6	LCD panel, 15.0-in. XGA <ul style="list-style-type: none"> • 1834-24x, 25x, 28x, 29x, 2Ax, 2Lx, 2Px, 51x, 52x, 53x, 54x, 56x, 57x, 58x, 59x, 5Ax, 5Bx, 5Dx, 5Ex, 5Jx, 5Kx, 5Lx, 5Mx, 5Px, 5Qx, 5Rx, 5Sx, 5Tx, 5Ux, 5Vx, 5Wx, 5Xx, 5Yx, 5Zx, 72x, 73x, 74x, 75x, 76x, 77x • 1834-92x, 93x, 94x, 95x, 96x, 97x, 98x, 99x, 9Ax, 9Bx, 9Cx, 9Dx, 9Ex, 9Fx, 9Gx, 9Hx, 9Jx, 9Kx, B2x, B3x, B4x, B5x, B6x, B7x, B8x, B9x, BAx, BBx, BCx, BDx, BEx, BFx, BGx, BHx, N2x, N3x, N4x, N5x, N8x, N9x, NAx, NBx, NCx, NDx • 1842-2Qx, 2Rx • 1842-BJx 		
	SAMSUNG	92P6678	N
	LG	92P6679	N
7	Clear plate	13N5599	N

Keyboard

Table 1. Keyboards for 15.0-in. LCD models

Language	P/N (NMB)	P/N (ALPS)	CRU ID
Arabic	91P8303	91P8304	**
Belgian	91P8293	91P8294	
Chinese, Traditional	91P8297	91P8298	
Czech	91P8305	91P8306	
Danish	91P8279	91P8280	
Dutch	91P8273	91P8274	
English, U.K.	91P8265	91P8266	
English, U.S.	91P8261	91P8262	
French, Canadian	91P8267	91P8268	
French, European	91P8271	91P8272	
German	91P8269	91P8270	
Greek	91P8309	91P8310	
Hungarian	91P8307	91P8308	
Hebrew	91P4715	91P4716	
Italian	91P8281	91P8282	
Japanese	91P8263	91P8264	
Korean	91P8291	91P8292	
Norwegian	91P8277	91P8278	
Polish	91P8313	91P8314	
Portuguese	91P8287	91P8288	
Russian	91P8299	91P8300	
Slovak	91P8311	91P8312	
Slovenian	91P8315	91P8316	
Spanish, European	91P8283	91P8284	
Spanish, Latin American	91P8289	91P8290	
Swedish or Finnish	91P8275	91P8276	
Swiss	91P8285	91P8286	
Thai	93P4727	93P4725	
Turkish	91P8295	91P8296	

Table 2. Keyboards for 14.1-in. LCD models

Language	P/N (NMB)	CRU ID
Arabic	08K5065	**
Belgian	08K5060	
Chinese, Traditional	08K5062	
Czech	08K5066	
Danish	08K5053	
Dutch	08K5050	
English, U.K.	08K5046	
English, U.S.	08K5044	
French, Canadian	08K5047	
French, European	08K5049	
German	08K5048	
Greek	08K5068	
Hungarian	08K5067	
Hebrew	93P4711	
Italian	08K5054	
Japanese	08K5045	
Korean	08K5059	
Norwegian	08K5052	
Polish	08K5070	
Portuguese	08K5057	
Russian	08K5063	
Slovak	08K5069	
Slovenian	08K5071	
Spanish, European	08K5055	
Spanish, Latin American	08K5058	
Swedish or Finnish	08K5051	
Swiss	08K5056	
Turkish	08K5061	

Recovery CDs

For Windows XP Professional

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

- 1834-2Kx, 2Lx, 2Px, 45x, 47x, 4Ax, 4Dx, 4Gx, 4Jx, 4Lx, 4Px, 4Rx, 4Tx, 4Vx, 52x, 54x, 56x, 59x, 5Ex, 5Jx, 5Lx, 5Qx, 5Sx, 5Ux, 5Wx, 5Xx, 64x, 72x, 73x
- 1834-82x, 85x, 88x, 8Ax, 8Cx, 8Ex, 8Hx, 8Kx, 92x, 95x, 98x, 9Ax, 9Cx, 9Ex, 9Hx, 9Jx, A2x, A6x, A8x, AAx, ACx, ADx, AEx, AGx, AHx, AKx, B2x, B3x, B5x, B7x, B9x, BBx, BCx, N3x, N5x, N6x, N8x, NBx, NCx
- 1842-2Qx, 2Rx
- 1842-BJ

Language	P/N	CRU ID
Arabic	24R3941	*
Chinese, Simplified	24R3934	
Chinese, Traditional	24R3935	
Chinese, Traditional (Hong Kong S.A.R.)	24R3936	
Czech	24R3940	
Danish	24R3930	
Dutch	24R3933	
English, U.K.	24R3923	
English, U.S.	24R3922	
Finnish	24R3931	
French	24R3924	
German	24R3925	
Greek	24R3945	
Hebrew	24R3938	
Hungarian	24R3944	
Italian	24R3927	
Japanese	24R3937	
Norwegian	24R3932	
Polish	24R3939	
Portuguese	24R3928	
Russian	24R3942	
Spanish	24R3926	
Swedish	24R3929	
Turkish	24R3943	

For Windows XP Home Edition

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

- 1834-46x, 48x, 4Cx, 4Ex, 4Fx, 4Hx, 4Kx, 4Mx, 4Qx, 4Sx, 4Ux, 4Wx, 4Xx, 4Yx, 4Zx, 51x, 53x, 57x, 58x, 5Ax, 5Bx, 5Dx, 5Kx, 5Mx, 5Px, 5Rx, 5Tx, 5Vx, 5Yx, 5Zx, 62x, 63x, 65x, 66x, 67x, 74x, 75x, 76x, 77x
- 1834-83x, 84x, 86x, 87x, 89x, 8Bx, 8Dx, 8Fx, 8Gx, 8Jx, 8Lx, 8Mx, 8Nx, 93x, 94x, 96x, 97x, 99x, 9Bx, 9Dx, 9Fx, 9Gx, 9Kx, A3x, A4x, A5x, A7x, A9x, ABx, AFx, AJx, ALx, ARx, B4x, B6x, B8x, BAx, BDx, N2x, N4x, N7x, N9x, NAx, NDx, NEx

Language	P/N	CRU ID
Arabic	24R4133	*
Chinese, Simplified	24R4126	
Chinese, Traditional	24R4127	
Chinese, Traditional (Hong Kong S.A.R.)	24R4128	
Czech	24R4132	
Danish	24R4122	
Dutch	24R4125	
English, U.K.	24R4115	
English, U.S.	24R4114	
Finnish	24R4123	
French	24R4116	
German	24R4117	
Greek	24R4137	
Hebrew	24R4130	
Hungarian	24R4136	
Italian	24R4119	
Japanese	24R4129	
Norwegian	24R4124	
Polish	24R4131	
Portuguese	24R4120	
Russian	24R4134	
Spanish	24R4118	
Swedish	24R4121	
Turkish	24R4135	

Miscellaneous parts

FRU	P/N	CRU ID
Screw kit (including nylon-coated screws): <ul style="list-style-type: none"> • M2.5 × 4.8 mm (black), bind-head (8) • M2 × 4 mm (black), bind-head (6) • M2 × 6 mm (black), bind-head (5) • M2 × 12 mm (black), flat-head (17) • M2 × 10 mm (black), flat-head (9) • Hex stud (4) • M2 × 18.9 mm, special shape (1) • M3 × 3 mm (PHILLIPS/slotted) (1) • M2 × 3 mm (silver), small flat-head (LCD unit hinge) (11) • Screw caps (not painted) • Screw caps, square • Screw caps, USB • Screw caps, rear, oval 	13N5168	N
Base miscellaneous parts: <ul style="list-style-type: none"> • Cover, PC Card slot • Spring, PC Card slot cover • Rubber foot (rear) • Rubber foot (front) • Insulation, bottom • Insulation sheet • Insulation, louver • Battery lock knob L • Battery lock latch L • Battery lock latch R • Battery lock link • Spring, battery lock • Slide lever • Slide lever spring • Pull lever • Pull lever spring • Puller • HDD rubber 14/15 • Sheet, HDD rubber 15 • Sheet, HDD rubber 14 • HDD rubber 15 • HDD rubber 14 • Security plate • Shield, battery 14 • Shield, battery 15 • Screw caps, square • Screw caps, rear, oval 	13N5166	N

(continued)

Parts list

FRU	P/N	CRU ID
<p>System miscellaneous parts:</p> <ul style="list-style-type: none"> • (a) Cable, RJ11-docking connector on system board • (b) Antenna cable guide • (c) EMI spring, CDC • (d) Heatsink M9 15 • (e) DC in cable • (f) Bracket, cable hook • (g) Bracket, VGA connector 14 • (g) Bracket, VGA connector 15 • (h) Bracket structure 14/15 • (i) Bracket, I/O plate 14/15 • Connector bag • Blank cap, IEEE1394 connector • Spacer, IEEE1394 connector • (j) Retainer, LCD cable • Bracket M7 14 • Bracket M7 15 • Ferrite core, RH • Ferrite core, LH • Bracket, joint 14 • Bracket, joint 15 • Cu tape, VGA cable • Hard disk connector retainer <p>Note: Italicized letters in parentheses are references to the exploded view on page 140.</p>	13N5167	N
<p>System board miscellaneous parts:</p> <ul style="list-style-type: none"> • Insulator, PC Card slot • Insulator, louver • Insulator, docking latch • Insulator, docking connector • Insulator, fan • Insulator, Mg • Insulator, hard disk drive • Insulator, security chip • Shield, Al tape (large) • Shield, Al tape (small) • S-video gasket • Form on system board • Insulator, louver, hard disk drive • Stud, triangle • Microphone rubber 14 • Audio connector bracket • Security chip spacer • Stud, system board 	13R2821	N

(continued)

FRU	P/N	CRU ID
14.1-in. LCD miscellaneous parts: <ul style="list-style-type: none"> • (k) LCD latch assembly, 14 (L) • (l) LCD latch, 14 (R) • (m) Lower cable bush, 14 • (n) Upper cable bush, 14 • Finger, LCD FPC 14 • LCD FPC tape • Screw caps (not painted) • Screw caps, square <p>Note: Italicized letters in parentheses are references to the exploded view on page 149.</p>	13N5169	N
15.0-in. LCD miscellaneous parts: <ul style="list-style-type: none"> • (k) LCD latch assembly, 15 (L) • (l) LCD latch, 15 (R) • (m) Lower cable bush, 15 • (n) Upper cable bush, 15 • LCD FPC tape • Finger, LCD FPC 15 • Screw caps (not painted) • Screw caps, square 	13N5170	N

Optional FRUs

FRU	P/N	CRU ID
128-MB DDR SDRAM SO DIMM (PC2100)	10K0029	*
256-MB DDR SDRAM SO DIMM (PC2100)	10K0031	*
512-MB DDR SDRAM SO DIMM (PC2100)	10K0033	*
1-GB DDR SDRAM SO DIMM (PC2100)	10K0035	*
1-GB DDR SDRAM SO DIMM (PC2700)	31P9835	*
Video cable	27L0531	*
ThinkPad Mini Dock	67P9011	*
ThinkPad Mini Dock AC adapter (2 pin, 120 W)		*
DELTA	02K7086	
LITEON	02K7092	
ThinkPad Mini Dock AC adapter (3 pin, 120 W)		*
DELTA	02K7094	
LITEON	02K7096	
ThinkPad Port Replicator II	74P6735	*
Multiple battery charger	02K6642	*
External diskette drive cable	27L0525	*
Diskette drive (TEAC)	08K9606	*
Diskette drive (SONY)	08K9607	*

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
ThinkPad Hardware Maintenance Diskette Version 1.71 or later Note: Download the file from the following Web site: http://www.ibm.com/pc/partner/infotips	—

Power cords (system)

An IBM power cord for a specific country or region is usually available only in that country or region:

For 2-pin power cords:

Region	P/N	CRU ID
Canada, U.S.	13H5264	*
Japan	74P4331	
Argentina	36L8870	
Brazil	49P2095	

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	

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