

**ThinkPad**

# ThinkPad<sup>®</sup> Z60t Hardware Maintenance Manual

October 2007

**This manual supports:**

**ThinkPad Z60t**

(MT 2511, 2512, 2513, and 2514)



**ThinkPad**

**ThinkPad<sup>®</sup> Z60t**  
**Hardware Maintenance Manual**

**Note**

Before using this information and the product it supports, be sure to read the general information under "Notices" on page 134.

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# Contents

## About this manual . . . . . 1

## Introduction . . . . . 3

Important service information . . . . .	3
Strategy for replacing FRUs . . . . .	3
Strategy for replacing a hard disk drive . . . . .	4
Important notice for replacing a system board . . . . .	4
How to use error messages . . . . .	4
Strategy for replacing FRUs for CTO, CMV, and GAV . . . . .	4
Product definition . . . . .	4
FRU identification for CTO, CMV, and GAV products . . . . .	5
Important information about replacing RoHS compliant FRUs . . . . .	6
Diskette compatibility matrix . . . . .	7
Safety notices: multilingual translations . . . . .	7
Safety information . . . . .	13
General safety . . . . .	13
Electrical safety . . . . .	13
Safety inspection guide . . . . .	15
Handling devices that are sensitive to electrostatic discharge . . . . .	16
Grounding requirements . . . . .	16
Laser compliance statement . . . . .	17

## General descriptions. . . . . 19

Read this first . . . . .	19
What to do first . . . . .	19
Related service information . . . . .	21
Service Web site . . . . .	21
Restoring the pre-installed system . . . . .	21
Passwords . . . . .	21
Power management . . . . .	24
Checkout guide . . . . .	26
Testing the computer . . . . .	26
Detecting system information with PC-Doctor . . . . .	29
Power system checkout . . . . .	30

## ThinkPad Z60t . . . . . 33

Product overview . . . . .	34
Specifications . . . . .	34
Status indicators . . . . .	36
FRU tests . . . . .	39
Fn key combinations . . . . .	41
Symptom-to-FRU index . . . . .	44
Numeric error codes . . . . .	44
Error messages . . . . .	48
Beep symptoms . . . . .	49
No-beep symptoms . . . . .	49

LCD-related symptoms . . . . .	50
Intermittent problems . . . . .	51
Undetermined problems . . . . .	51
FRU replacement notices . . . . .	52
Screw notices . . . . .	52
Retaining serial numbers . . . . .	52
Removing and replacing a FRU. . . . .	55
1010 Battery pack . . . . .	56
1020 Ultrabay Slim device . . . . .	57
1030 Hard disk drive cover, hard disk drive, and hard disk drive rubber rails . . . . .	58
1040 Palm rest or palm rest with fingerprint reader . . . . .	60
1050 DIMM . . . . .	62
1060 Keyboard . . . . .	63
1070 Modem daughter card (MDC-1.5) . . . . .	65
1080 PCI Express Mini card for wireless WAN. . . . .	67
1090 PCI Express Mini card for wireless LAN . . . . .	69
1100 Backup battery . . . . .	71
1110 Keyboard bezel . . . . .	72
1120 Speaker assembly . . . . .	74
1130 Fan assembly . . . . .	76
1140 CPU . . . . .	78
1150 Wireless WAN antenna (DIV). . . . .	79
1160 LCD assembly. . . . .	80
1170 Base cover . . . . .	83
1180 USB/S-video sub card with cable . . . . .	86
1190 MG (Magnesium) frame . . . . .	87
1200 System board and PC Card slot assembly . . . . .	92
2010 LCD front bezel . . . . .	97
2020 Inverter card . . . . .	99
2030 <i>Bluetooth</i> daughter card (BDC-2) . . . . .	100
2040 Wireless WAN antenna cable (MAIN) . . . . .	102
2050 LCD panel, LCD cable, and hinges . . . . .	105
2060 LCD rear cover and wireless LAN antenna cables . . . . .	108
Locations . . . . .	114
Front view . . . . .	114
Rear view . . . . .	115
Bottom view. . . . .	116
Parts list . . . . .	117
Overall . . . . .	118
LCD FRUs . . . . .	126
Keyboard. . . . .	128
Recovery CDs . . . . .	129
Miscellaneous parts . . . . .	131
AC adapters. . . . .	132
Common parts list. . . . .	132
Notices . . . . .	134
Trademarks . . . . .	135



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## About this manual

This manual contains service and reference information for ThinkPad® Z60t (MT 2511, 2512, 2513, and 2514) products. Use this manual along with the advanced diagnostic tests to troubleshoot problems.

The manual is divided into sections as follows:

- The common sections provide general information, guidelines, and safety information required in servicing computers.
- The product-specific section includes service, reference, and product-specific parts information.

### **Important**

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

Before servicing a ThinkPad product, be sure to review the safety information under “Safety notices: multilingual translations” on page 7, “Safety information” on page 13, and “Laser compliance statement” on page 17.





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## Introduction

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### Important service information

**Important**

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

Advise customers to contact the Customer Support Center at 800-426-7378 if they need assistance in obtaining or installing any software fixes, drivers, and BIOS downloads.

Customers in Canada should call the Customer Support Center at 800-565-3344 for assistance or download information.

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### Strategy for replacing FRUs

**Before replacing parts**

Make sure that all software fixes, drivers, and BIOS downloads are installed before replacing any FRUs listed in this manual.

After a system board is replaced, ensure that the latest BIOS is loaded to the system board before completing the service action.

To download software fixes, drivers, and BIOS, do as follows:

1. Go to <http://www.lenovo.com/support>
2. Enter the product number of the computer or press Auto-detect button on the screen.
3. Select **Downloads and drivers**.
4. Follow the directions on the screen and install the necessary software.

Use the following strategy to prevent unnecessary expense for replacing and servicing FRUs:

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

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

## **Strategy for replacing a hard disk drive**

Always try to run a low-level format before replacing a hard disk drive. This will cause all customer data on the hard disk to be lost. Be sure that the customer has a current backup of the data before doing this task.

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

## **Important notice for replacing a system board**

Some components mounted on a system board are very sensitive. Improper handling of a system board can cause damage to those components, and may cause a system malfunction.

**Attention:** When handling a system board:

- Do not drop a system board or apply any excessive force to it.
- Avoid rough handling of any kind.
- Avoid bending a system board and hard pushing to prevent cracking at each BGA (Ball Grid Array) chipset.

## **How to use error messages**

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

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## **Strategy for replacing FRUs for CTO, CMV, and GAV**

### **Product definition**

#### **Dynamic Configure To Order (CTO)**

This provides the ability for a customer to configure an IBM® or a Lenovo™ solution from an eSite, and have this configuration sent to fulfillment, where it is built and shipped directly to the customer. The machine label, Product Entitlement Warehouse (PEW), eSupport, and the HMM will load these products as the 4-digit MT and 3-digit model, where model = "CTO" (Example: 1829-CTO).

#### **Custom Model Variant (CMV)**

This is a unique configuration that has been negotiated between IBM or Lenovo and the customer. A unique 4-digit MT and 3-digit model is provided to the customer to place orders (Example: 1829-W15). A CMV is a special bid offering. Therefore, it is NOT generally announced.

- The MTM portion of the machine label is the 4-digit MT and 3-digit model, where model = "CTO" (Example: 1829-CTO). The PRODUCT ID portion of the machine label is the 4-digit MT and 3-digit CMV model (Example: 1829-W15).

- The PEW record is the 4-digit MT and 3-digit model, where model = “CTO” (Example: 1829-CTO).
- eSupport will show both the CTO and CMV machine type models (Example: 1829-CTO and 1829-W15 will be found on the eSupport site.)
- The HMM will have the 4-digit MT and 3-digit CTO model only (Example: 1829-CTO). Again, CMVs are custom models and are not found in the HMM.

#### **General Announce Variant (GAV)**

This is a standard model (fixed configuration). GAVs are announced and offered to all customers. The MTM portion of the machine label is a 4-digit MT and 3-digit model, where model = a “fixed part number”, not “CTO” (Example: 1829-F1U). Also, PEW, eSupport, and the HMM will list these products under the same fixed model number.

## **FRU identification for CTO, CMV, and GAV products**

There are three information resources to identify which FRUs are used to support CTO, CMV, and GAV products. These sources are PEW, eSupport, and the HMM.

### **Using PEW**

- PEW is the primary source for identifying FRU part numbers and FRU descriptions for the key commodities for CTO, CMV and GAV products at a MT - serial number level. An example of key commodities are hard disk drives, system boards, microprocessors, Liquid Crystal Displays (LCDs), and memory.
- Remember, all CTO and CMV products are loaded in PEW under the 4-digit MT and 3-digit model, where model = “CTO” (Example: 1829-CTO). GAVs are loaded in PEW under the 4-digit MT and 3-digit model, where model = a “fixed part number”, not “CTO” (Example: 1829-F1U).
- PEW can be accessed at the following Web site:  
<http://w3-3.ibm.com/pc/entitle>  
Customers can also access PEW via  
<http://www-307.ibm.com/pc/support/site.wss/product.do?template=/warranty/warranty.vm&sitestyle=lenovo>  
Select Warranty lookup. Input the MT and the Serial number and the list of key commodities will be returned in the PEW record under COMPONENT INFORMATION.
- **Business Partners** using Eclaim will access PEW when performing Entitlement Lookup. Business Partners will enter Loc ID, MT and Serial, and the key commodities will be returned in the Eclaim record under SYSTEM DETAILS.
- Authorized IBM Business Partners can access Eclaim at the following Web site:  
<https://wca.eclaim.com>

### **Using eSupport**

**For Key Commodities (Examples - hard disk drive, system board, microprocessor, LCD, and memory)**

- eSupport can be used to view the list of key commodities built in a particular machine serial (this is the same record found in PEW).
- eSupport can be accessed at the following Web site: <http://www.lenovo.com/support>
- To view the key commodities, click on PARTS INFORMATION, then PARTS LOOKUP. Type in the model type and serial number. The key commodities will be returned in the eSupport record under PARTS SHIPPED WITH YOUR SYSTEM.

**For the Remaining FRUs (the complete list of FRUs at the MT Model level)**

- eSupport can be used to view the complete list of FRUs for a machine type and model.
- To view the complete list of FRUs, type in the machine type and model (Example: 1829-CTO) under QUICK PATH. Under “View by Document Type” select PARTS INFORMATION. Under “Filter by Category” select SERVICE PARTS. Under “Parts Information by Date” select SYSTEM SERVICE PARTS. The list of service parts by description, with applicable machine type model and FRU will be displayed.

**Using the HMM**

Use the HMM as a back-up to PEW and eSupport to view the complete list of FRUs at the MT Model level.

**Important information about replacing RoHS compliant FRUs**

RoHS, The Restriction of Hazardous Substances in Electrical and Electronic Equipment Directive (2002/95/EC) is a European Union legal requirement affecting the global electronics industry. RoHS requirements must be implemented on Lenovo products placed on the market and sold in the European Union after June 2006. Products on the market before June 2006 are not required to have RoHS compliant parts. If the original FRU parts are non compliant, replacement parts can also be non compliant. In all cases if the original FRU parts are RoHS compliant the replacement part must also be RoHS compliant.

**Note:** RoHS and non-RoHS FRU part numbers with the same fit and function are identified with unique FRU part numbers.

Lenovo plans to transition to RoHS compliance well before the implementation date and expects its suppliers to be ready to support Lenovo's requirements and schedule in the EU. Products sold in 2005 and 2006, will contain some RoHS compliant FRUs. The following statement pertains to these products and any product Lenovo produces containing RoHS compliant FRUs.

RoHS compliant FRUs have unique FRU part numbers. Before or after the RoHS implementation date, failed RoHS compliant parts must always be replaced using RoHS compliant FRUs, so only the FRUs identified as compliant in the system HMM or direct substitutions for those FRUs may be used.

Products marketed before June 2006		Products marketed after June 2006	
Current or original part	Replacement FRU	Current or original part	Replacement FRU
Non-RoHS	Can be Non-RoHS	Must be RoHS	Must be RoHS
Non-RoHS	Can be RoHS		
Non-RoHS	Can sub to RoHS		
RoHS	Must be RoHS		

**Note:** A direct substitution is a part with a different FRU part number that is automatically shipped by the distribution center at the time of the order.

## Diskette compatibility matrix

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

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

## Safety notices: multilingual translations

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

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

### Safety notice 1

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

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

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

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

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

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

Safety notice 2



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

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

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

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

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

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

## Safety notice 3



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

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

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

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

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

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

Safety notice 4



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

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

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

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

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

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



## Safety notice 5

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

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

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

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

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

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

## Safety notice 6



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

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

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

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

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

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

Safety notice 7



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

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

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

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

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

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

Safety notice 8



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

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

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

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

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

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

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## Safety information

The following section presents safety information with which you need to be familiar before you service a ThinkPad computer.

### General safety

Follow these rules to ensure general safety:

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

**Attention:** Metal objects are good electrical conductors.
- Wear safety glasses when you are hammering, drilling, soldering, cutting wire, attaching springs, using solvents, or working in any other conditions that might be hazardous to your eyes.
- After service, reinstall all safety shields, guards, labels, and ground wires. Replace any safety device that is worn or defective.
- Reinstall all covers correctly before returning the machine to the customer.
- Fan louvers on the machine help to prevent overheating of internal components. Do not obstruct fan louvers or cover them with labels or stickers.

### 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 Field Replaceable Units (FRUs)
  - Before you start to work on the machine, unplug the power cord. If you cannot unplug it, ask the customer to power-off the wall box that supplies power to the machine, and to lock the wall box in the off position.
  - If you need to work on a machine that has *exposed* electrical circuits, observe the following precautions:
    - Ensure that another person, familiar with the power-off controls, is near you.  
**Attention:** Another person must be there to switch off the power, if necessary.
    - Use only one hand when working with powered-on electrical equipment; keep the other hand in your pocket or behind your back.  
**Attention:** An electrical shock can occur only when there is a complete circuit. By observing the above rule, you may prevent a current from passing through your body.
    - When using testers, set the controls correctly and use the approved probe leads and accessories for that tester.
    - Stand on suitable rubber mats (obtained locally, if necessary) to insulate you from grounds such as metal floor strips and machine frames.
- Observe the special safety precautions when you work with very high voltages; Instructions for these precautions are in the safety sections of maintenance information. Use extreme care when measuring high voltages.
- Regularly inspect and maintain your electrical hand tools for safe operational condition.
  - Do not use worn or broken tools and testers.
  - *Never assume* that power has been disconnected from a circuit. First, *check* that it has been powered off.
  - Always look carefully for possible hazards in your work area. Examples of these hazards are moist floors, nongrounded power extension cables, power surges, and missing safety grounds.
  - Do not touch live electrical circuits with the reflective surface of a plastic dental mirror. The surface is conductive; such touching can cause personal injury and machine damage.

- Do not service the following parts *with the power on* when they are removed from their normal operating places in a machine:
  - Power supply units
  - Pumps
  - Blowers and fans
  - Motor generatorsand similar units. (This practice ensures correct grounding of the units.)
- If an electrical accident occurs:
  - Use caution; do not become a victim yourself.
  - Switch off power.
  - Send another person to get medical aid.

## Safety inspection guide

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

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

Consider these conditions and the safety hazards they present:

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

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

Checklist:

1. Check exterior covers for damage (loose, broken, or sharp edges).
2. Power off the computer. Disconnect the power cord.
3. Check the power cord for:
  - a. A third-wire ground connector in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and the frame ground.
  - b. The power cord should be the type specified in the parts list.
  - c. Insulation must not be frayed or worn.
4. Check for cracked or bulging batteries.
5. Remove the cover.
6. Check for any obvious non-ThinkPad alterations. Use good judgment as to the safety of any non-ThinkPad alterations.
7. 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.
8. Check for worn, frayed, or pinched cables.

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

## Handling devices that are sensitive to electrostatic discharge

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

### Notes

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

When handling ESD-sensitive parts:

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

### Note

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

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

## Grounding requirements

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

## Laser compliance statement

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

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

**⚠ CAUTION:**

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

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

凡未在这里指明的任何控制用法、调整、行为，都会导致严重后果。

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

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

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

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

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

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

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

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

## Laser compliance statement

A CD-ROM drive, a DVD-ROM drive, or any other storage device installed may contain an embedded Class 3A or Class 3B laser diode. Note the following:

### DANGER

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

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

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

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

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

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

Aprenendo 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.



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## General descriptions

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

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### Read this first

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

#### Important notes

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

### What to do first

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

- \_\_\_ 1. Name and phone number of servicer
- \_\_\_ 2. Date of service
- \_\_\_ 3. Date on which the machine failed
- \_\_\_ 4. Date of purchase
- \_\_\_ 5. Failure symptoms, error codes appearing on the display, and beep symptoms
- \_\_\_ 6. Procedure index and page number in which the failing FRU was detected
- \_\_\_ 7. Failing FRU name and part number
- \_\_\_ 8. Machine type, model number, and serial number
- \_\_\_ 9. Customer's name and address

#### Note for warranty:

During the warranty period, the customer may be responsible for repair costs if the computer damage was caused by misuse, accident, modification, unsuitable physical or operating environment, or improper maintenance by the customer.

## *Read this first*

Following is a list of some common items that are not covered under warranty and some symptoms that might indicate that the system was subjected to stress beyond normal use.

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

### **The following are not covered under warranty:**

- LCD panel cracked from the application of excessive force or from being dropped
- Scratched (cosmetic) parts
- Distortion, deformation, or discoloration of the cosmetic parts
- Plastic parts, latches, pins, or connectors that have been cracked or broken by excessive force
- Damage caused by liquid spilled into the system
- Damage caused by the improper insertion of a PC Card or the installation of an incompatible card
- Improper disc insertion or use of an optical drive
- Diskette drive damage caused by pressure on the diskette drive cover, foreign material in the drive, or the insertion of a diskette with multiple labels
- Damaged or bent diskette eject button
- Fuses blown by attachment of a nonsupported device
- Forgotten computer password (making the computer unusable)
- Sticky keys caused by spilling a liquid onto the keyboard
- Use of an incorrect ac adapter on laptop products

### **The following symptoms might indicate damage caused by nonwarranted activities:**

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

## Related service information

This section provides information about the following:

- “Service Web site”
- “Restoring the pre-installed system”
- “Passwords”
- “Power management” on page 24

### Service Web site

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

### Restoring the pre-installed system

When the hard disk drive is replaced because of a failure, no Product Recovery program is on the new hard disk. In this case, you must use the recovery CD for the computer. Order the recovery CD and the hard disk drive at the same time so that you can recover the new hard disk drive with the pre-installed software when they arrive. For information on which CD to order, see “Recovery CDs” on page 129.

### Recovery to Factory Contents by using Product Recovery CDs

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

#### Note

The recovery process might take up to 2 hours.

1. Insert the recovery CD into the CD or DVD drive, then restart the computer.
2. Following message is displayed: **“Your computer originally included a Product Recovery program ... Reinstall the Product Recovery program? (Y/N) [ ]”**.
3. Press Y key. The service partition is created and loaded with the Product Recovery program files.
4. At next window, press Enter to continue.
  - The service partition is created. The system automatically reboots during this process.
  - The recovery process copies some files to the service partition, and PKUNZIPs others.
  - Follow the prompts. You may be prompted to change CDs.
  - When the process is complete, the system reboots.
5. If you get a message asking which operating system to install, select the proper operating system and press Enter.
6. A message is displayed: **“Full Recovery:”**. Press Enter to select.
7. On each of the next three windows, press the Y key.
8. Follow the prompts to complete the recovery.

### Passwords

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

## Related service information

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

**Exception:** If only an SVP is installed, the password prompt does not appear when the operating system is booted.

### ***Power-on password:***

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

### ***Hard-disk password:***

There are two hard-disk passwords (HDPs):

- User HDP—for the user
- Master HDP—for the system administrator, who can use it to get access to the hard disk even if the user has changed the user HDP

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

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

### ***Supervisor password:***

A supervisor password (SVP) protects the system information stored in the BIOS Setup Utility. The user must enter the SVP in order to get access to the BIOS Setup Utility and change the system configuration.

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

## **How to remove the power-on password**

To remove a POP that you have forgotten, do the following:

*(A) If no SVP has been set:*

1. Turn off the computer.
2. Remove the battery pack.  
For how to remove the battery pack, see “1010 Battery pack” on page 56.
3. Remove the backup battery.  
For how to remove the backup battery, see “1100 Backup battery” on page 71.
4. Turn on the computer and wait until the POST ends.  
After the POST ends, the password prompt does not appear. The POP has been removed.
5. Reinstall the backup battery and the battery pack.

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

1. Turn on the computer; then, while the “To interrupt normal startup, press the blue ThinkVantage button” message is displayed at the lower-left of the screen, press the ThinkVantage button. Rescue and Recovery screen opens.

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

2. Click **Access BIOS**. The system Restart Required window is displayed.
3. Click **Yes**. The computer restarts, and the BIOS Setup Utility screen opens.
4. Select **Security**, using the cursor directional keys to move down the menu.
5. Select **Password**.
6. Select **Power-On Password**.
7. Type the current SVP in the **Enter Current Password** field. then leave the **Enter New Password** field blank, and press Enter twice.
8. In the Changes have been saved window, press Enter.
9. Press F10; then, in the Setup confirmation window, select **Yes** .

### How to remove the hard-disk password

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

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

1. Turn on the computer; then, while the “To interrupt normal startup, press the blue ThinkVantage button” message is displayed at the lower-left of the screen, press the ThinkVantage button. The Rescue and Recovery screen opens.

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

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

2. Click **Access BIOS**. The system Restart Required window is displayed.
3. Click **Yes**. The computer restarts, and the BIOS Setup Utility screen opens.
4. Select **Security**, using the cursor directional keys to move down the menu.
5. Select **Password**.
6. Select **Hard-disk x password**, where *x* is the letter of the hard disk drive. A pop-up window opens.
7. Select **Master HDP**.
8. Type the current master HDP in the **Enter Current Password** field. then leave the **Enter New Password** field blank, and press Enter twice.
9. Press F10.
10. Select **Yes** in the Setup Configuration window.  
Both user HDP and master HDP will have been removed.

## Power management

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

### Screen blank mode

Screen blank mode has three variants, as follows:

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

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

### Standby mode

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

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

To enter standby mode, press Fn+F4.

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

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

- If a “suspend time” has been set on the timer, and the user does not do any operation with the keyboard, the TrackPoint®, the hard disk, the parallel connector, or the diskette drive within that time.
- If the battery indicator blinks orange, indicating that the battery power is low. (Alternatively, if **Hibernate when battery becomes low** has been selected in the “Power Management Properties” window, the computer goes into hibernation mode.)

To cause the computer to return from standby mode and resume operation, do one of the following:

- Press the Fn key.
- Open the LCD cover.
- Turn on the power switch.

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

- The ring indicator (RI) is signaled by a serial device or a PC Card device.
- The time set on the resume timer elapses.

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

### **Hibernation mode**

In hibernation mode, the following occurs:

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

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

To cause the computer to enter hibernation mode, do any of the following:

- Press the Fn+F12 keys.
- If you are using the ACPI operating system and have defined one of the following actions as the event that causes the system to go into hibernation mode, perform that action.
  - Closing the lid.
  - Pressing the power button.
  - Pressing Fn+F4 keys.

Also, the computer goes into hibernation mode automatically in either of the following conditions:

- If a “hibernation time” has been set on the timer, and if the user does not do any operation with the keyboard, the TrackPoint, the hard disk drive, the parallel connector, or the diskette drive within that time.
- If the timer conditions are satisfied in suspend mode.

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

## Checkout guide

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

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

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

## Testing the computer

The ThinkPad computer has a test program called PC-Doctor® DOS (hereafter called *PC-Doctor*.) You can detect errors by running the diagnostics test included in PC-Doctor. This section is an overview of the procedure. For details that depend on model-unique functions, refer to “Product overview” on page 34.

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

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

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

### Creating the PC-Doctor diagnostics diskette

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

1. Enter the Predesktop application by pressing the ThinkVantage button during POST.
2. When the Access application finishes loading, double-click the “Create Diagnostic Diskettes” icon.
3. Authenticating the digital signature takes about 15 seconds; then the ThinkPad computer will reboot into PC-DOS.
4. A batch file automatically starts up to prompt you through the process of creating diskettes. You are notified of how many diskettes you will need.
  - a. You are prompted to insert each diskette in sequence.
  - b. Typically, all you need to do is to press the Enter key for the floppy drive; the system then formats and creates the diskette.
  - c. Each diskette is erased and formatted with the PC-Doctor for DOS boot image.
5. Once all the diskettes have been created, the ThinkPad computer will reboot. The user is asked to remove all diskettes from the drive, or to insert the first diskette created if it is desired to run the diagnostics.

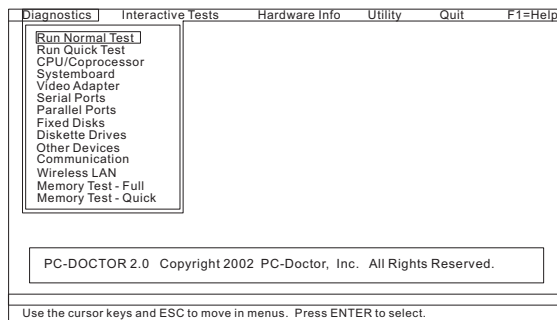
To run the test, do as follows:



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

1. Insert the PC-Doctor disk into the diskette drive; then power on the computer.  
If the computer cannot be powered on, go to "Power system checkout" on page 30, and check the power sources.  
If an error code appears, go to "Symptom-to-FRU index" on page 44.  
On the first screen, select the model and press Enter. Follow the instructions on the screen.
2. The main panel of PC-Doctor appears.
3. Select **Diagnostics** with the arrow keys, and press Enter.  
A pull-down menu appears. (Its exact form depends on the model.)

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



The options on the test menu are as follows:

Diagnostics	Interactive Tests
<ul style="list-style-type: none"> <li>• Run Normal Test</li> <li>• Run Quick Test</li> <li>• CPU/Coprocessor</li> <li>• Systemboard</li> <li>• Video Adapter</li> <li>• Serial Ports</li> <li>• Parallel Ports</li> <li>• Fixed Disks</li> <li>• Diskette Drives</li> <li>• Other Devices</li> <li>• ThinkPad Devices</li> <li>• Communication</li> <li>• Wireless LAN</li> <li>• Memory Test – Full</li> <li>• Memory Test – Quick</li> </ul>	<ul style="list-style-type: none"> <li>• Keyboard</li> <li>• Video</li> <li>• Internal Speaker</li> <li>• Mouse</li> <li>• Diskette</li> <li>• System Load</li> <li>• CD-ROM/DVD Test</li> <li>• Intel Wireless Radio</li> </ul>
<p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>• In the <b>Keyboard</b> test in <b>Interactive Tests</b>, the Fn key should be held down for at least 2 seconds; otherwise, it cannot be sensed.</li> <li>• <b>Video Adapter</b> test supports only the LCD display on the ThinkPad computer. If you have an external monitor attached to your computer, detach it before running PC-Doctor for DOS.</li> <li>• To test <b>Serial Ports</b> or <b>Parallel Ports</b>, the ThinkPad computer must be attached to the ThinkPad Advanced Dock or ThinkPad Advanced Mini Dock.</li> </ul>	

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

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

## Detecting system information with PC-Doctor

PC-Doctor can detect the following system information:

### Hardware Info

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

### Utility

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

### PC-Doctor for Windows

This product is designed to help you troubleshoot and resolve problems related to your computer. Select one of the categories listed below to display symptoms and solutions:

- CHECK SYSTEM HEALTH
- SYSTEM AND DEVICE TESTS
- LENOVO TROUBLESHOOTING
- CENTER
- SYSTEM REPORTS
- UPDATES AND SUPPORT

## Power system checkout

To verify a symptom, do the following:

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

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

- "Checking the ac adapter"
- "Checking operational charging"
- "Checking the battery pack" on page 31
- "Checking the backup battery" on page 31

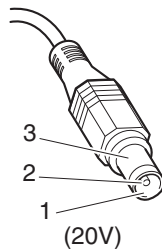
### Checking the ac adapter

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

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

To check the ac adapter, do the following:

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



Pin	Voltage (V dc)
1	+20
2	0
3	Ground

**Note:** Output voltage of pin no.2 of the ac adapter may differ from the one you are servicing.

3. If the voltage is not correct, replace the ac adapter.
4. If the voltage is acceptable, do the following:
  - Replace the system board.
  - If the problem persists, go to "Product overview" on page 34.

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

### Checking operational charging

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

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

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

### Checking the battery pack

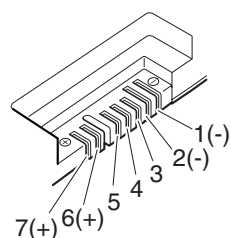
Battery charging does not start until the Power Meter shows that less than 95% of the total power remains; under this condition the battery pack can charge to 100% of its capacity. This protects the battery pack from being overcharged or from having a shortened life.

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

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

To check the battery pack, do the following:

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



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

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

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

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

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

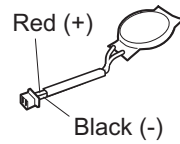
If the resistance is not correct, replace the battery pack. If the resistance is correct, replace the system board.

### Checking the backup battery

Do the following:

1. Power off the computer, and unplug the ac adapter from it.
2. Turn the computer upside down.
3. Remove the battery pack (see "1010 Battery pack" on page 56).
4. Remove the backup battery (see "1100 Backup battery" on page 71).
5. Measure the voltage of the backup battery. See the following figure.

## Checkout guide



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

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

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## ThinkPad Z60t

Product overview . . . . .	34	1130 Fan assembly . . . . .	76
Specifications . . . . .	34	1140 CPU . . . . .	78
Status indicators . . . . .	36	1150 Wireless WAN antenna (DIV). . . . .	79
FRU tests . . . . .	39	1160 LCD assembly. . . . .	80
Fn key combinations . . . . .	41	1170 Base cover . . . . .	83
Symptom-to-FRU index . . . . .	44	1180 USB/S-video sub card with cable . . . . .	86
Numeric error codes . . . . .	44	1190 MG (Magnesium) frame . . . . .	87
Error messages . . . . .	48	1200 System board and PC Card slot assembly . . . . .	92
Beep symptoms . . . . .	49	2010 LCD front bezel . . . . .	97
No-beep symptoms. . . . .	49	2020 Inverter card . . . . .	99
LCD-related symptoms . . . . .	50	2030 <i>Bluetooth</i> daughter card (BDC-2) . . . . .	100
Intermittent problems . . . . .	51	2040 Wireless WAN antenna cable (MAIN) . . . . .	102
Undetermined problems . . . . .	51	2050 LCD panel, LCD cable, and hinges . . . . .	105
FRU replacement notices . . . . .	52	2060 LCD rear cover and wireless LAN antenna cables . . . . .	108
Screw notices. . . . .	52	Locations . . . . .	114
Retaining serial numbers . . . . .	52	Front view . . . . .	114
Restoring the serial number of the system unit . . . . .	53	Rear view . . . . .	115
Retaining the UUID . . . . .	53	Bottom view. . . . .	116
Reading or writing the ECA information . . . . .	53	Parts list . . . . .	117
Removing and replacing a FRU. . . . .	55	Overall . . . . .	118
1010 Battery pack . . . . .	56	LCD FRUs . . . . .	126
1020 Ultrabay Slim device . . . . .	57	Keyboard. . . . .	128
1030 Hard disk drive cover, hard disk drive, and hard disk drive rubber rails . . . . .	58	Recovery CDs . . . . .	129
1040 Palm rest or palm rest with fingerprint reader . . . . .	60	Windows XP Professional . . . . .	129
1050 DIMM . . . . .	62	Windows XP Home Edition . . . . .	130
1060 Keyboard . . . . .	63	Miscellaneous parts . . . . .	131
1070 Modem daughter card (MDC-1.5) . . . . .	65	AC adapters. . . . .	132
1080 PCI Express Mini card for wireless WAN. . . . .	67	Common parts list. . . . .	132
1090 PCI Express Mini card for wireless LAN . . . . .	69	Tools . . . . .	132
1100 Backup battery . . . . .	71	Power cords (system). . . . .	133
1110 Keyboard bezel . . . . .	72	Notices . . . . .	134
1120 Speaker assembly . . . . .	74	Trademarks . . . . .	135

## Product overview

This section presents the following product-unique information:

- “Specifications”
- “Status indicators” on page 36
- “FRU tests” on page 39
- “Fn key combinations” on page 41

## Specifications

The following table lists the specifications of the ThinkPad Z60t:

Feature	Description
Processor	<ul style="list-style-type: none"> <li>• Intel Celeron M processor 360 (1.4 GHz), 1-MB L2 cache</li> <li>• Intel Celeron M processor 370 (1.5 GHz), 1-MB L2 cache</li> <li>• Intel Celeron M processor 380 (1.6 GHz), 1-MB L2 cache</li> <li>• Intel Pentium M processor 740 (1.73 GHz), 2-MB L2 cache</li> <li>• Intel Pentium M processor 750 (1.86 GHz), 2-MB L2 cache</li> <li>• Intel Pentium M processor 760 (2 GHz), 2-MB L2 cache</li> <li>• Intel Pentium M processor 770 (2.13 GHz), 2-MB L2 cache</li> <li>• Intel Pentium M processor 780 (2.26 GHz), 2-MB L2 cache</li> </ul>
Bus architecture	<ul style="list-style-type: none"> <li>• 533-MHz PSB</li> <li>• 533-MHz DDR2 SDRAM (PC2-4200)</li> <li>• HUB link</li> <li>• PCI bus</li> <li>• LPC bus</li> </ul>
Graphic memory chip	<ul style="list-style-type: none"> <li>• Intel 915GM</li> </ul>
Display	<ul style="list-style-type: none"> <li>• 14.0-inch wide, 16M colors, WXGA (1280 × 768 resolution) TFT color LCD</li> </ul>
Standard memory	<ul style="list-style-type: none"> <li>• 256-MB DDR2-533 SDRAM SO-DIMM (PC2-4200) card × 1</li> <li>• 512-MB DDR2-533 SDRAM SO-DIMM (PC2-4200) card × 1</li> <li>• 512-MB DDR2-533 SDRAM SO-DIMM (PC2-4200) card × 2</li> <li>• 1-GB DDR2-533 SDRAM SO-DIMM (PC2-4200) card × 1</li> <li>• 1-GB DDR2-533 SDRAM SO-DIMM (PC2-4200) card × 2</li> </ul>
Optional memory	<ul style="list-style-type: none"> <li>• 256-MB DDR2-533 SDRAM SO-DIMM (PC2-4200) card × 1</li> <li>• 512-MB DDR2-533 SDRAM SO-DIMM (PC2-4200) card × 1</li> <li>• 1-GB DDR2-533 SDRAM SO-DIMM (PC2-4200) card × 1 (maximum of 2048 MB)</li> </ul>
CMOS RAM	<ul style="list-style-type: none"> <li>• 242 bytes</li> </ul>
Hard disk drive	<ul style="list-style-type: none"> <li>• 40.0 GB, 5400 rpm, 9.5 mm high, SATA interface</li> <li>• 60.0 GB, 5400 rpm, 9.5 mm high, SATA interface</li> <li>• 80.0 GB, 5400 rpm, 9.5 mm high, SATA interface</li> <li>• 100 GB, 5400 rpm, 9.5 mm high, SATA interface</li> <li>• 100 GB, 7200 rpm, 9.5 mm high, SATA interface</li> </ul> <p>Supported hard disk drives depend on the model.</p>
Ultrabay Slim device (standard)	<ul style="list-style-type: none"> <li>• DVD drive, 9.5 mm high</li> <li>• DVD/CD-RW combo drive, 9.5 mm high</li> <li>• DVD-RAM/RW drive, 9.5 mm high</li> </ul>
Fingerprint reader	Some models

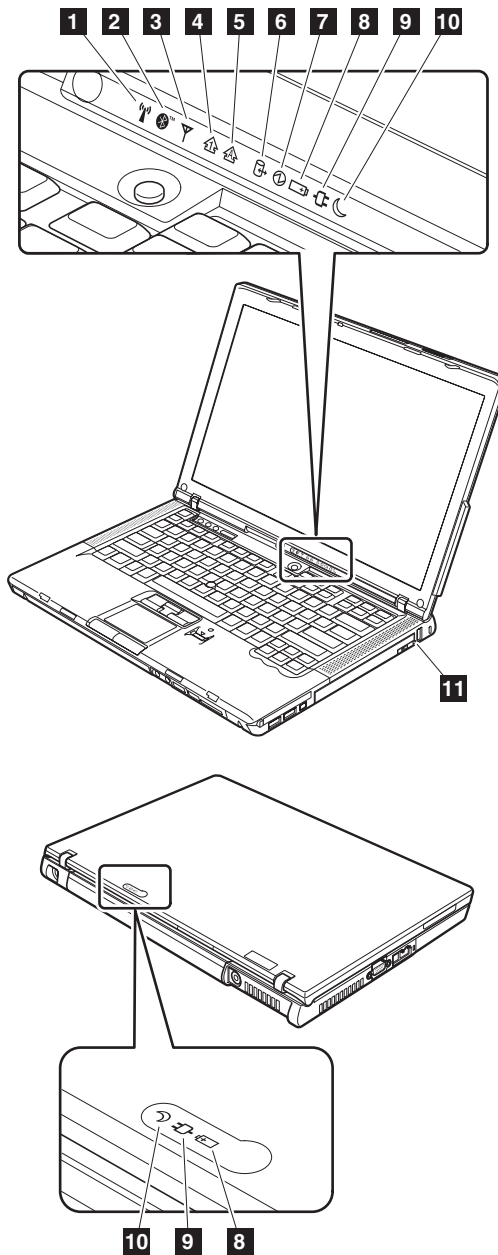
(continued)










Feature	Description
I/O port	<ul style="list-style-type: none"> <li>• External-monitor connector</li> <li>• SD card slot</li> <li>• Stereo headphone jack</li> <li>• Microphone jack</li> <li>• Video-out connector (S-Video)</li> <li>• 3 Universal Serial Bus (USB) connectors</li> <li>• IEEE 1394 connector</li> <li>• Infrared port</li> <li>• RJ11 telephone connector</li> <li>• RJ45 Ethernet connector</li> <li>• Ultrabay™ Slim</li> <li>• Docking connector</li> <li>• Integrated wireless LAN feature (on some models)</li> <li>• Integrated wireless WAN feature (on some models)</li> <li>• Integrated <i>Bluetooth</i> feature (on some models)</li> </ul>
Audio	<ul style="list-style-type: none"> <li>• Built-in stereo speakers</li> <li>• Software control volume</li> </ul>
Infrared transfer	<ul style="list-style-type: none"> <li>• IrDA 1.1</li> </ul>
Ethernet (on the system board)	<ul style="list-style-type: none"> <li>• Gigabit Ethernet</li> </ul>
PCI Express Mini card	<ul style="list-style-type: none"> <li>• ThinkPad 11a/b/g Wireless LAN Mini PCI Express Adapter</li> </ul>
PC Card slot	<ul style="list-style-type: none"> <li>• PC Card (Type-II)</li> </ul>
Modem	<ul style="list-style-type: none"> <li>• ThinkPad Modem (MDC-1.5, 56 kbps HDA)</li> </ul>
<i>Bluetooth</i> wireless	<ul style="list-style-type: none"> <li>• ThinkPad <i>Bluetooth</i> with Enhanced Data Rate (BDC-2)</li> </ul>
Touch pad	<ul style="list-style-type: none"> <li>• UltraNav</li> </ul>
ThinkLight	Yes
Battery	<ul style="list-style-type: none"> <li>• Li-ion battery (4 cells) 2.6 Ah</li> <li>• Li-ion battery (7 cells) 2.6 Ah</li> </ul>
AC adapter	<ul style="list-style-type: none"> <li>• 90-watt type</li> </ul>
Preinstalled operating system	<ul style="list-style-type: none"> <li>• Windows XP Professional</li> <li>• Windows XP Home Edition</li> </ul>




## Status indicators

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



Indicator	Meaning
<b>1</b> Wireless status 	<b>Green:</b> The wireless feature (the IEEE 802.11 standard) is on, and the radio link is ready for use. <b>Blinking green:</b> Data is being transmitted.
<b>2</b> <i>Bluetooth</i> status 	<b>Note:</b> Some models do not have this indicator. <b>Green:</b> <i>Bluetooth</i> wireless is operational. This indicator is on when <i>Bluetooth</i> wireless is on and not in suspend mode.
<b>3</b> Wireless WAN status 	<b>Green:</b> The wireless feature (the IEEE 802.11 standard) is on, and the radio link is ready for use. <b>Blinking green:</b> Data is being transmitted.
<b>4</b> Num lock 	<b>Green:</b> The numeric keypad on the keyboard is enabled. To enable or disable the keypad, press and hold the Shift key, and press the NumLk (ScrLk) key.
<b>5</b> Caps lock 	<b>Green:</b> Caps Lock mode is enabled. To enable or disable Caps Lock mode, press the Caps Lock key.
<b>6</b> Drive in use 	<b>Green:</b> Data is being read from or written to the hard disk drive, the diskette drive, or the drive in the Ultrabay Slim device. When this indicator is on, do not put the computer into standby mode or turn off the computer. <b>Note:</b> Do not move the system while the green drive-in-use light is on. Sudden physical shock could cause drive errors.
<b>7</b> Power on 	<b>Green:</b> The computer is on and ready to use. This indicator stays lit whenever the computer is on and is not in standby mode.

(continued)

Indicator	Meaning
<p><b>8</b> Battery status  </p>	<p><b>Green:</b>                      The battery is charged between 80% to 100% of the capacity, and being discharged between 20% to 80% of the capacity.</p> <p><b>Blinking green:</b>                      The battery is charged between 20% to 80% of the capacity, and being charged.</p> <p><b>Orange:</b>                      The battery is charged between 5% and 20% of the capacity, and being discharged.</p> <p><b>Blinking orange (slow):</b>                      The battery is charged between 5% to 20% of the capacity, and being charged.</p> <p><b>Blinking orange (rapid):</b>                      The battery is charged between 0% to 5% of the capacity.</p>
<p><b>9</b> AC power status  </p>	<p><b>Green:</b>                      The computer is connected to the ac power supply.</p>
<p><b>10</b> Standby status  </p>	<p><b>Green:</b>                      The computer is in standby mode.</p> <p><b>Blinking green:</b>                      The computer is entering standby mode or hibernation mode, or is resuming normal operation.</p>
<p><b>11</b> Ultrabay Slim status</p>	<p><b>Green:</b>                      An Ultrabay Slim device is installed and in use.</p> <p><b>Blinking green:</b>                      An Ultrabay Slim device is in the process of being detached.</p> <p><b>Turn off:</b>                      An Ultrabay Slim device is ready to be attached or detached.</p>

## FRU tests

The following table shows the test for each FRU.

FRU	Applicable test
System board	<ol style="list-style-type: none"> <li>1. <b>Diagnostics --&gt; CPU/Coprocessor</b></li> <li>2. <b>Diagnostics --&gt; Systemboard</b></li> <li>3. If the docking station or the port replicator is attached to the ThinkPad computer, undock it. Place the computer on a horizontal surface, and run <b>Diagnostics --&gt; ThinkPad Devices --&gt; HDD Active Protection Test</b>. <b>Note:</b> Do not apply any physical shock to the computer while the test is running.</li> </ol>
Power	<b>Diagnostics --&gt; ThinkPad Devices --&gt; AC Adapter, Battery 1 ( Battery 2)</b>
LCD unit	<ol style="list-style-type: none"> <li>1. <b>Diagnostics --&gt; Video Adapter</b></li> <li>2. <b>Interactive Tests --&gt; Video</b></li> </ol>
Modem daughter card (MDC-1.5)	<ol style="list-style-type: none"> <li>1. Make sure the modem is set up correctly.</li> <li>2. Replace the modem jack and the modem card in turn, and run the following tests in <b>Diagnostics --&gt; Communication:</b> <ol style="list-style-type: none"> <li>a. Conexant Smart Modem Interrupt</li> <li>b. Conexant Smart Modem Dialtone</li> </ol> </li> </ol>
Audio	<ol style="list-style-type: none"> <li>1. <b>Interactive Tests --&gt; Internal Speaker</b></li> <li>2. <b>Diagnostics --&gt; Other Devices --&gt; Analog Devices HDA CODEC Test</b></li> </ol>
Speaker	<b>Interactive Tests --&gt; Internal Speaker</b>
PC Card slot	<ol style="list-style-type: none"> <li>1. <b>Diagnostics --&gt; Systemboard --&gt; PCMCIA</b></li> <li>2. Insert a PC Card Wrap Plug into every PC Card slot, and run <b>Diagnostics --&gt; Systemboard --&gt; PCMCIA External Loop</b></li> </ol>
Keyboard	<ol style="list-style-type: none"> <li>1. <b>Diagnostics --&gt; Systemboard --&gt; Keyboard</b></li> <li>2. <b>Interactive Tests --&gt; Keyboard</b></li> </ol>
Hard disk drive	<b>Diagnostics --&gt; Fixed Disks</b>
Diskette drive	<ol style="list-style-type: none"> <li>1. <b>Diagnostics --&gt; Diskette Drives</b></li> <li>2. <b>Interactive Tests --&gt; Diskette</b></li> </ol>
DVD drive or DVD/CD-RW combo drive	<ol style="list-style-type: none"> <li>1. <b>Diagnostics --&gt; Other Devices --&gt; CD-ROM/DVD</b></li> <li>2. <b>Interactive Tests --&gt; CD-ROM/DVD Test</b></li> </ol>

(continued)

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

## Fn key combinations

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

Key combination	Description
Fn+F1	Reserved.
Fn+F2	Reserved.
Fn+F3	Select a power scheme that has been created by Power Manager.
Fn+F4	Put the computer in standby mode. To return to normal operation, press the Fn key only, without pressing a function key. <b>Note:</b> In Windows 2000 and Windows XP, this combination of keys functions as a sleep button. The setting can be changed so that pressing it puts the computer into hibernation mode or even shuts the computer down.
Fn+F5	Enable or disable the built-in wireless networking features and the <i>Bluetooth</i> features. If you press Fn+F5, a list of wireless features is displayed in the Wireless Radio Control window. You can quickly change the power state of each feature in the list. <b>Note:</b> This function is supported only in Windows 2000 and Windows XP. <b>Note:</b> If you want to use this combination of keys to enable or disable the feature, the following device drivers must be installed on the computer beforehand: <ul style="list-style-type: none"> <li>• ThinkPad Power Management driver</li> <li>• OnScreen Display utility</li> <li>• Wireless device drivers</li> </ul>
Fn+F6	Reserved.
Fn+F7	Switch a display output location <ul style="list-style-type: none"> <li>• External monitor (CRT display)</li> <li>• Computer display and external monitor (LCD + CRT display)</li> <li>• Computer display (LCD)</li> </ul> <b>Note:</b> For any operating system other than Windows 2000 or Windows XP, no additional procedure is needed; just press Fn+F7. <b>Notes:</b> <ol style="list-style-type: none"> <li>1. This function does not work when different desktop images are displayed on the computer display and the external monitor (the Extend desktop function).</li> <li>2. This function does not work while a DVD movie or a video clip is playing.</li> <li>3. For Windows 2000 or Windows XP, a hotkey application might take over the switching function.</li> </ol>

(continued)

Key combination	Description
Fn+F8	Change the settings of the TrackPoint and the touch pad.
Fn+F9	<p>Open the ThinkPad EasyEject Utility screen. Buttons for the following choices are displayed:</p> <ul style="list-style-type: none"> <li>• <b>Eject ThinkPad PC from Dock:</b> This button is displayed only if the ThinkPad computer has been attached to a ThinkPad Dock II or a ThinkPad Mini Dock. The computer can be detached from the ThinkPad Dock II or the ThinkPad Mini Dock.</li> <li>• <b>Eject ThinkPad PC from Port Replicator:</b> This button is displayed only if the ThinkPad computer has been docked in a ThinkPad Essential Port Replicator and one or more USB devices have been connected to the ThinkPad Essential Port Replicator. You can stop and remove all the USB devices safely by clicking the button.</li> <li>• <b>Run EasyEject Actions:</b> This button is used to select, stop, or remove external devices connected to the ThinkPad computer.</li> <li>• <b>Configure EasyEject Actions:</b> Opens the ThinkPad EasyEject Utility main window.</li> <li>• <b>Fn+F9 Settings:</b> Configures the settings for the Fn+F9 function.</li> </ul> <p>You can use this utility to stop and remove all ejectable devices connected to the ThinkPad computer, the ThinkPad Mini Dock, or the ThinkPad Port Replicator II. You cannot use it to detach the computer from the ThinkPad Mini Dock or the ThinkPad Port Replicator II.</p> <p><b>Note:</b> This function is supported only in Windows 2000 and Windows XP.</p>
Fn+F10	Reserved.
Fn+F11	Reserved.
Fn+F12	<p>Put the computer into hibernation mode. To return to normal operation, press the power button for less than four seconds.</p> <p><b>Note:</b> To use Fn+F12 for hibernation in Windows 2000 or Windows XP, you must have the PM device driver installed on the computer.</p>

(continued)



Key combination	Description
Fn+PgUp	Turn the ThinkLight on or off. <b>Note:</b> This function is supported only on the ThinkPad computers that have the ThinkLight. The on or off status of the ThinkLight is shown on the screen for a few seconds when you press Fn+PgUp.
Fn+Home	The computer display becomes brighter.
Fn+End	The computer display becomes dimmer.
Fn+Spacebar	Enable the FullScreen Magnifier function.
Fn+PrtSc	Has the same function as the SysRq key.
Fn+ScrLk	Enable or disable the numeric keypad.
Fn+Pause	Has the same function as the Break key.
Fn+cursor keys	These key combinations work with Windows Media Player. Fn+down arrow key works for the Play or Pause button, Fn+up arrow key for the Stop button, Fn+right arrow key for the Next Track button, and Fn+left arrow key for the Previous Track button.

## Symptom-to-FRU index

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

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

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

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

If no numeric code is displayed, check the narrative descriptions of symptoms. If the symptom is not described there, go to “Intermittent problems” on page 51.

**Note**

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

## Numeric error codes

Symptom or error	FRU or action, in sequence
<b>0175</b> Bad CRC1, stop POST task—The EEPROM checksum is not correct.	<b>System board.</b>
<b>0176</b> System Security—The system has been tampered with.	1. <b>Run BIOS Setup Utility, and save the current setting by pressing F10.</b> 2. System board.
<b>0177</b> Bad SVP data, stop POST task—The checksum of the supervisor password in the EEPROM is not correct.	<b>System board.</b>
<b>0182</b> Bad CRC2. Enter BIOS Setup and load Setup defaults.—The checksum of the CRS2 setting in the EEPROM is not correct.	1. <b>Run BIOS Setup Utility. Press F9, and Enter to load the default setting. Then save the current setting by pressing F10.</b> 2. System board.
<b>0185</b> Bad startup sequence settings. Enter BIOS Setup and load Setup defaults.	1. <b>Run BIOS Setup Utility. Press F9, and Enter to load the default setting. Then save the current setting by pressing F10.</b>
<b>0187</b> EAIA data access error—The access to EEPROM is failed.	<b>System board.</b>
<b>0188</b> Invalid RFID Serialization Information Area.	<b>System board.</b>
<b>0189</b> Invalid RFID configuration information area—The EEPROM checksum is not correct.	<b>System board.</b>

Symptom or error	FRU or action, in sequence
<b>0190</b> Critical low-battery error	<ol style="list-style-type: none"> <li>1. <b>Charge the battery pack.</b></li> <li>2. Battery pack.</li> </ol>
<b>0191</b> System Security—Invalid Remote Change requested.	<ol style="list-style-type: none"> <li>1. <b>Run BIOS Setup Utility, and then save current setting by pressing F10.</b></li> <li>2. System board.</li> </ol>
<b>0192</b> System Security— Embedded Security hardware tamper detected.	<b>System board.</b>
<b>0199</b> System Security— Security password retry count exceeded.	<ol style="list-style-type: none"> <li>1. <b>Run BIOS Setup Utility, and then save the current setting by pressing F10.</b></li> <li>2. System board.</li> </ol>
<b>01C8</b> Two or more modem devices are found. Remove all but one of them. Press <Esc> to continue.	<ol style="list-style-type: none"> <li>1. <b>Remove either a Mini-PCI Card or a modem daughter card. Otherwise, press Esc to ignore the warning message.</b></li> <li>2. System board.</li> </ol>
<b>01C9</b> More than one Ethernet devices are found. Remove one of them. Press <Esc> to continue.	<ol style="list-style-type: none"> <li>1. <b>Remove the Ethernet device that you installed; or press Esc to ignore the warning message.</b></li> <li>2. System board.</li> </ol>
<b>01CA</b> More than one Wireless LAN devices are found. Remove one of them.	<ol style="list-style-type: none"> <li>1. <b>Remove the wireless LAN device that you installed.</b></li> <li>2. System board.</li> </ol>
<b>0200</b> Hard disk error—The hard disk is not working.	<ol style="list-style-type: none"> <li>1. <b>Reseat the hard disk drive.</b></li> <li>2. Load Setup Defaults in BIOS Setup Utility.</li> <li>3. Hard disk drive.</li> <li>4. System board.</li> </ol>
<b>021x</b> Keyboard error.	<b>Run interactive tests of the keyboard and the auxiliary input device.</b>
<b>0220</b> Monitor type error—Monitor type does not match the one specified in CMOS.	<b>Load Setup Defaults in BIOS Setup Utility.</b>
<b>0230</b> Shadow RAM error—Shadow RAM fails at offset nnnn.	<b>System board.</b>
<b>0231</b> System RAM error—System RAM fails at offset nnnn.	<ol style="list-style-type: none"> <li>1. <b>DIMM.</b></li> <li>2. System board.</li> </ol>
<b>0232</b> Extended RAM error— Extended RAM fails at offset nnnn.	<ol style="list-style-type: none"> <li>1. <b>DIMM.</b></li> <li>2. System board.</li> </ol>
<b>0250</b> System battery error—System battery is dead.	<ol style="list-style-type: none"> <li>1. <b>Charge the backup battery for more than 8 hours by connecting the ac adapter.</b></li> <li>2. Replace the backup battery and run BIOS Setup Utility to reset the time and date.</li> </ol>
<b>0251</b> System CMOS checksum bad— Default configuration used.	<ol style="list-style-type: none"> <li>1. <b>Charge the backup battery for more than 8 hours by connecting the ac adapter.</b></li> <li>2. Replace the backup battery and run BIOS Setup Utility to reset the time and date.</li> </ol>

Symptom or error	FRU or action, in sequence
<b>0252</b> Password checksum bad—The password is cleared.	<b>Reset the password by running BIOS Setup Utility.</b>
<b>0260</b> System timer error.	<ol style="list-style-type: none"> <li><b>1. Charge the backup battery for more than 8 hours by connecting the ac adapter.</b></li> <li>Replace the backup battery and run BIOS Setup Utility to reset the time and date.</li> <li>System board.</li> </ol>
<b>0270</b> Real-time clock error.	<ol style="list-style-type: none"> <li><b>1. Charge the backup battery for more than 8 hours by connecting the ac adapter.</b></li> <li>Replace the backup battery and run BIOS Setup Utility to reset the time and date.</li> <li>System board.</li> </ol>
<b>0271</b> Date and time error—Neither the date nor the time is set in the computer.	<b>Run BIOS Setup Utility to reset the time and date.</b>
<b>0280</b> Previous boot incomplete— Default configuration used.	<ol style="list-style-type: none"> <li><b>1. Load “Setup Default” in BIOS Setup Utility.</b></li> <li>DIMM.</li> <li>System board.</li> </ol>
<b>02F4</b> EISA CMOS not writable.	<ol style="list-style-type: none"> <li><b>1. Load Setup Defaults in BIOS Setup Utility.</b></li> <li>Replace the backup battery.</li> <li>System board.</li> </ol>
<b>02F5</b> DMA test failed.	<ol style="list-style-type: none"> <li><b>1. DIMM.</b></li> <li>System board.</li> </ol>
<b>02F6</b> Software NMI failed	<ol style="list-style-type: none"> <li><b>1. DIMM.</b></li> <li>System board.</li> </ol>
<b>02F7</b> Fail-safe timer NMI failed	<ol style="list-style-type: none"> <li><b>1. DIMM.</b></li> <li>System board.</li> </ol>
<b>1802</b> Unauthorized network card is plugged in—Turn off and remove the miniPCI network card.	<ol style="list-style-type: none"> <li><b>1. Remove Mini PCI network card.</b></li> <li>System board.</li> </ol>
<b>1803</b> Unauthorized daughter card is plugged in—Turn off and remove the daughter card.	<ol style="list-style-type: none"> <li><b>1. Remove the daughter card that you installed.</b></li> <li>System board.</li> </ol>
<b>1804</b> Unauthorized WAN card is plugged in—Power off and remove the WAN card.	<ol style="list-style-type: none"> <li><b>1. Remove the WAN card that you installed.</b></li> <li>System board.</li> </ol>
<b>1820</b> More than one external fingerprint reader is attached. Power off and remove all but the reader that you set up within your main operating system.	<b>Remove all but the reader that you set up for the authentication.</b>

Symptom or error	FRU or action, in sequence
<b>2000</b> Hard Drive Active Protection sensor diagnostics failed. Press <Esc> to continue. Press <F1> to enter SETUP	<ol style="list-style-type: none"> <li>1. Undock docking station or port replicator if it is attached to the ThinkPad computer, and place the computer on a horizontal surface. Do not apply any physical shock to the computer.</li> <li>2. Run <b>Diagnostics --&gt; ThinkPad Devices --&gt; HDD Active Protection Test.</b></li> </ol>
<b>2010</b> Warning: Your internal hard disk drive (HDD) may not function correctly on this system. Ensure that your HDD is supported on this system and that the latest HDD firmware is installed.	Inform the following information to the customer: If in the primary bay the customer is using a non-IBM or non-Lenovo hard disk drive (HDD), or an old generation IBM HDD which is not supported by this system, with the risk in mind, the customer can still use it by pressing ESC. If in the primary drive bay the customer is using a supported IBM/Lenovo HDD with an old firmware, the customer needs to update its firmware to the latest. The latest version is available at <a href="http://www.lenovo.com/support">http://www.lenovo.com/support</a>
<b>2100</b> Initialization error on HDD0 (Main hard disk drive)	<ol style="list-style-type: none"> <li>1. <b>Reseat the hard disk drive.</b></li> <li>2. Main hard disk drive.</li> <li>3. System board.</li> </ol>
<b>2102</b> Initialization error on HDD1 (Ultrabay hard disk drive)	<ol style="list-style-type: none"> <li>1. <b>Reseat the hard disk drive.</b></li> <li>2. Ultrabay hard disk drive.</li> <li>3. System board.</li> </ol>
<b>2110</b> Read error on HDD0 (Main hard disk drive)	<ol style="list-style-type: none"> <li>1. <b>Reseat the hard disk drive.</b></li> <li>2. Main hard disk drive.</li> <li>3. System board.</li> </ol>
<b>2112</b> Read error on HDD1 (Ultrabay hard disk drive)	<ol style="list-style-type: none"> <li>1. <b>Reseat the hard disk drive.</b></li> <li>2. Ultrabay hard disk drive.</li> <li>3. System board.</li> </ol>

## Error messages

Symptom or error	FRU or action, in sequence
Device address conflict.	<ol style="list-style-type: none"> <li>1. Load "Setup Defaults" in the BIOS Setup Utility.</li> <li>2. Backup battery.</li> <li>3. System board.</li> </ol>
Allocation error for device.	<ol style="list-style-type: none"> <li>1. Load "Setup Defaults" in the BIOS Setup Utility.</li> <li>2. Backup battery.</li> <li>3. System board.</li> </ol>
Failing bits: nnnn.	<ol style="list-style-type: none"> <li>1. DIMM.</li> <li>2. System board.</li> </ol>
Invalid system configuration data.	<ol style="list-style-type: none"> <li>1. DIMM.</li> <li>2. System board.</li> </ol>
I/O device IRQ conflict.	<ol style="list-style-type: none"> <li>1. Load "Setup Defaults" in the BIOS Setup Utility.</li> <li>2. Backup battery.</li> <li>3. System board.</li> </ol>
Hibernation error.	<ol style="list-style-type: none"> <li>1. Restore the system configuration to what it was before the computer entered hibernation mode.</li> <li>2. If memory size has been changed, re-create the hibernation file.</li> </ol>
Fan error.	<ol style="list-style-type: none"> <li>1. Fan.</li> <li>2. Thermal grease.</li> <li>3. System board.</li> </ol>
Thermal sensing error.	System board.
Cannot boot from any device.	<p><b>Check the status of device which you want to boot from.</b></p> <p>Device not found.</p> <ol style="list-style-type: none"> <li>1. The device you want to boot from.</li> <li>2. System board.</li> </ol> <p>Device Error.</p> <ol style="list-style-type: none"> <li>1. The device you want to boot from.</li> <li>2. System board.</li> </ol> <p>No valid operating system.</p> <ol style="list-style-type: none"> <li>1. Check that the operating system has no failure and is installed correctly.</li> <li>2. Reinstall the operation system.</li> </ol> <p>Excluded from boot order.</p> <ul style="list-style-type: none"> <li>• Enter the BIOS Setup Utility and add the device in boot order.</li> </ul>

## Beep symptoms

Symptom or error	FRU or action, in sequence
One beep and a blank, unreadable, or flashing LCD.	<ol style="list-style-type: none"> <li>1. <b>Reseat the LCD connector.</b></li> <li>2. LCD assembly.</li> <li>3. External CRT.</li> <li>4. System board.</li> </ol>
One long and two short beeps, and a blank or unreadable LCD.	<ol style="list-style-type: none"> <li>1. <b>System board.</b></li> <li>2. LCD assembly.</li> <li>3. DIMM.</li> </ol>
Two short beeps with error codes.	<b>POST error. See “Numeric error codes” on page 44.</b>
Two short beeps and a blank screen.	<ol style="list-style-type: none"> <li>1. <b>System board.</b></li> <li>2. DIMM.</li> </ol>
Three short beeps, pause, three more short beeps, and one short beep.	<ol style="list-style-type: none"> <li>1. <b>DIMM.</b></li> <li>2. System board</li> </ol>
One short beep, pause, three short beeps, pause, three more short beeps, and one short beep.	
Only the cursor appears.	<b>Reinstall the operating system.</b>
Four cycles of four short beeps and a blank screen.	<b>System board</b> (security chip)
Five short beeps and a blank screen.	<b>System board</b>

## No-beep symptoms

Symptom or error	FRU or action, in sequence
No beep, power-on indicator on, LCD blank, and no POST.	<ol style="list-style-type: none"> <li>1. <b>Make sure that every connector is connected tightly and correctly.</b></li> <li>2. DIMM.</li> <li>3. System board.</li> </ol>
No beep, power-on indicator on, and LCD blank during POST.	<ol style="list-style-type: none"> <li>1. <b>Reseat DIMM.</b></li> <li>2. System board.</li> </ol>
The power-on password prompt appears.	A power-on password or a supervisor password is set. Type the password and press <b>Enter</b> .
The hard-disk password prompt appears.	A hard-disk password is set. Type the password and press <b>Enter</b> .

## LCD-related symptoms

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

*Minimum quantity of defective pixels required for LCD replacement on June 2006 or later manufactured ThinkPad*

LCD resolution	Bright dots	Dark dots	Bright and dark dots
XGA, WXGA	5	6	6
WXGA+, SXGA+, WSXGA+	5	8	10
UXGA, WUXGA, QXGA	5	13	13

### Notes:

1. Lenovo will not provide replacement if the LCD is within specification as we cannot guarantee that any replacement LCD will have zero pixel defects.
2. A bright dot means a pixel is always on (white or color.)
3. A dark dot means a pixel is always off (black color.)
4. One pixel consists of R, G, B sub-pixels.

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



## Intermittent problems

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

When analyzing an intermittent problem, do the following:

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

## Undetermined problems

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

Verify that all attached devices are supported by the computer.

Verify that the power supply being used at the time of the failure is operating correctly. (See "Power system checkout" on page 30.)

1. Turn off the computer.
2. Visually check each FRU for damage. Replace any damaged FRU.
3. Remove or disconnect all of the following devices:
  - a. Non-ThinkPad 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 or optical drive
  - g. DIMM
  - h. Optical disk or diskette in the internal drive
  - i. PC Cards
4. Turn on the computer.
5. Determine whether the problem has been solved.
6. If the problem does not recur, reconnect the removed devices one at a time until you find the failing FRU.
7. If the problem remains, replace the following FRUs one at a time (do not replace a nondefective FRU):
  - a. System board
  - b. LCD assembly

## FRU replacement notices

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

### Screw notices

Loose screws can cause a reliability problem. In the ThinkPad computer, this problem is addressed with special nylon-coated screws that have the following characteristics:

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

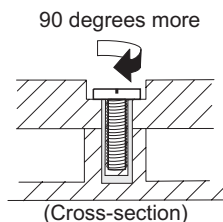
Do the following when you service this machine:

- Keep the screw kit (for the P/N, see “Miscellaneous parts” on page 131) in your tool bag.
- Always use new screws.
- Use a torque screwdriver if you have one.

Tighten screws as follows:

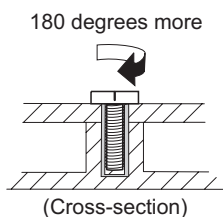
- **Plastic to plastic**

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



- **Logic card to plastic**

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



- **Torque driver**

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

- Make sure that you use the correct screw. If you have a torque screwdriver, tighten all screws firmly to the torque shown in the table. **Never use a screw that you removed. Use a new one. Make sure that all of the screws are tightened firmly.**
- Ensure torque screwdrivers are calibrated correctly following country specifications.

### Retaining serial numbers

This section includes the following descriptions:

- “Restoring the serial number of the system unit” on page 53

- “Retaining the UUID”
- “Reading or writing the ECA information”

### Restoring the serial number of the system unit

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

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

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

1. Install the ThinkPad Hardware Maintenance Diskette Version 1.73 or later, and restart the computer.
2. From the main menu, select **1. Set System Identification**.
3. Select **2. Read S/N data from EEPROM**.

The serial number of each device in your computer is displayed; the serial number of the system unit is listed as follows:

- 20: Serial number

Write down that number.

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

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

1. Install the ThinkPad Hardware Maintenance Diskette Version 1.73 or later and restart the computer.
2. From the main menu, select **1. Set System Identification**.
3. Select **1. Add S/N data from EEPROM**.  
Follow the instructions on the screen.

### Retaining the UUID

The Universally Unique Identifier (UUID) is a 128-bit number uniquely assigned to your computer at production and stored in the EEPROM of your system board. The algorithm that generates the number is designed to provide unique IDs until the year A.D. 3400. No two computers in the world have the same number.

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

1. Install the ThinkPad Hardware Maintenance Diskette Version 1.73 or later, and restart the computer.
2. From the main menu, select **4. Assign UUID**.

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

### Reading or writing the ECA information

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

To check what ECAs have been previously applied to the machine, use the ECA Information Read/Write function on the ThinkPad Hardware Maintenance Diskette Version 1.73 or later.

1. Insert the ThinkPad Hardware Maintenance Diskette Version 1.73 or later, and restart the computer.
2. From the main menu, select **6. Set ECA Information**.
3. To read ECA information, select **2. Read ECA/rework number from EEPROM** and follow the instruction.
4. To read box build date, select **5. Read box build date from EEPROM**, and follow the instruction on the screen.

After an ECA has been applied to the machine, the EEPROM must be updated to reflect the ECA's application. Use the ThinkPad Hardware Maintenance Diskette Version 1.73 or later to update the EEPROM.

**Note:** Only the ECA number is stored in the EEPROM. The machine type of the ECA is assumed be the same as the machine type of the machine that had the ECA applied to it.

1. Insert the ThinkPad Hardware Maintenance Diskette Version 1.73 or later, and restart the computer.
2. From the main menu, select **6. Set ECA Information**.
3. To write ECA information, select **1. Write ECA/rework number from EEPROM**, and follow the instruction.
4. To write box build date, select **4. Write box build date from EEPROM**, and follow the instruction on the screen.

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

---

## Removing and replacing a FRU

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

1. Do not try to service any computer unless you have been trained and certified. An untrained person runs the risk of damaging parts.
2. Before replacing any FRU, review “FRU replacement notices” on page 52.
3. Begin by removing any FRUs that have to be removed before the failing FRU. Any such FRUs are listed at the top of the page. Remove them in the order in which they are listed.
4. Follow the correct sequence in the steps for removing the FRU, as given in the drawings by the numbers in square callouts.
5. When turning a screw to replace a FRU, turn it in the direction as given by the arrow in the drawing.
6. When removing the FRU, move it in the direction as given by the arrow in the drawing.
7. To put the new FRU in place, reverse the removal procedure and follow any notes that pertain to replacement. For information about connecting and arranging internal cables, see “Locations” on page 114.
8. When replacing a FRU, use the correct screw as shown in the procedures.

 **DANGER**

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

**Attention:** After replacing a FRU, do not turn on the computer until you have made sure that all screws, springs, and other small parts are in place and none are loose inside the computer. Verify this by shaking the computer gently and listening for rattling sounds. Metallic parts or metal flakes can cause electrical short circuits.

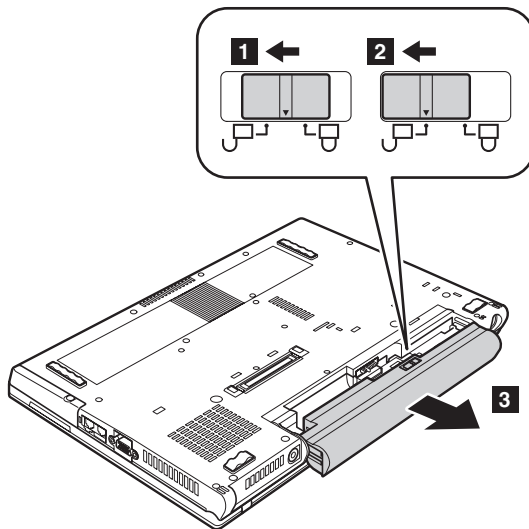
**Attention:** The system board is sensitive to, and can be damaged by, electrostatic discharge. Before touching it, establish personal grounding by touching a ground point with one hand or by using an electrostatic discharge (ESD) strap (P/N 6405959).

## 1010 Battery pack

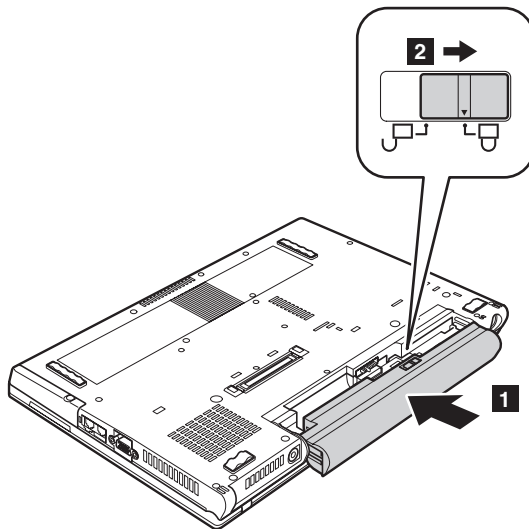
**⚠ DANGER**

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

Unlock the battery release lever **1**. Holding the battery release lever in the unlocked position **2**, remove the battery pack in the direction shown by arrow **3**.



**When installing:** Install the battery pack along the slide rails of the slot. Then make sure that the battery release lever is locked, as in this figure.



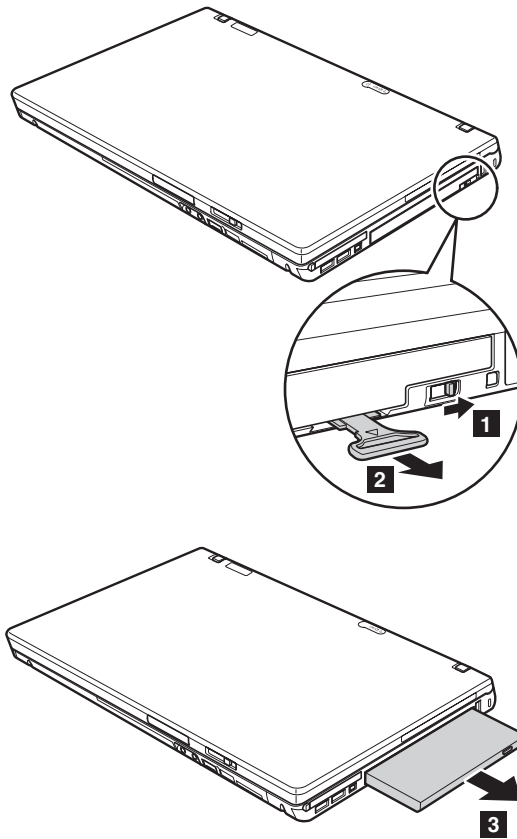
## 1020 Ultrabay Slim device

**Note**

Ultrabay Slim does not accept any of the following devices:

- Ultrabay Plus devices
- Ultrabay 2000 devices

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



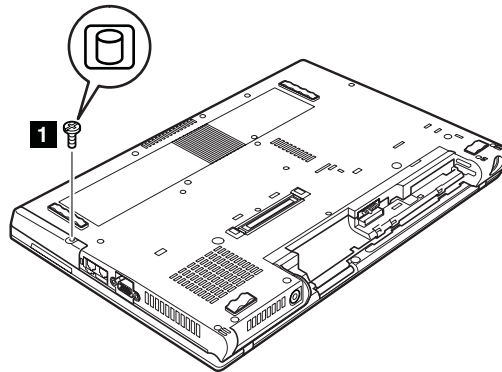
## 1030 Hard disk drive cover, hard disk drive, and hard disk drive rubber rails

For access, remove this FRU:

- “1010 Battery pack” on page 56

### Attention

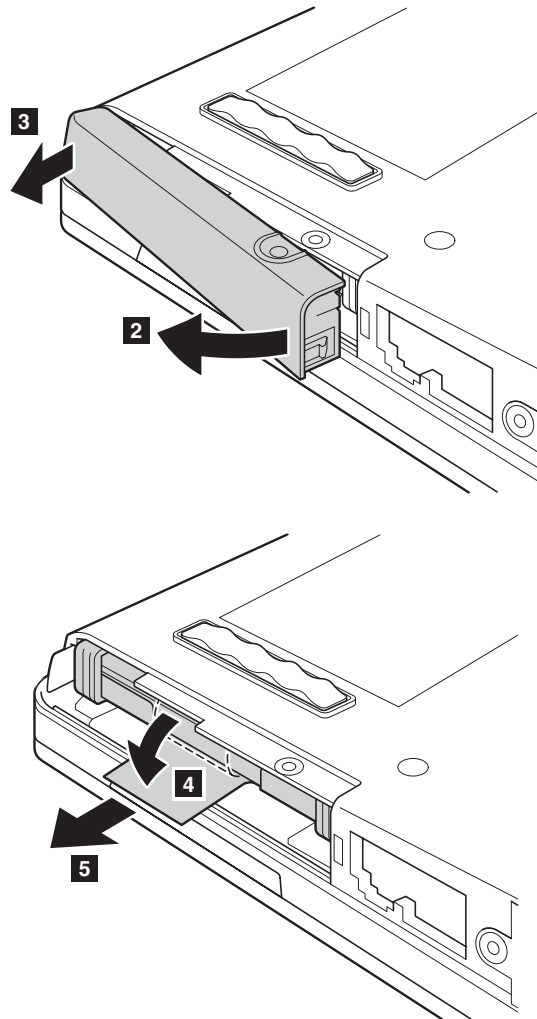
- **Do not drop the hard disk drive or apply any physical shock to it.** The hard disk drive is sensitive to physical shock. Improper handling can cause damage and permanent loss of data.
- Before removing the drive, have the user make a backup copy of all the information on it if possible.
- Never remove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



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

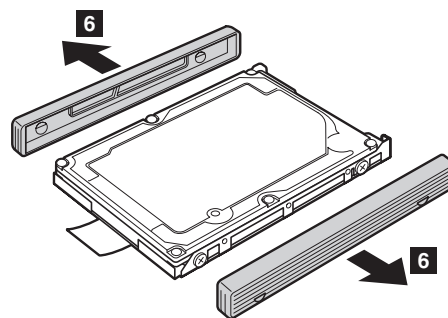
(continued)





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

(continued)



**When installing:** Rubber rails of the hard disk drive must be attached to the replacement drive. Otherwise the hard disk drive cannot be properly installed to the computer.

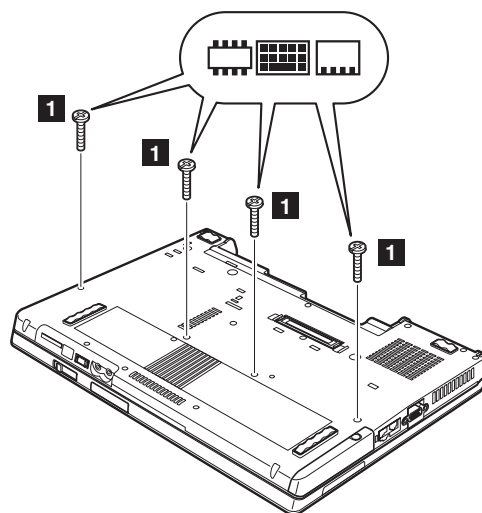
## 1040 Palm rest or palm rest with fingerprint reader


For access, remove this FRU in order:

- “1010 Battery pack” on page 56

### Note

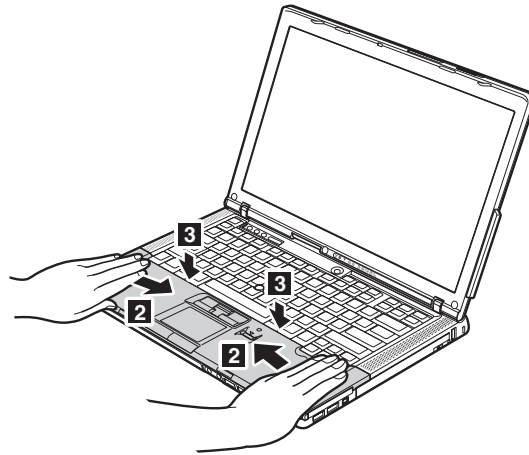
In models with the fingerprint reader, the sensor has been attached to the palm rest FRU as the child part. If the fingerprint reader has any defects and needs to be replaced, you need to replace the palm rest by the procedures given in this section. These procedures are the same for a palm rest with or without a fingerprint reader.



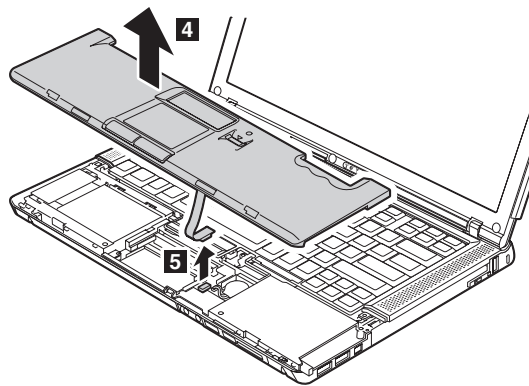
Step	Icon	Screw (quantity)	Color	Torque
1		M2 × 14 mm, flat-head, nylon-coated (4)	Black	0.196 Nm (2.0 kgfcm)

(continued)

In step **2**, press the left and right sides of the palm rest toward the center to release the side latches, as in this figure. Then release the latches indicated by arrow **3**.



Pull the palm rest a little in the direction shown by arrow **4**, and then detach the touch pad connector by pulling the tab with your fingers in the direction shown by arrow **5**.

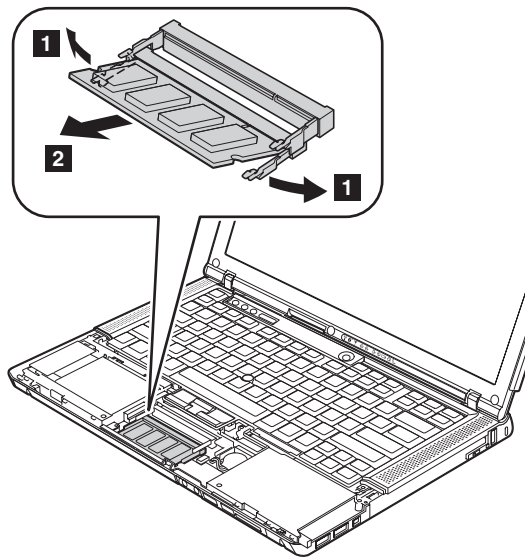


**When installing:** Make sure that the touch pad connector is attached firmly.

## 1050 DIMM

For access, remove these FRUs in order:

- “1010 Battery pack” on page 56
- “1040 Palm rest or palm rest with fingerprint reader” on page 60

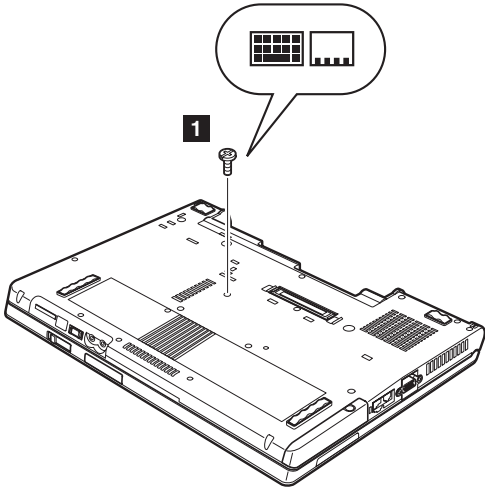



**When installing:** Insert the notched end of the DIMM into the socket. Press the DIMM firmly, and pivot it until it snaps into the place. Make sure that it is fixed firmly in the slot and does not move easily.

## 1060 Keyboard

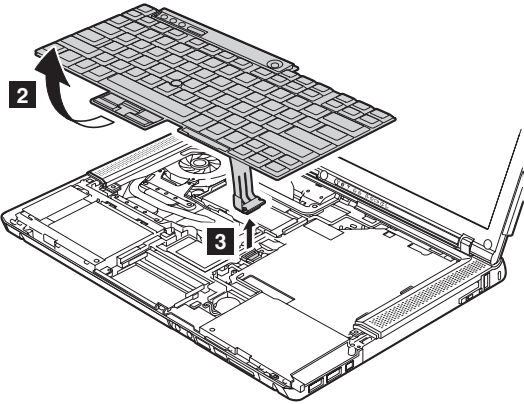
For access, remove this FRU:

- "1010 Battery pack" on page 56
- "1040 Palm rest or palm rest with fingerprint reader" on page 60



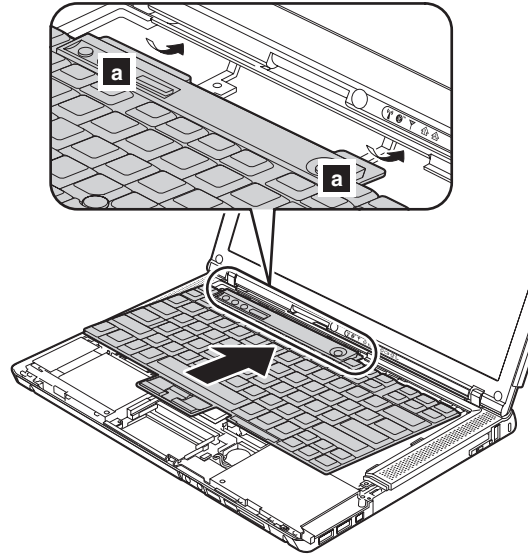
Step	Icon	Screw (quantity)	Color	Torque
1		M2 × 14 mm, flat-head, nylon-coated (1)	Black	0.196 Nm (2.0 kgfcm)

Lift the keyboard a little in the direction shown by arrow **2**, and then detach the connector **3**.



## Removing and replacing a FRU

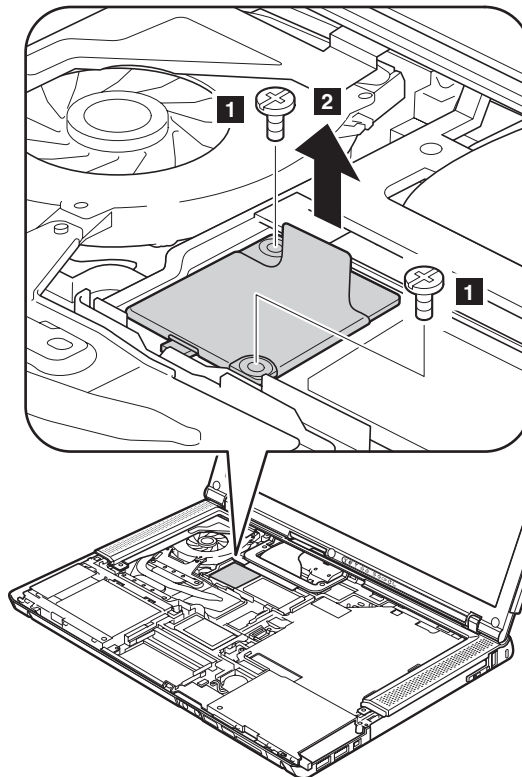
**When installing:** Make sure that the keyboard edges **a** are under the frame as shown in this figure.



## 1070 Modem daughter card (MDC-1.5)

For access, remove these FRUs in order:

- “1010 Battery pack” on page 56
- “1040 Palm rest or palm rest with fingerprint reader” on page 60
- “1060 Keyboard” on page 63



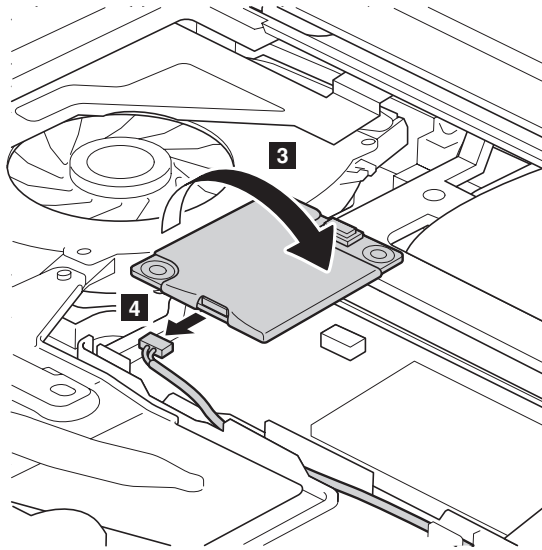
Step	Screw (quantity)	Color	Torque
<b>1</b>	M2 × 3 mm, flat-head, nylon-coated (2)	Black	0.196 Nm (2.0 kgfcm)

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

(continued)

## Removing and replacing a FRU

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



**When installing:** Make sure that the modem connector and the connector on the underside of the card are attached firmly.

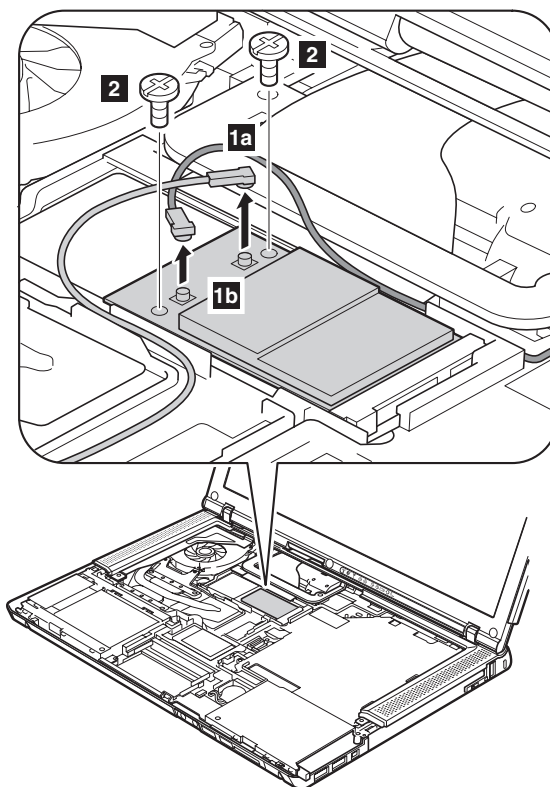


## 1080 PCI Express Mini card for wireless WAN

For access, remove these FRUs in order:

- “1010 Battery pack” on page 56
- “1040 Palm rest or palm rest with fingerprint reader” on page 60
- “1060 Keyboard” on page 63

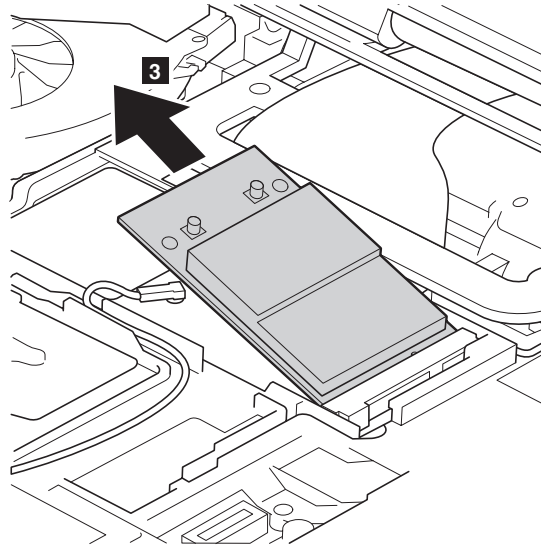
In steps **1a** and **1b**, unplug the jacks by using the removal tool antenna RF connector (P/N: 08K7159), or pick the connectors with your fingers and gently unplug them in the direction shown by the arrow.



Step	Screw (quantity)	Color	Torque
<b>2</b>	M2 × 3 mm, flat-head, nylon-coated (2)	Black	0.196 Nm (2.0 kgfcm)

(continued)

## Removing and replacing a FRU



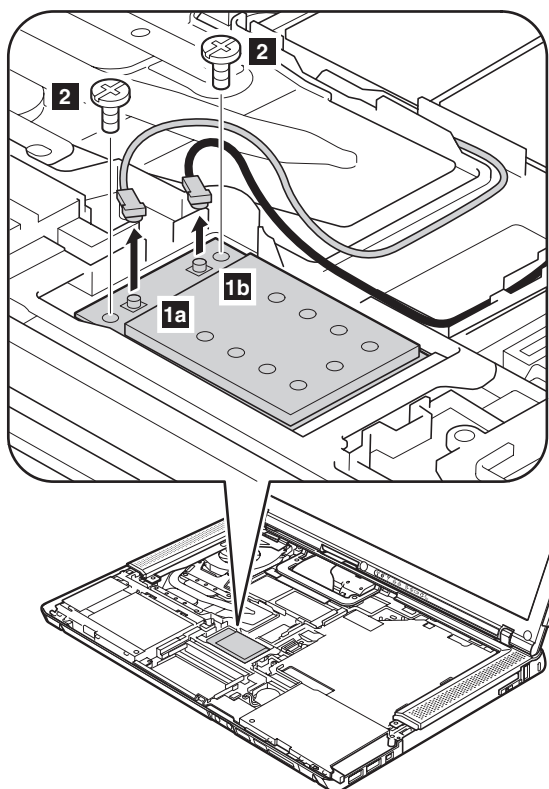
**When installing:** Plug the red cable into the jack labeled **MAIN** on the card, and the blue cable into the jack labeled **DIV**.

## 1090 PCI Express Mini card for wireless LAN

For access, remove these FRUs in order:

- “1010 Battery pack” on page 56
- “1040 Palm rest or palm rest with fingerprint reader” on page 60
- “1060 Keyboard” on page 63

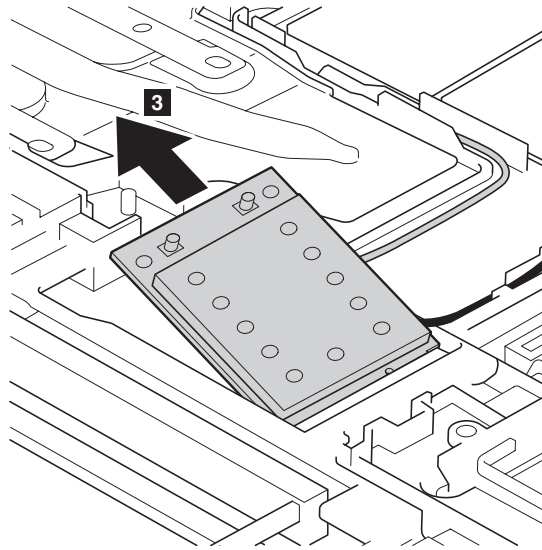
In steps **1a** and **1b**, unplug the jacks by using the removal tool antenna RF connector (P/N: 08K7159), or pick the connectors with your fingers and gently unplug them in the direction shown by arrow **2**.



Step	Screw (quantity)	Color	Torque
<b>2</b>	M2 × 3 mm, flat-head, nylon-coated (2)	Black	0.196 Nm (2.0 kgfcm)

(continued)

*Removing and replacing a FRU*



**When installing:** Plug the gray cable into the jack labeled **MAIN** on the card, and the black cable to the jack labeled **AUX**.

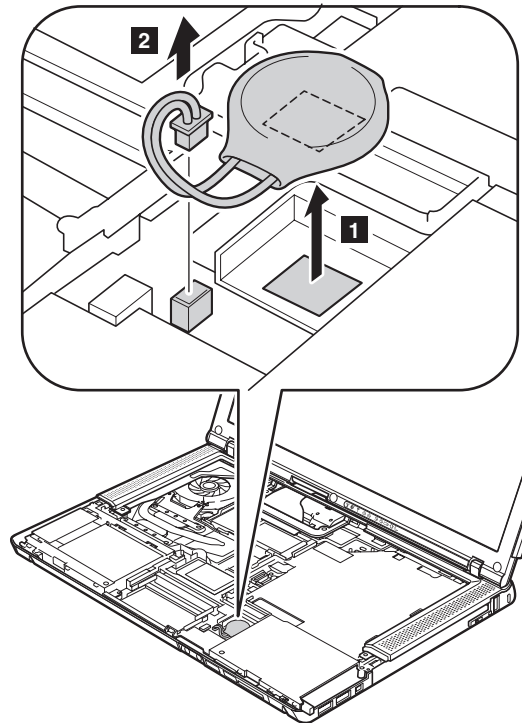
## 1100 Backup battery

**⚠ DANGER**

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

For access, remove these FRUs in order:

- “1010 Battery pack” on page 56
- “1040 Palm rest or palm rest with fingerprint reader” on page 60
- “1060 Keyboard” on page 63

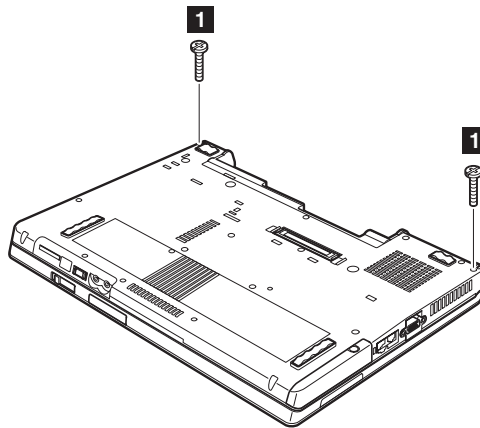


**When installing:** Make sure that the battery connector is attached firmly.

## 1110 Keyboard bezel

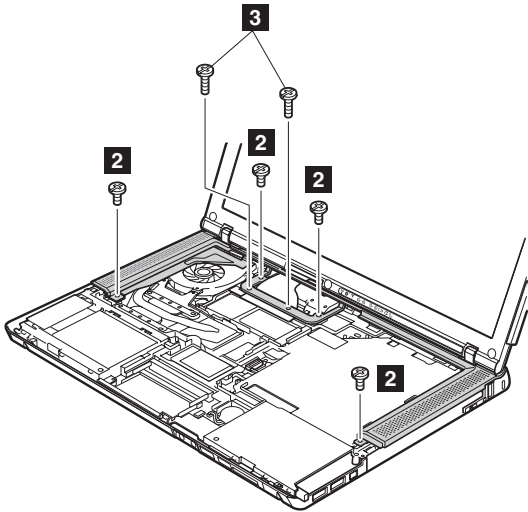
For access, remove these FRUs in order:

- “1010 Battery pack” on page 56
- “1060 Keyboard” on page 63
- “1040 Palm rest or palm rest with fingerprint reader” on page 60

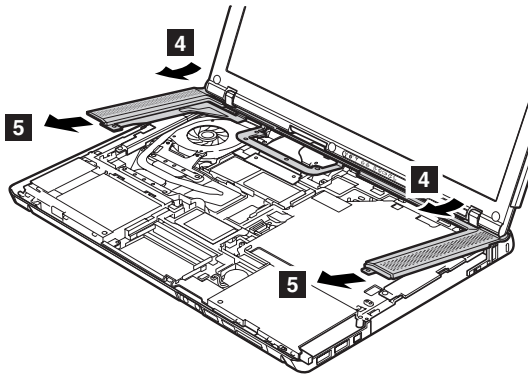


Step	Screw (quantity)	Color	Torque
<b>1</b>	M2 × 14 mm, flat-head, nylon-coated (2)	Black	0.196 Nm (2.0 kgfcm)

(continued)



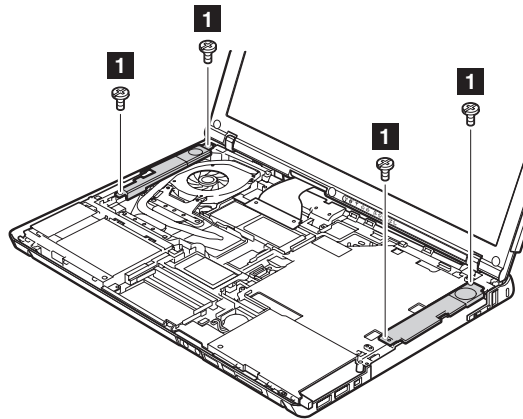
Step	Screw (quantity)	Color	Torque
<b>2</b>	M2 × 3 mm, flat-head, nylon-coated (4)	Black	0.196 Nm (2.0 kgfcm)
<b>3</b>	M2 × 5 mm, flat-head, nylon-coated (2)	Black	0.196 Nm (2.0 kgfcm)



## 1120 Speaker assembly

For access, remove these FRUs in order:

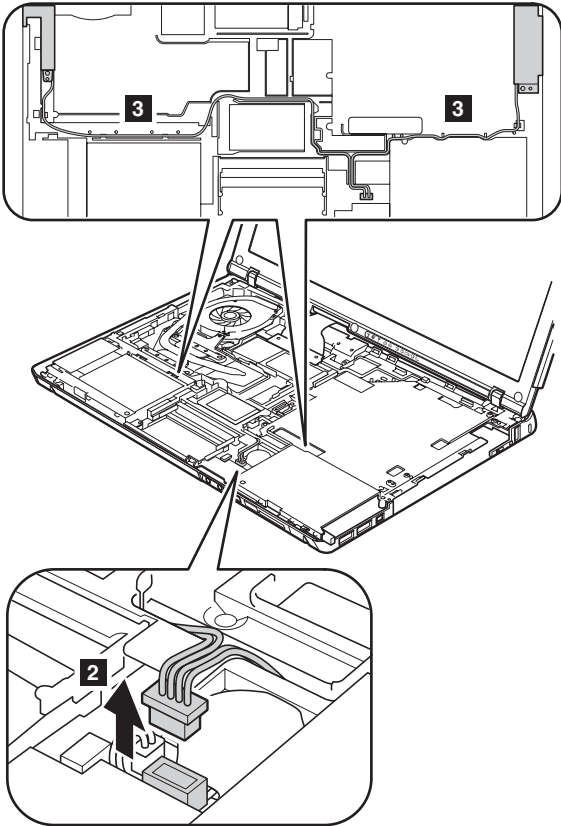
- “1010 Battery pack” on page 56
- “1040 Palm rest or palm rest with fingerprint reader” on page 60
- “1060 Keyboard” on page 63
- “1110 Keyboard bezel” on page 72



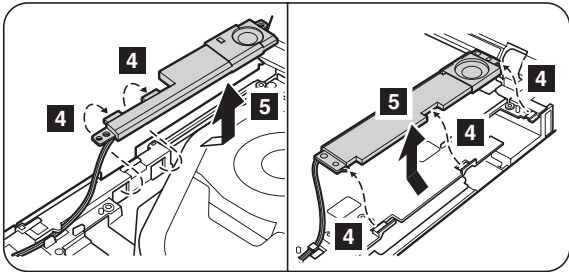
Step	Screw (quantity)	Color	Torque
<b>1</b>	M2 × 3 mm, flat-head, nylon-coated (4)	Black	0.196 Nm (2.0 kgfcm)

(continued)





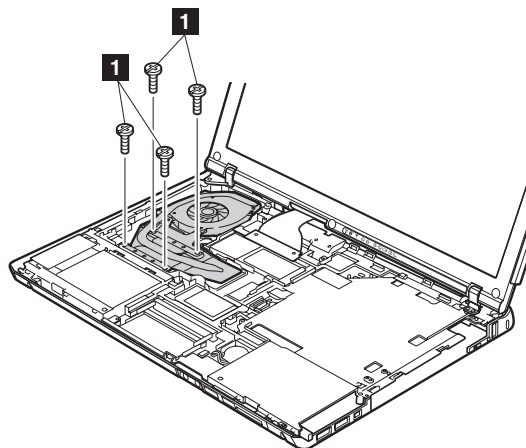
**When installing:** Make sure that the speaker cables are routed along the cable guides **3** and that the connector **2** is attached firmly.



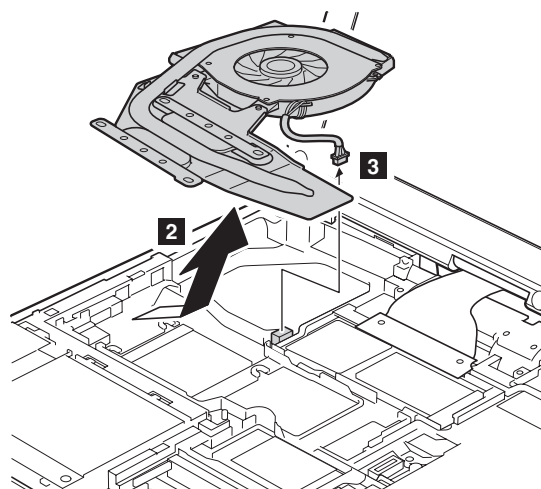
## 1130 Fan assembly

For access, remove these FRUs in order:

- "1010 Battery pack" on page 56
- "1040 Palm rest or palm rest with fingerprint reader" on page 60
- "1060 Keyboard" on page 63
- "1110 Keyboard bezel" on page 72

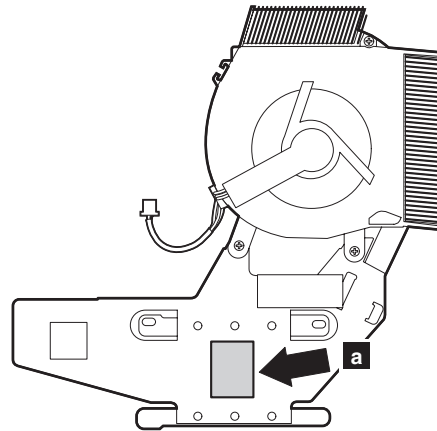


Step	Screw (quantity)	Color	Torque
<b>1</b>	M2 × 5 mm, flat-head, nylon-coated (4)	Black	0.196 Nm (2.0 kgfcm)

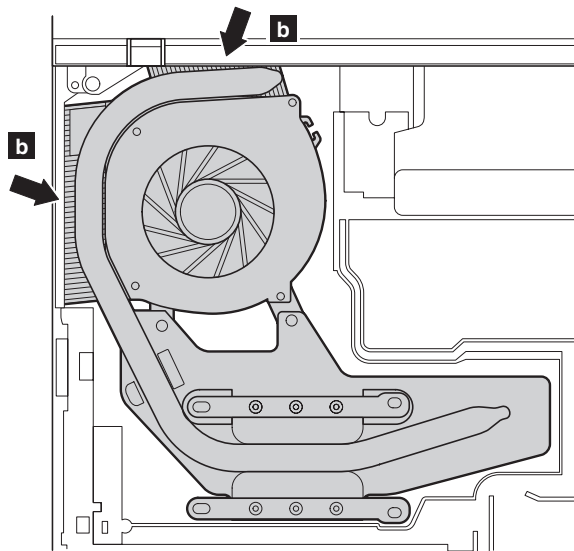


**When installing:**

- Before you attach the fan assembly to the computer, apply thermal grease on the part marked **a** as in the following figure.



- Make sure that the fan connector is attached firmly.
- When attaching the fan assembly to the frame, take care not to damage the heat sink (**b**) of the fan assembly.



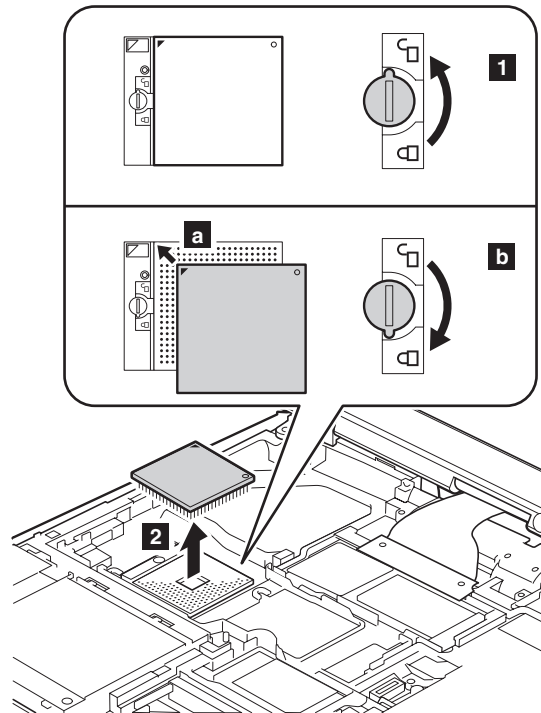
## 1140 CPU

For access, remove these FRUs in order:

- "1010 Battery pack" on page 56
- "1040 Palm rest or palm rest with fingerprint reader" on page 60
- "1060 Keyboard" on page 63
- "1110 Keyboard bezel" on page 72
- "1130 Fan assembly" on page 76

**Attention:** CPU is extremely sensitive. When you service the CPU, avoid any kind of rough handling.

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



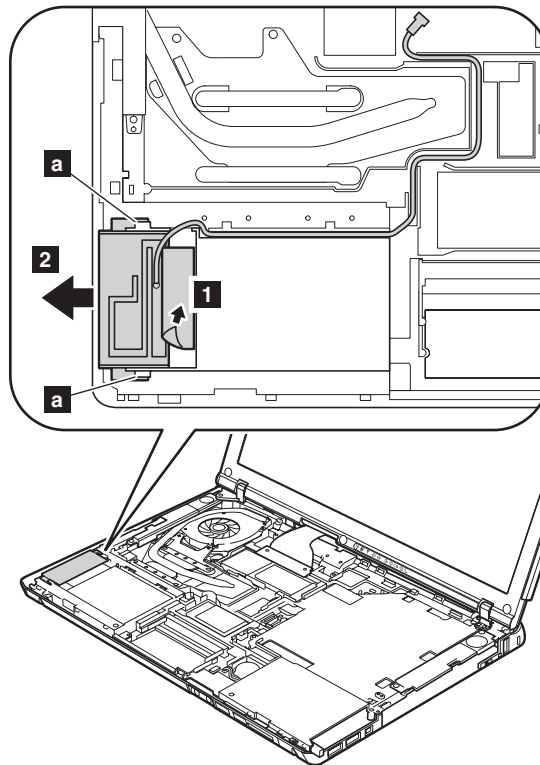
**When installing:** Place the CPU on the CPU socket **a**, and then rotate the head of the screw in the direction shown by arrow **b** to secure the CPU.

## 1150 Wireless WAN antenna (DIV)

For access, remove these FRUs in order:

- “1010 Battery pack” on page 56
- “1040 Palm rest or palm rest with fingerprint reader” on page 60
- “1060 Keyboard” on page 63
- “1080 PCI Express Mini card for wireless WAN” on page 67

Strip the tape that secures the wireless WAN antenna **1**, and release the antenna cable from the cable guide. Then slide the antenna in the direction shown by arrow **2**.

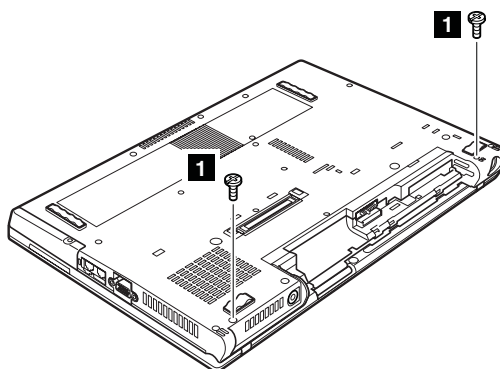


**When installing:** Make sure that the antenna cable is routed along the cable guides, and that the antenna is attached to the guides **a** firmly.

## 1160 LCD assembly

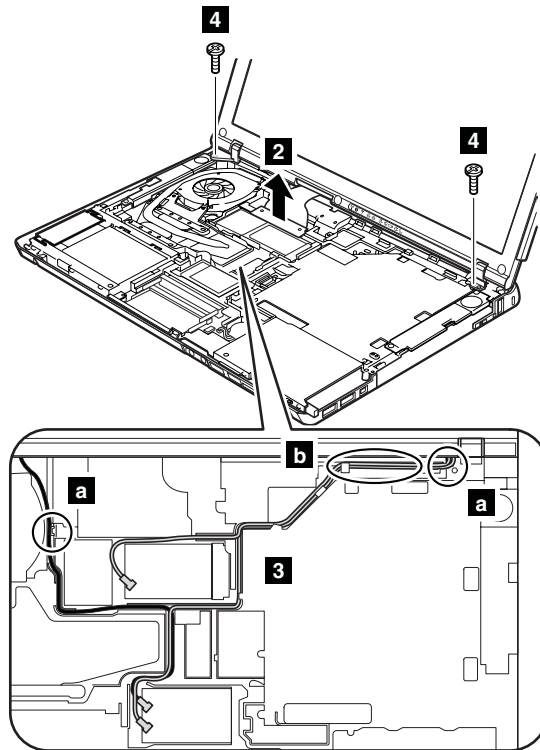
For access, remove these FRUs in order:

- “1010 Battery pack” on page 56
- “1040 Palm rest or palm rest with fingerprint reader” on page 60
- “1060 Keyboard” on page 63
- “1070 Modem daughter card (MDC-1.5)” on page 65
- “1080 PCI Express Mini card for wireless WAN” on page 67
- “1090 PCI Express Mini card for wireless LAN” on page 69
- “1110 Keyboard bezel” on page 72



Step	Screw (quantity)	Color	Torque
<b>1</b>	M2 × 5 mm, flat-head, nylon-coated (2)	Black	0.196 Nm (2.0 kgfcm)

(continued)



In step **3**, release the antenna cables from the cable guides.

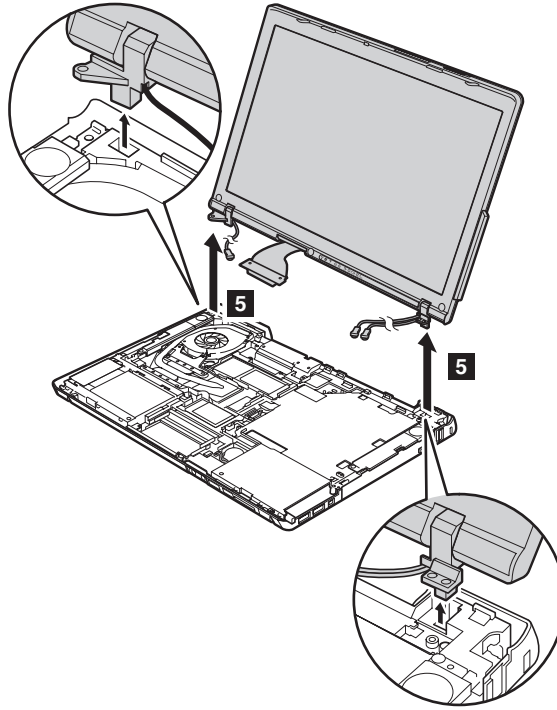
Step	Screw (quantity)	Color	Torque
<b>4</b>	M2 × 5 mm, flat-head, nylon-coated (2)	Black	0.245 Nm (2.5 kgfcm)

**When installing:**

1. Make sure that the antenna cables are routed along the cable guides. In the parts indicated by circle **a** in the figure, do not tense the cables. To do so, the cables may get damaged by the cable guides of the frame, and may cause a broken wire.
2. In the part indicated by circle **b**, do not twist the cables, and place the cables to be parallel.
3. Make sure that the connector **2** is attached firmly.

(continued)

*Removing and replacing a FRU*

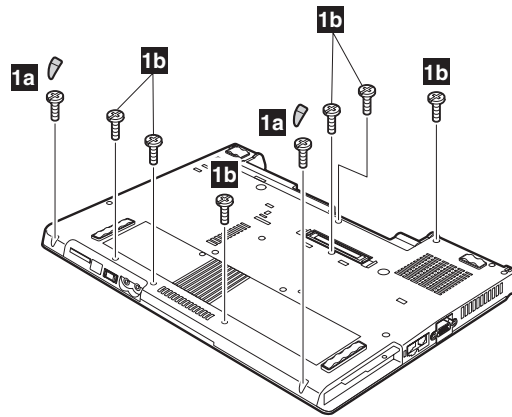





## 1170 Base cover

For access, remove these FRUs, in order:

- “1010 Battery pack” on page 56
- “1020 Ultrabay Slim device” on page 57
- “1030 Hard disk drive cover, hard disk drive, and hard disk drive rubber rails” on page 58
- “1040 Palm rest or palm rest with fingerprint reader” on page 60
- “1060 Keyboard” on page 63
- “1070 Modem daughter card (MDC-1.5)” on page 65
- “1080 PCI Express Mini card for wireless WAN” on page 67
- “1090 PCI Express Mini card for wireless LAN” on page 69
- “1110 Keyboard bezel” on page 72
- “1120 Speaker assembly” on page 74
- “1130 Fan assembly” on page 76
- “1150 Wireless WAN antenna (DIV)” on page 79
- “1160 LCD assembly” on page 80



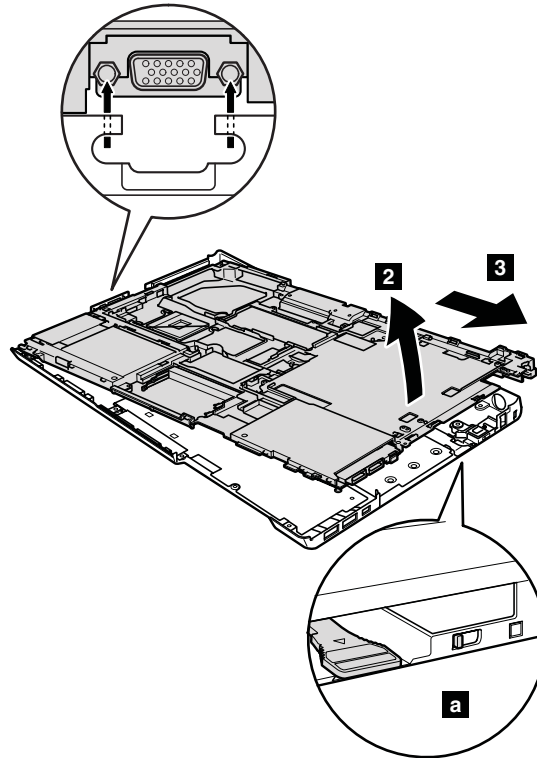
Step	Screw cap	Screw (quantity)	Color	Torque
<b>1a</b>		M2 × 5 mm, flat-head, nylon-coated (2)	Black	0.196 Nm (2.0 kgfcm)
<b>1b</b>	—	M2 × 5 mm, flat-head, nylon-coated (6)	Black	0.196 Nm (2.0 kgfcm)

(continued)

## Removing and replacing a FRU

In step **2**, lift the MG frame a little in the direction shown by the arrow, and then remove it in the direction shown by arrow **3**.

**Attention:** Before step **2**, be sure that the Ultrabay Slim device eject lever is not popped out and it is housed in its position properly as shown in the figure **a**.



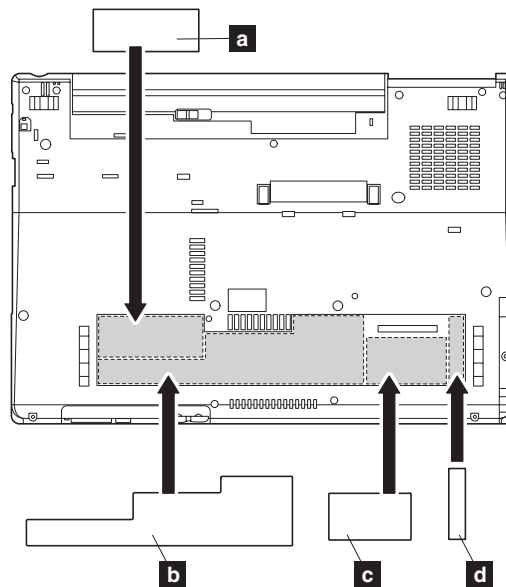
**Note: Applying labels to the base cover**

The new base cover FRU is shipped with a kit containing labels of several kinds. When you replace the base cover, you need to apply the following labels:

- a** Windows license label (COA)
- b** Product label
- c** FCC or homologation label
- d** MAC address label

For some models, you also need to apply one or two FCC labels **c**. Check the old base cover; if it has one or two FCC labels, find duplicates of them in the label kit and apply them to the new base cover.

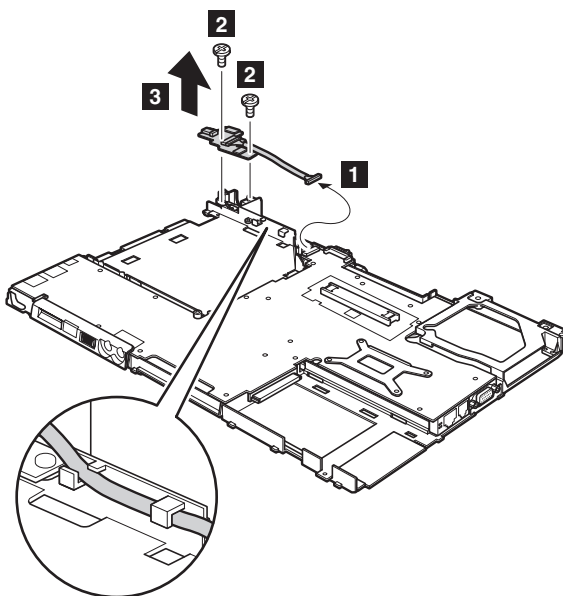
Apply the labels to the base cover as shown in this figure.



## 1180 USB/S-video sub card with cable

For access, remove these FRUs, in order:

- "1010 Battery pack" on page 56
- "1020 Ultrabay Slim device" on page 57
- "1030 Hard disk drive cover, hard disk drive, and hard disk drive rubber rails" on page 58
- "1040 Palm rest or palm rest with fingerprint reader" on page 60
- "1060 Keyboard" on page 63
- "1070 Modem daughter card (MDC-1.5)" on page 65
- "1080 PCI Express Mini card for wireless WAN" on page 67
- "1090 PCI Express Mini card for wireless LAN" on page 69
- "1110 Keyboard bezel" on page 72
- "1120 Speaker assembly" on page 74
- "1130 Fan assembly" on page 76
- "1150 Wireless WAN antenna (DIV)" on page 79
- "1160 LCD assembly" on page 80
- "1170 Base cover" on page 83



Step	Screw (quantity)	Color	Torque
<b>2</b>	M2 × 3 mm, flat-head, nylon-coated (2)	Black	0.196 Nm (2.0 kgfcm)

**When installing:** Make sure that the connector **1** is attached firmly, and that the cable is routed as in the figure above.

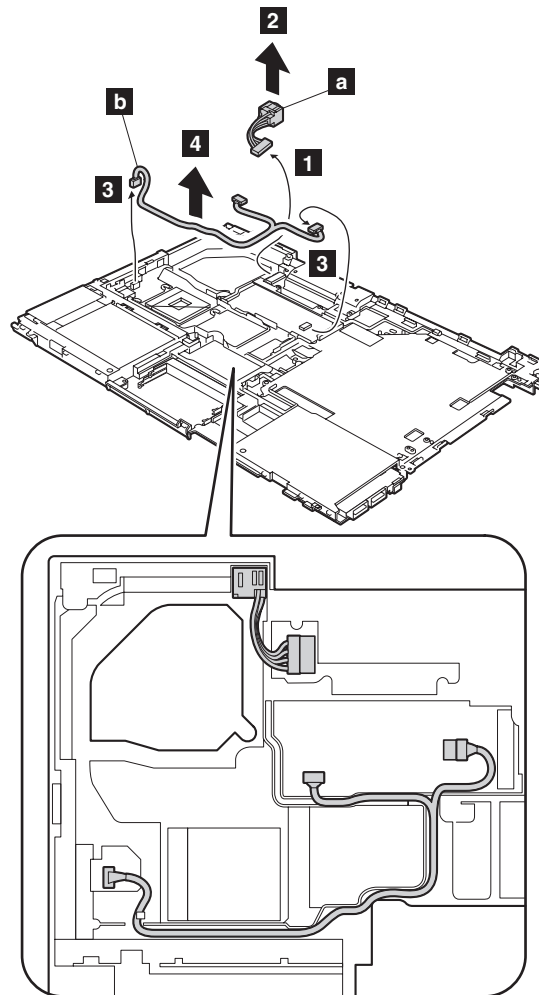
## 1190 MG (Magnesium) frame

For access, remove these FRUs, in order:

- "1010 Battery pack" on page 56
- "1020 Ultrabay Slim device" on page 57
- "1030 Hard disk drive cover, hard disk drive, and hard disk drive rubber rails" on page 58
- "1040 Palm rest or palm rest with fingerprint reader" on page 60
- "1050 DIMM" on page 62
- "1060 Keyboard" on page 63
- "1070 Modem daughter card (MDC-1.5)" on page 65
- "1080 PCI Express Mini card for wireless WAN" on page 67
- "1090 PCI Express Mini card for wireless LAN" on page 69
- "1110 Keyboard bezel" on page 72
- "1120 Speaker assembly" on page 74
- "1130 Fan assembly" on page 76
- "1150 Wireless WAN antenna (DIV)" on page 79
- "1160 LCD assembly" on page 80
- "1170 Base cover" on page 83
- "1180 USB/S-video sub card with cable" on page 86

## Removing and replacing a FRU

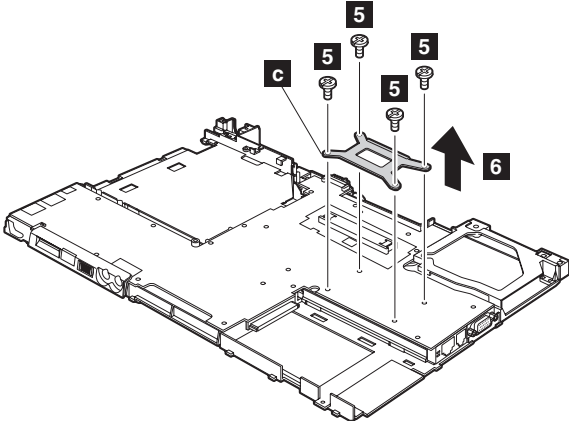
Remove the ac power jack cable **a** and the modem cable **b**.



**When installing:** Make sure that the connectors **1** and **3** are attached firmly, and that the cables are routed as in the figure above.

(continued)

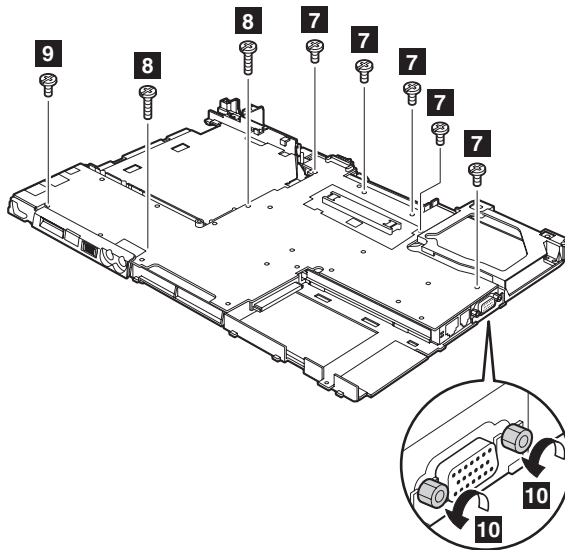
Remove the CPU support plate **c**.



Step	Screw (quantity)	Color	Torque
<b>6</b>	M2 × 3 mm, flat-head, nylon-coated (4)	Black	0.196 Nm (2.0 kgfcm)

(continued)

## Removing and replacing a FRU



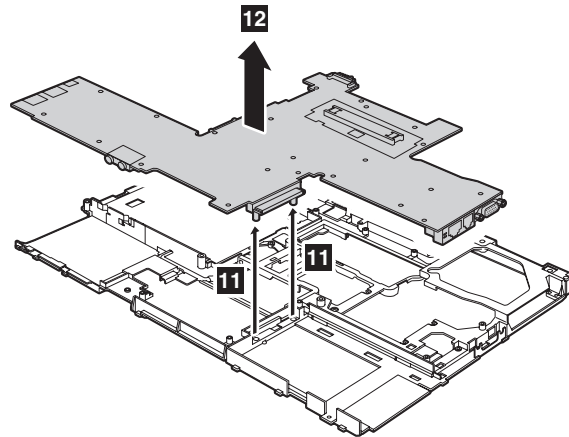
Step	Screw (quantity)	Color	Torque
<b>7</b>	M2 × 3 mm, flat-head, nylon-coated (5)	Black	0.196 Nm (2.0 kgfcm)
<b>8</b>	M2 × 9 mm, flat-head, nylon-coated (2)	Black	0.196 Nm (2.0 kgfcm)
<b>9</b>	M2 × 5 mm, flat-head, nylon-coated (1)	Black	0.196 Nm (2.0 kgfcm)

In step **10**, loosen the hex screws.

(continued)



Remove the system board and the PC Card slot assembly from the MG frame together, in the direction shown by arrow **12** .



**When installing:** Attach the system board so that the two small projections on the MG frame **11** fit into the holes provided, and then secure the system board with the screw.

## 1200 System board and PC Card slot assembly

For access, remove these FRUs, in order:

- "1010 Battery pack" on page 56
- "1020 Ultrabay Slim device" on page 57
- "1030 Hard disk drive cover, hard disk drive, and hard disk drive rubber rails" on page 58
- "1040 Palm rest or palm rest with fingerprint reader" on page 60
- "1050 DIMM" on page 62
- "1060 Keyboard" on page 63
- "1070 Modem daughter card (MDC-1.5)" on page 65
- "1080 PCI Express Mini card for wireless WAN" on page 67
- "1090 PCI Express Mini card for wireless LAN" on page 69
- "1110 Keyboard bezel" on page 72
- "1120 Speaker assembly" on page 74
- "1130 Fan assembly" on page 76
- "1140 CPU" on page 78
- "1150 Wireless WAN antenna (DIV)" on page 79
- "1160 LCD assembly" on page 80
- "1170 Base cover" on page 83
- "1180 USB/S-video sub card with cable" on page 86
- "1190 MG (Magnesium) frame" on page 87

**Important notice for handling the system board**

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

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

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

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

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

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

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

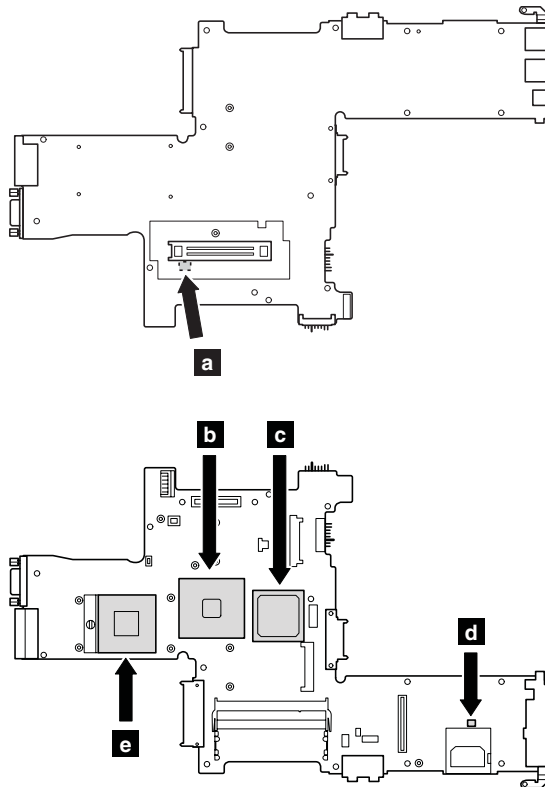
1. Place the computer on a horizontal surface.
2. Run **Diagnostics --> ThinkPad Devices --> HDD Active Protection Test**.

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

## Removing and replacing a FRU

Following components soldered on the system board are extremely sensitive. When you service the system board, avoid any kind of rough handling.

- a** Accelerometer chip for the HDD Active Protection System
- b** MCH (Memory ControllerHub)
- c** ICH (I/O Controller Hub)
- d** Security chip
- e** CPU



**Important**

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

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

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

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

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

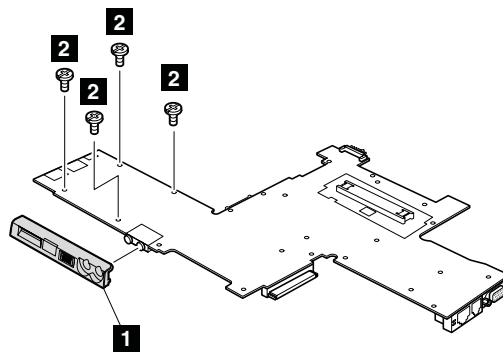
- Avoid rough handling of any kind.
- At every point in the process, be sure not to drop or stack the system board.
- If you put a system board down, be sure to put it only on a padded surface such as an ESD mat or conductive corrugated material.

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

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

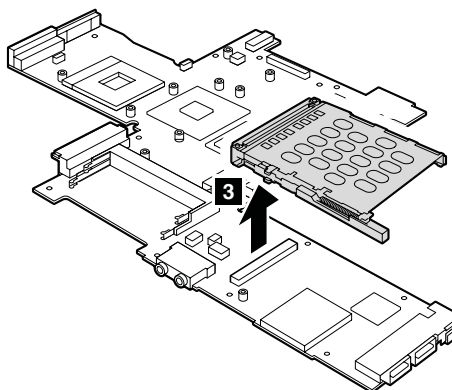
**Attention:** Do not apply physical shock to the computer while the test is running.

## Removing and replacing a FRU



Step	Screw (quantity)	Color	Torque
2	M2 × 5 mm, flat-head, nylon-coated (4)	Black	0.196 Nm (2.0 kgfcm)

Turn over the system board, and then disconnect the PC Card slot assembly from the system board.

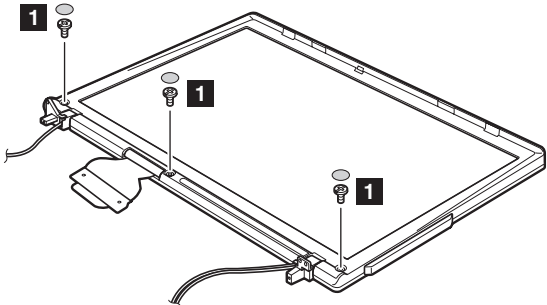


**When installing:** Make sure that the connector of PC Card slot is attached to the system board firmly.

### 2010 LCD front bezel

For access, remove these FRUs in order:

- "1010 Battery pack" on page 56
- "1040 Palm rest or palm rest with fingerprint reader" on page 60
- "1060 Keyboard" on page 63
- "1070 Modem daughter card (MDC-1.5)" on page 65
- "1080 PCI Express Mini card for wireless WAN" on page 67
- "1090 PCI Express Mini card for wireless LAN" on page 69
- "1110 Keyboard bezel" on page 72
- "1160 LCD assembly" on page 80

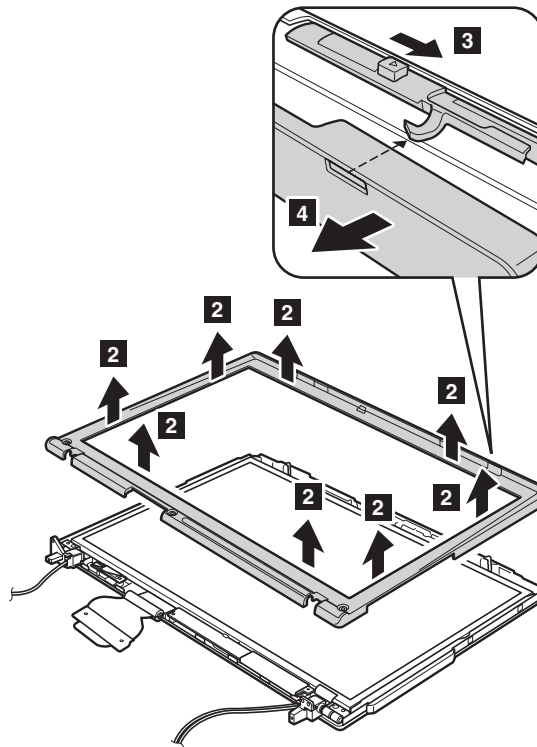


Step	Screw cap	Screw (quantity)	Color	Torque
<b>1</b>	○	M2 × 5 mm, flat-head, nylon-coated (3)	Black	0.196 Nm (2.0 kgfcm)

(continued)

## Removing and replacing a FRU

In step **3**, while sliding the LCD latch lever in the direction shown by the arrow, remove the bezel in the direction shown by arrow **4**.

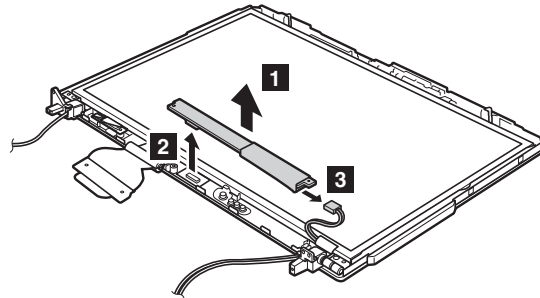




## 2020 Inverter card

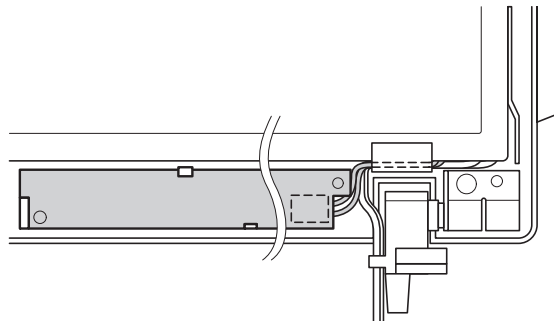
For access, remove these FRUs in order:

- “1010 Battery pack” on page 56
- “1040 Palm rest or palm rest with fingerprint reader” on page 60
- “1060 Keyboard” on page 63
- “1070 Modem daughter card (MDC-1.5)” on page 65
- “1080 PCI Express Mini card for wireless WAN” on page 67
- “1090 PCI Express Mini card for wireless LAN” on page 69
- “1110 Keyboard bezel” on page 72
- “1160 LCD assembly” on page 80
- “2010 LCD front bezel” on page 97



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

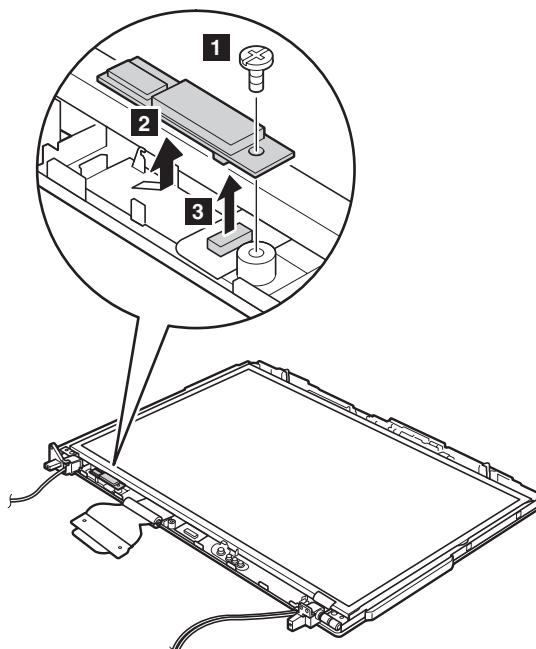
**Cable routing:** When installing the inverter card, route the connector cable as in this figure.



## 2030 Bluetooth daughter card (BDC-2)

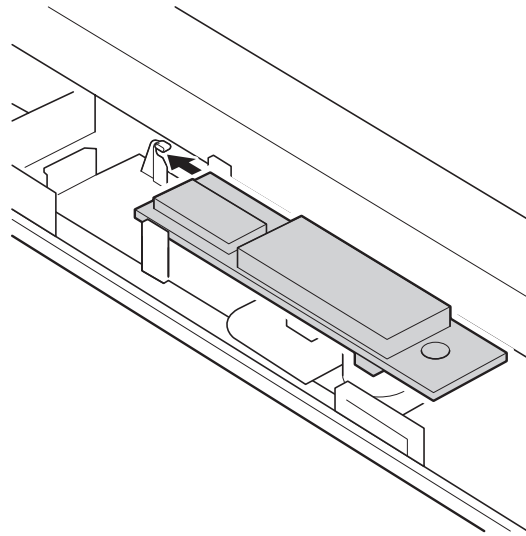
For access, remove these FRUs in order:

- "1010 Battery pack" on page 56
- "1040 Palm rest or palm rest with fingerprint reader" on page 60
- "1060 Keyboard" on page 63
- "1070 Modem daughter card (MDC-1.5)" on page 65
- "1080 PCI Express Mini card for wireless WAN" on page 67
- "1090 PCI Express Mini card for wireless LAN" on page 69
- "1110 Keyboard bezel" on page 72
- "1160 LCD assembly" on page 80
- "2010 LCD front bezel" on page 97



Step	Screw (quantity)	Color	Torque
<b>1</b>	M2 × 5 mm, flat-head, nylon-coated (1)	Black	0.196 Nm (2.0 kgfcm)

**When installing:** Make sure that connector is attached firmly, and that the card is attached to the guide as in this figure.

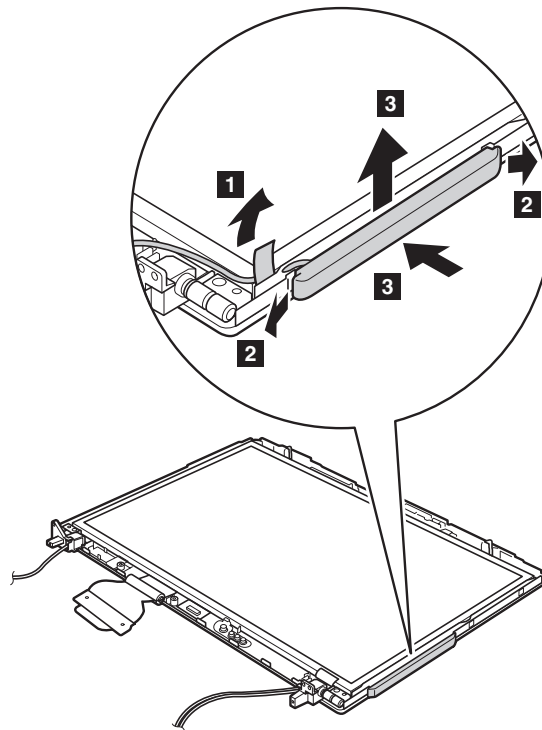


## 2040 Wireless WAN antenna cable (MAIN)

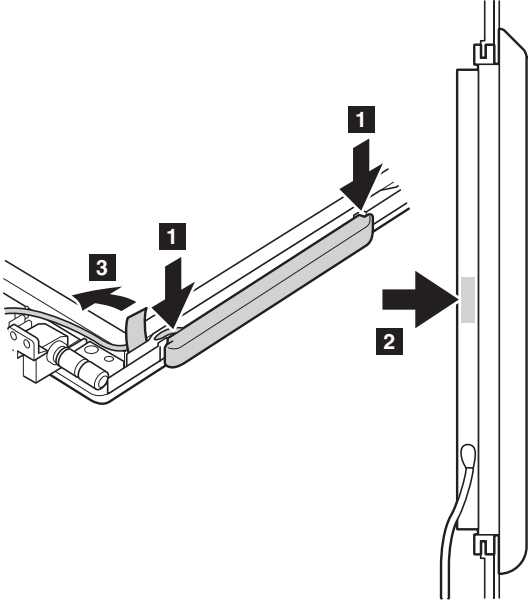
For access, remove these FRUs in order:

- "1010 Battery pack" on page 56
- "1040 Palm rest or palm rest with fingerprint reader" on page 60
- "1060 Keyboard" on page 63
- "1070 Modem daughter card (MDC-1.5)" on page 65
- "1080 PCI Express Mini card for wireless WAN" on page 67
- "1090 PCI Express Mini card for wireless LAN" on page 69
- "1110 Keyboard bezel" on page 72
- "1160 LCD assembly" on page 80
- "2010 LCD front bezel" on page 97
- "2020 Inverter card" on page 99
- "2030 *Bluetooth* daughter card (BDC-2)" on page 100

Strip the tape securing the antenna cable **1**. Then remove the antenna cable.

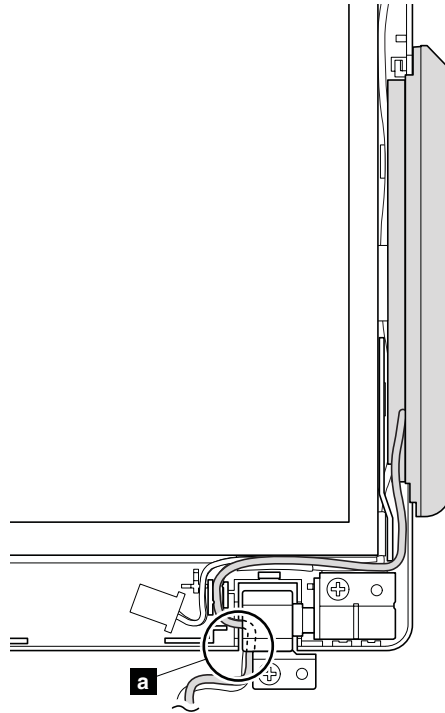


**When installing:** In step **2**, press the part indicated by the arrow until it snaps into place.



## Removing and replacing a FRU

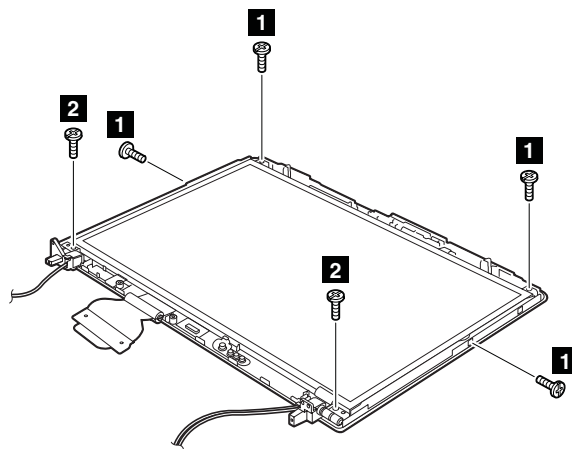
**Cable routing:** Route the antenna cable as shown in this figure. In the part indicated by circle **a**, do not tense the cable. To do so, the cable may get damaged by the hinge, and may cause a broken wire.



## 2050 LCD panel, LCD cable, and hinges

For access, remove these FRUs in order:

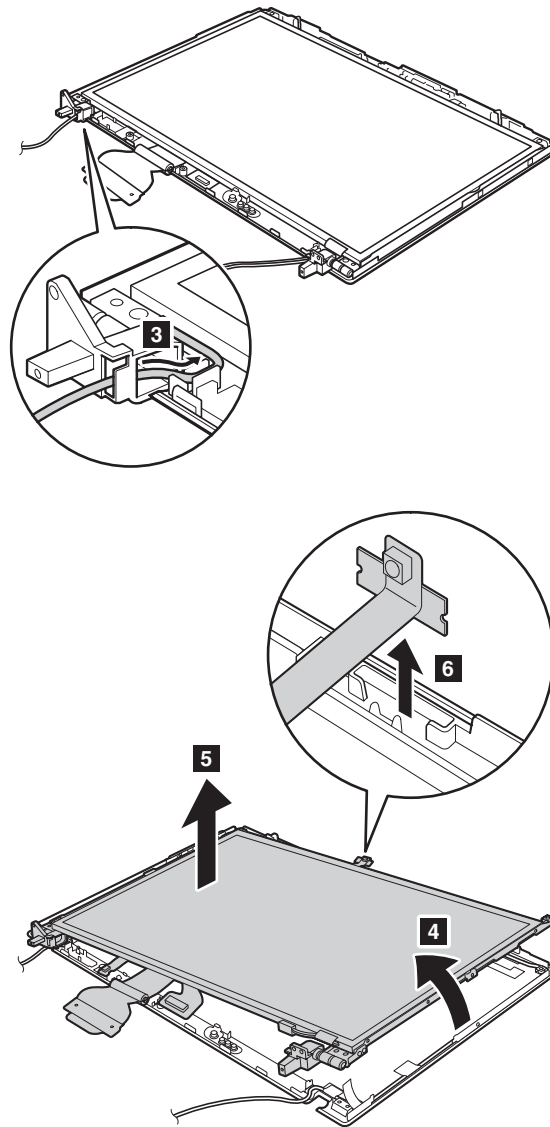
- "1010 Battery pack" on page 56
- "1040 Palm rest or palm rest with fingerprint reader" on page 60
- "1060 Keyboard" on page 63
- "1070 Modem daughter card (MDC-1.5)" on page 65
- "1080 PCI Express Mini card for wireless WAN" on page 67
- "1090 PCI Express Mini card for wireless LAN" on page 69
- "1110 Keyboard bezel" on page 72
- "1160 LCD assembly" on page 80
- "2010 LCD front bezel" on page 97
- "2020 Inverter card" on page 99
- "2030 *Bluetooth* daughter card (BDC-2)" on page 100
- "2040 Wireless WAN antenna cable (MAIN)" on page 102



Step	Screw (quantity)	Color	Torque
<b>1</b>	M2 × 3 mm, flat-head, nylon-coated (4)	Silver	0.196 Nm (2.0 kgfcm)
<b>2</b>	M2 × 5 mm, flat-head, nylon-coated (2)	Black	0.196 Nm (2.0 kgfcm)

(continued)

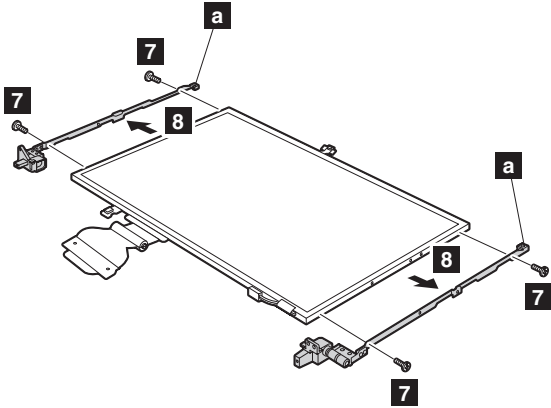
*Removing and replacing a FRU*



(continued)

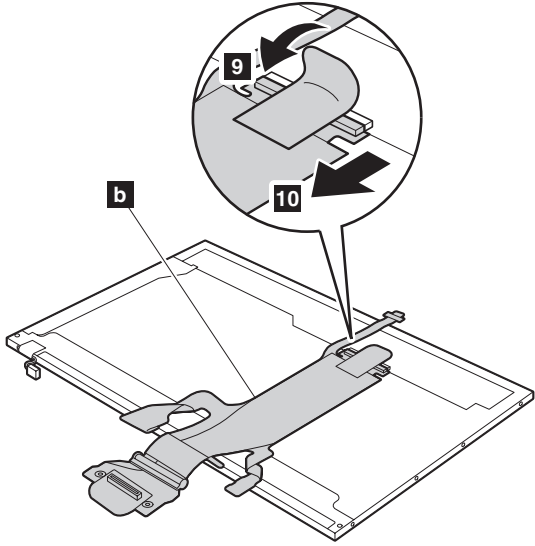


Remove the hinges **a** from the LCD panel.



Step	Screw (quantity)	Color	Torque
<b>7</b>	M2 × 3 mm, small-head, nylon-coated (4)	Silver	0.196 Nm (2.0 kgfcm)

Remove the LCD cable assembly **b** from the LCD panel.



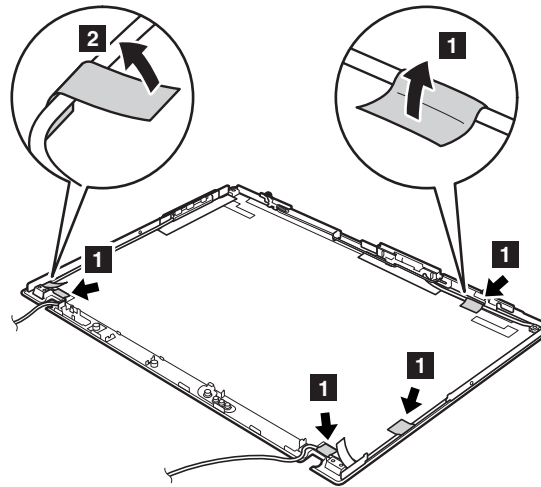
**When installing:** When replacing any LCD FRUs, be sure not to pinch the antenna cables. Make sure that the cables are routed as shown in the figures on page 112 and 113.

## 2060 LCD rear cover and wireless LAN antenna cables

For access, remove these FRUs in order:

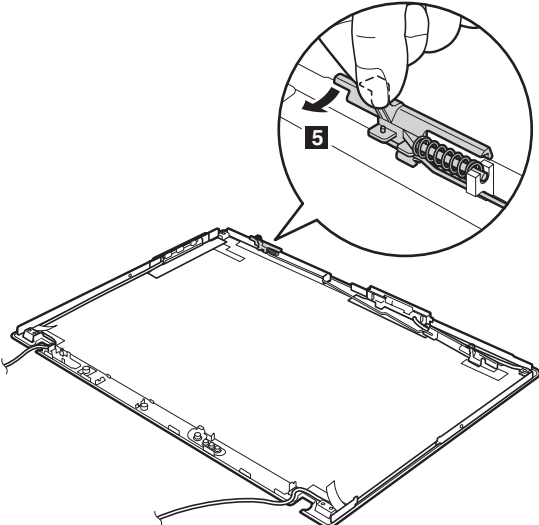
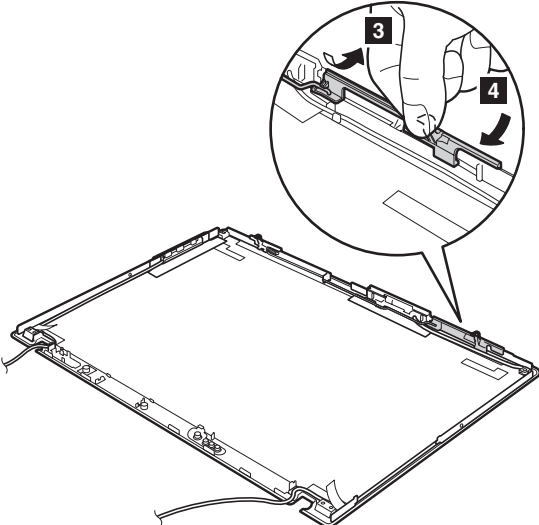
- "1010 Battery pack" on page 56
- "1040 Palm rest or palm rest with fingerprint reader" on page 60
- "1060 Keyboard" on page 63
- "1070 Modem daughter card (MDC-1.5)" on page 65
- "1080 PCI Express Mini card for wireless WAN" on page 67
- "1090 PCI Express Mini card for wireless LAN" on page 69
- "1110 Keyboard bezel" on page 72
- "1160 LCD assembly" on page 80
- "2010 LCD front bezel" on page 97
- "2020 Inverter card" on page 99
- "2030 *Bluetooth* daughter card (BDC-2)" on page 100
- "2040 Wireless WAN antenna cable (MAIN)" on page 102
- "2050 LCD panel, LCD cable, and hinges" on page 105

Strip the tapes **1** and **2** that secure the antenna cables.



(continued)

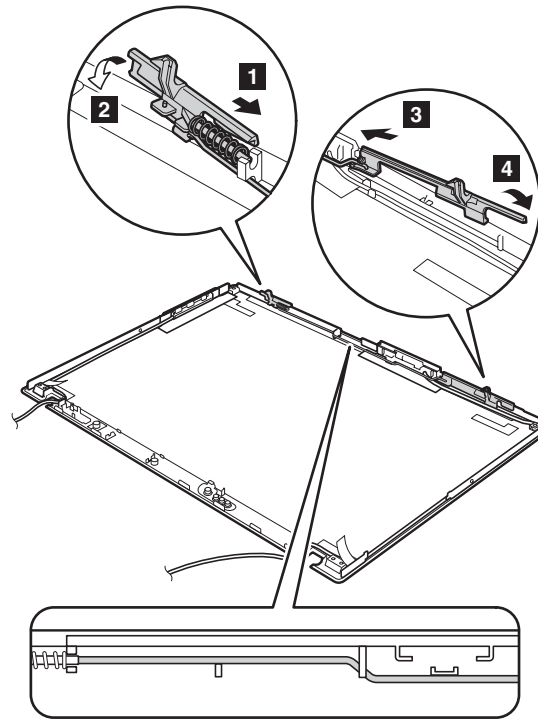
Remove the LCD latches before you remove the antenna cables.

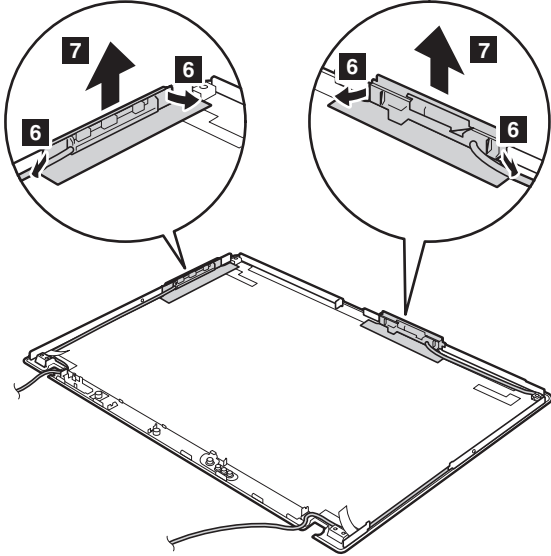


(continued)

## Removing and replacing a FRU

**When installing:** Attache the latches as shown in this figure.



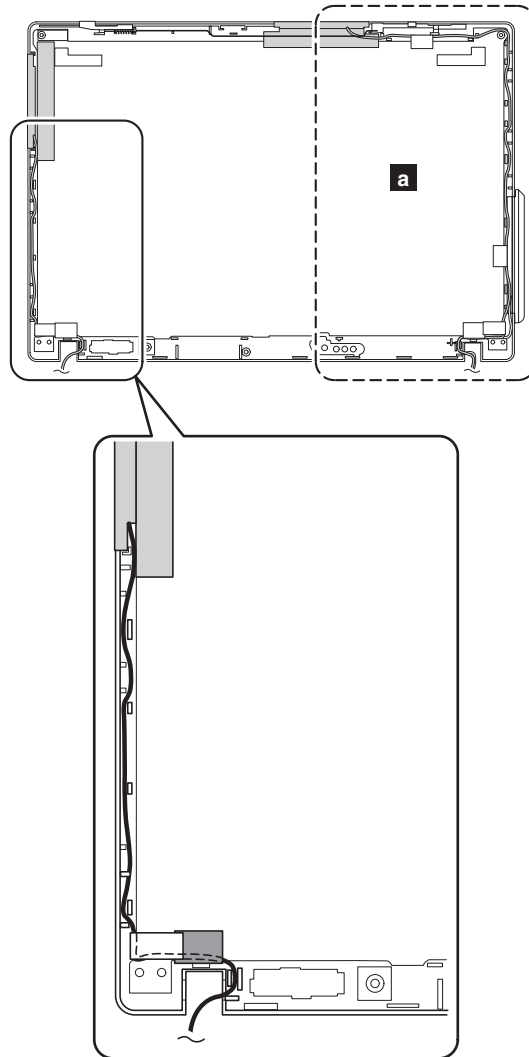


(continued)

## Removing and replacing a FRU

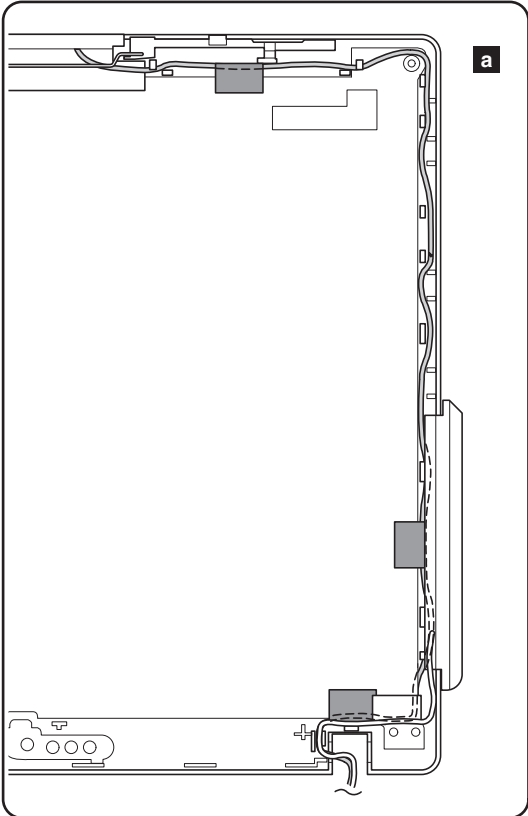
**Cable routing:** Route and secure the antenna cables as shown in the following figures.

**Wireless LAN antenna cable (AUX: black)**



(continued)

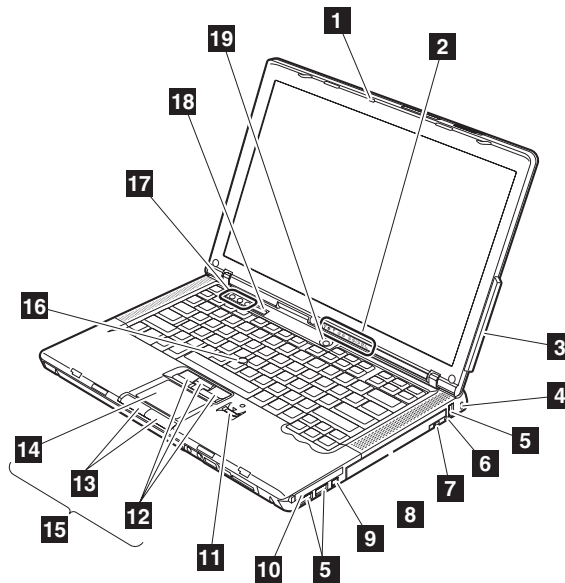
Wireless LAN antenna cable (MAIN: gray)



## Locations

### Front view

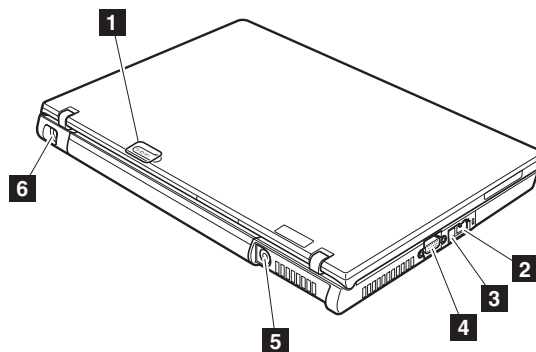
- 1** ThinkLight
  - 2** Status indicators
- Note:** For the description of each indicator, see “Status indicators” on page 36.
- 3** Wireless WAN antenna
  - 4** Security key hole
  - 5** Universal serial bus (USB) connectors
  - 6** Ultrabay Slim status indicator
  - 7** Ultrabay Slim latch
  - 8** Ultrabay Slim
  - 9** IEEE 1394 connector
  - 10** PC Card slot
  - 11** Fingerprint reader (for some models)
  - 12** TrackPoint buttons
  - 13** Touch pad buttons
  - 14** Touch pad
  - 15** UltraNav
  - 16** TrackPoint pointing stick
  - 17** Volume control buttons
  - 18** ThinkVantage button
  - 19** Power switch





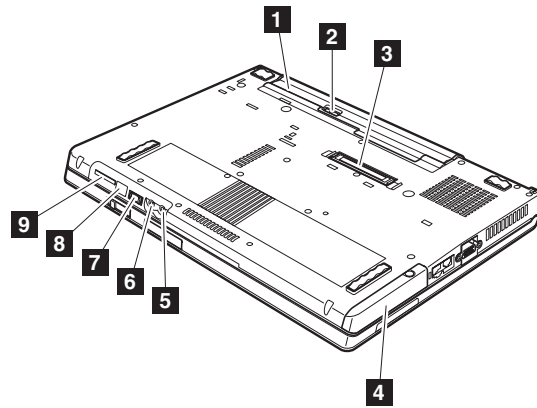
## Rear view

- 1** Status indicators  
**Note:** For the description of each indicator, see “Status indicators” on page 36.
- 2** RJ-45 (Ethernet) connector
- 3** RJ-11 (modem) connector
- 4** External monitor connector
- 5** AC power connector
- 6** Video-out connector



## Bottom view

- 1** Battery pack
- 2** Battery pack latch
- 3** Docking connector
- 4** Hard disk drive
- 5** Stereo headphone jack
- 6** Microphone jack
- 7** Wireless radio switch
- 8** Infrared port
- 9** SD card slot



---

## Parts list

- Each FRU is available for all types or models, unless specific types or models are specified.
- FRU with specific models listed and described as xxU (where U is an example of a country designator) should be used for all models ending in U.
- FRU with specific models listed and described as 3Dx (where 3D is an example of a unique configuration) should be used for all of these models, unless specific country or region designator is specified.
- A CRU (customer replaceable unit) is identified by a single asterisk (\*) or two asterisks (\*\*) in the CRU ID column. An N in the CRU ID column means the part is not a CRU. A single asterisk (\*) means the part is an External CRU; two asterisks (\*\*) means the part is an Internal CRU.

ThinkPad computers contain the following types of the external CRUs:

### External CRUs (pluggable)

These CRUs unplug from the computer. Examples of these types of CRUs include an ac adapter, an external keyboard, a mouse, a power cord, a port replicator, a USB device, and an external bay device adapter.

### External CRUs with latches

These CRUs have a latch to help you to remove and replace the part. Examples of these types of CRUs include a battery pack, an Ultrabay device such as an optical drive, a hard disk drive, and an extended battery.

ThinkPad computers contain the following types of the internal CRUs:

### Internal CRUs (located behind an access panel)

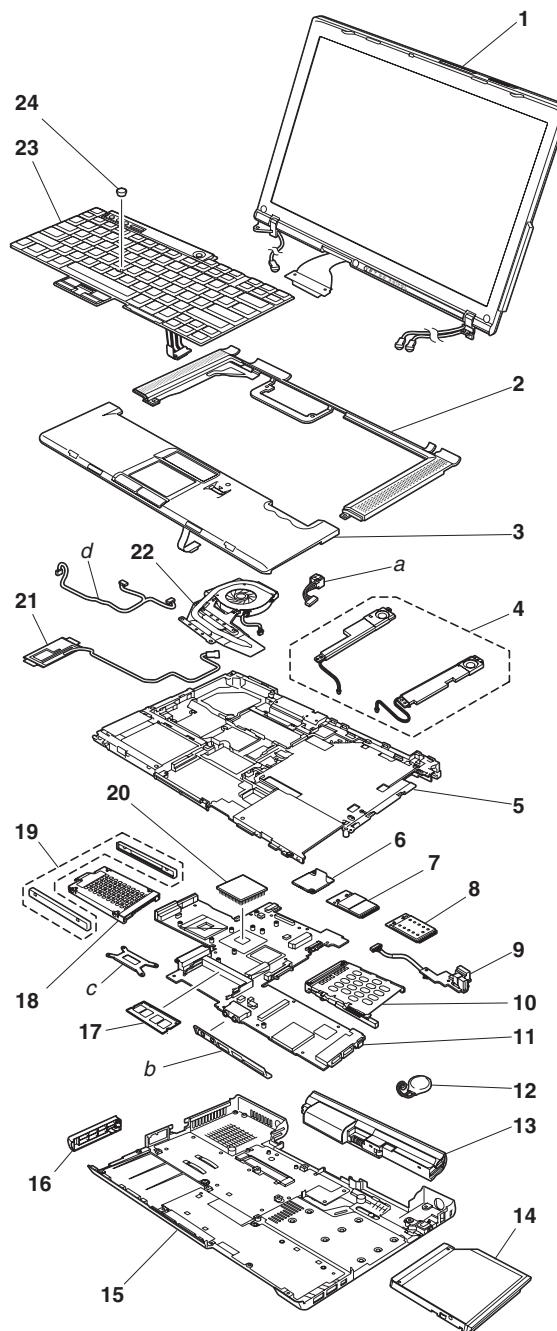
These CRUs are isolated parts within the computer that are concealed by an access panel that is typically secured by either one or two screws. Once the access panel is removed, only the specific CRU is visible. Examples of these types of CRUs include a memory card and a hard disk drive.

### Internal CRUs (located within the product itself)

These CRUs are accessible only by opening the outer case of the computer. Examples of these CRUs include the integrated keyboard parts beneath the integrated keyboard and parts beneath the palm rest.

- A RoHS compliant FRU is identified by an R. An N in the RoHS ID column means the part is not a RoHS compliant FRU.
- FRUs marked with **OP** are available as options.

# Overall



No.	FRU	P/N	CRU ID
<i>a-d</i>	See "Miscellaneous parts" on page 131.		
1	LCD unit (see "LCD FRUs" on page 126.)		
2	Keyboard bezel assembly	41V9786	N
3	Palm rest assembly without fingerprint reader <ul style="list-style-type: none"> <li>• 2511-CTO, E1x</li> <li>• 2511-H1x, H3x</li> <li>• 2512-CTO, 11x, 12x, 13x, 14x, 15x, 18x, 1Ax, 1Dx, 1Ex, 1Fx, 1Gx, 1Jx, 1Mx, 1Nx, 1Px, 1Ux, 1Zx, 24x, 26x, 2Dx, 38x, 4Hx, 4Jx, E1x</li> <li>• 2512-JFx, JGx, JHx</li> <li>• 2513-CTO, 11x, 14x, 1Ax, 1Fx, 1Nx, 24x, 62x, 67x, 6Gx, 6Px, 7Cx, 7Jx</li> <li>• 2514-CTO, 11x, 1Dx, 7Cx</li> </ul>	41V9788	**
	Palm rest assembly with fingerprint reader <ul style="list-style-type: none"> <li>• 2511-CTO, 3Bx, 5xx, Exx except E1x, Fxx</li> <li>• 2511-H2x, H4x, H5x, H6x, H7x, H8x, H9x, HAx, Pxx</li> <li>• 2512-CTO, 16x, 19x, 1Bx, 1Cx, 1Qx, 1Rx, 1Sx, 1Tx, 22x, 25x, 27x, 28x, 29x, 2Ax, 2Bx, 2Ex, 2Fx, 31x, 32x, 3Ax, 3Cx, 3Dx, 3Ex, 3Fx, 3Gx, 3Hx, 3Jx, 44x, 47x, 48x, 49x, 4Ax, 4Bx, 4Cx, 4Dx, 4Ex, 4Fx, 4Gx, 4Mx, 4Nx, 4Px, 51x, 52x, 64x, E6x, F4x</li> <li>• 2512-J1x, J2x, J3x, J4x, J5x, J6x, J7x, J8x, J9x, JAx, JBx, JDx, JEx, JJx, JKx, JLx, JMx, JPx, JQx, JRx</li> <li>• 2513-CTO, 19x, 1Cx, 28x, 29x, 2Ax, 2Ex, 2Fx, 37x, 3Ax, 3Bx, 4Mx, 63x, 64x, 6Ax, 6Ex, 6Hx, 6Jx, 6Kx, 6Mx, 6Rx, 73x, 74x, 79x, 7Bx, 7Dx, 7Ex, 7Fx, 7Gx, E4x, E5x</li> <li>• 2513-Mxx</li> <li>• 2514-CTO, 3Ax, 3Bx, 79x</li> <li>• 2514-Mxx</li> </ul>	41V9790	**
4	Speaker assembly	39T7220	N
5	Magnesium frame	41V9784	N
6	Modem daughter card (MDC-1.5)	39T0495	**
7	ThinkPad 11a/b/g Wireless LAN Mini PCI Express Adapter		
	WW	39T0499	**
	BG	39T5617	**
	Japan	39T5613	**
	Korea	41W1073	**
	Taiwan	39T5615	**
8	Sierra Wireless EV-DO Wireless WAN Mini PCI Express Adapter <ul style="list-style-type: none"> <li>• 2511-CTO, E7x, EGx</li> <li>• 2511-H8x</li> <li>• 2512-CTO</li> <li>• 2513-CTO, 7Bx, 7Dx, 7Ex</li> <li>• 2514-CTO</li> </ul>	39T5664	N

(continued)

Parts list

No.	FRU	P/N	CRU ID
9	USB/S-video sub card with cable	39T5622	N
10	PC Card slots	26R9553	N
11	System board with Intel 915GM	39T5618	N
12	Backup battery	92P1161	**
13	Battery pack, Li-ion (4 cell) <ul style="list-style-type: none"> <li>• 2511-CTO, E1x, E8x, E9x, EAx, EBx, EEx, EJx, EMx, FCx</li> <li>• 2511-H1x, H4x, H5x, H6x</li> <li>• 2512-CTO, 11x, 13x, 14x, 15x, 18x, 19x, 1Ex, 1Fx, 1Gx, 1Jx, 1Zx, 2Bx, 2Dx, 2Ex, 2Fx, 32x, 38x, 3Ax, 3Cx, 3Dx, 3Ex, 3Fx, 44x, 47x, 48x, 49x, 4Ax, 4Bx, 4Cx, 4Dx, 4Ex, 4Fx, 4Gx, 4Hx, 4Jx, 4Mx, 4Nx, 4Px, E1x</li> <li>• 2512-J1x, J3x, J4x, J5x, J6x, J7x, J8x, J9x, JAx, JBx, JDx, JEx, JFx, JGx, JHx, JLx, JMx, JPx, JQx</li> <li>• 2513-CTO, 11x, 14x, 19x, 1Fx, 2Ex, 2Fx, 37x, 3Ax, 4Mx, 62x, 67x, 6Px, 73x, 74x, 7Jx</li> <li>• 2513-M1x, M2x, M3x, M6x, M7x</li> <li>• 2514-CTO, 11x, 3Ax</li> <li>• 2514-M6x, MEx</li> </ul>		
	Sanyo	92P1121	*
	Panasonic	92P1123	*
	Battery pack, Li-ion (7 cell) Sanyo <ul style="list-style-type: none"> <li>• 2511-CTO, 3Bx, E2x, E3x, E4x, E5x, E6x, E7x, ECx, EDx, EFx, EGx</li> <li>• 2511-H2x, H3x, H7x, H8x, H9x, HAx</li> <li>• 2512-CTO, 12x, 16x, 1Ax, 1Bx, 1Cx, 1Dx, 1Mx, 1Nx, 1Px, 1Qx, 1Rx, 1Sx, 1Tx, 1Ux, 22x, 24x, 25x, 26x, 27x, 28x, 29x, 2Ax, 31x, 3Gx, 3Hx, 3Jx, 64x, E6x</li> <li>• 2512-J2x, JJx, JKx, 1Rx</li> <li>• 2513-CTO, 1Ax, 1Cx, 1Nx, 24x, 28x, 29x, 2Ax, 3Bx, 63x, 64x, 6Ax, 6Ex, 6Gx, 6Hx, 6Jx, 6Kx, 6Mx, 6Rx, 79x, 7Bx, 7Vx, 7Dx, 7Ex, 7Fx, 7Gx, E4x, E5x</li> <li>• 2513-M4x, M5x, M8x, M9x, MAx, MBx, MCx, MDx</li> <li>• 2514-CTO, 1Dx, 3Bx, 79x, 7Cx</li> <li>• 2514-M6x, MEx</li> </ul>	92P1125	*
14	DVD drive, 9.5mm <ul style="list-style-type: none"> <li>• 2511-CTO</li> <li>• 2512-CTO</li> <li>• 2513-CTO</li> <li>• 2514-CTO</li> </ul>		
	PCC (UJDA765)	39T2681	*
	HLDS (GDR-8085N)	39T2683	*

(continued)

No.	FRU	P/N	CRU ID	
14	DVD/CD-RW combo drive, 9.5mm <ul style="list-style-type: none"> <li>• 2511-CTO, E1x, E2x, E4x, E8x, EAx, EBx, ECx, EEx, EFx, EGx, EJx, EMx</li> <li>• 2511-H1x</li> <li>• 2512-CTO, 11x, 13x, 14x, 15x, 18x, 19x, 1Dx, 1Ex, 1Fx, 1Gx, 1Jx, 1Mx, 1Nx, 1Px, 1Qx, 1Rx, 1Ux, 1Zx, 24x, 25x, 28x, 2Bx, 2Ex, 3Ex, 3Fx, 3Gx, 44x, 4Dx, 4Ex, 4Fx, 4Gx, 4Hx, 4Jx, 4Nx, 4Px, 64x, E1x</li> <li>• 2512-1Rx, J1x, J2x, J3x, J6x, J7x, JDx, JEx, JFx, JGx, JHx</li> <li>• 2513-CTO, 11x, 14x, 19x, 1Fx, 1Nx, 24x, 28x, 2Ex, 37x, 62x, 63x, 64x, 67x, 6Ex, 6Gx, 6Hx, 6Jx, 6Px, 74x, 79x, 7Dx, 7Fx, 7Jx, E4x</li> <li>• 2513-M1x, M2x, M4x, M8x, M9x</li> <li>• 2514-CTO, 11x, 1Dx, 79x</li> <li>• 2514-M9x</li> </ul>			
	PCC (UJDA765DL)	39T2685	*	
	HLDS (GCC-4246N)	39T2687	*	
	DVD-RAM/RW drive, 9.5mm, PCC (UJ-832B) <ul style="list-style-type: none"> <li>• 2511-CTO, 3Bx, E3x, E5x, E6x, E7x, E9x, EDx, FCx</li> <li>• 2511-H9x, HAx</li> <li>• 2512-CTO, 12x, 16x, 1Ax, 1Bx, 1Cx, 1Sx, 1Tx, 27x, 29x, 2Ax, 2Dx, 2Fx, 31x, 32x, 38x, 3Ax, 3Cx, 3Dx, 3Hx, 3Jx, 47x, 48x, 49x, 4Ax, 4Bx, 4Cx, 4Mx, E6x</li> <li>• 2513-CTO, 1Ax, 1Cx, 29x, 2Ax, 2Fx, 3Ax, 3Bx, 4Mx, 6Ax, 6Kx, 6Mx, 6Rx, 73x, 7Bx, 7Cx, 7Ex, 7Gx, E5x</li> <li>• 2514-CTO, 3Ax, 3Bx, 7Cx</li> </ul>	39T2573	*	
	DVD-RAM/RW drive, 9.5mm <ul style="list-style-type: none"> <li>• 2511-CTO, H2x, H3x, H4x, H5x, H6x, H7x, H8x</li> <li>• 2512-CTO, J4x, J5x, J8x, J9x, JAx, JBx, JJx, JKx, JLx, JMx, JPx, JQx</li> <li>• 2513-CTO, M3x, M5x, M6x, M7x, MAx, MBx, MCx, MDx, MEx, MGx</li> <li>• 2514-CTO, M6x, MEx</li> </ul>			
	PCC (UJ-842B)	92P6249	*	
	HLDS (GSA-4083N)	92P6248	*	
	Travel cover <ul style="list-style-type: none"> <li>• 2511-CTO, xxJ, xxP, xxS, xxY</li> <li>• 2512-CTO, xxJ, xxP, xxS, xxY</li> <li>• 2513-CTO, xxJ, xxP, xxS, xxY</li> <li>• 2514-CTO, xxJ, xxP, xxS, xxY</li> </ul>	13N5108	*	
	15	Base cover for 2511		
		WW <ul style="list-style-type: none"> <li>• 2511-CTO, 3xx, 5xx, Exx, Fxx except xxV</li> <li>• 2511-Hxx, Pxx except xxV</li> </ul>	26R9563	N
Taiwan <ul style="list-style-type: none"> <li>• 2511-CTO, 3xV, 5xV, ExV, FxV</li> <li>• 2511-HxV</li> </ul>		26R9567	N	

(continued)

Parts list

No.	FRU	P/N	CRU ID
15	Base cover for 2512		
	WW • 2512-CTO, 1xx, 2xx, 3xx, 4xx, 5xx, 6xx, Exx, Fxx except xxV • 2512-Jxx except xxV	26R9564	N
	Taiwan • 2512-CTO, 1xV, 2xV, 3xV, 4xV, 5xV, 6xV, ExV, FxV	26R9568	N
	Base cover for 2513		
	WW • 2513-CTO, 1xx, 2xx, 3xx, 4xx, 6xx, Exx except xxV • 2513-Mxx except xxV	26R9565	N
	Taiwan • 2513-CTO, 1xV, 2xV, 3xV, 4xV, 6xV, ExV • 2513-MxV	26R9569	N
	Base cover for 2514		
	WW • 2514-CTO, 1xx, 3xx, 7xx except xxV • 2514-Mxx except xxV	26R9566	N
	Taiwan • 2514-CTO, 1xV, 3xV, 7xV	26R9570	N
16	Hard disk drive cover	26R9561	*
17	256-MB DDR2-533 SDRAM SO-DIMM (PC2-4200) card <b>R</b> • 2511-CTO, E2x, EAx, EBx, ECx, EEx • 2512-CTO, 13x, 14x, 15x, 1Ex, 1Fx, 1Jx, 1Mx, 1Nx, 1Px, 1Qx, 1Zx, 2Bx, 4Hx, 4Jx, 4Nx, 4Px • 2512-J8x, J9x, JAx, JBx, JDx, JEx, JFx, JGx, JHx • 2513-CTO, 14x, 1Fx, 1Nx, 6Gx, 6Hx, 6Px • 2513-M8x	73P3841	**
	512-MB DDR2-533 SDRAM SO-DIMM (PC2-4200) card <b>R</b> • 2511-CTO, 3Bx, E1x, E3x, E4x, E5x, E6x, E8x, E9x, EDx, EFx, EGx, EJx, EMx, FCx • 2511-Hxx • 2512-CTO, 11x, 12x, 16x, 18x, 19x, 1Ax, 1Cx, 1Dx, 1Gx, 1Rx, 1Sx, 1Tx, 1Ux, 22x, 24x, 25x, 28x, 2Dx, 2Ex, 2Fx, 31x, 32x, 38x, 3Ax, 3Cx, 3Dx, 3Ex, 3Fx, 3Hx, 3Jx, 44x, 47x, 48x, 49x, 4Ax, 4Bx, 4Cx, 4Dx, 4Ex, 4Fx, 4Gx, 4Mx, 64x, E1x, E6x • 2512-1Rx, J1x, J2x, J3x, J4x, J5x, J6x, J7x, JJx, JL,x JMx, JPx, JQx • 2513-CTO, 11x, 19x, 1Ax, 1Cx, 24x, 28x, 2Ex, 2Fx, 37x, 3Ax, 3Bx, 4Mx, 62x, 63x, 64x, 67x, 6Ex, 6Jx, 6Kx, 6Mx, 6Rx, 73x, 74x, 79x, 7Bx, 7Cx, 7Dx, 7Ex, 7Fx, 7Gx, 7Jx, E4x, E5x • 2513-M1x, M2x, M3x, M4x, M5x, M6x, M7x, M9x, MAx, MBx, MEx, MGx • 2514-CTO, 11x, 1Dx, 3Ax, 3Bx, 79x, 7Cx • 2514-Mxx	73P3843	**

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No.	FRU	P/N	CRU ID
17	1-GB DDR2-533 SDRAM SO-DIMM (PC2-4200) card <b>R</b> <ul style="list-style-type: none"> <li>• 2511-CTO, E7x</li> <li>• 2512-CTO, 1Bx, 26x, 27x, 29x, 2Ax, 3Gx</li> <li>• 2512-JKx</li> <li>• 2513-CTO, 29x, 2Ax, 6Ax</li> <li>• 2513-MCx, MDx</li> </ul>	73P3845	**
18	Hard disk drive, 40 GB, 9.5 mm, 5,400 rpm <ul style="list-style-type: none"> <li>• 2511-CTO, E1x, E2x, E4x, E8x, EAx, EBx, ECx, EEx</li> <li>• 2511-H1x</li> <li>• 2512-CTO, 11x, 13x, 14x, 15x, 1Fx, 1Gx, 1Jx, 1Mx, 1Nx, 1Zx, 2Dx, 2Ex, 4Hx, 4Jx, E1x</li> <li>• 2512-J1x, J8x, J9x, JAx, JBx, JDx, JEx, JFx, JGx, JHx</li> <li>• 2513-CTO, 11x, 14x, 1Fx, 1Nx, 2Ex, 62x, 6Gx, 6Hx, 6Px, 73x, 79x, 7Dx, 7Jx, E4x</li> <li>• 2514-CTO, 11x, 79x</li> </ul>		
	HGST	39T2701	*
	Toshiba	39T2629	*
	Hard disk drive, 60 GB, 9.5 mm, 5,400 rpm <ul style="list-style-type: none"> <li>• 2511-CTO, E3x, E5x, E9x, EDx, EFx, EGx, EJx, FCx</li> <li>• 2512-CTO, 1Dx, 1Ex, 1Px, 1Qx, 1Ux, 22x, 25x, 2Bx, 2Fx, 31x, 38x, 3Ax, 3Ex, 3Fx, 44x, 49x, 4Ax, 4Bx, 4Cx, 4Dx, 4Ex, 4Fx, 4Gx, 64x</li> <li>• 2512-J6x, J7x, Jx, JPx, JQx</li> <li>• 2513-CTO, 2Fx, 3Ax, 63x, 64x, 67x, 6Rx, 74x, 7Ex, 7Fx, E5x</li> <li>• 2512-M1x, M2x, M3x, M8x</li> <li>• 2514-CTO, 1Dx, 3Ax</li> </ul>		
	HGST	39T2703	*
	Toshiba	39T2631	*
	Hard disk drive, 80 GB, 9.5 mm, 5,400 rpm <ul style="list-style-type: none"> <li>• 2511-CTO, 3Bx, E6x, EMx</li> <li>• 2511-H2x, H3x, H4x, H9x, HAx</li> <li>• 2512-CTO, 12x, 16x, 18x, 19x, 1Ax, 1Bx, 1Cx, 1Rx, 1Sx, 1Tx, 24x, 26x, 28x, 32x, 3Cx, 3Dx, 3Gx, 3Hx, 3Jx, 47x, 48x, 4Mx, E6x</li> <li>• 2512-1Rx, J2x, J3x, J4x, J5x, JLx, JMx</li> <li>• 2513-CTO, 19x, 1Ax, 1Cx, 24x, 28x, 37x, 3Bx, 4Mx, 6Ax, 6Ex, 6Jx, 6Kx, 7Cx, 7Gx</li> <li>• 2513-M4x, M6x, M7x, M9x, MBx, MEx</li> <li>• 2514-CTO, 3Bx, 7Cx</li> <li>• 2514-M6x, M9x, MEx</li> </ul>		
	HGST	39T2705	*
	Toshiba	39T2633	*
	Hard disk drive, 100 GB, 9.5 mm, 5,400 rpm <ul style="list-style-type: none"> <li>• 2511-CTO, E7x</li> <li>• 2512-CTO, 27x 29x, 2Ax</li> <li>• 2512-JKx</li> <li>• 2513-CTO, 2Ax, 29x, 6Mx, 7Bx</li> <li>• 2513-M5x, MAx</li> <li>• 2514-CTO</li> </ul>		
	HGST	39T2707	*
	Toshiba	39T2635	*

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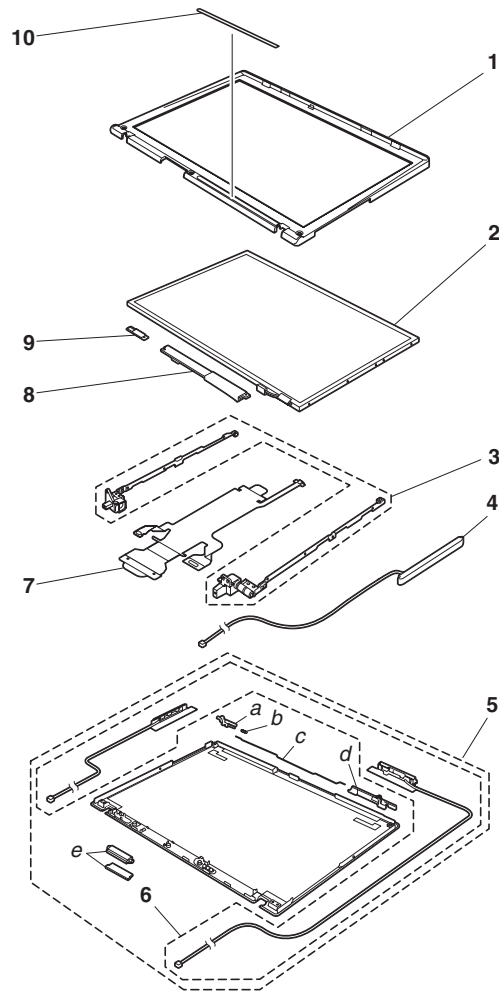
Parts list

No.	FRU	P/N	CRU ID
18	Hard disk drive, 100 GB, 9.5 mm, 7,200 rpm <ul style="list-style-type: none"> <li>• 2511-CTO, H5x, H6x, H7x, H8x</li> <li>• 2513-CTO, MCx, MDx, MGx</li> </ul>		
	HGST	27R2345	*
	Seagate	27R2346	*
19	Hard disk drive rubber rails	41V9756	*
20	CPU assembly, Intel Celeron M processor 360 (1.4 GHz) <ul style="list-style-type: none"> <li>• 2511-CTO, E2x, E3x, E8x, E9x, EAx, FCx</li> <li>• 2512-CTO, 13x, 1Ex, 1Mx, 1Nx, 2Dx, 4Dx, 4Ex, 4Fx, 4Gx, 4Hx, 4Jx, 4Nx, 4Px</li> <li>• 2513-CTO, 1Nx, 6Px, 7Jx</li> </ul>	39T5385	N
	CPU assembly, Intel Celeron M processor 370 (1.5 GHz) <ul style="list-style-type: none"> <li>• 2511-CTO, 52x, E1x, EBx, ECx, EDx</li> <li>• 2512-CTO, 38x, 44x, 52x, E1x</li> <li>• 2512-J6x, J7x, J8x, J9x, JAx, JBx, JDx, JEx, JFx, JGx, JHx, JPx, JQx</li> </ul>	39T0331	N
	CPU assembly, Intel Celeron M processor 380 (1.6 GHz) <ul style="list-style-type: none"> <li>• 2511-CTO, H1x, P1x</li> </ul>	39T5686	N
	CPU assembly, Intel Pentium M processor 740 (1.73 GHz) <ul style="list-style-type: none"> <li>• 2511-CTO, 51x, E4x, E5x, EEx, EFx</li> <li>• 2511-HAx, P2x, P4x</li> <li>• 2512-CTO, 11x, 14x, 15x, 1Cx, 1Px, 1Qx, 1Rx, 1Ux, 1Zx, 22x, 24x, 3Ax, 3Cx, 3Dx, 3Ex, 3Fx, 4Bx, 4Cx, 51x, 64x</li> <li>• 2512-1Rx, J4x, J5x</li> <li>• 2513-CTO, 11x, 14x, 1Cx, 24x, 3Ax, 62x, 63x, 64x, 6Gx, 6Hx, 6Jx, E4x, E5x</li> <li>• 2513-M1x</li> <li>• 2514-CTO, 11x, 3Ax</li> </ul>	39T0046	N
	CPU assembly, Intel Pentium M processor 750 (1.86 GHz) <ul style="list-style-type: none"> <li>• 2511-CTO, E6x, EGx, EJx, F1x</li> <li>• 2511-H9x, P3x, P5x</li> <li>• 2512-CTO, 12x, 16x, 18x, 19x, 1Ax, 1Dx, 1Sx, 25x, 26x, 27x, 2Ex, 2Fx, 3Gx, E6x</li> <li>• 2512-J2x</li> <li>• 2513-CTO, 19x, 1Ax, 2Ex, 2Fx, 37x, 67x, 6Kx, 6Mx, 6Rx, 73x, 74x, 79x, 7Bx, 7Dx, 7Ex</li> <li>• 2513-M4x</li> <li>• 2514-CTO, 1Dx, 79x</li> <li>• 2514-M6x</li> </ul>	39T0047	N

(continued)

No.	FRU	P/N	CRU ID
20	CPU assembly, Intel Pentium M processor 760 (2.0 GHz) <ul style="list-style-type: none"> <li>• 2511-CTO, 3Bx, E7x, EMx, F2x, F4x</li> <li>• 2511-H2x, H3x, H4x</li> <li>• 2512-CTO, 1Bx, 1Fx, 1Gx, 1Jx, 1Tx, 28x, 29x, 2Ax, 31x, 32x, 3Hx, 3Jx, 47x, 48x, 49x, 4Ax, 4Mx, F4x</li> <li>• 2512-J1x, JLx, JMx</li> <li>• 2513-CTO, 1Fx, 28x, 29x, 2Ax, 3Bx, 4Mx, 6Ax, 6Ex, 7Cx, 7Fx, 7Gx</li> <li>• 2513-M2x, M3x, M5x, M9x, MAx, MDx</li> <li>• 2514-CTO, 3Bx, 7Cx</li> <li>• 2514-M9x</li> </ul>	39T0048	N
	CPU assembly, Intel Pentium M processor 770 (2.13 GHz) <ul style="list-style-type: none"> <li>• 2511-CTO, F3x, F5x</li> <li>• 2511-H5x, H6x, H7x, H8x</li> <li>• 2513-M7x, MEx</li> <li>• 2514-MEx</li> </ul>	39T0049	N
	CPU assembly, Intel Pentium M processor 780 (2.26 GHz) <ul style="list-style-type: none"> <li>• 2512-CTO, JJx, JKx</li> <li>• 2513-CTO, MBx, MCx, MGx</li> </ul>	39T0460	N
21	Wireless WAN antenna cable (MAIN and AUX) <ul style="list-style-type: none"> <li>• 2511-CTO, E7x, EGx</li> <li>• 2511-H8x, P4x, P5x</li> <li>• 2513-CTO, 7Bx, 7Dx, 7Ex</li> </ul>	91P6980	N
22	Fan and thermal device	26R9554	N
23	Keyboard (see "Keyboard" on page 128)		
24	Track point stick caps	91P9642	*

## LCD FRUs



No.	FRU	P/N	CRU ID
<i>a-d</i>	See "Miscellaneous parts" on page 131.		
1	LCD front bezel	41V9783	N
2	LCD panel, 14.0-in. WXGA, Samsung	13N7010	N
	LCD panel, 14.0-in. WXGA, LG	13N7012	N
3	Hinge	26R9551	N
4	Wireless WAN antenna cable (MAIN and AUX) <ul style="list-style-type: none"> <li>• 2511-CTO, E7x, EGx</li> <li>• 2513-CTO, 7Bx, 7Dx, 7Ex</li> </ul>	91P6980	N
5	LCD cover kit (black) <ul style="list-style-type: none"> <li>• 2511-CTO, 51x, 52x, E1x, E2x, E3x, E4x, E5x, E6x, E8x, E9x, EAx, EBx, ECx, EDx, EEx, EFx, EGx, EHx, EJx, F1x, F2x, F3x, FCx</li> <li>• 2511-H1x, H2x, H3x, P1x</li> <li>• 2512-CTO, 11x, 12x, 13x, 14x, 15x, 16x, 18x, 19x, 1Ax, 1Bx, 1Cx, 1Dx, 1Ex, 1Mx, 1Nx, 1Px, 1Qx, 1Rx, 1Sx, 1Ux, 1Zx, 22x, 24x, 25x, 26x, 27x, 2Bx, 2Dx, 2Ex, 2Fx, 38x, 3Ax, 3Cx, 3Dx, 3Ex, 3Fx, 3Gx, 3Hx, 3Jx, 44x, 4Bx, 4Cx, 4Dx, 4Ex, 4Fx, 4Gx, 4Hx, 4Jx, 4Nx, 4Px, 51x, 52x, 64x, E1x, E6x</li> <li>• 2512-J1x, J2x, J3x, J4x, J5x, J6x, J7x, J8x, J9x, JAx, JBx, JDx, JEx, JFx, JGx, JHx, JPx, JQx</li> <li>• 2513-CTO, 11x, 14x, 19x, 1Ax, 1Cx, 1Nx, 24x, 2Ex, 2Fx, 37x, 3Ax, 62x, 63x, 64x, 67x, 6Ex, 6Gx, 6Hx, 6Jx, 6Kx, 6Mx, 6Px, 6Rx, 73x, 74x, 79x, 7Bx, 7Cx, 7Dx, 7Ex, 7Jx, E4x, E5x</li> <li>• 2513-M1x, M2x, M3x, M4x, M5x, M6x, M7x, M8x, M9x</li> <li>• 2514-CTO, 11x, 1Dx, 3Ax, 79x, 7Cx</li> <li>• 2514-M6x, M9x</li> </ul>	41V9758	N
	LCD cover kit (silver) <ul style="list-style-type: none"> <li>• 2511-CTO, 3Bx, E7x, EMx, F4x, F5x</li> <li>• 2511-H4x, H5x, H6x, H7x, H8x, H9x, HAx, P2x, P3x, P4x, P5x</li> <li>• 2512-CTO, 1Fx, 1Gx, 1Jx, 1Tx, 28x, 29x, 2Ax, 31x, 32x, 47x, 48x, 49x, 4Ax, 4Mx, F4x</li> <li>• 2512-JJx, JKx, JLx, JMx</li> <li>• 2513-CTO, 1Fx, 28x, 29x, 2Ax, 3Bx, 4Mx, 6Ax, 7Fx, 7Gx</li> <li>• 2513-MAx, MBx, MCx, MDx, MEx, MGx</li> <li>• 2514-CTO, 3Bx</li> <li>• 2514-MEx</li> </ul>	41V9781	N
6	Wireless LAN antenna cable	91P6954	N
7	LCD cable assembly, 14.1-in. WXGA	91P6953	N
8	Inverter card, WXGA (Sumida)	39T5620	N
	Inverter card, WXGA (Foxconn)	39T5635	N
9	Bluetooth daughter card (BDC-2)	39T0497	N
10	Clear plate kit	26R9552	N

## Keyboard

Language	P/N (NMB)	P/N (ALPS)	P/N (Chicony)	CRU ID
Arabic	39T0961	39T7121	39T7181	**
Belgian	39T0962	39T7122	39T7182	
Canadian, multilanguage (445)	39T0959	39T7119	39T7179	
Chinese, Traditional	39T0985	39T7145	39T7205	
Czech	39T0963	39T7123	39T7183	
Danish	39T0964	39T7124	39T7184	
Dutch	39T0972	39T7132	39T7192	
English, U.K.	39T0982	39T7142	39T7202	
English, U.S.	39T0958	39T7118	39T7178	
English, U.S. (International, with a Euro symbol)	39T0983	39T7143	39T7203	
Finnish, Swedish	39T0979	39T7139	39T7199	
French, Canadian (058)	39T0960	39T7120	39T7009	
French, European	39T0966	39T7126	39T7186	
German	39T0967	39T7127	39T7187	
Greek	39T0968	39T7128	39T7188	
Hebrew	39T0970	39T7130	39T7190	
Hungarian	39T0969	39T7003	39T7189	
Italian	39T0971	39T7131	39T7191	
Japanese	39T0984	39T7144	39T7010	
Korean	39T7213	39T7215	39T7011	
Norwegian	39T0973	39T7004	39T7193	
Polish	39T0974	39T7134	39T7194	
Portuguese	39T0975	39T7135	39T7195	
Russian	39T0976	39T7136	39T7196	
Slovak	39T0977	39T7005	39T7197	
Slovenian	39T0978	39T7006	39T7198	
Spanish, European	39T0965	39T7002	39T7185	
Spanish, Latin American	39T0987	39T7147	39T7008	
Swiss	39T0980	39T7007	39T7200	
Thai	39T0986	39T7146	39T7206	
Turkish	39T0981	39T7141	39T7201	

## Recovery CDs

### Windows XP Professional

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

- 2511-CTO, 3Bx, E2x, E3x, E4x, E5x, E6x, E7x, E8x, E9x, ECx, EDx, EFx, EGx, EJx, EMx
- 2511-H2x, H4x, H5x, H6x, H7x, H8x, H9x, HAx
- 2512-CTO, 11x, 12x, 15x, 1Bx, 1Dx, 1Fx, 1Gx, 1Nx, 1Ux, 22x, 24x, 26x, 27x, 28x, 29x, 2Ax, 2Dx, 2Ex, 2Fx, 31x, 32x, 38x, 3Ax, 3Cx, 3Dx, 3Ex, 3Fx, 3Gx, 3Hx, 3Jx, 47x, 48x, 49x, 4Ax, 4Bx, 4Cx, 4Dx, 4Ex, 4Mx, E6x
- 2512-J1x, J4x, J5x, J6x, J7x, J8x, J9x, JHx, JIx, JKx, JLx, JMx, JPx, JQx
- 2513-CTO, 11x, 1Fx, 1Nx, 24x, 28x, 29x, 2Ex, 2Fx, 37x, 3Ax, 3Bx, 63x, 6Ax, 6Ex, 6Gx, 6Hx, 6Jx, 6Kx, 6Mx, 6Px, 6Rx, 73x, 74x, 79x, 7Bx, 7Vx, 7Dx, 7Ex, 7Fx, 7Gx, 7Jx, E4x, E5x
- 2513-Mxx
- 2514-CTO, 11x, 1Dx, 3Ax, 3Bx, 79x, 7Cx
- 2514-Mxx

Language	P/N	CRU ID
Arabic	42J4834	*
Chinese, Simplified	42J4827	
Chinese, Traditional	42J4828	
Chinese, Traditional (Hong Kong S.A.R.)	42J4829	
Czech	42J4833	
Danish	42J4823	
Dutch	42J4826	
English, Russia	42J4816	
English, U.K.	42J4815	
English, U.S.	42J4814	
Finnish	42J4824	
French	42J4817	
German	42J4818	
Greek	42J4838	
Hebrew	42J4831	
Hungarian	42J4837	
Italian	42J4820	
Japanese	42J4830	
Korean	42J4839	
Norwegian	42J4825	
Polish	42J4832	
Portuguese, Brazilian	42J4821	
Russian	42J4835	
Slovak	42J4840	
Spanish	42J4819	
Swedish	42J4822	
Turkish	42J4836	

## Windows XP Home Edition

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

- 2511-CTO, E1x, EAx, EBx, EEx, FCx
- 2511-H1x, H3x
- 2512-CTO, 13x, 14x, 16x, 18x, 19x, 1Ax, 1Cx, 1Ex, 1Jx, 1Mx, 1Px, 1Qx, 1Rx, 1Sx, 1Tx, 1Zx, 25x, 2Bx, 44x, 4Fx, 4Gx, 4Hx, 4Jx, 4Nx, 4Px, 64x, E1x, E6x
- 2512-J2x, J3x, JAx, JBx, JDx, JEx, JFx, JGx
- 2513-CTO, 14x, 19x, 1Ax, 1Cx, 62x, 64x, 67x
- 2514-CTO

Language	P/N	CRU ID
Arabic	42J5050	*
Chinese, Simplified	42J5043	
Chinese, Traditional	42J5044	
Chinese, Traditional (Hong Kong S.A.R.)	42J5045	
Czech	42J5049	
Danish	42J5039	
Dutch	42J5042	
English, Russia	42J5032	
English, U.K.	42J5031	
English, U.S.	42J5030	
Finnish	42J5040	
French	42J5033	
German	42J5034	
Greek	42J5054	
Hebrew	42J5047	
Hungarian	42J5053	
Italian	42J5036	
Japanese	42J5046	
Korean	42J5055	
Norwegian	42J5041	
Polish	42J5048	
Portuguese, Brazilian	42J5037	
Russian	42J5051	
Spanish	42J5035	
Swedish	42J5038	
Turkish	42J5052	



## Miscellaneous parts

FRU	P/N	CRU ID
Screw kit (including nylon-coated screws): <ul style="list-style-type: none"> <li>• M2 × 3 mm (silver), small head (8)</li> <li>• M2 × 3 mm (black), flat head (31)</li> <li>• M2 × 5 mm (black), flat head (28)</li> <li>• M2 × 9 mm (black), flat head (2)</li> <li>• M2 × 14 mm (black), flat head (7)</li> <li>• M3 × 3 mm (PHILLIPS/slotted) (1)</li> <li>• Hex stud (2)</li> <li>• Security screw (1)</li> <li>• Screw caps (oval, not painted)</li> </ul>	26R9547	N
System miscellaneous parts: <ul style="list-style-type: none"> <li>• Cable, RJ11-docking connector on system board</li> <li>• <i>(a)</i> DC in cable</li> </ul> <p><b>Note:</b> Italicized letter in parentheses is reference to the exploded view on page 118.</p>	26R9546	N
Base miscellaneous parts: <ul style="list-style-type: none"> <li>• Rubber foot</li> <li>• Insulation sheet</li> <li>• Gasket</li> </ul>	26R9545	N
System board miscellaneous parts: <ul style="list-style-type: none"> <li>• <i>(d)</i> MDC cable</li> <li>• <i>(c)</i> CPU support plate</li> <li>• Magnetic tape</li> <li>• Gasket</li> </ul> <p><b>Note:</b> Italicized letters in parentheses are references to the exploded view on page 118.</p>	26R9544	N
LCD assembly miscellaneous parts: <ul style="list-style-type: none"> <li>• <i>(a)</i> LCD latch R</li> <li>• <i>(b)</i> Coil spring</li> <li>• <i>(c)</i> Link wire</li> <li>• <i>(d)</i> LCD latch L</li> <li>• <i>(e)</i> Cable bush</li> <li>• Wireless WAN antenna cover</li> </ul> <p><b>Note:</b> Italicized letters in parentheses are references to the exploded view on page 126.</p>	26R9548	N

## AC adapters

FRU	P/N	CRU ID
3-pin (90 W, 20 V) adapter (models CTO, xxA, xxB, xxC, xxG, xxH, xxK, xxM, xxQ, xxV) <b>OP</b>		
ASTEC	92P1104	*
Lite-On	92P1108	*
Sanken	92P1112	*
2-pin (90W, 20 V) slim adapter for non-PFC model (models CTO, xxE, xxF, xxJ, xxL, xxP, xxS, xxU, xxY) <b>OP</b>		
ASTEC	92P1106	*
Lite-On	92P1110	*
Sanken	92P1114	*

## Common parts list

### Tools

Tool	P/N
Screwdriver kit	95F3598
1/4" drive spinner handle	1650840
1/4" Sq. to 1/4" hex torx adapter	93F2838
TR7-TR-10 tamper resistant torx bits	00P6967
Removal tool antenna RF connector	08K7159
USB 2.0 CD-RW/DVD-ROM combo drive II	40Y8687
USB cable	40Y8704
USB floppy diskette drive for maintenance diskette	05K9283
USB floppy diskette drive tool kit	27L3452
Test card for integrated Smart Card	42W7820
ThinkPad Hardware Maintenance Diskette Version 1.73 or later <b>Note:</b> Download the file from the following Web site: <a href="http://www.lenovo.com/spm">http://www.lenovo.com/spm</a>	—

**Power cords (system)**

A ThinkPad power cord for a specific country or region is usually available only in that country or region:

*For 2-pin power cords:*

Region	P/N	CRU ID
Canada, U.S. <b>R</b> • models -CTO, xxF, xxL, xxS, xxU	39M5016	*
Japan <b>R</b> • models -Exx, Jxx	39M5040	
Argentina <b>R</b> • models -CTO, xxY	39M5020	
Brazil <b>R</b> • models -CTO, xxP	39M5056	

*For 3-pin power cords:*

Region	P/N	CRU ID
Australia, New Zealand <b>R</b> • models -CTO, xxG, xxM	39M4960	*
Taiwan, Thailand <b>R</b> • models -CTO, xxV	39M4955	
Italy <b>R</b> • models -CTO, xxG	39M4984	
Denmark <b>R</b> • models -CTO, xxG	39M4968	
U.K., China (Hong Kong S.A.R.) <b>R</b> • models -CTO, xxB, xxG, xxH	39M4976	
European countries <b>R</b> • models -CTO, xxG	39M4964	
India, South Africa <b>R</b> • models -CTO, xxG	39M4972	
Israel <b>R</b> • models -CTO, xxG	39M4988	
Korea <b>R</b> • models -xxK	39M5000	
China (P.R.C.) (other than Hong Kong S.A.R.) <b>R</b> • models -xxC	39M4996	
Switzerland <b>R</b> • models -CTO, xxG	39M4980	

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