



Hardware Maintenance Manual

500e Chromebook



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500e Chromebook

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Chapter 1. Safety information

This chapter presents the following safety information that you need to be familiar with before you service a Lenovo notebook 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 technicians 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. 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 non-conductive 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 main units
- Before you start to work on the machine, unplug the power cord. If you cannot unplug it, ask the customer to power-off the wall box that supplies power to the machine, and to lock the wall box in the off position.
- If you need to work on a machine that has *exposed* electrical circuits, observe the following precautions:
 - Ensure that another person, familiar with the power-off controls, is near you.

Attention: Another person must be there to switch off the power, if necessary.

- Use only one hand when working with powered-on electrical equipment; keep the other hand in your pocket or behind your back.

Attention: An electrical shock can occur only when there is a complete circuit. By observing the above rule, you may prevent a current from passing through your body.

- When using testers, set the controls correctly and use the approved probe leads and accessories for that tester.
- Stand on suitable rubber mats (obtained locally, if necessary) to insulate you from grounds such as metal floor strips and machine frames.

Observe the special safety precautions when you work with very high voltages; 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, non-grounded 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
 - Similar units as listed above

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 technicians from injury. This guide addresses only those items. You should use good judgment to identify potential safety hazards due to attachment of non-Lenovo 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 cathode ray tube (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 authorized type specified for your computer. Go to: <http://www.lenovo.com/serviceparts-lookup>
 - 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-Lenovo alterations. Use good judgment as to the safety of any non-Lenovo 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.
- 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 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.

Safety notices (multilingual translations)

The safety notices in this section are provided in the following languages:

- English
- Arabic
- Brazilian Portuguese
- French
- German
- Hebrew
- Japanese
- Korean
- Spanish
- Traditional Chinese



DANGER

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



DANGER

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



DANGER

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



DANGER

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



DANGER

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.



DANGER

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



DANGER

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



DANGER

Unless hot swap is allowed for the FRU being replaced, do as follows before removing it: power off the computer, unplug all power cords from electrical outlets, remove the battery pack, and disconnect any interconnecting cables.



قبل اعادة تشغيل الحاسب بعد الانتهاء من استبدال FRU، تأكد من أنه قد تم اعادة كل من المسامير والسوست وكل الأجزاء الصغيرة الأخرى في أماكنهم ولم يتم فقدهم داخل الحاسب. ويمكن التحقق من ذلك عن طريق هز الحاسب والاستماع لأي صوت صاخب يصدر منه. قد تؤدي الأجزاء أو الرقائق المعدنية الى حدوث دائرة قصر.



تحتوي بعض البطاريات الاحتياطية على كمية صغيرة من مادتي النيكل والكاديوم. لا تقم بفك أو اعادة شحن البطارية الاحتياطية ولا تقم أيضا بالقائها في النار أو الماء ولا تتسبب في احداث دائرة قصر بها. قم بالتخلص من البطارية كما هو موضح في القوانين المحلية. استخدم نوع البطارية المحدد والذي يوصى باستخدامه. حيث أنه قد يؤدي استخدام نوع بطارية غير صحيح الى اشتعالها أو انفجارها.



تحتوي حزمة البطارية على كمية صغيرة من مادة النيكل. لا تقم بفكها أو القاءها في النار أو الماء ولا تتسبب في احداث دائرة قصر بها. تخلص من حزمة البطارية وفقا لما هو موضح في القوانين المحلية. قم، عند استبدال حزمة البطارية، باستخدام الأنواع المحددة فقط والتي يوصى باستخدامها. حيث أنه قد يؤدي استخدام نوع بطارية غير صحيح الى اشتعالها أو انفجارها.



قد تتسبب بطارية الليثيوم في حدوث حريق أو انفجار أو حدوث حروق شديدة. لا تقم باعادة شحن البطارية أو ازالة موصل الاستقطاب الخاص بها ولا تحاول أيضا فكها أو تسخينها لأكثر من ١٠٠ درجة مئوية (٢١٢١ فهرنهايت) أو حرقها أو تعريض محتويات الخانة الخاصة بها للماء. قم بالتخلص من البطارية وفقا لما هو موضح في القوانين المحلية. استخدم نوع البطارية المحدد والذي يوصى باستخدامه. حيث أنه قد يؤدي استخدام نوع بطارية غير صحيح الى اشتعالها أو انفجارها.



إذا ما انكسرت شاشة LCD ولامس السائل الداخلي عينيك أو يديك، قم في الحال بغسلها بالماء لمدة لا تقل عن ١٥ دقيقة. إذا ما وجدت أي أعراض بعد الغسل اطلب عندئذ المساعدة الطبية.



لتجنب التعرض لأي صدمات، لا تقم بإزالة الغطاء البلاستيكي الذي يحمي الجزء الأسفل من بطاقة العاكس.



على الرغم من أن البطاريات الرئيسية يكون لها جهد منخفض، إلا أنه قد تقوم البطاريات التي حدث قصور بها أو التي تم توصيلها أرضيا بإصدار تيار يكفي لحدوث حروق للأفراد أو تعرض المواد القابلة للاشتعال للحريق.



ما لم يتم السماح بالتبديل الفوري لأي FRU الجاري استبداله بدون ضرورة اغلاق النظام، قم بتنفيذ ما يلي قبل ازالته، قم بإيقاف تشغيل الحاسب ونزع كل أسلاك الطاقة من المخارج الكهربائية وقم أيضا بإزالة حزمة البطارية ثم قم بفصل أي كابلات متصلة.



PERIGO

Antes de ligar o computador após a substituição da FRU, certifique-se de que todos os parafusos, molas e outras peças pequenas estejam no lugar e não estejam soltos dentro do computador. Verifique isso sacudindo o computador e procurando ouvir sons de peças soltas. Peças metálicas ou lascas de metal podem causar curto-circuito.



PERIGO

Algumas baterias reserva contêm uma pequena quantidade de níquel e cádmio. Não desmonte uma bateria reserva, recarregue-a, jogue-a no fogo ou na água, ou deixe-a entrar em curto-circuito. Descarte a bateria conforme requerido pelas leis ou regulamentos locais. Use somente a bateria nas partes listadas apropriadas. O uso de uma bateria incorreta pode resultar em combustão ou explosão da bateria.



PERIGO

O pacote da bateria contém uma pequena quantidade de níquel. Não o desmonte, jogue-o no fogo ou na água, ou deixe-o entrar em curto-circuito. Descarte o pacote da bateria conforme requerido pelas leis ou regulamentos locais. Use somente a bateria nas partes listadas apropriadas ao substituir o pacote da bateria. O uso de uma bateria incorreta pode resultar em combustão ou explosão da bateria.



PERIGO

A bateria de lítio pode causar incêndio, explosão ou graves queimaduras. Não a recarregue, remova seu conector polarizado, desmonte-a, aqueça-a acima de 100°C (212°F), incinere-a, ou exponha o conteúdo de sua célula à água. Descarte a bateria conforme requerido pelas leis ou regulamentos locais. Use somente a bateria nas partes listadas apropriadas. O uso de uma bateria incorreta pode resultar em combustão ou explosão da bateria.



PERIGO

Se o LCD quebrar e o fluido de dentro dele entrar em contato com seus olhos ou com suas mãos, lave as áreas afetadas imediatamente com água durante pelo menos 15 minutos. Procure cuidados médicos se algum sintoma causado pelo fluido surgir após a lavagem.



PERIGO

Para evitar choque elétrico, não remova a capa plástica que protege a parte inferior da placa inversora.



PERIGO

Embora as principais baterias possuam baixa voltagem, uma bateria em curto-circuito ou aterrada pode produzir corrente o bastante para queimar materiais de pessoal ou inflamáveis.



PERIGO

A menos que uma hot swap seja permitida para a FRU que está sendo substituída, faça o seguinte antes de removê-la: desligue o computador, desconecte todos os cabos de energia das tomadas, remova o pacote de baterias e desconecte quaisquer cabos de interconexão.



DANGER

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.



DANGER

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.



DANGER

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.



DANGER

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.



DANGER

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.



DANGER

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



DANGER

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.



DANGER

Si le remplacement à chaud n'est pas autorisé pour l'unité remplaçable sur site que vous remplacez, procédez comme suit avant de retirer l'unité : mettez l'ordinateur hors tension, débranchez tous les cordons d'alimentation des prises de courant, retirez le bloc de batterie et déconnectez tous les câbles d'interconnexion.



VORSICHT

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.



VORSICHT

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.



VORSICHT

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.



VORSICHT

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



VORSICHT

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.



VORSICHT

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



VORSICHT

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.



VORSICHT

Wenn ein Austausch der FRU bei laufendem Betrieb nicht erlaubt ist, gehen Sie beim Austausch der FRU wie folgt vor: Schalten Sie den Computer aus, ziehen Sie alle Netzkabel von den Netzsteckdosen ab, entfernen Sie den Akku und ziehen Sie alle miteinander verbundenen Kabel ab.



סכנה

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



סכנה

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



סכנה

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



סכנה

סוללת חליתיום 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 כנדרש בתקנות ובחוקים המקומיים. יש להשתמש רק בסוללה המופיעה ברשימת החלקים המתאימים. שימוש בסוללה אחרת עלול לגרום לסכנת שריפה או התפוצצות.



סכנה

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



סכנה

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



סכנה

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



סכנה

אלא אם כן מותרת 'החלפה חמה' של ה-FRU המוחלף, פעלו כדלהלן לפני הסרתו: כבו את המחשב, נתקו את כל כבלי החשמל מהשקעים, חוציאו את מארז הסוללות ונתקו את כל הכבלים המחוברים.



החלפה חמה

FRU の交換後、ThinkPad の電源を入れる前に、ねじ、バネ、その他の小さな部品がすべて正しい位置にあり、また ThinkPad の内部で緩んでいないことを確認してください。これを確認するには、ThinkPad を振って、カチャカチャと音がしないか確かめます。金属部品や金属破片はショートの原因になることがあります。



החלפה חמה

予備バッテリーの中には少量のニッケルとカドミウムが含まれているものがあります。したがって、予備バッテリーの分解、再充電、火または水の中への投棄、またはショートさせることは決して行わないでください。バッテリーを廃棄する場合は地方自治体の条例に従ってください。適切なパーツ・リストにあるバッテリーだけを使用してください。誤ったバッテリーを使用すると、バッテリーが発火したり、爆発したりすることがあります。



危険

バッテリー・パックには少量のニッケルが含まれています。バッテリー・パックを分解したり、火または水の中に投げ込んだり、ショートさせないでください。バッテリー・パックの廃棄にあたっては、地方自治体の条例または規則に従ってください。バッテリー・パックを交換するときは、適切なパーツ・リストにあるバッテリーだけを使用してください。誤ったバッテリーを使用すると、バッテリーが発火したり、爆発したりすることがあります。



危険

リチウム・バッテリーは、火災、爆発、または重症のやけどを引き起こすことがあります。バックアップ・バッテリーの充電、その極性コネクタの取り外し、バッテリー本体の分解、100 °C (212 °F) 以上への加熱、焼却、電池の中身を水に浸すことはしないでください。バッテリーを廃棄する場合は地方自治体の条例に従ってください。適切なパーツ・リストにあるバッテリーだけを使用してください。誤ったバッテリーを使用すると、バッテリーが発火したり、爆発したりすることがあります。



危険

LCD が破損し、LCD 中の液体が目に入ったり、手に触れたりした場合は、液体が触れた部分を少なくとも 15 分間洗い流してください。洗い流した後に、液体によって何らかの症状が現れた場合は、医師の治療を受けてください。



危険

感電を防ぐため、インバーター・カードの下部を保護しているプラスチック・カバーを外さないでください。



危険

メイン・バッテリーの電圧は低くても、ショートしたり、接地したバッテリーが、作業者にやけどを負わせたり、可燃物を燃やすだけの電流を発生させる場合があります。



危険

交換しようとしている FRU がホット・スワップに対応していない場合、それを取り外す前に、コンピューターの電源をオフにし、すべての電源コードをコンセントから抜き、バッテリー・パックを取り外して、相互接続しているケーブルをすべて切り離してください。



위험

FRU를 교체하고 나서 컴퓨터 전원을 켜기 전에 모든 나사, 스프링 및 기타 작은 부품들이 올바른 위치에 있는지, 컴퓨터 내부에 단단하게 연결되어 있는지 확인하십시오. 컴퓨터를 흔들어 달걀거리는 소리가 나지 않는지 확인하십시오. 금속 부품 또는 금속 조각은 누전을 일으킬 수 있습니다.



위험

일부 보조 배터리에는 소량의 니켈 및 카드뮴이 포함되어 있습니다. 보조 배터리를 분해하거나, 다시 충전하거나, 불 또는 물에 던지거나, 단락시키지 마십시오. 배터리 팩을 폐기할 때에는 해당 지역의 법률 규정을 따르십시오. 배터리 팩을 교체할 때에는 올바른 배터리만 사용하십시오. 올바르지 않은 배터리를 사용하면 배터리가 발화되거나 폭발할 수 있습니다.



위험

배터리 팩에는 소량의 니켈이 포함되어 있습니다. 배터리 팩을 분해하거나, 불 또는 물에 던지거나, 단락시키지 마십시오. 배터리 팩을 폐기할 때에는 해당 지역의 법률 규정을 따르십시오. 배터리 팩을 교체할 때에는 올바른 배터리만 사용하십시오. 올바르지 않은 배터리를 사용하면 배터리가 발화되거나 폭발할 수 있습니다.



위험

리튬 배터리는 화재, 폭발 또는 심각한 화상을 일으킬 수 있습니다. 리튬 배터리를 다시 충전하거나, 극성 커넥터를 제거하거나, 분해하거나, 100C(212F) 이상으로 가열하거나, 소각하거나, 전지 내용물을 물에 노출시키지 마십시오. 배터리를 폐기할 때에는 해당 지역의 법률 규정을 따르십시오. 올바른 배터리만 사용하십시오. 올바르지 않은 배터리를 사용하면 배터리가 발화되거나 폭발할 수 있습니다.



위험

LCD가 파손되어 LCD 내부의 액체가 눈에 들어가거나 손에 묻으면 즉시 깨끗한 물로 15분 이상 닦아 내십시오. 씻은 후에 조금이라도 이상을 느끼면 즉시 병원에 가서 의사의 진찰을 받아야 합니다.



위험

전기적 위험을 방지하려면 인버터 카드의 아래 부분을 보호하는 플라스틱 덮개를 제거하지 마십시오.



위험

기본 배터리의 전압은 낮지만, 단락되거나 접지된 배터리는 화상을 입히기에 충분한 전류와 가연성 물질을 발생시킬 수 있습니다.



위험

FRU 교체 시 Hot Swap이 지원되지 않는 경우, FRU를 제거하기 전에 컴퓨터의 전원을 끄고, 전기 콘센트에서 전원 코드를 분리하고, 배터리를 제거한 후, 연결된 모든 케이블을 분리하십시오.



PELIGRO

Antes de encender el sistema después 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.



PELIGRO

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.



PELIGRO

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.



PELIGRO

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 esponga el contenido de sus celdas al agua. Deséchela tal como dispone la normativa local.



PELIGRO

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 médica si se presenta algún síntoma del fluido después de lavarse.



PELIGRO

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



PELIGRO

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.



PELIGRO

Salvo que se permita el intercambio en caliente para la unidad sustituible localmente, realice lo siguiente antes de extraerla: apague el sistema, desconecte todos los cables de alimentación de las tomas de alimentación eléctrica, extraiga la batería y desconecte los cables de interconexión.



危險

完成 FRU 更換之後，在開啟電腦的電源之前，請確定所有螺絲、彈簧及其他小零件都已歸位，沒有遺留在電腦內部。
若要確認這一點，請搖晃電腦，聽聽看是否有卡嗒的聲響。
金屬零件或儀錶的火花會造成電線短路。



危險

部分備用電池含有微量的鎳和鎘。請勿拆開備用電池、再充電、丟入火或水中，或使其形成短路。請按照當地法令或規定來棄置電池。
僅限使用零件清單中的電池。使用不適當的電池會導致電池起火或爆炸。



危險

電池套件含有微量的鎳。請勿拆開電池套件、丟入火或水中，或使其形成短路。請按照當地法令或規定來棄置電池套件。
更換電池套件時，僅限使用零件清單中的電池。使用不適當的電池會導致電池起火或爆炸。



危險

鋰電池會導致起火、爆炸或嚴重燒傷。請勿再充電、拔除其電極接頭、拆開、加熱超過 100°C (212°F)、焚燒，或讓電池組成物浸到水。請按照當地法令或規定來棄置電池。
僅限使用零件清單中的電池。使用不適當的電池會導致電池起火或爆炸。



危險

如果 LCD 破裂導致 LCD 流出的液體沾到您的眼睛或手，請立即以清水沖洗沾染部位至少 15 分鐘。如果在清洗後出現該液體所造成的任何症狀，請就醫治療。



危險

為避免電擊，請勿拆下轉換卡下面的塑膠護蓋。



危險

雖然主電池的電壓很低，但短路或接地電池所產生的電流，仍足以使人燒傷或使可燃物質起火。



危險

除非 FRU 允許以熱抽換來替換，否則請依下列方式將其移除：將電腦關機，拔除插座上所有電源線，移除電池包，並拔開任何交互連接的線材。

Chapter 2. General checkout

Before you go to the checkout instructions, ensure that you read the following important notes.

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, it is recommended to 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 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 service technician
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: 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. 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 personal-computer card (PC card) or the installation of an incompatible card
- Improper disc insertion or use of an external optical drive
- Fuses blown by attachment of a non-supported device
- Forgotten computer password (making the computer unusable)
- Sticky keys caused by spilling a liquid onto the keyboard
- Use of an incorrect ac power adapter on laptop products

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

- Missing parts might be a symptom of unauthorized service or modification.
- Check for obvious damage to a hard disk drive. If the spindle of a hard disk drive becomes noisy, the hard disk drive might have been dropped or subject to excessive force.

500e Chromebook – CRU list

Model: Lenovo 500e Chromebook	
MT: 81ES	
CRU	Type
ac power adapter	self-service
power cord	self-service
stylus	self-service

Chapter 3. Create and use a USB repair shim

What is a USB repair shim?

A USB repair shim is created by writing a repair shim image to a USB storage drive. Once created, it can be used to boot and service the Chromebook computer, including:

- Diagnose problems and restore system to factory settings.
- Refresh the system with the latest firmware.

Before replacing any FRUs, use the repair shim to diagnose and identify problems.

Note: You do not need to use the repair shim to diagnose problems before replacing CRUs. For the list of CRUs for your computer, refer to “500e Chromebook — CRU list” on page 22.

Create a repair shim

Step 1. Prepare a USB drive. The capacity of the USB drive should be at least 8 gigabytes (GB).

Attention: Creating repair shim deletes all files stored on the USB drive. Back up personal files before creating the shim.

Step 2. Download the image file of the repair shim from <http://www.lenovo.com/support>. A Lenovo service credential is needed to download the image file.

Attention: Make sure to download the latest version of the image file. A shim created with an earlier version of the image file may cause the repair process to fail.

Step 3. Use a disk image tool to write the downloaded image to the USB drive. An open source tool Win32 Disk Imager is available for download at <http://sourceforge.net/projects/win32diskimager>.

Boot into Developer Mode

Step 1. Shut down the Chromebook.

Step 2. While holding down **esc** and the Refresh key, press the power button. Wait for the Chromebook to boot in Recovery Mode.

Step 3. When the recovery screen is displayed, press **ctrl — d**.

Note: A message “Please insert a recovery USB stick or SD card.” is typically displayed on the Recovery screen.

Step 4. Press Enter to turn OS verification OFF.

Attention: If you press Enter, all local data on your Chromebook will be deleted.

Step 5. Wait for the Chromebook to restart or press **ctrl — d** to start immediately. Your Chromebook will restart and prepare to boot into Developer Mode.

Note: It takes about 10 to 15 minutes for your Chromebook to transition into Developer Mode.

If you need to boot into normal mode, start your Chromebook, press the Space key when the message “OS Verification is OFF” is displayed.

Disable ROM-write protection

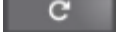
You need to disable the ROM-write protection function before you can use a repair shim to diagnose and fix problems.

- Step 1. Disconnect and the re-connect the battery cable.Refer to “Remove the back cover” on page 32 for how to locate and disconnect the battery cable.
- Step 2. Connect the Chromebook to ac power to activate the battery.
- Step 3. Boot the Chromebook into Developer Mode.Refer to “Boot into Developer Mode” on page 23 for instructions.
- Step 4. Press **ctrl — alt — →(F2)** to display the virtual terminal.
- Step 5. Type `root` and press Enter to log in as root.
- Step 6. Type the following command and press Enter at the command prompt.
`flashrom -p host -wp-disable`
- Step 7. Type the following command and press Enter at the command prompt.
`flashrom -p ec -wp-disable`
- Step 8. Press the Refresh key and the power button to restart the Chromebook.

The ROM-write protection is disable after restart.

Use a USB repair shim to diagnose and fix problems

Make sure the ROM-write protection has been disabled. Refer to “Disable ROM-write protection” on page 24 for instructions.

- Step 1. While holding down the **esc** and the refresh key , press the power button.The Chrome OS recovery screen should be displayed.
- Step 2. Connect the USB repair shim to the computer. The repair shim will update the computer firmware and OS image automatically.
- Step 3. When prompted, choose **I** to install the shim image to the computer.When the update is completed, the computer restarts to the factory-test-image environment and then starts the Final Function Test (FFT). The FFT will run for 10 minutes and then the Final Assembly Test (FAT) will start.

Note: When computer restarts, remove the repair shim and put it in a safe place.

- Step 4. If the Vital Product Data (VPD) is displayed on the screen, press **esc** to continue.

If the system board is replaced, you are required to enter the VPD.

Note: The VPD is a 20 — character string.

Table 1. Combination of the 20 — character VPD

Preceding characters	Machine type	Model number	SN
“1S”, 2 digits	7 digits	3 digits	8 digits

The MTM and SN can be found on the label attaching to the bottom cover.

- Step 5. Follow the instructions on the screen to start the Final Function Test (FFT).

- Step 6. If the factory test items reveal a defective component, turn off the computer, disconnect the ac power adapter, and then replace the defective component.
- Step 7. Turn on the computer. The computer should start to the factory-test-image environment again. It is recommended that you run Final Function Test (FFT) to ensure that new components function correctly.
- Step 8. Run the GoogleRequiredTests. If the tests finish successfully, all data stored on the computer will be deleted and the computer will be turned off. If the GoogleRequiredTests fails, refer to “Common issues leading to GoogleRequiredTests fail” on page 26.

Note: If any test is marked as failed, the final process cannot be completed. The final process can be forced to end by pressing the **f** key. Do not force the final process to end when a component fails the test. Force the final process to end only when the test has to be bypassed because it cannot be performed.

After the repair process is completed, the built-in battery is disabled. The system is in a clean out-of-box state. In order to turn on the computer, attach the ac power adapter to the power connector on the computer first. If applicable, customers must re-enroll the system for enterprise enrollment.

Note: ROM-write protection is re-activated after the repair process.

Factory test items

When the computer restarts to the factory-test-image environment, factory test items will run automatically.

Table 2. Factory test items

Test item	Description
Stress Test	The Stress Test is designed to test how the system functions under stress by running the maximum workload applications. The Stress Test includes the test of memory, microprocessor, and graphics card. The test takes about 10 minutes to finish.
FATP Test	The FATP Test is designed to test the individual component to verify its function, such as the display, audio, camera, keyboard, and other components. It is recommended that you run all the FATP Test items. Some test items might require an HDMI monitor or an SD card. If the devices are not available, the tests can be bypassed, but with the overall test marked as failed. This will require the finalized step of the GoogleRequiredTests to be forced in order to complete the servicing of the computer.
GoogleRequiredTests	GoogleRequiredTests checks the system status and helps reset the system back to the factory-default settings. If any tests fails, the system cannot be finalized.

Common issues leading to GoogleRequiredTests fail

Issue	Description
HWID mismatch	<p>Each Chromebook has a known hardware configuration. Each configuration is assigned an HWID. HWID mismatch can be caused by using unauthorized parts, or missing parts.</p> <p>If the write-protect function is not turned off before recovering the computer with the repair shim, it will also cause HWID mismatch.</p>
Write-protect function is off	<p>System cannot be finalized until the write-protect function is turned back on.</p>

Hardware identify

A set of valid hardware identities (HWIDs) are provided by Google. Google logs the exact hardware combination into a Chromebook and creates a HWID. The HWID is used to ensure that all parts are valid during the repair of the Chromebook. The HWID is used for the following purposes:

- Auto-update new patches and software for the lifetime of the computer
- Recover the computer to the factory default settings

If unauthorized parts are installed, you might not get the correct auto-updates for your computer, or you might not recover your computer successfully to the factory default settings. For example, if you install a different model of the wireless LAN card, which is not the required configuration, the HWID will not match.

HWID is checked by using the repair shim.

Chapter 4. Identifying FRUs (CRUs)

All FRUs (CRUs) for Lenovo 500e Chromebook

The exploded illustrations help Lenovo service technicians identify FRUs or CRUs that they may need to replace when servicing a customer's computer.

Refer to Appendix B "Lenovo part numbers for replacement FRUs" on page 45 if you need to look up Lenovo part numbers for a particular FRU or CRU.

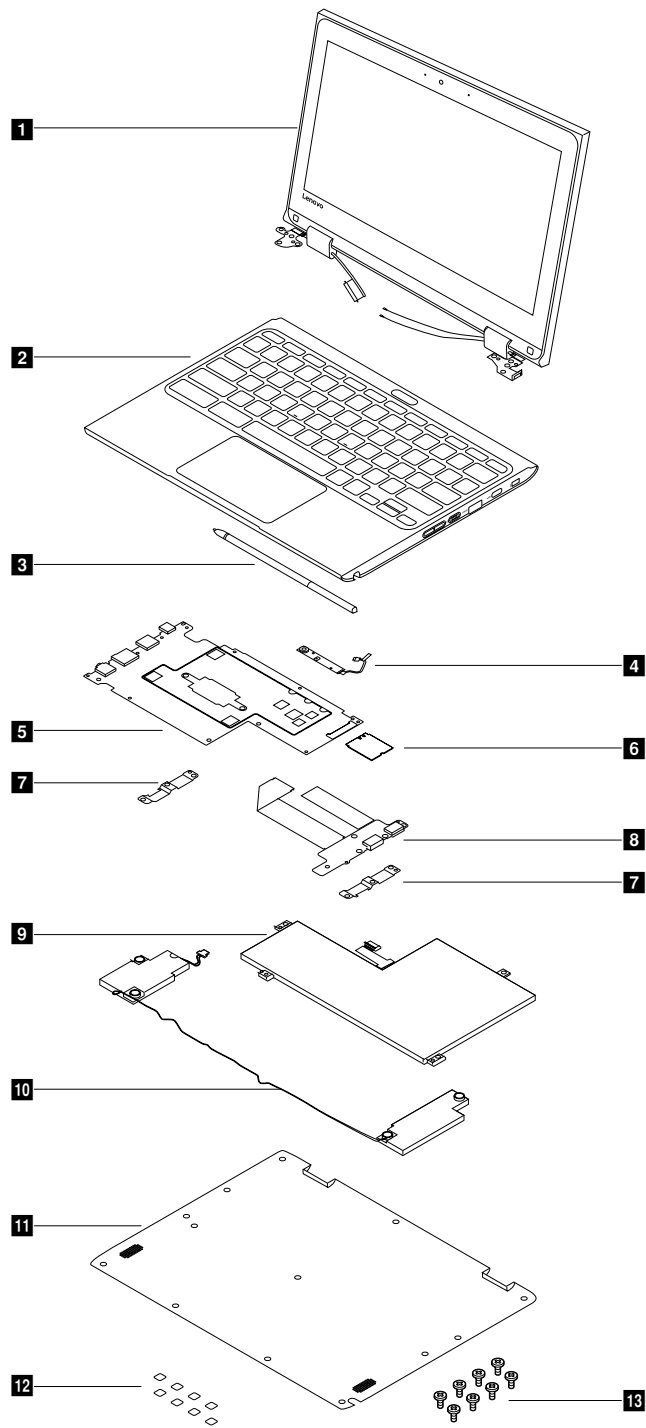


Figure 1. 500e Chromebook exploded view

Table 3. FRU (CRU) categories

No.	FRU (CRU) category
1	LCD module
2	Upper case (with keyboard)
3	Stylus

Table 3. FRU (CRU) categories (continued)

4	Secondary (WorldFacing) camera
5	System board
6	USB brackets
7	WLAN & Bluetooth combo module
8	USB board
9	Battery
10	Speakers
11	Back cover
12	Rubber pack
13	Screw pack

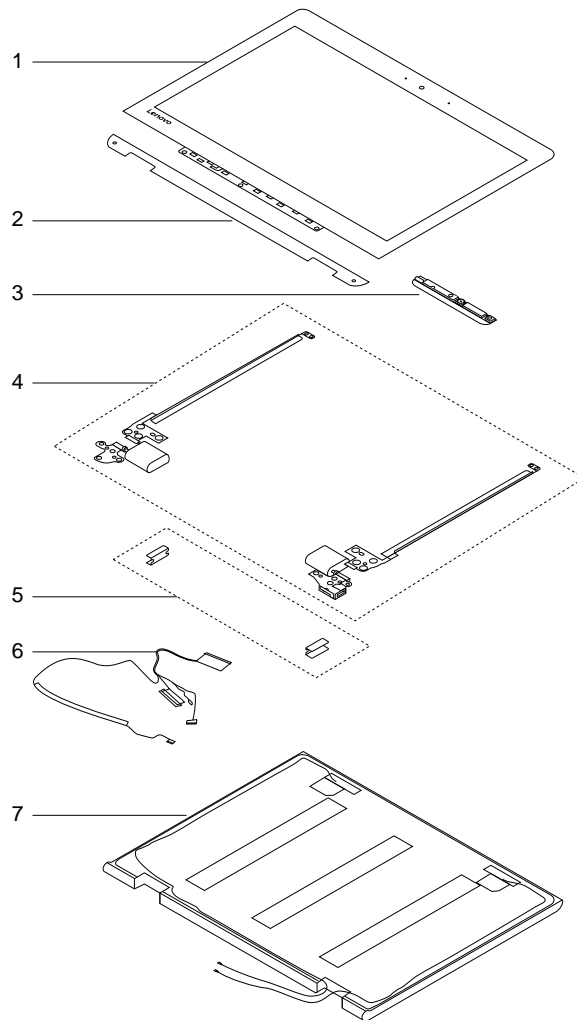


Figure 2. LCD module — exploded view

Table 4. FRU categories for the LCD module

No.	FRU (CRU) category
1	Display module
2	LCD rubbers
3	LCD strip cover
4	Camera (front)
5	Hinges
6	Hinge rubbers
7	eDP cable
8	LCD base cover

Chapter 5. Removing a FRU or CRU

General guidelines

When removing or replacing a FRU, ensure that you observe the following general guidelines:

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. Begin by removing any FRUs that have to be removed before replacing the failing FRU. Any such FRUs are listed at the beginning of each FRU replacement procedure. Remove them in the order in which they are listed.
3. Follow the correct sequence in the steps for removing a FRU, as shown in the illustrations by the numbers in square callouts.
4. When removing a FRU, move it in the direction as shown by the arrow in the illustration.
5. To install a new FRU in place, perform the removal procedure in reverse and follow any notes that pertain to replacement.
6. When replacing a FRU, carefully retain and reuse all screws. If screws are missing, look up the Lenovo parts numbers in Appendix C “Lenovo part numbers for CRUs and miscellaneous parts” on page 47 for replacement screws and order them through the Lenovo CRM system.
7. When replacing the base cover, reapply all labels that come with the replacement base cover. If some original labels are not included with the replacement base cover, peel them off from the original base cover and paste them on the replacement base cover. Refer to Appendix D “Label locations” on page 51 for the layout of labels on the back side of the base cover.



Before removing any FRU or CRU, shut down the computer and unplug all power cords from electrical outlets.

Attention: After replacing a FRU, do not turn on the computer until you have ensured 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 ESD. Before touching it, establish personal grounding by touching a ground point with one hand or by using an ESD strap (P/N 6405959).

Cut off the power supply from the built-in battery pack

Before replacing any FRUs, cut off the power supply from the built-in battery pack.

- Step 1. Boot the Chromebook into Developer Mode. Refer to “Boot into Developer Mode” on page 23 for instructions.
- Step 2. Press **ctrl — alt — →(F2)** to display the virtual terminal.
- Step 3. Type `chronos` and press Enter to log in.
- Step 4. Type `sudo bash` and press Enter.

Note: If you have set up a password for the `chronos` account, type the password when prompted.

The following message should be displayed after you press Enter.

We trust you have received the usual lecture from the local system administrator. It usually boils down to these

three things:

- #1) Respect the privacy of others
- #2) Think before you type
- #3) With great power comes great responsibility

Step 5. Type `ectool batterycutoff` and press Enter.

Step 6. When the message `SUCCESS`. The battery has arranged a cut-off and the system should be shutdown immediately. is printed, disconnect the ac power adapter from the computer and the computer turns off immediately.

If you re-connect the ac power adapter, power supply from the built-in battery pack will resume.

Remove the back cover

Step 1. Place the Chromebook on a desk, with the base cover facing upwards.

Step 2. Remove the screws.

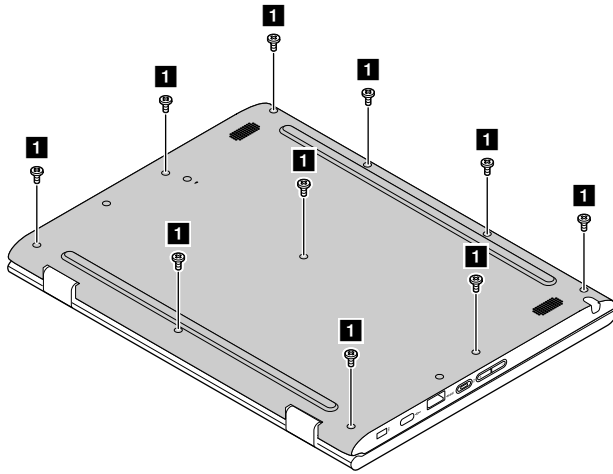
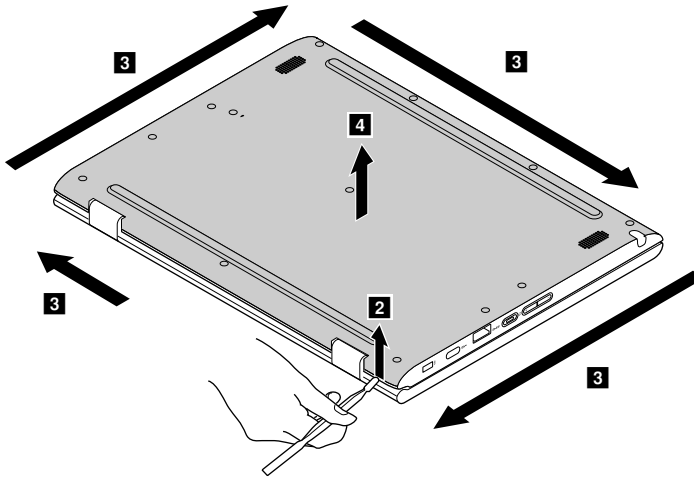


Table 5. Screw specifications

Screw location	Quantity	Specifications
Back cover	10	M2.5 × 6 mm

Step 3. Use a bar to pry the illustrated position; slowly pull the back cover along the edges until it is completely detached from the Chromebook.



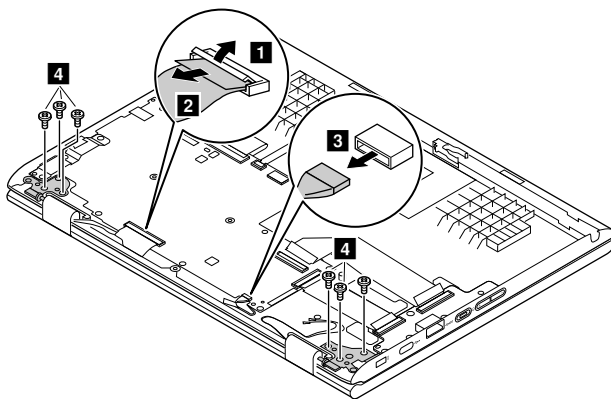
Refer to Table 16 “Part numbers for FRUs (CRUs)” on page 45 to look up the Lenovo part number for the replacement back cover.

Remove the LCD module

Make sure the following FRUs (CRUs) have been removed and the battery connector has been detached.

“Remove the back cover” on page 32

Step 1. Disconnect the antenna cables and the LCD cable from the system board.



Step 2. Remove the screws.

Table 6. Screw specifications — removing the LCD module

Screw location	Quantity	Specifications
Hinges to upper case	6	M2.5 × 5 mm

Step 3. Lift up the LCD module to detach it from the upper case.

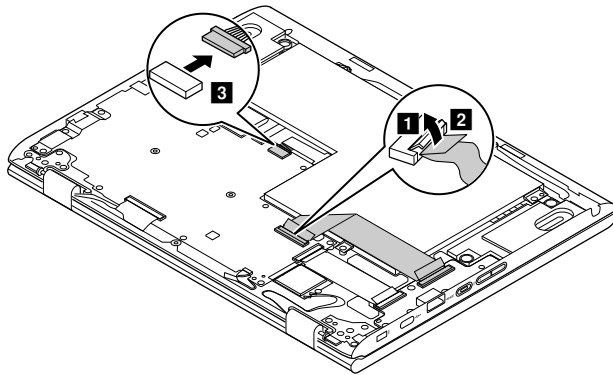
The LCD module is not a FRU. Instead, it contains FRUs as its components. Refer to “Disassemble the LCD module” on page 38 if you need to replace a FRU contained in the LCD module.

Remove the battery pack

Make sure the following FRUs (or CRUs) have been removed.

“Remove the back cover” on page 32

Step 1. Disconnect the cable that is on top of the battery; unplug the battery cable from the system board.



Attention: Use your fingernail to pull the connector to unplug it. Do not pull the cable itself.

Step 2. Remove the screws and take out the battery pack.

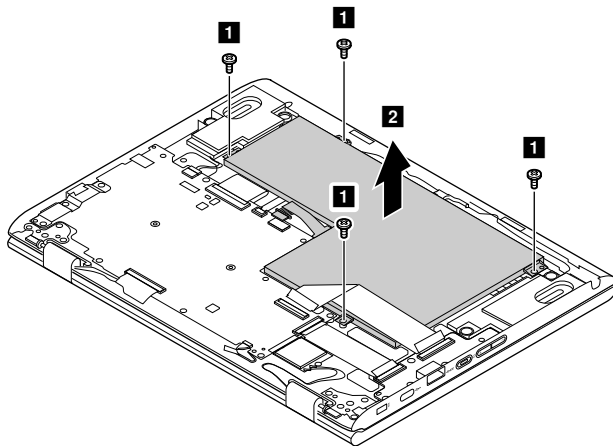


Table 7. Screw specifications

Screw location	Quantity	Specifications	Color
Battery pack to upper case	4	M2 × 4 mm	Silver

Refer to Table 16 “Part numbers for FRUs (CRUs)” on page 45 to look up the Lenovo part numbers for the following replacement parts:

Battery pack

Remove the speakers

Make sure the following FRUs (CRUs) have been removed.

“Remove the back cover” on page 32

Step 1. Unplug the speakers' cable from the system board.

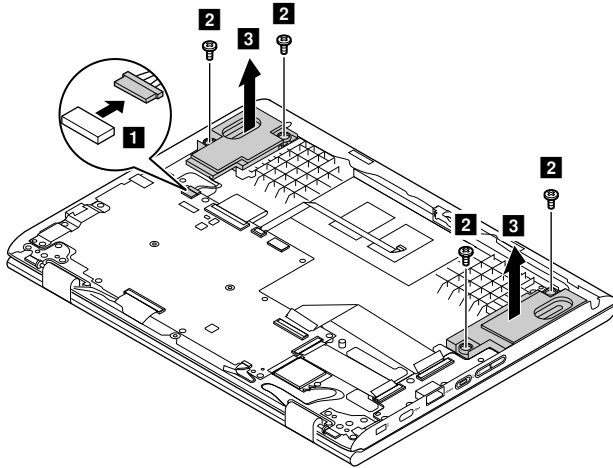


Figure 3. Unplug the speakers' cable from the system board

Step 2. Remove the screws.

Table 8. Screw specifications

Screw location	Quantity	Specifications
Speakers to upper case	4	M2 x 2.5 mm

Step 3. Carefully take the cable out of guiders and remove the speakers.

Refer to Table 16 “Part numbers for FRUs (CRUs)” on page 45 to look up the Lenovo part numbers for the replacement speakers.

Remove the WLAN & Bluetooth combo module

Make sure the following FRUs (CRUs) have been removed and the battery connector has been detached.

“Remove the back cover” on page 32

Step 1. Disconnect the white and black cables.

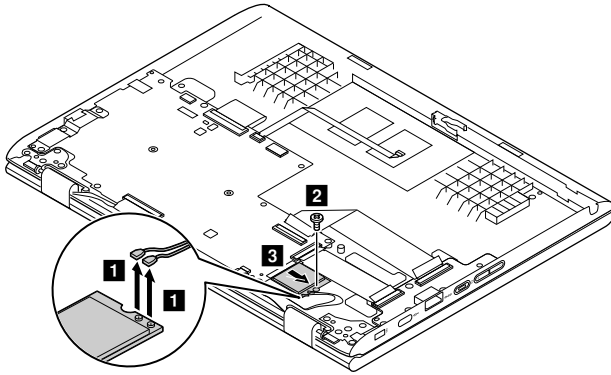


Figure 4. Disconnect antenna cables

Step 2. Remove the screw and pull out the WLAN & Bluetooth combo module in the direction as shown by the arrow.

Table 9. Screw specifications — removing the WLAN & Bluetooth combo module

Screw location	Quantity	Specifications
WLAN&Bluetooth combo card to upper case	1	M2 x 3 mm

Refer to Table 16 “Part numbers for FRUs (CRUs)” on page 45 to look up the Lenovo part numbers for the replacement WLAN & Bluetooth combo modules.

Remove the USB board

Make sure the following FRUs (CRUs) have been removed:

“Remove the back cover” on page 32

“Remove the LCD module” on page 33

Step 1. Disconnect the cables between the USB board and the system board.

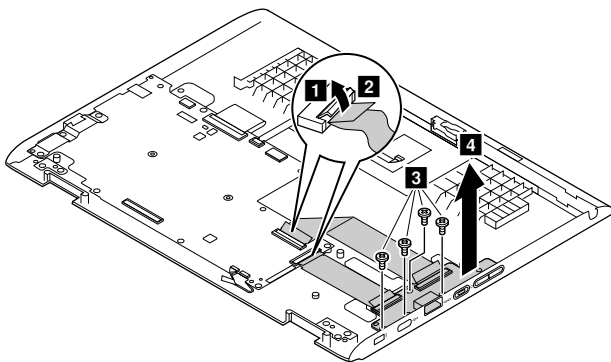


Figure 5. Disconnect the two cable

Step 2. Remove the screw.

Table 10. Screw specifications

Screw location	Quantity	Specifications
USB board to upper case	4	M2 x 4 mm

Step 3. Remove the USB bracket and the USB board.

Refer to Table 16 “Part numbers for FRUs (CRUs)” on page 45 to look up the Lenovo part numbers for the following replacement parts:

USB board

USB brackets

Note: The replacement USB board includes two cables for connecting with the system board; replacement USB brackets come in left and right pairs.

Remove the system board and WorldFacing camera

“Remove the back cover” on page 32

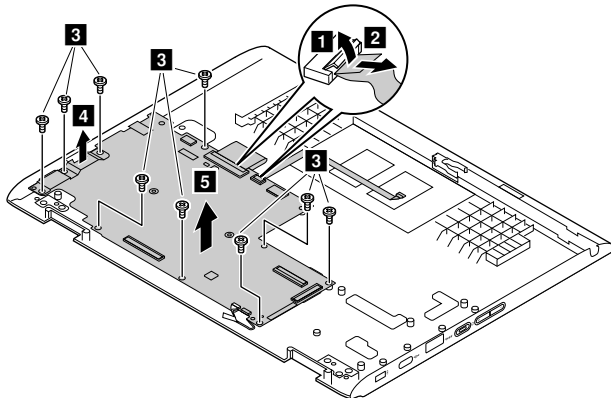
“Remove the LCD module” on page 33

“Remove the WLAN & Bluetooth combo module” on page 35

Step 1. Disconnect all cables from the system board.

Notes: Cables that are connected with the system board includes:

- Battery cable
- USB board cables
- Antenna cables
- LCD cable
- Speaker cable
- Touch pad cable
- Keyboard cable

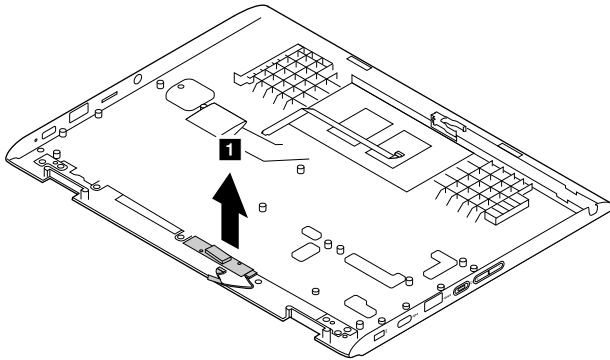


Step 2. Remove the screws and take out the system board.

Table 11. Screw specifications – removing the LCD module

Screw location	Quantity	Specifications
system board to upper case	8	M2 x4 mm

Step 3. Remove the WorldFacing camera.



Refer to Table 16 “Part numbers for FRUs (CRUs)” on page 45 to look up the Lenovo part numbers of the following replacement parts:

- System board
- USB brackets
- Secondary camera
- Upper case

Note: Replacement USB brackets come in left and right pairs; the secondary camera comes in a kit with rubbers, cables, sponges, and adhesive tapes.

Disassemble the LCD module

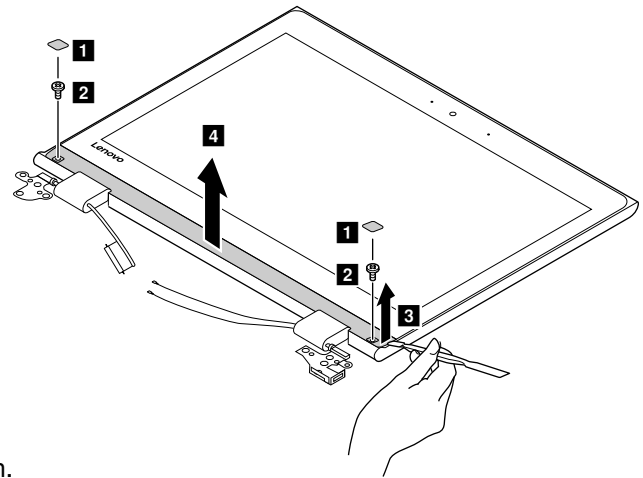
The LCD module as a whole is not a FRU. Instead, it contains FRUs as its components. Before disassembling the LCD module, make sure it has been detached from the base cover. Refer to “Remove the LCD module” on page 33 for instructions.

Remove the LCD strip cover

Step 1. Pry out the two rubbers and remove the screws underneath them.

Table 12. Screw specifications – removing the LCD bezel

Screw location	Quantity	Specifications
Strip cover to LCD base cover	2	M2 x 3 mm



Step 2. Pry the strip cover at the illustrated position.

Step 3. Detach and remove the strip cover.

Refer to Table 17 “Part numbers for LCD FRUs” on page 46 to look up the Lenovo part numbers for the following replacement parts.

Strip cover

Screen rubbers

Note: Screen rubbers come in a pack of 20.

Remove the LCD panel

Make sure the following FRUs (or CRUs) have been removed.

“Remove the LCD strip cover” on page 38

Step 1. Remove the screws.

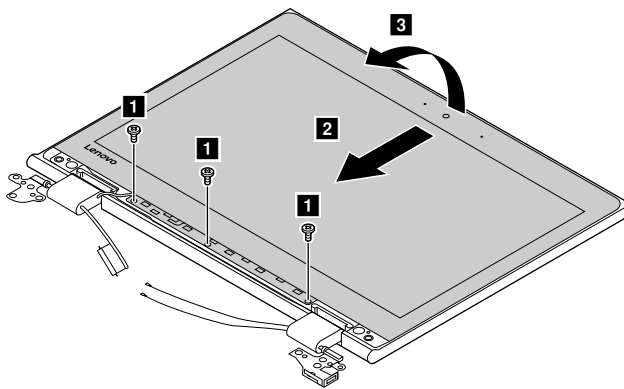


Figure 6. Remove 4 screws and lift up the LCD panel

Table 13. Screw specifications — removing the LCD panel

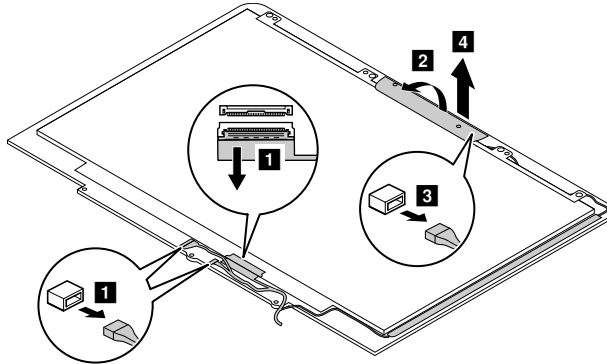
Screw location	Quantity	Specifications
LCD panel to LCD base cover	3	M2 × 3 mm

Step 2. Slide down the LCD panel in the illustrated direction **2**.

Step 3. Holding the upper edge of the LCD panel, slowly lift up the LCD panel **3**.

Attention: Do not remove the LCD panel at this step. The LCD panel is connected by a cable at the back side. Detach the cable before removing the LCD panel.

Step 4. From the back of the LCD panel, disconnect the LCD cable **1**, the gnomometer cable **2**, and the gnomometer cable **3**.



Step 5. Remove the LCD panel.

Refer to Table 17 “Part numbers for LCD FRUs” on page 46 to look up the Lenovo part numbers for replacement LCD panels.

Remove the hinges

Make sure the following FRUs (or CRUs) have been removed.

“Remove the LCD strip cover” on page 38

“Remove the LCD panel” on page 39

Step 1. Remove the screws.

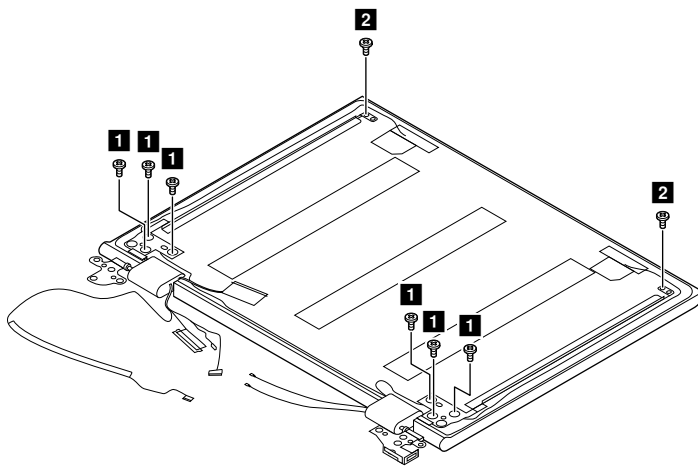
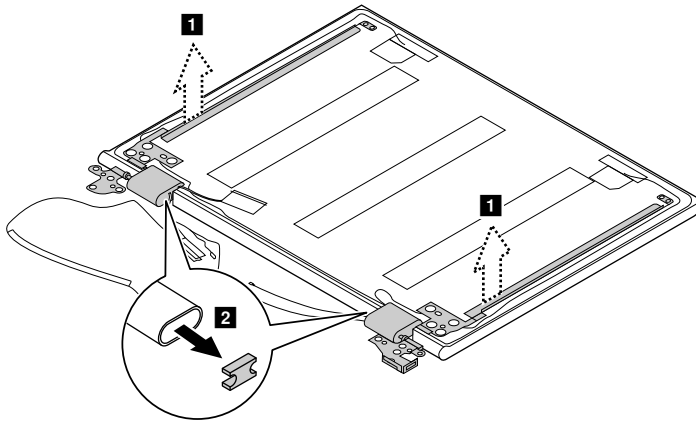


Table 14. Screw specifications — removing the hinges and the WLAN antennas

Number	Screw location	Quantity	Specifications
1	hinges to LCD base cover	6	M2 × 3 mm
2	hinges to LCD base cover	2	M2 × 2.5 mm

Step 2. Lift up the hinges **1**; pry out of the rubbers **2**, then take out all cables.



Refer to Appendix B “Lenovo part numbers for replacement FRUs” on page 45 to look up the Lenovo part numbers for the following replacement parts.

Hinges

Hinge rubbers

eDP cable

LCD back cover

Note: Replacement hinges come in left and right pairs; hinge rubbers come in a pack of 20; the eDP cable includes the LCD cable and the front-camera cable; the LCD back cover includes the antennas, aluminum foils, sponges, and accessory parts.

Appendix A. Features, controls, and connectors

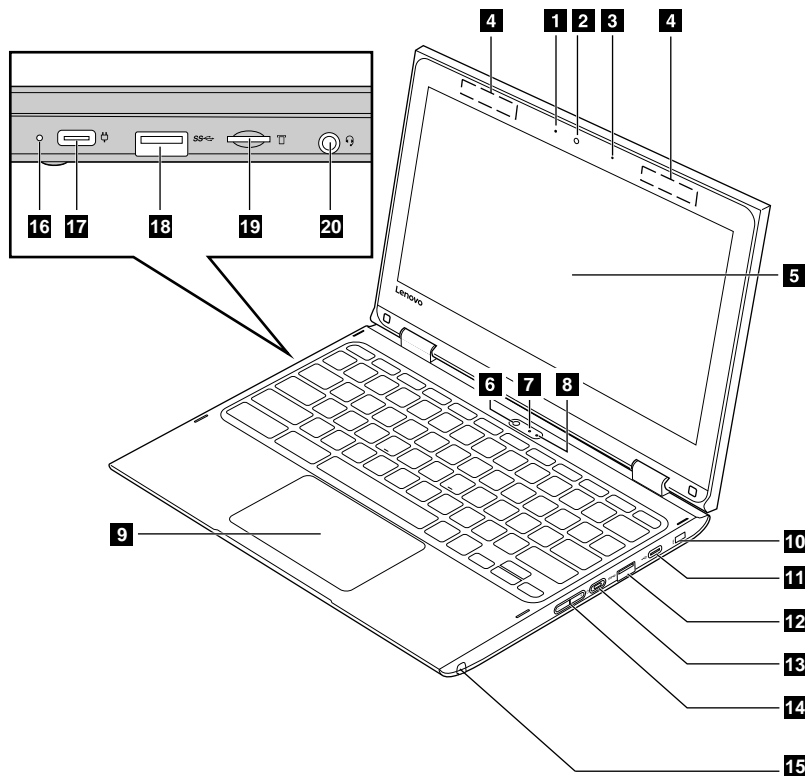


Figure 7. 500e Chromebook features and connectors

Table 15. 500e Chromebook features and connectors

No.	Feature or connector
1	Camera light
2	Camera (front)
3	Microphone hole
4	Wireless antennas (invisible from the outside)
5	Display (with touch function)
6	Secondary camera (WorldFacing)
7	Camera light
8	Microphone hole
9	Touch pad
10	Kensington Mini Security slot
11	USB (Type-C) connector
12	USB (Type-A) connector
13	Power button

Table 15. 500e Chromebook features and connectors (continued)

14	Volume buttons
15	Stylus
16	dc-in light
17	dc-in / USB (Type-C) connector
18	USB (Type-A) connector
19	microSD card slot
20	Combo audio connector

Appendix B. Lenovo part numbers for replacement FRUs

When servicing a customer's computer, Lenovo service technicians may use part numbers listed in the following tables to order replacement parts through Lenovo CRM (customer relationship management) system.

Table 16. Part numbers for FRUs (CRUs)

No.	FRU (CRU) category	Parts description	Lenovo part number
2	Upper case (with keyboard)		
		Upper Case B 81ES W/KB US	5CB0Q79737
		Upper Case B 81ES W/KB UK	5CB0Q79763
		Upper Case B 81ES W/KB ITA	5CB0Q79721
		Upper Case B 81ES W/KB SPA	5CB0Q79764
		Upper Case B 81ES W/KB LSP	5CB0Q79722
		Upper Case B 81ES W/KB CFEn	5CB0Q79766
		Upper Case B 81ES W/KB FR	5CB0Q79754
		Upper Case B 81ES W/KB GE	5CB0Q79718
		Upper Case B 81ES W/KB ARA	5CB0Q79746
		Upper Case B 81ES W/KB HEB	5CB0Q79731
		Upper Case B 81ES W/KB NOD	5CB0Q79758
		Upper Case B 81ES W/KB BEL	5CB0Q79741
		Upper Case B 81ES W/KB SW	5CB0Q79720
		Upper Case B 81ES W/KB USI	5CB0Q79743
		Upper Case B 81ES W/KB ROM	5CB0Q79723
		Upper Case B 81ES W/KB CZE	5CB0Q79757
		Upper Case B 81ES W/KB POL	5CB0Q79726
		Upper Case B 81ES W/KB POR	5CB0Q79728
3	Stylus		
		WCM CP90307B2 D6.0 EMR Pen	5T70Q39587
4	Secondary camera		
		2nd Camera 5M B 81ES	5C20Q79738
5	System board		
		MBB 81ES N3450 4G32GEMMC UMANOK	5B20Q79762
		MBB 81ES N3450 8G64GEMMC UMANOK	5B20Q79751
6	USB brackets		
		USB bracket(L+R) B 81ES	5B40Q79725

Table 16. Part numbers for FRUs (CRUs) (continued)

7	WLAN & Bluetooth combo module		
		Intel 7265 2x2AC+BT PCIE M.2 WLAN	SW10H24548
8	USB board		
		USB Board W/Cable B 81ES	5C50Q79756
9	Battery pack		
		SP/A L17M3PB0 11.25V42Wh3cellbty	5B10Q13163
		LG L17L3PB0 11.4V42Wh3cellbty	5B10Q13162
10	Speakers		
		Speaker(L+R) B 81ES	5SB0Q79732
11	Back cover		
		D Cover B 81ES	5CB0Q79740

Note: Refer to Appendix C “Lenovo part numbers for CRUs and miscellaneous parts” on page 47 to look up the Lenovo part numbers of ac power adapters and power cords.

Table 17. Part numbers for LCD FRUs

No.	FRU (CRU) category	Spare parts description	Lenovo part number
1	Display module		
		LCDModuleW/sensor/EMR Film B81ES	5D10Q79736
2	Rubber		
		Panel Rubber B 81ES	5R60Q79749
3	LCD strip cover		
		Strip Cover B 81ES	5CB0Q79752
4	Camera		
		Main Camera 720P B 81ES	5C20Q79760
5	Hinges		
		Hinge(L+R)B 81ES	5H50Q79755
6	Hinge rubbers		
		Hinge Rubber B 81ES	5R60Q79724
7	EDP cable		
		LCD Cable B 81ES	5C10Q79748
8	LCD base cover		
		LCD Cover B 81ES	5CB0Q79742

Appendix C. Lenovo part numbers for CRUs and miscellaneous parts

Part numbers for power cords, ac adapters, screw pack and rubber pack are listed in the following table.

Note: The power cords and ac adapters are CRUs.

Table 18. Part numbers for FRUs (CRUs)

CRU category	Parts description	Lenovo part number
Screw pack		
	Screw Pack B 81ES	5S10Q79729
Rubber pack		
	Panel Rubber B 81ES	5R60Q79749
ac power adapter		
	Chicony PD 3.0 45W 3pin	SA10E75843
	Liteon PD 3.0 45W 3pin	SA10E75841
	Chicony PD 3.0 45W 2pin	SA10E75844
	Liteon PD 3.0 45W 2pin	SA10E75842
	Delta PD 3.0 45W 2pin	SA10E75840
Power cord		
	LINETEK PC323+RVV300/300+LS15 1米电源线	145000600
	LINETEK LS15+H03VV-F+LP39 1米电源线	145000599
	LINETEK LS15+H03VV-F+LP-37 1米电源线	145000597
	LINETEK LS15 H03VV-F LP26A 1米电源线	145000596
	LINETEK LS15+H03VV-F+LP-41 1米电源线	145000595
	LINETEK LP-30B + SPT-2 + LS15 1米电源线	145000594
	LINETEK LP-61L+ H03VV-F+ LS15 1米电源线	145000593
	LINETEK PE-361+ H05VV-F+ LS15 1米电源线	145000592
	LINETEK LS15+H03VV-F+PE-336 1米电源线	145000591
	LINETEK LS15+H05VV-F+LP-E04A 1米电源线	145000590
	LINETEK LS15+H03VV-F+LP-23A 1米电源线	145000589
	LINETEK LS15+VCTF+LP-53 1米电源线	145000588
	LINETEK LS15+VCTF+LP-54 1米电源线	145000587
	LINETEK LS15+H03VV-F+PE-364 1米电源线	145000586
	LINETEK LP-34+H03VV-F + LS15 1米电源线	145000585
	Longwell LSG-31+RVV300/300+LS-18 1米电源线	145000568
	Longwell LP-24+H03VV-F+LS-18 1米电源线	145000567
	Longwell LP-40+H03VV-F+LS-18 1米电源线	145000566

Table 18. Part numbers for FRUs (CRUs) (continued)

	Longwell LP-37+H03VV-F+LS-18 1米电源线	145000565
	Longwell LP-46+H03VV-F+LS-18 1米电源线	145000564
	Longwell LP-41+H03VV-F+LS-18 1米电源线	145000563
	Longwell LP-30B+SPT-2 18AWG+LS-18 1米电源线	145000562
	Longwell LP-61L+H03VV-F+LS-18 1米电源线	145000561
	Longwell LP-67+BIS+LS-18 1米电源线	145000560
	Longwell LP-22+H03VV-F+LS-18 1米电源线	145000559
	Longwell LP-486+KTLH03VV-F+LS-5 1米电源线	145000558
	Longwell LP-23A+LFC-3R+LS-18 1米电源线	145000557
	Longwell LP-71+VCTF+LS-33 1米电源线	145000556
	Longwell LP-54+VCTF+LS-18 1米电源线	145000555
	Longwell LP-39+H03VV-F+LS-18 1米电源线	145000554
	Longwell LP-34A+H03VV-F+LS-18 1米电源线	145000553
	VOLEX GB10S3+RVV 300/500+VAC5S 1米电源线	145000538
	Volex US15S3+SPT-2 + VAC5S 1米电源线	145000537
	VOLEX MP5004+H03VV-F+VAC5S 1米电源线	145000605
	VOLEX MP232+H03VV-F+VAC5S 1米电源线	145000524
	VOLEX IT10S3+H03VV-F+VAC5S 1米电源线	145000535
	VOLEX MP233D+H03VV-F+VAC5S 1米电源线	145000534
	VOLEX M2511+KETI IEC+VAC5S 1米电源线	145000533
	VOLEX AU10S3+H03VV-F+VAC5S 1米电源线	145000532
	VOLEX TW15CS3+VCTF+VAC5S 1米电源线	145000531
	VOLEX VAC5S+VCTF+M755 1米电源线	145000530
	VOLEX VA2073+H03VV-F+VAC5S 1米电源线	145000528
	VOLEX CH10S3+H03VV-F+VAC5S 1米电源线	145000527
	VOLEX SI16S3+H03VV-F+VAC5S 1米电源线	145000526
	VOLEX M2511+H03VV-F+VAC5S 1米电源线	145000525
	lux 0036+RVV 300/300 0.75/3C+0002 1米电源线	145500003
	lux 0040+H03VV-F 0.75/3C+0011 1米电源线	145500015
	lux 0048+H03VV-F 0.75/3C+0011 1米电源线	145500014
	lux 0027+H03VV-F 0.75/3C+0011 1米电源线	145500013
	lux 0034+H03VV-F 0.75/3C+0011 1米电源线	145500011
	lux 0041+H03VV-F 0.75/3C+0011 1米电源线	145500012
	lux 0014+SPT-2 60°C 18/3C+0016 1米电源线	145500002
	lux 0014+H03VV-F 0.75/3C+0011 1米电源线	5L60J33143
	lux 0031+H03VV-F 0.75/3C+0011 1米电源线	145500000
	lux 0046+IS694 0.75/3C+0011 1米电源线	145500004

Table 18. Part numbers for FRUs (CRUs) (continued)

	lux 0029+H03VV-F 0.75/3C+0011 1米电源线	145500009
	lux 0033+H03VV-F 0.75/3C+0011 1米电源线	145500008
	lux 0038+H03VV-F 0.75/3C+0011 1米电源线	145500006
	lux 0019+VCTF 0.75/3C+0021 1米电源线	145500007
	lux 0018(E)+VCTF 0.75/3C+0021 1米电源线	145500005
	lux 0044+H03VV-F 0.75/3C+0011 1米电源线	145500010
	lux 0033+H03VV-F 0.75/3C+0011 1米电源线	145500001
	LINETEK PC205+RVV 0.75/2C+LS7H 1米电源线	145500018
	LINETEK LP40+H03VVH2-F+LS7H 1米电源线	145500030
	LINETEK LP25+H03VVH2-F+LS7H 1米电源线	145500028
	LINETEK LP45+H03VV-F+LS7H 1米电源线	145500029
	LINETEK LP5+SPT-2 #18/2C+ LS7H 1米电源线	145500021
	LINETEK LP61L+H03VVH2-F+ LS7H 1米电源线	145500019
	LINETEK LP28+IS:694 0.75/2C+ LS7H 1米电源线	145500020
	LINETEK LPE03A+H03VVH2-F+LS7H 1米电源线	145500025
	LINETEK LP15A+H03VVH2-F+LS7H 1米电源线	145500023
	LINETEK LP51A+VCTFK 0.75/2C+LS7H 1米电源线	145500027
	LINETEK LP51A+HVCTFK 0.75/2C+LS7H 1米电源线	145500026
	LINETEK PE364("O")+H03VVH2-F+LS7H 1米电源线	145500024
	LINETEK LP21+H03VVH2-F+ LS7H 1米电源线	145500022
	Longwell LSG-21+RVV300/300+LS-72 1米电源线	145500069
	Longwell LP-16+H03VVH2-F+LS-7 1米电源线	145500070
	Longwell LP-18A+H03VVH2-F+LS-18 1米电源线	145500071
	Longwell LP-55+H03VVH2-F+LS-7 1米电源线	145500072
	Longwell LP-11+SPT-2+LS-7C/7J 1米电源线	145500073
	Longwell LP-61L+H03VVH2-F+ LS-7 1米电源线	145500074
	Longwell LP-77+Longwell-p 2X+LS-7 1米电源线	145500075
	Longwell LP-57+H03VVH2-F+LS-7KS 1米电源线	145500076
	Longwell LP-15A+LFC-2F+LS-7 1米电源线	145500077
	Longwell LP-70+VCTFK+LS-31 1米电源线	145500078
	Longwell LP-51A+VCTFK+LS-7C/7J 1米电源线	145500079
	Longwell LP-39+H03VVH2-F+LS-7 1米电源线	145500080
	Longwell LP-21+ H03VVH2-F+LS-7 1米电源线	145500081
	Lux 2pin 1M C7 cord Thailand type	5L60J39488

Appendix D. Label locations

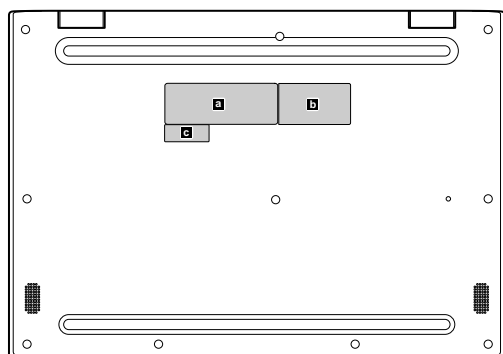


Figure 8. Label layout on the back side of the back cover

Labels attached to the base cover are country/region specific. If you need to replace the back cover of customer's computer, apply the appropriate labels to the replacement back cover.

Table 19. All base cover labels

Label	Label description	Applied country/region	Label dimensions
a	Rating label	all	66 mm x 24 mm
b	Rating label (printed at factory)	all	43 mm x 24 mm
c	Radio certification label		
	ICASA label	South Africa	20 mm x 10 mm
	Israel label	Israel	32 mm x 10 mm
	Anatel label	Brazil	35 mm x 5 mm
	FCC/IC ID label	USA, Canada	32 mm x 10 mm
	Malaysia label	Malaysia	8 mm x 8 mm
	EU RED label	European Union	78 mm x 27 mm
	Japan radio label	Japan	57 mm x 33 mm
	Indonesia radio label	Indonesia	15 mm x 10 mm

Note: Radio certification labels are country/region specific. Only the certification label for the country/region that the product is shipped is attached. Not all countries/regions include certification labels.

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