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IBM Mobile Systems

S10L-9619-03

**ThinkPad 600/600E (2645)
Hardware Maintenance Manual**

June 1999

Note

Before using this information and the product it supports, be sure to read the general information under “Notices” on page 117.

Fourth Edition (June 1999)

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Related Publications

The following product publications are available through IBM or your IBM Authorized Dealer.

Publication	Part, Form Number
Mobile Systems HMM Volume 1: Laptop, Notebook, Portable, and ThinkPad Computers (Models L40, CL57, N45, N51, P70/P75, ThinkPad 300, 350, 500, 510, 710T, Expansion Unit, Dock I, Dock II)	30H2356, S82G-1501-01
Mobile Systems HMM Volume 2: ThinkPad Computers (Models 340, 355, 360, 370, 700, 701, 720, 750, 755)	30H2357, S82G-1502-03
Mobile Systems HMM Volume 3: ThinkPad Computers (Models 365, 380, 385, 560, 760, SelectaDock)	84H8099, S82G-1503-05
Mobile Systems HMM Volume 4: ThinkPad Computers (Models 380, 385, 560, 760, 765)	05L1271, S05L-1270-01

Related Diskettes

The following diskettes are available through IBM or your IBM Authorized Dealer.

Diskette	Part, Form Number
ThinkPad 300 (2615) Advanced Diagnostics Diskette	33G9361, S33G-9361
ThinkPad 350, 350C, 425, 425C (2618) Advanced Diagnostics Diskette	A211000, GA21-1000
ThinkPad 365 (2625) Advanced Diagnostics Diskette	76H7578, S30H-2498
ThinkPad 380/385 (2635) Maintenance Diskette	06J0333, S06J-0333
ThinkPad 390/i Series 1700 (2626, 2627) Diagnostic and Utilities Diskettes	10L9942, S10L-9942
ThinkPad 500 (2603) Advanced Diagnostics Diskette	71G3702, S71G-3702
ThinkPad 510 (2604) Advanced Diagnostics Diskette	83G8095, S83G-8095
ThinkPad 700 (9552) Reference Diskette	42G2017, S42G-2017
ThinkPad 700C (9552) Reference Diskette	42G2023, S42G-2023
ThinkPad 720/720C (9552) Reference Diskette	61G1194, S61G-1194
ThinkPad Hardware Maintenance Diskette (for all Models 355, 360, 560, 750, 755, 760)	78H5384, S78H-5384
ThinkPad Dock I (3545)	71G4140, S71G-4140
Docking Station (3550)	42G2428, S42G-2428
Data/Fax Modem	61G1556, S61G-1556
FaxConcentrator/A	84F8540, S84F-8540

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General Descriptions

This chapter includes the descriptions for all ThinkPad models. Some descriptions might not apply to the particular computer.

Introduction

Important Service Information

Important

Diskette fixes are customer installable. The diskette fixes are located on the PC Company Bulletin Board Service (BBS). The direct phone line for modem connection is 919-557-0001 or tieline 255-0001.

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 down-load information. The Canadian BBS phone numbers are:

Montreal	514-938-3022
Toronto	905-316-4255
Vancouver	604-664-6464
Winnipeg	204-934-2735

FRU Replacement Strategy

Before Replacing Parts

Ensure that all diskette fixes are installed prior to 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 and that 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 the first board that you replaced does not correct the problem, reinstall the original board, then replace the other (processor or system) board.
- If an adapter or device consists of more than one FRU, an error code may be caused by any of the FRUs. 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

A customized setup configuration (other than default settings) may exist on the computer you are servicing. Running Automatic Configuration may alter those settings. Note the current configuration settings (using the View Configuration option) and verify that the settings are in place when service is complete.

Hard Disk Drive Replacement Strategy:

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

Attention

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

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. The cause of the first error code can result in false error codes being displayed. 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.

How to Read POST Error Messages: POST error messages are displayed on the screen as three, four, five, or eight digits. The error messages that can be displayed as shorter POST messages are highlighted in this index. Some digits will represent different information for SCSI errors versus non-SCSI errors.

The following example shows which digits display the shorter POST error messages and also defines the SCSI information in an eight-digit error message.

	Shorter POST Messages															

	"		"		"		"		"		"		"		"	

	"	0	"	0	"	0	"	0	"	0	"	0	"	0	"	

	"		"		"		"		"		"		"		"	
Reserved	"		"		"		"		"		"		"		Size (SCSI)	
	*****										"	"	Slot Number (SCSI)			
	Device Code				"	Logical Unit Number (SCSI)										
	ID (SCSI)															

All SCSI devices are set to a different SCSI ID. Duplicate SCSI ID settings can generate a false error message. Use the SCSI ID to determine whether the error message is coming from an internal or an external device.

Drive and Diskette Compatibility Matrix

The following table provides identification information for 3.5-inch drives.

Diskette Drive	Identifying Mark
3.5-Inch - 1.44MB	1.44 on the eject button
3.5-Inch - 2.88MB	2.88 on the eject button

The following table provides compatibility information for 3.5-inch diskettes and 3.5-inch diskette drives.

Diskette Capacity	1.44MB Drive	2.88MB Drive
1.0MB	Read/Write	Read/Write
2.0MB	Read/Write	Read/Write
4.0MB	Not Compatible	Read/Write

The following table provides identification information for 5.25-inch diskette drives.

Diskette Drive	Identifying Mark
5.25-Inch - 360KB (External)	Asterisk on bezel
5.25-Inch - 1.2MB (Internal)	1.2 on the eject button

The following table provides compatibility information for 5.25-inch diskettes and 5.25-inch diskette drives.

Diskette Capacity	360KB Drive	1.2MB Drive
360KB	Read/Write	Read/Write
1.2MB	Not Compatible	Read/Write

Note

A 360KB diskette written to or formatted on a 1.2MB drive can be read reliably only on a 1.2MB drive.

Safety Notices (Multi-lingual 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, or other small parts are in place and are not left loose inside the computer. Verify this by shaking the computer and listening for rattling sounds. Metallic parts or metal flakes can cause electrical shorts.

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

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

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

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

Safety Notice 2

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

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

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

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

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

Safety Notice 3

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

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

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

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

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

Safety Notice 4

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

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

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

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

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

Safety Notice 5

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

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

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

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

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

Safety Notice 6

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

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

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

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

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

Safety Notice 7

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

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

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

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

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

Safety Notice 8

Before removing any FRU, power-off the computer, unplug all power cords from electrical outlets, remove the battery pack, 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 tool case away from walk areas so that other people will not trip over it.
- Do not wear loose clothing that can be trapped in the moving parts of a machine. Ensure that your sleeves are fastened or rolled up above your elbows. If your hair is long, fasten it.
- Insert the ends of your necktie or scarf inside clothing or fasten it with a nonconductive clip, approximately 8 centimeters (3 inches) from the end.
- Do not wear jewelry, chains, metal-frame eyeglasses, or metal fasteners for your clothing.

Attention: Metal objects are good electrical conductors.

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

Electrical Safety: Observe the following rules when working on electrical equipment.

Important

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

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

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

- If you need to work on a machine that has *exposed* electrical circuits, observe the following precautions:
 - Ensure that another person, familiar with the power-off controls, is near you.

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

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

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

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

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

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

Safety Inspection Guide: The intent of this inspection guide is to assist you in identifying potentially unsafe conditions on these products. Each machine, as it was designed and built, had required safety items installed to protect users and service personnel from injury. This guide addresses only those items. However, good judgment should be used 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 bulging capacitor
- Mechanical hazards, such as loose or missing hardware

The guide consists of a series of steps presented in a checklist. 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 appropriate type as specified in the parts listings.
 - c. Insulation must not be frayed or worn.
4. Remove the cover.
5. Check for any obvious non-IBM alterations. Use good judgment as to the safety of any non-IBM alterations.
6. Check inside the unit for any obvious unsafe conditions, such as metal filings, contamination, water or other liquids, or signs of fire or smoke damage.
7. Check for worn, frayed, or pinched cables.
8. Check that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

Handling Electrostatic Discharge-Sensitive Devices: Any computer part containing transistors or integrated circuits (ICs) should be considered sensitive to electrostatic discharge (ESD). ESD damage can occur when there is a difference in charge between objects.

Protect against ESD damage by equalizing the charge so that the machine, the part, the work mat, and the person handling the part are all at the same charge.

Notes

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

When handling ESD-sensitive parts:

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

Note

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

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

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

Laser Compliance Statement

Some IBM Personal Computer models are equipped from the factory with a CD-ROM drive. CD-ROM drives are also sold separately as options. The CD-ROM drive is a laser product. The CD-ROM 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 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 could result in exposure to hazardous laser radiation. There are no serviceable parts inside the CD-ROM drive. **Do not open.**

Introduction

Some CD-ROM drives contain an embedded Class 3A or Class 3B laser diode. Note the following.

DANGER:

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

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

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

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

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

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

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

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

Keď je laserová jednotka otvorená. Vyhnite sa priamemu pohľadu a nehládte 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.

Read This First

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

Important Notes

- **Only certified trained personnel should service the computer.**
- **Read the entire FRU removal and replacement page before replacing any FRU.**
- **Use new nylon-coated screws when you replace FRUs.**
- **Be extremely careful during such write operations as copying, saving, or formatting.** Drives in the computer that you are servicing might have been rearranged, or the drive startup sequence might have been altered. If you select an incorrect drive, data or programs might be overwritten.
- **Replace FRUs only for the correct model.** When you replace a FRU, make sure the model of the machine and 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 from a variety of reasons that have nothing to do with a hardware defect, such as: cosmic radiation, electrostatic discharge, or software errors. FRU replacement should be considered only when a recurring problem exists. If this is suspected, clear the error log and run the test again. Do not replace any FRUs if log errors do not reappear.
- **Be careful not to replace a nondefective FRU.**

What to Do First: The servicer must include the following in the parts exchange form or parts return form that is attached to the returned FRU:

- ___ 1. Name and phone number of servicer
- ___ 2. Date of service
- ___ 3. Date that 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

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

Note

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 may indicate that the system was subjected to stress beyond normal use.

The following is not covered under warranty:

- LCD panel cracked from the application of excessive force or from being dropped.
- Scratched (cosmetic) parts.
- Cracked or broken plastic parts, broken latches, broken pins, or broken connectors caused by excessive force.
- Damage caused by liquid spilled into the system.
- Damage caused by the improper insertion of a PC Card or the installation of an incompatible card.
- Damage caused by foreign material in the FDD.
- Diskette drive damage caused by the diskette drive cover being pressed 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).

The following symptoms might indicate damage caused by nonwarranted activities:

- Missing parts might be a symptom of unauthorized service or modification.
- HDD spindles can become noisy from being subjected to excessive force or from being dropped.
- I9990303 errors can be caused by exposure to strong magnetic fields.

FRU Replacement Notices

This section contains notices for removal and replacement. Read this section carefully before replacing any FRU.

LCD Replacement Notice

The TFT LCD for the computer contains over 2,359,296 thin-film transistors (TFTs). A small number of missing, discolored, or lighted dots (on all the time) 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 **5 or more**.

Screw Notices

This computer uses special nylon-coated screws with the following characteristics:

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

Do the following when you service this machine:

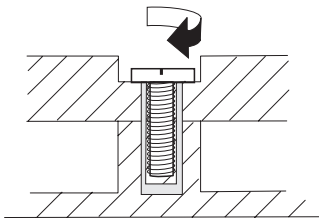
- Keep the screw kit (P/N 05K4841) in your tool bag.
- Always use new screws if you are instructed.
- Use a torque screwdriver if you have one.

Loose screws can cause a reliability problem. The IBM ThinkPad computer addresses this problem with nylon-coated screws. Tighten screws as follows:

- **Plastic to plastic**

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

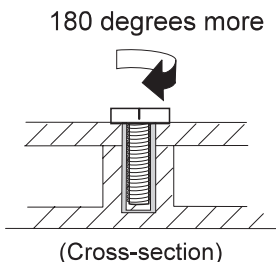
90 degrees more



(Cross-section)

- **Logic card to plastic**

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



- **Torque driver**

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

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

System Board Replacement Notice

Notice for 770E and 600: Restoring the System Unit Serial Number: The EEPROM on the system board contains vital product data (VPD), such as the system unit serial number and the system board serial number. You must restore the system unit serial number to its original number when the system board is replaced.

To restore the system unit serial number, do the following:

1. Press and hold **F1** and power on the computer.
2. Hold down **F1** until the Easy-Setup menu appears.
3. Click on **Config**.
4. Press **Ctrl + N**. The System Unit Serial Number menu appears.
5. Follow the instructions on the menu.

Notes:

1. Do not power-off the computer during the restoration process.
2. The serial number label is attached to the bottom of the computer.

Notice for 770X and 600E

Serial Numbers: When the computer was manufactured, the EEPROM on the system board was loaded with the serial numbers of the system and all major components. The EEPROM contains the following serial numbers:

- System board serial number
- System unit serial number
- CPU Card serial number
- DC-DC Card serial number

You must restore each of those serial numbers except the system board serial number to its original number when replacing the system board.

To save the original serial numbers, do the following:

1. Boot from DOS, or open an MS-DOS prompt.
2. Insert the ThinkPad Hardware Maintenance Diskette Version 1.05 into the diskette drive.
3. Enter `A:\SERUPDT.EXE` at the DOS prompt.

The usage of this tool is displayed.

Note: SERUPDT.EXE is in the ThinkPad Hardware Maintenance Diskette Version 1.05 or a later version.

4. Enter `SERUPDT R`

Each serial numbers is displayed with its device type. Write down all numbers except the system board serial number. The device type designations for the each serial number are as follows:

- 08: CPU card serial number
- 20: System unit serial number
- 38: DC-DC card serial number
- 40: System board serial number
- 78–7F: Hard disk drive serial number

Note: You can disregard the hard disk drive serial number.

To restore the serial numbers, do the following:

1. Boot from DOS, or open a MS-DOS prompt.
 2. Enter `SERUPDT.EXE` at the DOS prompt.
- The usage of this tool is displayed.
3. Enter `SERUPDT W nn SSSSSSS` for each serial number you saved.

Notes:

- a. nn is the device type, and SSSSSSS is the serial number.
- b. The system unit serial number is written in the label attached on the bottom of the computer.

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 unique number is designed to provide unique IDs until the year A.D. 3400. Consequently, 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. Press and hold **F1** and power on the computer.
2. Hold down **F1** until the Easy-Setup menu appears.
3. Click on **Config**.

4. Press **Ctrl + G**. The UUID menu appears.
5. Press **F5** to generate a new UUID, and press **Enter** to overwrite it to EEPROM.

CPU Card Replacement Notice (600E and 770X Only)

You must restore the CPU card serial number to its original number, when the CPU card is replaced. To save and restore the CPU card serial number, follow the instruction in “Serial Numbers” on page 20.

DC-DC Card Replacement Notice (770X Only)

You must restore the DC-DC card serial number to its original number, when the DC-DC card is replaced. To save and restore the DC-DC card serial number, follow the instruction in “Serial Numbers” on page 20.

Related Service Information

This section provides information about the following:

- “How to Use Error Messages”
- “How to Diagnose Multiple FRUs”
- “Reset Switch”
- “Running a Low-Level Format”
- “Service Web Site” on page 24
- “Passwords” on page 24
- “Power Management Features” on page 25
- “Fn Key Combinations” on page 29

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 caused the first error code can result in false error codes being displayed. If no error code is displayed, see if the error symptom is listed in the “Symptom-to FRU Index” section.

How to Diagnose Multiple FRUs

When the adapter or device has more than one FRU, the error code could be caused by any of them. Before replacing multiple FRUs, try removing or exchanging each FRU, one by one in the designated sequence, to see if the symptoms change.

Reset Switch

The Reset switch resets the system (regardless of the microcode status) and forces the power off. Use this push button to power off when power is not completely off or the microcode is in a hung state. See the “Locations” section of each model for Reset switch location.

Running a Low-Level Format

Do the following to format the hard disk.

Attention: Make sure the drive address to be formatted is correct. This procedure erases all information on the disk.

1. Power off the computer.
2. Hold **F1** until the Easy-Setup menu appears.
3. Click on the **Test** icon. The Basic Diagnostics menu appears.
4. Press **Ctrl+A** to enter advanced diagnostic mode. The ThinkPad FRU Connections window appears.
5. Click on **Exit**. The Keyboard Test menu appears.
6. Click on **Exit** again.
7. Press **Ctrl+L**. The Low-Level Format menu appears.
8. Follow the instructions on the screen

If you are prompted to use the Maintenance Diskette, do the following:

Related Service Information

1. Insert the ThinkPad Hardware Maintenance Diskette Version 1.05 or a later version into the diskette drive and power on the computer.
2. Select **Format the hard disk** from the main menu.
3. Select the drive from the menu.
4. Follow the instructions on the screen.

Service Web Site

When the latest maintenance diskette and the system program service diskette are available, they will be posted on:

Maintenance diskette:

<http://www.pc.ibm.com/files/searchfiles.html>
(search for either MAINTENANCE or MAINT150)

System program service diskette:

<http://pccbbs.raleigh.ibm.com/>

Passwords

When the power-on password (POP), hard disk password (HDP), and supervisor password (PAP) are used, the following situations may occur:

- **If the POP is the same as the HDP**, the POP prompt appears, but the HDP prompt does not appear.
- **If the POP is not the same as the HDP**, both prompts appear.
- **The PAP and the HDP:**
If the PAP is used, the HDP is enabled automatically, but no HDP prompt appears. The HDP is set the same as the PAP.

The ThinkPad computer that has the bay can support more than two HDPs.

- If the **POP** is the same as one of the **HDPs** (HDP-1 or HDP-2), a POP prompt appears. The passwords are different.
- If the **POP** is not the same as either of the **HDPs** (HDP-1 or HDP-2);, both prompts appear.
- If the **PAP** is used, the **HDP-1** or the **HDP-2** is automatically enabled, but the HDP prompt does not appear. The HDP-1 and HDP-2 are then set to the same password as the PAP.

Supervisor and Hard Disk Passwords: The supervisor password and the hard disk password (HDP) are security features that are used to protect the system and the hard disk data from unauthorized access. No overriding capability is provided. If only a hard disk password is set, obtaining permission from the password owner to unlock the password is a prerequisite for running diagnostic tests and performing service. If both supervisor password and hard disk password are set, you can enter Easy-Setup by pressing the **Enter** key or by entering the

power-on password at the supervisor password prompt. In this case, the **Password**, **Start up**, **Network**, and **Initialize** or **Asset ID** (for some models) icons cannot be selected.

Note: The supervisor password and hard disk password cannot be replaced if they are forgotten. If the customer forgets the supervisor password, the system board must be replaced. If the customer forgets the hard disk password, the hard disk drive must be replaced.

How to Remove the Power-On Passwords:

If only the power-on password is set, do the following to remove the power-on password.

1. Power off the computer
2. Remove the DIMM cover on the bottom side of the computer.
3. Short-circuit the two password pads or put the jumper.

For the location of the password pads or jumper, see the "Locations" section for each model.

4. Under the short-circuit condition, power on the computer and wait until the POST ends.

After the POST ends, the password prompt does not appear. The power-on password is removed.

5. Reinstall the DIMM cover.

If both the power-on password and the supervisor password are set, do the following to remove the passwords:

1. Power on the computer by pressing and holding **F1**.
2. Enter the supervisor password. The Easy-Setup menu appears.
3. Click on the **Password** icon.
4. Click on the **Power on** icon.
5. Enter the supervisor password and press the **Space bar**.
6. Press **Enter** twice.
7. Click on **Exit**; then click on **Restart**.

The power-on password has been removed.

Power Management Features

Three power management modes are provided by the computer to reduce power consumption and prolong battery power.

Standby Mode: In standby mode, the following occurs:

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

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

The computer enters standby mode when the **Fn + F3** keys are pressed.

The computer exits standby and resumes normal operation when any key is pressed.

Suspend Mode: The following events occur in addition to what occurs in standby mode when the computer enters suspend mode:

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

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

The following events cause the computer to enter suspend mode:

- The **Fn + F4** keys are pressed.
- The LCD cover is closed. If you add a check mark to the **Will not suspend even if LCD is closed** box in the Power Management Properties window, the computer will not enter suspend mode even if the LCD is closed. The LCD only turns off.
- The **Suspend** button is selected in the Fuel-Gauge program.
- The specified time has elapsed from the last operation with the keyboard, the TrackPoint, the hard disk drive, the parallel connector, or the diskette drive; or the AC Adapter is plugged in.

In Windows 95, the timer is set by the **Suspend Timer** selection in the Power Properties window. In Windows 98, the timer is set by the **System standby timer** selection in the Power Management Properties window.

- The battery indicator blinks orange indicating that the battery power is low. If you add a check mark to the **Hibernate when battery becomes low** box in the Power Management Properties window, the computer enters hibernation mode under this condition.

Note: Even if you don't set the low-battery alarm, the charge indicator will let you know that the battery is low, and then the ThinkPad will automatically enter the power-saving mode. This default low-battery behavior is

independent of the operating system, so the computer might behave differently from your setting if you set the low-battery alarm. The computer chooses appropriately between your setting and the default setting.

Note: The computer cannot enter suspend mode if it is attached to a docking station.

The following events cause the computer to resume operation from suspend mode:

- The **Fn** key is pressed.
- The LCD cover is opened.
- The ring indicator (RI) is signaled by a serial device or PC Card device.
- The power switch is turned on.
- The resume timer is set. In Windows 95, you can set the time with the **Resume on timer** selection in the Power Management Properties window. In Windows 98, the **Scheduled Tasks** setting has priority over the **Resume on timer** selection in the Power Management Properties window.

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

Hibernation Mode

For the Windows NT User

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

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.

Notes:

1. In the ThinkPad Configuration program, the computer can be set to **suspend/hibernate while docked**.
2. The computer cannot enter hibernation mode when:
 - It is powered with ac power and a communication PC Card is used.

Related Service Information

The following events cause the computer to enter hibernation mode:

- The **Fn + F12** keys are pressed.
- The **Hibernation** button is selected in the Fuel-Gauge program.
- The power switch is turned off when hibernation mode is set to **Hibernate by Power Switch** in the Windows 98 Power Management Properties window.
- The timer conditions are satisfied in suspend mode (for operating systems other than Windows 98).
- A critically low battery condition occurs and hibernation mode is set to **Hibernate when battery becomes low**.

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

Fn Key Combinations

The following table shows the **Fn** key and function key combinations and their corresponding functions.

The **Fn** key works independently from the operating system. The operating system obtains the status through the system management interface to control the system.

Fn +	Description
F1	Reserved.
F2	Turn Fuel-Gauge display on or off.
F3	Turn standby mode on.
F4	Turn suspend mode on.
F5	Reserved.
F6	Reserved.
F7	Switch between the LCD and an external monitor.
F8	Turn screen expansion on or off. (no symbol on the key)
F9	Reserved.
F10	Reserved.
F11	Switch the power management mode (High Performance, Automatic, and Customized) Note: In Windows 98, only the CPU speed is changed.
F12	Turn hibernation mode on.
Model depending functions	
Pg Up	Increase the sound volume or un-mute.
Pg Dn	Decrease the sound volume or un-mute.
Back space	Mute.

Checkout Guide

Use the following procedure as a guide for computer problems.

Note: The diagnostic tests are intended to test only IBM products. Non-IBM products, prototype cards, or modified options can give false errors and invalid system responses.

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

Note: To run the diagnostics, refer to “Running the Diagnostics” on page 39.

- 3. Use the following table with the verified symptom to determine which page to go to. Search the “Symptoms (Verified)” column, and find the description that best matches your symptom; then go to the page shown in the “Go To” column.

Symptoms (Verified)	Go To
Power failure. (The power indicator does not go on or stay on.)	“Power Systems Checkout” on page 35.
POST does not complete. No beep or error codes are indicated.	“Symptom-to-FRU Index” section, and then use the No Beep Symptoms table.
POST beeps, but no error codes are displayed.	“Symptom-to-FRU Index” section, and then use the Beep Symptoms table.
POST detected an error and displayed numeric error codes.	“Symptom-to-FRU Index” section, and then use the Numeric Error Codes table.
The diagnostic test detected an error and displayed a FRU code.	“FRU Codes” on page 44.
The configuration is not the same as the installed devices.	“Checking the Installed Devices List” on page 42.
Other symptoms (such as LCD display problems).	“Symptom-to-FRU Index” section, and then use the Other Symptoms table.

Symptoms (Verified)	Go To
Symptoms cannot be re-created (intermittent problems).	Use the customer-reported symptoms and go to “Symptom-to-FRU Index” section.

Audio Checkout

ISA Audio Check Out

1. Go to the diagnostic menu by selecting **Test** in the Easy-Setup menu.
2. Select **Audio** and run the diagnostic tests.
3. If the test detects a audio problem, replace the system board.

PCI Audio Check Out

1. Power off the computer.
2. Insert the ThinkPad Hardware Maintenance Diskette Version 1.05 or later version into the diskette drive.
3. Power on the computer.
4. Select **Test the audio feature** from the main menu.
5. If **FAIL** is displayed on the screen, replace the system board.

Diskette Drive Checkout

Do the following to isolate the problem to a controller, drive, or diskette. A blank, formatted, write-enabled, nondefective 2HD diskette is required.

FDD-1 represents the diskette drive in the bay. *FDD-2* represents an external diskette drive.

Note: Some ThinkPad 600E computers support only one FDD at a time. The icon of the diskette drive for such models is FDD instead of FDD-1 or FDD-2.

Attention: Make sure that the diskette does not have more than one label attached to it. Multiple labels can cause damage to the drive or cause the drive to fail.

Do the following to select the test device.
See “Running the Diagnostics” on page 39 for details.

1. Start Easy-Setup.
2. Click on **Test**.
3. Press **Ctrl+A** to enter the advanced diagnostic mode.
The ThinkPad FRU Connections window appears.
4. Click on **Exit**.
The keyboard layout window appears.
5. Click on **Exit**.
6. Click on **FDD-1** (or **FDD-2**) to start the test.

7. Insert the blank diskette when instructed and follow the instructions on the screen.
8. If the controller test detects an error, FRU code 10 appears. Replace the system board.
9. If the controller test runs without errors, the drive read/write tests start automatically. If a drive test detects an error, FRU code 50 for FDD-1 or 51 for FDD-2 appears. If the diskette itself is known to be good, replace the drive.

Fan Checkout

To check the fan, do the following:

1. Start Easy-Setup.
2. Click on **Test**. The fan will start so you can check the air turbulence at the louver near the power switch.
3. Press **Ctrl+A** to enter the advanced diagnostic mode. The ThinkPad FRU Connections window appears. If the fan connector is not connected, **Fan not connected** message appears.
4. Click on **Exit**. The keyboard layout window appears.
5. Click on **Exit**.
6. Click on **System Board** and press **Enter** to run the test. Follow the description on the window. If the test detects the fan problem, replace it.

Indicator LED Checkout

If an indicator LED problem occurs, do the following:

1. Power off the computer.
2. Power on the computer. All the LEDs should turn on for a moment after the computer is powered on.
3. Verify that all LEDs turned on. If some of the LEDs do not turn on, replace the card that the LEDs are on. If the problem persists, replace the system board.

Indicator Panel Check Out

If an indicator panel problem occurs, do the following:

1. Power off the computer.
2. Power on the computer. All the icons should turn on for a moment after the computer is powered on.
3. Verify that all icons appear correctly. If some of the icons do not appear, replace the card that the indicator panel is connected to. If the problem persists, replace the DC-DC card.

Keyboard or Auxiliary Input Device Checkout

Remove the external keyboard if the internal keyboard is to be tested.

If the internal keyboard does not work or an unexpected character appears, make sure that the flexible cable extending from the keyboard is correctly seated in the connector. If the keyboard cable connection is correct, run

the keyboard test. See “Running the Diagnostics” on page 39 for details.

Note: When the **Fn** key is pressed, a black square briefly appears.

If the tests detect a keyboard problem, do the following one at a time to correct the problem. Do not replace a nondefective FRU:

1. Reseat the keyboard cable.
2. Replace the keyboard.
3. Replace the card that the keyboard is connected to.
4. Replace the system board.

The following auxiliary input devices are supported for this computer:

- Numeric keypad
- Mouse (PS/2 compatible)
- External keyboard (with keyboard/mouse cable)

If any of these devices do not work, reseat the cable connector and repeat the failing operation.

If the problem does not recur, recheck the connector. If the problem is not corrected, replace the device and then the card that the devices are directly connected to.

Memory Checkout

DIMM cards are available for increasing memory capacity.

The memory size is displayed in kilobites. 576 KB is reserved by the system, so you calculate the memory size by the following equation:

$$[\text{total memory size (MB)}] \times 1024 - 576 \text{ (KB)}$$

For example, if the total memory size is 64 MB, it is displayed as 64960 KB.

Memory errors might stop system operations, show error messages on the screen, or hang the system.

Use the following procedure to isolate memory problems:

1. Power off the computer and remove any installed DIMM from its slot.
Note: If the computer has a base memory slot and option memory slots, remove any DIMMs installed in the option memory slots.
2. Press and hold the **F1** key; then power on the computer. Hold the **F1** key down until the Easy-Setup menu appears.
3. Select **Test** and press **Enter**.
4. Select **Memory** and press **Enter** to run the memory test on base memory.

See “Running the Diagnostics” on page 39 for details.

If an error appears:

- If the computer don't have the base memory slot, replace the system board.
- If the computer has the base memory slot, remove the DIMM installed in the base memory slot and go to step 2 on page 33. Then if an error appears, replace the system board.

If an error does not appear, continue the following procedures.

5. Power off the computer and reinstall the DIMM one by one; then power on the computer. Verify the memory size; then test the memory. If an error appears, replace the DIMM.

Note: Make sure that the DIMM is fully installed into the connector. A loose connection can cause an error.

6. If the problem does not corrected, replace the following FRU.
 - a. System board
 - b. CPU card

If memory problems occur intermittently, use the loop option to repeat the test. When the test detects an error, an error log is printed on the printer connected to the parallel port. See "Displaying the Error Log" on page 42 for more information.

System Programs in Flash Memory: System setup programs and diagnostic tests are stored in the Flash memory.

Flash Memory Update: The Flash memory update is required for the following conditions:

- New versions of system programs
- New features or options

To update the Flash memory, do the following:

1. Get the appropriate diskette containing the update.
2. Insert the **System Program Service Diskette** into drive A and power on the computer.
3. Select **Update system programs** from the menu.

Modem (DSP) Checkout

Note: This section is for the built-in modem model.

Do the following:

1. Go to the diagnostic menu by selecting **Test** in the Easy-Setup menu.
2. Select **DSP** and run the diagnostic tests.
3. If the test detects a DSP problem, replace the modem card.

Port Replicator Checkout

Use the following procedure to isolate a port replicator problem. The port replicator attaches to the system expansion connector at the rear of the computer:

1. Power off the computer.
2. Remove the failing devices from the port replicator.
3. Unplug the AC Adapter from the port replicator, if attached.
4. Remove the port replicator from the computer.
5. Reconnect the failing device directly to the computer. (If another device is already connected to the computer, remove it first.)
6. Go to the "Running the Diagnostics" on page 39 and run the diagnostics.
7. If the advanced diagnostic device test did not find an error, suspect a problem with the port replicator.
8. Power off the computer and reconnect the port replicator.
9. Power on the computer and run the following advanced diagnostic tests:
 - Serial port test with the wrap plug installed on the port replicator
 - Universal serial bus test with the USB parallel test cable
 - Parallel port test with the wrap plug installed on the port replicator
 - FDD-2 device test on the failing device with a scratch diskette
10. If diagnostic errors appear, replace the port replicator or the diskette drive. If the problem remains after the replacement, replace the system board.
11. If power problems appear only when the port replicator is used, replace the port replicator.

Port Replicator Power Overload: If power shutdown occurs intermittently when PC Card devices are used through a port replicator with PC Card slots, suspect an over-current problem. Some PC Card devices use more power; if the maximum usage of each device occurs simultaneously, the total current will exceed the limit, thereby causing a power shutdown. Isolate this problem by removing one of the devices, use the computer under the same condition, and see whether a power shutdown occurs. Do this procedure for all devices to determine the cause.

Power Systems Checkout

To verify the symptom of the problem, power on the computer using each of the following power sources:

1. Remove the battery pack.
2. Connect the AC Adapter and check that power is supplied.

- 3. Disconnect the AC Adapter and install the charged battery pack; then check that power is supplied by the battery pack.

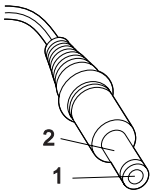
If you suspect a power problem, see the appropriate power supply checkout in the following list:

- “Checking the AC Adapter”
- “Checking Operational Charging”
- “Checking the Battery Pack” on page 37
- “Checking the Backup Battery” on page 38

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 operational charge does not work, go to Checking Operational Charging.

- 1. Unplug the AC Adapter cable from the computer and 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

If the voltage is not correct, replace the AC Adapter.

If the voltage is within the range, do the following:

- Replace the system board.
- If the problem is not corrected, go to “Undetermined Problems” section of each model.

Note: An audible noise from the AC Adapter does not always indicate a defect.

Checking Operational Charging: To check operational charging, 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

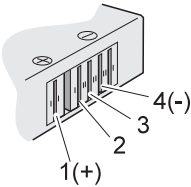
pack. If the charge indicator or icon still does not turn on, replace the battery pack.

If the charge indicator still does not turn on, replace either the system board or DC-DC card that the battery is connected to. Then reinstall the battery pack. If the reinstalled battery pack is not charged, go to the next section.

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

Do the following:

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



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

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

Note: In this case, the battery pack is over-discharged. It takes at least 3 hours to recharge the battery pack even if the indicator does not turn on.

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

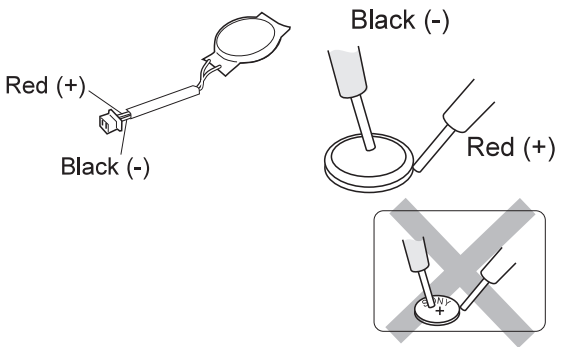
4. If the voltage is more than +11.0 V dc, measure the resistance between battery terminals 3 and 4. The resistance must be 4 to 30 K ohm.

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

Checking the Backup Battery: Do the following:

- 1. Power off the computer and unplug the AC Adapter from the computer.
- 2. Turn the computer upside down.
- 3. Remove the backup battery (see “Removal and Replacement” section of each model).
- 4. Measure the voltage of the backup battery. See the following figure.

Note: Be careful not to measure the wrong side of the backup battery.



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.

System Board and CPU Card Checkout

The processing functions are performed by both the system board and the CPU card. Processor problems can be caused by either FRU. However, the CPU card generally has a lower probability of failure. If a numeric code indicates the system board or the CPU card as a failing FRU, or the CPU card is indicated by a diagnostic test by showing FRU code **11**, use the following procedure to isolate the problem:

- 1. Run the system board test to verify the symptom. This test verifies both the system board and the CPU card. If no error is detected, return to “Checkout Guide” on page 30.

Note: Don't touch the keyboard and pointing device when the system board test is running. This might cause an unexpected error.

2. If FRU code 10 appears, replace the system board but do not replace the CPU card. Remove the CPU card from the old system board and install it to the new system board.
3. If FRU code 11 appears, reseal the CPU card.
4. Rerun the test to verify the fix.
5. If FRU code 11 remains, replace the CPU card.

If this procedure does not correct the problem, go to the “Undetermined Problems” section for each model.

TrackPoint Checkout

If the TrackPoint does not work, check the configuration in the ThinkPad Configuration program. If the configuration of the TrackPoint is disabled, select **Enable** to enable it.

If this does not correct the TrackPoint problem, continue with the following. After you use the TrackPoint, the pointer drifts on the screen for a short time. This self-acting pointer movement can occur when a slight, steady pressure is applied to the TrackPoint pointer. This symptom is not a hardware problem. No service actions are necessary if the pointer movement stops in a short period of time.

If a click button problem or the pointing stick problem occurs, do the following:

1. Go to the Easy-Setup menu.
2. Select an item with the pointing stick.
3. Press any one of the click buttons.
4. Verify that the item is selected.
5. Move to another item with the pointing stick.
6. Press the pointing stick (press-to-select), and verify that the item is selected.

Note: This step is only for the model that has the press-to-select function.

7. Verify that all buttons work correctly.

If either the pointing stick or the click button do not work, do the following actions one at a time to correct the problem. Do not replace a nondefective FRU.

1. Reseat the keyboard cables.
2. Replace the keyboard.
3. Reseat the card that the TrackPoint cable is directly connected to.
4. Replace the system board.

Running the Diagnostics

The following table lists the special tools needed for the diagnostics:

Tool Name	Part Number
PC test card	35G4703
Tri-connector wrap plug	72X8546
USB parallel test cable	05K2580

Use either the TrackPoint or the cursor-moving keys to interact with the tests. The **Enter** key works the same as selecting the **OK** icon to reply OK.

1. Press and hold **F1**; then power on the computer. Hold **F1** down until the Easy-Setup menu appears.
2. Click on **Test**. The basic diagnostic menu appears.
3. Click on a device to run the test. The test progress screen appears; then **OK** appears under the tested device icon when the test ends without any errors.
4. Start the **Advanced Diagnostic test** by pressing **Ctrl+A** on the basic diagnostic menu. The ThinkPad FRU connections window appears.
5. Click on **Exit** or press the **Esc** key. The keyboard test window appears.
6. When you press a key, a mark appears or disappears on the corresponding key position on the screen. Repeat this step for any keys that need to be tested. You can run the keyboard test if you press **Ctrl+K** in the advanced diagnostic test mode.
7. To exit the keyboard test, click on **Exit** or press **Ctrl+Break**. The advanced diagnostics window appears.
8. Click on a device to test it, or click on **Test All** to test all devices.

Click on **Looptest** to run the tests in a repeated loop. The loop option menu appears. Click on a device; the ✓ mark appears beside the selected device. Repeat this step to select multiple devices. Click on **OK** to start the diagnostic loop. If no device is selected, all devices tests are looped.
9. To exit the loop, keep pressing **Ctrl+Pause** until the test exits. A beep sounds to notify that the exit interrupt is sensed by the test program. Press **Esc** to exit from the loop test.

PC Card Slots Test

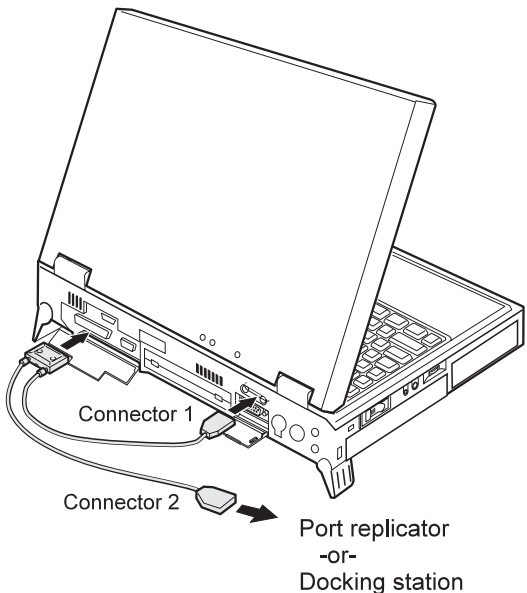
The green LED on the PC test card turns on when the PC Card slot test is running. If the LED does not turn on, check that the card is installed correctly by reseating it. If the LED still does not turn on after the card is reseated, try using another slot for the test. If the LED still does not turn on and the test fails, replace the FRU shown by the diagnostic error code.

Universal Serial Bus (USB) Test

At the advanced diagnostic window, do the following:

1. Connect the USB parallel test cable to the parallel connector of the computer.
2. Connect Connector 1 of the cable to the USB connector of the computer.

Note: The illustration shows a ThinkPad 770 computer, but the procedure is the same for the other model.



3. Click on **USB-1** to run the test.

Follow the instructions on the screen. **OK** appears if the test passed, but three lines of error codes appear if the test failed. The defective FRU must be the system board.

If you want to test the USB port on the port replicator, connect the USB parallel test cable to a port replicator and click on **USB-2**.

If you want to test the USB ports on a docking station, connect the USB parallel test cable to the

USB ports of the docking station and click on **USB-3** and **USB-4**.

Displaying the Error Log

Diagnostic errors are printed on a printer attached to the parallel port when the error is detected. The error is also logged in the system memory.

Use the following procedure to display the errors:

1. Enter the advanced diagnostic test.
2. Press **Ctrl+E**.
3. The error log appears.
4. To exit the screen, click on **Exit** or press **Esc**.

The error log is not saved when system power is turned off.

Checking the Installed Devices List

If a device is installed but the icon appears in a gray shade rather than a dark shade on the basic diagnostics menu, the device is defective. If necessary, adjust the contrast control to clearly distinguish the shades of the icon. Reseat the device connectors. If the symptom remains, replace the device or the system board.

If a device that is not installed appears in a dark shade (for example, FDD-2 appears in a dark shade when *no* second FDD is installed), do the following:

Note: Some ThinkPad 600E computers support only one FDD at a time. The icon of the diskette drive for such models is FDD instead of FDD-1 or FDD-2.

1. Replace the **first** device in the configuration, such as an FDD-1.
2. If the problem persists, replace the card that the device is connected to.

The Parallel, and Serial icons are always displayed in a dark shade, because the icons represent subsystems of the system board and not the attachment of devices.

The FDD-1 icon represents a device in the computer. The FDD-2 icon represents another device, such as:

- An external diskette drive attached to the computer
- An external diskette drive attached to a port replicator
- A diskette drive in a docking station

Diagnostic Error Codes

If an error is detected, the following appears:

- Large **X** on the left side of the device icon.
- Device ID (three digits).
- Error code (two digits).
- FRU code (four digits).



SystemBoard
 DEV 001
 ERR 02
 FRU 0010

The device ID and error code indicate the detailed portion of the FRU that caused the error. If replacing a FRU does not correct the problem, see the device ID or error code from the previous failure. If they have changed, the cause might be that the new FRU is defective or that the FRU was incorrectly installed.

Device ID: If an error is detected by the diagnostic tests, a three-digit device ID is displayed, indicating the suspected device.

Icon	Device ID	Suspected Device
SystemBoard	001	System board
	003	Keyboard
	007	Math coprocessor
	086	Pointing device
Memory	002	Memory
FDD-1 or FDD*	006	Diskette drive in the computer
FDD-2 or FDD*	066	External diskette drive or FDD connector
Parallel	009	Parallel port
Serial	011	Serial port
HDD-1	017	Hard disk drive
HDD-2	151	First (external) hard disk drive
HDD-3	067	Second (external) hard disk drive
HDD-4	152	Third (external) hard disk drive
Display	050	Display
	052	
	053	
	054	
PCMCIA-1	080	1. Connection of the PC Card slot 2. PC Card
PCMCIA-2	088	External PC Card
Infrared	103	IR
DSP	113	DSP
Audio (ISA)	153	ISA audio

Icon	Device ID	Suspected Device
USB-1	154	USB
USB-2	155	External USB
USB-3	156	External USB
USB-4	157	External USB
Audio (PCI)	158	PCI audio
CDROM-1	215	CD-ROM
CDROM-2	216	External CD-ROM
DVD-1	217	DVD drive
DVD-2	218	External DVD drive
Note: * Some ThinkPad 600E computers support only one FDD at a time. The icon of the diskette drive for such models is FDD instead of FDD-1 or FDD-2.		

FRU Codes: If an error is detected by the diagnostic tests, a four-digit FRU code is displayed. The FRU code indicates two suspected FRUs. Replace the FRU that is indicated by the **two leftmost digits** first; then replace the FRU that indicated by the **two rightmost digits**. No FRU is assigned to code 00. If only one FRU is suspected, the other FRU code is 00. See the reference page before replacing the FRU.

FRU Code	FRU
10	System board
11	CPU card
12	DC-DC card
15	Audio card
16	Modem card
20	Memory
30	Reserved
32	External keyboard
33	External mouse
34	AC Adapter
35	Stereo Speaker
36	Battery pack
37	Secondary battery pack
38	Fan
39	Box speaker
40	LCD assembly
41	DVD or DVD and enhanced video adapter
42	Video card or system board (video)
45	External monitor

FRU Code	FRU
50	1. Reseat the diskette drive (FDD-1) 2. Diskette drive (FDD-1)
51	1. Reseat the diskette drive (FDD-2) 2. Diskette drive (FDD-2)
60	1. Reseat the hard disk drive (HDD-1) 2. Hard disk drive (HDD-1)
61	1. Reseat the hard disk drive in the docking station (HDD-3) 2. Hard disk drive in the docking station (HDD-3)
62	1. Reseat the hard disk drive in the docking station (HDD-2) 2. Hard disk drive in the docking station (HDD-2)
63	1. Reseat the hard disk drive in the docking station (HDD-4) 2. Hard disk drive in the docking station (HDD-4)
70	PC Card (at the port replicator)
72	PC Card slot assembly
73	Port replicator
74	Main board in the docking station
75	USB card in the docking station
90	CD-ROM drive
91	External CD-ROM drive
92	DVD drive
93	External DVD drive

If the problem persists after replacement of the FRUs, go to the “Undetermined Problems” section for each model.

ThinkPad 600

This chapter includes the descriptions for the ThinkPad 600 series computer.

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Model-Unique Functions

Product Overview

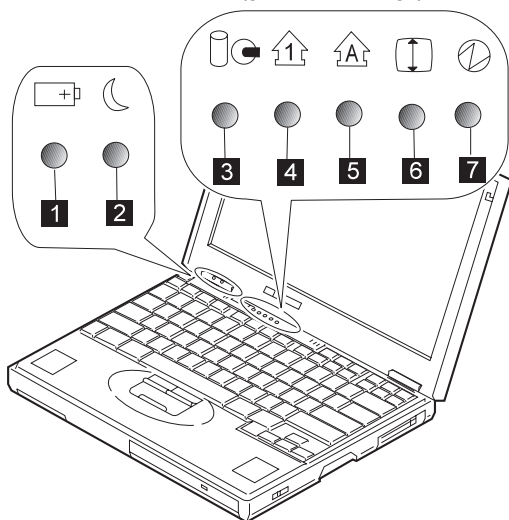
The following table is an overview of the system features of the ThinkPad 600 series:

Feature	Description
Processor	For 600: - Intel Pentium® MMX™ 233 MHz, L2 cache - Intel Pentium® II 233 MHz, L2 cache - Intel Pentium® II 266 MHz, L2 cache - Intel Pentium® II 300 MHz, L2 cache For 600E: - Intel Pentium® II 300 MHz, L2 cache with AGP - Intel Mobile Pentium® II 300PE MHz, L2 cache with AGP - Intel Mobile Pentium® II 366 MHz, L2 cache with AGP - Intel Mobile Pentium® II 400 MHz, L2 cache with AGP
Bus Architecture	For 600: - PCI Bus For 600E: - PCI Bus, AGP Bus
Memory (Standard)	For 600: 32 MB (on the system board) 32 MB (on the system board) and 32 MB in the DIMM slot For 600E: 32 MB (on the system board) 32 MB (on the system board) and 32 MB in the DIMM slot
Memory (Option)	For 600: 16 MB, 32 MB, 64 MB, or 128 MB DIMM card (maximum of 288 MB) For 600E: 32 MB, 64 MB, or 128 MB DIMM card (maximum of 288 MB)
CMOS RAM	114 bytes +4 Kbytes

Feature	Description
Video	For 600: • 13.0-inch, 64K colors 1024×768 pixel HPA color LCD • 12.1-inch, 64K colors, 800×600 pixel TFT color LCD • 13.3-inch, 64K colors, 1024×768 pixel TFT color LCD For 600E: • 13.3-inch, 16M colors 1024×768 pixel TFT color LCD
Diskette Drive (External)	1.44 MB (3-mode), 3.5-inch
Hard Disk Drive	For 600: • 3.2 GB, 2.5-inch, IDE interface • 4.0 GB, 2.5-inch, IDE interface For 600E: • 4.0 GB, 2.5-inch, IDE interface • 6.4 GB, 2.5-inch, IDE interface • 10.0 GB, 2.5-inch, IDE interface
CD-ROM/DVD Drive	For 600: • 24 x CD-ROM drive (some models have no CD-ROM) For 600E: • 24 x CD-ROM drive • DVD drive (2 x DVD)
I/O Port	• External monitor • Headphone • Microphone • Mouse • Parallel • Port replicator • Serial • USB • Video output port (for 600E only)
Internal Modem	For 600: • 56.6 Kbps (some models have no internal modem.) For 600E: • 56.6 Kbps
Audio	• 16-bit audio • Internal stereo speaker • Internal microphone • Software control volume
Infrared Transfer	IrDA 1.1
PCMCIA	One Type-III or two Type-II
AC Adapter	56-Watt type

Status Indicators

The system status indicators show the current computer status in different colors (green and orange):



Symbol	Color	Meaning
1 Battery	Green	The battery is fully charged.
	Orange	The battery is charging.
	Blinking orange	The battery needs charging.
2 Suspend Mode	Green	Suspend mode
	Blinking green	Entering suspend mode
3 Hard Disk In Use	Orange	Data is read from or written to the hard disk drive.
4 Numeric Lock	Green	The numeric keypad on the keyboard is enabled.
5 Caps Lock	Green	Caps Lock mode is enabled.
6 Scroll Lock	Green	Arrow keys can be used as screen-scroll function keys.
7 Power On	Green	Power on

Symptom-to-FRU Index

The symptom-to-FRU index lists the symptoms and errors and their possible causes. The most likely cause is listed first.

Note: Perform the FRU replacement or actions in the sequence shown in the “FRU/Action in Sequence” column. If a FRU replacement did 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 the next possible FRUs to be replaced when servicing a computer.

Numeric error codes show the errors detected in POST or system operation. In the following error codes, **X** can be any number.

If no codes are available, use narrative symptoms.

If the symptom is not listed, go to “Undetermined Problems” on page 64.

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

Numeric Error Codes

Symptom / Error	FRU / Action in Sequence
10X 101: Interrupt failure. 102: Timer failure. 103: Timer interrupt failure. 104: Protected mode failure. 105: Last 8042 command not accepted. 107: NMI test failure. 108: Timer bus test failure. 109: Low meg-chip select test.	1. System board
110 (Planar parity.)	1. Go to “Memory Checkout” on page 33. 2. DIMM card 3. Detach the expansion unit if it is attached to the computer. 4. System board

Symptom / Error	FRU / Action in Sequence
111 (I/O parity.)	1. Go to “Memory Checkout” on page 33. 2. Expansion unit or port replicator. 3. System board
11XX 1101: Serial_A test failure.	1. Serial device 2. Communication cable 3. System board
12XX 1201: Serial_B test failure.	1. System board (infrared)
158 (The hard disk password was not set even though the supervisor password is set.)	Set the password for the hard disk drive.
159 (The hard disk password is not set the same as the supervisor password.)	Set the correct password for the hard disk drive.
161 (Dead battery.)	1. Go to “Checking the Backup Battery” on page 38. 2. Backup battery 3. System board
163 (Time and date were not set.)	1. Set time and date. 2. System board
173 (Configuration data was lost.)	1. Select OK in the error screen; then set the time and date. 2. Backup battery 3. System board
174 (Configuration error: Perform “Checking the Installed Devices List” on page 42 before changing any FRUs.)	1. Check device configuration. 2. Hard disk drive assembly 3. System board
175, 177, 178 175: EEPROM CRC #1 error. 177: Supervisor password check sum error. 178: EEPROM is not functional.	1. System board
17XX 1701: Hard disk controller failure. 1780, 1790: Hard disk 0 error. 1781, 1791: Hard disk 1 error.	1. Hard disk drive 2. System board

Symptom / Error	FRU / Action in Sequence
183 (Incorrect password entered at the supervisor password prompt.)	Have the user examine the password.
184 (Power-on password check sum error.)	Reset the power-on password in Easy-Setup.
185 (The startup sequence is not valid. Suspect that power was off when the startup sequence was being updated.)	Reset the startup sequence in Easy-Setup.
186	1. System board
188, 189 (BAD EEPROM CRC #1. An incorrect checksum of the EEPROM is received.)	1. System board
190 (A depleted battery pack was installed when the power was on.)	Go to “Checking the Battery Pack” on page 37.
191XX (PM initialization error.)	1. System board
192 (Fan error.)	1. Measure the voltage of the backup battery. If the voltage is not correct, replace the backup battery. 2. Fan 3. System board
193 (RF Antenna has been removed.)	1. Type the correct Supervisor Password at the password prompt. 2. Reseat the RF Antenna to the HDD cover.
194 (The computer is carried through the portal gate.)	1. Type the correct Supervisor Password at the password prompt.
195 (The configuration read from the hibernation area does not match the actual configuration.)	Check if the configuration was changed. For example, check if the DIMM card is added.
196 (A read error occurred in the hibernation area of the hard disk drive.)	1. Run the hard disk drive test. 2. Hard disk drive
199XX (Resume error.)	1. System board

Symptom / Error	FRU / Action in Sequence
1XX	1. System board
2XX 201: Memory data error. 202: Memory line error 00–15. 203: Memory line error 16–23. 205: Memory test failure on on-board memory. 221: ROM to RAM remap error.	1. Go to “Memory Checkout” on page 33. 2. DIMM card 3. System board
225 (Unsupported memory module.)	1. Check if the supported DIMM is installed. 2. DIMM card 3. System board
301, 303, 304, 305, 3XX (301: Keyboard error.)	1. Go to “Keyboard or Auxiliary Input Device Checkout” on page 32. 2. Keyboard 3. External numeric keypad 4. External keyboard 5. Keyboard/mouse cable 6. System board
601, 6XX (601: Diskette drive or controller error.)	1. Go to “Diskette Drive Checkout” on page 31. 2. Diskette drive assembly 3. Diskette 4. System board
602 (Diskette read error.)	1. Go to “Diskette Drive Checkout” on page 31. 2. Diskette 3. Diskette drive assembly
604 (Unacceptable ID was read from the diskette drive.)	1. Go to “Diskette Drive Checkout” on page 31. 2. Diskette drive assembly 3. System board
2402	1. TV Out Card
24XX (2401: System board video error.)	1. System board

Symptom / Error	FRU / Action in Sequence
808X 8081: PCMCIA presence test failure. (PCMCIA revision number also checked.) 8082: PCMCIA register test failure.	1. PC Card slot assembly 2. PCMCIA device 3. System board
860X (Pointing device error when TrackPoint is disabled.) 8601: System bus error—8042 mouse interface. 8602: External mouse error. 8603: System bus error or mouse error.	1. External mouse 2. External keyboard 3. System board
861X (Pointing device error when TrackPoint is enabled.) 8611: System bus error—I/F between 8042 and IPDC. 8612: TrackPoint error. 8613: System board or TrackPoint error.	1. Reseat the keyboard cable on the sub card. 2. Keyboard 3. External mouse 4. Sub card 5. System board
I9990301 I9990302 I9990305 I9990301: Hard disk error. I9990302: Invalid hard disk boot record. I9990305: No bootable device.	1. Check that the operating system is installed in the hard disk drive. If not, install the operating system. 2. Reseat the boot device. 3. Check the startup sequence for the correct boot device. 4. Check that the operating system has no failure and is installed correctly.
I9990303 (Bank–2 flash ROM check sum error.)	1. System board
Other codes not listed above.	Go to “Undetermined Problems” on page 64.

Beep Symptoms

Symptom / Error	FRU / Action in Sequence
Continuous beeps.	1. System board
One beep and a blank, unreadable, or flashing LCD.	1. Reseat the LCD connector 2. LCD assembly 3. System board
One beep, and the message "Unable to access boot source."	1. Boot device 2. System board
One long and two short beeps, and a blank or unreadable LCD.	1. System board 2. LCD assembly
One long beep followed by four short beeps each time the power switch is operated. (System cannot power on due to low battery voltage.)	Connect the AC Adapter or install a fully charged battery.
One beep every second. (System is shutting down due to low battery voltage.)	Connect the AC Adapter or install a fully charged battery. (Allow the system to completely shut down before changing the battery.)
Two short beeps with error codes.	POST error. See "Numeric Error Codes" on page 52.
Two short beeps with blank screen.	1. System board

No Beep Symptoms

Symptom / Error	FRU / Action in Sequence
No beep, power-on indicator not on, and a blank LCD during POST.	1. Go to "Power Systems Checkout" on page 35. 2. System board 3. Check the power outlet
No beep, power-on indicator on, and a blank LCD during POST.	1. System board
No beep, power-on indicator on, and a blinking cursor only during POST.	1. System board
No beep during POST but system runs correctly.	1. Turn the volume up and check the speaker. 2. Speaker 3. Sub card 4. System board

Audio-Related Symptoms

Symptom / Error	FRU / Action in Sequence
In OS/2, DOS, or Windows multimedia programs, no sound comes from the computer. (Only system beeps are heard at power-on.)	Check that the device driver is installed correctly.

CD-ROM-Related Symptoms

Symptom / Error	FRU / Action in Sequence
You hear a noise from the CD-ROM drive when the CD-ROM is spinning.	1. CD-ROM drive 2. System board
The CD-ROM tray does not open even if you press the CD-ROM eject button.	Insert a pin into the CD-ROM emergency eject hole and eject the CD-ROM tray.
The compact disc cannot be read.	Make sure that: • The compact disc is not dirty. If it is, clean it with a CD-ROM cleaner kit. • The compact disc is not defective. If it is, try another compact disc. • The compact disc is placed in the tray with the label side up. • The compact disc format conforms with one of the following: – Music CD – CD-ROM or CD-ROM XA – Multisession photo CD – Video CD and CD-i movie (Windows 95 does not support CD-i movies) 1. CD-ROM drive 2. System board

Symptom / Error	FRU / Action in Sequence
The CD-ROM does not work.	Make sure that: • The computer power is turned on and a compact disc is in the CD-ROM drive. • The CD-ROM drive connector is firmly connected to the computer. • The CD-ROM drive tray is firmly closed. • The device drivers are correctly installed. If the CD-ROM drive in the docking station does not work, do the following: 1. Click on Start. 2. Move the cursor to Programs and ThinkPad; then click on ThinkPad Configuration. 3. Click on Docking Station. 4. Make sure that you checked Enable IDE device in the docking station. Note: Do not use IRQ 11 and 15 for the PCI device setting. 5. Click on OK. If the problem remains, replace the following FRUs in order. 1. CD-ROM drive 2. System board

Function-Related Symptoms

Symptom / Error	FRU / Action in Sequence
The system does not suspend or resume when the LCD is closed or opened.	1. Go to “Suspend Mode” on page 26, and check that the computer can enter suspend mode. 2. Boot an operating system and press Fn+F4. If the computer enters suspend mode, suspect that the application program is not working properly. 3. LCD assembly 4. System board
The battery Fuel-Gauge does not go higher than 90%.	Go to “Checking the Battery Pack” on page 37 and see the note.
The memory count (size) appears different from the actual size.	Go to “Memory Checkout” on page 33.
The system configuration does not match the installed devices.	Go to “Checking the Installed Devices List” on page 42.
The system hangs intermittently.	Go to “Intermittent Problems” on page 64.

Indicator-Related Symptoms

Symptom / Error	FRU / Action in Sequence
The indicator incorrectly remains off or on, but system runs correctly.	1. Sub card 2. System board
The battery power status indicator blinks from green, yellow, to orange.	1. Check that a correct battery is installed. 2. Battery pack 3. System board
The battery indicator does not turn on when the battery is installed.	1. Battery pack 2. System board

Infrared-Related Symptoms

Symptom / Error	FRU / Action in Sequence
Unable to communicate using the Infrared (IR) Port.	1. Make sure the setup for the IR is correct. Use the ThinkPad Configurations utility. 2. Make sure there are no fluorescent lights near the computer. The computer may receive optical noise from the fluorescent light. 3. Run the advanced diagnostic test. If an error occurs and a FRU code is displayed, replace the parts shown by the FRU code.

Keyboard- or TrackPoint-Related Symptoms

Symptom / Error	FRU / Action in Sequence
The keyboard (one or more keys) does not work.	1. Reseat the keyboard cable on the sub card. 2. Keyboard 3. System board
The TrackPoint does not work.	1. Reseat the keyboard cable on the system board. 2. Go to "TrackPoint Checkout" on page 39. 3. Keyboard 4. System board
The pointer moves automatically or does not work correctly.	See "TrackPoint Checkout" on page 39.

LCD-Related Symptoms

Important

The TFT LCD for the notebook computer contains over 2,359,296 thin-film transistors (TFTs). A small number of missing, discolored, or lighted dots (on all the time) 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 **21 or more**.

Symptom / Error	FRU / Action in Sequence
No beep, power-on indicator on, and a blank LCD during POST.	1. 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 pels. - Screen abnormal. - Wrong color displayed.	1. See important note for "LCD-Related Symptoms." 2. Reseat all LCD connectors. 3. LCD assembly 4. System board
LCD has extra horizontal or vertical lines displayed.	1. LCD assembly

Modem (DSP)-Related Symptoms

Symptom / Error	FRU / Action in Sequence
In OS/2, DOS, or Windows multimedia programs, no sound comes from the computer. (Only system beeps are heard at power-on.)	Check that the device driver is installed correctly.
In OS/2, DOS, or Windows, the modem does not work.	Check that the DSP Modem is active. OS/2 and Windows: Click on the DSP Modem icon in the ThinkPad Configuration program. DOS: Run the MWMODEM ON command.

PC Card-Related Symptoms

Symptom / Error	FRU / Action in Sequence
PC Card does not work in either the upper slot or the lower slot. Diagnostic error code: DEV 080 ERR 33 FRU 7210	1. Reseat the PCMCIA slot assembly. 2. PCMCIA slot assembly 3. System board
PCMCIA slot pin is damaged.	PCMCIA slot assembly
PC Card does not work.	1. Reseat the PC Card 2. Check that the PC Card is enabled in the ThinkPad Configuration program 3. Reseat the PCMCIA slot assembly. 4. PCMCIA slot assembly 5. System board

Peripheral-Device-Related Symptoms

Symptom / Error	FRU / Action in Sequence
The external monitor does not work correctly.	Connect the external monitor to another PC. If the monitor works fine, replace the system board. If not, replace the external monitor.
Printer problems.	1. Run printer self-test. 2. Run parallel port wrap test. 3. System board 4. Printer cable
Serial or parallel port device problems.	1. Run serial/parallel port wrap test. 2. Device 3. System board 4. Device cable

Power-Related Symptoms

Symptom / Error	FRU / Action in Sequence
Power shuts down during operation.	1. Go to “Power Systems Checkout” on page 35. 2. Battery pack 3. Remove the battery pack and let it cool for 2 hours. 4. System board 5. Check the power outlet.
The system does not power off. (See “Reset Switch” on page 23.)	1. Press the power shutdown switch. 2. System board

Other Symptoms

Symptom / Error	FRU / Action in Sequence
Errors occur only when the port replicator is used.	See “Port Replicator Checkout” on page 35.
PC Card slot pin is damaged.	1. PC Card slots assembly

Note

If you cannot find a symptom or an error in this list and the problem remains, see “Undetermined Problems”

Intermittent Problems

Intermittent system hang problems can be caused by a variety of reasons that have nothing to do with a hardware defect, such as: cosmic radiation, electrostatic discharge, or software errors. FRU replacement should be considered only when a recurring problem exists.

When analyzing an intermittent problem, do the following:

1. Run the advanced 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, installed devices are incorrect, a short circuit is suspected, or the system is inoperative. Follow these procedures to isolate the failing FRU (do not isolate nondefective FRUs).

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 Systems Checkout” on page 35):

1. Power off the computer.
2. Visually check them for damage. If any problems are found, replace the FRU.
3. Remove or disconnect all of the following devices:
 - a. Non-IBM devices
 - b. Devices attached to the port replicator
 - c. Printer, mouse, and other external devices
 - d. Battery pack
 - e. Hard disk drive
 - f. External diskette drive
 - g. DIMM
 - h. CD-ROM and diskette drive in the UltralimBay
 - i. PC Cards
4. Power on the computer.
5. Determine if 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
 - c. CPU card

FRU Removals and Replacements

This section contains information about removals and replacements:

- Do not damage any part. Only certified and trained personnel should service the computer.
- The arrows in the “Removals and Replacements” section show the direction of movement to remove a FRU, or to turn a screw to release the FRU. The arrows are marked in numeric order, in square callouts, to show the correct sequence of removal.
- If other FRUs must be removed before the failing FRU is removed, they are listed at the top of the page.
- To replace a FRU, reverse the removal procedure and follow any notes that pertain to replacement. See “Locations” for internal cable connections and arrangement information.
- When replacing a FRU, use the correct screw as shown in the procedures.

Reviews “FRU Replacement Notices” on page 19 before replacing any FRU.

Caution

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

Caution

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.

Attention

Before the computer is powered on after FRU replacement, make sure all screws, springs, or 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 short circuits.

Attention

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

An electrostatic discharge (ESD) strap (P/N 6405959) must be used to establish personal grounding.

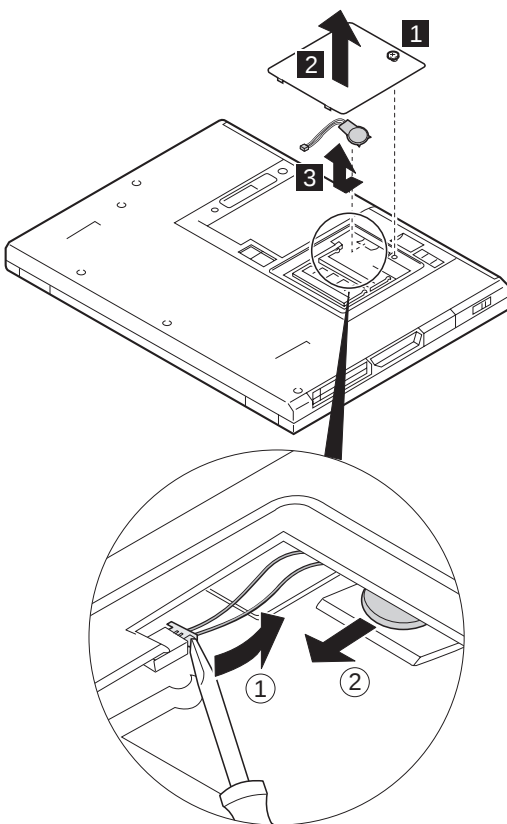
1010 Backup Battery

Caution

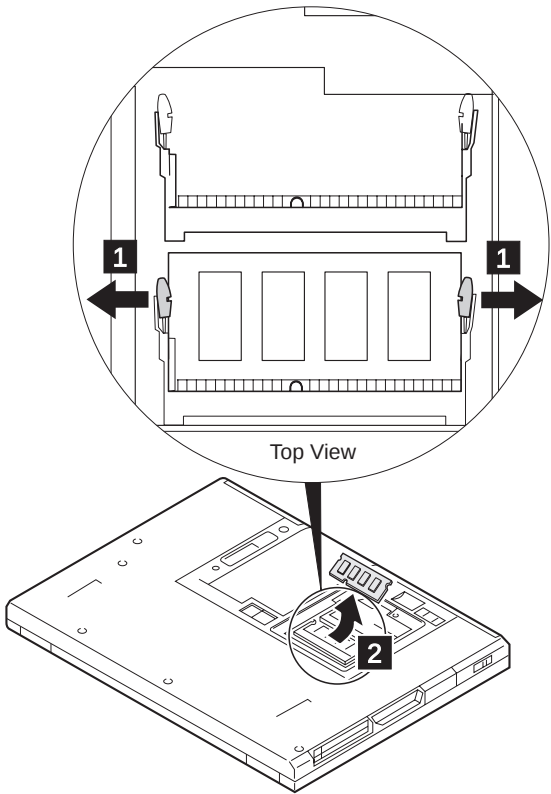
The backup battery is a lithium battery and can cause a fire, an explosion, or severe burns. Do not recharge it, remove its polarized connector, disassemble it, heat it above 100°C (212°F), incinerate it, or expose its cell contents to water. Dispose of the battery as required by local ordinances or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

Note

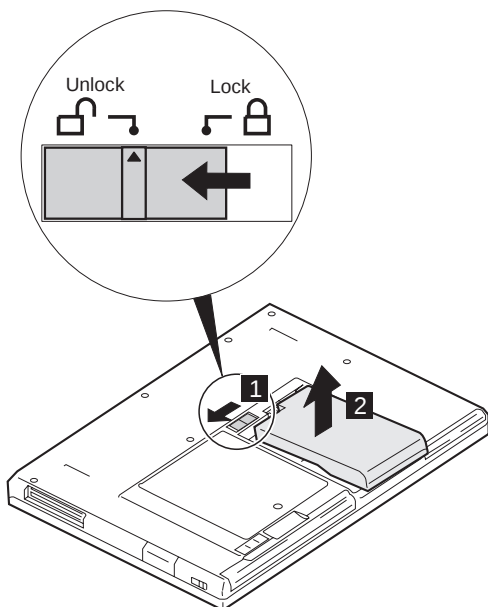
Loosen (but not remove) the screw **1**.



1020 DIMM



1030 Battery Pack



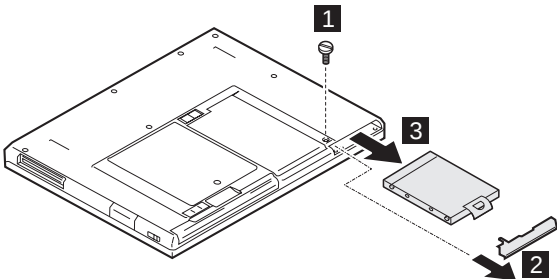
1040 Hard Disk Drive

Attention

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

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.



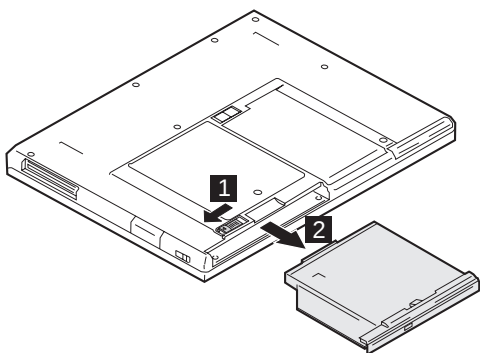
Step	Screw (Quantity)	Color	Torque
1	Coin screw —Or— Security screw	Black	—
Note: Use a 2.5-mm allen wrench to remove the security screw.			

Note

Make sure that the HDD connector is firmly connected.

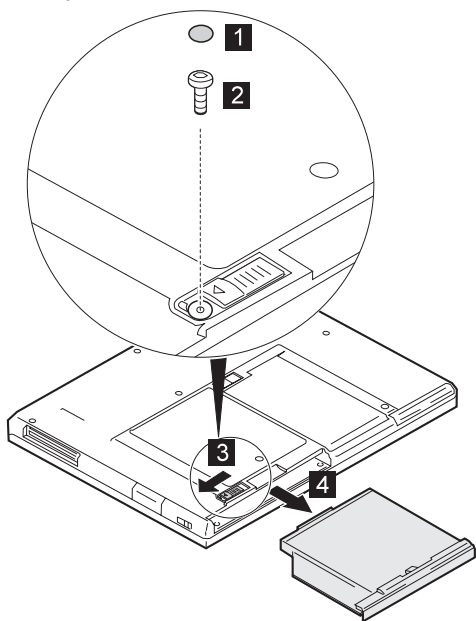
1050 UltralimBay Device

The artwork shows the FDD in the UltralimBay, one of the CD-ROM drive, DVD Drive, battery pack, or HDD with adapter is available in the UltralimBay.



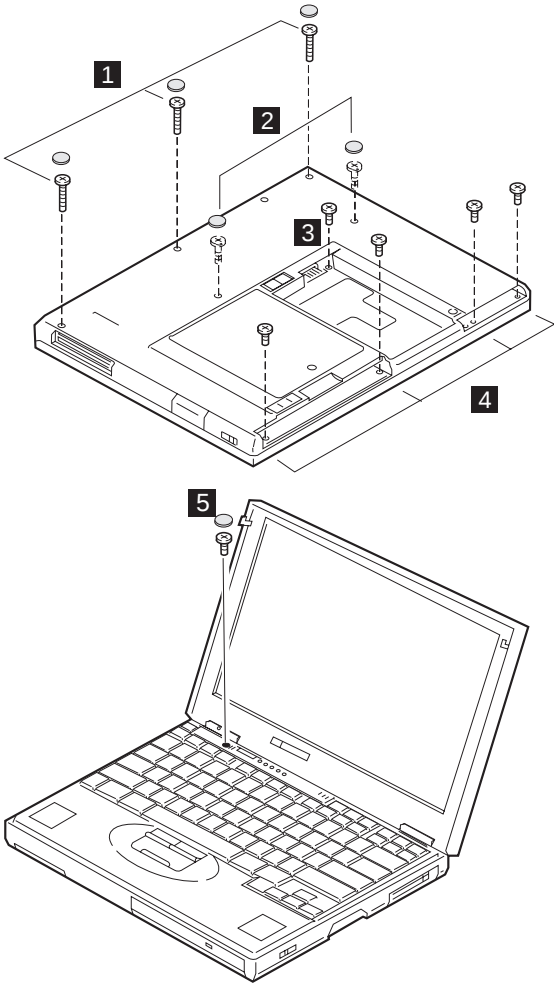
When the security screw is installed

In step **1**, use a 2.5-mm allen wrench to remove the security screw.



1060 Keyboard Assembly

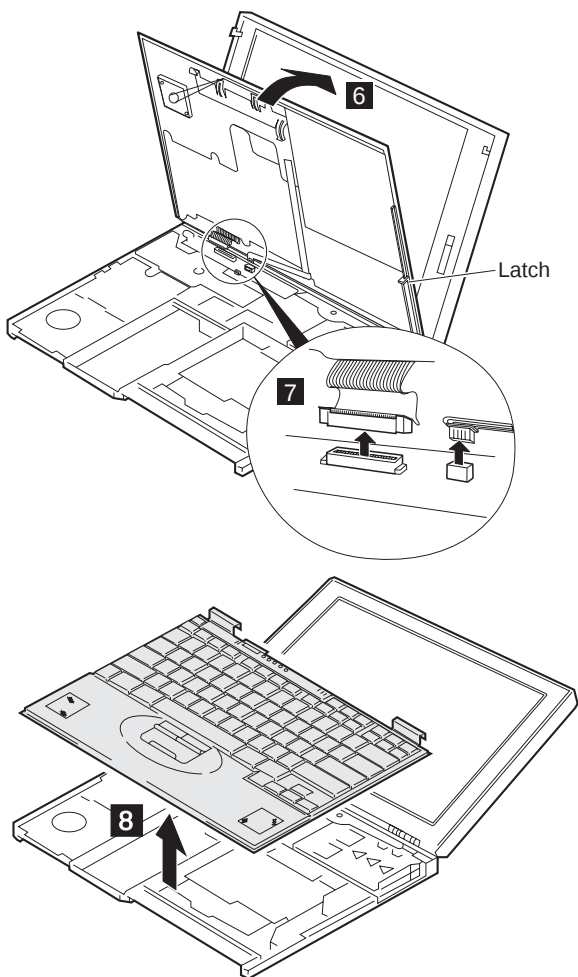
- Battery Pack (1030)
- Hard Disk Drive (1040)
- CD-ROM Drive or Diskette Drive (1050)



Turn the computer right side up.

Step	Screw (Quantity)	Color	Torque
1	M2.5 × 19.5 mm, nylon-coated (3)	Black	4 kgcm
2	M2.5 × 16 mm, nylon-coated (2)	Black	4 kgcm
3	M2.5 × 4.8 mm, nylon-coated (1)	Black	4 kgcm

Step	Screw (Quantity)	Color	Torque
4	M2.5 × 3 mm, nylon-coated (4)	Yellow	4 kgcm
5	M2.5 × 4.8 mm, nylon-coated (1)	Black	4 kgcm

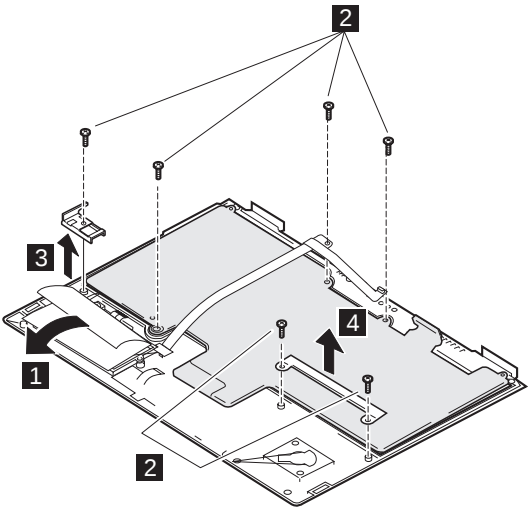


1070 Keyboard

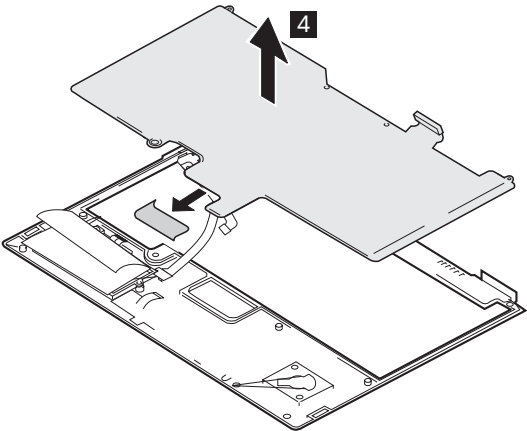
- Battery Pack (1030)
- Hard Disk Drive (1040)
- CD-ROM Drive or Diskette Drive (1050)
- Keyboard Assembly (1060)

Note

When you tear off the insulator in step **1**, do it gently for it is reused.



Bottom view



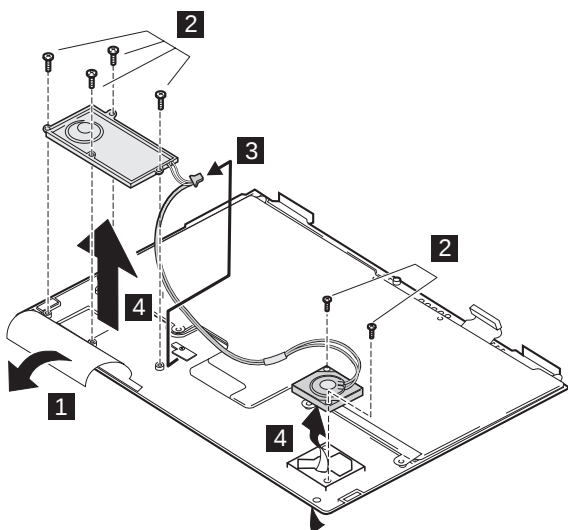
Step	Screw (Quantity)	Color	Torque
2	M2.5 × 3 mm, nylon-coated (6)	Yellow	4 kgcm

1080 Speakers

- Battery Pack **(1030)**
- Hard Disk Drive **(1040)**
- CD-ROM Drive or Diskette Drive **(1050)**
- Keyboard Assembly **(1060)**

Note

In step **1**, remove the insulator on the left speaker.

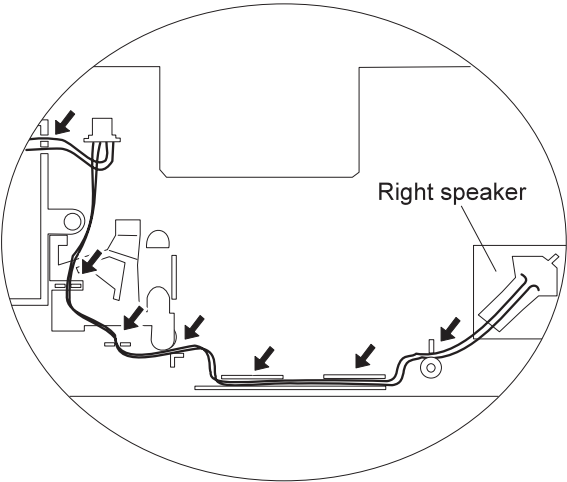


Bottom view

Step	Screw (Quantity)	Color	Torque
2	M2.5 × 3 mm, nylon-coated (6)	Yellow	4 kgcm

Note

When replacing the right speaker, see the following artwork for its cable routing.

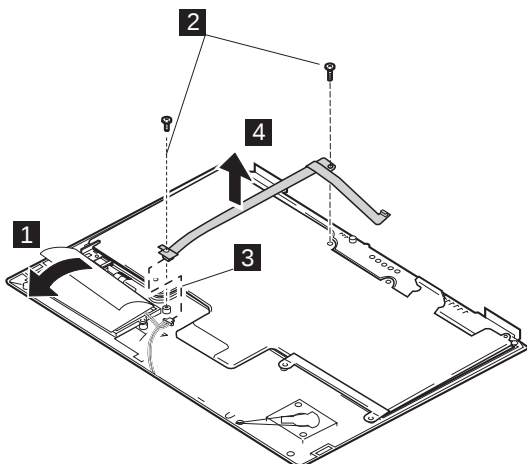


1085 Speaker Cable

- Battery Pack **(1030)**
- Hard Disk Drive **(1040)**
- CD-ROM Drive or Diskette Drive **(1050)**
- Keyboard Assembly **(1060)**

Note

In step **1**, remove the insulator on the left speaker.



Bottom view

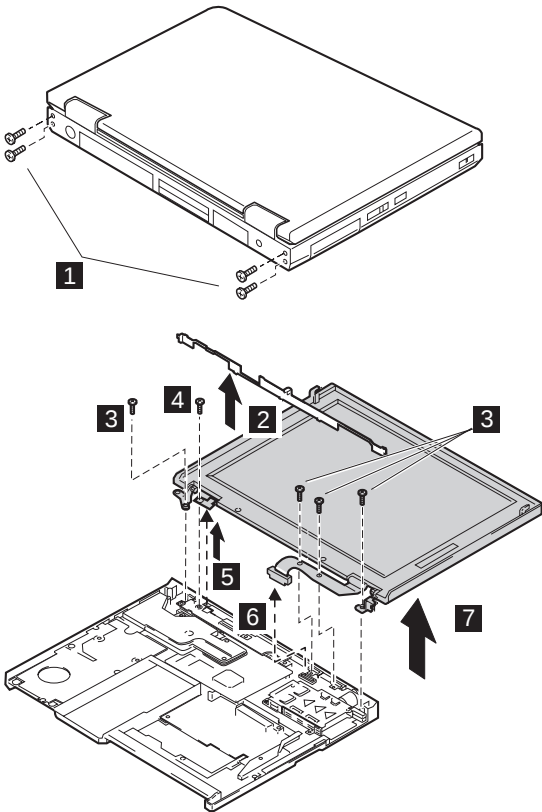
Step	Screw (Quantity)	Color	Torque
2	M2.5 × 3 mm, nylon-coated (1)	Yellow	4 kgcm

1090 LCD Assembly

- Battery Pack (1030)
- Hard Disk Drive (1040)
- CD-ROM Drive or Diskette Drive (1050)
- Keyboard Assembly (1060)

Note

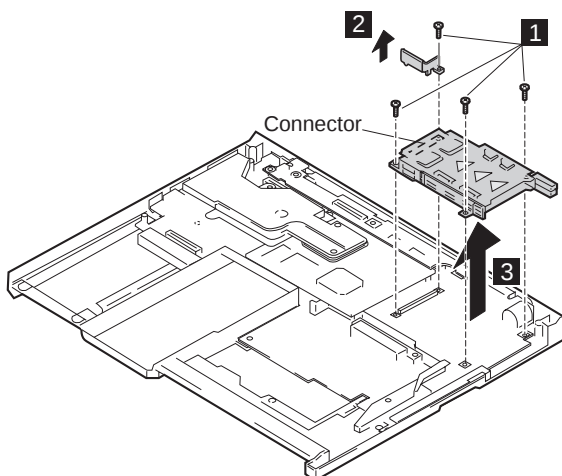
For the LCD FRU removals and replacement, go to “2010 LCD Front Cover” on page 88.



Step	Screw (Quantity)	Color	Torque
1	M2.5 × 4.8 mm, nylon-coated (4)	Black	4 kgcm
3	M2.5 × 4.8 mm, nylon-coated (4)	Black	4 kgcm
4	M2.5 × 4.8 mm, nylon-coated (1)	Black	4 kgcm

1100 PC Card (PCMCIA) Slot Assembly

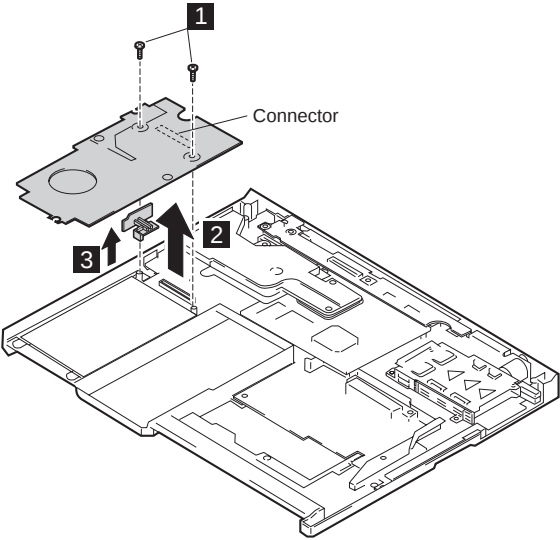
- Battery Pack **(1030)**
- Hard Disk Drive **(1040)**
- CD-ROM Drive or Diskette Drive **(1050)**
- Keyboard Assembly **(1060)**



Step	Screw (Quantity)	Color	Torque
1	M2.0 × 9.5 mm, nylon-coated (4)	Black	2.5 kgcm

1110 Modem Card

- Battery Pack **(1030)**
- Hard Disk Drive **(1040)**
- CD-ROM Drive or Diskette Drive **(1050)**
- Keyboard Assembly **(1060)**



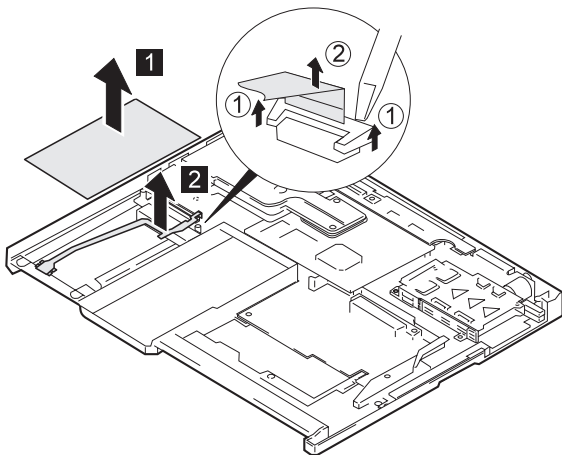
Step	Screw (Quantity)	Color	Torque
1	M2.5 × 4.8 mm, nylon-coated (2)	Black	4 kgcm

1115 System Kit for RFID

Note

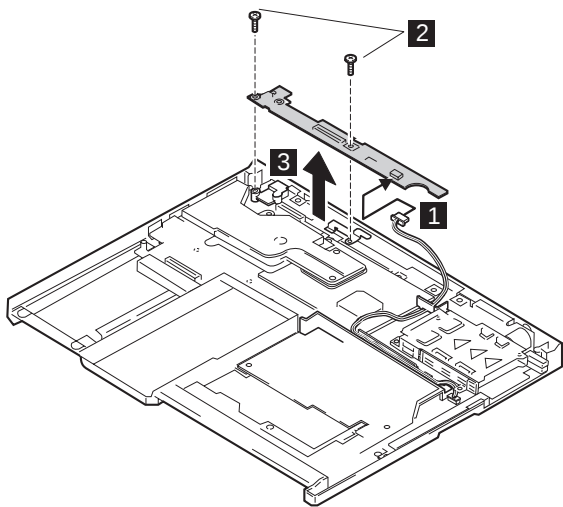
This FRU is only for 600E (2645-AAU) only.

- Battery Pack **(1030)**
- Hard Disk Drive **(1040)**
- CD-ROM Drive or Diskette Drive **(1050)**
- Keyboard Assembly **(1060)**
- Modem Card **(1110)**



1120 Sub Card

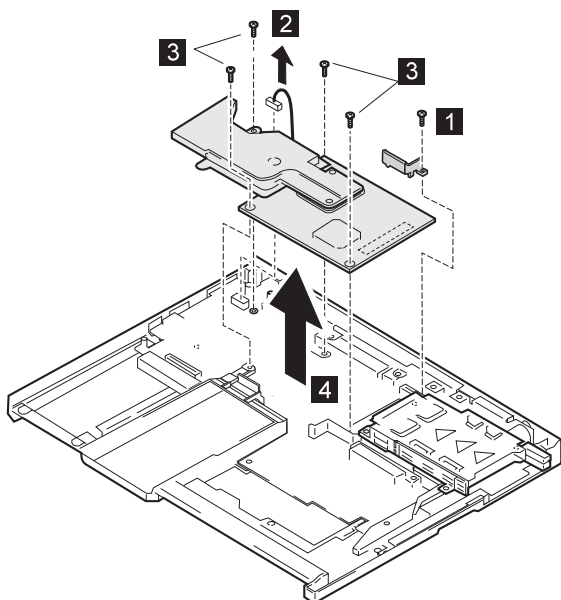
- Battery Pack **(1030)**
- Hard Disk Drive **(1040)**
- CD-ROM Drive or Diskette Drive **(1050)**
- Keyboard Assembly **(1060)**
- LCD Assembly **(1090)**



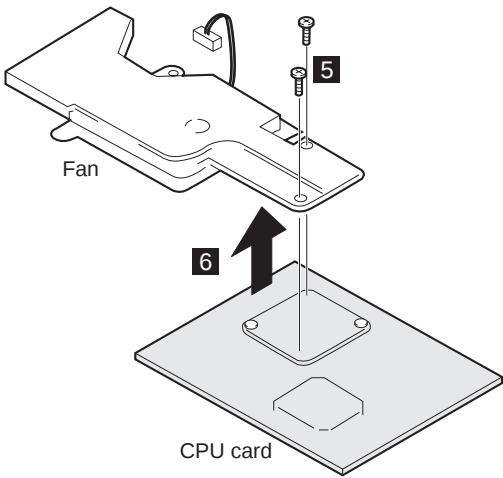
Step	Screw (Quantity)	Color	Torque
2	M2.5 × 4.8 mm, nylon-coated (2)	Black	4 kgcm

1130 CPU Card and Fan

- Battery Pack **(1030)**
- Hard Disk Drive **(1040)**
- CD-ROM Drive or Diskette Drive **(1050)**
- Keyboard Assembly **(1060)**



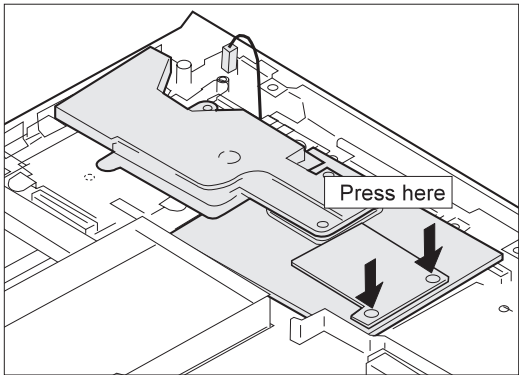
Step	Screw (Quantity)	Color	Torque
1	M2.0 × 9.5 mm, nylon-coated (1)	Black	2.5 kgcm
3	M2.0 × 9.5 mm, nylon-coated (4)	Black	2.5 kgcm



Step	Screw (Quantity)	Color	Torque
5	M2.0 × 4.0 mm, nylon-coated (2)	Black	2.5 kgcm

Note

When you replace the CPU card, press only on the places indicated in the figure. **Press both sides at the same time. Do not press only one side or any other part of the card..**



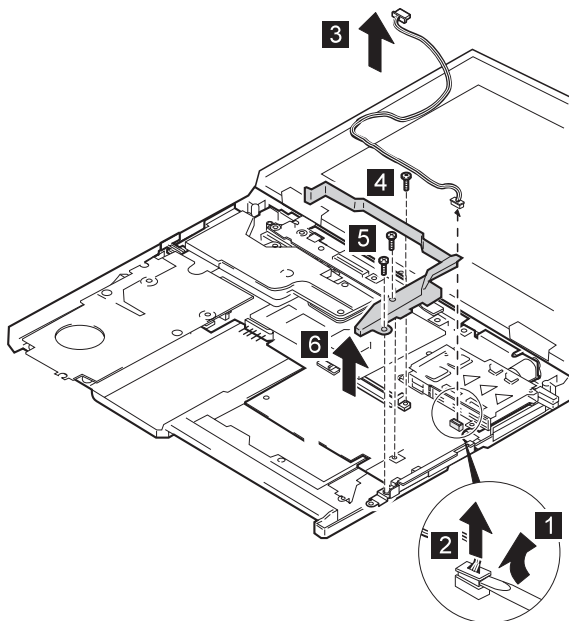
1140 Guide Rail, Mic. Cable, or TV Out Card

- Battery Pack (1030)
- Hard Disk Drive (1040)
- CD-ROM Drive or Diskette Drive (1050)
- Keyboard Assembly (1060)

Note

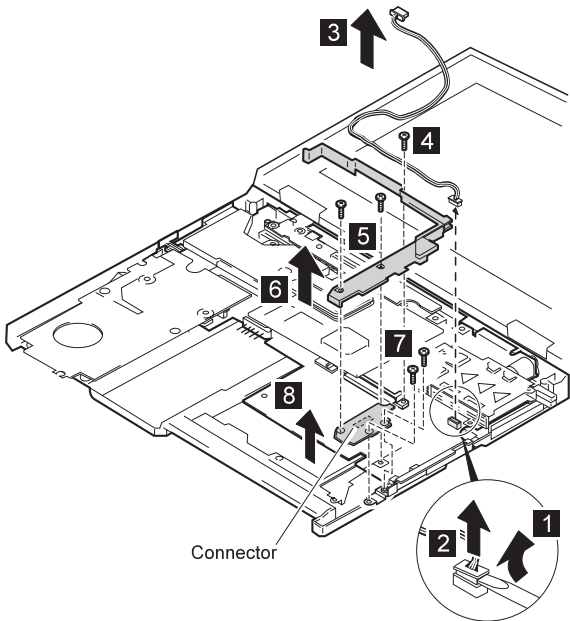
TV out card is available for 600E model only.

For 600



Step	Screw (Quantity)	Color	Torque
4	M2.0 × 9.5 mm, nylon-coated (1)	Black	2.5 kgcm
5	M2.5 × 4.8 mm, nylon-coated (3)	Black	4 kgcm

For 600E



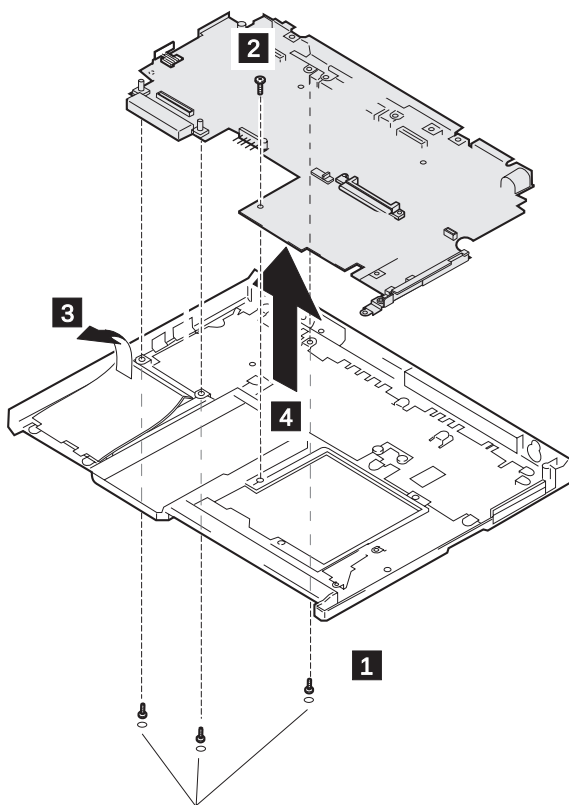
Step	Screw (Quantity)	Color	Torque
4	M2.0 × 9.5 mm, nylon-coated (1)	Black	2.5 kgcm
5	M2.5 × 4.8 mm, nylon-coated (2)	Black	4 kgcm
7	M2.5 × 7 mm, nylon-coated (2)	Yellow	4 kgcm

Note

Make sure the connector on the TV out card is firmly connected.

1150 System Board

- Backup Battery (1010)
- DIMM (1020)
- Battery Pack (1030)
- Hard Disk Drive (1040)
- CD-ROM Drive or Diskette Drive (1050)
- Keyboard Assembly (1060)
- LCD Assembly (1090)
- PC Card (PCMCIA) Slot Assembly (1100)
- Modem Card (1110)
- Sub Card (1120)
- CPU Card and Fan (1130)
- TV Out Card (1140)



Step	Screw (Quantity)	Color	Torque
1	M2.5 × 4.8 mm, nylon-coated (3)	Black	4 kgcm
2	M2.5 × 4.8 mm, nylon-coated (1)	Black	4 kgcm

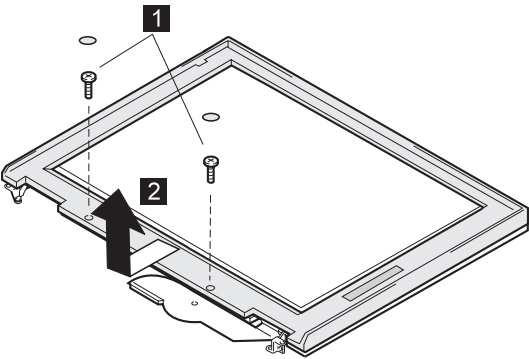
2010 LCD Front Cover

- Battery Pack **(1030)**
- Hard Disk Drive **(1040)**
- CD-ROM Drive or Diskette Drive **(1050)**
- Keyboard Assembly **(1060)**
- LCD Assembly **(1090)**

Important

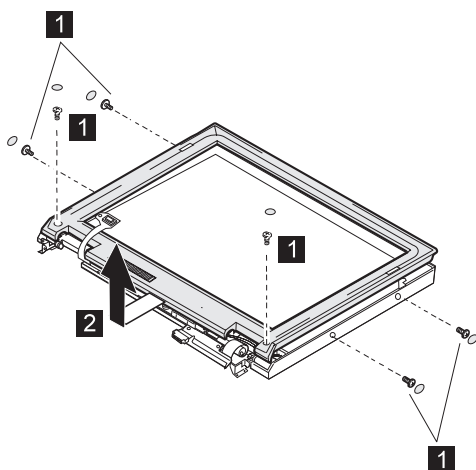
The TFT LCD for the notebook computer contains over 2,359,296 thin-film transistors. A small number of missing, discolored, or constantly lighted dots is characteristic of TFT LCD technology, but excessive pixel problems can cause viewing concerns. The LCD should be replaced if the number of missing, discolored, or lighted dots in any background is **21 or more**.

12.1-Inch TFT Panel (600 Only)



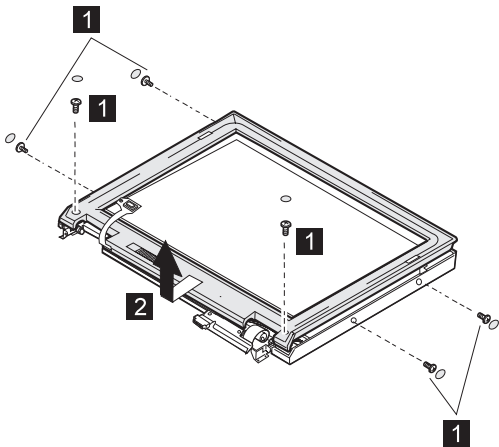
Step	Screw (Quantity)	Color	Torque
1	M2.5 × 4.8 mm, nylon-coated (2)	Black	4 kgcm

13.3-Inch TFT Panel



Step	Screw (Quantity)	Color	Torque
1	M2.5 × 4.8 mm, nylon-coated (2)	Black	4 kgcm
1	M2.5 × 4.8 mm, nylon-coated (4)	Black	4 kgcm

13.0-Inch HPA Panel (600 Only)

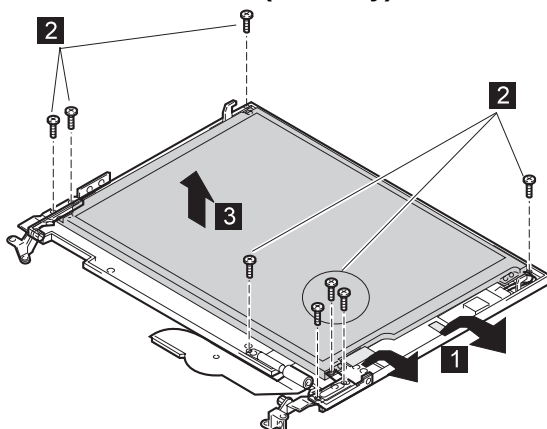


Step	Screw (Quantity)	Color	Torque
1	M2.5 × 4.8 mm, nylon-coating (2)	Black	4 kgcm
1	M2.5 × 4.8 mm, nylon-coating (4)	Black	4 kgcm

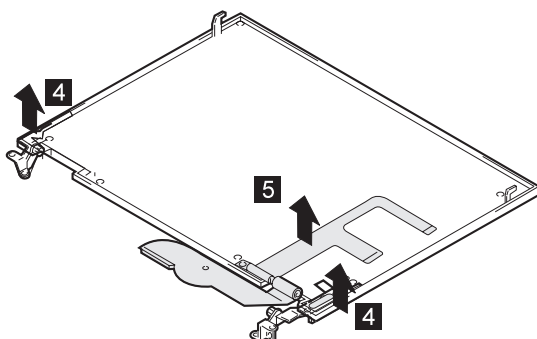
2020 LCD Hinges and Cables

- Battery Pack **(1030)**
- Hard Disk Drive **(1040)**
- CD-ROM Drive or Diskette Drive **(1050)**
- Keyboard Assembly **(1060)**
- LCD Assembly **(1090)**
- LCD Front Cover **(2010)**

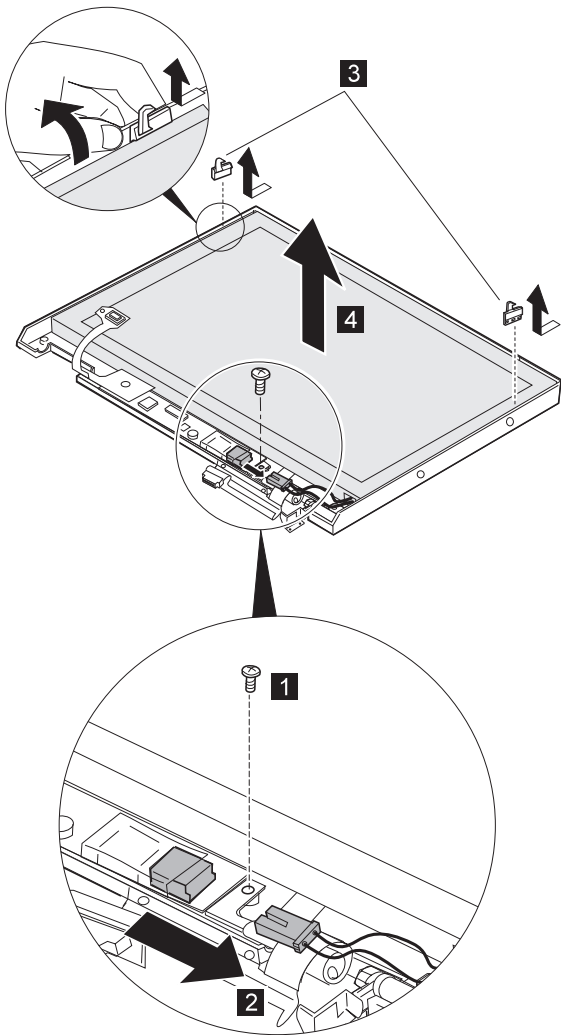
12.1-Inch TFT Panel (600 Only)



Step	Screw (Quantity)	Color	Torque
2	M2 × 4.8 mm, (8)	Black	4 kgcm

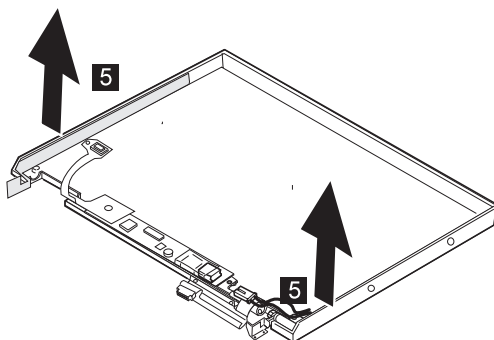


13.3-Inch TFT Panel

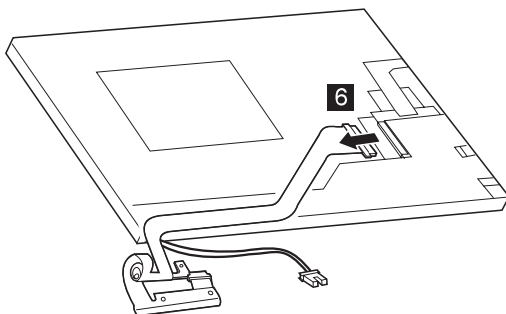


Note

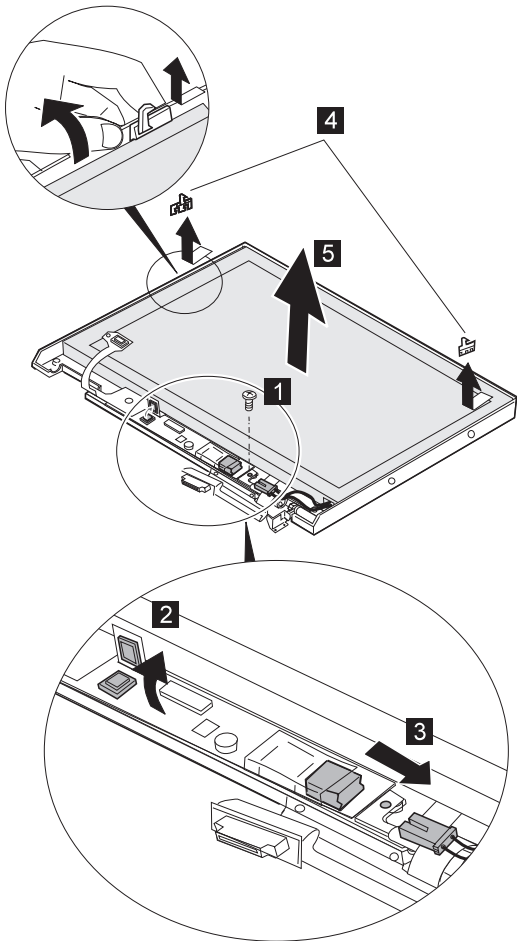
When you replace the cables, make sure the cables are not caught by the LCD panel.



Step	Screw (Quantity)	Color	Torque
1	M2.5 × 4.8 mm, nylon-coated (1)	Black	4 kgcm



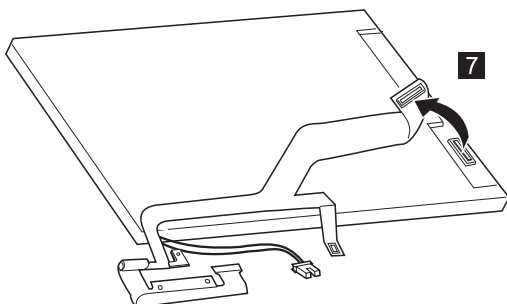
13.0-Inch HPA Panel (600 Only)



Note

When you replace the cables, make sure the cables are not caught by the LCD panel.

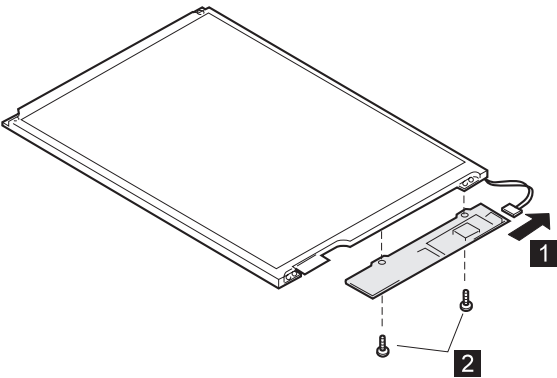
Step	Screw (Quantity)	Color	Torque
2	M2.5 × 4.8 mm, nylon-coated (6)	Black	4 kgcm



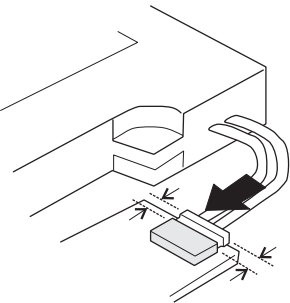
2030 Inverter Card

- Battery Pack (1030)
- Hard Disk Drive (1040)
- CD-ROM Drive or Diskette Drive (1050)
- Keyboard Assembly (1060)
- LCD Assembly (1090)
- LCD Front Cover (2010)
- LCD Hinges and Cables (2020)

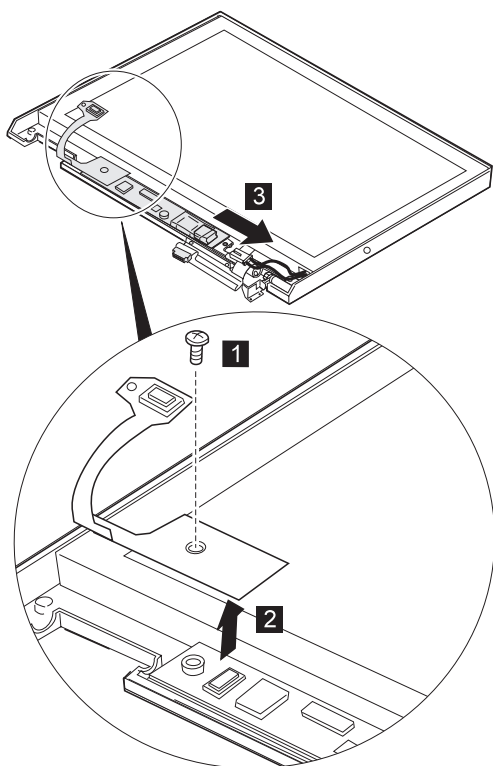
12.1-Inch TFT Panel (600 Only)



Step	Screw (Quantity)	Color	Torque
2	M2.0 × 3 mm, nylon-coated (2)	Silver	2.5 kgcm
Note: Connect the LCD connector to the inverter card by lining them up straight.			

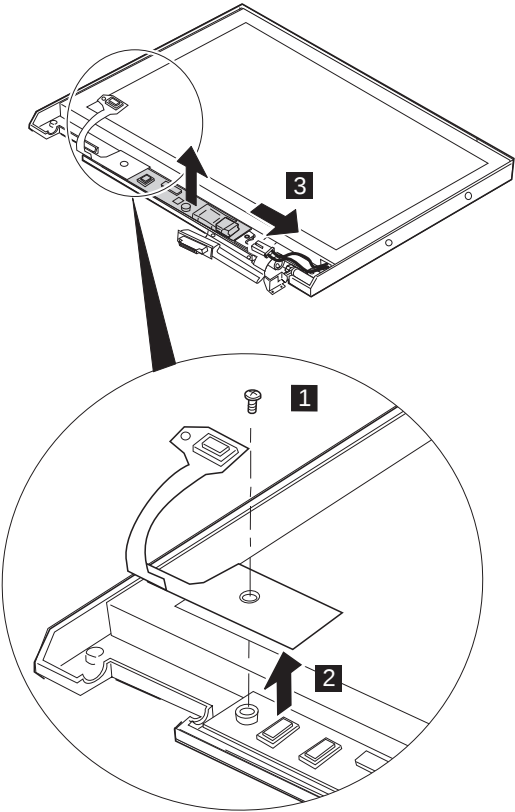


13.3-Inch TFT Panel



Step	Screw (Quantity)	Color	Torque
1	M2.5 × 4.8 mm, nylon-coating (1)	Black	4 kgcm

13.0-Inch HPA Panel (600 Only)

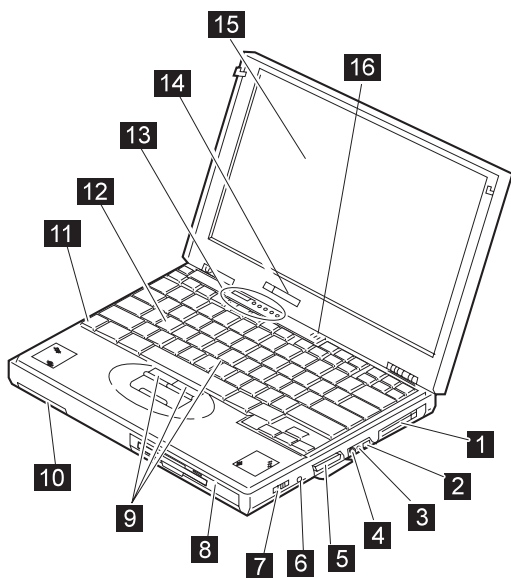


Step	Screw (Quantity)	Color	Torque
1	M2.5 × 4.8 mm, nylon-coating (1)	Black	4 kgcm

Locations

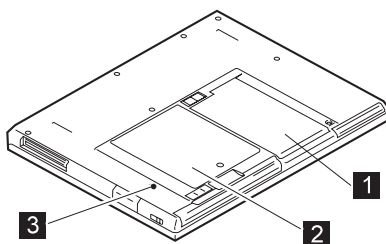
Front View

- 1** PC Card Slots
- 2** Infrared Port
- 3** Headphone Jack
- 4** Microphone Jack
- 5** External Diskette Drive Connector
- 6** Video Out Connector
- 7** LCD Latch
- 8** Diskette/CD-ROM Drive
- 9** TrackPoint
- 10** Hard Disk Drive
- 11** Fn Key
- 12** Keyboard
- 13** Indicator Panel
- 14** Brightness Control
- 15** LCD Panel
- 16** Built-in Microphone

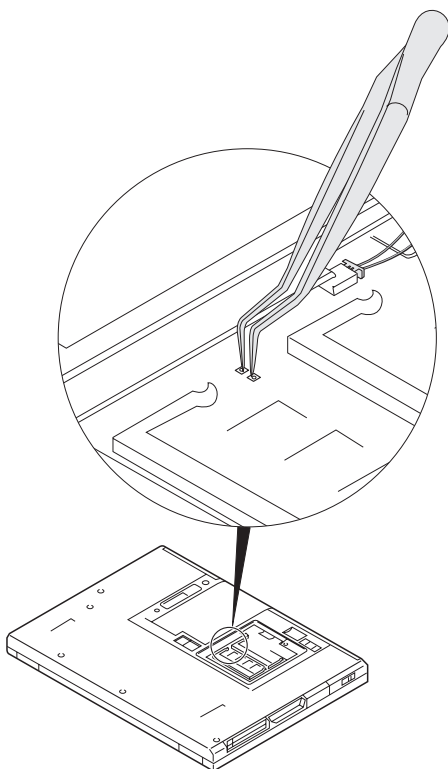


Bottom View

- 1** Battery Pack
- 2** DIMM Cover
- 3** UltralimBay Indicator

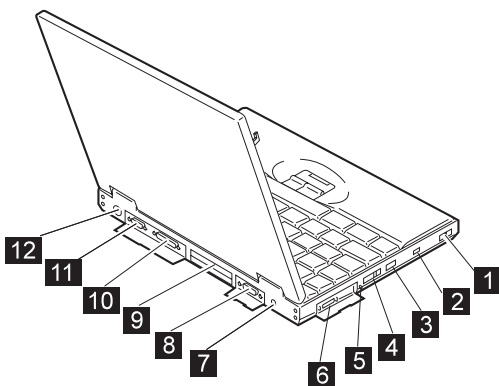


Password Pads



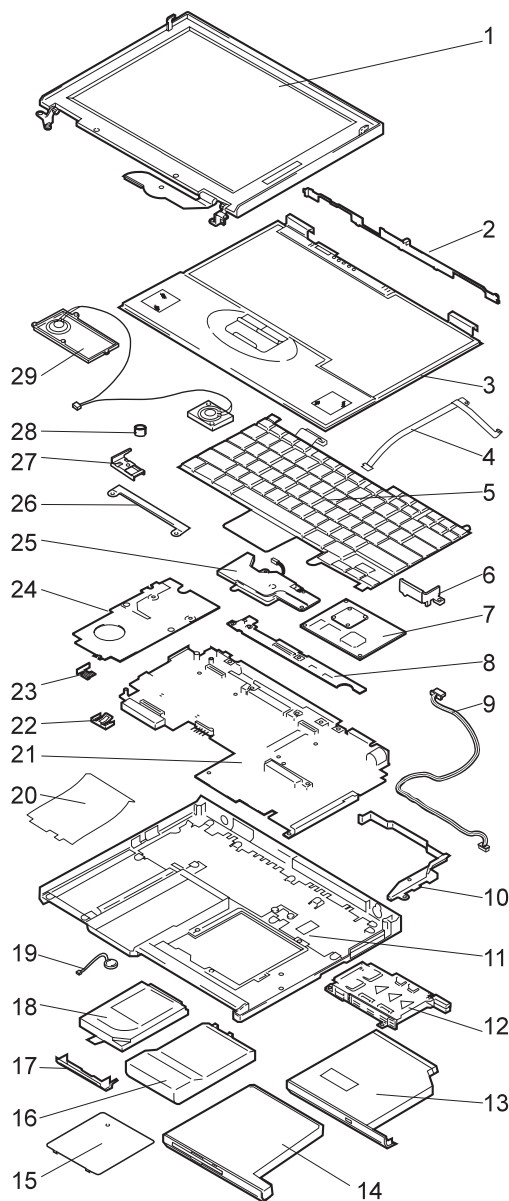
Rear View

- 1** LCD Latch
- 2** Security Keyhole
- 3** Modem Port
- 4** Power Switch
- 5** Reset Switch
- 6** Universal Serial Connector
- 7** AC Adapter Jack
- 8** Serial Connector
- 9** System Expansion Connector
- 10** Parallel Connector
- 11** External Monitor Connector
- 12** External-Input-Device Connector



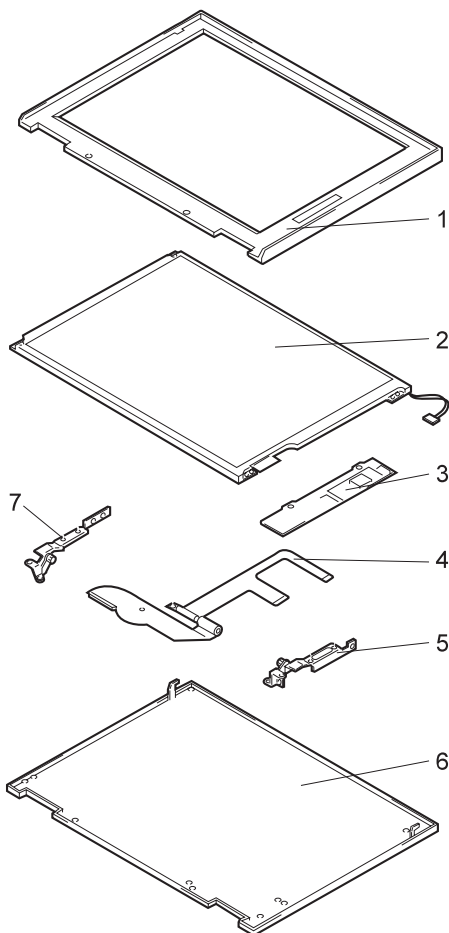
Parts List

Model 600



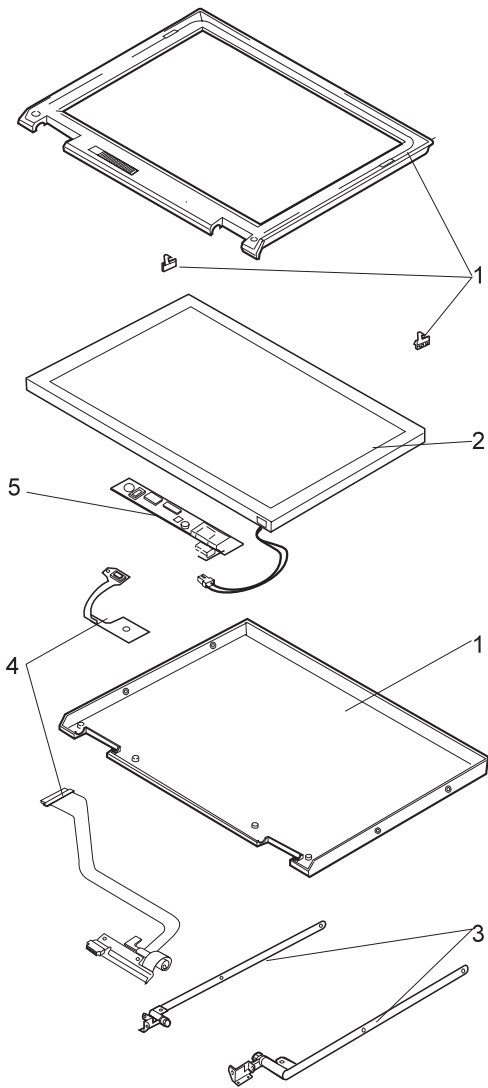
Index	System Unit	
1	LCD Assembly (see "LCD FRU (TFT)" on page 105.)	
2	Center Cover (see misc. parts)	
3	Keyboard Bezel	05K7046
3	Keyboard Bezel - Korea	05K7048
4	Speaker and Microphone Cable (see misc. parts)	
5	Keyboard (see "Keyboard" on page 112)	
6	Holder for CPU Card (see misc. parts)	
7	CPU Card (MMX™ 233 MHz)	12J0408
	CPU Card (Pentium® II 233 MHz)	10L0888
	CPU Card (Pentium® II 266 MHz)	10L0887
	CPU Card (Pentium® II 300 MHz)	10L1020
8	Sub Card	05K3468
9	Mic. Cable (see misc. parts)	
10	Guide Rail (see misc. parts)	
11	Base Cover (with modem)	05K4826
	Base Cover (without modem)	05K5376
	Base Cover for Korea	05K5274
	Base Cover for China	05K5651
	Base Cover for Taiwan	05K5667
12	PC Card Slot	05K4790
13	CD-ROM Drive	05K9045
	CD-ROM Drive	20L1926
14	Diskette Drive	05K8874
15	DIMM Cover	05K7064
16	Battery Pack	02K7018
17	Hard Disk Drive Cover, Coin Screw	05K5995
18	Hard Disk Drive (3.2 GB)	22L0005
	Hard Disk Drive (3.2 GB, 905mm)	28L1595
	Hard Disk Drive (4.0 GB)	83H7085
	Hard Disk Drive (5.1 GB)	83H7102
	Hard Disk Drive (6.4 GB)	83H7103
	Hard Disk Shield	05K4752
19	Backup Battery	02K6502
20	Insulator for Modem (see misc. parts)	
21	System Board (12.1 LCD model)	10L1716
	System Board (13.0 LCD model)	10L1740
	System Board (13.3 LCD model)	10L1711
	System Board (13.3 LCD model)	10L1209
22	Backup Battery Holder	05K4827
23	Power Switch Knob (see misc. parts)	
24	Modem Card	05K3469
25	Fan	05K4830
26	Keyboard Bracket (see misc. parts)	
27	Bracket for Keyboard Corner (see misc. parts)	
28	TrackPoint Cap	84G6536
29	Speaker	02K4897

<i>Index</i>	<i>System Unit</i>	
	Telephone Cable	05K2707
	External FDD Cover	05K6187
	Blank Bay	05K4842
	CD-ROM Carrying Case	05K4843
	AC Adapter (56 W)	
	2-pin	11J8974
	2-pin	02K6497
	3-pin	02K7007
	3-pin	02K7011
	Doors	05K4828
	FDD	
	I/O Right	
	I/O Left	
	USB	
	Miscellaneous Parts for Base Cover	05K4827
	System Miscellaneous Parts	05K4831
	Center Cover	
	Guide Rail	
	Insulator for Modem	
	Insulator for Bay	
	Speaker and Microphone Cable	
	Holder for CPU Card	
	Power Switch Knob	
	Blank Door for Modem	
	Latch for Keyboard Bezel	
	Bracket for Keyboard	
	Bracket for Blind Corner	
	Bracket for Keyboard Corner	
	System Board Miscellaneous Parts	05K4829
	I/O Plate	
	Hex Stud for Bus	
	Hex Stud for D-Sub	
	FDD/Audio Cover	
	USB Plate	
	Holder Sub Card	
	Insulator System Board Battery	
	Insulator System Board Bay	
	Insulator System Board Fuse	

LCD FRU (TFT)**12.1-Inch TFT**

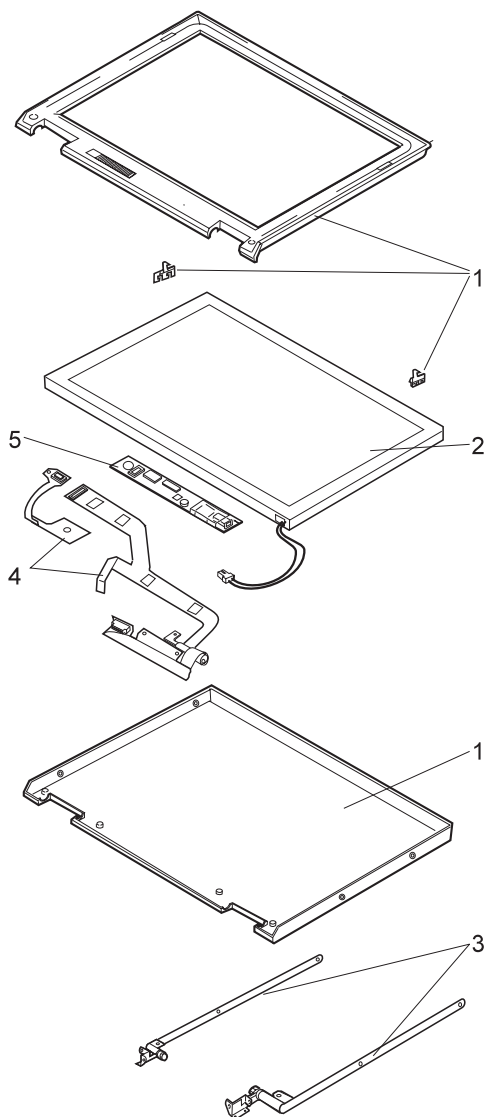
Index	System Unit	
1	Cover Set	05K5255
2	LCD Panel	05K9335
3	Inverter Card	10L0931
4	LCD Cables	05K2655
5	Hinges	05K5257

13.3-Inch TFT



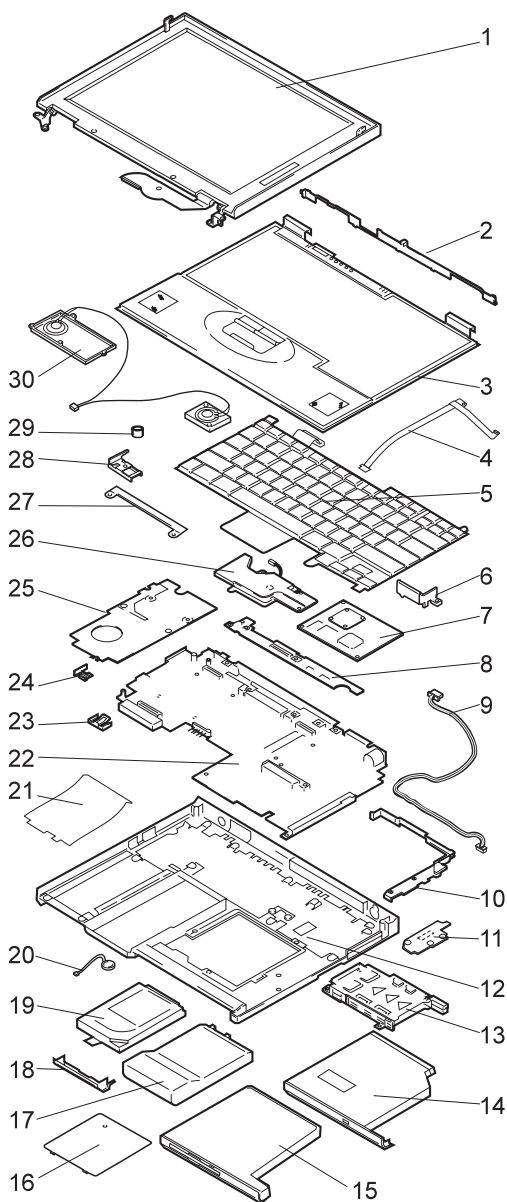
Index	System Unit	
1	Cover Set	05K4833
	Cover Set (Korea)	05K5256
2	LCD Panel (DBU)	05K9428
	LCD Panel (LG)	05K9367
3	Hinges	05K4835
4	LCD Cables	22L1891
5	Inverter Card	10L1719

13.0-Inch HPA



<i>Index</i>	<i>System Unit</i>	
1	Cover Set	05K4832
2	LCD Panel	05K9337
3	Hinges	05K4834
4	LCD Cables	05K2645
5	Inverter Card	05K3470

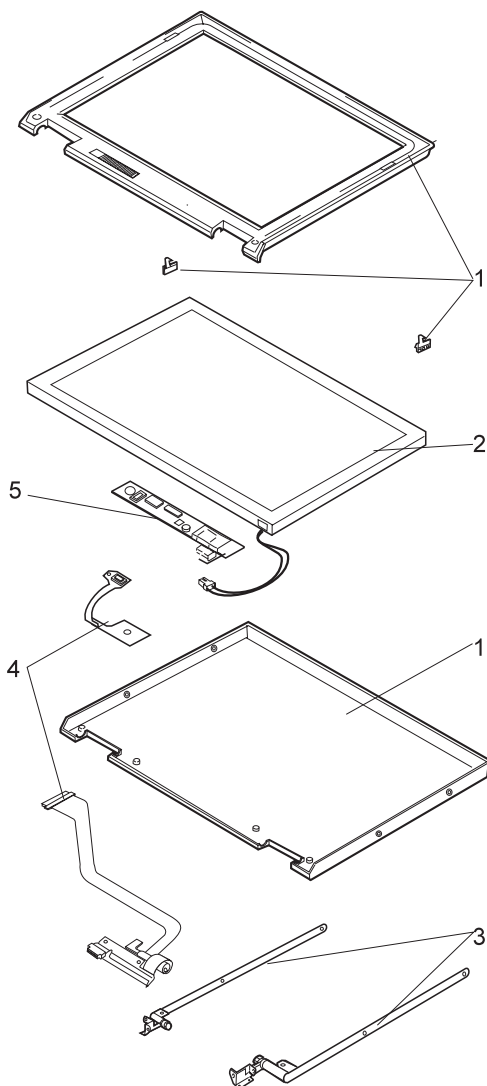
Model 600E



Index	System Unit	
1	LCD Assembly (see "LCD FRU (TFT)" on page 111)	
2	Center Cover (see misc. parts)	
3	Keyboard Bezel	05K5856
4	Speaker and Microphone Cable 2 (see misc. parts)	
5	Keyboard (see "Keyboard" on page 112)	
6	Holder for CPU Card (see misc. parts)	
7	CPU Card (Dixon 300 MHz, AGP)	10L1277
	CPU Card (Dixon 366 MHz, AGP)	10L1260
	CPU Card (Dixon 400 MHz, AGP)	10L1333
8	Sub Card 2	10L1193
9	Mic. Cable (see misc. parts)	
10	Guide Rail 2 (see misc. parts)	
11	TV Out Card	10L1192
12	Base Cover	05K6168
	for China	05K6169
	for Taiwan	05K6170
	for Korea	05K6171
13	PC Card Slot	05K4790
14	DVD Drive	05K9068
	DVD Drive	05K9106
15	CD-ROM Drive (LG)	05K9134
	CD-ROM Drive (SANYO)	05K9059
	CD-ROM Drive (SANYO)	05K8993
	CD-ROM Drive (TOSHIBA)	05K9124
16	Diskette Drive	05K8874
17	DIMM Cover	05K7064
18	Battery Pack	02K7018
19	Hard Disk Drive Cover, Coin Screw	05K5995
20	Hard Disk Drive (4.0 GB, SSD)	22L0018
	Hard Disk Drive (4.0 GB, TOSHIBA)	36L8619
	Hard Disk Drive (6.4 GB, SSD)	22L0019
	Hard Disk Drive (6.4 GB, HITACHI)	36L8615
	Hard Disk Drive (10.0 GB, SSD)	22L0016
	Hard Disk Shield	05K4752
21	Backup Battery	02K6502
22	Insulator for Modem (see misc. parts)	
23	System Board (13.3" AGP model)	10L1191
	Note: This system board is for 2645-55x and 2645-A5U.	
	System Board (13.3" 32MB AGP model)	10L1270
	Note: In U.S., this FRU is for 2645-4Ax, 2645-8Ax, 2645-AAx, 2645-5Ax, 2645-4Bx, 2645-8Bx, and 2645-ABx.	
24	Backup Battery Holder	05K4827
25	Power Switch Knob (see misc. parts)	
26	Modem Card	05K3469
27	Fan	05K4830
28	Keyboard Bracket (see misc. parts)	
29	Bracket for Keyboard Corner (see misc. parts)	
30	TrackPoint Cap	84G6536
31	Speaker	02K4897

Parts List

<i>Index</i>	<i>System Unit</i>	
	Telephone Cable	05K2707
	Video Cable	05K2821
	External FDD Cover	05K6187
	Blank Bay	05K4842
	CD-ROM Carrying Case	05K4843
	AC Adapter (56 W)	
	2-pin	02K6554
	2-pin	02K6556
	3-pin	02K6555
	3-pin	02K6557
	Doors	05K4828
	FDD	
	I/O Right	
	I/O Left	
	USB	
	System Kit for RFID	05K5855
	Miscellaneous Parts for Base Cover	05K4827
	System Miscellaneous Parts	05K5854
	Center Cover	
	Guide Rail	
	Insulator for Modem	
	Insulator for Bay	
	Speaker and Microphone Cable 2	
	Holder for CPU Card	
	Power Switch	
	Latch for Keyboard Bezel	
	Bracket for Keyboard	
	Bracket for Blind Corner	
	Bracket for Keyboard Corner	
	System Board Miscellaneous Parts	05K5853
	I/O Plate	
	Hex Stud for Bus	
	Hex Stud for D-Sub	
	FDD/Audio Cover	
	USB Plate	
	Holder Sub Card	
	Insulator System Board Battery	
	Insulator System Board Bay 2	
	Insulator System Board Fuse	
	System Board Miscellaneous Parts 2	05K4829

LCD FRU (TFT)**13.3-Inch TFT**

Index	System Unit	
1	Cover Set	05K4833
2	LCD Panel (DBU)	05K9398
	LCD Panel (HITACHI)	05K9466
	LCD Panel (LG)	05K9519
	LCD Panel (Samsung)	05K9546
3	Hinges	05K4835
4	LCD Cables	22L1891
5	Inverter Card	10L1719

Keyboard

Arabic	02K4837
Belgian	02K4801
Canadian French	02K4788
Czech	02K4839
Danish	02K4794
Dutch	02K4791
French	02K4790
German	02K4789
Greek	02K4843
Hungary	02K4841
Hebrew	02K4835
Italian	02K4795
Japanese	02K4786
Korean	02K4800
Latin American Spanish	02K4799
Norwegian	02K4793
Portuguese	02K4798
Russian	02K4833
Spanish	02K4796
Swedish or Finnish	02K4792
Swiss	02K4797
Taiwan	02K4803
Turkish	02K4802
U.K. English	02K4787
U.S. English	02K4785

Miscellaneous Parts

Screw Kit (for 600 series)	05K4841
Including nylon-coated screws:	
Pan head screw M2 x 4 mm (black)	
Pan head screw M2 x 9.5 mm (black)	
Pan head screw M2.5 x 3 mm (yellow)	
Flat head screw M2.5 x 4.8 mm (black)	
Flat head screw M2.5 x 16 mm (black)	
Flat head screw M2.5 x 19.5 mm (black)	
Flat head screw M3 x 3 mm (black)	
Screw Cap (painted)	
Screw Cap (no painted)	

Option Parts List

24X-10X IDE CD-ROM Drive	12J2471
20X-8X CD-ROM Drive	1969010
20X-8X Stereo CD-ROM Drive	1969011
56 AC Adapter (2-pin)	83H6739
4.0 GB Hard Disk Drive	05K8887
6.4 GB Hard Disk Drive	02K0520
Battery Charger	11J9003
Battery Attachment	02K6501
External Battery Charger	02K6499
LS-120	20L1922
PC Card Enabler	12J2480
RFID Option	05K5862
Secondary Battery	02K6505
Secondary HDD Adapter	05K5338
Slim Bay Adapter	05K5858
SuperDisk UltralimBay Drive	20L1929
SelectaBase PC Card Enabler	83H6741
SelectaBase 600	12J2467
SelectaDock III	3547003
UltralimBay Battery	02K6504
UltralimBay HDD Adapter	05K5336
UltralimBay DVD Drive	
-For North America (Region 1)	05K8890
-For Japan and EMEA (Region 2)	05K8891
-For AP North and AP South (Region 3)	05K8832
-For Latin America and AP South (Region 4)	05K8893
-For Russia (Region 5)	05K8959
-For China (Region 6)	05K8960
32 MB SDRAM SO DIMM	42H2819
64 MB SDRAM SO DIMM	20L0242
128 MB SDRAM SO DIMM	01K1153
Miniature Mouse (Black)	07G0033
TrackPoint III Cap	39H1354

Modem Kit

Australia	22L1885
Austria	22L1863
Belgium	22L1861
Brazil	22L1871
Cyprus	22L1887
Denmark	22L1879
France	22L1862
Germany	22L1877
Indonesia	22L1872
Ireland	22L1896
Italy	22L1865
Israel	22L1869
Malaysia	22L1868
Mexico	22L1870
Netherlands	22L1878
New Zealand	22L1860
Norway/Finland	22L1880
Pakistan	22L1873
Philippines	22L1874
Portugal	22L1883
Singapore	22L1867
Spain	22L1866
Sweden	22L1881
Switzerland	22L1882
Turkey	22L1884
UK	22L1876
Vietnam	22L1875

Common Parts List

Tools

Tri-Connector Wrap Plug	72X8546
PC Test Card	35G4703
Audio Wrap Cable	66G5180
USB Parallel Test Cable	05K2580
Screwdriver Kit	95F3598
Torque Screwdriver	05K4695
5mm Socket Wrench	05K4694
Screwdriver	27L8126
ThinkPad Hardware Maintenance Diskette Version 1.50	

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

For 2-pin power cords:

P/N	Used in These Countries
13H5273	Japan

For 3-pin power cords:

P/N	Used in These Countries
02K0539	People's Republic of China (other than Hong Kong)
36L8867	Argentina
76H3514	Argentina, Australia, New Zealand, Papua New Guinea, Paraguay, Uruguay
76H3516	Aruba, Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canada, Cayman Islands, Colombia, Costa Rica, Curacao, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Korea (South), Liberia, Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Suriname, Taiwan, Thailand, Trinidad (West Indies), United States of America, Venezuela
76H3518	Austria, Belgium, Bosnia-Herzegovina, Bulgaria, Croatia, Czech Republic, Egypt, Finland, France, Germany, Greece, Hungary, Iceland, Indonesia, Macao, Macedonia, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Turkey, Yugoslavia
76H3520	Denmark
76H3522	Bangladesh, Myanmar, Pakistan, South Africa, Sri Lanka
76H3524	Abu Dhabi, Albania, Antigua, Bahrain, Brunei, Dubai, Fiji, Hong Kong, India, Ireland, Kenya, Kuwait, Malaysia, Nigeria, Oman, Qatar, Singapore, United Kingdom
76H3526	Japan
76H3528	Switzerland, Liechtenstein
76H3530	Chile, Ethiopia, Italy, Libya
76H3532	Israel
76H3535	Korea

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