IBM

IBM Mobile Systems
ThinkPad Computer
Hardware Maintenance Manual

October 2001

This manual supports:
  ThinkPad A20m, A21m, A22m
                        (MT 2628/2633)
                A20p, A21p, A22p
                        (MT 2629)
  ThinkPad Dock   (MT 2631)

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About this manual

This manual contains service and reference information for IBM ThinkPad A20, A21, A22 (MT2628, 2629, 2633), and ThinkPad Dock (MT2631) products. Use this manual along with the advanced diagnostic tests to troubleshoot problems.

The manual is divided into sections as follows:
- The common sections provide general information, guidelines, and safety information required in servicing computers.
- The product-specific section includes service, reference, and product-specific parts information.

Important

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

Before servicing an IBM ThinkPad product, be sure to review the safety information under "Safety notices: multilingual translations" on page 3, "Safety information" on page 14, and "Laser compliance statement" on page 18.

Contents

Introduction

Important service information

> **Important**
>
> BIOS and device driver fixes are customer-installable. The BIOS and device drivers are posted on the IBM support site http://www.ibm.com/pc/support
>
> Advise customers to contact the PC Company HelpCenter at 800-772-2227 if they need assistance in obtaining or installing any diskette fixes.
>
> Customers in Canada should call IBM HelpPC at 800-565-3344 for assistance or download information.

Strategy for replacing FRUs

> **Before replacing parts**
>
> Make sure that all diskette fixes are installed before replacing any FRUs listed in this manual.

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

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

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

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

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

How to use error messages

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

Diskette compatibility matrix

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

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

Safety notices: multilingual translations

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

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

Safety notice 1

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

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

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

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

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

Safety notice 2

DANGER

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

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

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

(continued)

(continuation of safety notice 2)

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

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

Safety notice 3

DANGER

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

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

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

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

(continued)

(continuation of safety notice 3)

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

Safety notice 4

DANGER

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

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

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

(continued)

(continuation of safety notice 4)

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

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

Safety notice 5

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

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

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

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

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

Safety notice 6

DANGER

> **To avoid shock, do not remove the plastic cover that protects the lower part of the inverter card.**
>
> **Afin d'éviter tout risque de choc électrique, ne retirez pas le cache en plastique protégeant la partie inférieure de la carte d'alimentation.**
>
> **Aus Sicherheitsgründen die Kunststoffabdeckung, die den unteren Teil der Spannungswandlerplatine umgibt, nicht entfernen.**
>
> **Per evitare scosse elettriche, non rimuovere la copertura in plastica che avvolge la parte inferiore della scheda invertitore.**
>
> **Para evitar descargas, no quite la cubierta de plástico que rodea la parte baja de la tarjeta invertida.**

Safety notice 7

DANGER

> **Though the main batteries have low voltage, a shorted or grounded battery can produce enough current to burn personnel or combustible materials.**
>
> **Bien que le voltage des batteries principales soit peu élevé, le court-circuit ou la mise à la masse d'une batterie peut produire suffisamment de courant pour brûler des matériaux combustibles ou causer des brûlures corporelles graves.**
>
> **Obwohl Hauptbatterien eine niedrige Spannung haben, können sie doch bei Kurzschluß oder Erdung genug Strom abgeben, um brennbare Materialien zu entzünden oder Verletzungen bei Personen hervorzurufen.**
>
> **Sebbene le batterie di alimentazione siano a basso voltaggio, una batteria in corto circuito o a massa può fornire corrente sufficiente da bruciare materiali combustibili o provocare ustioni ai tecnici di manutenzione.**
>
> **Aunque las baterías principales tienen un voltaje bajo, una batería cortocircuitada o con contacto a tierra puede producir la corriente suficiente como para quemar material combustible o provocar quemaduras en el personal.**

Safety notice 8

DANGER

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

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

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

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

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

Safety information

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

General safety

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

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

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.

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

  and similar units. (This practice ensures correct
  grounding of the units.)
- If an electrical accident occurs:
    – Use caution; do not become a victim yourself.
    – Switch off power.
    – Send another person to get medical aid.

Safety inspection guide

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

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

Consider these conditions and the safety hazards they
present:
- Electrical hazards, especially primary power (primary
  voltage on the frame can cause serious or fatal
  electrical shock)
- Explosive hazards, such as a damaged CRT face or a
  bulging capacitor

• Mechanical hazards, such as loose or missing hardware

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

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

Handling electrostatic discharge-sensitive devices

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

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

When handling ESD-sensitive parts:
• Keep the parts in protective packages until they are inserted into the product.
• Avoid contact with other people.

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

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

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

Grounding requirements

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

Laser compliance statement

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

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

CAUTION:

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

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

凡未在这里指明的任何控制用法、调整、行为，
都会导致严重后果。

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

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

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

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

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

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

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

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

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

⚠️

DANGER

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

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

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

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

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

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

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

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

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

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

General descriptions

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

Read this first

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

Important notes

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

What to do first

When you do return a FRU, you must include the following information in the parts exchange form or parts return form that you attach to it:
__ 1. Name and phone number of servicer
__ 2. Date of service
__ 3. Date on which the machine failed
__ 4. Date of purchase
__ 5. Failure symptoms, error codes appearing on the display, and beep symptoms

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

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

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

The following are not covered under warranty:
- LCD panel cracked from the application of excessive
  force or from being dropped
- Scratched (cosmetic) parts
- Distortion, deformation or discoloration of the cosmetic
  parts
- Cracked or broken plastic parts, broken latches, broken
  pins, or broken connectors caused by excessive force
- Damage caused by liquid spilled into the system
- Damage caused by the improper insertion of a PC Card
  or the installation of an incompatible card
- Damage caused by foreign material in the diskette drive
- Diskette drive damage caused by pressure on the
  diskette drive cover or by the insertion of a diskette with
  multiple labels
- Damaged or bent diskette eject button
- Fuses blown by attachment of a nonsupported device
- Forgotten computer password (making the computer
  unusable)
- Sticky keys caused by spilling a liquid onto the keyboard

**The following symptoms might indicate damage
caused by nonwarranted activities:**
- Missing parts might be a symptom of unauthorized
  service or modification.
- If the spindle of a hard-disk drive becomes noisy, it may
  have been subjected to excessive force, or dropped.

Related service information

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

Service web site

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

Product recovery program

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

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

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

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

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

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

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

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

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

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

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

To create a recovery repair diskette
If the prompt needed for access to the Product Recovery
program does not appear, you can recover it by use of the

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

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

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

Note

Should the hard-disk drive need to be replaced, you must order a Recovery CD with the hard-disk drive so that you can recover the new hard-disk drive with the pre-installed software when it arrives. For information on which CD to order, see "Recovery CDs" on page 141.

Passwords

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

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

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

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

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

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

Attention

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

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

Attention

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

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

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

For how to remove the battery pack, see "1010 Battery pack" on page 60.

3. Remove the backup battery.

   For how to remove the backup battery, see "1040 Backup battery" on page 66.

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

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

5. Reinstall the backup battery and the battery pack.

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

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

How to remove the hard-disk password

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

To remove a user HDP that has been forgotten, when the SVP and the master HDP are known, do the following:

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

   Both user HDP and master HDP will have been removed.

General descriptions **29**

Power management

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

Notes

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

Screen blank mode

Screen blank mode has three variants, as follows:

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

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

Standby mode

When the computer enters standby mode, the following events occur in addition to what occurs in screen blank mode:

- The LCD is powered off.
- The hard-disk drive is powered off.
- The CPU stops.

To enter standby mode, press Fn + F4.

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

In certain circumstances, the computer goes into standby mode automatically:

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

- If the battery indicator blinks orange, indicating that the battery power is low. (Alternatively, if **Hibernate when battery becomes low** has been selected in the "Power Management Properties" window, the computer goes into hibernation mode.)

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

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

To cause the computer to return from standby mode and resume operation, do one of the following:
- Press the Fn key.
- Open the LCD cover (only if you are using Windows Me and you entered standby mode by closing the LCD cover.)
- Turn on the power switch.

Also, the computer automatically returns from standby mode and resumes operation in either of the following events:
- The ring indicator (RI) is signaled by a serial device or a PC Card device (Windows 2000 does not support the ring indicator (RI) resume by PC Card device.)
- The time set on the resume timer elapses. In Windows 98, the **Scheduled Tasks** setting takes priority over the **Resume on timer** selection in the "Power Management Properties" window.

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

Hibernation mode

Note for Windows NT

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

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

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

Note: If the computer enters the hibernation mode while it
   is docked to the docking station, do not undock it
   from the docking station before resuming normal
   operation. If you do undock it and then try to
   resume normal operation, you will get an error
   message, and you will have to restart the system.

To cause the computer to enter hibernation mode, do any
of the following:
- Press the Fn + F12 keys.
- If you are using the APM operating system and have set
  the mode to **Power switch mode [Hibernation]**, turn
  off the power switch.
- If you are using the ACPI operating system and have
  defined one of the following actions as the event that
  causes the system to go into hibernation mode, perform
  that action.
    – Closing the lid.
    – Pressing the power button.
    – Pressing Fn + F4 keys.

Also, the computer goes into hibernation mode
automatically in either of the following conditions:
- If a "hibernation time" has been set on the timer, and the
  user does not do any operation with the keyboard, the
  TrackPoint, the hard-disk drive, the parallel connector, or
  the diskette drive within that time.
- If the timer conditions are satisfied in suspend mode.
- If you are using the APM operating system and have set
  the mode to **Hibernate when battery becomes low**,
  and the battery charge becomes critically low.

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

Checkout guide

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

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

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

Testing the computer

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

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

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

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

To run the test, do as follows:

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

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

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

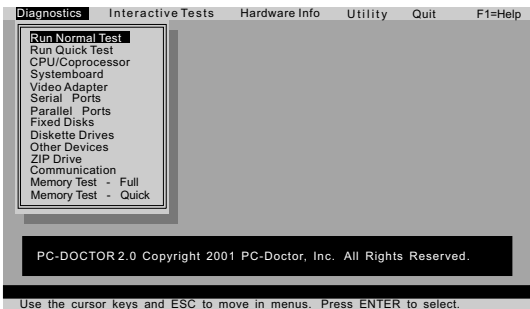If an error code appears, go to "Symptom-to-FRU index" on page 49.

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

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

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

   The options on the test menu are as follows:

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

Notes:
- In the **Keyboard** test in **Interactive Tests**, the **Fn** key is scanned only once. Each key should be held down for at least 2 seconds; otherwise, it cannot be sensed.
- The sound card is not recognized in the **Stereo Speaker** in the **Interactive Tests**. To test it, use the audio device test in the **Other Devices** (**Diagnostics**).
- **Video Adapter** test supports only the LCD display on ThinkPad. Before running PC-Doctor DOS, detach the external Monitor.
- **ZIP Drive** test and **LS-120 Drive** test are only for some models. Some model do not have them.


```
Diagnostics   Interactive Tests   Hardware Info   Utility   Quit   F1=Help
  Run Normal Test
  Run Quick Test
  CPU/Coprocessor
  Systemboard
  Video Adapter
  Serial  Ports
  Parallel  Ports
  Fixed Disks
  Diskette Drives
  Other Devices
  ZIP Drive
  Communication
  Memory Test  -  Full
  Memory Test  -  Quick


  PC-DOCTOR 2.0 Copyright 2001 PC-Doctor, Inc. All Rights Reserved.

Use the cursor keys and ESC to move in menus. Press ENTER to select.
```

4. Run the applicable function test.

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

   To cancel the test, press Esc.

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

Detecting system information with PC-Doctor

PC-Doctor can detect the following system information:

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

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

Power system checkout

To verify a symptom, do the following:
1. Power off the computer.
2. Remove the battery pack.
3. Connect the ac adapter.
4. Check that power is supplied when you power on the computer.
5. Power off the computer.
6. Disconnect the ac adapter and install the charged battery pack.
7. Check that the battery pack supplies power when you power on the computer.

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

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

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

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

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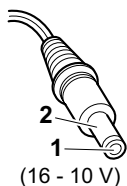
Pin	Voltage (V dc)
1	+15.5 to +17.0
2	Ground

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

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

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

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

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

Checking the battery pack

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

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

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

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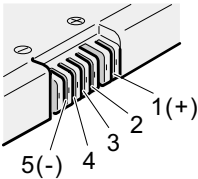
Terminal	Voltage (V dc)
1	+ 0 to + 12.6
5	Ground (–)

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

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

   If the voltage is still less than +11.0 V dc after recharging, replace the battery.
4. If the voltage is more than +11.0 V dc, measure the resistance between battery terminals 4 and 5. The resistance must be 4 to 30 K Ω.
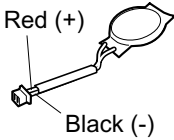
   If the resistance is not correct, replace the battery pack. If the resistance is correct, replace the system board.

Checking the backup battery

Do the following:
1. Power off the computer, and unplug the ac adapter from it.
2. Turn the computer upside down.

3. Remove the battery pack (see "1010 Battery pack" on page 60).
4. Remove the backup battery (see "Checking the battery pack" on page 37).
5. Measure the voltage of the backup battery. See the following figure.

Red (+)

Black (-)

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

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

ThinkPad A20m/p, A21m/p and A22m/p

Product overview

This section presents the following product-unique information:
- "Specifications"
- "Status indicators" on page 44
- "FRU tests" on page 46
- "Fn key combinations" on page 48

Specifications

The following table lists the specifications of the ThinkPad A20m/p, A21m/p and A22m/p series:

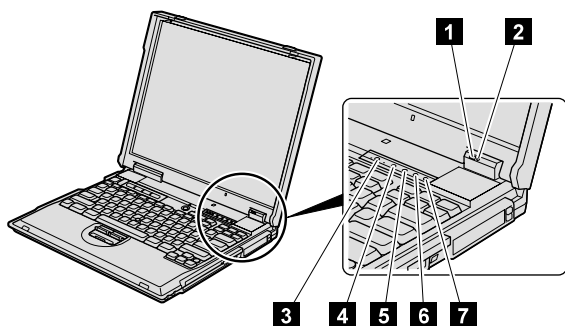| Feature	Description
Processor	**A20m** • Intel® Celeron® processor 500 MHz, L2 256-KB cache • Intel® Celeron® processor 550 MHz, L2 256-KB cache • Mobile Intel® Pentium® III processor 500 MHz, L2 256-KB cache • Mobile Intel® Pentium® III processor at 600 MHz featuring Intel® SpeedStep™ technology • Mobile Intel® Pentium® III processor at 650 MHz featuring Intel® SpeedStep™ technology • Mobile Intel® Pentium® III processor at 700 MHz featuring Intel® SpeedStep™ technology **A20p** • Mobile Intel® Pentium® III processor at 700 MHz featuring Intel® SpeedStep™ technology • Mobile Intel® Pentium® III processor at 750 MHz featuring Intel® SpeedStep™ technology **A21m** • Mobile Intel® Pentium® III processor at 700 MHz featuring Intel® SpeedStep™ technology • Mobile Intel® Pentium® III processor at 750 MHz featuring Intel® SpeedStep™ technology • Mobile Intel® Pentium® III processor at 800 MHz featuring Intel® SpeedStep™ technology

(continued)

Feature	Description
Processor	**A21p** • Mobile Intel® Pentium® III processor at 850 MHz featuring Intel® SpeedStep™ technology **A22m** • Mobile Intel® Pentium® III processor at 800 MHz featuring Intel® SpeedStep™ technology • Mobile Intel® Pentium® III processor at 850 MHz featuring Intel® SpeedStep™ technology • Mobile Intel® Pentium® III processor at 900 MHz featuring Intel® SpeedStep™ technology • Mobile Intel® Pentium® III processor at 1 GHz featuring Intel® SpeedStep™ technology **A22p** • Mobile Intel® Pentium® III processor at 1 GHz featuring Intel® SpeedStep™ technology
Bus architecture	PCI Bus
Memory (standard)	**A20m/p** • 64 MB (on the system board) • 128 MB (on the system board) **A21m/p** • 64 MB (on the system board) • 128 MB (on the system board) • 64 MB (64 MB SO-DIMM × 1) • 128 MB (128 MB SO-DIMM × 1) **A22m/p** • 64 MB (64 MB SO-DIMM × 1) • 128 MB (128 MB SO-DIMM × 1)
Memory (optional)	64 MB, 128 MB, or 256 MB DIMM card (maximum of 512 MB)
CMOS RAM	114 bytes + 128 bytes
Display	• 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 • 15.0-inch, 16M colors, SXGA+ (1400×1050 resolution) TFT color LCD • 15.0-inch, 16M colors, UXGA (1600×1200 resolution) TFT color LCD

(continued)

Feature	Description
Diskette drive	1.44 MB (3-mode), 3.5-inch
Hard-disk drive	**A20m/p** • 6.0 GB, 2.5-inch, IDE interface • 12.0 GB, 2.5-inch, IDE interface • 18.0 GB, 2.5-inch, IDE interface • 20.0 GB, 2.5-inch, IDE interface **A21m/p** • 10.0 GB, 2.5-inch, IDE interface • 20.0 GB, 2.5-inch, IDE interface • 32.0 GB, 2.5-inch, IDE interface **A22m/p** • 10.0 GB, 2.5-inch, IDE interface • 20.0 GB, 2.5-inch, IDE interface • 30.0 GB, 2.5-inch, IDE interface • 32.0 GB, 2.5-inch, IDE interface
I/O port	• External monitor • Line-in • Headphone • Microphone • Mouse or keyboard • Parallel • Port replicator connector • Serial • Universal serial bus (USB) connector • RJ11 • RJ45 • TV-in/out (for MT2629) • TV-out (for MT2628-Fxx, Gxx, Sxx, Txx, MT2623-Gxx, Txx)
Internal modem	56.6 Kbps
Audio	• Internal microphone (for A20m/p, A21m/p) • Internal speaker • Software control volume
Infrared transfer	IrDA 1.1
PC Card	One Type-III or two Type-II
AC adapter	72-watt type
Bay device	**A20m/p** • 10-24 x CD-ROM drive • 6 x DVD drive **A21m/p, A22m/p** • 10-24 x CD-ROM drive • 8 x DVD drive

Status indicators

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

Indicator	Meaning
1 Battery	**Green:** The battery is fully charged. **Blinking green:** The battery has enough power to operate, but is being charged. **Orange:** The battery power is low. The battery is to being charged. **Blinking orange:** The battery needs to be charged. when the indicator starts blinking orange, the computer beeps three times.
2 Standby status	**Green:** The computer is in standby mode. **Blinking green:** The computer is entering standby mode or hibernation mode, or is resuming normal operation. This indicator does not blink in Windows 2000 and Windows Me.
3 Drive in use	**Green:** Data is being read from or written to the hard-disk drive, the diskette drive, or the drive in the Ultrabay 2000. When this indicator is on, do not put the computer into standby mode or turn off the computer. **Note:** Do not move the system while the Green drive in use light is on. Sudden physical shock could cause drive errors.

(continued)

Indicator	Meaning	
4 Num lock	**Green:**	The numeric keypad on the keyboard is enabled. To enable or disable the keypad, press and hold the Shift key while pressing the NumLk key.
5 Caps lock	**Green:**	Caps Lock mode is enabled. To enable or disable Caps Lock mode, press Caps Lock key.
6 Scroll lock	**Green:**	Scroll Lock mode is enabled. Arrow keys can be used as screen-scroll function keys, but not to move the cursor. To enable or disable Scroll Lock mode, press ScrLk key. Not all application programs support this function.
7 Power on	**Green:**	This indicator stays lighted whenever the computer is on. If the power-on indicator is on and the standby indicator is off, the system is ready to use. If both the power-on indicator and the standby indicator are on, you can use the computer after it returns from the standby mode and the standby indicator goes off.

FRU tests

The following table shows the test for each FRU.

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

(continued)

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

Fn key combinations

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

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

Symptom-to-FRU index

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

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

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

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

If no numeric code is displayed, check the narrative descriptions of symptoms. If the symptom is not described there, go to "Intermittent problems" on page 55.

Note

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

Numeric error codes

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

(continued)

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

(continued)

Symptom or error	FRU or action, in sequence
0270 Real-time clock error.	1. **Replace the backup battery and run IBM BIOS Setup Utility to reset the time and date**. 2. System board.
0271 Date and time error — Neither the date nor the time is set in the computer.	**Run IBM BIOS Setup Utility to reset the time and date**.
02B2 Incorrect drive A type.	1. **Diskette drive**. 2. External FDD cable. 3. I/O card.
02F4 EISA CMOS not writable.	1. **Load Setup Defaults in IBM BIOS Setup Utility**. 2. Replace the backup battery. 3. System board.
02F5 DIMM test failure.	1. **DIMM**. 2. System board.
02F6 Software NMI failure.	1. **DIMM**. 2. System board.
02F7 Fail-safe timer NMI failure.	1. **DIMM**. 2. System board.

Error messages

Symptom or error	FRU or action, in sequence
Device address conflict.	1. **Load Setup Defaults in IBM BIOS Setup Utility**. 2. Backup battery. 3. System board.
Allocation error for device.	1. **Load Setup Defaults in IBM BIOS Setup Utility**. 2. Backup battery. 3. System board.
Failing bits: nnnn.	1. **DIMM**. 2. System board.
Invalid system configuration data.	1. **DIMM**. 2. System board.
I/O device IRQ conflict.	1. **Load Setup Defaults in IBM BIOS Setup Utility**. 2. Backup battery. 3. System board.
Operating system not found.	1. Check that the operating system has no failure and is installed correctly. 2. **Enter IBM BIOS Setup Utility and see whether the hard-disk drive and the diskette drive are properly identified**. 3. Reseat the hard-disk drive. 4. Reinstall the operating system. 5. Diskette drive. 6. Hard-disk drive. 7. System board.
Hibernation error.	1. **Restore the system configuration to what it was before the computer entered hibernation mode**. 2. If memory size has been changed, re-create the hibernation file.
Fan error.	**Fan**.

Beep symptoms

Symptom or error	FRU or action, in sequence
One beep and a blank, unreadable, or flashing LCD.	1. **Reseat the LCD connector**. 2. LCD assembly. 3. External CRT. 4. System board.
One long and two short beeps, and a blank or unreadable LCD.	1. **System board**. 2. LCD assembly. 3. DIMM.
Two short beeps with error codes.	**POST error. See "Numeric error codes" on page 49.**
Two short beeps with blank screen.	1. **System board**. 2. DIMM.
Two or more beeps, or a continuous beep. Operating System starts successfully.	If a mini-PCI Ethernet card is installed, confirm that **Alert On LAN 2** in IBM BIOS Setup Utility is **disabled**.
Three short beeps, pause, three more short beeps, and one short beep.	1. **DIMM**. 2. System board
Only cursor appears.	**Reinstall operating system**.

No beep symptoms

Symptom or error	FRU or action, in sequence
No beep, power-on indicator on, LCD blank, and no POST.	1. **Make sure that every connector is connected tightly and correctly**. 2. DIMM. 3. System board.
No beep, power-on indicator on, and LCD blank during POST.	1. **Reseat DIMM**. 2. System board.
The power-on password prompt.	A power-on password or a supervisor password is set. Type the password and press **Enter**.
The hard-disk password prompt.	A hard-disk password is set. Type the password and press **Enter**.
The DOS full screen looks smaller.	Start the ThinkPad Configuration program and set the **Screen expansion** function.

LCD-related symptoms

> **Important**
>
> The TFT LCD for the notebook computer contains many thin-film transistors (TFTs). A small number of dots that are missing, discolored, or always lighted is characteristic of TFT LCD technology, but excessive pixel problems can cause viewing concerns. The LCD should be replaced if the number of missing, discolored, or lighted dots in any background is:
> - **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, 13 or more dark dots, or a total of 16 or more bright and dark dots.
> - **UXGA:** 11 or more bright dots, 16 or more dark dots, or a total of 16 or more bright and dark dots.
>
> **Note:** A bright dot is a white or colored pixel that is always on. A dark dot is a pixel that is always off and shows as black.

Symptom or error	FRU or action, in sequence
No beep, power-on indicator on, and a blank LCD during POST.	**System board**.
• LCD backlight not working. • LCD too dark. • LCD brightness cannot be adjusted. • LCD contrast cannot be adjusted.	1. **Reseat the LCD connectors**. 2. LCD assembly. 3. System board.
• LCD screen unreadable. • Characters missing pixels. • Screen abnormal. • Wrong color displayed.	1. **See important note for "LCD-related symptoms"**. 2. Reseat all LCD connectors. 3. LCD assembly. 4. System board.
Horizontal or vertical lines displayed on LCD.	**LCD assembly**.

Intermittent problems

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

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

Undetermined problems

You are here because the diagnostic tests did not identify which adapter or device failed, wrong devices are installed, a short circuit is suspected, or the system is inoperative. Follow these procedures to isolate the failing FRU (do not isolate FRUs that have no defects).

Verify that all attached devices are supported by the computer.

Verify that the power supply being used at the time of the failure is operating correctly. (See "Power system checkout" on page 35.)
1. Power off the computer.
2. Visually check each FRU for damage. Replace any damaged FRU.
3. Remove or disconnect all of the following devices:
    a. Non-IBM devices
    b. Devices attached to the port replicator
    c. Printer, mouse, and other external devices
    d. Battery pack
    e. Hard-disk drive
    f. External diskette drive
    g. DIMM
    h. CD-ROM and diskette drive in the UltraslimBay
    i. PC Cards
4. Power on the computer.
5. Determine whether the problem has changed.
6. If the problem does not recur, reconnect the removed devices one at a time until you find the failing FRU.
7. If the problem remains, replace the following FRUs one at a time (do not replace a nondefective FRU):
    a. System board
    b. LCD assembly

FRU replacement notices

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

Screw notices

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

Do the following when you service this machine:
- Keep the screw kit (for the P/N, see "Miscellaneous parts" on page 145) in your tool bag.
- Always use new screws.
- Use a torque screwdriver if you have one.

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

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

  90 degrees more

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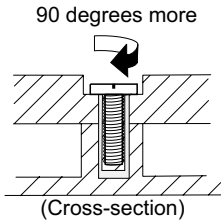
- **Logic card to plastic**

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

  180 degrees more

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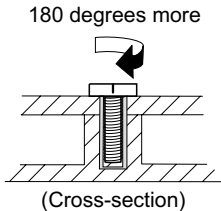
- **Torque driver**

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

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

Retaining serial numbers

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

Restoring the serial number of the system unit

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

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

Before replacing the system board, save the original serial number by doing the following:
1. Install the ThinkPad hardware maintenance diskette version 1.62, and restart the computer.
2. From the main menu, select **1. Set System Identification**.
3. Select **2. Read S/N data from EEPROM**.

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

   20: System unit serial number

After you have replaced the system board, restore the serial number by doing the following:
1. Install the ThinkPad hardware maintenance diskette version 1.62 and restart the computer.
2. From the main menu, select **1. Set System Identification**.
3. Select **1. Add S/N data from EEPROM**.

   Follow the instructions on the screen.

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

Retaining the UUID

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

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

When you replace the system board, you must set the UUID on the new system board as follows:
1. Install the ThinkPad hardware maintenance diskette version 1.62, and restart the computer.
2. From the main menu, select **4. Assign UUID**.

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

Removing and replacing a FRU

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

1. Do not try to service any computer unless you have been trained and certified. An untrained person runs the risk of damaging parts.
2. Before replacing any FRU, review "FRU replacement notices" on page 56.
3. Begin by removing any FRUs that have to be removed before the failing FRU. Any such FRUs are listed at the top of the page. Remove them in the order in which they are listed.
4. Follow the correct sequence in the steps for removing the FRU, as indicated in the drawings by the numbers in square callouts.
5. When turning a screw to replace a FRU, turn it in the direction indicated by the arrow in the drawing.
6. When removing the FRU, move it in the direction indicated by the arrow in the drawing.
7. To put the new FRU in place, reverse the removal procedure and follow any notes that pertain to replacement. For information about connecting and arranging internal cables, see "Locations" on page 112.
8. When replacing a FRU, use the correct screw as shown in the procedures.

DANGER

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

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

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

1010 Battery pack

DANGER

Use only the battery in the parts listing for your computer. Use of an incorrect battery can result in ignition or explosion of the battery.
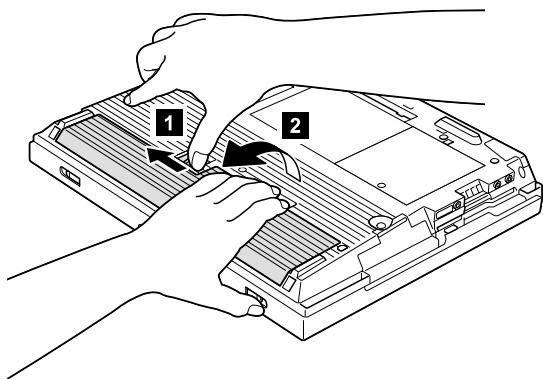
1020 DIMM

For access, remove this FRU:
- "1010 Battery pack" on page 60

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

(continued)

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

1030 Mini PCI adapter
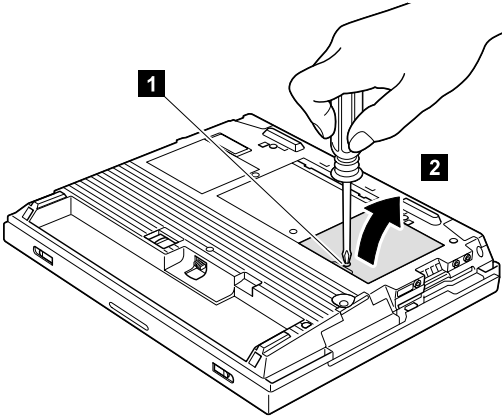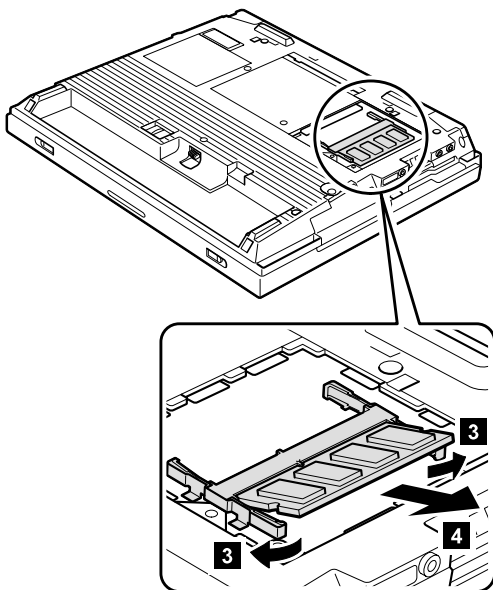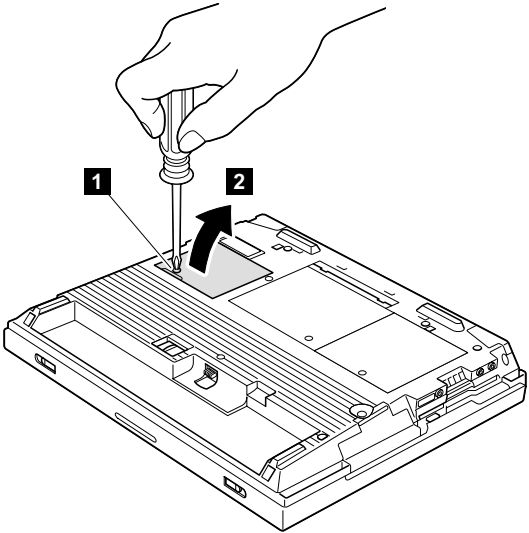
For access, remove this FRU:
• "1010 Battery pack" on page 60

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

(continued)

For A20m/p, A21m/p series
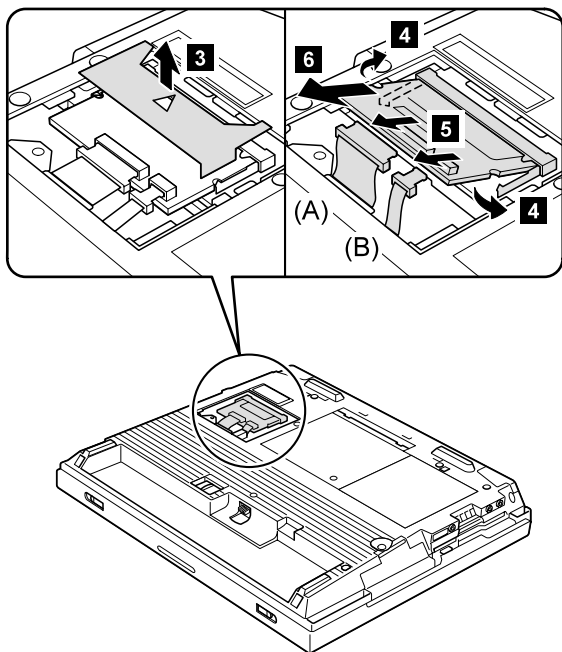
Note: The illustration shows the combo card. Connector **(A)** is for the LAN feature and **(B)** is for the modem feature. This slot also supports a Mini PCI modem card or Mini PCI network card. Step 5 depends on the card type. Disconnect either **(A)**, **(B)** or both.

When installing the card, do the following:
- With the notched end of the card toward the socket, insert the card into the socket, then press it firmly. Pivot the card until it snaps into place. Make sure that the card is firmly fixed in the slot and does not move easily.
- Make sure that the connector **(A)** is placed under the card when reinstalling the Mini PCI adapter.
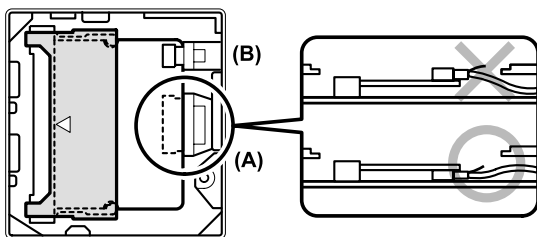
For A22m/p series
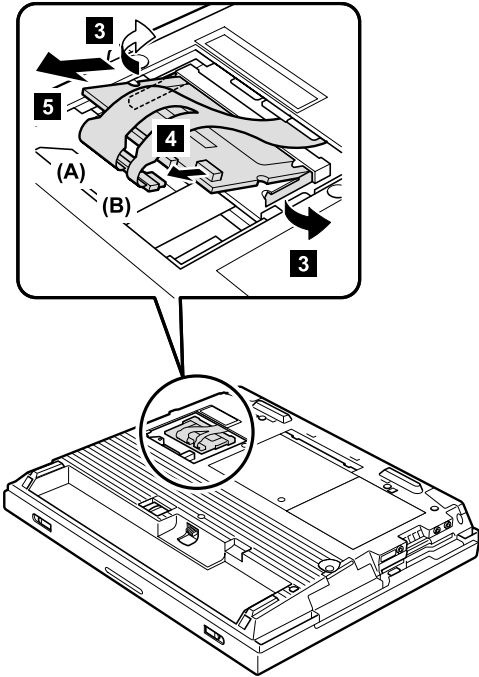
Note: The illustration shows the combo card. Connector **(A)** is for the LAN feature and **(B)** is for the modem feature. This slot also supports a Mini PCI modem card or Mini PCI network card. Step **4** depends on the card type. Disconnect either **(A)**, **(B)** or both.

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

1040 Backup battery

DANGER

> **Use only the battery in the parts listing for your computer. Use of an incorrect battery can result in ignition or explosion of the battery.**

For access, remove these FRUs, in order:

- "1010 Battery pack" on page 60
- "1020 DIMM" on page 61
- "1030 Mini PCI adapter" on page 63
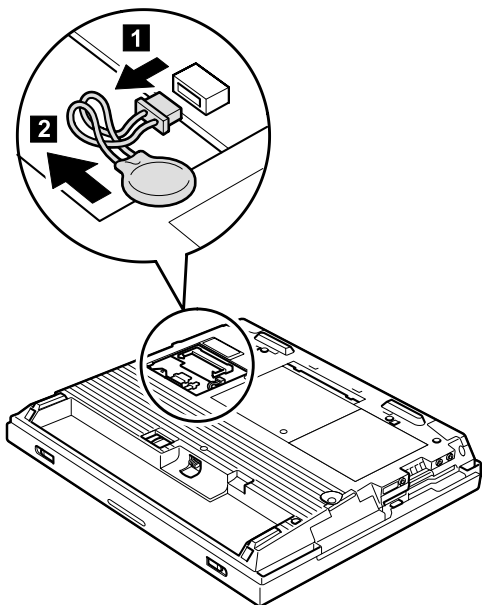
1050 Hard-disk drive or RF ID adapter

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

For access, remove this FRU:
• "1010 Battery pack" on page 60
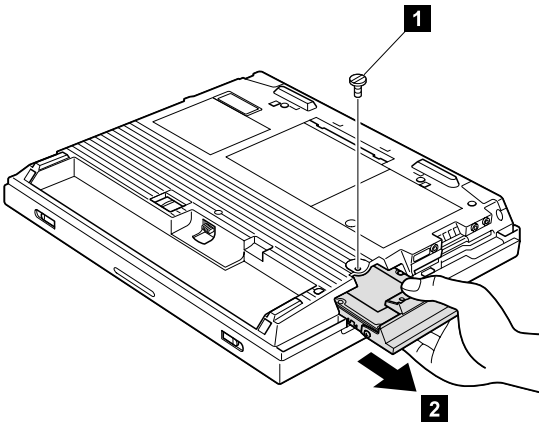
Note: The hard disk is attached to the cover.

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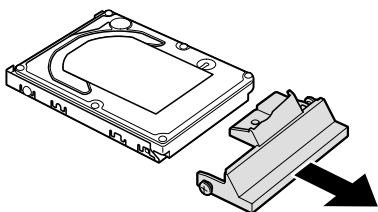
When installing: Make sure that the HDD connector is firmly connected.

1060 Ultrabay 2000 device

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

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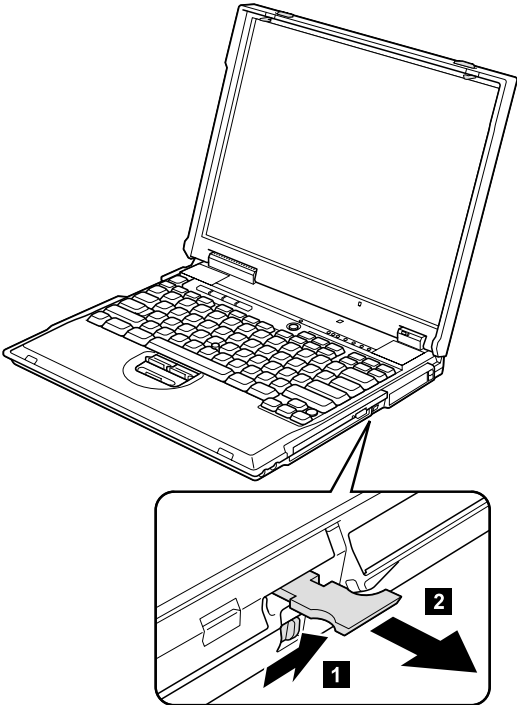
(continued)
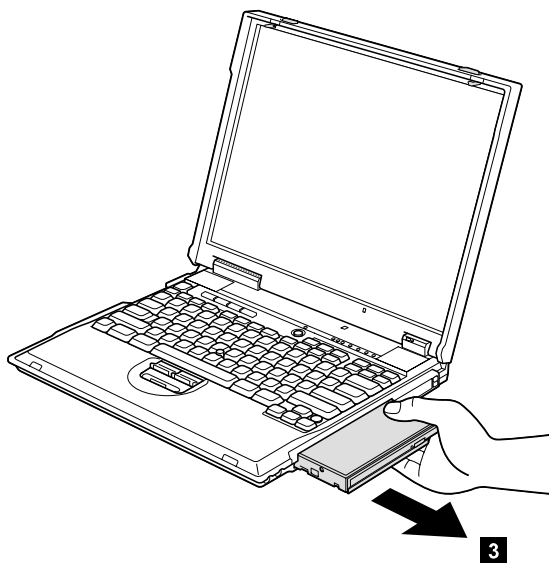
1070 Keyboard

For access, remove these FRUs, in order:
- "1010 Battery pack" on page 60
- "1050 Hard-disk drive or RF ID adapter" on page 67
- "1060 Ultrabay 2000 device" on page 69
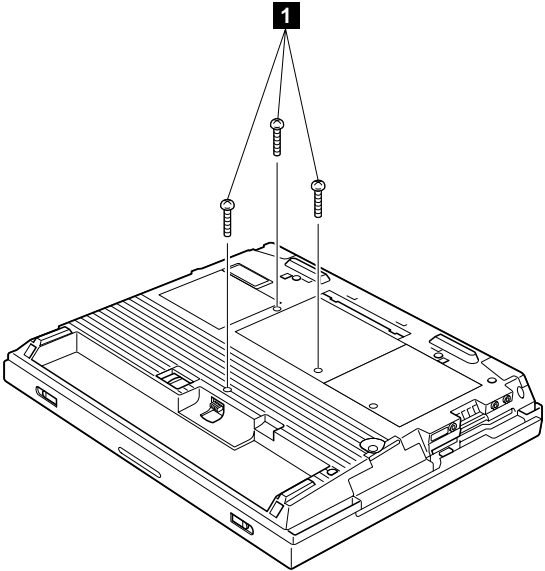
Step	Screw (quantity)	Torque
1	M2.5 × 15 mm, nylon-coated (3)	0.392 Nm (4 kgfcm)
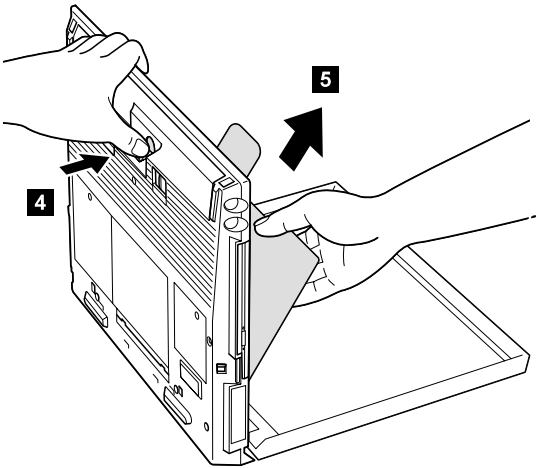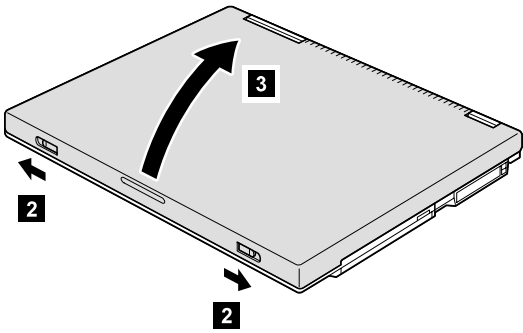
(continued)

(continued)

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.
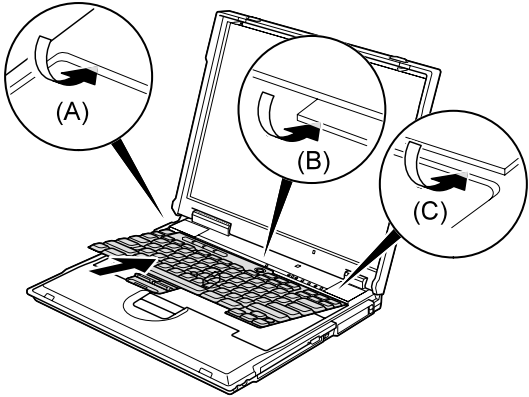
2. Push the **Y** key **1** to connect the keyboard to the
   connector on the underside of the key; then push the
   frame of the keyboard **2** to latch the latches.
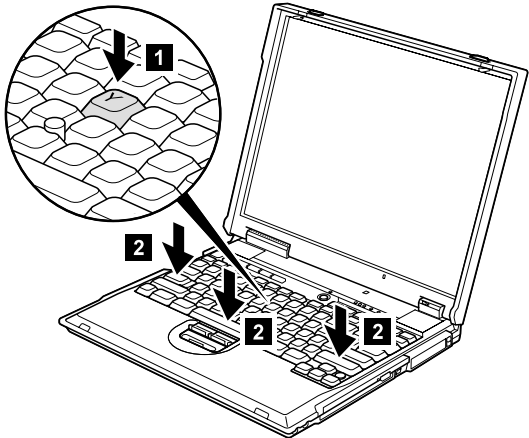
3. After the fastening of three screws of bottom side, push
   the **Y** key again to connect the keyboard firmly to the
   connector on the underside of the key.

ThinkPad A20m/p, A21m/p and A22m/p **73**

1080 Keyboard CRU insulator

For access, remove these FRUs, in order:

- "1010 Battery pack" on page 60
- "1050 Hard-disk drive or RF ID adapter" on page 67
- "1060 Ultrabay 2000 device" on page 69
- "1070 Keyboard" on page 71
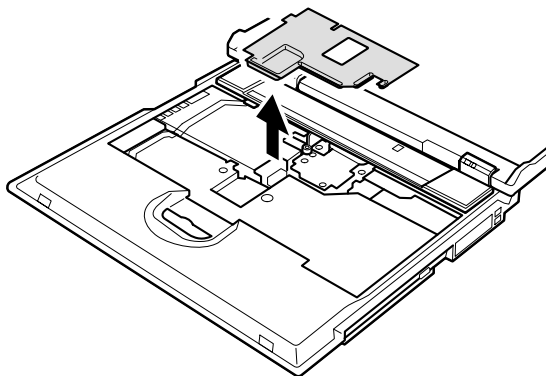
1090 Hinge cover and clear sheet icon

For access, remove these FRUs, in order:
- "1010 Battery pack" on page 60
- "1050 Hard-disk drive or RF ID adapter" on page 67
- "1060 Ultrabay 2000 device" on page 69
- "1070 Keyboard" on page 71
- "1080 Keyboard CRU insulator" on page 74

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

When installing: Stick the new clear sheet icon suitable for the model onto the new hinge cover, and then attach it to the computer.

1100 Keyboard bezel and speaker

For access, remove these FRUs, in order:

- "1010 Battery pack" on page 60
- "1050 Hard-disk drive or RF ID adapter" on page 67
- "1060 Ultrabay 2000 device" on page 69
- "1070 Keyboard" on page 71
- "1080 Keyboard CRU insulator" on page 74
- "1090 Hinge cover and clear sheet icon" on page 75
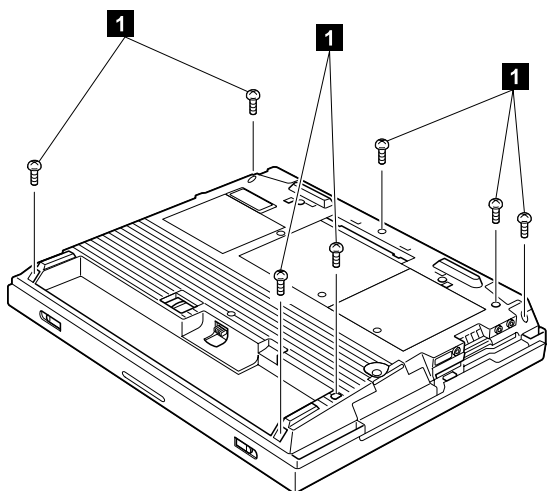
Step	Screw (quantity)	Torque
1	M2.5 × 4.8 mm, nylon-coated (7)	0.392 Nm (4 kgfcm)

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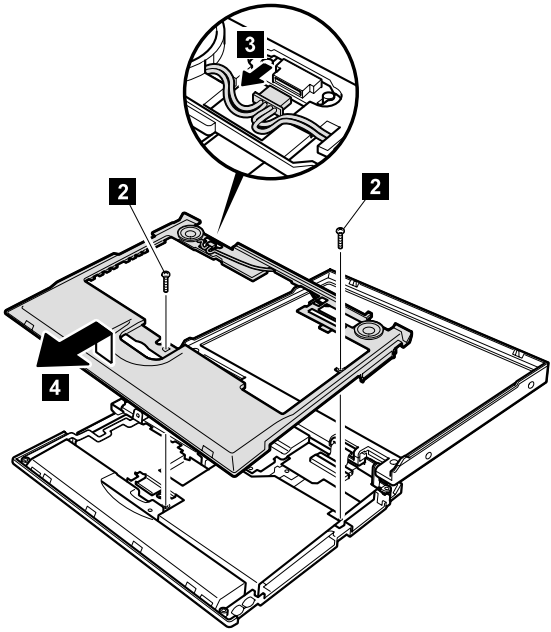
Step	Screw (quantity)	Torque
2	M2.5 × 15 mm, nylon-coated (2)	0.392 Nm (4 kgfcm)

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

# 1110 Microphone and speaker cable

For access, remove these FRUs, in order:
• "1010 Battery pack" on page 60
• "1050 Hard-disk drive or RF ID adapter" on page 67
• "1060 Ultrabay 2000 device" on page 69
• "1070 Keyboard" on page 71
• "1080 Keyboard CRU insulator" on page 74
• "1090 Hinge cover and clear sheet icon" on page 75
• "1100 Keyboard bezel and speaker" on page 76

For A20m/p and A21m/p series (microphone and speaker cable)
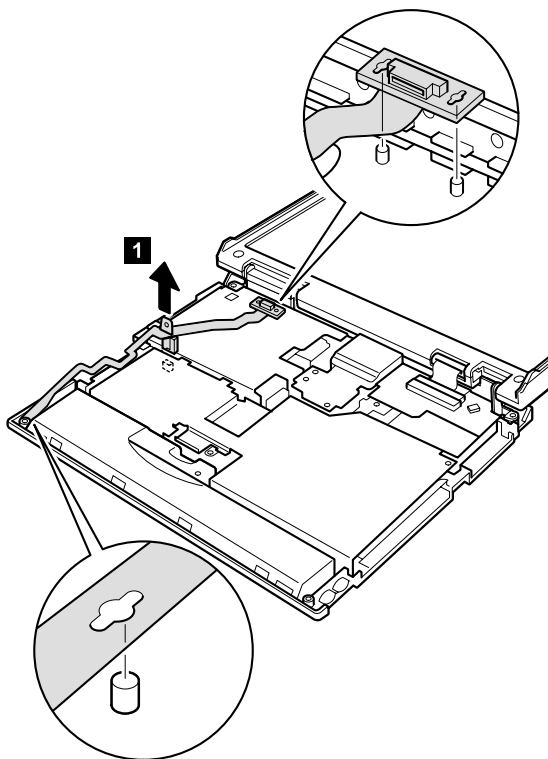
When installing: Make sure that you fasten the connector firmly.

(continued)

For A22m/p series (speaker cable)

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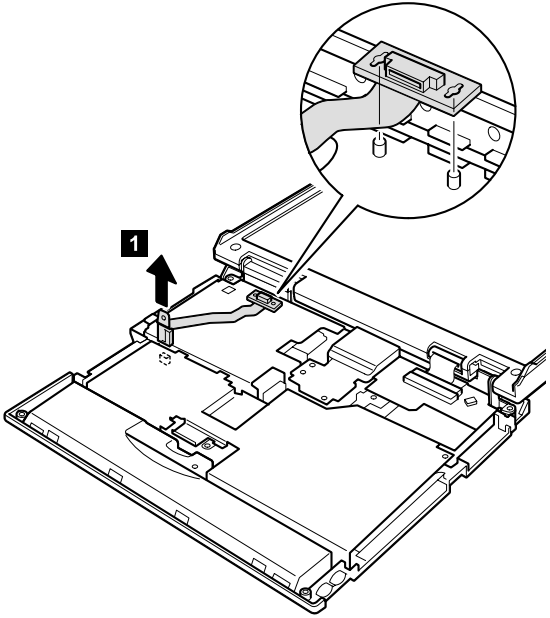
When installing: Make sure that you fasten the connector firmly.

1120 Sub card

For access, remove these FRUs, in order:
- "1010 Battery pack" on page 60
- "1050 Hard-disk drive or RF ID adapter" on page 67
- "1060 Ultrabay 2000 device" on page 69
- "1070 Keyboard" on page 71
- "1080 Keyboard CRU insulator" on page 74
- "1090 Hinge cover and clear sheet icon" on page 75
- "1100 Keyboard bezel and speaker" on page 76
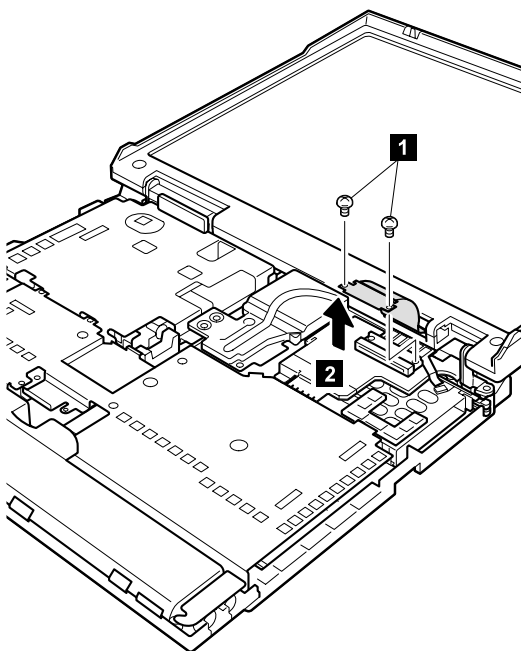
Step	Screw (quantity)	Torque
1	M2.6 × 2.8 mm, nylon-coated (2)	0.392 Nm (4 kgfcm)

(continued)

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

1130 PC Card slot assembly

For access, remove these FRUs, in order:
- "1010 Battery pack" on page 60
- "1050 Hard-disk drive or RF ID adapter" on page 67
- "1060 Ultrabay 2000 device" on page 69
- "1070 Keyboard" on page 71
- "1080 Keyboard CRU insulator" on page 74
- "1090 Hinge cover and clear sheet icon" on page 75
- "1100 Keyboard bezel and speaker" on page 76
- "1120 Sub card" on page 80

Note: Step **1** (PC Card slot spacer) is only for MT2629. Other model do not have the spacer. Remove it gently; it will be reused when installing new PC Card slot assembly.
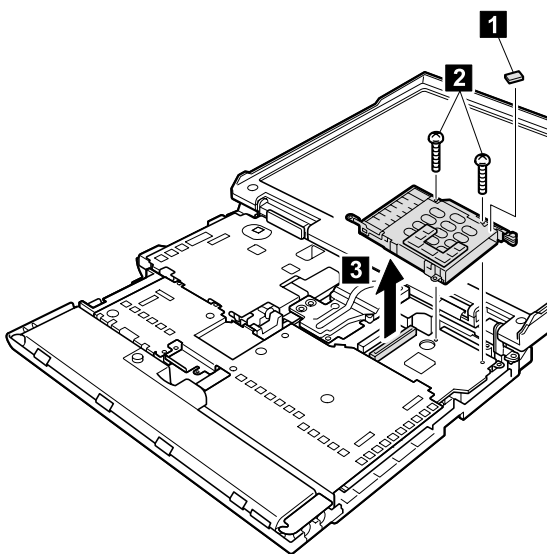
Step	Screw (quantity)	Torque
2	M2.0 × 9.5 mm, nylon-coated (2)	0.245 Nm (2.5 kgfcm)

1140 Fan assembly
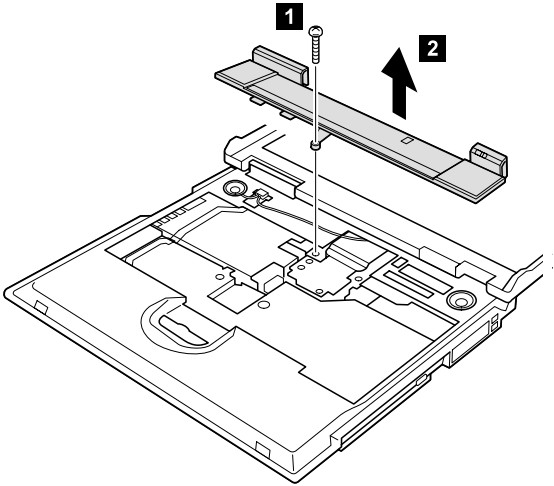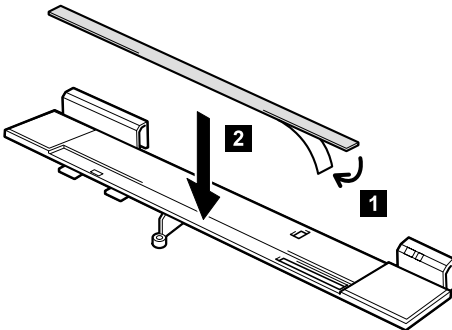
For access, remove these FRUs, in order:
- "1010 Battery pack" on page 60
- "1050 Hard-disk drive or RF ID adapter" on page 67
- "1060 Ultrabay 2000 device" on page 69
- "1070 Keyboard" on page 71
- "1080 Keyboard CRU insulator" on page 74
- "1090 Hinge cover and clear sheet icon" on page 75
- "1100 Keyboard bezel and speaker" on page 76

Note: Step **1a** is for the MT2628-Fxx, Gxx, Pxx, Qxx, Rxx, Sxx, Txx, Xxx, MT2633-Gxx, Txx, and MT2629. Other model do not have the screw **1a**.
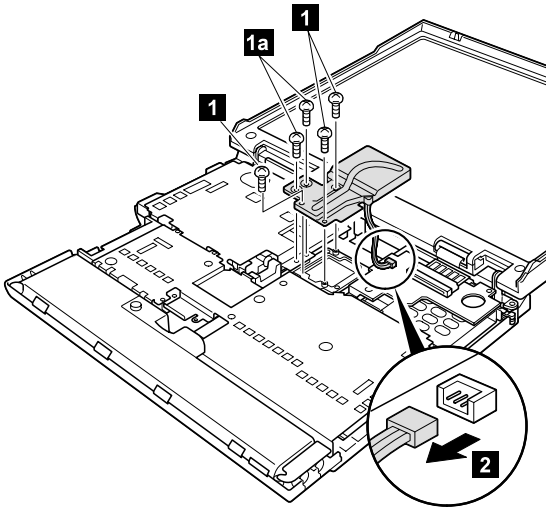
Step	Screw (quantity)	Torque
1a	M2.5 × 4.8 mm, nylon-coated (2)	0.392 Nm (4 kgfcm)
1	M2.5 × 4.8 mm, nylon-coated (3)	0.392 Nm (4 kgfcm)

Installation notice for A21m/p and A22m/p series

When installing the fan assembly, apply the thermal grease
(05K5751) on the **a** -part of the fan as shown in the
following figure.
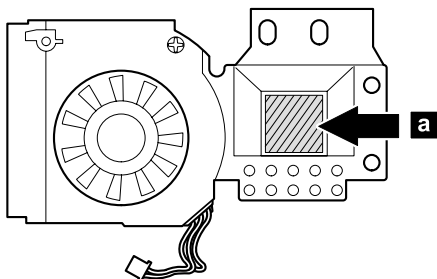
1150 Diskette drive

For access, remove these FRUs, in order:

Note: Step **1a** are for the MT2628-Fxx, Gxx, Pxx, Qxx, Rxx, Sxx, Txx, Xxx, MT2633-Gxx, Txx, and MT2629. Other model do not have the screws **1a** .
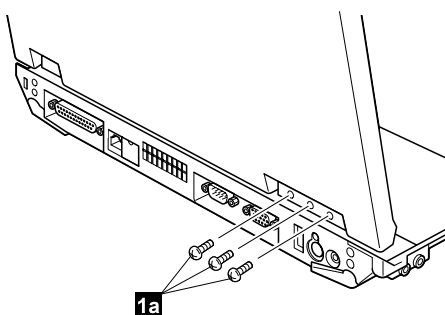
Step	Screw (quantity)	Torque
1a	M2.5 × 4.8 mm, nylon-coated (3)	0.392 Nm (4 kgfcm)

(continued)
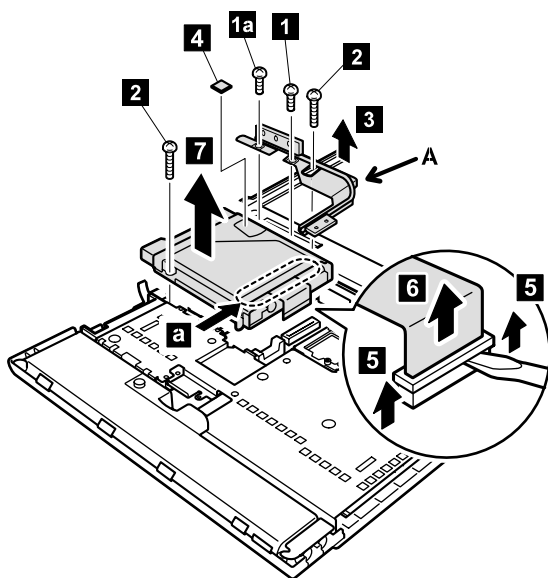
Notes:

1. The heatpipe **A** and the screw **1a** are for the MT2628-Fxx, Gxx, Pxx, Qxx, Rxx, Sxx, Txx, Xxx, MT2633-Gxx, Txx, and MT2629. Other models do not have them.

2. Step **4** (diskette drive spacer) is only for MT2629. Other models do not have the spacer. Remove it gently; it will be reused when installing new diskette drive.

Step	Screw (quantity)	Torque
1a	M2.5 × 4.8 mm, nylon-coated (1)	0.392 Nm (4 kgfcm)
1	M2.5 × 4.8 mm, nylon-coated (1)	0.392 Nm (4 kgfcm)
2	M2.5 × 15 mm, nylon-coated (2)	0.392 Nm (4 kgfcm)

When installing: Do not press the **a** -part of the diskette drive to avoid the damage.

1160 Upper shield

For access, remove these FRUs, in order:
- "1010 Battery pack" on page 60
- "1050 Hard-disk drive or RF ID adapter" on page 67
- "1060 Ultrabay 2000 device" on page 69
- "1070 Keyboard" on page 71
- "1080 Keyboard CRU insulator" on page 74
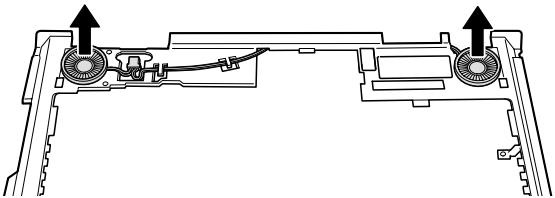- "1090 Hinge cover and clear sheet icon" on page 75
- "1100 Keyboard bezel and speaker" on page 76
- "1110 Microphone and speaker cable" on page 78
- "1120 Sub card" on page 80
- "1130 PC Card slot assembly" on page 82
- "1140 Fan assembly" on page 83
- "1150 Diskette drive" on page 85
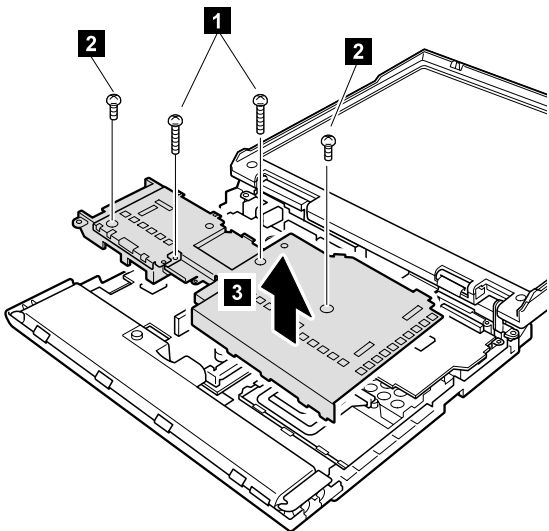
Step	Screw (quantity)	Torque
1	M2.5 × 15 mm, nylon-coated (2)	0.392 Nm (4 kgfcm)
2	M2.5 × 4.8 mm, nylon-coated (2)	0.392 Nm (4 kgfcm)

1170 TV card

> **Note**
>
> This section is only for MT2628-Fxx,-Gxx, -Sxx,-Txx, MT2633-Gxx,-Txx, and MT2629. Other models do not have the TV card.
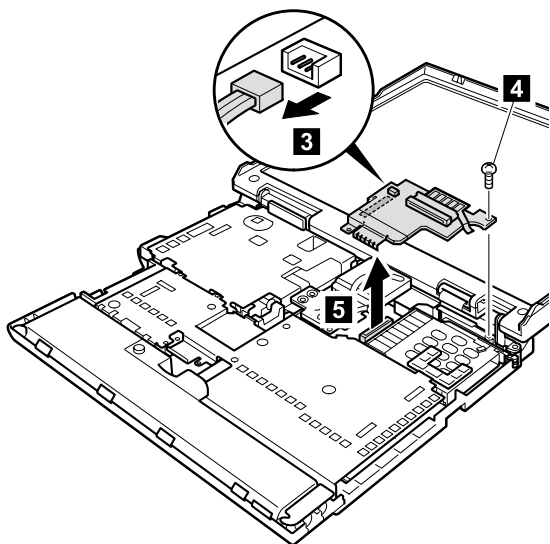
For access, remove these FRUs, in order:
- "1010 Battery pack" on page 60
- "1050 Hard-disk drive or RF ID adapter" on page 67
- "1060 Ultrabay 2000 device" on page 69
- "1070 Keyboard" on page 71
- "1080 Keyboard CRU insulator" on page 74
- "1090 Hinge cover and clear sheet icon" on page 75
- "1100 Keyboard bezel and speaker" on page 76
- "1110 Microphone and speaker cable" on page 78
- "1120 Sub card" on page 80
- "1130 PC Card slot assembly" on page 82
- "1140 Fan assembly" on page 83
- "1150 Diskette drive" on page 85
- "1160 Upper shield" on page 87
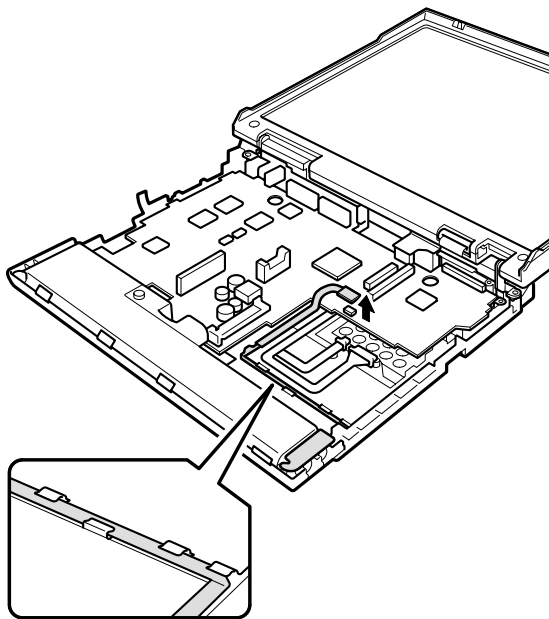
Cable routing: When replacing the modem cable, see the figure for the cable routing.

1180 CPU socket and CPU

For access, remove these FRUs, in order:

Note: MT2628-Exx, -Dxx do not have the CPU removal procedure.
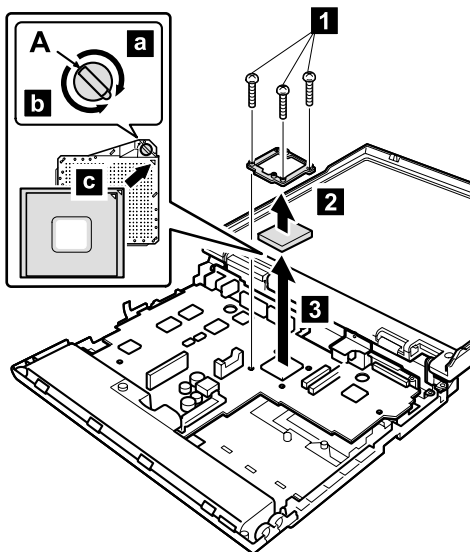
Rotate the screw head (**A**) 180° to the direction of the arrow `a` to release the lock and then remove the CPU.

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

When installing the CPU, do as shown in the figure.

- Rotate the screw head (**A**) 180° to the direction of the arrow **b** to lock the CPU.
- When attach the CPU to the socket, do as shown in the step **c** .

1190 System board and RJ45/11 connector assembly

For access, remove these FRUs, in order:

- "1010 Battery pack" on page 60
- "1020 DIMM" on page 61
- "1030 Mini PCI adapter" on page 63
- "1040 Backup battery" on page 66
- "1050 Hard-disk drive or RF ID adapter" on page 67
- "1060 Ultrabay 2000 device" on page 69
- "1070 Keyboard" on page 71
- "1080 Keyboard CRU insulator" on page 74
- "1090 Hinge cover and clear sheet icon" on page 75
- "1100 Keyboard bezel and speaker" on page 76
- "1110 Microphone and speaker cable" on page 78
- "1120 Sub card" on page 80
- "1130 PC Card slot assembly" on page 82
- "1140 Fan assembly" on page 83
- "1150 Diskette drive" on page 85
- "1160 Upper shield" on page 87
- "1170 TV card" on page 88
- "1180 CPU socket and CPU" on page 89
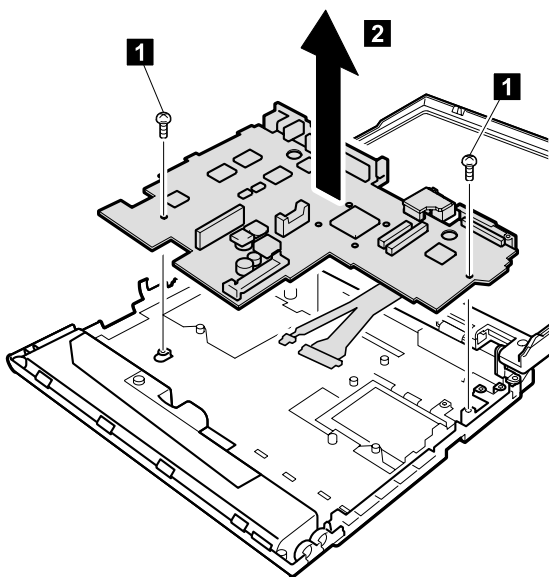
Step	Screw (quantity)	Torque
1	M2.5 × 4.8 mm, nylon-coated (2)	0.392 Nm (4 kgfcm)

(continued)

Note: Step ▟ (thermal rubbers) are only for
MT2628-Pxx, -Qxx, -Rxx, -Sxx, -Txx, -Xxx, and
MT2629-Hxx, -Uxx. When replacing the system
board for those models, remove the thermal rubbers
from the removed system board and put them onto
the new system board. And then install the new
system board to the base cover. (For the location of
the therma rubbers, see "Thermal rubbers location"
on page 93.)

For A20m/p and A21m/p series
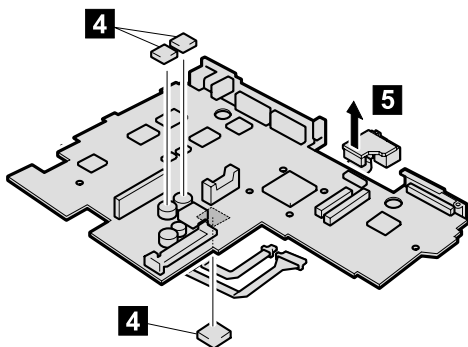
For A22m/p series
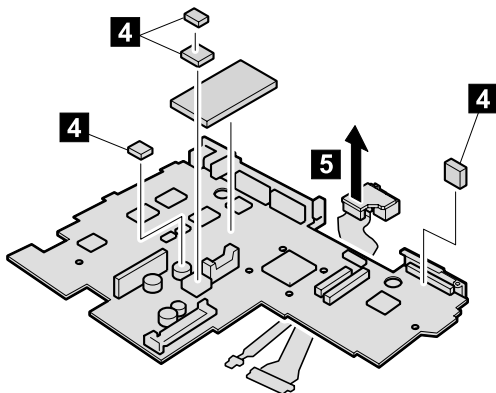
Note: When installing the new RJ45/11 connector
assembly onto the system board, make sure that
the connector is firmly attached.

Thermal rubbers location

Before installing the new system board, make sure that the thermal rubbers are placed on the system board as shown in the following figures.

For A21m/p series
Upper side of the system board
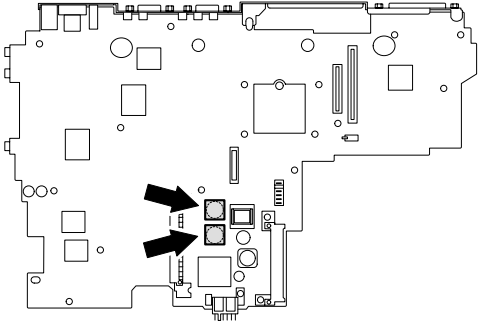
Bottom side of the system board
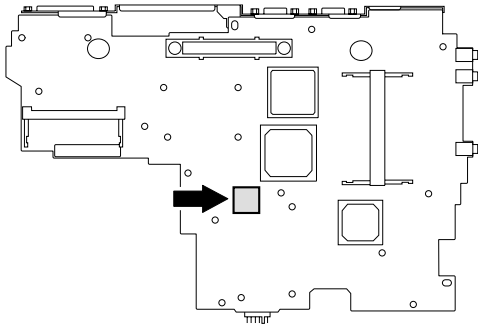

For A22m/p series
Upper side of the system board
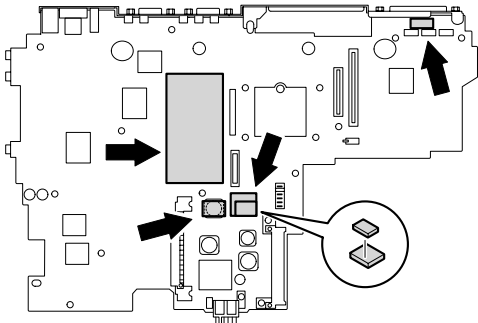
2010 LCD assembly

For access, remove these FRUs, in order:
- "1010 Battery pack" on page 60
- "1050 Hard-disk drive or RF ID adapter" on page 67
- "1060 Ultrabay 2000 device" on page 69
- "1070 Keyboard" on page 71
- "1080 Keyboard CRU insulator" on page 74
- "1090 Hinge cover and clear sheet icon" on page 75
- "1100 Keyboard bezel and speaker" on page 76

Note: Screws **1a** are for MT2628-Fxx, -Gxx, -Pxx, -Qxx, -Rxx, -Sxx, -Txx, -Xxx, MT2633-Gxx, -Txx and MT2629. Other models do not have them.
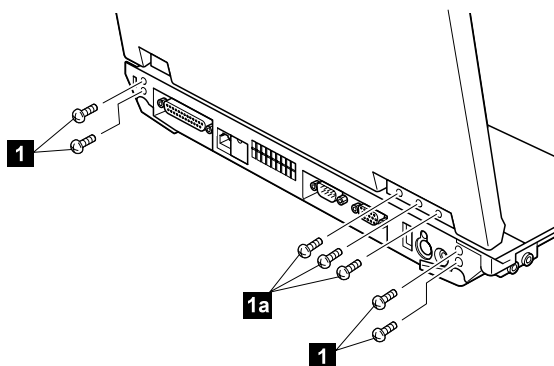
Step	Screw (quantity)	Torque
1a	M2.5 × 4.8 mm, nylon-coated (3)	0.392 Nm (4 kgfcm)
1	M2.5 × 4.8 mm, nylon-coated (4)	0.392 Nm (4 kgfcm)

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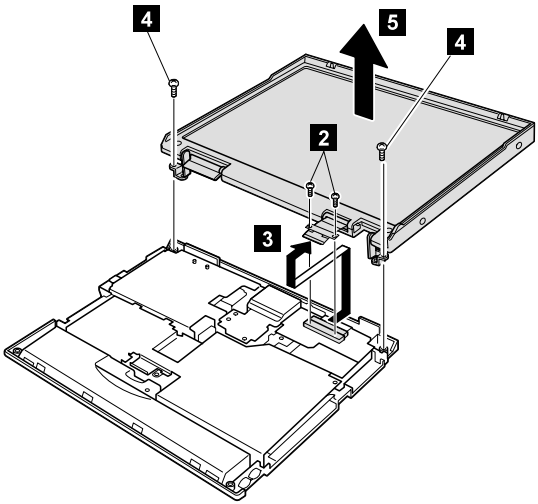
Step	Screw (quantity)	Torque
2	M2.6 × 2.8 mm, nylon-coated (2)	0.392 Nm (4 kgfcm)
4	M2.5 × 4.8 mm, nylon-coated (2)	0.392 Nm (4 kgfcm)

2020 Front bezel

For access, remove these FRUs, in order:
- "1010 Battery pack" on page 60
- "1050 Hard-disk drive or RF ID adapter" on page 67
- "1060 Ultrabay 2000 device" on page 69
- "1070 Keyboard" on page 71
- "1080 Keyboard CRU insulator" on page 74
- "1090 Hinge cover and clear sheet icon" on page 75
- "1100 Keyboard bezel and speaker" on page 76
- "2010 LCD assembly" on page 94

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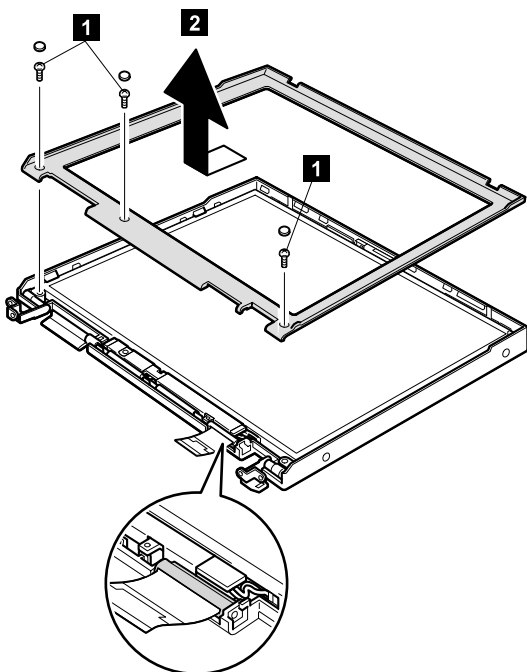
Step	Screw (quantity)	Torque
1	M2.5 × 4.8 mm, nylon-coated (3)	0.392 Nm (4 kgfcm)

14.1-in. and 15.0-in. panels
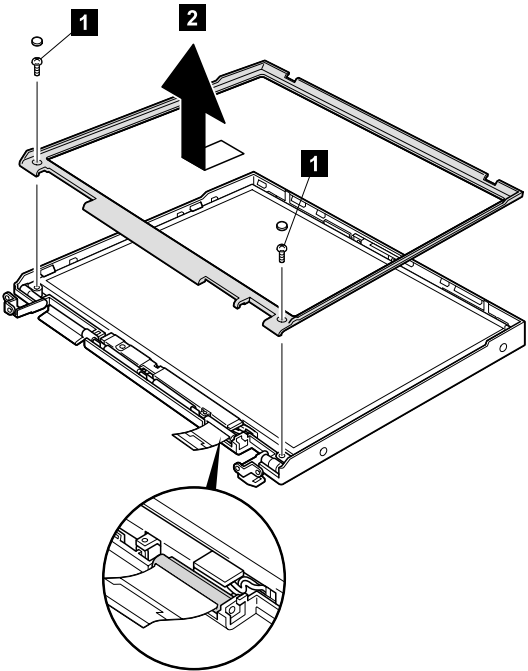
Step	Screw (quantity)	Torque
1	M2.5 × 4.8 mm, nylon-coated (2)	0.392 Nm (4 kgfcm)

Note: Only the front bezel for the 15.0-in. XGA TFT (LG)
has a identifying mark (○), as in the following
figure. For the FRU list, see "15.0-in. XGA TFT
(LG)" on page 138.
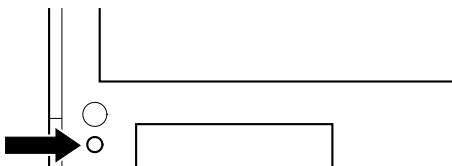
2030 Inverter card

For access, remove these FRUs, in order:
- "1010 Battery pack" on page 60
- "1050 Hard-disk drive or RF ID adapter" on page 67
- "1060 Ultrabay 2000 device" on page 69
- "1070 Keyboard" on page 71
- "1080 Keyboard CRU insulator" on page 74
- "1090 Hinge cover and clear sheet icon" on page 75
- "1100 Keyboard bezel and speaker" on page 76
- "2010 LCD assembly" on page 94
- "2020 Front bezel" on page 96

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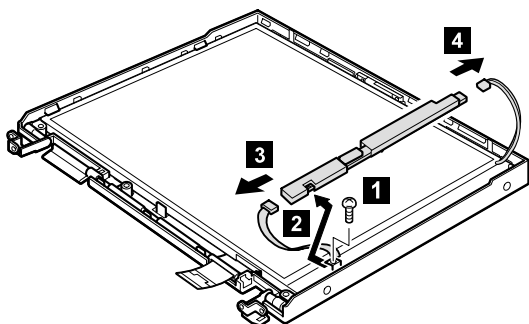
Step	Screw (quantity)	Torque
1	M2.5 × 4.8 mm, nylon-coated (1)	0.392 Nm (4 kgfcm)

(continued)

14.1-in. and 15.0-in. panels
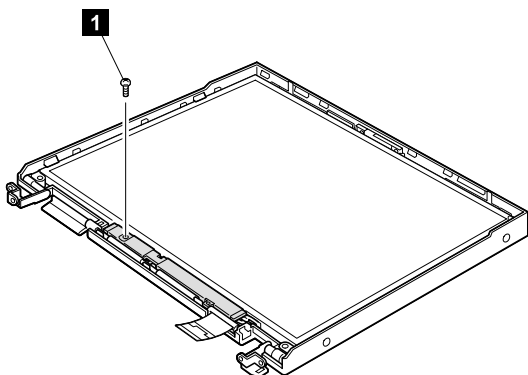
Step	Screw (quantity)	Torque
1	M2.5 × 4.8 mm, nylon-coated (1)	0.392 Nm (4 kgfcm)
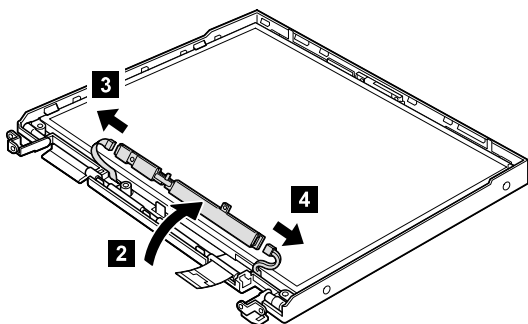
2040 LCD panel

For access, remove these FRUs, in order:
- "1010 Battery pack" on page 60
- "1050 Hard-disk drive or RF ID adapter" on page 67
- "1060 Ultrabay 2000 device" on page 69
- "1070 Keyboard" on page 71
- "1080 Keyboard CRU insulator" on page 74
- "1090 Hinge cover and clear sheet icon" on page 75
- "1100 Keyboard bezel and speaker" on page 76
- "2010 LCD assembly" on page 94
- "2020 Front bezel" on page 96
- "2030 Inverter card" on page 99

12.1-in. panel
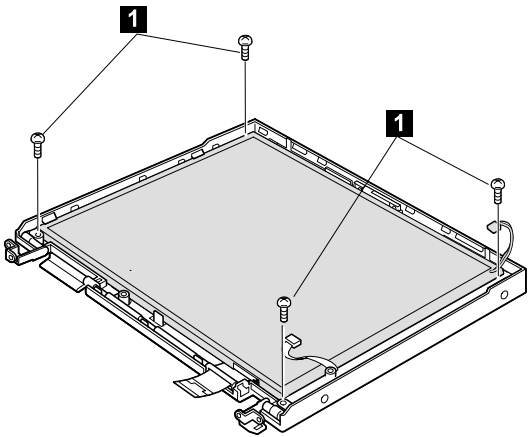
Step	MT	Screw (quantity)	Torque
1	2628-Dxx, Qxx, 1xx, 2xx	M2.5 x 7.0 mm, nylon-coated (4)	0.392 Nm (4 kgfcm)
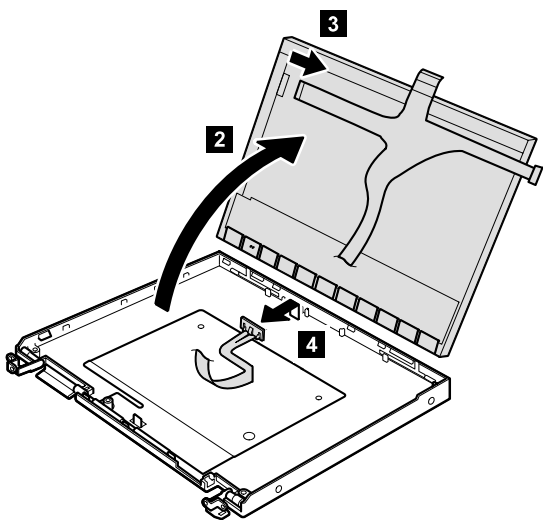
(continued)

(continued)

14.1-in. and 15.0-in. panels
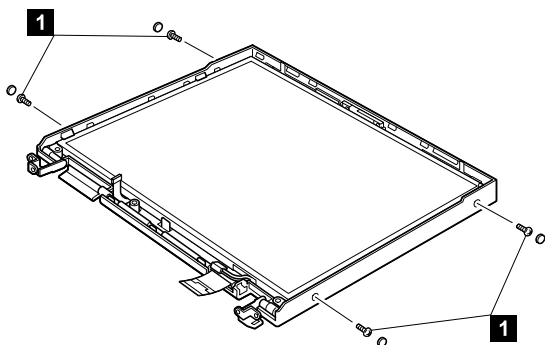
Step	MT	Screw (quantity)	Torque
1	2628-Fxx, Pxx, Rxx, 3xx	M2 × 5.7 mm, nylon-coated (4)	0.245 Nm (2.5 kgfcm)
	2628-Exx, Gxx, Xxx, Txx and 2633-Gxx, Txx, 4xx	M2 × 5.7 mm, nylon-coated (4)	0.167 Nm (1.7 kgfcm)
	2628-Sxx and 2629	M2 × 5.1 mm, nylon-coated (4)	0.196 Nm (2.0 kgfcm)

(continued)

ThinkPad A20m/p, A21m/p and A22m/p   **103**

- For the 14-in. LCD, the LCD cable is taped onto the connector. Tear off the tape before disconnecting the LCD cable in step 4 .
- The LCD cable for the 15.0-in. UXGA LCD (27L0598) and the LCD cable for the 15.0-in. SXGA+ LCD (27L0488) have the UltraPort connector and need step 6 . If the UltraPort adapter has been screwed onto the LCD, remove the adapter before step 6 . To do this, remove the screws from both sides of the adapter as shown in the figure 2a . For other cable, do as shown in the figure 2b .
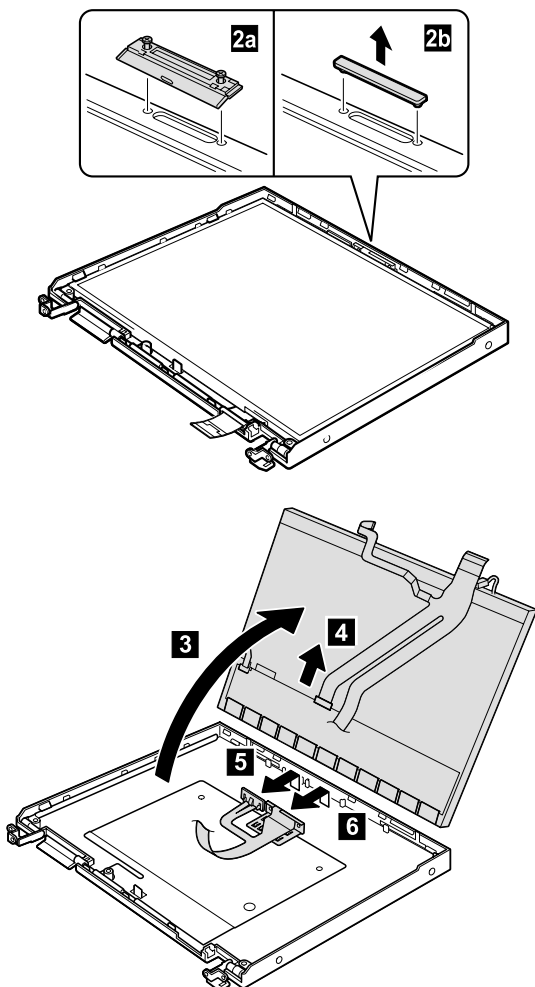
3010 ThinkPad Dock PCI cover

Before replacing the PCI cover:

There are two types of ThinkPad Dock as follows:

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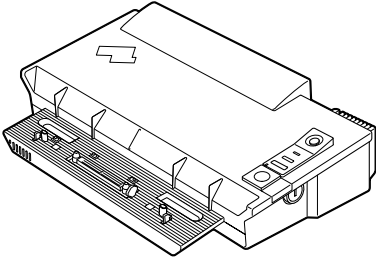
- ThinkPad Dock with extension plate: FRU part no. 08N1537 (PCI cover: FRU part no. 08N7317)
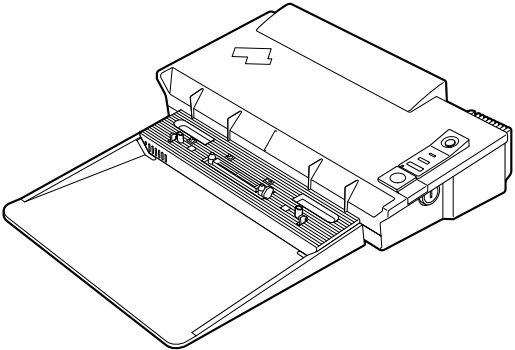
Make sure that the PCI cover FRU suits the ThinkPad Dock you are servicing.

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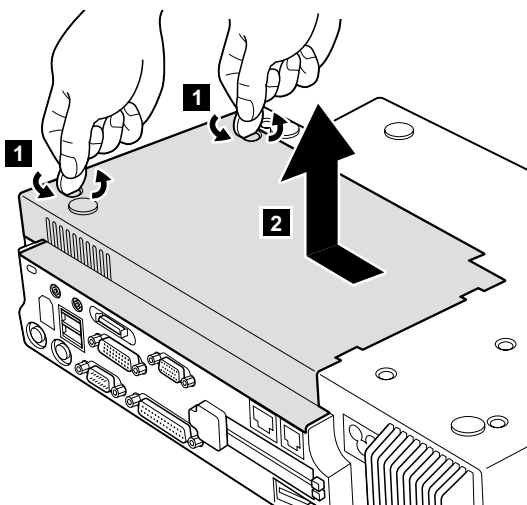
(Bottom view)

3020 ThinkPad Dock top cover

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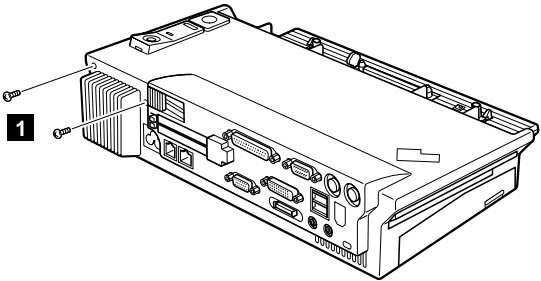
(Rear view)

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

(continued)
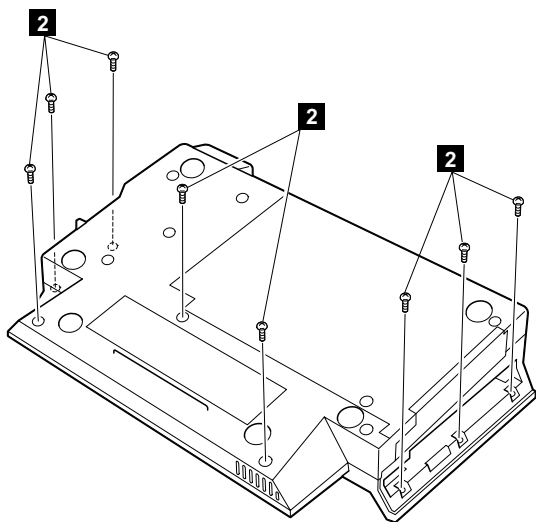
(Bottom view)

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

(continued)

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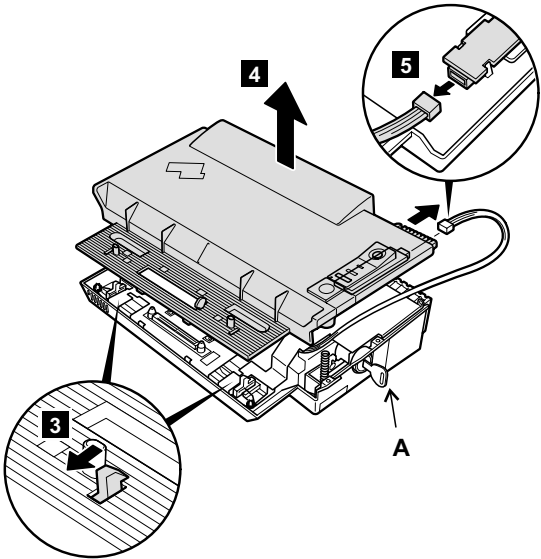
When replacing the top cover, do the following:

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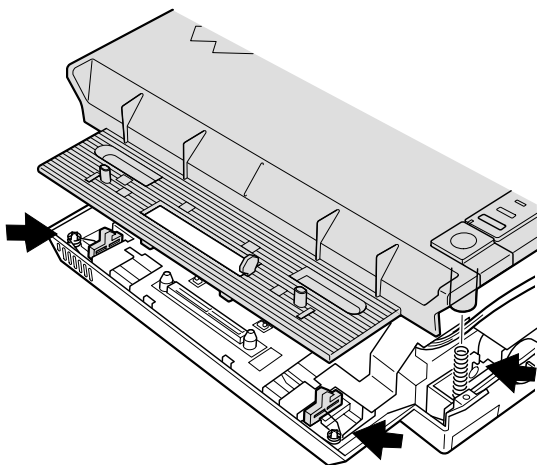
- Make sure that the device release lever is seated correctly.
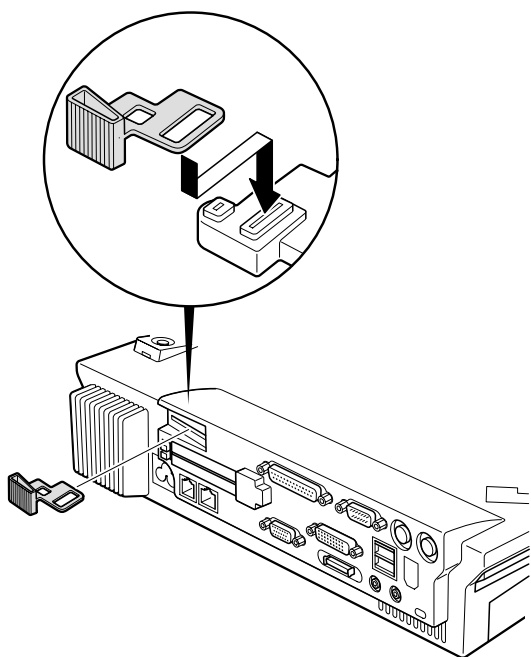
(continued)

- Make sure that the release button works correctly.
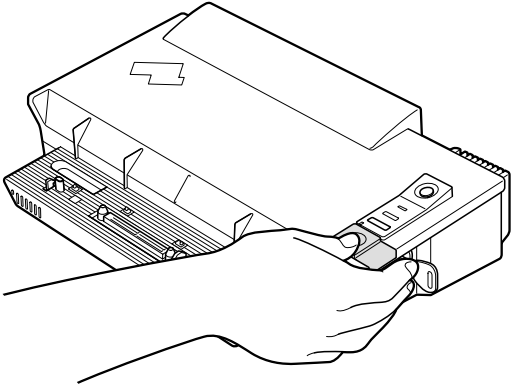
Locations

Front view

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

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

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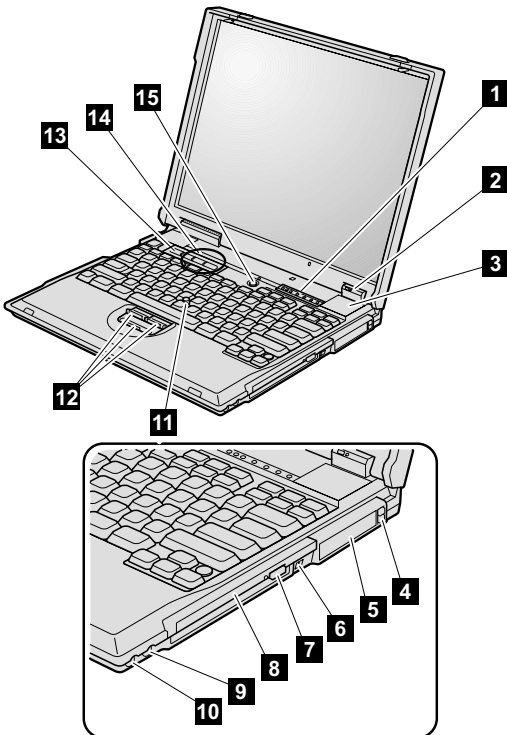
Rear view

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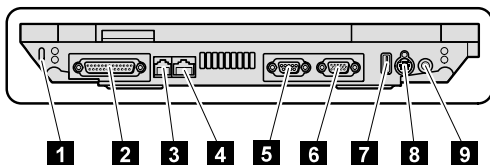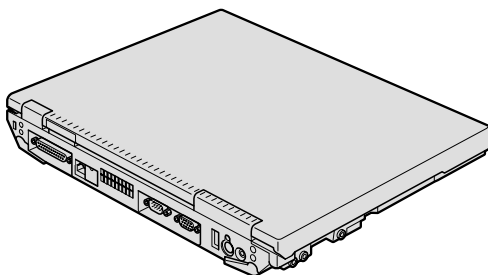
Bottom view

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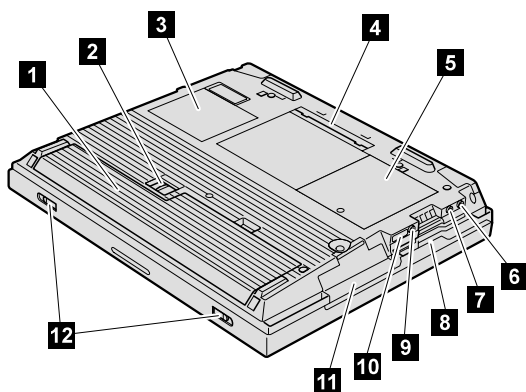
Parts list

A series model matrix

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

Model	CPU	Bay device	Mini PCI adapter	LCD	HDD
A20m (Memory, 64 MB; Video memory, 4 MB)					
2628-11x except 11J, 11K 2628-12x except 12J, 12K	Cel 500	CD-ROM	Modem	12.1-in. SVGA	6 GB
2628-11J, 11K, 12J, 12K			Ethernet		
2628-14x, 1Rx, 1Sx, 1Tx			Combo (Intel)		
2628-1Ox		—	—		—
2628-1Ax except 1AJ, 1AK 2628-1Cx except 1CJ, 1CK	Cel 550	CD-ROM	Modem		6 GB
2628-1AJ, 1AK, 1CJ, 1CK			Ethernet		
2628-1Ux, 1Vx			Combo (Intel)		
2628-1Zx		—	—		—
2628-21x except 21J, 21K 2628-22x except 22J, 22K	CM 500	CD-ROM	Modem		6 GB
2628-21J 21K, 22J, 22K			Ethernet		
2628-24x, 2Sx, 2Tx			Combo (Intel)		
2628-2Ox		—	—		—

(continued)

Model	CPU	Bay device	Mini PCI adapter	LCD	HDD
A20m (Memory, 64 MB; Video memory, 8 MB)					
2628-31x except 31J, 31K 2628-32x except 32J, 32K	Cel 500	CD-ROM	Modem	15.0-in. XGA	12 GB
2628-31J, 31K, 32J, 32K			Ethernet		
2628-3Sx, 3Tx			Combo (Intel)		
2628-3Ax except 3AJ 2628-3Cx except 3CJ	Cel 550		Modem		
2628-3AJ, 3CJ			Ethernet		
2628-3Ux, 3Vx			Combo (Intel)		
2628-3Zx		—	—		—
2628-3Jx, 3Kx *1	CM 700G	DVD-ROM	Modem		18 GB
2628-47x, 48x	Cel 500	CD-ROM	Modem	14.1-in. XGA	12 GB
2628-4Ax except 4AK 2628-4Cx except 4CK	CM 600G	DVD-ROM	Modem		
2628-4AK, 4CK			Ethernet		
2628-4Ux, 4Vx			Combo (Intel)		
2628-4Zx		—	—		—
2628-4Dx, 4Ex	CM 650G	CD-ROM	Modem		12 GB
2628-4Fx, 4Gx		DVD-ROM	Modem		
2628-41x except 41J, 41K 2628-42x except 42J, 42K 2628-44x except 44J, 44K	CM 700G	CD-ROM	Modem		
2628-41J, 41K, 42J, 42K, 44J, 44K			Ehternet		
2628-43x, 45x			—		

*1: Memory 128 MB

(continued)

Model	CPU	Bay device	Mini PCI adapter	LCD	HDD
A20m (Memory, 64 MB; Video memory, 8 MB)					
2628-4Lx [1]	CM 700G	CD-ROM	Modem	14.1-in. XGA	12 GB
2628-4Sx, 4Tx			Combo (Intel)		
2628-4Ox		—	—		—
2628-4Wx, 4Xx		CD-ROM	Combo (3Com)		12 GB
2628-4Hx, 4Ix [1]		DVD-ROM	Modem		18 GB
2633-41x except 41J, 41K 42x except 42J, 42K		CD-ROM	Modem		12 GB
2633-41J, 41K, 42J, 42K			Ethernet		
2633-43x, 45x			—		
2633-4Sx, 4Tx			Combo (Intel)		
2633-4Wx, 4Xx			Combo (3Com)		
A20p (Memory, 128 MB; Video memory, 16 MB)					
2629-61x except 61J, 61K 2629-62x except 62J, 62K	CM 700G	DVD-ROM	Modem	15.0-in. SXGA+	18 GB
2629-61J, 61K, 62J, 62K			Ehternet		
2629-6Sx, 6Tx			Combo (Intel)		
2629-6Ox		—	—		—
2629-6Ax except 6AJ, 6AK 2629-6Cx except 6CJ, 6CK	CM 750G	DVD-ROM	Modem		20 GB
2629-6AJ, 6AK, 6CJ, 6CK			Ethernet		
2629-6Ux, 6Vx			Combo (Intel)		
2629-6Zx		—	—		—

[1]: Memory 128 MB

(continued)

Model	CPU	Bay device	Mini PCI adapter	LCD	HDD
A21m (Memory, 64 MB; Video memory, 4 MB)					
2628-C1x, C2x	Cel 600	CD-ROM	Modem	12.1-in. SVGA	10 GB
2628-C4x			Combo (Intel)		
2628-CXx, CYx			Combo (3Com)		
2628-COx		—	—		—
2628-D1x, D2x	CM 700G	CD-ROM	Modem		10 GB
2628-D4x			Combo (Intel)		
2628-DXx, DWx			Combo (3Com)		
2628-DOx		—	—		—
2628-EDx, EEx		CD-ROM	Modem	14.1-in. XGA	10 GB
2628-E1x, E2x		DVD-ROM			
2628-ESx, ETx			Combo (Intel)		
2628-EXx, EWx			Combo (3Com)		
2628-EFx, EGx			Modem		20 GB
2628-EOx		—	—		—
2628-JAx except JAJ 2628-JCx except JCJ	Cel 700	CD-ROM	Modem	15.0-in. XGA	20 GB
2628-JAJ, JCJ			Ethernet		
2628-JUx except JUY 2628-JVx			Combo (Intel)		
2628-JUY			Combo (3Com)		

(continued)

Model	CPU	Bay device	Mini PCI adapter	LCD	HDD
A21m (Memory, 64 MB; Video memory, 8 MB)					
2628-F1x, F2x except F2J	CM 750G	CD-ROM	Modem	15.0-in. XGA	20 GB
2628-F2J			Ethernet		
2628-FXx, FWx			Combo (3Com)		
2628-FSx, FTx			Combo (Intel)		
2628-FOx		—	—		—
2628-FDC *1		DVD-ROM	Modem		20 GB
2628-G1x except G1J 2628-G2x except G2J 2628-G4x except G4J	CM 800G	DVD-ROM	Modem	14.1-in. XGA	
2628-GLx *1					
2628-G1J, G2J, G4J			Ethernet		
2628-G3x, G5x			—		
2628-GSx, GTx			Combo (Intel)		
2628-GXx, GWx			Combo (3Com)		
2628-GOx		—	—		—
2633-G1x except G1J, G1K 2633-G2x except G2J, G2K		DVD-ROM	Modem		20 GB
2633-G1J, G1K, G2J, G2K			Ethernet		
2633-GSx, GTx			Combo (Intel)		
2633-GXx, GWx			Combo (3Com)		

*1: Memory 128 MB

(continued)

Model	CPU	Bay device	Mini PCI adapter	LCD	HDD
A21p (Memory, 128 MB; Video memory, 16 MB)					
2629-H1x, H2x except H2J	CM 850G	DVD-ROM	Modem	15.0-in. UXGA	32 GB
2629-H2J			Ehternet		
2629-HSx, HTx			Combo (Intel)		
2629-HXx, HWx			Combo (3Com)		
2629-HOx		—	—		—
A22m (Memory, 64 MB; Video memory, 4 MB)					
2628-P1x except P1J 2628-P2x except P2J	CM 800G	CD-ROM	Modem	15.0-in. XGA	10 GB
2628-P1J, P2J			Ethernet		
2628-PSx, PTx, PQH, PRA			Combo (Intel)		
2628-Q1x except Q1J 2628-Q2x except Q2J			Modem	12.1-in. SVGA	20 GB
2628-Q1J, Q2J			Ethernet		
2628-QSx, QTx			Combo (Intel)		
2628-QQx, QRx, QUx, QVx					
2628-XxG	CM 850G	DVD-ROM		14.1-in. XGA	
2628-R1x except R1J 2628-R2x except R2J	CM 850G	DVD-ROM	Modem	15.0-in. XGA	
2628-R1J, R2J			Ethernet		
2628-RAC		CD-ROM	Modem		
2628-RSx, RTx, RQA		DVD-ROM	Combo (Intel)		

(continued)

Model	CPU	Bay device	Mini PCI adapter	LCD	HDD
A22m (Memory, 64 MB; Video memory, 8 MB)					
2628-S1x excepting S1J 2628-S2x excepting S2J	CM 900G	DVD-ROM	Modem	15.0-in. SXGA+	20 GB
2628-S1J, S2J			Ethernet		
2628-SAC *1			Modem		
2628-SSx, STx			Combo (Intel)		
2628-T1x excepting T1J 2628-T2x excepting T2J *1	CM 1KG		Modem	14.1-in. XGA	30 GB
2628-T7x, T8x, TMx, TNx					
2628-T1J, T2J *1			Ethernet		
2628-T3x, T5x *1			—		
2628-TSx, TTx, TUx *1			Combo (Intel)		
2628-TQx, TRx, TUx, TVx *1					
2628-TXx, TWx *1			Combo (3Com)		
2633-T1x excepting T1J, T1K 2633-T2x excepting T2J, T2K *1			Modem		
2633-T1J, T1K, T2J, T2K *1			Ethernet		
2633-T3x, T5x *1			—		
2633-TSx, TTx *1			Combo (Intel)		
2633-TXx, TWx *1			Combo (3Com)		

*1: Memory 128 MB

(continued)

Model	CPU	Bay device	Mini PCI adapter	LCD	HDD
A22p (Memory, 128 MB; Video memory, 16 MB)					
2629-Y1x except Y1J 2629-Y2x except Y2J	CM 900G	CD-R/W	Modem	15.0-in. UXGA	32 GB
2629-Y1J, Y2J			Ethernet		
2629-YSx, YTx			Combo (Intel)		
2629-YUx, YVx		DVD-ROM			
2629-U1x except U1J 2629-U2x except U2J	CM 1KG	CD-R/W	Modem		
2629-U1J, U2J			Ethernet		
2629-USx, UTx			Combo (Intel)		
2629-UQx, URx, UUx, UVx					

CMxxx: Mobile Intel® Pentium® III processor xxx MHz, L2 256-KB cache

CM xxxG:
Mobile Intel® Pentium® III processor at xxx MHz featuring Intel® SpeedStep™ technology

CMG xKG:
Mobile Intel® Pentium® III processor at x GHz featuring Intel® SpeedStep™ technology

Celxxx: Intel® Celeron® processor xxx MHz, L2 256-KB cache

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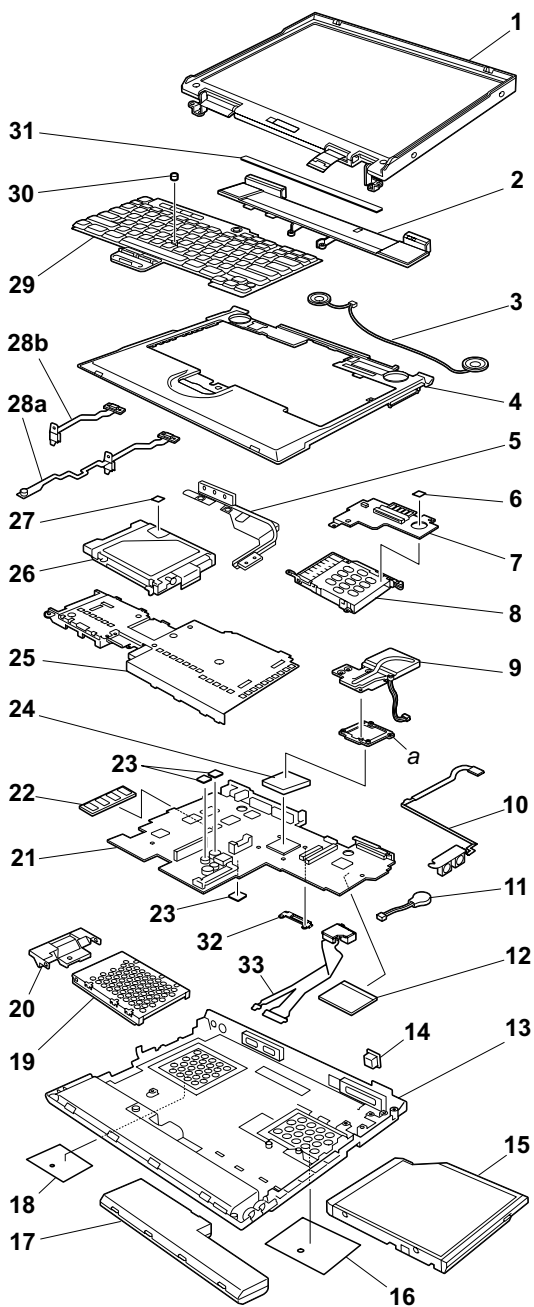
- Each FRU is available for all types/models, unless specific types or models are given.
- The FRUs marked with asterisk are CRUs (customer replacable units).
- The FRUs marked with **OP** are also available as optional FRUs.

No.	FRU	P/N
a	See "Miscellaneous parts" on page 145.	
1	LCD unit (see "LCD FRUs" on page 136)	
2	Hinge cover (for A20m/A20p)	
	12.1/14.1-in. LCD models 2628-1xx, 2xx, 4xx, Bxx, 2633-all	04P3970
	15.0-in. LCD models 2628-3xx	04P3972
	15.0-in. LCD with heatpipe models 2629-all	04P3971
	Hinge cover (for A21m/A21p)	
	12.1/14.1-in. LCD models 2628-Cxx, Dxx, Exx	04P3970
	15.0-in. LCD models 2628-Jxx	04P3972
	12.1/14.1-in. LCD with heatpipe models 2628-Gxx, 2633-Gxx	04P3490
	15.0-in. LCD with heatpipe models 2628-Fxx	04P3971
	15.0-in. LCD with heatpipe models 2629-Hxx	08K0863
	Hinge cover (for A22m/A22p)	
	12.1/14.1-in. LCD with heatpipe models 2628-Qxx, Txx, Xxx, 2633-Txx	08K7301
	15.0-in. LCD with heatpipe models 2628-Pxx, Rxx, Sxx, 2629-Uxx, Yxx	08K7302
3	Speaker assembly	
	12.1/14.1-in. LCD models 2628-1xx, 2xx, 4xx, Bxx, Cxx, Dxx, Exx, Gxx, Kxx, Qxx, Txx, Xxx 2633-4xx, Gxx, Txx	02K5007
	15.0-in. LCD models 2628-3xx, Fxx, Jxx, Pxx, Rxx, Sxx 2629-6xx, Hxx, Uxx, Yxx	02K5644

(continued)

No.	FRU	P/N
4	Keyboard bezel for 12.1/14.1-in. LCD models	
	2628-1xx, 2xx, 4xx, Dxx, Exx, Gxx, Qxx, Txx except xxK 2628-Bxx, Xxx 2633-4xx, Gxx, Txx except xxK	08K5667
	2628-1xK, 2xK, 4xK, DxK, ExK, GxK, QxK, TxK 2633-4xK, GxK, TxK	08K5669
	Keyboard bezel for 12.1/14.1-in. LCD (1 slot) models	
	2628-Cxx except CxK	04P3726
	2628-CxK	08K7090
	Keyboard bezel for 15.0-in. LCD models	
	2628-3xx, Fxx, Pxx, Rxx, Sxx except xxK 2629-6xx, Hxx, Uxx , Yxx except xxK	08K7162
	2628-3xK, FxK, PxK, RxK, SxK 2629-6xK, HxK, UxK	08K7163
	Keyboard bezel for 15.0-in. LCD (1slot) models	
	2628-Jxx except JxK	08K7164
	2628-JxK	08K7165
5	Heatpipe hinge (lower) 2628-Fxx, Gxx, Pxx, Qxx, Rxx, Sxx, Txx 2629-6xx, Fxx, Gxx, Hxx, Uxx, Yxx 2633-Gxx, Txx	08K7287
6	Spacer, PC card slots 2629-6xx, Hxx, Uxx, Yxx	04P3223
7	Sub card	
	for A20m, A20p	10L1418
	for A21m, A22m except 2628-Sxx	08K3306
	for 2628-Sxx, A21p, A22p	08K3261
8	PC card slots (2 slots) all models except 2628-Cxx, Jxx	04P3523
	PC card slot (1 slot) 2628-Cxx, Jxx	04P3398
9	Fan assembly	
	2628-1xx, 2xx, 47x, 48x, Bxx 2628-3xx except 3JC, 3KC	08K5650
	2628-4xx except 47x, 48x 2628-3JC, 3KC 2633-4xx 2629-6xx	08K6614

(continued)

No.	FRU	P/N
9	Fan assembly	
	2628-Cxx, Dxx, Exx, Jxx	04P3482
	2628-Fxx, Gxx, Pxx, Qxx, Rxx 2633-Gxx 2629-Fxx, Gxx, Hxx	04P3483
	2628-Sxx, Txx, 2629-Uxx, 2633-Txx	26P9207
10	TV card (out only) 2628-Fxx, Gxx, Sxx, Txx, Xxx 2633-Gxx, Txx	08K3259
	TV card (in/out) 2629-6xx, Hxx, Uxx	10L1419
11	Backup battery	02K6572
12	Mini PCI adapter	
	Mini PCI combo card (Intel) for A20m/p, A21m/p **OP** 2628-14U, 14F, 1Sx, 1Tx, 24U, 24F, 2Sx, 2Tx, 3Sx, 3Tx, 4Sx, 4Tx 2628-1Ux, 1Vx, 3Ux, 3Vx, 4Ux, 4Vx 2628-xxJ, xxK 2629-6Sx, 6Tx, 6Ux, 6Vx 2629-xxJ, xxK 2633-4Sx, 4Tx 2633-xxJ, xxK	08K3125*
	Mini PCI combo card (Intel) for A22m/p **OP** 2628-xSx, xTx 2629-xSx, xTx 2633-xSx, xTx	06P3809*
	Mini PCI combo card (3Com) for A20m, A21m **OP** 2628-4Wx, 4Xx, GWx, GXx 2633-4Wx, 4Xx, GWx, GXx	00N8117*
	Mini PCI combo card (3Com) for A22m **OP** 2628-xXx, xWx 2633-xXx, xWx	22P6753*
	Mini PCI combo card (CR) for A21m/p **OP** 2628-all except xxJ, xxK 2629-all except xxJ, xxK 2633-all except xxJ, xxK	19K5888*

(continued)

No.	FRU	P/N
12	Mini PCI adapter	
	Mini PCI modem card (Ambit) for A20m/p, A21m/p 2628-11x, 12x, 21x, 22x, 31x, 32x, 41x, 42x, 44x, 47x, 48x, 4Dx, 4Ex, 4Fx, 4Gx, 4Hx, 4Ix, Bxx except xxJ, xxK, xxA 2628-1Ax, 1Cx, 3Ax, 3Cx, 4Ax, 4Cx, 4Lx except xxA, xxJ, xxK 2628-Cxx, Dxx, Exx, Fxx, Gxx except xxA 2628-3JC, 3KC 2628-JAx, JCx except xxA 2629-61x, 62x except xxA, xxJ, xxK 2629-Hxx except xxA 2633-41x, 42x except xxA, xxJ, xxK 2633-Gxx except xxA	08K3252
	Mini PCI modem card (Ambit) for A22m/p 2628-x1x, x2x except xxJ, xxK 2629-U1x, U2x except xxJ, xxK 2633-x1x, x2x except xxJ, xxK	08K3383
	Mini PCI modem card (M2) (IBM) for A20m/p 2628-11A, 12A, 1AA, 1CA, 21A, 22A, 31A, 32A, 3AA, 3CA, 41A, 42A, 44A, 47A, 48A, 4AA, 4CA, 4LA, 4DA, 4EA, 4FA, 4GA, 4HA, 4IA 2629-61A, 62A 2633-41A, 42A	08K3429
	Mini PCI modem card (IBM CR) for A21m/p 2628-xxA 2629-xxA 2633-xxA	08K3338
	Mini PCI Ethernet card (Intel) 2.6 for A20m/p 2628-xxJ, xxK except 43x, 45x 2629-xxJ, xxK 2633-41J, 41K, 42J, 42K	10L1423
	Mini PCI Ethernet card (Intel) 3.0 for A21m/p 2628-xxJ, xxK 2629-xxJ, xxK 2633-xxJ, xxK for A22m/p 2628-x1J, x1K, x2J, x2K 2629-U1J, U1K, U2J, x2K 2633-x1J, x1K, x2J, x2K	08K3348

(continued)

No.	FRU	P/N
13	Base cover for A20m	
	2628-1xx, 2xx, 3xx, 4xx except xxK, xxT, 2628-Bxx	04P3410
	2628-1xK, 2xK, 3xK, 4xK	04P3412
	2628-1xT, 2xT, 3xT, 4xT	04P3411
	2633-4xx except 4xK, 4xT	08K5901
	2633-4xK	08K5904
	2633-4xT	08K5902
	Base cover for A20p	
	2629-6xx except 6xK, 6xT	08K5640
	2629-6xK	08K5646
	2629-6xT	08K5642
	Base cover for A21m	
	2628-Dxx, Exx, Fxx, Gxx except xxK, xxT	04P3711
	2628-Jxx except JxK, JxT	04P3712
	2628-DxK, ExK, FxK, GxK	04P3719
	2628-JxK	04P3720
	2628-DxT, ExT, FxT, GxT	04P3715
	2628-JxT	04P3716
	2633-Gxx except GxK, GxT	04P3714
	2633-GxK	04P3722
	2633-GxT	04P3718
	Base cover for A21p	
	2629-Hxx except HxK, HxT	04P3713
	2629-HxK	04P3721
	2629-HxT	04P3717
	Base cover for A22m	
	2628-Pxx, Qxx, Rxx, Sxx, Txx except xxK, xxT	26P9523
	2628-PxK, QxK, RxK, SxK	26P9529
	2628-PxT, QxT, RxT, SxT	26P9529
	2633-Txx except TxK, TxT	26P9525
	2633-TxK	26P9531
	2633-TxT	26P9528
	Base cover for A22p	
	2629-Uxx except UxK, UxT	26P9524
	2629-UxK	26P9530
	2629-UxT	26P9527

(continued)

No.	FRU	P/N
14	Blank cap RJ45 2628-x1x, x2x, x4x except xxJ, xxK 2628-xAx, xCx except xxJ, xxK 2628-3JC, 3KC, 4Lx 2628-47G, 48G, 4DC, 4EC, 4FC, 4GC, 4HC, 4IC 2628-xSx, xTx, xWx, xXx, x1J, x1K, x2J, x2K 2629-x1x, x2x, x4x except xxJ, xxK 2629-xAx, xCx except xxJ, xxK 2629-USx, UTx, U1J, U1K, U2J, U2K 2633-x1x, x2x, x4x except xxJ, xxK 2633-xSx, xTx, xWx, xXx, x1J, x1K, x2J, x2K	04P3975
15	Ultrabay 2000 device	
	CD-ROM drive (TOSHIBA) `OP` 2628-1xx except 10U, 1ZU 2628-2xx except 20U 2628-3xx except 30U, 3JC, 3KC, 3ZU 2628-4xx except 40U 2628-Bxx 2633-4xx	05K9158
	CD-ROM drive (LG) `OP` 2628-1xx except 10U, 1ZU 2628-2xx except 20U 2628-3xx except 30U, 3JC, 3KC, 3ZU 2628-4xx except 40U 2628-Bxx 2628-Cxx, Dxx, Fxx, Jxx 2633-4xx	05K9159
	CD-ROM drive (LG) `OP` 2628-Bxx 2628-Pxx, Qxx, RAx 2633-4xx	08K9545
	CD-ROM drive (TEAC) `OP` 2628-Bxx 2628-Cxx, Dxx, Fxx, Jxx 2628-Pxx, Qxx, RAx 2633-4xx	27L3436
	DVD-ROM drive (MKE) `OP` 2628-4Ax, 4Cx, 4Ux, 4Vx, 3JC, 3KC 2628-6xx except 6ZU 2629-6xx except 60U	05K9188
	DVD-ROM drive (TOSHIBA) `OP` 2628-4Ax, 4Cx, 4Ux, 4Vx, 3JC, 3KC 2628-6xx except 6ZU 2629-6xx except 60U	05K9160

(continued)

No.	FRU	P/N
15	Ultrabay 2000 device	
	DVD-ROM drive 8x (MKE) `OP` 2628-Exx, Gxx 2628-Rxx except RAx, Sxx, Txx, Xxx 2629-Exx, Gxx, Hxx 2629-UUx 2633-Txx	27L3447
	DVD-ROM drive (HITACHI) `OP` 2628-Exx, Gxx 2629-Exx, Gxx, Hxx 2633-Gxx	08K9513
	DVD-ROM drive (HITACHI) `OP` 2628-Rxx except RAx, Sxx, Txx, Xxx 2629-UUx 2633-Txx	27L4087
	CD-R/W drive (SONY) `OP` 2629-Uxx except UUx	08K9617
	for optional Ultrabay 2000 device, see "Optional FRUs" on page 147.	
16	Cover, Mini PCI adapter slot	08K7294
17	Battery pack (6 cell)	
	Panasonic Li-Ion 2628-1xx, 2xx, 3xx, 4xx, Bxx 2628-Cxx, Dxx, Exx, Fxx, Gxx, Jxx except xxE, xxJ, xxK 2628-Pxx, Qxx, Rxx, Sxx, Txx except xxE, xxJ 2633-4xx, Txx 2633-Cxx, Dxx, Exx, Fxx, Gxx, Jxx except xxE, xxJ, xxK	02K6614*
	SANYO Li-Ion 2628-1xx, 2xx, 3xx, 4xx, Bxx 2628-Cxx, Dxx, Exx, Fxx, Gxx, Jxx except xxE, xxJ, xxK 2628-Pxx, Qxx, Rxx, Sxx, Txx except xxE, xxJ 2633-4xx, Txx 2633-Cxx, Dxx, Exx, Fxx, Gxx, Jxx except xxE, xxJ, xxK	02K6618*
	Panasonic Li-Ion (ECO) 2628-xxE 2628-DxJ, ExJ, FxJ, GxE, GxJ, IxJ 2628-xxJ except CxJ, JxJ 2633-DxJ, ExJ, FxJ, GxE, GxJ, IxJ	02K6769*

(continued)

No.	FRU	P/N
17	Battery pack (6 cell)	
	SANYO Li-Ion (ECO) 2628-xxE, xxJ 2628-DxJ, ExJ, FxJ, GxE, GxJ, IxJ 2628-xxJ except CxJ, JxJ 2633-DxJ, ExJ, FxJ, GxE, GxJ, IxJ	02K6770*
	Panasonic NiMH (ECO) 2628-CxK	02K6720*
	SANYO NiMH (ECO) 2628-CxJ, JxJ	02K6864*
	Battery pack (9 cell)	
	Panasonic Li-Ion OP 2629-6xx 2629-Hxx except HxJ 2629-Uxx except UxE, UxJ	02K6615*
	SANYO Li-Ion OP 2629-6xx 2629-Hxx except HxJ 2629-Uxx except UxE, UxJ	02K6619*
	Panasonic Li-Ion (ECO) 2629-HxJ, UxE, UxJ	02K6860*
	SANYO Li-Ion (ECO) 2629-HxJ, UxE, UxJ	02K6862*
18	Cover, DIMM slot	08K7295
19	Hard-disk drive (6.0 GB), STD OP 2628-1xx except 10U, 1ZU 2628-2xx except 20U 2628-Bxx	05K9227
	Hard-disk drive (6.0 GB), HITACHI OP 2628-1xx except 10U, 1ZU 2628-2xx except 20U 2628-Bxx	05K9228
	Hard-disk drive (10.0 GB), STD OP 2628-Cxx, Dxx, Exx, Jxx, Pxx	08K9508
	Hard-disk drive (10.0 GB), HITACHI OP 2628-Cxx, Dxx, Exx, Jxx, Pxx	08K9531
	Hard-disk drive (12.0 GB), STD OP 2628-3xx except 30U, 3JC, 3KC, 3ZU 2628-4xx except 40U, 4ZU 2633-4xx	05K9229
	Hard-disk drive (12.0 GB), HITACHI OP 2628-3xx except 30U, 3JC, 3KC, 3ZU 2628-4xx except 40U, 4ZU 2633-4xx	05K9230
	Hard-disk drive (18.0 GB), STD OP 2628-3JC, 3KC 2629-6xx except 60U	27L4073

(continued)

No.	FRU	P/N
19	Hard-disk drive (18.0 GB), STD `OP` 2628-3JC, 3KC 2629-6xx except 60U	27L4073
	Hard-disk drive (20.0 GB), STD `OP` 2628-Qxx, Rxx, Sxx, Xxx, T7x, T8x, TUx, TVx 2629-6Ax, 6Cx, 6Ux, 6Vx	27L4075
	Hard-disk drive (20.0 GB), STD `OP` 2628-Fxx, Gxx, Jxx 2633-Gxx	27L3427
	Hard-disk drive (20.0 GB), HITACHI `OP` 2628-Fxx, Gxx, Jxx 2628-Qxx, Rxx, Sxx, Xxx, T7x, T8x, TUx, TVx 2633-Gxx	08K9533
	Hard-disk drive (30.0 GB), STD `OP` 2628-Txx except T7x, 8x, TUx, TVx 2633-Txx	08K9564
	Hard-disk drive (30.0 GB), HITACHI `OP` 2628-Txx except T7x, 8x, TUx, TVx 2633-Txx	08K9692
	Hard-disk drive (32.0 GB), STD `OP` 2629-Hxx, Uxx	08K9509
20	Cover, hard-disk drive for 12.1/14.1-in. models 2628-1xx, 2xx, 4xx, Bxx, Cxx, Dxx, Exx, Gxx, Qxx, Rxx, Txx 2633-4xx, Gxx, Txx	08K5675
	Cover, hard-disk drive for 15.0-in. models 2628-3xx, Fxx, Jxx, Pxx, Sxx 2629-6xx, Fxx, Hxx, Jxx, Uxx	08K5676
—	Asset ID RF adapter (see "Optional FRUs" on page 147)	
21	System board for A20	
	Video memory 4 MB 2628-1xx, 2xx, Bxx	08K3314
	Video memory 8 MB 2628-3xx except 3JC, 3KC	08K3315
	Video memory 8 MB 2628-4xx, 3JC, 3KC, 2633-4xx	08K3316
	Video memory 16 MB 2629-6xx	08K3317
	System board for A21	
	Video memory 4 MB 2628-Cxx, Jxx	08K3262
	Video memory 4 MB 2628-Dxx, Exx	08K3263
	Video memory 4 MB 2628-Jxx	26P7975

(continued)

No.	FRU	P/N
21	System board for A21	
	Video memory 8 MB 2628-Gxx, Fxx, 2633-Gxx	08K3264
	Video memory 16 MB 2629-Hxx	08K3265
	System board for A22	
	without Video memory 2628-Sxx	26P8104
	Video memory 4 MB 2628-Qxx	26P8105
	Video memory 4 MB 2628-Pxx, Rxx, Xxx	26P8106
	Video memory 8 MB 2628-Txx, 2633-Txx	26P8102
	Video memory 16 MB 2629-Uxx, Yxx	26P8103
22	64-MB SDRAM SO DIMM (PC100) `OP` 2628-1xx except 10U, 1ZU 2628-2xx except 20U 2628-3xx except 30U, 3JC, 3KC, 3ZU 2628-4xx except 40U, 4Hx, 4Ix, 4Lx 2628-Cxx, Dxx, Exx, Fxx, Gxx, Jxx, Pxx, Qxx, Rxx, Xxx, T7x, T8x, TUx, TVx 2633-4xx, Gxx	20L0264*
	128-MB SDRAM SO DIMM (PC100) `OP` 2628-4Hx, 4Ix 2628-3JC, 3KC, 4Lx 2628-Txx except T7x, T8x, TUx, TVx 2629-6xx except 60U, 6ZU 2629-Hxx, Uxx 2633-Txx	20L0265*
23	Thermal rubbers	
	2628-Pxx, Qxx, Rxx 2629-Uxx 2633-Txx	08K7157
	2628-Sxx, Txx 2629-Uxx 2633-Txx	26P9337

No.	FRU	P/N
24	CPU, Celeron 500 MHz 2628-1xx, 3xx, 47x, 48x	08K3149
	CPU, Celeron 550 MHz 2628-1Ax, 1Cx, 1Ux, 1Vx, 1ZU, 3Ax, 3Cx, 3Ux, 3Vx, 3ZU	08K3211
	CPU, Pentium III 500 MHz 2628-2xx, Bxx	10L1415
	CPU, Pentium III 600 MHz with SpeedStep technology 2628-4Ax, 4Cx, 4Ux, 4Vx, 4ZU	08K3213
	CPU, Pentium III 650 MHz with SpeedStep technology 2628-4Dx, 4Ex, 4Fx, 4Gx	10L1405
	CPU, Pentium III 650 MHz with SpeedStep technology 2628-Hxx	12P3450
	CPU, Pentium III 700 MHz with SpeedStep technology 2628-4xx except 47x, 48x, 4Dx, 4Ex, 4Fx, 4Gx 2628-3JC, 3KC, 4Lx 2629-6xx 2633-4xx	10L1417
	CPU, Pentium III 750 MHz with SpeedStep technology 2628-Fxx 2629-6Ax, 6Cx, 6Ux, 6Vx, 6ZU	08K3191
	CPU, Pentium III 800 MHz with SpeedStep technology 2628-Gxx, Pxx, Qxx 2633-Gxx	12P3448
	CPU, Pentium III 850 MHz with SpeedStep technology 2628-Rxx, Xxx	12P3450
	CPU, Pentium III 900 MHz with SpeedStep technology 2628-Sxx	26P8126
	CPU, Pentium III 900 MHz with SpeedStep technology 2629-Yxx	08K3346
	CPU, Pentium III 1 GHz with SpeedStep technology 2628-Txx 2629-Uxx 2633-Txx	08K3392
25	Upper shield assembly, front	08K7286
26	Diskette drive (TEAC)	05K9157
	Diskette drive (SONY)	08K9552

(continued)

No.	FRU	P/N
27	Spacer, diskette drive for 2629	04P3225
28a	Microphone/speaker cable for A20m/A20p, A21m/A21p 2628-1xx, 2xx, 3xx, 4xx, Bxx, Dxx, Exx, Fxx, Gxx 2629-6xx, Dxx, Fxx, Gxx, Hxx 2633-4xx, Gxx	27L0484
28b	Speaker cable for A22m/A22p 2628-Cxx, Jxx, Pxx, Qxx, Rxx, Sxx, Txx 2629-Uxx 2633-Txx	27L0601
29	Keyboard* (see "Keyboard" on page 140)	
30	Pointing stick cap for A20, 21	84G6536*
	Pointing stick cap for A22	26P9212*
31	Clear sheet LED icon for A22	08K7304
32	Fan duct for A22 2628-Sxx, Txx, 2629-Uxx, 2633-Txx	26P9208
33	RJ45/11 connector assembly for A22	27L0645
—	Telephone cable	27L0603*
—	Video cable 2628-Fxx, Gxx 2629-6xx, Fxx, Gxx, Hxx, Uxx 2633-Gxx	27L0531
—	AC adapter (see "AC adapter" on page 136.)	
—	Recovery CD (see "Recovery CDs" on page 141.)	

AC adapter

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

FRU	P/N
AC adapter (72 W), 2-pin (ASTEC) models xxE, xxF, xxJ, xxP, xxS, xxU, xxX	02K6669
AC adapter (72 W), 2-pin (DELTA) models xxE, xxF, xxJ, xxP, xxS, xxU, xxX	02K6673
AC adapter (72 W), 2-pin (SANKEN) models xxE, xxF, xxJ, xxP, xxS, xxU, xxX	02K6677
AC adapter (72 W), 3-pin (ASTEC) models xxC, xxG, xxH, xxK, xxT, xxY	02K6666
AC adapter (72 W), 3-pin (DELTA) models xxC, xxG, xxH, xxK, xxT, xxY	02K6670
AC adapter (72 W), 3-pin (SANKEN) models xxC, xxG, xxH, xxK, xxT, xxY	02K6674

LCD FRUs

12.1-in. SVGA TFT
Following FRUs are available for MT2628-1xx, 2xx, Bxx, Cxx, Dxx, Qxx.

FRU	P/N
LCD cover assembly	
2628-1xx, 2xx, Bxx, Cxx, Dxx except xxK	08K5655
2628-1xK, 2xK 2628-CxK, DxK	08K5659
2628-Qxx except QxK (with heatpipe)	08K7288
2628-QxK (with heatpipe)	08K7289
LCD cable 12.1	27L0485
LCD panel 12.1 SVGA (SANYO)	05K9577
Hinges 12.1	08K5664
Inverter card 12.1/14.1/15.0 2628-1xx, 2xx, Bxx	08K3120
Inverter card 12.1 (large) 2628-Cxx, Dxx, Qxx	08K3325

Parts list

14.1-in. XGA TFT
Following FRUs are available for MT2628-4xx, Exx, Gxx, Txx, Xxx, MT2633-4xx, Gxx, Txx.

FRU	P/N
LCD cover assembly 14.1 XGA	
2628-4xx, Exx except xxK 2633-4xx except 4xK	08K5656
2628-4xK, ExK 2633-4xK	08K5660
2628-Txx except TxK 2628-Xxx 2633-Txx except TxK 2633-Xxx	12P4215
2628-TxK 2633-TxK	08K7291
with heatpipe 2628-Gxx except GxK 2633-Gxx except GxK	04P3485
with heatpipe 2628-GxK 2633-GxK	08K7111
LCD cable 14.1 2628-4xx, Exx, Gxx, Txx, Xxx 2633-4xx, Gxx,Txx	27L0486
LCD panel 14.1 XGA (DBU) 2628-4xx, Exx, Gxx, Txx, Xxx 2633-4xx, Gxx, Txx	05K9578
LCD panel 14.1 XGA (SAMSUNG) 2628-4xx, Exx, Gxx, Txx, Xxx 2633-4xx, Gxx, Txx	05K9588
Hinges 14.1 2628-4xx, Exx, Gxx, Txx, Xxx 2633-4xx, Gxx, Txx	08K5665
Inverter card 12.1/14.1/15.0 2628-4xx 2633-4xx	08K3120
Inverter card 12.1/14.1/15.0 2628-Exx	12P3051
Inverter card (slim) 2628-Gxx, Txx 2633-Gxx, Txx	12P3053

15.0-in. XGA TFT (LG)

Following FRUs are available for MT2628-3xx, Jxx, Pxx, Rxx.

FRU	P/N
LCD cover assembly 15.0 XGA	
2628-3xx, Jxx except xxK (without heatpipe)	26P9403
2628-3xK, JxK (without heatpipe)	26P9404
2628-Pxx, Rxx except xxK(with heatpipe)	26P9405
2628-PxK, RxK(with heatpipe)	26P9406
LCD cable 15.0 XGA (LG) 2628-3xx, Jxx, Pxx, Rxx	27L0578
LCD panel 15.0 XGA (LG) 2628-3xx, Jxx, Pxx, Rxx	05K9647
Hinges 15.0 (LG) (for 2628-3xx)	04P3051
Hinges 15.0 2628-3xx, Jxx, Pxx, Rxx	04P3488
Inverter card 12.1/14.1/15.0 (for 2628-3xx)	08K3120
Inverter card 15.0 XGA (for 2628-Jxx)	08K3326
Inverter card (slim) (for 2628-Pxx, Rxx)	12P3053
Misc kit for 15.0 XGA (LG) for 2628-Jxx (see "Miscellaneous parts" on page 145.)	

15.0-in. XGA TFT (SAMSUNG)

Following FRUs are available for MT2628-3xx, Fxx, Jxx, Pxx, Rxx .

FRU	P/N
LCD cover assembly 15.0 XGA	
2628-3xx, Jxx except xxK (without heatpipe)	26P9403
2628-3xK, JxK (without heatpipe)	26P9404
2628-Fxx, Pxx, Rxx except xxK(with heatpipe)	26P9405
2628-FxK, PxK, RxK(with heatpipe)	26P9406
LCD cable 15.0 XGA (SAMSUNG) 2628-3xx, Fxx, Jxx, Pxx, Rxx	27L0487
LCD panel 15.0 XGA (SAMSUNG) 2628-3xx, Fxx, Jxx, Pxx, Rxx	05K9580
Hinges 15.0 2628-3xx, Fxx, Jxx, Pxx, Rxx, Sxx	04P3488
Inverter 12.1/14.1/15.0 (for 2628-3xx)	08K3120
Inverter card 15.0 XGA (for 2628-Jxx)	08K3326
Inverter card (slim) (for 2628-Gxx, Pxx, Rxx, Sxx)	12P3053

15.0-in. SXGA+ TFT

Following FRUs are available for MT2628-Sxx and
2629-6xx.

FRU	P/N
LCD cover assembly	
2628-Sxx except SxK (with heatpipe LM)	26P9210
2628-SxK (with heatpipe LM)	26P9211
2629-6xx except 6xK	26P9532
2629-6xK	26P9533
LCD cable 15.0 SXGA+ (for 2629-6xx)	27L0488

LCD cable 15.0 SXGA+
   2628-Sxx
   2629-6xx
	27L0662

LCD panel 15.0 SXGA+ (DBU)
   2628-Sxx
   2629-6xx
	05K9581

Hinges 15.0
   2628-Fxx, Jxx, Sxx
   2629-6xx
	04P3488

Inverter card (slim) (for 2629-Fxx, Gxx)	12P3053

15.0-in. UXGA TFT

Following FRUs are available for MT2629-Hxx, Uxx, Yxx.

FRU	P/N
LCD cover assembly	
2629-6xx, Hxx, Uxx except xxK	26P9532
2629-6xK, HxK, UxK	26P9533
LCD cable 15.0 UXGA (for 2629-Hxx, Uxx)	27L0664
LCD panel 15.0 UXGA (DBU) (for 2629-Hxx, Uxx)	05K9835
LCD panel 15.0 UXGA (LG) (for 2629-Hxx, Uxx)	05K9693
Hinges 15.0 (for 2629-Hxx, Uxx)	04P3488
Inverter card (slim) (for 2629-Hxx, Uxx)	12P3053

Keyboard

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

Language	P/N		
	A20m/p	**A21m/p**	**A22m/p**
Arabic	02K5051	02K5476	
Belgian	02K5045	02K5470	
Canadian French	02K5035	02K5456	
Chinese, traditional	02K5057	02K5459	
Czech	02K5055	02K5480	
Danish	02K5042	02K5467	
Dutch	02K5039	02K5464	
English, U.K.	02K5036	02K5461	
English, U.S.	02K5034	02K5455	
French, European	02K5038	02K5463	
German	02K5037	02K5462	
Greek	02K5048	02K5473	
Hebrew	02K5049	02K5474	
Hungarian	02K5054	02K5479	
Italian	02K5043	02K5468	
Japanese	02K5056	02K5458	
Korean	02K5058	02K5460	
Norwegian	02K5041	02K5466	
Polish	02K5150	02K5481	
Portuguese	02K5047	02K5472	
Russian	02K5052	02K5477	
Slovak	02K5053	02K5478	
Slovenian	02K5151	02K5482	
Spanish, European	02K5044	02K5469	
Spanish, Latin American	02K5059	02K5457	
Swedish or Finnish	02K5040	02K5465	
Swiss	02K5046	02K5471	
Thai	—	—	02K5759
Turkish	02K5050	02K5475	

Recovery CDs

For Windows 98 (A22m)

Language	P/N
Arabic	23P8930
Chinese, Simplified	27P2266
Chinese, Traditional	27P2261
Czech	23P8931
Danish	23P8897
Dutch	23P8904
English, U.S.	23P8892
English, U.K.	23P8893
Finnish	23P8903
French, Canadian	23P8894
French, European	23P8898
German	23P8899
Greek	23P8935
Hebrew	23P8932
Hungarian	23P8936
Italian	23P8902
Japanese	46P4403
Norwegian	23P8905
Polish	23P8933
Portuguese	23P8896
Spanish, European	23P8900
Spanish, Latin American	23P8895
Slovenian	23P8938
Slovak	23P8939
Swedish	23P8901
Thai	23P8940
Turkish	23P8934
Russian	23P8937

For Windows 98 (A22p)

Language	P/N
Arabic	23P9062
Arabic (modem enabled)	14P9553
Chinese, Simplified	27P2256
Chinese, Traditional	27P2251
Czech	23P9063
Danish	23P9029
Dutch	23P9036
English, U.S.	14P9569
English, U.K.	14P9582
Finnish	23P9035
French, Canadian	23P9026
French, European	23P9030
German	14P9586
Greek	23P9067
Hebrew	23P9064
Hungarian	23P9068
Italian	23P9034
Japanese	46P4400
Norwegian	23P9037
Polish	23P9065
Portuguese	23P9028
Spanish, European	23P9032
Spanish, Latin American	23P9027
Slovenian	23P9070
Slovak	23P9071
Swedish	14P9590
Thai	23P9072
Turkish	23P9066
Russian	23P9069

For Windows 2000 (A22m)

Language	P/N
Chinese, Simplified	27P2268
Chinese, Traditional	27P2263

For Windows 2000 (A22p)

Language	P/N
Chinese, Simplified	27P2258
Chinese, Traditional	27P2253

For Windows 2000/Windows NT (A22m)

Language	P/N
Arabic	23P9002
Czech	23P9003
Danish	23P8957
Dutch	23P8964
English, U.S.	23P8952
English, U.K.	23P8953
Finnish	23P8963
French, Canadian	23P8954
French, European	23P8958
German	23P8959
Greek	23P9007
Hebrew	23P9004
Hungarian	23P9008
Italian	23P8962
Japanese	27P1871
Norwegian	23P8965
Polish	23P9005
Portuguese	23P8956
Spanish, European	23P8960
Spanish, Latin American	23P8955
Slovenian	23P9010
Slovak	23P9011
Swedish	23P8961
Thai	23P9012
Turkish	23P9006
Russian	23P9009

For Windows 2000/Windows NT (A22p)

Language	P/N
Arabic	23P9134
Arabic (modem enabled)	14P9558
Czech	23P9135
Danish	23P9089
Dutch	23P9096
English, U.S.	14P9572
English, U.K.	14P9594
Finnish	23P9095
French, Canadian	23P9086
French, European	23P9090
German	23P9091
Greek	23P9139
Hebrew	23P9136
Hungarian	23P9140
Italian	23P9094
Japanese	46P4400
Norwegian	23P9097
Polish	23P9137
Portuguese	23P9088
Spanish, European	23P9092
Spanish, Latin American	23P9087
Slovenian	23P9142
Slovak	23P9143
Swedish	23P9093
Thai	23P9144
Turkish	23P9138
Russian	23P9141

Miscellaneous parts

FRU	P/N
Screw kit (including nylon-coated screws): • M2 x 3.6 mm, flat head (3) • M2 x 5.1 mm, flat head (5) • M2 x 5.7 mm, flat head (5) • M2 x 16 mm, bind head (3) • M2.5 x 4.8 mm, flat head (42) • M2.5 x 5.5 mm, flat head (2) • M2.5 x 15 mm, flat head (15) • M2.6 x 2.8 mm, bind head (7) • M3 x 2.8 mm, small head (5) • Coin screw (1) • Security screw (1) • Screw caps (14)	04P3973
Base miscellaneous parts: • Lens, IR • Lens, Ultrabay 2000 LES • Lock, battery • Spring, battery lock • Lid, docking FR • Lid, docking RR • Spring, lid docking • Rubber foot • Sponge • Sponge, shield lower • Sponge, small • Blank cap, battery • Screw caps • Cu tape	08K5647
System miscellaneous parts (for A20m/p, A21m/p): • Door, PC card slots • Door, PC card 1 slot • 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 • (*a*) Stiffner, CPU socket • Screw caps	04P3966

(continued)

FRU	P/N
System miscellaneous parts (for A22m/p): • Keyboard stopper • Door, PC card slots • Door, PC card 1 slot • Spring, PC card slots door • Lens, LED hinge • Blank cap, TV connector • Eject knob, Ultrabay 2000 • Lock lever, Ultrabay 2000 • Spring 1, Ultrabay 2000 • Spring 2, Ultrabay 2000 • Insulator, hard-disk drive • Insulator, keyboard CRU • Mini PCI guide • (*a*) Stiffner, CPU socket - upper • Screw caps	26P9209
Miscellaneous parts, for system board (for A20m/p, A22m/p): • I/O bracket (right/left) • Guide, keyboard connector • Hex stud • I/O bracket spacer • FDD sponge • Docking hole cap • Flat head screw (M2.5 x 4.8) • Screw caps	26P9335
Miscellaneous parts, for diskette drive: • Bezel • Bezel without icon • Bracket • Flexible cable • Screw caps	26P9336
Miscellaneous parts, for LCD: • Latch (right/left) • Spring • Spacer (for 15.0-in.) • Blank cap, UltraPort • Screw caps	04P3968
Miscellaneous kit for LCD 15.0-in. LG • Latch (RH 15.0 LG) • Latch (LH 15.0 LG) • Spring (15.0 LG) • Spacer (for 15.0-in.) • Screw caps	04P3050

Optional FRUs

FRU	P/N
Ultrabay 2000 SuperDisk drive	05K9235
ZIP-250	00N8254
Multiple battery charger	02K6642
Ultrabay 2000 2nd HDD adapter	08K6067
Ultrabay 2000 battery	02K6645
UltraPort camera for MT2629	02K5153
IBM tripod	08K6449
UltraPort adapter and connector cover	08K6105
USB cable attachment	08K6108
USB cable	27L0542
ThinkPad Dock	08N1546
PCI cover	05K6246
ThinkPad Dock with extension plate	08N1537
PCI cover with foot	08K7317
Top cover and screw kit for ThinkPad Dock	12P4143
ThinkPad Port Replicator	08N1536
Asset ID RF adapter	08K6065

Common parts list

Tools

Tools	P/N
Triconnector wrap plug	72X8546
PC test card	35G4703
Audio wrap cable	66G5180
USB parallel test cable	05K2580
Screwdriver kit	95F3598
Torque screwdriver	05K4695
5 mm socket wrench	05K4694
Screwdriver	27L8126
ThinkPad hardware maintenance diskette version 1.62 **Note:** Download the file from the Web site.	—

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

For 2-pin power cords:

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

For 3-pin power cords:

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

Power cords (docking station)

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

For 3-pin power cords:

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

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