

IBM Mobile Systems

ThinkPad Computer
Hardware Maintenance Manual

June 2000

This manual supports:

ThinkPad A20m (MT 2628/MT 2633)

ThinkPad A20p (MT 2629)

Note

Before using this information and the product it supports, be sure to read the general information under "Notices" on page 101.

First Edition (June 2000)

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Introduction

Important service information

Important

Diskette fixes are customer-installable. The diskette fixes are posted on the IBM support site (<http://www.pc.ibm.com/support/>).

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

Customers in Canada should call IBM HelpPC at 800-565-3344 for assistance or download information.

FRU replacement strategy

Before replacing parts

Ensure that all diskette fixes are installed before replacing any FRUs listed in this manual.

Use the following strategy to prevent unnecessary FRU replacement and service expense:

- **If you are instructed to replace a FRU but the replacement does not correct the problem, reinstall the original FRU before you continue.**
- Some computers have both a processor board and a system board. If you are instructed to replace either the processor board or the system board, and replacing one of them does not correct the problem, reinstall that board, and then replace the other one.
- If an adapter or device consists of more than one FRU, any of the FRUs may be the cause of the error. Before replacing the adapter or device, remove the FRUs, one by one, to see if the symptoms change. Replace only the FRU that changed the symptoms.

Attention

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

Hard-disk drive replacement strategy:

Always try to run a low-level format before replacing a hard-disk drive.

Attention

The drive startup sequence in the computer you are servicing may have been changed. Be extremely careful during write operations such as copying, saving, or formatting. If you select an incorrect drive, data or programs can be overwritten.

How to use error messages

Use the error codes displayed on the screen to diagnose failures. If more than one error code is displayed, begin the diagnosis with the first error code. Whatever causes the first error code may also cause false error codes. If no error code is displayed, see if the error symptom is listed in the Symptom-to-FRU Index for the computer you are servicing.

Diskette compatibility matrix

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

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

Safety notices: multilingual translations

In this manual, safety notices appear in English with a page number reference to the appropriate translation in this section.

The safety notices are provided in English, French, German, Italian, and Spanish, as follows:

Safety notice 1

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

Avant de remettre l'ordinateur sous tension après remplacement d'une unité en clientèle, vérifiez que tous les ressorts, vis et autres pièces sont bien en place et bien fixées. Pour ce faire, secouez l'unité et assurez-vous qu'aucun bruit suspect ne se produit. Des pièces métalliques ou des copeaux de métal pourraient causer un court-circuit.

Bevor nach einem FRU-Austausch der Computer wieder angeschlossen wird, muß sichergestellt werden, daß keine Schrauben, Federn oder andere Kleinteile fehlen oder im Gehäuse vergessen wurden. Der Computer muß geschüttelt und auf Klappergeräusche geprüft werden. Metallteile oder-splitter können Kurzschlüsse erzeugen.

Prima di accendere l'elaboratore dopo che é stata effettuata la sostituzione di una FRU, accertarsi che tutte le viti, le molle e tutte le altri parti di piccole dimensioni siano nella corretta posizione e non siano sparse all'interno dell'elaboratore. Verificare ci scuotendo l'elaboratore e prestando attenzione ad eventuali rumori; eventuali parti o pezzetti metallici possono provocare cortocircuiti pericolosi.

Antes de encender el sistema despues de sustituir una FRU, compruebe que todos los tornillos, muelles y demás piezas pequeñas se encuentran en su sitio y no se encuentran sueltas dentro del sistema. Compruébelo agitando el sistema y escuchando los posibles ruidos que provocarían. Las piezas metálicas pueden causar cortocircuitos eléctricos.

Safety notice 2

DANGER:

Some standby batteries contain a small amount of nickel and cadmium. Do not disassemble a standby battery, recharge it, throw it into fire or water, or short-circuit it. Dispose of the battery as required by local ordinances or regulations. Use only the battery in the appropriate parts listing. Use of an incorrect battery can result in ignition or explosion of the battery.

Certaines batteries de secours contiennent du nickel et du cadmium. Ne les démontez pas, ne les rechargez pas, ne les exposez ni au feu ni à l'eau. Ne les mettez pas en court-circuit. Pour les mettre au rebut, conformez-vous à la réglementation en vigueur. Lorsque vous remplacez la pile de sauvegarde ou celle de l'horloge temps réel, veillez à n'utiliser que les modèles cités dans la liste de pièces détachées adéquate. Une batterie ou une pile inappropriée risque de prendre feu ou d'exploser.

Die Bereitschaftsbatterie, die sich unter dem Diskettenlaufwerk befindet, kann geringe Mengen Nickel und Cadmium enthalten. Sie darf nur durch die Verkaufsstelle oder den IBM Kundendienst ausgetauscht werden. Sie darf nicht zerlegt, wiederaufgeladen, kurzgeschlossen, oder Feuer oder Wasser ausgesetzt werden. Die Batterie kann schwere Verbrennungen oder Verätzungen verursachen. Bei der Entsorgung die örtlichen Bestimmungen für Sondermüll beachten. Beim Ersetzen der Bereitschafts- oder Systembatterie nur Batterien des Typs verwenden, der in der Ersatzteilliste aufgeführt ist. Der Einsatz falscher Batterien kann zu Entzündung oder Explosion führen.

Alcune batterie di riserva contengono una piccola quantità di nichel e cadmio. Non smontarle, ricaricarle, gettarle nel fuoco o nell'acqua né cortocircuitarle. Smaltirle secondo la normativa in vigore (DPR 915/82, successive disposizioni e disposizioni locali). Quando si sostituisce la batteria dell'RTC (real time clock) o la batteria di supporto, utilizzare soltanto i tipi inseriti nell'appropriato Catalogo parti. L'impiego di una batteria non adatta potrebbe determinare l'incendio o l'esplosione della batteria stessa.

Algunas baterías de reserva contienen una pequeña cantidad de níquel y cadmio. No las desmonte, ni recargue, ni las eche al fuego o al agua ni las cortocircuite. Deséchelas tal como dispone la normativa local. Utilice sólo baterías que se encuentren en la lista de piezas. La utilización de una batería no apropiada puede provocar la ignición o explosión de la misma.

Safety notice 3

 **DANGER:**

The battery pack contains small amounts of nickel. Do not disassemble it, throw it into fire or water, or short-circuit it. Dispose of the battery pack as required by local ordinances or regulations. Use only the battery in the appropriate parts listing when replacing the battery pack. Use of an incorrect battery can result in ignition or explosion of the battery.

La batterie contient du nickel. Ne la démontez pas, ne l'exposez ni au feu ni à l'eau. Ne la mettez pas en court-circuit. Pour la mettre au rebut, conformez-vous à la réglementation en vigueur. Lorsque vous remplacez la batterie, veillez à n'utiliser que les modèles cités dans la liste de pièces détachées adéquate. En effet, une batterie inappropriée risque de prendre feu ou d'exploser.

Akkus enthalten geringe Mengen von Nickel. Sie dürfen nicht zerlegt, wiederaufgeladen, kurzgeschlossen, oder Feuer oder Wasser ausgesetzt werden. Bei der Entsorgung die örtlichen Bestimmungen für Sondermüll beachten. Beim Ersetzen der Batterie nur Batterien des Typs verwenden, der in der Ersatzteilliste aufgeführt ist. Der Einsatz falscher Batterien kann zu Entzündung oder Explosion führen.

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

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

Safety notice 4

 **DANGER:**

The lithium battery can cause a fire, an explosion, or a severe burn. Do not recharge it, remove its polarized connector, disassemble it, heat it above 100°C (212°F), incinerate it, or expose its cell contents to water. Dispose of the battery as required by local ordinances or regulations. Use only the battery in the appropriate parts listing. Use of an incorrect battery can result in ignition or explosion of the battery.

La pile de sauvegarde contient du lithium. Elle présente des risques d'incendie, d'explosion ou de brûlures graves. Ne la rechargez pas, ne retirez pas son connecteur polarisé et ne la démontez pas. Ne l'exposez pas à une température supérieure à 100°C, ne la faites pas brûler et n'en exposez pas le contenu à l'eau. Mettez la pile au rebut conformément à la réglementation en vigueur. Une pile inappropriée risque de prendre feu ou d'exploser.

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

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

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

Safety notice 5

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

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

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

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

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

Safety notice 6

To avoid shock, do not remove the plastic cover that protects the lower part of the inverter card.

Afin d'éviter tout risque de choc électrique, ne retirez pas le cache en plastique protégeant la partie inférieure de la carte d'alimentation.

Aus Sicherheitsgründen die Kunststoffabdeckung, die den unteren Teil der Spannungswandlerplatine umgibt, nicht entfernen.

Per evitare scosse elettriche, non rimuovere la copertura in plastica che avvolge la parte inferiore della scheda invertitore.

Para evitar descargas, no quite la cubierta de plástico que rodea la parte baja de la tarjeta invertida.

Safety notice 7

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

Bien que le voltage des batteries principales soit peu élevé, le court-circuit ou la mise à la masse d'une batterie peut produire suffisamment de courant pour brûler des matériaux combustibles ou causer des brûlures corporelles graves.

Obwohl Hauptbatterien eine niedrige Spannung haben, können sie doch bei Kurzschluß oder Erdung genug Strom abgeben, um brennbare Materialien zu entzünden oder Verletzungen bei Personen hervorzurufen.

Sebbene le batterie di alimentazione siano a basso voltaggio, una batteria in corto circuito o a massa può fornire corrente sufficiente da bruciare materiali combustibili o provocare ustioni ai tecnici di manutenzione.

Aunque las baterías principales tienen un voltaje bajo, una batería cortocircuitada o con contacto a tierra puede producir la corriente suficiente como para quemar material combustible o provocar quemaduras en el personal.

Safety notice 8

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

Avant de retirer une unité remplaçable en clientèle, mettez le système hors tension, débranchez tous les cordons d'alimentation des socles de prise de courant, retirez la batterie et déconnectez tous les cordons d'interface.

Die Stromzufuhr muß abgeschaltet, alle Stromkabel aus der Steckdose gezogen, der Akku entfernt und alle Verbindungskabel abgenommen sein, bevor eine FRU entfernt wird.

Prima di rimuovere qualsiasi FRU, spegnere il sistema, scollegare dalle prese elettriche tutti i cavi di alimentazione, rimuovere la batteria e poi scollegare i cavi di interconnessione.

Antes de quitar una FRU, apague el sistema, desenchufe todos los cables de las tomas de corriente eléctrica, quite la batería y, a continuación, desconecte cualquier cable de conexión entre dispositivos.

Safety information

The following section contains the safety information that you need to be familiar with before servicing an IBM mobile computer.

General safety

Follow these rules to ensure general safety:

- Observe good housekeeping in the area of the machines during and after maintenance.
- When lifting any heavy object:
 1. Ensure you can stand safely without slipping.
 2. Distribute the weight of the object equally between your feet.
 3. Use a slow lifting force. Never move suddenly or twist when you attempt to lift.
 4. Lift by standing or by pushing up with your leg muscles; this action removes the strain from the muscles in your back. *Do not attempt to lift any objects that weigh more than 16 kg (35 lb) or objects that you think are too heavy for you.*
- Do not perform any action that causes hazards to the customer, or that makes the equipment unsafe.
- Before you start the machine, ensure that other service representatives and the customer's personnel are not in a hazardous position.
- Place removed covers and other parts in a safe place, away from all personnel, while you are servicing the machine.
- Keep your 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. Ensure that your sleeves are fastened or rolled up above your elbows. If your hair is long, fasten it.
- Insert the ends of your necktie or scarf inside clothing or fasten it with a nonconductive clip, approximately 8 centimeters (3 inches) from the end.
- Do not wear jewelry, chains, metal-frame eyeglasses, or metal fasteners for your clothing.

Attention: Metal objects are good electrical conductors.
- Wear safety glasses when you are hammering, drilling, soldering, cutting wire, attaching springs, using solvents, or working in any other conditions that might be hazardous to your eyes.
- After service, reinstall all safety shields, guards, labels, and ground wires. Replace any safety device that is worn or defective.
- Reinstall all covers correctly before returning the machine to the customer.

Electrical safety

Observe the following rules when working on electrical equipment.

Important

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

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

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

Attention: Another person must be there to switch off the power, if necessary.
 - Use only one hand when working with powered-on electrical equipment; keep the other hand in your pocket or behind your back.

Attention: An electrical shock can occur only when there is a complete circuit. By observing the above rule, you may prevent a current from passing through your body.
 - When using testers, set the controls correctly and use the approved probe leads and accessories for that tester.
 - Stand on suitable rubber mats (obtained locally, if necessary) to insulate you from grounds such as metal floor strips and machine frames.

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

- Regularly inspect and maintain your electrical hand tools for safe operational condition.
- Do not use worn or broken tools and testers.
- *Never assume* that power has been disconnected from a circuit. First, *check* that it has been powered off.
- Always look carefully for possible hazards in your work area. Examples of these hazards are moist floors, nongrounded power extension cables, power surges, and missing safety grounds.
- Do not touch live electrical circuits with the reflective surface of a plastic dental mirror. The surface is conductive; such touching can cause personal injury and machine damage.
- Do not service the following parts *with the power on* when they are removed from their normal operating places in a machine:
 - Power supply units
 - Pumps
 - Blowers and fans
 - Motor generators
 and similar units. (This practice ensures correct grounding of the units.)
- If an electrical accident occurs:
 - Use caution; do not become a victim yourself.
 - Switch off power.
 - Send another person to get medical aid.

Safety inspection guide

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

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

Consider these conditions and the safety hazards they present:

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

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

Checklist:

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

Handling electrostatic discharge-sensitive devices

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

Notes

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

When handling ESD-sensitive parts:

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

Note

The use of a grounding system is desirable but not required to protect against ESD damage.

- Attach the ESD ground clip to any frame ground, ground braid, or green-wire ground.
- Use an ESD common ground or reference point when working on a double-insulated or battery-operated system. You can use coax or connector-outside shells on these systems.
- Use the round ground-prong of the AC plug on AC-operated computers.

Grounding requirements

Electrical grounding of the computer is required for operator safety and correct system function. Proper grounding of the electrical outlet can be verified by a certified electrician.

Laser compliance statement

Some IBM Personal Computer models are equipped from the factory with a CD-ROM drive or DVD drive. CD-ROM drives or DVD drives are also sold separately as options. The CD-ROM drive or DVD drive is a laser product. The CD-ROM drive or DVD drive is certified in the U.S. to conform to the requirements of the Department of Health and Human Services 21 Code of Federal Regulations (DHHS 21 CFR) Subchapter J for Class 1 laser products. Elsewhere, the drive is certified to conform to the requirements of the International Electrotechnical Commission (IEC) 825 and CENELEC EN 60 825 for Class 1 laser products.

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

 **CAUTION:**

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

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

凡未在这里指明的任何控制用法、调整、行为，都会导致严重后果。

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

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

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

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

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

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

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

Opening the CD-ROM drive or DVD drive could result in exposure to hazardous laser radiation. There are no serviceable parts inside the CD-ROM drive or DVD drive.

Do not open.

Some CD-ROM drives or DVD drives 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，请勿直视激光光束，请勿直接查看视觉仪器，并且避免直接接触在激光光束之中。

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

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

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

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

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

Keď je laserová jednotka otvorená. Vyhňte sa priamemu pohľadu a nehľadte priamo s optickými nástrojmi do lúča a vyhňte sa priamemu vystaveniu lúčov.

Radiación láser al abrir. No mire fijamente ni examine con instrumental óptico el haz de luz. Evite la exposición directa al haz.

Read this first

General descriptions

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

Read this first

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

Important notes

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

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

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

Read this first

- ___ 6. Procedure index and page number in which the failing FRU was detected
- ___ 7. Failing FRU name and part number
- ___ 8. Machine type, model number, and serial number
- ___ 9. Customer's name and address

Note for warranty: During the warranty period, the customer may be responsible for repair costs if the computer damage was caused by misuse, accident, modification, unsuitable physical or operating environment, or improper maintenance by the customer. The following list provides some common items that are not covered under warranty and some symptoms that might indicate that the system was subjected to stress beyond normal use.

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

The following are not covered under warranty:

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

The following symptoms might indicate damage caused by nonwarranted activities:

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

Related service information

This section provides information about the following:

- “Service Web site”
- “Passwords”
- Power management

Service Web site

When the latest maintenance diskette and the system program service diskette are available, a notice will be posted on <http://pccbbs.raleigh.ibm.com/>

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).

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

When any of these passwords is used, a password prompt appears on the screen whenever the computer is turned on. The computer does not start until the password is entered.

Power-on password: A power-on password (POP) protects the system from being powered on by an unauthorized person. Without knowing the password, nobody can start the system.

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**. You can enter two HDPs when you select **Master + User**.

Attention

If the master HDP has been forgotten, there is no way to delete it. But you can still get access to the hard disk if you remember the user HDP. If both user HDP and master HDP have been forgotten, the password cannot be removed and the hard disk will not be accessible.

Related service information

Supervisor password: A supervisor password (SVP) protects the system information stored in the IBM BIOS Setup Utility so that without knowing the password, nobody can change the configuration of the computer.

Attention

If the SVP has been forgotten, there is no way to reset it.

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

(A) If SVP is not installed:

1. Turn off the computer.
2. Remove the Mini PCI adapter cover from the bottom of the computer.
3. Remove the backup battery.
For how to remove the backup battery, see "1030 Backup battery" on page 52.
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 Mini PCI adapter cover.

(B) If SVP is installed:

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

How to remove the hard-disk password

Attention

If **User only** mode is selected and the user HDP is forgotten, there is no way to reset it.

To remove the user HDP that you have been forgotten, do the following:

1. Power on the computer by pressing and holding **F1**.
2. Enter the SVP. The IBM BIOS Setup Utility menu appears.
3. Select **Password**, using the cursor keys to move down the menu.

Related service information

4. Select **Hard-disk x password**, where *x* is the letter of the hard-disk drive. A pop-up window opens.
5. Select either **User HDP** or **Master HDP**.
6. Enter the master HDP; then leave the New Password field blank and press **Enter** twice.
7. Press **F10**.
8. Select **Yes** in the Setup Configuration window.

The both user HDP and master HDP have been removed.

Power management

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

Screen blank mode: In screen blank mode, the following occurs:

- The LCD backlight turns off.
- The hard disk drive motor stops.
- The speaker is muted.

Note: Screen blank mode in Windows 98 is called *standby mode* in Windows 95.

To enter screen blank mode, press **Fn + F3**. 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.

Note: Standby mode in Windows 98 is called *suspend mode* in Windows 95.

To enter standby mode by, do any of the following:

- Press **Fn + F4**.
- Close the LCD cover. (To prevent the computer from entering standby mode when the LCD is closed, click **Will not suspend even if LCD is closed** in the Power Management Properties window. Then only the LCD turns off.)

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 the time set.
- If the ac adapter is plugged in.
- 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

Related service information

“Power Management Properties” window, the computer goes into hibernation mode.)

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

Any one of the following events causes the computer to resume operation from standby mode:

- The **Fn** key is pressed.
- The LCD cover is opened.
- The ring indicator (RI) is signaled by a serial device or a PC Card device.
- The power switch is turned on.
- The resume timer is set. In Windows 98, the **Scheduled Tasks** setting has priority over the **Resume on timer** selection in the “Power Management Properties” window.

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

Hibernation mode

Note for Windows NT

A Windows NT user cannot create a hibernation file in a Windows NT system that uses NTFS format, the Windows NT default format. If you want to use hibernation mode, you will need to reinstall Windows NT with FAT format.

In hibernation mode, the following occurs:

- The system status, RAM, VRAM, and setup data are stored on the hard disk.
- The system is powered off.

Related service information

Notes:

1. In the ThinkPad Configuration program, the computer can be set to **suspend/hibernate while docked**.
2. The computer cannot enter hibernation mode when it is powered with ac power and a communication PC Card is used.
3. If the computer enters the hibernation mode when it is docked to the docking station, do not undock it from the docking station before resuming normal operation. If you do undock it, then if you try to resume normal operation, you will get an error message, and you will have to restart the system.

Any one of the following events causes the computer to enter hibernation mode:

- The **Fn + F12** keys are pressed.
- The power switch is turned off and the mode is set to **Power switch mode [Hibernation]**.
- The timer conditions are satisfied in suspend mode (for operating systems other than Windows 98).
- A critically low battery condition occurs and the mode is set to **Hibernate when battery becomes low**.

When the power is turned on, the computer leaves 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 32.

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. If a device is in the Ultrabay 2000 or connected to the USB connector of the docking station, remove it and install it in the Ultrabay 2000 of the computer or connect it to the USB connector of the computer. Then test it with PC-Doctor.

To run the test, do as follows:

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

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

If the computer cannot be powered on, go to “Power system checkout” on page 26, and check the power sources.

If an error code appears, go to “Symptom-to-FRU index” on page 39.

Checkout guide

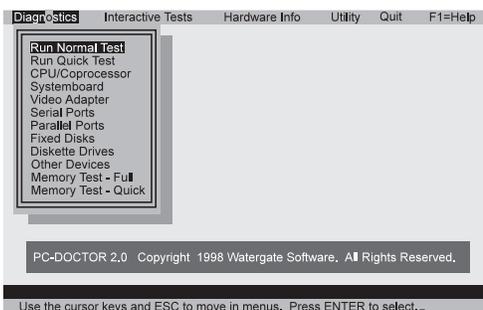
On the first screen, select the model and press **Enter**.
Follow the instructions on the screen.

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

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

The options on the test menu are as follows:

Diagnostics	Interactive Tests
<ul style="list-style-type: none">• Run Normal Test• Run Quick Test• CPU/Coprocessor• System Board• Video Adapter• Audio• Serial Ports• Parallel Ports• Fixed Disks• Diskette Drives• Other Devices• Memory Test – Full• Memory Test – Quick	<ul style="list-style-type: none">• Keyboard• Video• Internal Speaker• Mouse• Joystick• Diskette• System Load• CD-ROM/DVD Test• Stereo Speaker
Notes: <ul style="list-style-type: none">• In the Keyboard test in Interactive Tests, the Fn key is scanned only once. Each key should be held down for at least 2 seconds; otherwise, it cannot be sensed.• The sound card is not recognized in the Stereo Speaker in the Interactive Tests. To test it, use Audio in Other Devices (Diagnostics).	



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**.

Checkout guide

Detecting system information with PC-Doctor

PC-Doctor can detect the following system information:

Hardware information:

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

Utility:

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

Power system checkout

To verify a symptom, do the following:

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

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

- “Checking the ac adapter” on page 27
- “Checking operational charging” on page 27
- “Checking the battery pack” on page 28
- “Checking the backup battery” on page 29

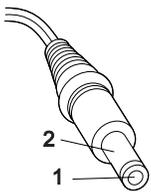
Checkout guide

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

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

To check the ac adapter, do the following:

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



(16 - 10 V)

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

3. If the voltage is not correct, replace the ac adapter.
4. If the voltage is acceptable, do the following:
 - Replace the system board.
 - If the problem persists, go to "Product overview" on page 32.

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.

Checkout guide

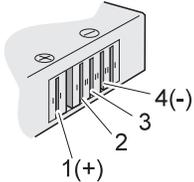
Checking the battery pack: Battery charging does not start until the Power Meter shows that less than 95% of the total power remains; under this condition the battery pack can charge to 100% of its capacity. This protects the battery pack from being overcharged or from having a shortened life.

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

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

To check the battery pack, do the following:

1. Power off the computer.
2. Remove the battery pack and measure the voltage between battery terminals 1 (+) and 4 (-). See the following figure:



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

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

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.

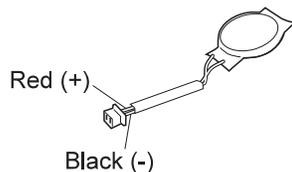
4. If the voltage is more than +11.0 V dc, measure the resistance between battery terminals 3 and 4. The resistance must be 4 to 30 K ohm.

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

Checkout guide

Checking the backup battery: Do the following:

1. Power off the computer, and unplug the ac adapter from it.
2. Turn the computer upside down.
3. Remove the backup battery (see “Checking the battery pack”).
4. Measure the voltage of the backup battery. See the following figure.



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

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

Checkout guide

ThinkPad A20m and A20p

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Product overview

This section presents the following product-unique information:

- “Specifications”
- “Status indicators” on page 35
- “Fn key combinations” on page 38

Specifications

The following table lists the specifications of the ThinkPad A20 series:

Feature	Description
Processor*	<p>MT2628 and MT2633 (A20m)</p> <ul style="list-style-type: none"> • Intel® mobile Pentium® III 500 MHz, L2 256-KB cache • Intel® mobile Pentium® III processor 600 featuring Intel® SpeedStep™ technology • Intel® mobile Pentium® III processor 650 featuring Intel® SpeedStep™ technology • Intel® mobile Pentium® III processor 700 featuring Intel® SpeedStep™ technology • Intel® Celeron® processor 500 MHz, L2 256-KB cache • Intel® Celeron® processor 550 MHz, L2 256-KB cache <p>MT2629 (A20p)</p> <ul style="list-style-type: none"> • Intel® mobile Pentium® III processor 700 featuring Intel® SpeedStep™ technology • Intel® mobile Pentium® III processor 750 featuring Intel® SpeedStep™ technology
Bus architecture	<ul style="list-style-type: none"> • PCI Bus
Memory (standard)	<p>MT2628 (excepting suffix no.-4HC, -4IC, -3JC, -3KC) and MT2633</p> <ul style="list-style-type: none"> • 64 MB (on the system board) <p>MT2628-4HC, -4IC, -3JC, -3KC and MT2629</p> <ul style="list-style-type: none"> • 128 MB (on the system board)
Memory (optional)	<ul style="list-style-type: none"> • 64 MB, 128 MB, or 256 MB DIMM card (maximum of 512 MB)
CMOS RAM	114 bytes +4 Kbytes

Product overview

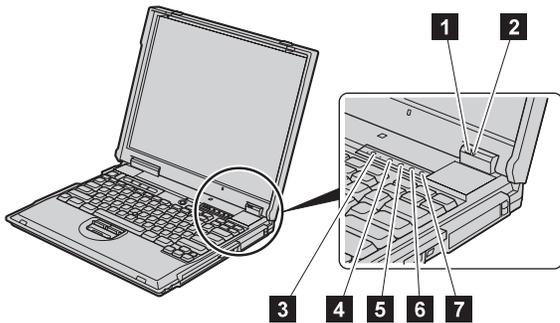
Feature	Description
Display*	<p>MT2628 and MT2633 (A20m)</p> <ul style="list-style-type: none"> • 12.1-inch, 16M colors SVGA (800×600 resolution) TFT color LCD • 14.1-inch, 16M colors, XGA (1024×768 resolution) TFT color LCD • 15.0-inch, 16M colors, XGA (1024×768 resolution) TFT color LCD <p>MT2629 (A20p)</p> <ul style="list-style-type: none"> • 14.1-inch, 16M colors, XGA (1024×768 resolution) TFT color LCD • 15.0-inch, 16M colors, SXGA+ (1400×1050 resolution) TFT color LCD
Diskette drive	1.44 MB (3-mode), 3.5-inch
Hard-disk drive	<p>MT2628-1xx, -2xx</p> <ul style="list-style-type: none"> • 6.0 GB, 2.5-inch, IDE interface <p>MT2628 (excepting suffix no.-1xx, -2xx, -4HC, -4IC, -3JC, -3KC), MT2633 and MT2629-61Y</p> <ul style="list-style-type: none"> • 12.0 GB, 2.5-inch, IDE interface <p>MT2628-4HC, -4IC, -3JC, -3KC and MT2629-61x, -62x, -6Sx, -6Tx</p> <ul style="list-style-type: none"> • 18 GB, 2.5-inch, IDE interface <p>MT2629-6Ax, -6Cx, -6Ux, -6Vx</p> <ul style="list-style-type: none"> • 20 GB, 2.5-inch, IDE interface
I/O port	<ul style="list-style-type: none"> • External monitor • Line-in • Headphone • Microphone • Mouse or keyboard • Parallel • Expansion connector • Serial • USB • RJ11 • RJ45
Internal modem	<ul style="list-style-type: none"> • 56.6 Kbps
Audio	<ul style="list-style-type: none"> • Internal microphone • Internal speaker • Software control volume
Infrared transfer	IrDA 1.1
PC Card	One Type-III or two Type-II
AC adapter	56-watt type or 72-watt type

Product overview

Feature	Description
Bay device*	MT2633 (A20m) <ul style="list-style-type: none">• 10-24 x CD-ROM drive MT2629 (A20p) and MT2628 (A20m) <ul style="list-style-type: none">• 6 x DVD drive• 10-24 x CD-ROM drive

Status indicators

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



Indicator	Meaning
1 Battery	<p>Green: The battery is fully charged.</p> <p>Blinking green: The battery has enough power to operate but is charging.</p> <p>Orange: The battery power is low. The battery is charging.</p> <p>Blinking orange: The battery needs charging.</p>
2 Standby status	<p>Green: The computer is in standby mode.</p> <p>Blinking green: The computer is entering standby mode or hibernation mode, or is resuming normal operation.</p>
3 Drive in use	<p>Green: Data is read from or written to the hard-disk drive, diskette drive, or drive in the Ultrabay 2000.</p>
4 Num lock	<p>Green: The numeric keypad on the keyboard is enabled.</p>
5 Caps lock	<p>Green: Caps Lock mode is enabled.</p>
6 Scroll lock	<p>Green: Arrow keys can be used as screen-scroll function keys.</p>
7 Power on	<p>Green: The power is on.</p>

Product overview

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 --> IBM AC Adapter, IBM Battery 1, IBM Battery 2 in Other Devices
LCD unit	<ol style="list-style-type: none"> 1. Diagnostics --> Video Adapter 2. Interactive Tests --> Video
Modem	<ol style="list-style-type: none"> 1. Make sure the modem is set up correctly. 2. Replace the modem jack and the modem card in turn, and run the following test in Other Devices (Diagnostics): <ul style="list-style-type: none"> • Modem Register Test • Modem DTMF/LoopBack Test • Intel Modem Register Test • Intel Modem Loopback/DTMT Test
Audio	<ol style="list-style-type: none"> 1. Interactive Tests --> Internal Speaker 2. Diagnostics --> Crystal SoundFusion™ Test in Other Devices
Speaker	Interactive Tests --> Internal Speaker
PC Card slots	Diagnostic --> PCMCIA, PCMCIA External Loop in Systemboard
Keyboard	<ol style="list-style-type: none"> 1. Diagnostics --> Keyboard in Systemboard 2. Interactive Test --> Keyboard

Product overview

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

Product overview

Fn key combinations

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

The **Fn** key works independently from the operating system.

Key combination	Description
Fn + F1	Reserved.
Fn + F2	Reserved.
Fn + F3	Turn off the LCD display, leaving the screen blank. Press any key or the TrackPoint stick to turn the LCD display on again.
Fn + F4	Turn standby mode on. Press the Fn key to return to normal operation.
Fn + F5	Reserved.
Fn + F6	Reserved.
Fn + F7	Switch between the LCD and an external monitor.
Fn + F8	Turn screen expansion on or off. (There is no symbol on the key.)
Fn + F9	Reserved.
Fn + F10	Reserved.
Fn + F11	Reserved.
Fn + F12	Turn hibernation mode on.
Fn + PgUp	Turn the ThinkLight on or off.
Fn + Home	The LCD becomes brighter.
Fn + End	The LCD becomes less bright.

Symptom-to-FRU index

The symptom-to-FRU index 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 44.

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

Numeric error codes

Symptom or error	FRU or action, in sequence
0175 Bad CRC1, stop POST task. The EEPROM checksum is not correct.	System board.
0187 EAIA data access error.	System board.
0188 Invalid RFID serialization information area or bad CRC2.	System board.
0189 Invalid RFID configuration information area.	System board.
0190 Critical low battery error.	1. Charge the battery pack. 2. Battery pack.
0193 RF antenna has been removed.	Enter the supervisor password.
0194 The computer has been carried through a security gate.	Enter the supervisor password.

Symptom-to-FRU index

Symptom or error	FRU or action, in sequence
0200 Fixed disk failure.	<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 Stuck key. Keyboard error.	Run an interactive tests of the keyboard and auxiliary input device.
0220 Monitor type does not match CMOS.	Load Setup Defaults in IBM BIOS Setup Utility.
0230 Shadow RAM failure at offset nnnn.	System board.
0231 System RAM failure at offset nnnn.	<ol style="list-style-type: none"> 1. DIMM. 2. System board.
0232 Extended RAM failure at offset nnnn.	<ol style="list-style-type: none"> 1. DIMM. 2. System board.
0250 System battery is dead—replace and run setup.	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.	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.	Run IBM BIOS Setup Utility to reset the time and date.
0280 Boot incomplete error—Default configuration used.	<ol style="list-style-type: none"> 1. Load Setup Defaults in IBM BIOS Setup Utility. 2. DIMM. 3. System board.

Symptom-to-FRU index

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 DIMM test failure.	<ol style="list-style-type: none"> 1. DIMM. 2. System board.
02F6 Software NMI failure.	<ol style="list-style-type: none"> 1. DIMM. 2. System board.
02F7 Fail-safe timer NMI failure.	<ol style="list-style-type: none"> 1. DIMM. 2. System board.

Error messages

Symptom or error	FRU or action, in sequence
Device address conflict.	<ol style="list-style-type: none"> 1. Load Setup Defaults in IBM BIOS Setup Utility. 2. Backup battery. 3. System board.
Allocation error for device.	<ol style="list-style-type: none"> 1. Load Setup Defaults in IBM BIOS Setup Utility. 2. Backup battery. 3. System board.
Failing bits: nnnn.	<ol style="list-style-type: none"> 1. DIMM. 2. System board.
Invalid system configuration data.	<ol style="list-style-type: none"> 1. DIMM. 2. System board.
I/O device IRQ conflict.	<ol style="list-style-type: none"> 1. Load Setup Defaults in IBM BIOS Setup Utility. 2. Backup battery. 3. System board.
Operating system not found.	<ol style="list-style-type: none"> 1. Check that the operating system has no failure and is installed correctly. 2. Enter IBM BIOS Setup Utility and see whether the hard-disk drive and 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.

Symptom-to-FRU index

Symptom or error	FRU or action, in sequence
Hibernation error.	<ol style="list-style-type: none"><li>1. Restore the system configuration to what it was the before the computer entered hibernation mode.<li>2. If memory size has been changed, re-create the hibernation file.
Fan error.	Fan.

Beep symptoms

Symptom or error	FRU or action, in sequence
One beep and a blank, unreadable, or flashing LCD.	<ol style="list-style-type: none"> 1. Reseat the LCD connector. 2. LCD assembly. 3. 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.
Two short beeps with error codes.	POST error. See "Numeric error codes" on page 39.
Two short beeps with blank screen.	System board.
Only the cursor appears.	Reinstall operating system.

No beep symptoms

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

LCD-related symptoms

Important

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

- **SVGA:** 5 or more bright dots, 5 or more dark dots, or a total of 9 or more bright and dark dots.
- **XGA:** 8 or more bright dots, 8 or more dark dots, or a total of 9 or more bright and dark dots.
- **SXGA+:** 11 or more bright dots, 11 or more dark dots, or a total of 16 or more bright and dark dots.

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 recurring problem exists.

When analyzing an intermittent problem, do the following:

1. Run the diagnostic test for the system board in loop mode **at least 10 times**.
2. If no error is detected, do **not** replace any FRUs.

Symptom-to-FRU index

3. If any error is detected, replace the FRU shown by the FRU code. Rerun the test to verify that no more errors exist.

Undetermined problems

You are here because the diagnostic tests did not identify which adapter or device failed, installed devices are incorrect, a short circuit is suspected, or the system is inoperative. Follow these procedures to isolate the failing FRU (do not isolate 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 26.)

1. Power off the computer.
2. Visually check each FRU for damage. Replace any damaged FRU.
3. Remove or disconnect all of the following devices:
 - a. Non-IBM devices
 - b. Devices attached to the port replicator
 - c. Printer, mouse, and other external devices
 - d. Battery pack
 - e. Hard-disk drive
 - f. External diskette drive
 - g. DIMM
 - h. CD-ROM and diskette drive in the UltralimBay
 - i. PC Cards
4. Power on the computer.
5. Determine whether the problem has changed.
6. If the problem does not recur, reconnect the removed devices one at a time until you find the failing FRU.
7. If the problem remains, replace the following FRUs one at a time (do not replace a nondefective FRU):
 - a. System board
 - b. LCD assembly

FRU replacement notices

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

Screw notices

Loose screws can cause a reliability problem. The an IBM ThinkPad computer address this problem with special nylon-coated screws that have the following characteristics:

- They maintain tight connections.
- They do not easily come loose, even with shock or vibration.
- They are harder to tighten.
- They should be used only once.

Do the following when you service this machine:

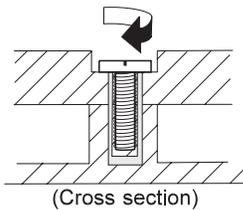
- Keep the screw kit (for reference the P/N, see “Miscellaneous parts” on page 96) in your tool bag.
- Always use new screws.
- Use a torque screwdriver if you have one.

Tighten screws as follows:

- **Plastic to plastic**

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

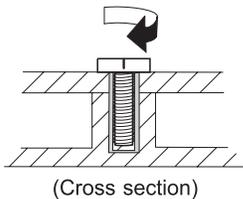
90 degrees more



- **Logic card to plastic**

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

180 degrees more



- **Torque driver**

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

- Make sure you use the correct screw. If you have a torque screwdriver, tighten all screws firmly to the torque shown in the table. **Never use a screw that**

FRU replacement notices

you removed. Use a new one. Make sure the screws are tightened firmly.

Retaining serial numbers

This section includes the following descriptions:

- “Restoring the serial number of the system unit”
- “Retaining the UUID”

Restoring the serial number of the system

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

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

Before replacing the system board, save the original serial number by doing the following:

1. Install the ThinkPad Hardware Maintenance Diskette Version 1.60, and restart the computer.
2. From the main menu, select **1. Set System Identification**.
3. Select **2. Read S/N data from EEPROM**.

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

20: System unit serial number

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

1. Install the ThinkPad Hardware Maintenance Diskette Version 1.60, and restart the computer.
2. From the main menu, select **1. Set System Identification**.
3. Select **1. Add S/N data from EEPROM**.

Follow the instructions on the screen.

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

Retaining the UUID: The Universally Unique Identifier (UUID) is a 128-bit number uniquely assigned to your computer at production and stored in the EEPROM of your system board. The algorithm that generates the number is designed to provide unique IDs until 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 1.60, and restart the computer.
2. From the main menu, select **4. Assign UUID**.

FRU replacement notices

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

Removing and replacing a FRU

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

1. Do not try to service the 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 46.
3. Begin by removing any FRUs that have to be removed before the failing FRU. In this manual, any such FRUs are listed at the top of the page for the FRU being replaced. Remove them in the order in which they are listed.
4. Follow the correct sequence in the steps for removing the FRU, as indicated in the drawings by the numbers in square callouts.
5. When turning a screw to replace a FRU, turn it in the direction indicated by the arrow in the drawing.
6. When removing the FRU, move it in the direction indicated by the arrow in the drawing.
7. To put the new FRU in place, reverse the removal procedure and follow any notes that pertain to replacement. For information about connecting and arranging internal cables, see "Locations" on page 86.
8. When replacing a FRU, use the correct screw as shown in the procedures.

CAUTION:

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.

CAUTION:

Do not disassemble a FRU, throw it into fire or water, or short-circuit it. Dispose of the battery pack as required by local ordinances or regulations.

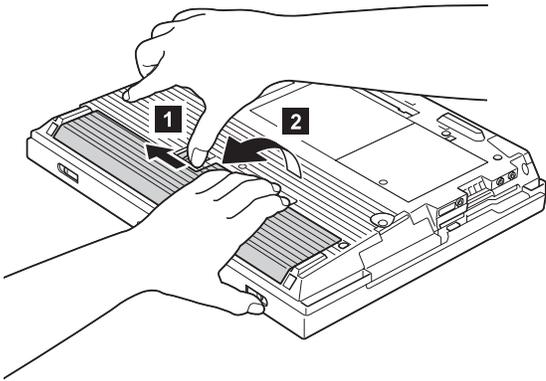
Attention: Before the computer is powered on after FRU replacement, make sure all screws, springs, and other small parts are in place and are not loose inside the computer. Verify this by shaking the computer gently and listening for rattling sounds. Metallic parts or metal flakes can cause electrical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

Attention: The system board is sensitive to, and can be damaged by, electrostatic discharge. Establish personal grounding by touching a ground point with one hand before touching these units.

You must use an electrostatic discharge (ESD) strap (P/N 6405959) to establish personal grounding.

Removing and replacing a FRU

1010 Battery pack

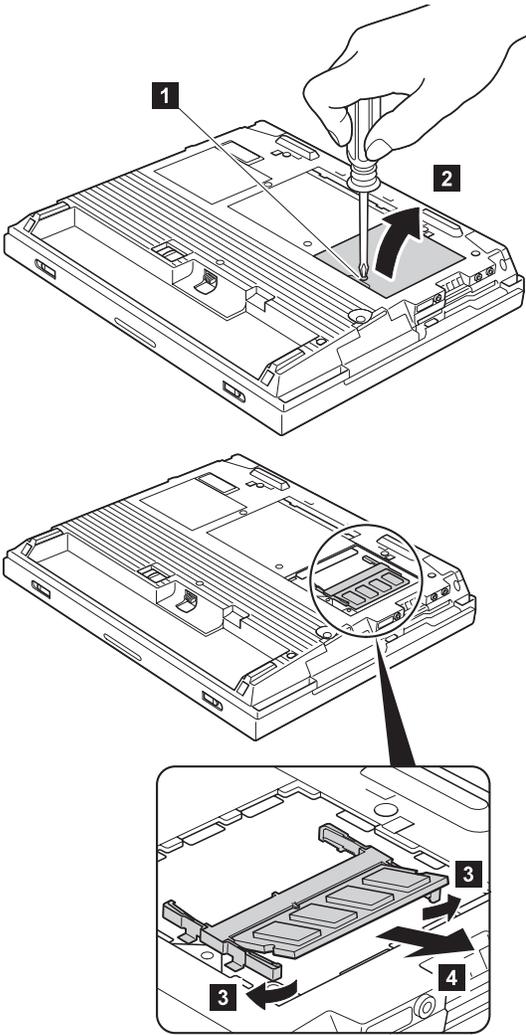


Removing and replacing a FRU

1020 DIMM

- Battery pack (1010)

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

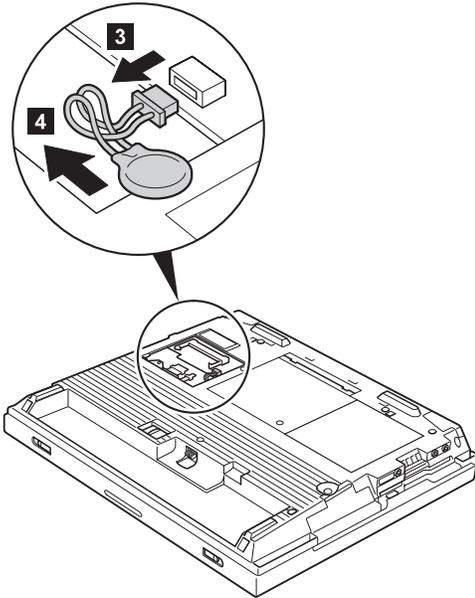


1030 Backup battery

CAUTION:

The backup battery is a lithium battery and can cause a fire, an explosion, or severe burns. Do not recharge it, remove its polarized connector, disassemble it, heat it above 100°C (212°F), incinerate it, or expose its cell contents to water. Dispose of the battery as required by local ordinances or regulations. The use of an incorrect battery can result in ignition or explosion of the battery.

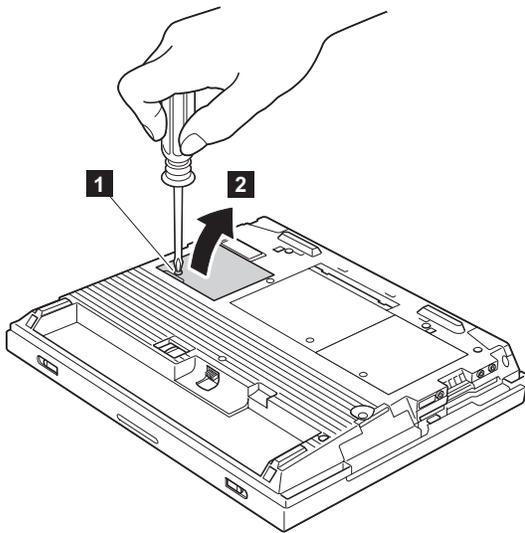
- Battery pack (1010)
- DIMM (1020)



Removing and replacing a FRU

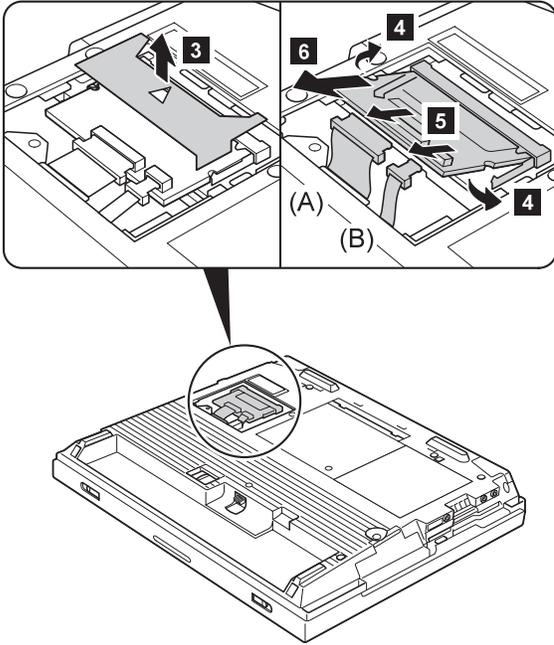
1040 Mini PCI adapter

- Battery pack (1010)



(continued)

Removing and replacing a FRU



Note: The illustration shows the combo card. Connector **(A)** is for the LAN feature and **(B)** is for the modem. This slot also supports a Mini PCI modem card or Mini PCI network card. Step **5** depends on the card type. Disconnect either **(A)**, **(B)**, or both.

1050 Hard-disk drive or RF ID adapter

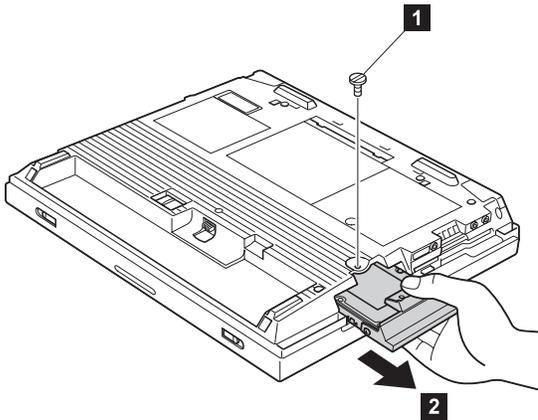
Attention

Do not drop the hard-disk drive or apply any shock to it. The hard-disk drive is sensitive to physical shock. Incorrect handling can cause damage and permanent loss of data.

Before removing the drive, have the user make a backup copy of all the information on the drive if possible.

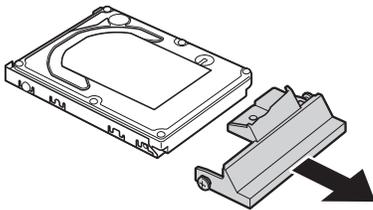
Never remove the drive while the system is operating or is in suspend mode.

- Battery pack (1010)



Note: The hard disk is attached to the cover.

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



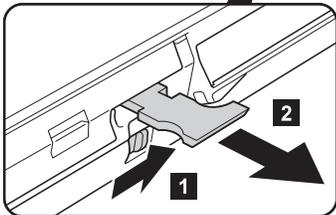
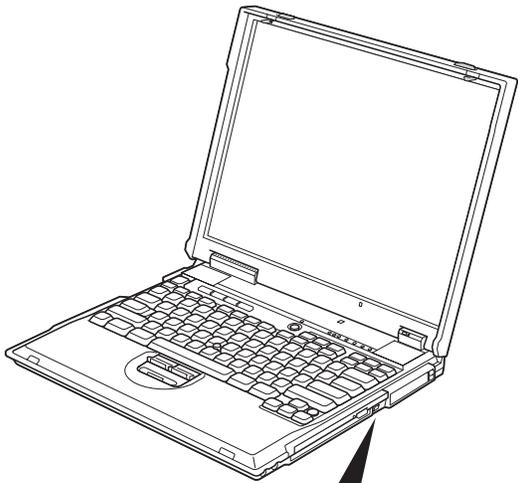
When installing: Make sure that the HDD connector is firmly connected.

Removing and replacing a FRU

1060 Ultrabay 2000 device

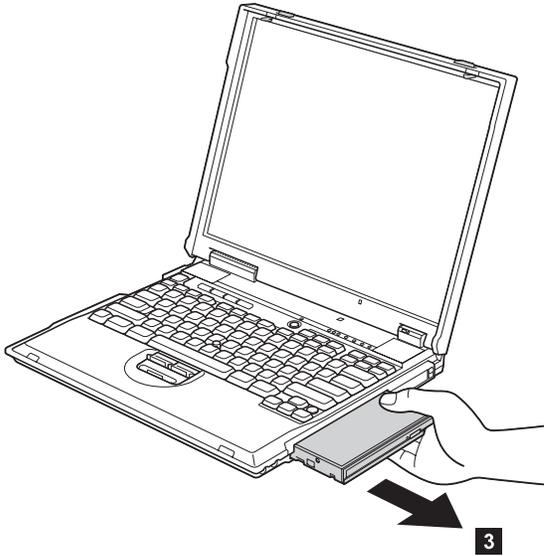
Any of several devices can be inserted into the Ultrabay 2000. The procedure for installing and removing is the same for every device.

Note: When you release the switch in step **1** the lever pops out. Pull the lever a little in step **2** to release the device from the bay.



(continued)

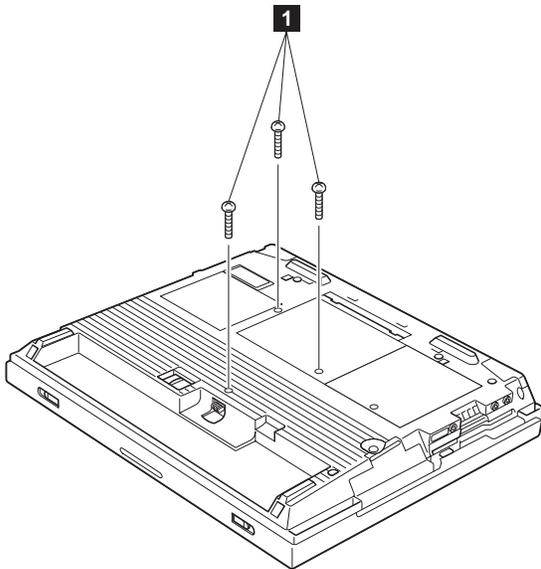
Removing and replacing a FRU



Removing and replacing a FRU

1070 Keyboard

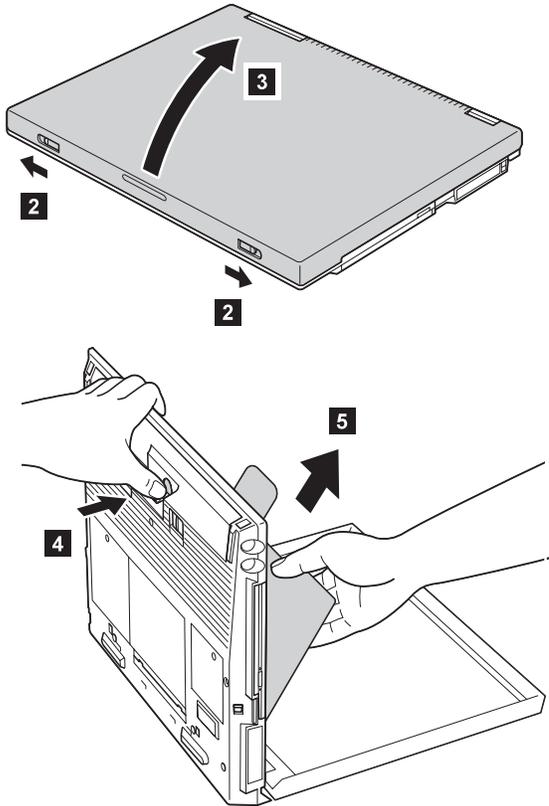
- Battery pack (1010)
- Hard-disk drive (1050)
- Ultrabay 2000 device (1060)



Step	Screw (quantity)	Torque
1	M2.5 × 15 mm, nylon-coated (3)	39.2 Ncm (4 kgfcm)

(continued)

Removing and replacing a FRU

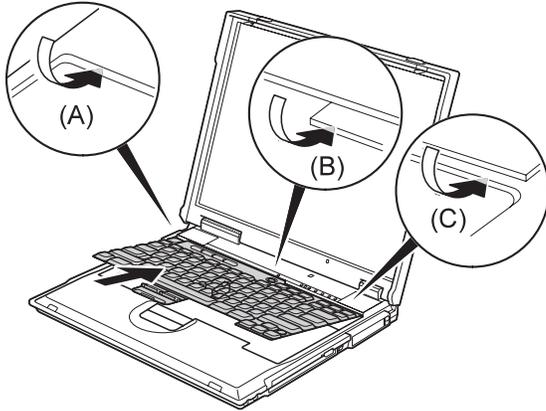


(continued)

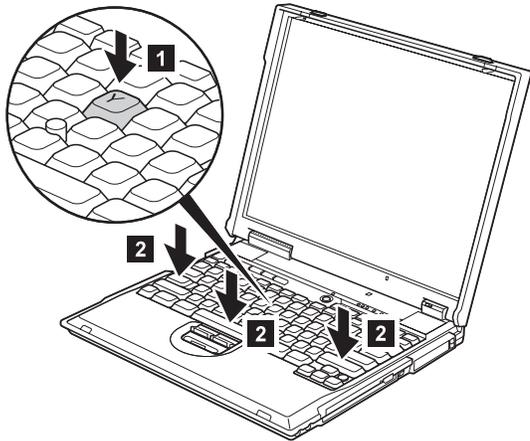
Removing and replacing a FRU

When installing: When installing the keyboard, do as follows:

1. Install the new keyboard, following the directions in the figure. Make sure that the keyboard edges, shown in the figure as (A), (B), and (C), are under the frame.



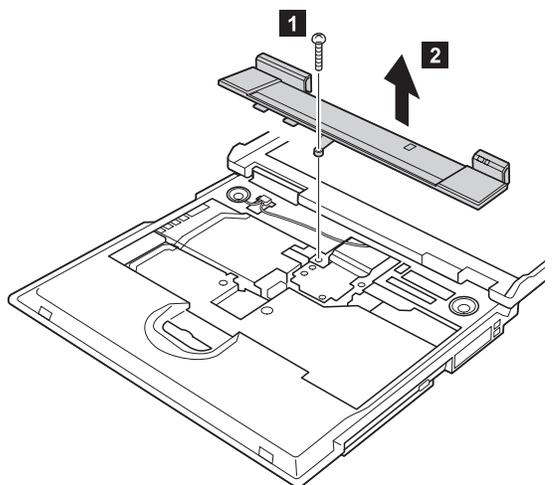
2. Push the Y key **1** to connect the keyboard to the connector on the underside of the key; then push the frame of the keyboard **2** to latch the latches.



Removing and replacing a FRU

1080 Hinge cover

- Battery pack (1010)
- Hard-disk drive (1050)
- Ultrabay 2000 device (1060)
- Keyboard (1070)

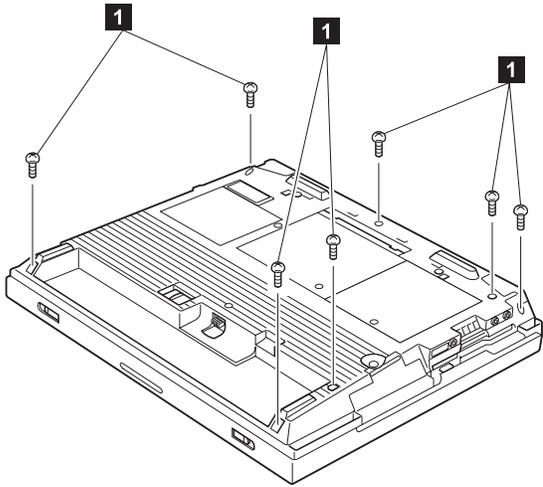


Step	Screw (quantity)	Torque
1	M2.5 × 15 mm, nylon-coated (1)	39.2 Ncm (4 kgfcm)

Removing and replacing a FRU

1090 Keyboard bezel and speaker

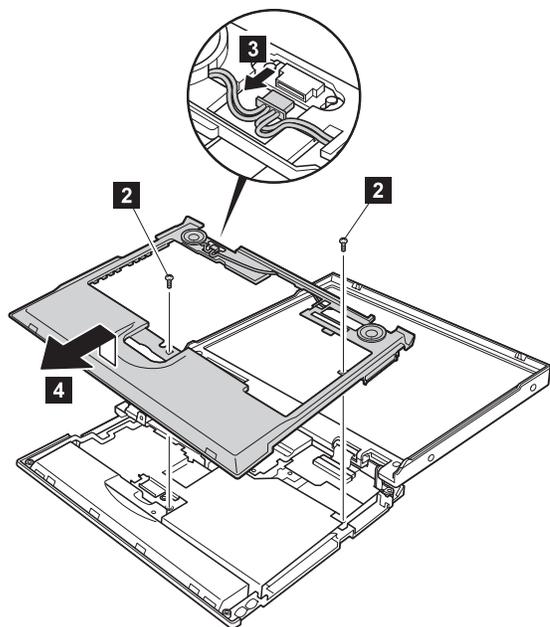
- Battery pack (1010)
- Hard-disk drive (1050)
- Ultrabay 2000 device (1060)
- Keyboard (1070)
- Hinge cover (1080)



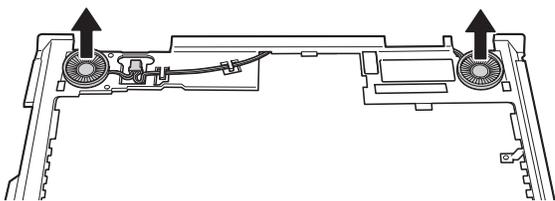
Step	Screw (quantity)	Torque
1	M2.5 × 4.8 mm, nylon-coated (7)	39.2 Ncm (4 kgfcm)

(continued)

Removing and replacing a FRU



Step	Screw (quantity)	Torque
2	M2.5 × 15 mm, nylon-coated (2)	39.2 Ncm (4 kgfcm)



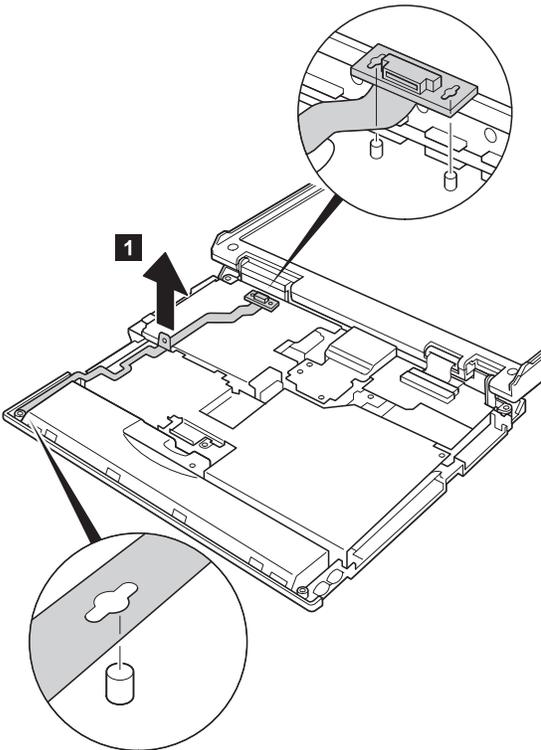
Cable routine:

When replacing the cable, see the preceding figure for its cable routing.

Removing and replacing a FRU

1100 Microphone cable

- Battery pack (1010)
- Hard-disk drive (1050)
- Ultrabay 2000 device (1060)
- Keyboard (1070)
- Hinge cover (1080)
- Keyboard bezel and speaker (1090)

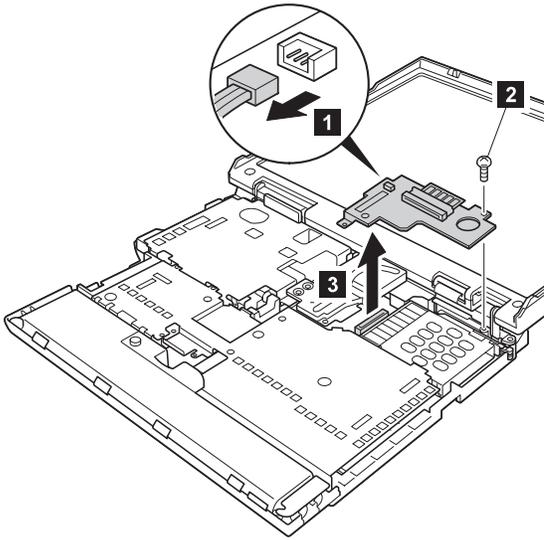


When installing: Make sure that you fasten the connector firmly.

Removing and replacing a FRU

1110 Sub card

- Battery pack (1010)
- Hard-disk drive (1050)
- Ultrabay 2000 device (1060)
- Keyboard (1070)
- Hinge cover (1080)
- Keyboard bezel and speaker (1090)

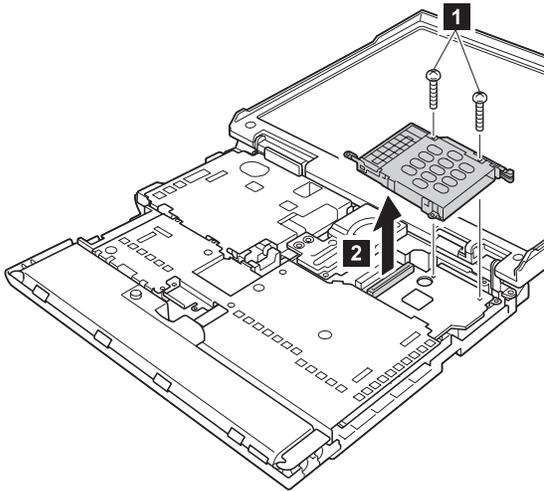


Step	Screw (quantity)	Torque
2	M2.5 × 4.8 mm, nylon-coated (1)	39.2 Ncm (4 kgfcm)

Removing and replacing a FRU

1120 PC Card slot assembly

- Battery pack (1010)
- Hard-disk drive (1050)
- Ultrabay 2000 device (1060)
- Keyboard (1070)
- Hinge cover (1080)
- Keyboard bezel and speaker (1090)
- Sub card (1110)



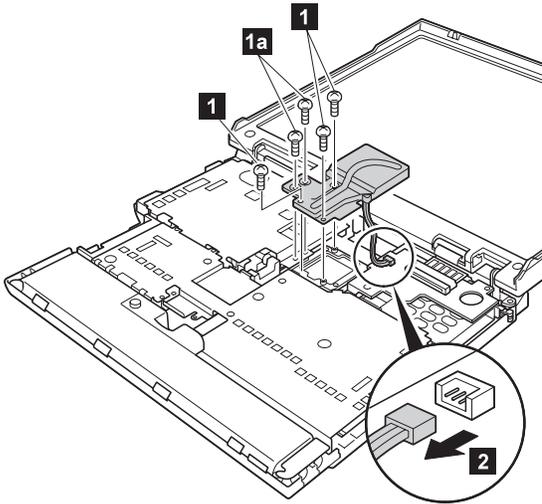
Step	Screw (quantity)	Torque
1	M2.0 × 9.5 mm, nylon-coated (2)	24.5 Ncm (2.5 kgfcm)

Removing and replacing a FRU

1130 Fan assembly

- Battery pack (1010)
- Hard-disk drive (1050)
- Ultrabay 2000 device (1060)
- Keyboard (1070)
- Hinge cover (1080)
- Keyboard bezel and speaker (1090)

Note: Step **1a** is for the MT2629 model only.



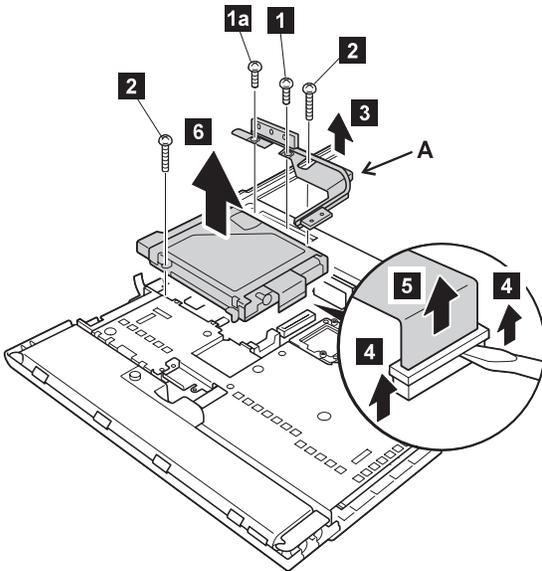
Step	Screw (quantity)	Torque
1a	M2.5 × 4.8 mm, nylon-coated (2)	39.2 Ncm (4 kgfcm)
1	M2.5 × 4.8 mm, nylon-coated (3)	39.2 Ncm (4 kgfcm)

Removing and replacing a FRU

1140 Diskette drive

- Battery pack (1010)
- Hard-disk drive (1050)
- Ultrabay 2000 device (1060)
- Keyboard (1070)
- Hinge cover (1080)
- Keyboard bezel and speaker (1090)

Note: The heatpipe **A** and the screw **1a** are for the MT2629 model only. Other models do not have them.

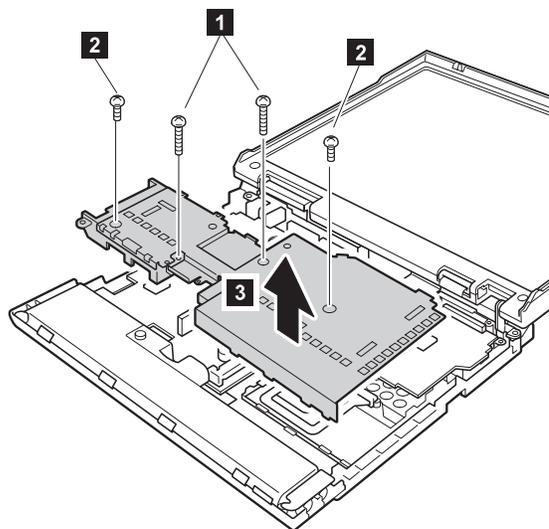


Step	Screw (quantity)	Torque
1a	M2.5 × 4.8 mm, nylon-coated (1)	39.2 Ncm (4 kgfcm)
1	M2.5 × 4.8 mm, nylon-coated (1)	39.2 Ncm (4 kgfcm)
2	M2.5 × 15 mm, nylon-coated (2)	39.2 Ncm (4 kgfcm)

Removing and replacing a FRU

1150 Upper shield

- Battery pack (1010)
- Hard-disk drive (1050)
- Ultrabay 2000 device (1060)
- Keyboard (1070)
- Hinge cover (1080)
- Keyboard bezel and speaker (1090)
- Sub card (1110)
- PC Card slot assembly (1130)
- Fan assembly(1130)
- Diskette drive (1140)

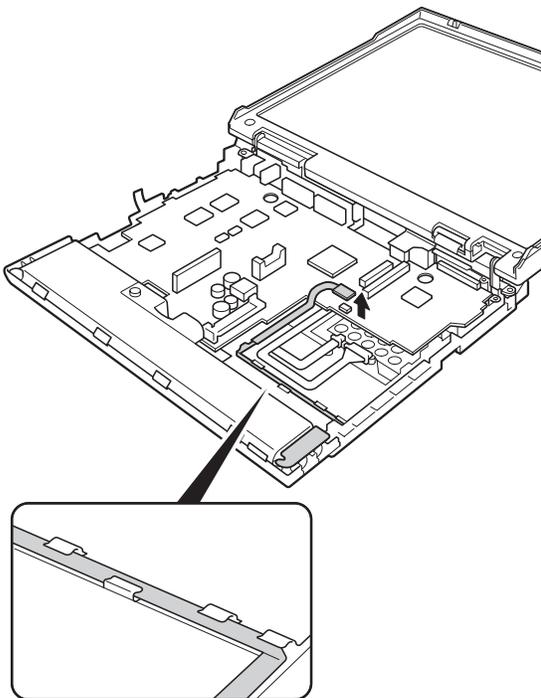


Step	Screw (quantity)	Torque
1	M2.5 × 15 mm, nylon-coated (2)	39.2 Ncm (4 kgfcm)
2	M2.5 × 4.8 mm, nylon-coated (2)	39.2 Ncm (4 kgfcm)

Removing and replacing a FRU

1160 TV card (MT2629 model only)

- Battery pack (1010)
- Hard-disk drive (1050)
- Ultrabay 2000 device (1060)
- Keyboard (1070)
- Hinge cover (1080)
- Keyboard bezel and speaker (1090)
- Sub card (1110)
- PC Card slot assembly (1130)
- Fan assembly(1130)
- Diskette drive (1140)
- Upper shield (1150)



Cable routine:

When replacing the modem cable, see the figure for the cable routing.

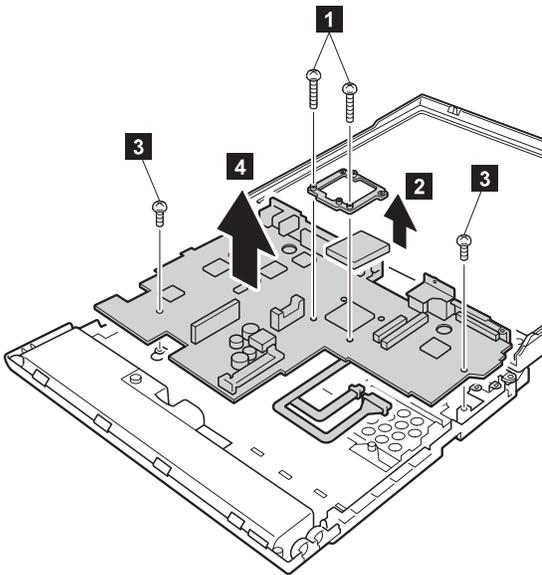
Removing and replacing a FRU

1170 CPU socket and system board

- Battery pack (1010)
- DIMM (1020)
- Backup battery (1030)
- Mini PCI adapter (1040)
- Hard-disk drive (1050)
- Ultrabay 2000 device (1060)
- Keyboard (1070)
- Hinge cover (1080)
- Keyboard bezel and speaker (1090)
- Sub card (1110)
- PC Card slot assembly (1130)
- Fan assembly(1130)
- Diskette drive (1140)
- Upper shield (1150)

1 2 for the CPU socket

1 2 3 4 for the system board



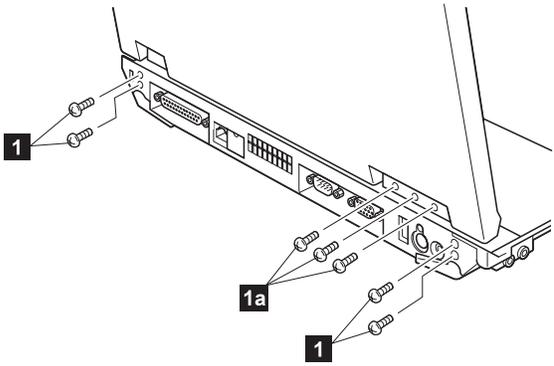
Step	Screw (quantity)	Torque
1	M2.5 × 15 mm, nylon-coated (2)	39.2 Ncm (4 kgfcm)
3	M2.5 × 4.8 mm, nylon-coated (2)	39.2 Ncm (4 kgfcm)

Removing and replacing a FRU

2010 LCD assembly

- Battery pack (1010)
- Hard-disk drive (1050)
- Ultrabay 2000 device (1060)
- Keyboard (1070)
- Hinge cover (1080)
- Keyboard bezel and speaker (1090)

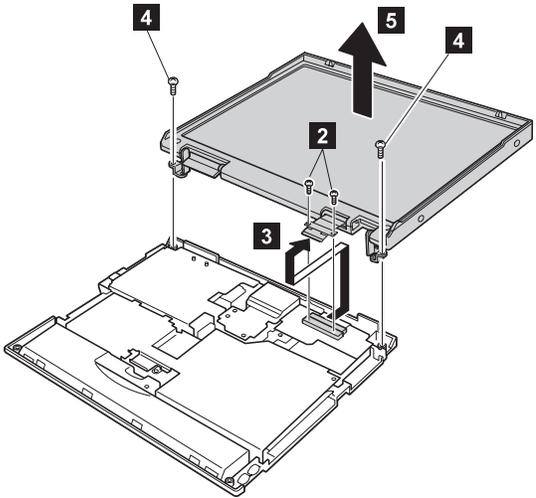
Note: Step **1a** is for the MT2629 model only.



Step	Screw (quantity)	Torque
1a	M2.5 × 4.8 mm, nylon-coated (3)	39.2 Ncm (4 kgfcm)
1	M2.5 × 4.8 mm, nylon-coated (4)	39.2 Ncm (4 kgfcm)

(continued)

Removing and replacing a FRU

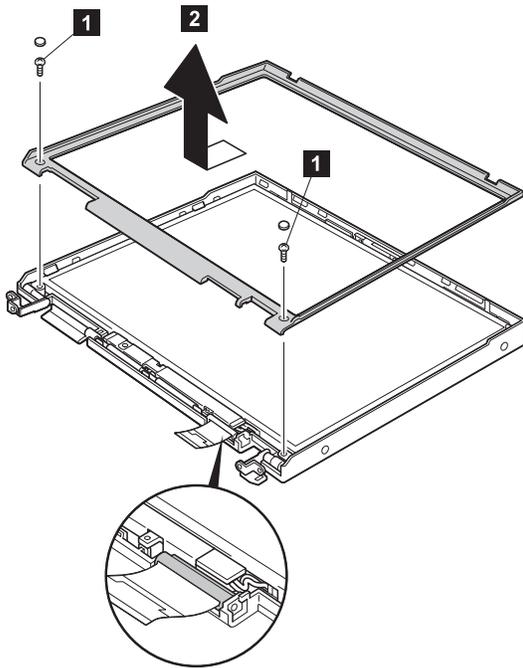


Step	Screw (quantity)	Torque
2	Special, nylon-coated (2)	—
4	M2.5 × 4.8 mm, nylon-coated (2)	39.2 Ncm (4 kgfcm)

Removing and replacing a FRU

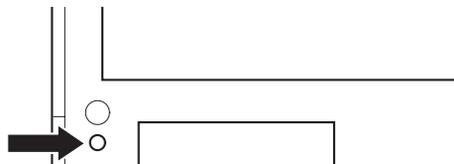
2020 Front bezel

- Battery pack (1010)
- Hard-disk drive (1050)
- Ultrabay 2000 device (1060)
- Keyboard (1070)
- Hinge cover (1080)
- Keyboard bezel and speaker (1090)
- LCD assembly (2010)



Step	Screw (quantity)	Torque
1	M2.5 × 4.8 mm, nylon-coated (2)	39.2 Ncm (4 kgfcm)

Note: Only the front bezel for the 15.0-in XGA TFT (LG) has an identifying mark (○), as in the following figure. For reference FRU list, see “15.0-inch XGA TFT LG” on page 94.

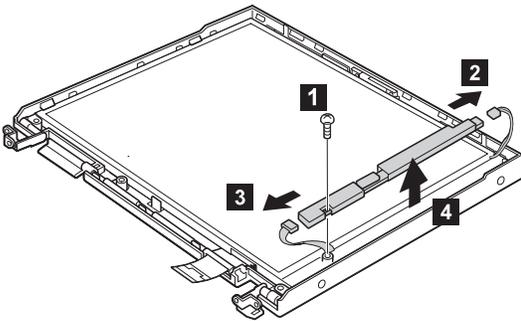


Removing and replacing a FRU

2030 Inverter card

- Battery pack (1010)
- Hard-disk drive (1050)
- Ultrabay 2000 device (1060)
- Keyboard (1070)
- Hinge cover (1080)
- Keyboard bezel and speaker (1090)
- LCD assembly (2010)
- Front bezel (2020)

12.1-in. panel

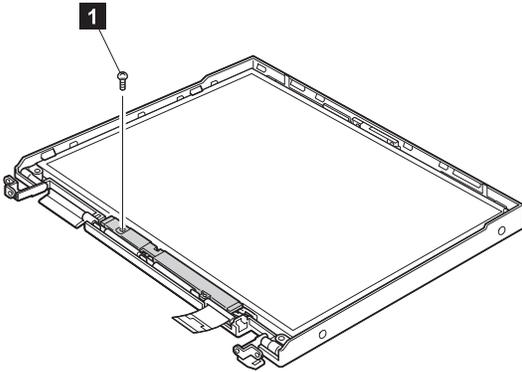


Step	Screw (quantity)	Torque
1	M2.5 × 4.8 mm, nylon-coated (1)	39.2 Ncm (4 kgfcm)

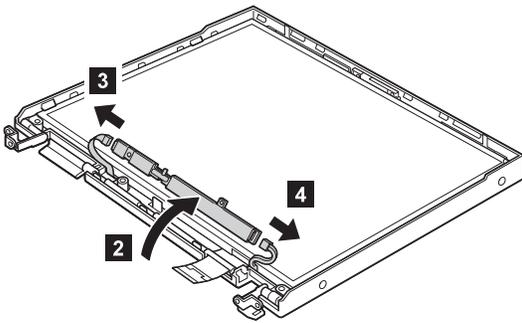
(continued)

Removing and replacing a FRU

14.1-in. and 15.0-in. panels



Step	Screw (quantity)	Torque
1	M2.5 × 4.8 mm, nylon-coated (1)	39.2 Ncm (4 kgfcm)

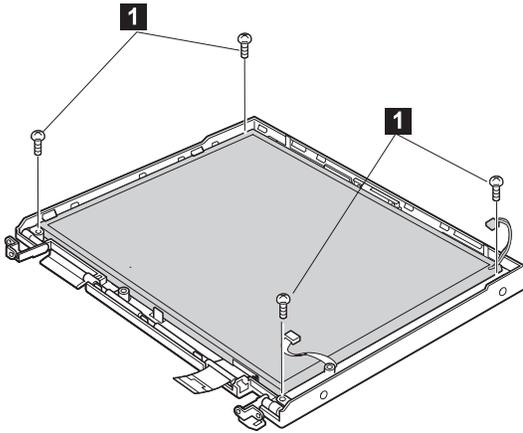


Removing and replacing a FRU

2040 LCD panel

- Battery pack (1010)
- Hard-disk drive (1050)
- Ultrabay 2000 device (1060)
- Keyboard (1070)
- Hinge cover (1080)
- Keyboard bezel and speaker (1090)
- LCD assembly (2010)
- Front bezel (2020)
- Inverter card (2030)

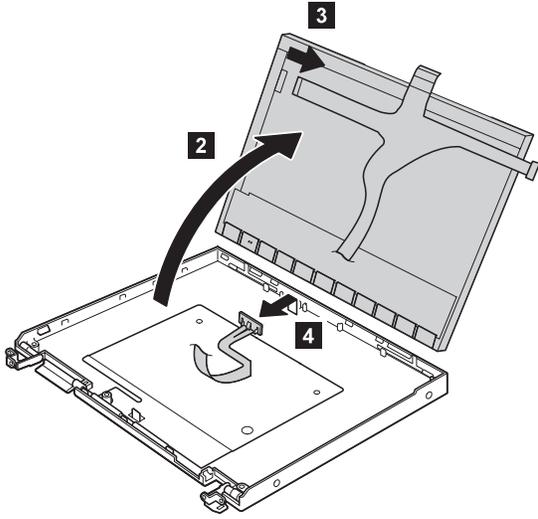
12.1-in. panel



Step	MT	Screw (quantity)	Torque
1	2628-1xx, -2xx	M2.5 × 7.0 mm, nylon-coated (4)	39.2 Ncm (4 kgfcm)
	2628-3xx	M2.0 × 5.7 mm, nylon-coated (4)	24.5 Ncm (2.5 kgfcm)
	2628-4xx, 2633	M2.0 × 5.7 mm, nylon-coated (4)	16.7 Ncm (1.7 kgfcm)
	2629	M2.0 × 5.1 mm, nylon-coated (4)	19.6 Ncm (2.0 kgfcm)

(continued)

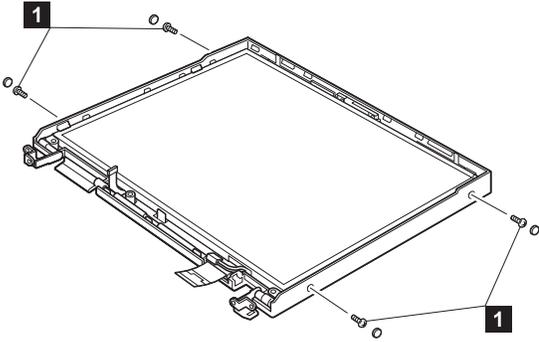
Removing and replacing a FRU



(continued)

Removing and replacing a FRU

14.1-in. and 15.0-in. panels



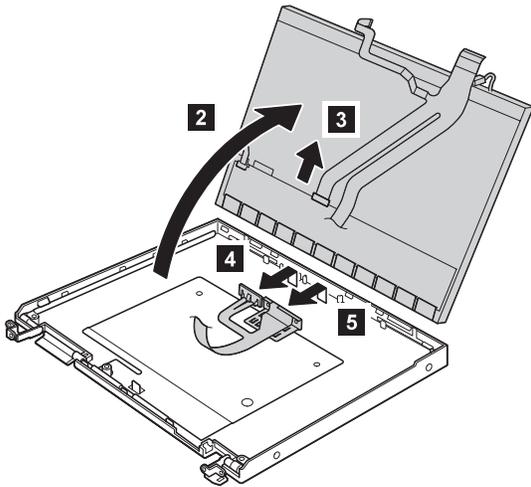
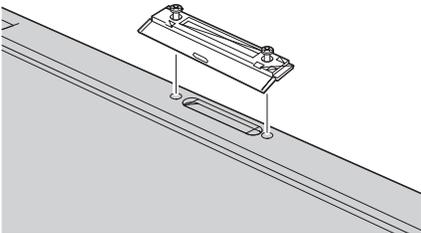
Step	MT	Screw (quantity)	Torque
1	2628-1xx, -2xx	M2.5 × 7.0 mm, nylon-coated (4)	39.2 Ncm (4 kgfcm)
	2628-3xx	M2.0 × 5.7 mm, nylon-coated (4)	24.5 Ncm (2.5 kgfcm)
	2628-4xx, 2633	M2.0 × 5.7 mm, nylon-coated (4)	16.7 Ncm (1.7 kgfcm)
	2629	M2.0 × 5.1 mm, nylon-coated (4)	19.6 Ncm (2.0 kgfcm)

(continued)

Removing and replacing a FRU

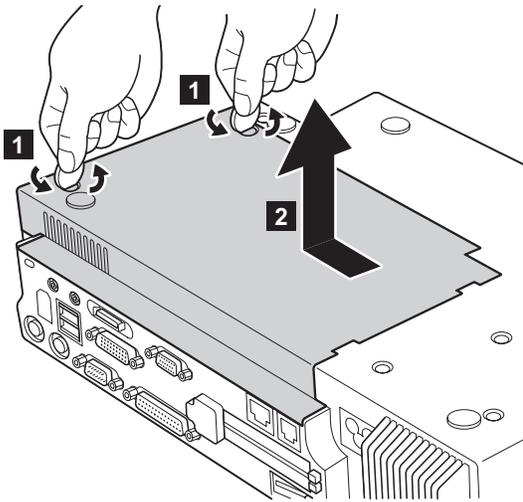
Notes:

1. For the 14-in. LCD, the LCD cable is taped onto the connector. Tear off the tape before disconnecting the LCD cable in step **3**.
2. Only the LCD cable for the 15.0-in SVGA+ LCD (27L0488) has the UltraPort connector and needs step **5**. If the UltraPort adapter has been screwed onto the LCD, remove the adapter before step **5**. To do this, remove the screws from both sides of the adapter.



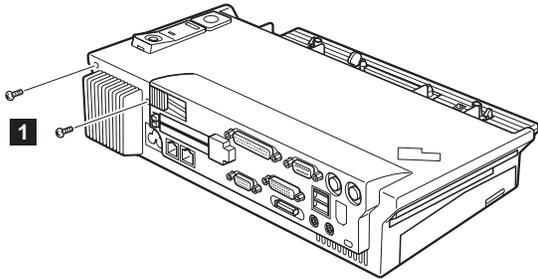
Removing and replacing a FRU

3010 ThinkPad Dock PCI cover



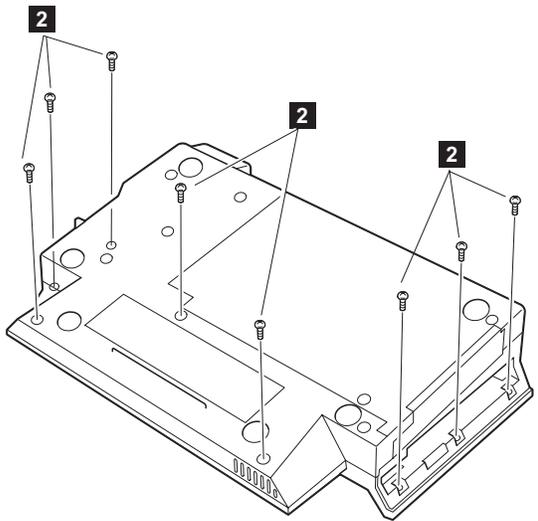
Removing and replacing a FRU

3010 ThinkPad Dock top cover



(Rear view)

Step	Screw (quantity)	Torque
1	M2.5 × 4.8 mm (2)	39.2 Ncm (4 kgfcm)



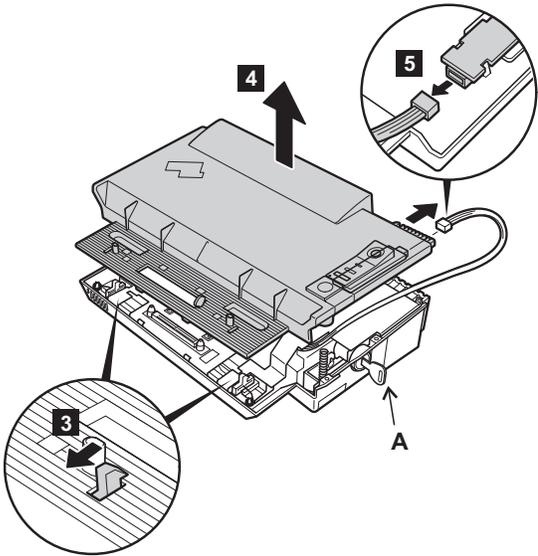
(Bottom view)

Step	Screw (quantity)	Torque
2	M2.5 × 4.8 mm (8)	39.2 Ncm (4 kgfcm)

(continued)

Removing and replacing a FRU

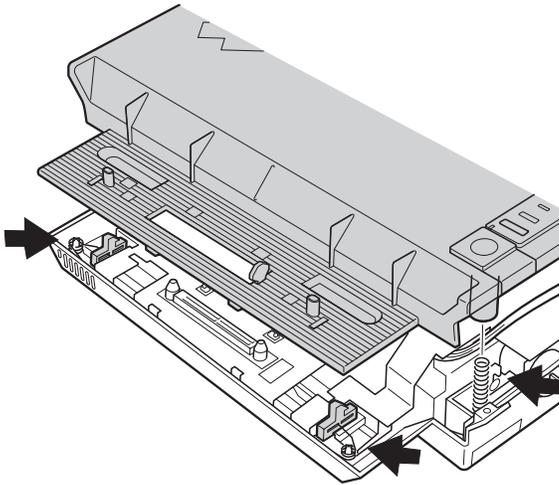
Make sure that the system lock key **A** is set to the Unlock position. Release the front latches in step **3**, and then remove the top cover **4**. For step **5**, see the inside view, shown in the circle.



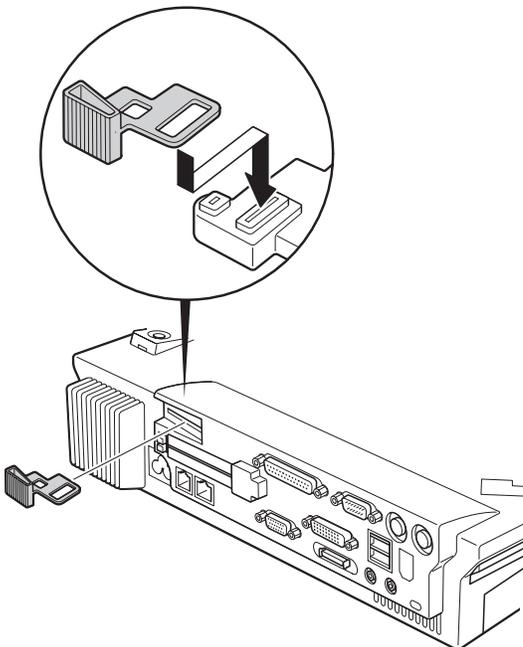
Removing and replacing a FRU

When reinstalling the top cover, do the following:

- Make sure that the springs are placed correctly.



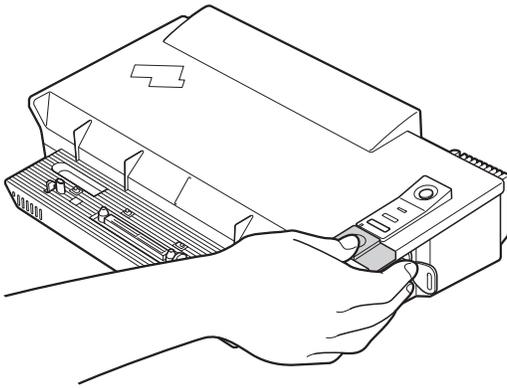
- Make sure that the device release lever is seated correctly.



(continued)

Removing and replacing a FRU

- Make sure that the release button works correctly.



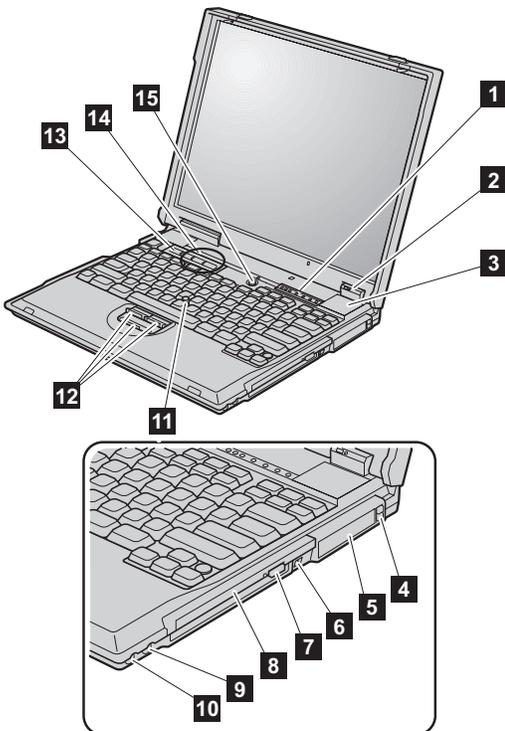
Locations

Front view

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

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

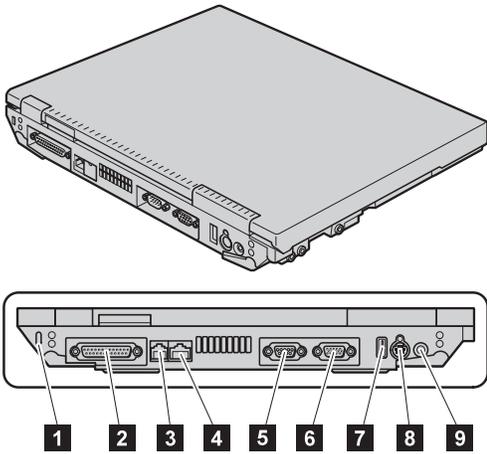
- 9** Video-out connector
- 10** Video-in connector
- 11** TrackPoint pointing stick
- 12** TrackPoint buttons
- 13** ThinkPad button
- 14** Volume buttons
- 15** Power switch



Locations

Rear view

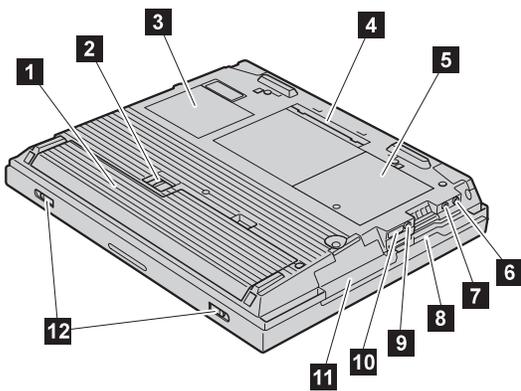
- 1** Security keyhole
- 2** Parallel connector
- 3** Modem connector
- 4** Network connector
- 5** Serial connector
- 6** External-monitor connector
- 7** Universal serial bus (USB) connector
- 8** External-input-device connector
- 9** Power jack



Locations

Bottom view

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



Parts List

A20 series model matrix

The A20 series includes several models. The following table summarizes the characteristics of each model, to help you determine which FRU in the parts list meets your need. The table contains an entry for each of the five types of model A20m (MT2628), labeled A through E, and for the two types of model A20p (MT2629), labeled A and B.

Type	Suffix no.	CPU	Bay device	LCD	Video memory (V-mem) on the system board
MT2628: A20m					
A	-11x,-12x,-14x, -1Sx,-1Tx	Cel500	CD-ROM	12.1-in SVGA	4 MB
	-1Ax,-1Cx,-1Ux, -1Vx	Cel550			
	-2xx	CM500			
B	-31x,-32x,-3Sx, -3Tx	Cel500	CD-ROM	15.0-in XGA	8 MB
	-3Ax,-3Cx,-3Ux, -3Vx	Cel550			
C	-3Jx,-3Kx	CM700G	DVD-ROM		
D	-47x,-48x	Cel500	CD-ROM	14.1-in XGA	
E	-41x to -45x, -4Sx,-4Tx	CM700G	DVD-ROM		
	-4Dx,-4Ex	CM650G			
	-4Ax,-4Cx,-4Ux, -4Vx	CM600G			
	-4Fx,-4Gx	CM650G			
	-4Fx,-4Gx,-4Hx, -4Ix	CM700G			
MT2663: A20m					
	-xxx	CM700G	CD-ROM	14.1-in XGA	8 MB
MT2629: A20p					
A	-xxY	CM700G	CD-ROM	14.1-in XGA	8 MB
B	-61x,-62x,-6Sx, -6Tx		CM750G	DVD-ROM	15.0-in SXGA+
	-6Ax,-6Cx,-6Ux, -6Vx				

Cel500: Intel® Celeron® processor 500 MHz, L2 256-KB cache

Cel550: Intel® Celeron® processor 550 MHz, L2 256-KB cache

CM500: Intel® mobile Pentium® III 500 MHz, L2 256-KB cache

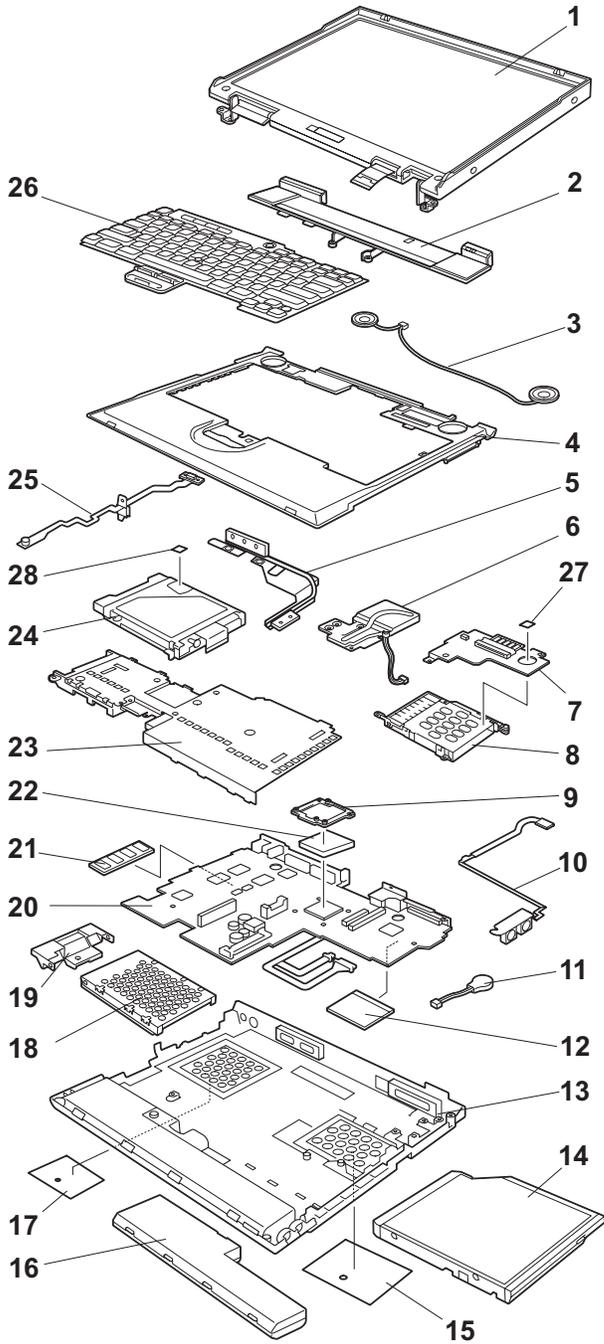
CM600G: Intel® mobile Pentium® III processor 600 featuring Intel® SpeedStep™ technology

CM650G: Intel® mobile Pentium® III processor 650 featuring Intel® SpeedStep™ technology

CM700G: Intel® mobile Pentium® III processor 700 featuring Intel® SpeedStep™ technology

CM750G: Intel® mobile Pentium® III processor 750 featuring Intel® SpeedStep™ technology

Parts list



Parts list

The parts marked with asterisk are CRUs (customer replacement units).

No.	FRU	P/N
1	LCD unit (see "LCD FRU" on page 94)	
2	Hinge cover	
	MT2628 (A, D, E), MT2633 and MT2629 (A)	08K5671
	MT2628 (B, C)	08K5672
	MT2629 (B)	08K6863
3	Speaker assembly	
	MT2628 (A, D, E), MT2633 and MT2629 (A)	02K5007
	MT2628 (B, C), MT2629 (B)	02K5008
	MT2629	02K5406
4	Keyboard bezel	
	MT2628 (A, D, E), MT2633 and MT2629 (A)	08K5667
	for Korea	08K5669
	MT2628 (B, C) and MT2629(B)	08K5668
	for Korea	08K5670
5	Heatpipe, for MT2629 (B)	08K6650
6	Fan assembly, for MT2628 (A, B, D)	08K5650
	Fan assembly, for MT2628 (C, E), MT2633 and MT2629	08K6614
7	Sub card	10L1418
8	PC Card slots	08K5649
9	Stiffner, CPU socket (includes fan assembly)	
10	TV card, for MT2629	10L1419
11	Backup battery	02K6572
	Holder, backup battery (see base miscellaneous parts)	
12	Mini PCI combo card* (see "Optional FRUs" on page 98)	
	Mini PCI Ethernet (Intel)	10L1423
	Mini PCI modem (M2) (Lucent)	08K3429
13	Base cover	
	MT2628 (A, B, D)	08K5639
	for T-China	08K5641
	for Korea	08K5645
	MT2628 (C, E)	08K6647
	for T-China	08K6648

(continued)

Parts list

No.	FRU	P/N
13	Base cover	
	MT2628 (C, E) for Korea	08K6649
	MT2629	08K5640
	for T-China	08K5642
	for Korea	08K5646
	MT2633	08K5901
	for T-China	08K5902
	for Korea	08K5904
14	UltralimBay CD-ROM drive* (see "Optional FRUs" on page 98)	
	UltralimBay DVD drive* (MKE) (see "Optional FRUs" on page 98)	
	UltralimBay DVD drive* (TOSHIBA), for MT2629	05K9160
15	Cover, Mini PCI adapter slot*	08K5673
16	Battery pack (6 cell)*, SANYO	02K6618
	Battery pack (6 cell)*, Panasonic	02K6614
	Battery pack (9 cell)*, SANYO, for MT2629	02K6619
	Battery pack (9 cell)*, Panasonic, for MT2629 (see "Optional FRUs" on page 98)	
17	Cover, DIMM slot*	08K5674
18	Hard-disk drive* (see "Optional FRUs" on page 98)	
19	Cover, hard-disk drive*	
	MT2628 (A, D, E), MT2633 and MT2629 (A)	08K5675
	MT2628 (B, C) and MT2629 (B)	08K5676
	Asset ID RF adapter (see "Optional FRUs" on page 98)	
20	System board	
	V-mem 4 MB, for MT2628 (A)	10L1411
	V-mem 8 MB, for MT2628 (B, D)	10L1412
	V-mem 8 MB, for MT2628 (C, E), MT2633 and MT2629 (A)	08K3152
	V-mem 16MB, for MT2629 (D)	10L1413
21	DIMM* (see "Optional FRUs" on page 98)	
22	CPU socket, Celeron 500 MHz	08K3149
	CPU socket, Celeron 550 MHz	08K3211
	CPU socket, Pentium III 500 MHz	10L1415

(continued)

Parts list

No.	FRU	P/N
22	CPU socket, Pentium® III 600 MHz with SpeedStep™ technology	08K3213
	CPU socket, Pentium® III 650 MHz with SpeedStep™ technology	10L1405
	CPU socket, Pentium® III 700 MHz with SpeedStep™ technology	10L1417
	CPU socket, Pentium® III 750 MHz with SpeedStep™ technology	08K3191
23	Upper shield	08K5651
24	Diskette drive (TEAC)	05K9157
25	Microphone assembly	27L0484
26	Keyboard* (see "Keyboard" on page 95)	
27	Spacer PCMCIA2 for MT2629	04P3223
28	Spacer FDD drive for MT2629	04P3225
–	Pointing stick cap*	84G6536
–	Telephone cable*	05K2707

Parts list

LCD FRU

12.1-inch SVGA TFT

FRU	P/N
LCD cover assembly	08K5655
for Korea	08K5659
LCD cables	27L0485
LCD panel (SANYO)	05K9577
Hinges	08K5664
Inverter card	08K3120

14.1-inch XGA TFT

FRU	P/N
LCD cover assembly	08K5656
for Korea	08K5660
LCD cable	27L0486
LCD panel (DBU)	05K9578
LCD panel (SAMSUNG)	05K9588
Hinges	08K5665
Inverter card	08K3120

15.0-inch XGA TFT

FRU	P/N
LCD cover assembly	08K5657
for Korea	08K6443
LCD cable	27L0487
LCD panel (SAMSUNG)	05K9580
Hinges	08K5666
Inverter card	08K3120

15.0-inch XGA TFT LG

FRU	P/N
LCD cover assembly	04P3048
for Korea	04P3049
LCD cable	27L0578
LCD panel (LG)	05K9647
Hinges	04P3051
Inverter card	08K3120
Misc kit (see miscellaneous kit for LCD 15.0 LG)	04P3050

Parts list

15.0-inch SVGA+ TFT

FRU	P/N
LCD cover assembly	08K5658
for Korea	08K5662
LCD cable	27L0488
LCD panel (DBU)	05K9581
Hinges	08K5666
Inverter card	10L1422

Keyboard

Language	P/N
Arabic	02K5051
Belgian	02K5045
Canadian French	02K5035
Chinese, traditional	02K5057
Czech	02K5055
Danish	02K5042
Dutch	02K5039
European Spanish	02K5044
European French	02K5038
German	02K5037
Greek	02K5048
Hungary	02K5054
Hebrew	02K5049
Italian	02K5043
Japanese	02K5056
Korean	02K5058
Latin American Spanish	02K5059
Norwegian	02K5041
Polish	02K5150
Portuguese	02K5047
Russian	02K5052
Slovakian	02K5053
Slovenian	02K5151
Swedish or Finnish	02K5040
Swiss	02K5046
Turkish	02K5050
U.K. English	02K5036
U.S. English	02K5034

Parts list

Miscellaneous parts

FRU	P/N
Screw kit (including nylon-coated screws): <ul style="list-style-type: none"> • M2 x 3.6 mm, flat head (3) • M2 x 5.1 mm, flat head (5) • M2 x 5.7 mm, flat head (5) • M2 x 16 mm, bind head (3) • M2.5x 4.8 mm, flat head (38) • M2.5 x 15 mm, flat head (15) • M2.6 x 2.8 mm, bind head (7) • M3 x 2.8 mm, flat head (5) • Coin screw (1) • Security screw (1) • Screw caps (8) 	08K5677
Base miscellaneous parts <ul style="list-style-type: none"> • Lens, IR • Lens, Ultrabay 2000 LES • Lock, battery • Holder, backup battery • Spring, battery lock • Lid, docking FR • Lid, docking RR • Spring, Lid docking • Rubber foot • Sponge • Sponge, shield lower • Sponge, small • Blank cap, battery • Screw caps • Cu tape 	08K5647
System miscellaneous parts <ul style="list-style-type: none"> • Door, PC card slots • Spring, PC card slots • Lens, LED hinge • Blank cap, TV connector • Eject knob, Ultrabay 2000 • Lock lever, Ultrabay 2000 • Spring, Ultrabay 2000 • Insulator, hard-disk drive • Insulator, keyboard CRU • Mini PCI guide • Screw caps 	08K5654

(continued)

Parts list

FRU	P/N
Miscellaneous parts, for system board <ul style="list-style-type: none"> • I/O bracket (right/left) • Guide, keyboard connector • Hex stud • Card modem connector • Flat head screw (M2.5 x 4.8) • Screw caps 	08K5648
Miscellaneous parts, for diskette drive <ul style="list-style-type: none"> • Bezel • Bracket • Flexible cable • Screw caps 	27L0595
Miscellaneous parts, for LCD <ul style="list-style-type: none"> • Latch (right/left) • Spring • Spacer (for 15.0 in.) • Blank cap, UltraPort • Screw caps 	08K5663
Miscellaneous kit for LCD 15.0 LG <ul style="list-style-type: none"> • Latch (RH 15.0 LG) • Latch (LH 15.0 LG) • Spring (15.0 LG) • Spacer (for 15.0 in.) • Screw caps 	04P3050

Parts list

Optional FRUs

64-MB SDRAM SO DIMM	20L0264
128-MB SDRAM SO DIMM	20L0265
AC adapter (72W), 3-pin (ASTEC)	02K6666
AC adapter (72W), 2-pin (ASTEC)	02K6669
Battery pack (9 cell), Panasonic, for MT2629	02K6615
Ultrabay CD-ROM drive (TOSHIBA)	05K9158
Hard-disk drive (6.0 GB), SSD	05K9227
Hard-disk drive (6.0 GB), HITACHI	05K9228
Hard-disk drive (12.0 GB), SSD	05K9229
Hard-disk drive (12.0 GB), HITACHI	05K9230
Hard-disk drive (18.0 GB)	05K9231
Hard-disk drive (20 GB)	27L3427
Mini PCI combo card	08K3125
Multiple battery charger	02K6642
Ultrabay 2000 2nd HDD adapter	08K6067
Ultrabay 2000 battery	02K6645
Ultrabay 2000 CD-ROM drive (LG)	05K9159
Ultrabay 2000 DVD drive (MKE), for MT2629	05K9188
Ultrabay 2000 SuperDisk drive	05K9235
UltraPort camera	02K5153
IBM tripod	08K6449
UltraPort adapter and connector cover	08K6105
USB cable attachment	08K6108
USB cable	27L0542
ThinkPad Dock	02K8666
Top cover and screw kit	05K6244
PCI cover	05K6246
ThinkPad Port Replicator	02K8669
Video cable, for MT2629	27L0531
Asset RF ID adapter	08K6065

Parts list

Common parts

Tools

Triconnector wrap plug	72X8546
PC test card	35G4703
Audio wrap cable	66G5180
USB parallel test cable	05K2580
Screwdriver kit	95F3598
Torque screwdriver	05K4695
5mm socket wrench	05K4694
Screwdriver	27L8126
ThinkPad hardware maintenance diskette version 1.60 Note: Download the file from the Web site.	–

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

For 2-pin power cords:

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

For 3-pin power cords:

Region	P/N
Australia, New Zealand	76H3514
Taiwan	76H3516
Germany	76H3518
Chile, Ethiopia, Italy, Libya	76H3530
Denmark	76H3520
European countries, United Kingdom	76H3524
India, South Africa	76H3522
Israel	76H3532
Korea	76H3535
People's Republic of China (other than Hong Kong)	02K0539
Switzerland	76H3528

Parts list

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

For 3-pin power cords:

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

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