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WorkPad z50 Mobile Companion (2608-1Ax)
Hardware Maintenance Manual

March 1999

First Edition (March 1999)

About This Manual

This manual contains service and reference information for the WorkPad z50, Mobile Companion. Use this manual along with the diagnostic software to troubleshoot problems effectively.

This manual is divided into sections as follows:

- The Introduction section provides general information, and safety information required to service 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 WorkPad products.

Before servicing an IBM WorkPad product, be sure to review the safety information under "Safety Notices" on page viii and "Safety Information" on page xii.

Contents

Introduction

Important Service Information

Important

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

Advise customers to contact the PC Company
HelpCenter at 800-722-2227 if they need assistance in
obtaining or installing software fixes.

Customers in Canada should call IBM HelpPC at 800-565-
3344 for assistance or down-load information. The Canadian
BBS phone numbers are:

Montreal	515-938-3022
Toronto	905-316-4255
Vancouver	604-664-6464
Winnipeg	204-934-2735

FRU Replacement Strategy

Before Replacing Parts

Ensure that all software fixes are installed prior to
replacing any FRUs listed in this manual.

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

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

Safety Notices (Multi-lingual Translations)

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

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

Safety Notice 1

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

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

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

Prima di accendere l'elaboratore dopo che è stata effettuata la sostituzione di una FRU, accertarsi che tutte le viti, le molle e tune 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

The battery pack contains small amounts of harmful substances. Do not disassemble 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 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 á l'eau. Ne la mettez pas en court-circuit. Pour la mettre au rebut, conformez-vous a 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 eftet, une batterie inappropriée risque de prendre feu ou d'exploser.

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

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

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

Safety Notice 3

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'aftichage 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 apres le lavage.

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

Nel caso che caso l'LCD si dovesse rompere ed ii 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 4

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

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

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

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

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

Safety Notice 5

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

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

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

Sebbene le batterie di alimentazione siano a basso voltaggio, una batteria in corto circuito o a massa può fornire corrente sufficiente da bruciare materiali combustibili 0 provocare ustioni al 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 6

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

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

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

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

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

Safety Information

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

General Safety

Follow these rules to ensure general safety:

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

    Attention: Metal objects are good electrical conductors.

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

Electrical Safety

Observe the following rules when working on electrical equipment.

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

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

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

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

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

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

Safety Inspection Guide

The intent of this inspection guide is to assist you in identifying potentially unsafe conditions on these products. Each machine, as it was designed and built, had required safety items installed to protect users and service personnel from injury. This guide addresses only those items. However, good judgment should be used to identify potential safety hazards due to attachment of non-IBM features or options not covered by this inspection guide.

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

Consider these conditions and the safety hazards they present:

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

The guide consists of a series of steps presented in a checklist. Begin the checks with the power off, and the power cord disconnected.

Checklist:

1. Check exterior covers for damage (loose, broken, or sharp edges).
2. Power-off the computer. **Disconnect the power cord**.
3. Check the power cord for:

   a. A third-wire ground connector in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and frame ground.

   b. The power cord should be the appropriate type as specified in the parts listings.

   c. Insulation must not be frayed or worn.

4. Remove the cover.
5. Check for any obvious non-IBM alterations. Use good judgment as to the safety of any non-IBM alterations.
6. Check inside the unit for any obvious unsafe conditions, such as metal filings, contamination, water or other liquids, or signs of fire or smoke damage.
7. Check for worn, frayed, or pinched cables.
8. Check that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

Handling Electrostatic Discharge-Sensitive Devices

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

Notes

1. Use product-specific ESD procedures when they exceed the requirements noted here.

2. Make sure that the ESD protective devices you use have been certified (ISO 9000) as fully effective.

When handling ESD-sensitive parts:

- Keep the parts in protective packages until they are inserted into the product.
- Avoid contact with other people.
- Wear a grounded wrist strap against your skin to eliminate static on your body. Approved static straps protect the user from high-operating voltages (110V).
- Prevent the part from touching your clothing. Most clothing is insulative and retains a charge even when you are wearing a wrist strap.
- Use the black side of a grounded work mat to provide a static-free work surface. The mat is especially useful when handling ESD-sensitive devices. Select a grounding system, such as those listed below, to provide protection that meets the specific service requirement.

Note

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

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

Grounding Requirements

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

WorkPad z50 Mobile Companion (2608)
Read This First

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

Important

- **Only certified trained personnel should service the computer.**
- Read FRU service procedures before replacing any FRUs.
- **Replace FRUs only for the correct model.** When you replace the FRU, make sure the model of the machine and FRU part number are correct by referring to the parts list.
- **FRUs should not be replaced because of a single, unreproducible failure.** Single failures can occur from a variety of reasons that have nothing to do with a hardware problem, such as cosmic radiation, electrostatic discharge, or software errors. FRU replacement should be considered only when a recurring problem exists. If this is suspected, clear the log error and run the test again. Do not replace any FRUs if log errors do not appear.
- **Be careful not to replace a nondefective FRU.**

Screw Tightening Information

Loose screws can cause reliability problems. The IBM
WorkPad z50 addresses this problem with nylon coated
screws. Tighten screws as follows:

Plastic to Plastic

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

90 Degrees More
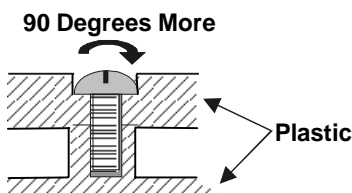
Plastic

Logic card to Plastic

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

180 Degrees More

Logic Card

Plastic
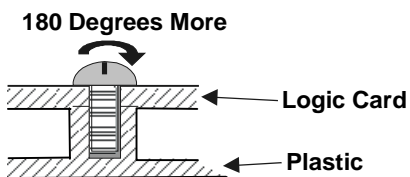
Torque Driver

If you have a torque driver, refer to the "Torque"
instruction with each step.

Cradle Problems: If you suspect a problem with the
cradle, see "Cradle Checkout" on page 15.

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

Attention

Pushing the WorkPad z50's Power button will power on (or resume) the system, or put the system in suspend mode: there is no power-off state.

If the AC Adapter, battery pack, and backup battery are removed, the system is reset and all the stored data is lost. There is no lithium battery to retain memory while these power sources are removed.

What to Do First: The service personnel must fill in the following information in the parts exchange form or parts return form that is attached to the returned FRU:

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

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

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

The following is not covered under warranty:

- LCD panel cracked from the application of excessive force or from being dropped.
- Scratched (cosmetic) parts
- Cracked or broken plastic parts, broken latches, broken pins, or broken connectors caused by excessive force
- Damage caused by liquid spilled into the system
- Damage caused by the improper insertion of a PC Card or the installation of an incompatible card
- Fuses blown by attachment of a nonsupported device

The following symptoms might indicate damage caused by non warranted activities:

Missing parts may be a symptom of unauthorized service or modification.

Attention

When resetting the system, all programs and stored data other than the operating system will be erased.

Any password that is set for testing purposes should be disabled before returning the WorkPad z50 to the customer.

Product Overview

Refer to the following table for an overview of the system features of the WorkPad z50 Mobile Companion:

Feature	Description
Processor	NEC VR4121
Chipset	NEC VRC4171A
Graphic/Video Controller	ITE IT8181
OS/APP ROM	20MB (32MB Japan)
Memory	16MB Upgradable to 48MB
Storage Memory	CompactFlash Type II socket
PC Card	One type III slot
I/O Ports	RJ-11 Modem port (US/Canada/Japan models only) Infrared Serial port External display port Cradle connector
Audio	External earphone jack External microphone jack Internal speaker Built-in microphone
Pointing Device	TrackPoint III
AC Adapter	45watt type
Internal Modem	Only available for US/Canada/Japan models
Battery Pack	16. 65watt
Backup Battery	Size AAA x 2
LCD Display	8.2" (inch) DSTN

Checkout Guide

Use the following procedure as a guide for computer problems.

1. Obtain the failing symptoms in as much detail as possible.
2. Verify the symptoms by attempting to re-create the failure by running the diagnostic test (refer to "Running the Diagnostics Test" on page 27) or by repeating the same operation.

Note

To run the diagnostics test, refer to "Running the Diagnostics" on page 27.

If the symptoms are intermittent and cannot be re-created (and therefore not verified), go to "Symptom-to-FRU Index" on page 21 and then go to "Intermittent Problems" on page 26.

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3. Use the following table with the verified symptom to determine which page to go to. Search the symptoms column, and find the description that best matches your symptom; then go to the page shown in the "Refer To" column.

Symptoms (Verified)	Refer To
Power failure: The power indicators (AC Adapter LED or Power on/Battery status LED) are not lit.	"Power Systems Checkout" on page 9.
Audio is not properly functioning.	"Audio Checkout" on page 7.
Keyboard does not work properly.	"Keyboard Checkout" on page 8.
Internal fax/modem does not work.	"Modem Checkout" on page 9.
Suspect mainboard or ROM card problems.	"ROM Card Checkout" on page 14.
TrackPoint problems.	"TrackPoint Checkout" on page 15.
Cradle does not communicate properly.	"Cradle Checkout" on page 15.
External monitor does not display.	"External Monitor Self-Test" on page 15.
The diagnostic test detected an error and displayed an error code.	"Running the Diagnostics Test" on page 27.

Symptoms (Verified)	Refer To
Other symptoms (such as LCD display problems).	"Symptom-to-FRU Index" on page 21.
PC cards do not work.	"PC Card Slots Test" on page 27.
Brightness/contrast buttons do not work.	"Brightness/Contrast Buttons Checkout" on page 19.

Audio Checkout

Speaker Checkout: If you suspect a problem with the speaker do the following:

1. Play an audio file. If no sound is heard, go to the diagnostic menu (see "Running the Diagnostics Test" on page 27).
2. Select **Audio** and run the diagnostic test.
3. If the test detects an audio problem, do the following: Click **Start**, **Programs**, **WorkPad,** and then **Rapid Access.** Check that "Mute" is not enabled in the Rapid Access utility. Click the "Volume & Sounds" icon in the Control Panel, adjust the volume to mid position and click any sound: if no sound is heard, do the following one at a time:
   • Reseat the connector
   • Replace the speaker
   • Replace the mainboard

Go to "Microphone Checkout" if the speaker is working properly.

Microphone Checkout: If you suspect a problem with the microphone, first check if the speaker is working (see above), then do the following:

1. Press the microphone button and record and playback any sound.
2. If no sound is heard, do the following one at a time:
   • Reseat the microphone cable
   • Replace the microphone cable
   • Replace the mainboard

Keyboard Checkout

If the keyboard does not work or an unexpected character appears, make sure that the flexible cable extending from the keyboard is correctly seated in the connector on the mainboard. If the keyboard cable connection is correct, run the **Keyboard Test** by doing the following:

1. Go to the diagnostic menu (see "Running the Diagnostics Test" on page 27).
2. Select **Keyboard** and run the diagnostic test. A layout of the keyboard appears on the screen.
3. Check that when each key is pressed, the key's position on the keyboard layout on the screen changes to a blue square.
4. Press **OK** to end the test.

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

*   Reseat the keyboard cable.
*   Replace the keyboard.
*   Replace the mainboard.

Memory Checkout

The WorkPad z50 Mobile Companion is shipped with 16MB on-board memory. Memory can be upgraded to 48MB by adding a single 32MB DRAM card.

Defective memory cards may show an error message during the POST or cause the system to hang or stop system operations.

Refer to the following to isolate memory problems:

1. Remove all power sources (AC power, battery pack, and backup battery). Remove any installed DRAM card from its slot (see page 18).
2. Connect to a power source and turn on the WorkPad z50.
3. If an error appears during POST, replace the mainboard.
4. Remove all power sources (AC power, battery pack, and backup battery) and reinstall the DRAM card.
5. Connect to a power source, then turn on the WorkPad z50.
6. If an error appears during POST, replace the DRAM card.

Modem Checkout

If a modem problem occurs, do the following:

1. Open the **Terminal** program. Double click the "Make a New Session" icon to open the **Session Properties** window.
2. Click "Configure…". In the **Device Properties** window check the "Manual Dial" box.
3. Issue the ATA command.
4. If there is no sound, replace the mainboard.

Note: The US, Canada, and Japan models have an internal fax/modem; the European models do not.

Power Systems Checkout

To determine whether a power systems problem is due to the AC Adapter or the battery pack, do the following:

1. Remove the battery pack.
2. Connect the AC Adapter and lock the battery release lock. Check that power is supplied.
3. Disconnect the AC Adapter and install the charged battery pack; then check that power is supplied by the battery pack.

If you suspect the problem is due to the AC Adapter, go to "AC Adapter Checkout".

If you suspect the problem is due to the battery pack, go to "Battery Pack Checkout".

External Power/Charge Status LED indicates the following status:

LED	AC Adapter	Battery Pack	Charge Status
Amber	Connected	Li-ion (standard or high-capacity battery)	Not full
Green	Connected	Li-ion (standard or high-capacity battery)	Full
Green	Connected	Dry cell battery is connected or no battery is connected	—
Not lit	Not connected	—	—

AC Adapter Checkout: You are here because the
WorkPad z50 fails only when the AC Adapter is used.

- If the power problem occurs only when the cradle is used, replace the cradle.
- If the power-on indicator for the AC Adapter does not turn on, check the power cord of the AC Adapter for correct continuity and installation.

1. Unplug the AC Adapter cable from the WorkPad z50 and measure the output voltage at the plug of the AC Adapter cable. See the following figure:
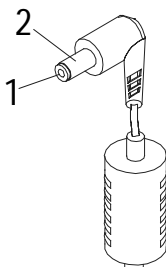
Pin	Voltage (V dc)
1	19 V (+ 1.5 V, - 0 V)
2	Ground

   a. If the voltage is correct, replace the mainboard.
   b. If the voltage is still incorrect, go to the next step.

2. Unplug the AC Adapter cable from the ac power outlet and wait 5 minutes or longer to allow the overvoltage protection circuit or other protection circuits to be fully discharged and initialized.
3. Plug the AC Adapter cable into the ac power outlet.
4. Measure the output voltage of the AC Adapter.
5. If the voltage is still not correct, replace the AC Adapter.

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

Battery Pack Checkout: If the battery pack or the optional high-capacity battery have a problem, refer to the following:

1. Enter suspend mode by pressing the Power button.
2. Remove the battery pack and check for any mechanical damage. Replace the battery pack if it is damaged.

   Note: Damage to the battery pack caused by the customer is not covered by the warranty.

3. Remove the battery pack and measure the voltage between the battery terminals. See the following figure:
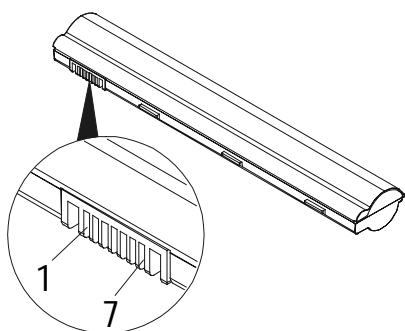
Terminal	Voltage (V dc)
1	11.1 V
7	Ground (-)

4. If the voltage is less than 11.1 V dc, the battery pack has been discharged. Recharge the battery pack.

   If the voltage is still less than 11.1 V dc after recharging, replace the battery pack.

   If the battery pack is extremely hot (over 50°C), replace the battery pack and the mainboard.

   If the voltage is correct, but you still suspect a problem with the battery pack, go to "Running the Diagnostics Test" on page 27.

Checking Operational Charging: There is no difference in battery charging time whether the system is fully operational or not. To check the battery charging, use a discharged battery pack or a battery pack that has less than 50% of total power remaining.

Turn on the WorkPad z50 while the AC Adapter is connected to the system. The External Power/Charge Status LED will change to amber while the battery is charging. When the battery is fully charged (after about 1 – 2.5 hrs., depending on the battery's initial charge) the battery terminal voltage should be around 12.6V dc. If the voltage is far less, or has not increased from the initial voltage, then repeat the procedure with another discharged battery pack. If this brings the same result, then suspect a mainboard failure.

Optional Dry Cell Battery Checkout: If the optional Dry Cell Kit (dry cell battery pack) has a problem, refer to the following:

1. Enter suspend mode by pressing the Power button.
2. Remove the dry cell battery pack and measure the voltage between the battery terminals. See the following figure:
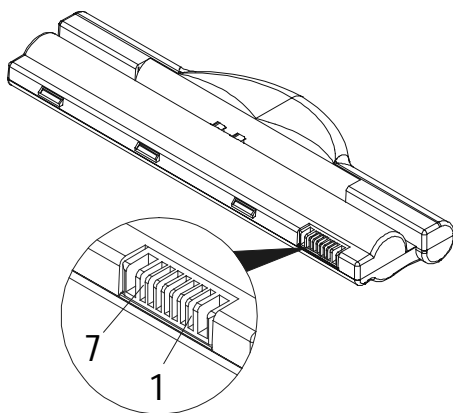
Terminal	Voltage (V dc)
1	8.8 – 12.8 V
7	Ground (-)

3. If the voltage is less than 8.8 V dc, the dry cell battery pack has been discharged. Replace the dry cells.

   If the dry cell battery pack is extremely hot, it must be replaced.

Backup Battery Checkout
(Nonrechargeable)

If removing all power sources except for the backup battery results in the system being reset, suspect a problem with the backup batteries. Refer to the following:

1. Enter suspend mode by pressing the Power button.
2. Remove the AAA batteries and measure the voltage between the battery terminals. The voltage should be 1.1–1.6 V dc per battery.

- If the voltage is correct, replace the mainboard.
- If the voltage is less than 1.1 V dc per battery, then the batteries have been discharged. Replace the batteries.
- If the backup battery discharges quickly after replacement, replace the mainboard.

Note: Make sure either the battery pack is installed or the AC Adapter is connected. If the backup batteries are removed and no other power source is available (AC Adapter or battery pack), the system is reset, and all the stored data is lost.

The Battery Calibration Application

The *Battery Calibration* application tests the battery to ensure that it charges to its full capacity. You must first connect the AC Adapter before you use the Battery Calibration application. Click **Start, Programs, WorkPad.** Click the **Battery Calibration** icon to open the "Battery Calibration" window:
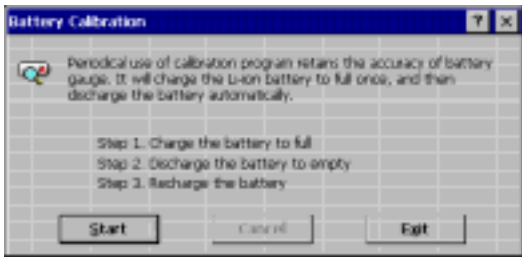
Press the **Start** button to begin the program. You will see the following dialog window:
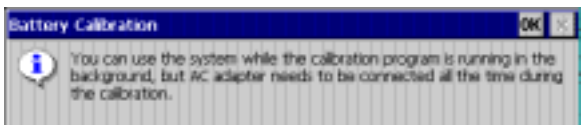
Note: If the AC Adapter is not connected when you start the Battery Calibration application, you will see a dialog window prompting you to connect it before you continue.

Press **OK** to close the message window, then click **Start** to begin the calibration. You will see the following dialog window:
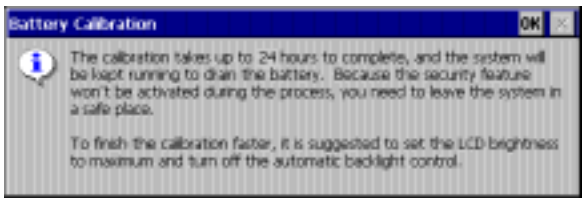
Press **OK** to close this dialog window.

The Battery Calibration application will charge the Li-ion battery to its full capacity. When the battery reaches full capacity, the Battery Calibration application will allow the battery to fully discharge. When the battery is fully discharged, the application will charge the battery again. When the battery has been charged to 2% of its capacity, the Battery Calibration application will stop.

> **Note:** During the battery calibration process, the AC Adapter must be connected at all times.
> To reduce the time it takes to discharge the battery, increase the LCD panel brightness to the maximum level and turn off the automatic backlight control in the Control Panel.
> It takes up to 12 hours to calibrate the standard battery pack. The high-capacity battery pack needs to go through the calibration procedure *twice.*

ROM Card Checkout

If you suspect the ROM card has a problem, refer to the following:

1. Remove all power sources (AC power, battery pack, and backup battery).
2. Reinstall the ROM card.
3. Connect to a power source. If the problem persists, replace the ROM card.

TrackPoint Checkout

The TrackPoint adjusts the pointer sensor automatically.
During this process, the pointer moves on the screen
automatically for a short time. This self-acting pointer
movement can occur when a slight, steady pressure is
applied to the TrackPoint pointer. You must readjust it if the
temperature has exceeded its normal temperature range.
This symptom does not indicate a hardware problem. No
service actions are necessary if the pointer movement stops
in a short period of time.

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

1. Go to the diagnostic menu (see "Running the
   Diagnostics Test" on page 27).
2. Select **TrackPoint** and run the diagnostics tests.
3. Verify that the item is selected.
4. Move to another item with the pointing stick.
5. Press the pointing stick (press-to-select) and verify
   that the item is selected.
6. Verify that both buttons work correctly.

If the click buttons do not work, replace the mainboard. If
the pointing stick does not work, do the following actions one
at a time to correct the problem. Do not replace a
nondefective FRU.

- Reseat the TrackPoint cable.
- Replace the keyboard.
- Replace the mainboard.

Cradle Checkout

Use the following procedure to isolate a problem with the
cradle. The cradle attaches to the system expansion
connector at the bottom of the WorkPad z50.

1. Enter suspend mode.
2. Remove the failing device from the cradle.
3. Unplug the AC Adapter from the cradle, if attached.
4. Remove the cradle from the WorkPad z50.
5. Reconnect the failing device directly to the WorkPad
   z50. (If another device is already connected to the
   WorkPad z50, remove it first.)
6. If the failing device works properly, replace the cradle.

External Monitor Self-Test

If a monitor problem occurs, use the following instructions to
correct the problem:

1. Test the external monitor and cable on another
   system to make sure they are working correctly.
2. Connect the monitor to the WorkPad z50.
3. Go to the diagnostic menu (see "Running the
   Diagnostics Test" on page 27) and select **Display**.
4. If the external monitor does not display correctly,
   change the mainboard.

Installing the ROM/DRAM Card

This section describes how to install the ROM card or the optional DRAM card to the WorkPad z50.

Note: When you remove the ROM/DRAM card, you will lose all stored data. Before you remove the ROM/DRAM card, be sure to back up all data and applications in the base memory.

Caution: Before removing or inserting the ROM/DRAM card, all power sources (AC power, the main battery pack, and the backup batteries) must be removed.

Follow these instructions when inserting the ROM/DRAM card:

1.   Place the WorkPad z50 into suspend mode and disconnect AC power.

2.   Turn the WorkPad z50 upside down.

3.   Remove the main battery and remove the backup batteries.

4.   Unscrew the single (captive) screw that secures the ROM/DRAM card compartment cover to the chassis. Remove the cover.

ROM card   *DRAM card*

Unscrew the screw that secures the ROM/DRAM card cover to the chassis and remove the ROM/DRAM card cover.
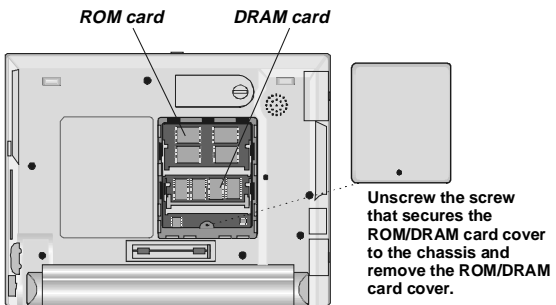
5.   Locate the ROM/DRAM card Slot.

6.   Find the notch on the side of the card.
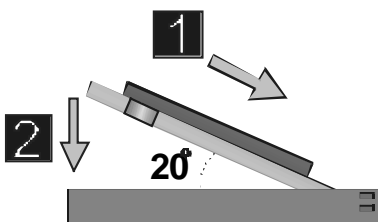
7. With the notched end of the card toward the right side of the socket, insert the card at an angle of approximately 20 degrees into the socket; press it in firmly as shown (1). Gently pivot the card until it snaps into place (2).

Attention

To avoid damaging the ROM/DRAM card, do not touch its contact edge.

---

8. Ensure that the ROM/DRAM card is securely inserted in the slot.

9. Replace the ROM/DRAM card cover over the memory slot, aligning the back side of the cover first; then tighten the screw.

10. Attach the main battery and insert the backup batteries.

11. Turn the WorkPad z50 top side up. Connect the AC Adapter and cables; then turn on the WorkPad z50.

Attention

Handling a Screwdriver

- Use a screwdriver that fits the screw.

- Use the screwdriver perpendicular to the head of the screw.

Handle the screwdriver properly; otherwise, you might damage the screw.

Removing the ROM/DRAM Card

Note: Before removing the ROM/DRAM card, back up all data and applications in the base memory. All data and installed applications will be lost by removing the ROM/DRAM card. The ROM needs to be reinstalled before starting the POST or running Windows CE.

**Caution:** Before removing the ROM/DRAM card, all power sources (AC power, the main battery pack, and the backup batteries) must be removed.

Follow these instructions when removing the ROM/DRAM card:

1. Turn off the WorkPad z50.

2. Disconnect AC power.

3. Turn the WorkPad z50 upside down.

4. Remove the main battery and remove the backup batteries.

5. Unscrew the single (captive) screw that secures the ROM/DRAM card compartment cover to the chassis. Remove the cover.

6. Using your fingers or a small screwdriver, press out the two latches on the sides of the card away from the slots. The ROM/DRAM card should pop out slightly.

Removing the DRAM and ROM Cards

DRAM Card

ROM Card

Pull the tabs in the direction of the arrows to release the cards.
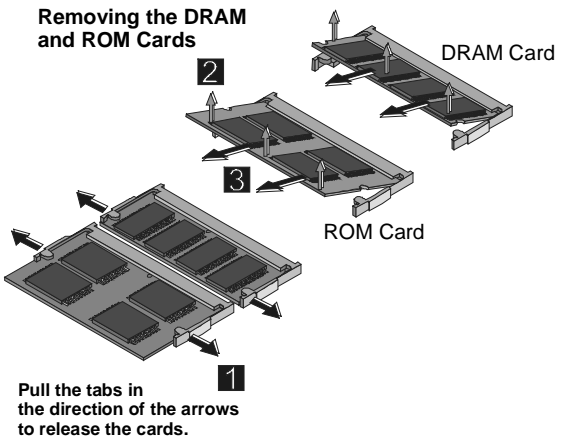
7. Gently pull out the card.

8. Replace the ROM/DRAM card cover over the memory slot, aligning the back side of the cover first; then tighten the screw.

9. Attach the main battery and insert the backup batteries.

10. Turn the WorkPad z50 top side up. Connect the AC Adapter and cables; then turn on the WorkPad z50.

Brightness/Contrast Buttons Checkout

If you suspect a problem with the brightness/contrast buttons do the following actions one at a time to correct the problem. Do not replace a nondefective FRU:

- Reseat the inverter cables and connectors to the mainboard and the LCD panel.
- Replace the inverter card
- Replace the mainboard

Power Management Features

The power management features are designed to save as much electricity as possible by putting components into a low-power consumption mode as often as possible. This low-power mode is referred to as "suspend" mode.

Full Power Mode

The WorkPad z50 operates in Full power mode when power management is disabled and the AC Adapter is connected.

Suspend Mode

In suspend mode, the system is powered off except for the system DRAM. The WorkPad z50 enters suspend mode when the system remains idle for a specified amount of time or under one of the following conditions:

- The Power button is pressed.
- The LCD panel is closed.
- A Windows CE power management time-out occurs.
- The Windows CE Suspend icon is clicked.
- The battery release lock is released.
- The remaining battery capacity of the battery pack is very low.
- A notification event set in the "Alarms" window of the **World Clock** application in the Control Panel occurs.

Attention

The system will not enter suspend mode after an idle time-out under the following conditions:
The serial port is connected to another system running Windows CE services.
The WorkPad z50 is connected to a network through the PCMCIA LAN card.

The system will resume to full power mode under one of the following conditions:

- The Power button is pressed while in suspend mode.
- An application launching key is pressed.
- The LCD panel is opened.
- An internal fax/modem ring-in occurs.
- The Microphone button is pushed.
- The Notification button is pushed when the notification LED blinks.
- A built-in data/fax modem ring occurs.
- The serial port is connected to another system for transmitting and receiving data.

Symptom-to-FRU Index

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

Note: Perform the FRU replacement or actions in the sequence shown in the "FRU/Action" columns. If a FRU replacement did not solve the problem, put the original part back in the WorkPad z50. Do not replace a nondefective FRU.

This index can also help you determine the next possible FRUs to be replaced when servicing the WorkPad z50.

Numeric error codes show the errors detected in system operation. In the following error codes, **X** can be any number. If no codes are available, use narrative symptoms. If the symptom is not listed, go to "Undetermined Problems" on page 26.

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

Numeric Error Codes

Symptom / Error	FRU / Action in Sequence
1XX 　101 IR error	
101 IR error	**Mainboard**
2XX 　201 checksum error 　202 DRAM test error (on board) 　203 DRAM test error (DRAM module) 　204 VRAM test error	
201 ROM checksum error	**1. Reinstall ROM card** 2. ROM card 3. Mainboard
202 DRAM test error (on board DRAM)	**Mainboard**
203 DRAM test error (DRAM module)	**1. Reinstall DRAM module** 2. DRAM module 3. Mainboard
204 VRAM test error	**Mainboard**
3XX 　301 Keyboard error	
301 Keyboard error	**1. Reinstall keyboard** 2. Keyboard 3. Mainboard
4XX	

401 LED board error	

Symptom / Error	FRU / Action in Sequence
401 LED board error	**1. LED board**
	2. Mainboard
5XX 501 Battery error	
501 Battery error	**1. Battery**
	2. Mainboard

6XX
  601 Audio playback error
  602 Audio recording error	

601 Audio playback error	**1. Speaker**
	2. Mainboard
602 Audio recording error	**1. Microphone**
	2. Mainboard
7XX 701 Display error	
701 Display error	**1. LCD panel**
	2. Mainboard
8XX 801 Serial port test error	
801 Serial port error	**1. Serial cable**
	2. Mainboard
9XX 901 PC card/CF test error	
901 PC card/CF test error	**Mainboard**
86XX 8601 Mouse test error	
8601 Mouse test error	**Mainboard**

Function-Related Symptoms

Symptom / Error	FRU / ACTION IN SEQUENCE
The system does not suspend or resume when the LCD is closed or opened.	1. **Go to "Suspend Mode" on page 20, and check that the WorkPad z50 can enter suspend mode.** 2. LCD panel 3. Mainboard
The memory count (size) appears different from actual size.	**Go to "Memory Checkout" on page 8.**
The system hangs intermittently.	**Go to "Intermittent Problems" on page 26.**

Indicator-Related Symptoms

Symptom / Error	FRU / Action in Sequence
The indicator incorrectly remains off or on, but system runs correctly.	**Mainboard**
The external/power status LED indicator blinks from green to amber.	1. **Check that a correct battery is installed.** 2. Battery pack 3. Mainboard
The battery indicator does not turn on when the battery is installed.	1. **Battery pack** 2. Mainboard

Infrared-Related Symptoms

Symptom / Error	FRU / Action in Sequence
Unable to communicate using the Infrared (IR) Port.	1. **Make sure the setup for the IR is correct. Use the WorkPad z50 Configuration utility.** 2. Make sure there are no fluorescent lights near the WorkPad z50. The WorkPad z50 may receive optical noise from the fluorescent light. 3. Run the advanced diagnostic test. If an error occurs, replace the parts shown by the FRU code.

Keyboard- or TrackPoint-Related Symptoms

Symptom / Error	FRU / Action in Sequence
The keyboard (one or more keys) does not work.	1. **On the Windows Taskbar, check that Caps Lock or Num Lock are not enabled.**
	2. Reseat the keyboard cable on the mainboard.
	3. Keyboard
	4. Mainboard
The TrackPoint does not work.	1. **Check the "TrackPoint" settings in the Control Panel.**
	2. Reseat the keyboard cable on the mainboard.
	3. Go to "TrackPoint Checkout" on page15.
	4. Keyboard
	5. Mainboard
The pointer moves automatically or does not work correctly.	**See "TrackPoint Checkout" on page 15.**

LCD-Related Symptoms

Symptom / Error	FRU / Action in Sequence
LCD backlight not working. LCD too dark. LCD brightness cannot be adjusted. LCD contrast cannot be adjusted.	1. **Open the "Display Properties" window in the Control Panel. Check that the auto dim setting is not enabled under the "Backlight" tab.**
	2. Reseat the LCD cable and connectors.
	3. LCD assembly
	4. Inverter assembly
	5. Mainboard
LCD screen unreadable. Non-readable characters. Screen abnormal. Wrong color displayed.	1. **Reseat the LCD cable and connectors.**
	2. LCD assembly
	3. Inverter assembly
	4. Mainboard
LCD has extra horizontal or vertical lines displayed.	**LCD assembly**
LCD lid is loose.	1. **Hinge screws**
	2. Hinge group

Peripheral Device Related Symptoms

Symptom / Error	FRU / Action in Sequence
The external monitor does not work correctly.	**1. Check that the external monitor is enabled in the Rapid Access utility.**
	2. Check that the external monitor can display at 640x480 and 800x600, @ 75Hz refresh rate.
	3. Connect the external monitor to another PC. If the monitor works fine, replace the mainboard. If not, replace the external monitor.
Serial port device problems.	**1. Run serial port wrap test.**
	2. Device
	3. Mainboard
	4. Device cable
	Note: The serial port and the infrared port can not be used at the same time.

Power-Related Symptoms

Symptom / Error	FRU / Action in Sequence
System enters suspend during operation.	**1. Go to "Power Systems Checkout" on page 9.**
	2. Battery pack
	3. Mainboard
	4. Check the power outlet

Other Symptoms

Symptom / Error	FRU / Action in Sequence
Errors occur only when the cradle is used.	**See "Cradle Checkout" on page 15.**
PC Card slot pin is damaged.	**PC Card slots assembly**.

Note: If you cannot find a symptom or an error in this list and the problem remains, see "Undetermined Problems".

Intermittent Problems

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

When analyzing the intermittent problem, do the following:

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

Undetermined Problems

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

Verify that all attached devices are supported by the WorkPad z50.

Verify that the power supply being used at the time of the failure is operating correctly. (See "Power Systems Checkout" on page 9.)

1. Enter suspend mode.
2. Visually check them for damage. If any problems are found, replace the FRU.
3. Remove or disconnect all of the following devices:
   a. Non-IBM devices
   b. Devices attached to the cradle
   c. External devices
   d. Battery pack
   e. DRAM
   f. PC Cards
   g. Compact Flash Cards
4. Turn on the WorkPad z50.
5. Determine if the problem has changed.
6. If the problem does not reoccur, 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. Mainboard
   b. LCD assembly

Running the Diagnostics

The following table lists the special tools used in the diagnostics:

Tool Name	FRU P/N
Serial wrap connector	05K2846
PCMCIA wrap card	35G4703
CompactFlash wrap converter	05K2845

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

1. Click **Start,** then **Run**. In the "Run" dialog window **Open** box, type "\Windows\ibmdiag.exe". Click **OK**. The basic diagnostic menu appears.

2. Start the **Advanced Diagnostic test** by pressing **Ctrl+A** on the basic diagnostic menu. The **Serial** and **PC Card** devices will appear on the diagnostic menu.
3. Click on a device to run the test. The test progress window appears. A confirmation message box will appear after exiting each test: click **Yes** if the test ends without any errors.

PC Card Slot Test

Insert the PCMCIA wrap card into the PC card slot for the PCMCIA test: insert the CompactFlash wrap converter into the CompactFlash slot for the CompactFlash slot test. Refer to the previous section, "Running the Diagnostics" to run the tests.

UUID

A UUID (universal unique ID) is uniquely assigned to each system board for system management purposes. The UUID is stored on the EEPROM on the board.

Related Service Procedures

This section provides information about the following:

- "Status Indicators and Control Buttons"
- "Application Launching Key Assignments" on page 29

Status Indicators and Control Buttons

The system status indicators show the current WorkPad z50 status in different colors (green and amber). The control buttons—1.*Notification*, 3.*Microphone*, and 5.*Power*—are shown in the illustration below.
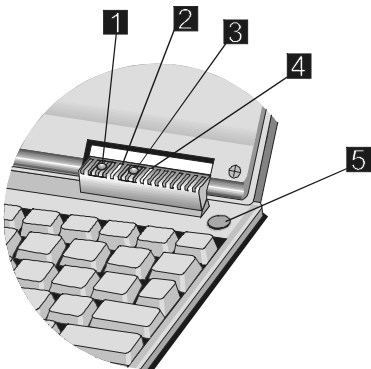
Indicator	Color	Meaning
1. Notification	Amber	The system is receiving a transfer call. Push the Notification button to stop the transfer.
5. External Power/Charge Status (this LED is on whenever the AC Adapter is connected)	Green	The battery is fully charged or the rechargeable battery pack is absent (see "Power Systems Checkout" on page 9).
	Amber	Battery charging (see "Power Systems Checkout" on page 9)

To record a message, push the Microphone button; the Voice Recorder window will appear. Click the Record button to start recording; click the Stop button to stop recording. There is no record LED.

Application Launching Key Assignments

The applications keys are programmed to launch preset software applications. The following table shows the application keys and their corresponding functions:

Key	Description
A1	Launch or switch to the Windows CE Inbox
A2	Launch Windows Explorer or switch to next Explorer Window
A3	Launch or switch to Calendar
A4	Launch or switch to Contacts
A5	Launch or switch to Tasks
A6	Launch Pocket Word or switch to next Pocket Word window
A7	Launch Pocket Excel or switch to next Pocket Excel window
A8	Launch Pocket PowerPoint or switch to next Pocket PowerPoint window
A9	Launch Pocket Access or switch to next Pocket Access window
A10	Launch or switch to Calculator
A11	Launch or switch to Voice Recorder
A12	Launch or switch to Rapid Access

To view the application keys and their corresponding functions, click on the **Launching Keys** icon in the Control Panel to bring up the "Launching Keys Properties" window.

Removing and Replacing Defective FRUs

This section provides information on removing and replacing FRUs.

- Do not damage any part. Only certified and trained personnel should service the WorkPad z50 Mobile Companion.
- The arrows in the "Removals and Replacements" section show the direction of movement to remove a FRU, or to turn a screw to release the FRU. The arrows are marked in numeric order, in square callouts, to show the correct sequence of removal.
- When other FRUs must be removed before the failing FRU is removed, they are listed at the top of the page.
- To replace a FRU, reverse the removal procedure and follow any notes that pertain to replacement.
- When replacing a FRU, use the correct screw size as shown in the procedures.

Safety Notice 1: Translation on page viii

Before the WorkPad z50 is powered-on after FRU replacement, make sure all screws, springs, or other small parts are in place and are not left loose inside the WorkPad z50. Verify this by shaking the WorkPad z50 and listening for rattling sounds. Metallic parts or metal flakes can cause electrical shorts.

Safety Notice 2: Translation on page ix

The battery pack contains small amounts of harmful substances. Do not disassemble it, throw it into fire or water, or short-circuit it. Dispose of the battery pack or backup battery 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.

Safety Notice 6: Translation on page xi

Before removing any FRU, place the WorkPad z50 into suspend mode, unplug all power cords from electrical outlets, then disconnect any interconnecting cables and remove the battery pack and backup batteries.

CAUTION:
If all power sources are removed from the WorkPad z50, all data and applications will be lost. If the problem is considered a software problem stored on DRAM memory, approach the problem from that standpoint before removing all power sources.

Attention: The mainboard is sensitive to, and can be damaged by, electrostatic discharge.

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

Important Notice

The WorkPad z50 Mobile Companion uses special nylon-coated screws with the following characteristics:

- They maintain tight connections.
- They do not easily come loose, even with shock or vibration.

But:

- They need additional force to tighten.
- They should be used only once.

Do the following when you service this machine:

- Keep the screw kit (P/N 05K5941) in your tool bag.
- Always use new screws.
- Use a torque screwdriver.

Screw Information: The following types of screws are used in this machine. Use the correct screw in the **Screw Kit** (P/N 05K5941) when replacing any FRUs.

Screw No.	Screw	Type of Head	Color	Length (mm)
3		Flat M2.5	Black	4.0/6.0
5		Flat	Silver	5.0
6		Pan M2.0	Silver	4.0/6.0
7		Flat M2.5	Black	8.0

Unplugging and Plugging Flexible Cables:

Two types of cable and connectors are used in the WorkPad z50. Some connectors have a clasp, which must be unlocked before removing the cable. Unlock the connector by pulling up the clasp with your fingernail or a small flat-tipped screwdriver. Then pull out the cable from the connector. Refer to the following illustrations:
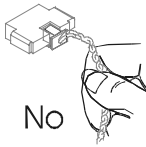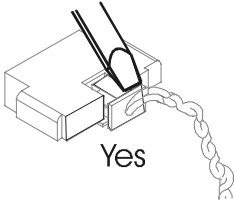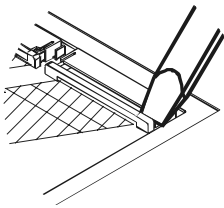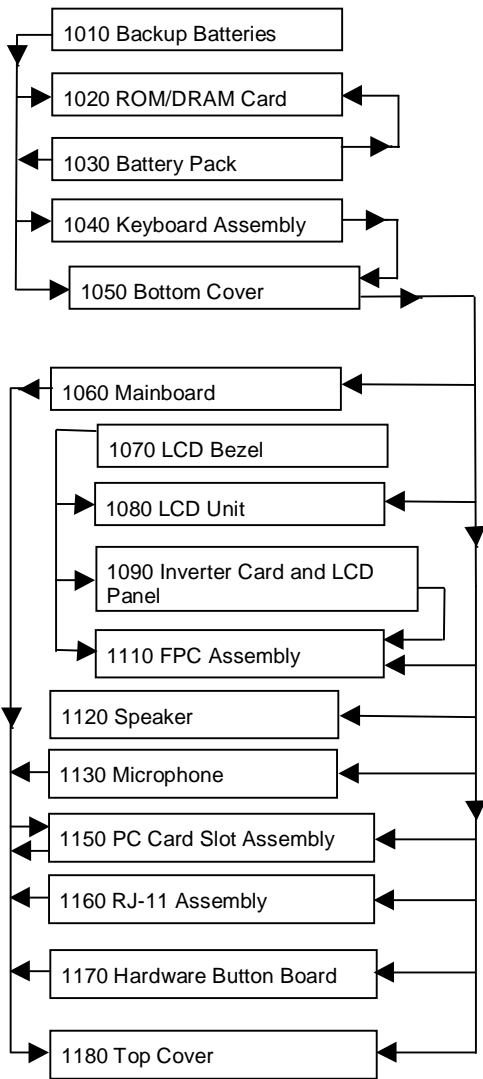
Removal reference

The chart below shows the order for removing FRUs. When a FRU has been removed, follow the arrows to the FRU (or FRUs) that can be removed next.

```
┌─────────────────────────────┐
│ 1010 Backup Batteries       │
└─────────────────────────────┘

┌─────────────────────────────┐
│ 1020 ROM/DRAM Card          │
└─────────────────────────────┘

┌─────────────────────────────┐
│ 1030 Battery Pack           │
└─────────────────────────────┘

┌─────────────────────────────┐
│ 1040 Keyboard Assembly      │
└─────────────────────────────┘

┌─────────────────────────────┐
│ 1050 Bottom Cover           │
└─────────────────────────────┘

┌─────────────────────────────┐
│ 1060 Mainboard              │
└─────────────────────────────┘

┌─────────────────────────────┐
│ 1070 LCD Bezel              │
└─────────────────────────────┘

┌─────────────────────────────┐
│ 1080 LCD Unit               │
└─────────────────────────────┘

┌─────────────────────────────┐
│ 1090 Inverter Card and LCD  │
│ Panel                       │
└─────────────────────────────┘

┌─────────────────────────────┐
│ 1110 FPC Assembly           │
└─────────────────────────────┘

┌─────────────────────────────┐
│ 1120 Speaker                │
└─────────────────────────────┘

┌─────────────────────────────┐
│ 1130 Microphone             │
└─────────────────────────────┘

┌─────────────────────────────┐
│ 1150 PC Card Slot Assembly  │
└─────────────────────────────┘

┌─────────────────────────────┐
│ 1160 RJ-11 Assembly         │
└─────────────────────────────┘

┌─────────────────────────────┐
│ 1170 Hardware Button Board  │
└─────────────────────────────┘

┌─────────────────────────────┐
│ 1180 Top Cover              │
└─────────────────────────────┘
```

1010 Backup Batteries

1.Turn the WorkPad z50 upside down.
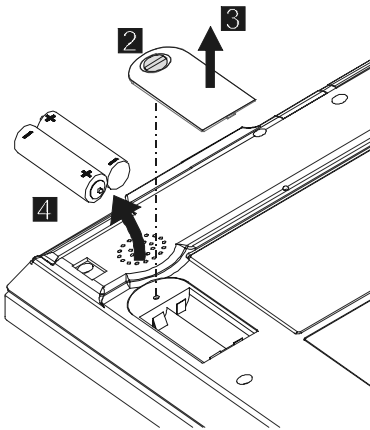
Step	Size (Quantity)	Color	Torque	Length
2	**Coin screw M2.5 (1)**	**Black**	**3 kgcm**	**4.0 mm**
Note: You can loosen the captive screw in step 2, but cannot remove it from the backup battery cover.				

1020 ROM/DRAM Card

- Backup Batteries **(1010)**
- Battery Pack **(1030)**

Attention

Remove all power sources from the WorkPad z50 before replacing the ROM/DRAM card.
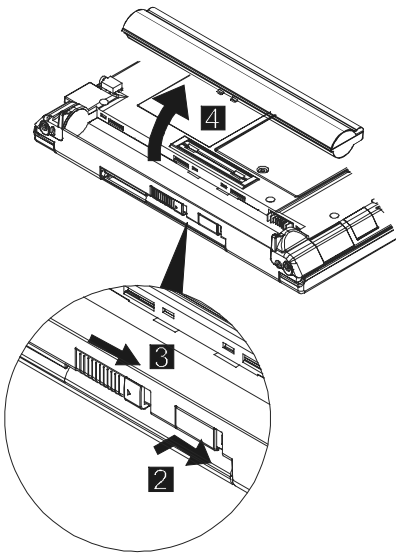
---

1. Turn the WorkPad z50 upside down.

DRAM Card

ROM Card
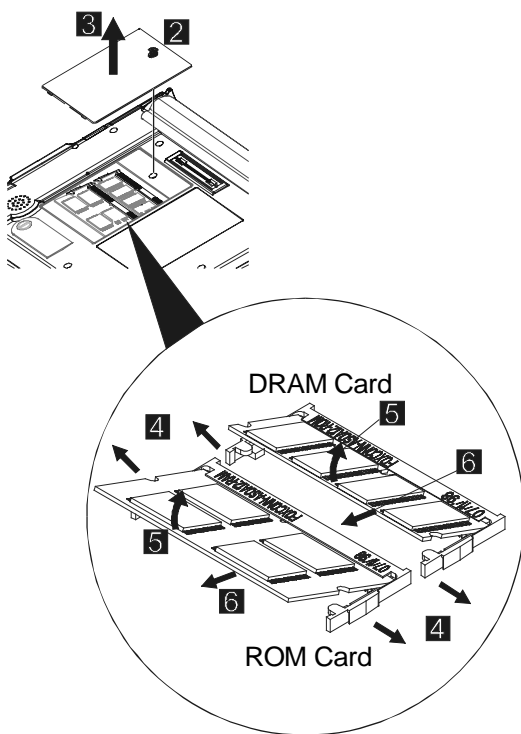
Step	Size (Quantity)	Color	Torque	Length
2	M2.5 (1)	Black	3 kgcm	4.0 mm
Note: You can loosen the captive screw in step 2, but cannot remove it from the ROM/DRAM card cover.				

1030 Battery Pack

1. Turn the WorkPad z50 upside down.

Note

At step 3 you must push and hold the battery release lock as you slide the lock in the direction indicated by the arrow.
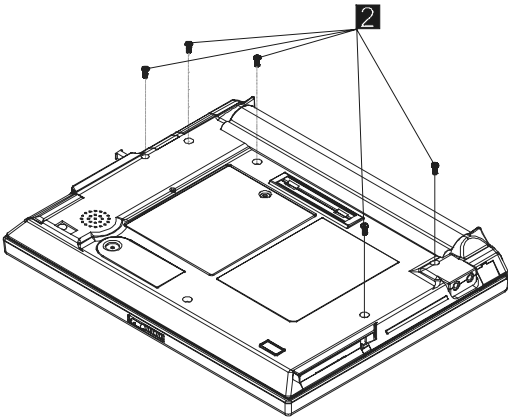

1040 Keyboard Assembly

- Backup Batteries **(1010)**
- Battery Pack **(1030)**

Attention

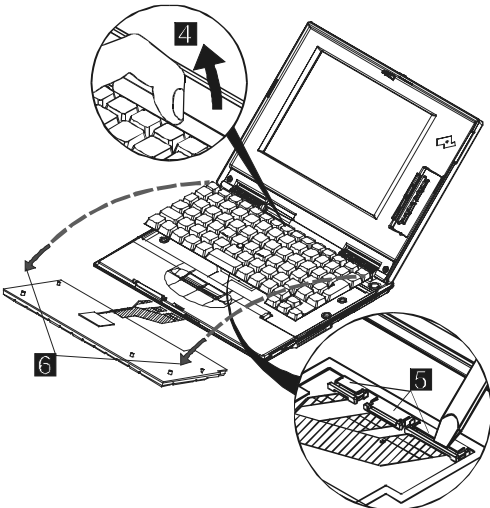Remove all power sources from the WorkPad z50 before removing the keyboard assembly.

---

1. Turn the WorkPad z50 upside down.

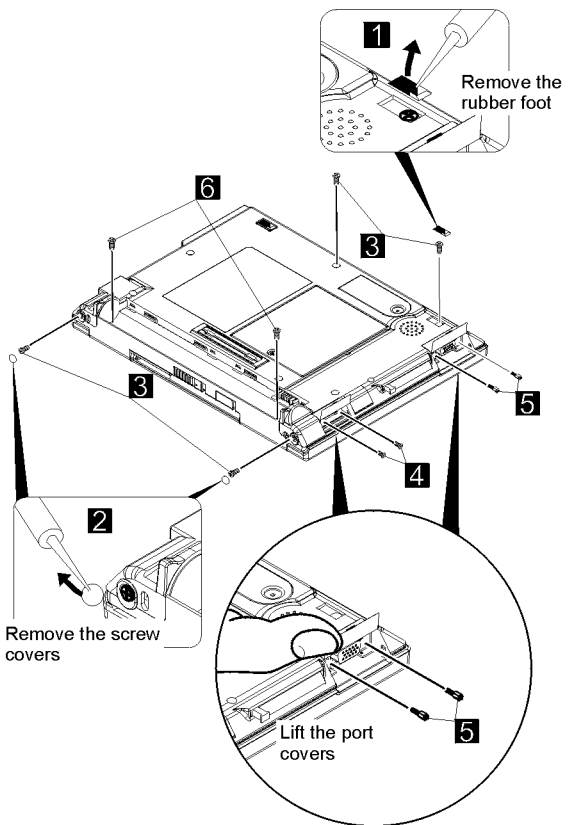| Step	Size (Quantity)	Color	Torque	Length
2	**M2.5 (5)**	**Black**	**3 kgcm**	**6.0 mm**

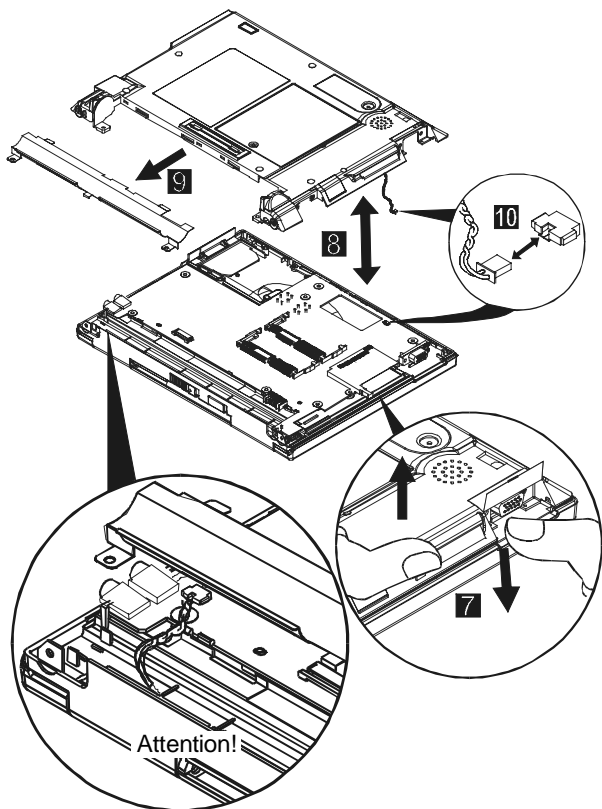**Note:** Make sure you use the correct screw and tighten the screw to the torque specified.

3. Turn the WorkPad z50 top side up and open the LCD panel.

1050 Bottom Cover

- Backup Batteries **(1010)**
- Battery Pack **(1030)**
- Keyboard Assembly **(1040)**

1 Remove the rubber foot

6

3

3

5

4

2 Remove the screw covers

5 Lift the port covers

Attention

Be careful when assembling the bottom cover and the battery shield not to pinch the cables.

Step	Size (Quantity)	Color	Torque	Length
3	M2.5 (4)	Black	3 kgcm	6.0 mm
4	M2.0 (2)	Silver	3 kgcm	4.0 mm
5	Hex (2)	Silver	3 kgcm	5.0 mm
6	M2.5 (2)	Black	3 kgcm	8.0 mm

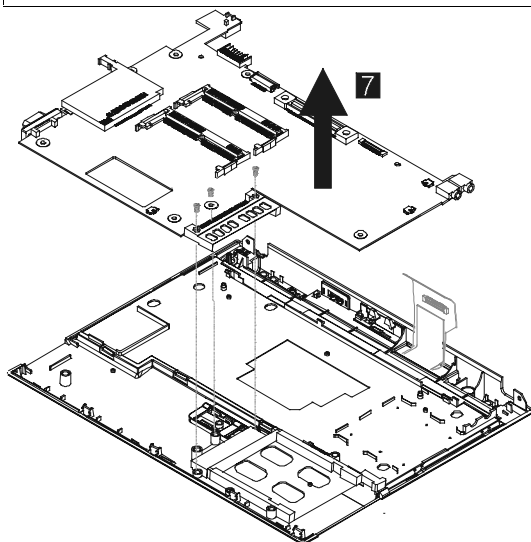**Note:** Make sure you use the correct screw and tighten the screw to the torque specified.

1060 Mainboard

- Backup Batteries **(1010)**
- Battery Pack **(1030)**
- Keyboard Assembly **(1040)**
- Bottom Cover **(1050)**
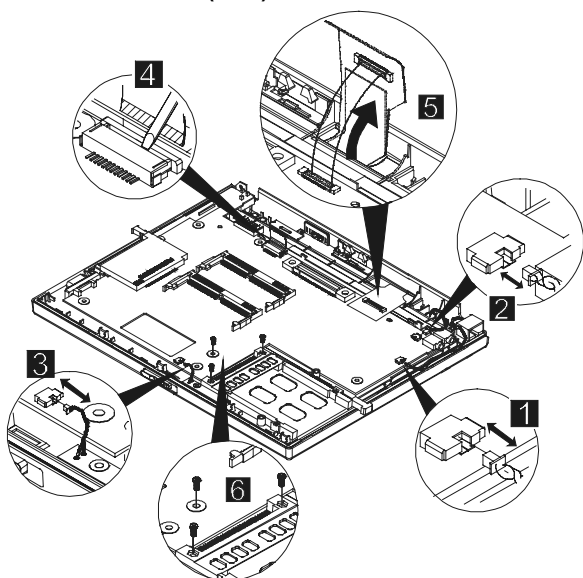
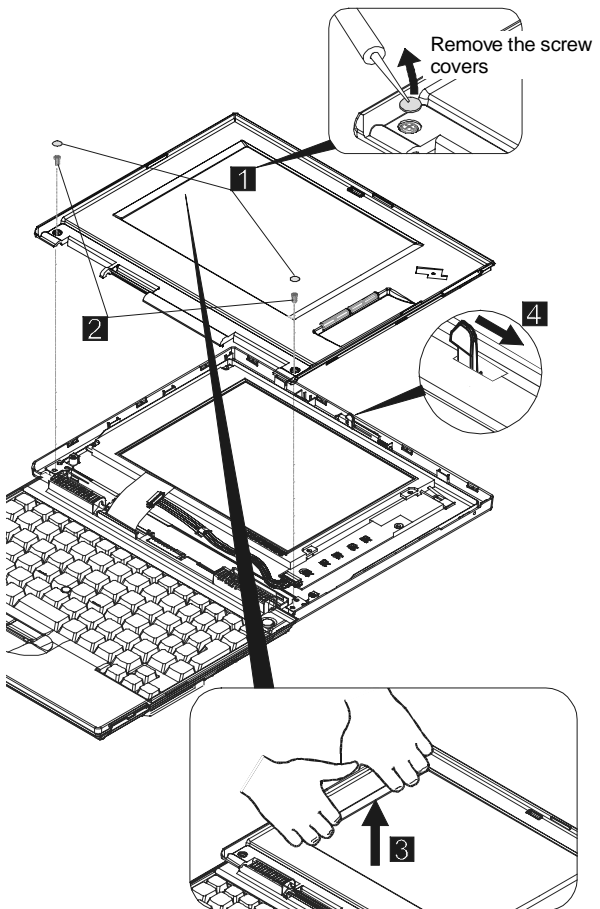| Step	Size (Quantity)	Color	Torque	Length
6	M2.0 (3)	N/A	3 kgcm	6.0 mm

Note: Make sure you use the correct screw and tighten the screw to the torque specified.

1070 LCD Bezel

> **Attention**
>
> Be careful when lifting the bezel cover loose. The plastic tabs that hold it securely to the LCD unit are easily damaged.
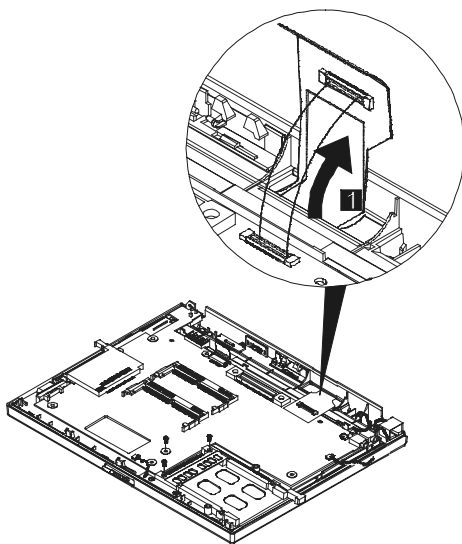

Remove the screw covers

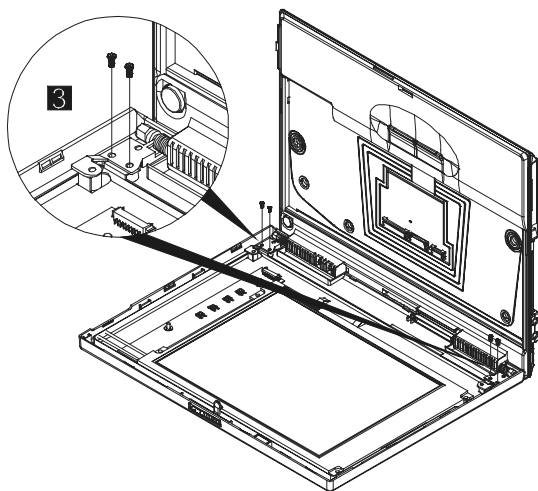| Step	Size (Quantity)	Color	Torque	Length
2	M2.5 (2)	Black	3 kgcm	4.0 mm
Note: Make sure you use the correct screw and tighten the screw to the torque specified.				

1080 LCD Unit

- Backup Batteries **(1010)**
- Battery Pack **(1030)**
- Keyboard Assembly **(1040)**
- Bottom Cover **(1050)**
- LCD Bezel **(1070)**

1. TURN THE WORKPAD Z50 OVER.

■ Remove the LCD unit.

Step	Size (Quantity)	Color	Torque	Length
3	M2.5 (4)	Black	3 kgcm	4.0 mm
Note: Make sure you use the correct screw and tighten the screw to the torque specified.				

1090 Inverter Card and LCD Panel

- Backup Batteries **(1010)**
- Battery Pack **(1030)**
- Keyboard Assembly **(1040)**
- Bottom Cover **(1050)**
- LCD Bezel **(1070)**
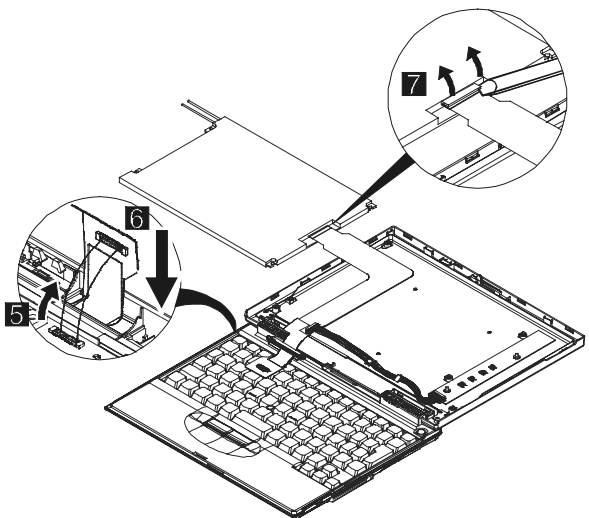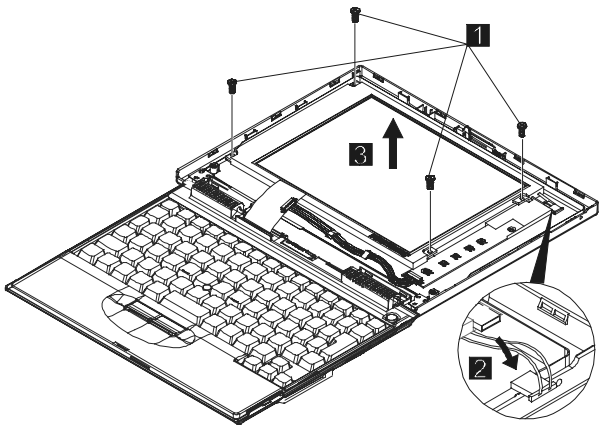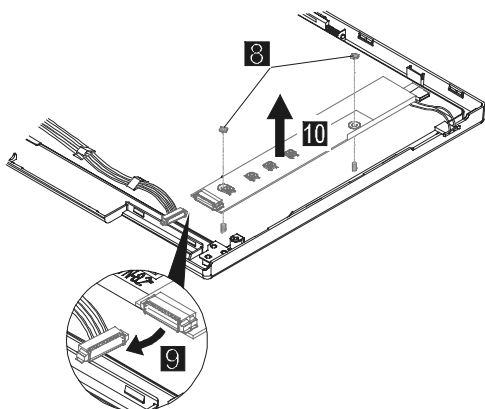
Step	Size (Quantity)	Color	Torque	Length
1	M2.5 (4)	N/A	3 kgcm	4.0 mm
5	Hex (2)	N/A	3 kgcm	5.0 mm

Note: Make sure you use the correct screw and tighten the screw to the torque specified.

1110 FPC Assembly

- Backup Batteries **(1010)**
- Battery Pack **(1030)**
- Keyboard Assembly **(1040)**
- Bottom Cover **(1050)**
- LCD Bezel **(1070)**
- Inverter Card and LCD Panel **(1090)**
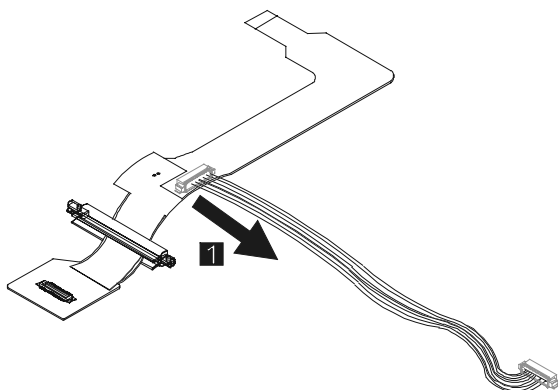
1120 Speaker

- Backup Batteries **(1010)**
- Battery Pack **(1030)**
- Keyboard Assembly **(1040)**
- Bottom Cover **(1050)**
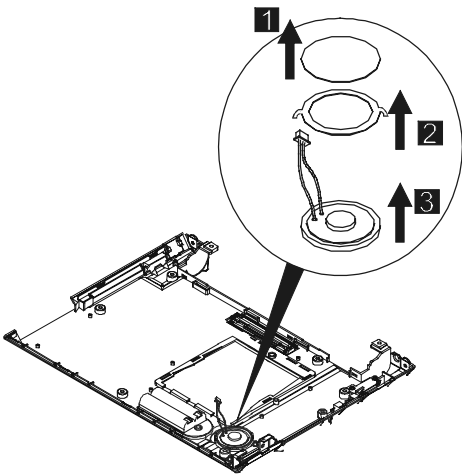
1130 Microphone

- Backup Batteries **(1010)**
- Battery Pack **(1030)**
- Keyboard Assembly **(1040)**
- Bottom Cover **(1050)**
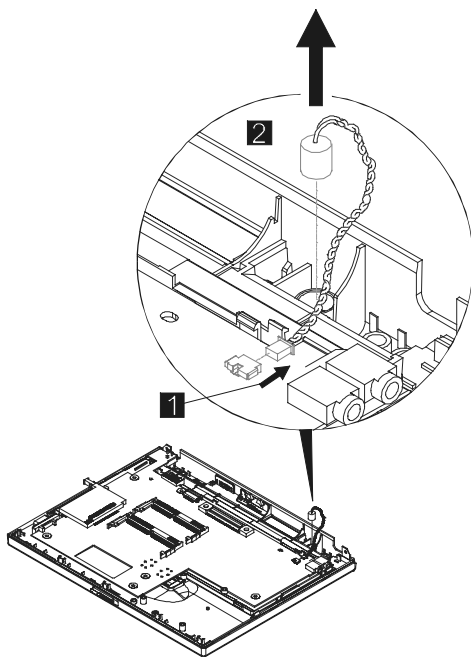
1140 Audio Ports

The ear jack and speaker out ports are all built into the mainboard. If any of these devices has malfunctioned, you must replace the mainboard.

1150 PC Card Slot Assembly

- Backup Batteries **(1010)**
- Battery Pack **(1030)**
- Keyboard Assembly **(1040)**
- Bottom Cover **(1050)**
- Mainboard **(1060)**
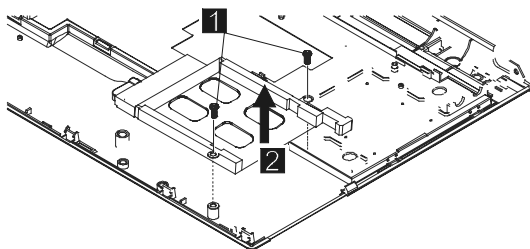
Step	Size (Quantity)	Color	Torque	Length
1	M2.0 (2)	N/A	3 kgcm	4.0 mm

Note: Make sure you use the correct screw and tighten the screw to the torque specified.

1160 RJ-11 Assembly

- Backup Batteries **(1010)**
- Battery Pack **(1030)**
- Keyboard Assembly **(1040)**
- Bottom Cover **(1050)**
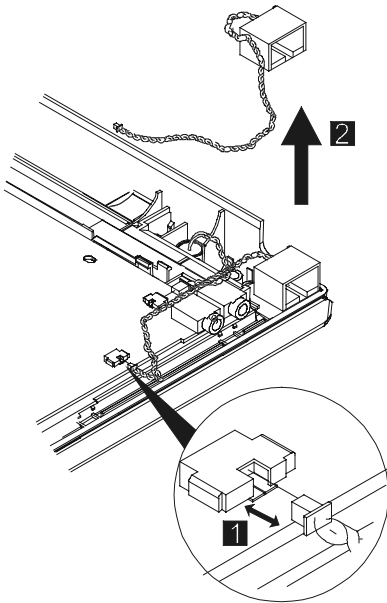
1170 Hardware Button Board

- Backup Batteries **(1010)**
- Battery Pack **(1030)**
- Keyboard Assembly **(1040)**
- Bottom Cover **(1050)**
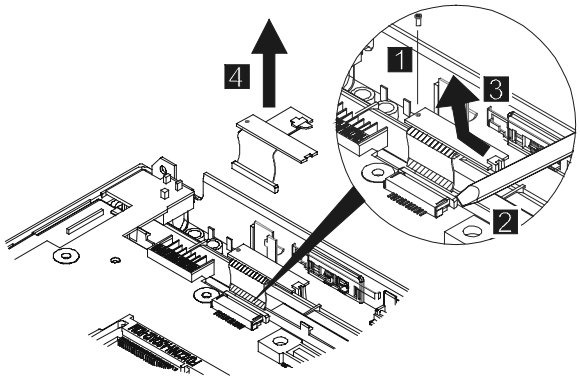
Step	Size (Quantity)	Color	Torque	Length
1	M2.0 (1)	N/A	3 kgcm	6.0 mm
Note: Make sure you use the correct screw and tighten the screw to the torque specified.				

1180 Top Cover

- Backup Batteries **(1010)**
- Battery Pack **(1030)**
- Keyboard Assembly **(1040)**
- Bottom Cover **(1050)**
- Mainboard **(1060)**
- LCD Bezel **(1070)**
- LCD Unit **(1080)**
- Microphone **(1130)**
- PC Card Slot Assembly **(1150)**
- RJ-11 Assembly **(1160)**
- Hardware Button Board **(1170)**
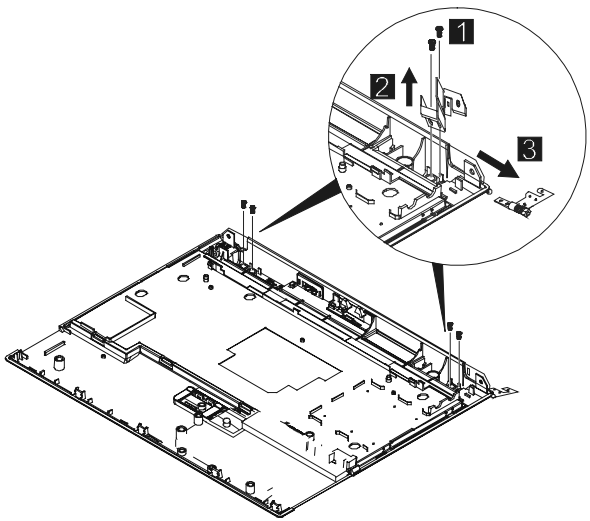
Step	Size (Quantity)	Color	Torque	Length
1	**M2.5 (4)**	**Black**	**3 kgcm**	**4.0 mm**
Note: Make sure you use the correct screw and tighten the screw to the torque specified.				

Locations

Front Right View

1. LCD cover release latch
2. LCD display
3. Brightness control buttons
4. Contrast control buttons
5. Notification button
6. Notification LED
7. Microphone button
8. External Power/Charge status LED
9. Power button
10. TrackPoint
11. TrackPoint buttons
12. Keyboard
13. Built-in microphone
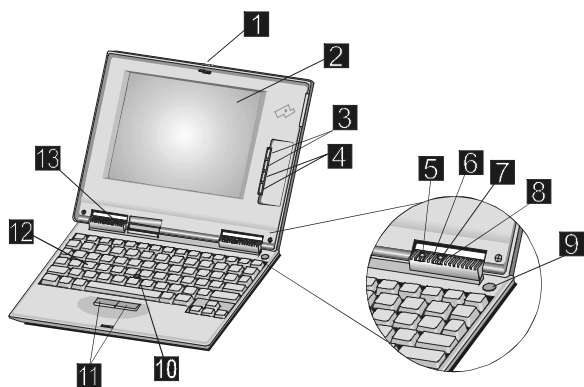
Left View

1. RJ-11 connector
2. External earphone jack
3. Microphone jack
4. PC card eject button
5. PC card slot
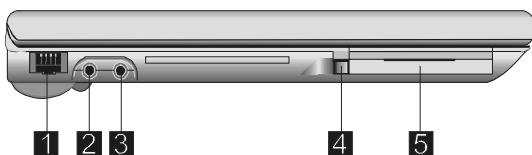
Right View

1. External monitor port
2. CompactFlash slot
3. CompactFlash eject button
4. Infrared data port
5. Serial port
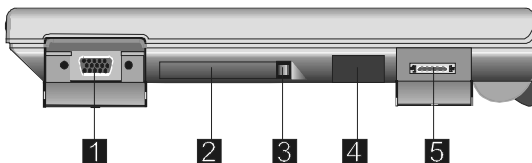
Rear View

1. Power jack
2. Battery release lock
3. Battery release latch
4. Lock keyhole

Bottom View

1. Backup battery compartment
2. Built-in monophonic speaker
3. OS ROM and DRAM compartment
4. Reset switch hole
5. Cradle connector
6. Battery pack

System Unit Parts Listing

System Unit FRU List

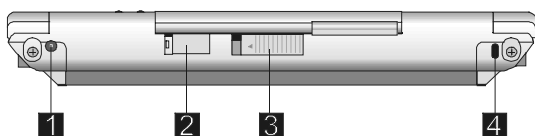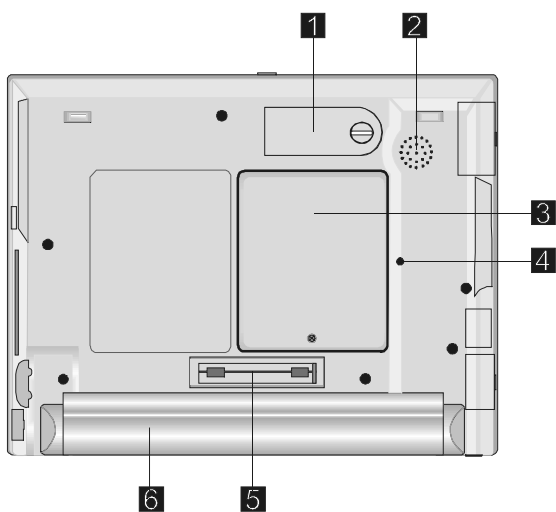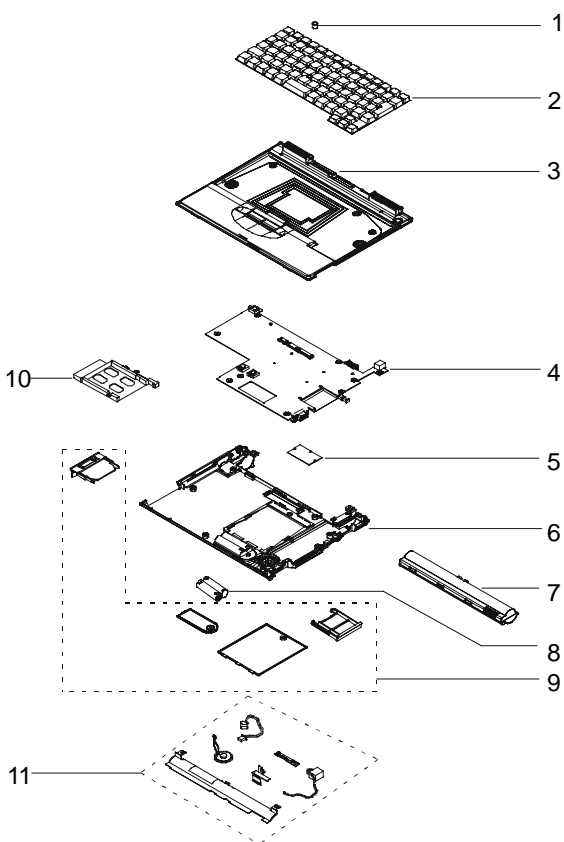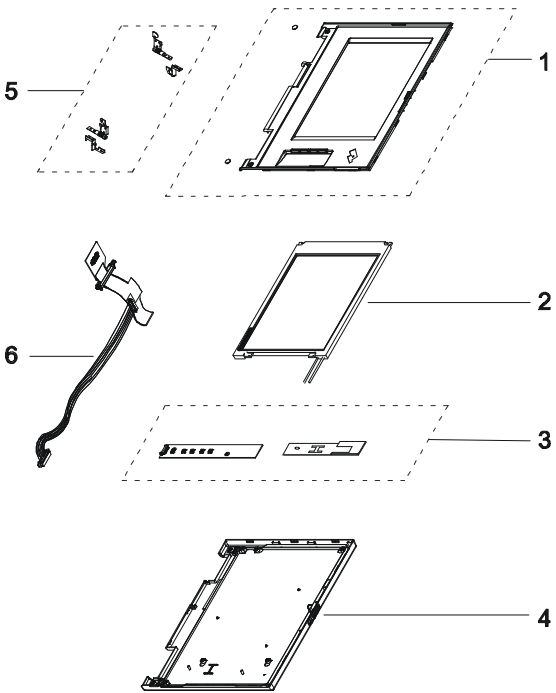| No.	FRU PART DESCRIPTION	FRU ELEMENTS	FRU P/N	QTY	CRU
1	POINTING STICK CAP		84G6536	1	ö
2	K/B ASS'Y (USA)		02K4862	1	
	K/B ASS'Y (CAN-FRE)		02K4867	1	
	K/B ASS'Y (FRE)		02K4865	1	
	K/B ASS'Y (JAP)		02K4863	1	
	K/B ASS'Y (UK)		02K4864	1	
	K/B ASS'Y (GERMANY)		02K4866	1	
3	TOP COVER ASS'Y		05K5936	1	
		TOP COVER		1	
		LED LENS		2	
		POWER BTN		1	
		TOUCH BTN (R)		1	
		TOUCH BTN (L)		1	
		INDICATOR BTN		2	
		BATTERY LATCH		1	
		BATTERY SPRING		1	
		INDICATOR SPRING		2	
		TOP ESD MYLAR		1	
		BATT-REL LATCH		1	
		BATT-REL BRACKET		1	
		CUSHION PLATE		1	
		K/B SEAL SUPPORT		1	
		K/B WATERPROOF TAPE		4	
		EMI SPONGE (740031*5m/m)		1	
		H/W BTN BOARD ASS'Y		1	
4	MAIN BOARD ASS'Y		10L1217	1	
	MAIN BOARD ASS'Y-EU		30L2168	1	
5	ROM CARD (USA)		10L1218	1	
	ROM CARD (JAP)		10L1256	1	ö
	ROM CARD (FRE)		10L1258	1	
	ROM CARD (GER)		10L1257	1	
6	BOTTOM COVER ASS'Y U/C/J		05K5938	1	
	BOTTOM COVER ASS'Y EMEA		27L6431	1	
		BOTTOM COVER		1	
		SMART CARD DOOR		1	
		BASE ESD MYLAR		1	
		DOCKING SHUTTER (R)		1	
		DOCKING SHUTTER (L)		1	
		VGA DOOR-P		1	
		SERIAL DOOR-P		1	
		IR LENS		1	
		BACKUP BATT TERMINAL		1	
		RATING LABEL		1	
		RUBBER FOOT		2	
7	BATTERY PACK		02K6565	1	ö
8	BACKUP BATTERY		02K6566	1	ö
9	BOTTOM DOOR GROUP		05K5939	1	
		EXTEND DOOR		1	
		BACKUP BATTERY DOOR		1	ö
		DUMMY PC CARD ASS'Y		1	
		DUMMY CF CARD		1	
10	PC CARD SLOT ASS'Y		05K5937	1	
11	SEE MISC PART GROUP 1				

LCD Unit Parts List

No.	FRU PART DESCRIPTION	FRU ELEMENTS	FRU P/N	QTY	CRU
1	LCD BEZEL ASS'Y		05K5934	1	
		LCD BEZEL		1	
		LCD BUTTON		1	
		SCREW CAP		2	
2	LCD MODULE ASS'Y	8.2" DSTN	05K9399	1	
3	INVERTER ASS'Y		10L1216	1	
		INV. MODULE (AMB)		1	
		INVERTER MYLAR W/COPPER TAPE		1	
4	LCD COVER ASS'Y		05K5933	1	
		LCD COVER		1	
		LCD SHIELD		1	
		LCD SHIELD TAPE		1	
		COVER LOGO (WORKPAD)		1	
		HOOK KNOB		1	
		HOOK SPRING		1	
		MAGNET (LCD COVER)		1	
		LCD MAGNET HOLDER		1	
5	HINGE GROUP		05K5935	1	
		HINGE (R)		1	
		HINGE (L)		1	
		HINGE BRACKET (R)		1	
		HINGE BRACKET (L)		1	
6	FPC AND WIRE GROUP		05K2822	1	
		LCD FPC ASS'Y		1	
		FPC COVER SHEET		1	
		FPC HOLDER (U)		1	
		FPC HOLDER (L)		1	
		CABLE ASS'Y, IV, 8.2		1	

Miscellaneous and Other Parts

DESCRIPTION	FRU ELEMENTS	QTY	FRU P/N	CRU
MISC PART GROUP 1		1	**05K5940**	
	HOOK KNOB	1		
	HOOK SPRING	1		
	IR LENS	1		
	DOCKING SHUTTER	1		
	RUBBER FOOT	2		
	COVER SWITCH/B ASS'Y	1		
	H/W BTN BOARD ASS'Y	1		
	CABLE ASS'Y, MIC	1		
	CABLE ASS'Y, RJ-11	1		
	RJ-11 DOOR (EMEA ONLY)	1		
	BATT SLOT BRACKET	1		
	LABEL CAN HOMO, (US/CA/JA ONLY)	1		
	SPEAKER BRACKET	1		
	SPEAKER MYLAR	1		
	CABLE ASS'Y, SP	1		
	TAPE	3		
MISC PART GROUP 2		1	**46L2666**	
	TEMPLATE, TEXT	1		
	TEMPLATE, ICON	1		√
	STICKER	1		
SCREW KIT		1	**05K5941**	
	SCREW (M2.0*3-P-NI-NYLOK)	10		
	SCREW (M2.0*6-P-NI-NYLOK)	10		
	SCREW (M2.5*6-I-BNI-NYLOK)	20		
	SCREW (M2.5*8-1-BNI-NI-NYLOK)	10		
	SCREW (M2.5*4-P-BNI-NYLOK)	20		
	STUD	10		
	I/V NUT	10		
	SCREW CAP	10		

Option Parts FRU List

ITEM	DESCRIPTION	QTY	FRU P/N	CRU
MEMORY EXPANSION	**32MB**	**1**	**20L0244**	√
HIGH CAPACITY BATTERY PACK		**1**	**02K6575**	√
DRY CELL BATTERY CASE		**1**	**02K6142**	√
CRADLE		**1**	**02K6143**	√

Other Parts

ITEM	DESCRIPTION	QTY	FRU P/N	CRU
SERIAL CABLE		**1**	**05K2823**	√
MODEM CABLE		**1**	**05K2824**	√
AC ADAPTOR (45w, 2-prong)		**1**	**02K6560**	√
AC ADAPTOR (45w, 3-prong)		**1**	**02K6562**	√

CRU

To find out which parts can be replaced by the customer, refer to the tables under "System Unit Parts Listing" starting on page 52. All parts marked "√" in the CRU column are considered CRU parts.

Tools

See the table of tools on page 26.

Power Cord

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

For 2-pin power cords:

IBM Power Cord Part Number	Used in These Countries	CRU
13H5273	Japan	√

For 3-pin power cords:

IBM Power Cord Part Number	Used in These Countries	CRU
76H3514	Argentina, Australia, Papua New Guinea, New Zealand, Paraguay, Uruguay	√
76H3516	Bahamas, Barbados, Bermuda, Bolivia, Canada, Cayman Islands, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Netherlands Antilles, Nicaragua, Panama, Peru, Philippines, Saudi Arabia, Suriname, Taiwan, Trinidad (West Indies), United States of America, Venezuela	√
76H3518	Austria, Belgium, Bulgaria, Czech Republic, Egypt, Finland, France, Germany, Greece, Hungary, Iceland, Indonesia, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Spain, Sweden, Turkey, former Yugoslavia	√
76H3520	Denmark	√
76H3522	Bangladesh, Pakistan, South Africa, Sri Lanka	√
76H3524	Abu Dhabi, Albania, Antigua, Bahrain, Brunei, Dubai, Fiji, India, Ireland, Kenya, Kuwait, Macao, Malaysia, Nigeria, Oman, People's Republic of China (including Hong Kong), Qatar, Singapore, United Kingdom	√
76H3528	Liechtenstein, Switzerland	√
76H3530	Chile, Ethiopia, Italy, Libya	√
76H3532	Israel	√
76H3535	Korea	√
76H4866	Thailand	√

Notices

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