Contents

3  About This Guide
4  Identification
5  Directive 2012/19/EU Annex VII Components
6  Safety Considerations
9  Recommended Tools
10  Disassembly Instructions
29  Material Categorization of Output Fractions
About This Guide

Apple Recycler Guides provide guidance for electronics recyclers on how to disassemble products to maximize recovery of resources. The guides provide step-by-step disassembly instructions and information on the material composition to help recyclers direct fractions to the appropriate material recycler.

To conserve important resources, we work to reduce the materials we use and aim to one day source only recycled or renewable materials in our products. A key path to reaching that goal is resource recovery from end-of-life electronics.

Disassembly procedures are intended to be performed only by trained electronics recycling professionals. The recycler is responsible for independently evaluating and ensuring compliance with all applicable environmental, health, and safety laws related to the work. These include but are not limited to laws relating to the management, handling, shipping, and disposal of the outputs of this work as waste and laws in place to ensure the health and safety of all employees who support this work.

For questions or feedback about this guide, email contactesci@apple.com.
Identification

You can find the model number on the underside of the MacBook Air.

Model number:
A1466
Directive 2012/19/EU Annex VII Components

Directive 2012/19/EU Annex VII requirements apply to the following substances and components.

<table>
<thead>
<tr>
<th>Substance/Component</th>
<th>Apple Part Name</th>
<th>Removal Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Printed circuit board if the surface is greater than 10 square centimeters</td>
<td>Main logic board, keyboard, data board assembly, light-emitting diode (LED) logic board</td>
<td>Follow steps 1–26</td>
</tr>
<tr>
<td>External electric cables</td>
<td>Charge cable</td>
<td>Follow step 1</td>
</tr>
<tr>
<td>Battery</td>
<td>Lithium-ion polymer batteries</td>
<td>Follow steps 1–3</td>
</tr>
<tr>
<td>Cover glass and liquid crystal display (LCD) cell if the surface is greater than</td>
<td>LCD cell</td>
<td>Follow steps 1–25</td>
</tr>
<tr>
<td>100 square centimeters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No further substances or components as listed in Annex VII</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Safety Considerations

The recycler is responsible for independently evaluating all activities undertaken by its employees to perform or support the work and ensuring compliance with all applicable health and safety laws related to the work. These include but are not limited to laws relating to the health and safety of all employees who perform or support this work. The recycler is also responsible for evaluating the workspace and ensuring that the area in which the work is to be undertaken is designed using ergonomic best practices and meets all ergonomic requirements to ensure the protection of its employees.

Personal Protective Equipment

Personal protective equipment should be worn during the entire recycling process.

- Wear hand protection
- Wear eye protection
- Wear protective clothing
- Wear a mask
- Wear foot protection

Battery Safety

This product uses a lithium-ion polymer battery. Before beginning any disassembly work, ensure that a safe working procedure for handling lithium-ion batteries has been established, which could include discharging the batteries so that they can be more safely managed. The following considerations may also be included:

- Remove anything from your person that could conduct energy, such as jewelry and watches, to avoid electric shock to yourself or the logic board.
- To avoid the potential for thermal runaway and the release of potentially noxious fumes, don’t puncture, strike, or crush lithium-ion polymer batteries or devices powered by them.
- Don’t throw, drop, or bend the battery.
- Don’t expose the battery to excessive heat or sunlight.
- Don’t use tools that are sharp or conduct electricity.
- Keep your workspace clear of foreign objects and sharp materials.
- Dispose of batteries according to local environmental laws and guidelines.
Workspace safety guidelines

- Use heat-resistant gloves and safety glasses.
- Keep a sand dispenser within arm's reach (2 feet or 0.6 m) on one side of the workstation, not above the workstation. The dispenser should be a wide-mouthed, quick-pour metal container with a flip-top lid or tray that contains 8–10 cups (1.9–2.4 L) of clean, dry, untreated sand.
- Keep the battery at least 2 feet (0.6 m) from paper and other combustible materials.
- Work in an area with adequate ventilation.

Handling a thermal runaway

If you notice any of the following signs, a thermal runaway is likely underway, and you should act immediately:

- The lithium-ion polymer battery or a device containing one begins to smoke or emit sparks or soot.
- The battery pouch suddenly and quickly puffs out.
- You hear hissing or popping sounds.

Don’t use water or an ABC/CO₂ fire extinguisher on a thermal runaway battery or a device containing one. Water and ABC/CO₂ fire extinguishers will not stop the reaction.

Do smother the battery or device immediately with plenty of clean, dry sand, dumped all at once. Timing is critical; the faster you pour all the sand, the faster the thermal runaway will stop.

Do leave the room for 30 minutes if the thermal runaway causes any irritation.

Do wait 30 minutes before touching the battery. Wear heat-resistant gloves and safety glasses to remove the battery from the sand, or use a touchless thermometer to measure the battery temperature. Only touch the battery when the event has finished.

Do dispose of the damaged battery or device (including any debris removed from the sand) according to local environmental laws and guidelines.

LED Safety

Broken light-emitting diodes (LEDs) must be handled properly to ensure the safety of your employees and mitigate any hazards. Package broken LEDs in an appropriate container to properly manage the hazards associated with the materials and store only with compatible materials. All waste must be properly classified, packaged, and labeled in accordance with all relevant laws and regulations.
Hazard Warnings

- Rechargeable battery hazard
- Sharp edges—cut hazard
- Broken glass hazard
- Chemical exposure hazard
- Chemical inhalation hazard
Recommended Tools

- Nail-pulling screwdriver
- Pentalobe P4 screwdriver
- Phillips screwdriver
- Plastic pry bar
- Screwdriver-handle pry bar
- Wire cutters
Disassembly Instructions

1. Remove the power adapter and the charge cable.
   - Ensure that the MacBook Air is turned off.
   - Unplug the power adapter. Disconnect the charge cable.
2. Remove the bottom case by unscrewing the 10 pentalobe P4 fasteners.
3. From the top case, carefully remove the four lithium-ion polymer batteries.

![Image of battery removal](image1)

**Rechargeable battery hazard**

4. Pry off both speakers.

![Image of speaker removal](image2)
5. Pry off the battery heat shield. Set the top case aside.

6. Separate the battery heat shield from the power supply cables and logic board.
7. Pull the power supply cables off the power supply logic board.
8. Remove the trackpad from the top case.
   
   » Push the trackpad down.
   
   » Pull it out from under the top case. Set the top case aside.

9. Pry off the trackpad logic board.

Tools Used

Fraction

Trackpad logic board

PMs
10. Pry off the sensor protective film and trackpad plate.
11. From the top case, remove the thermal duct.

12. Remove the ribbon cable from the main logic board.
13. Pry off the fan.

14. Pry off the main logic board.
15. Remove the trackpad ribbon cable and keyboard cable.

16. Remove the plastic keyboard sheet from the keyboard.
17. Bend the display and top case back and forth until they break apart. Set the display aside.

⚠️ Sharp edges—cut hazard
18. Separate the keyboard and trackpad enclosure by breaking the top case in half.

![Keyboard and trackpad enclosure]

Tip: Sharp edges—cut hazard

19. Pry off the display frame.

![Display frame]

Tools Used:
- Screwdriver

PMs: 
- Keyboard
- Trackpad enclosure

Precious Metals: 
- Al (Aluminum)
20. Remove the camera with logic board.

» Unscrew the three Phillips fasteners.

» Pull off the camera with logic board and the attached camera cable. Set the display aside.
21. Cut the camera with logic board off the camera cable.
22. On the display, pull off the antenna cover.

23. Remove the antenna by unscrewing the nine Phillips fasteners.
24. Pry off the data board assembly.
25. Remove the LCD cell and display films.

» **Broken glass hazard**

» **Chemical exposure hazard**

» **Unscrew the five Phillips fasteners.**

» **Pry off the LCD cell and display films.**
26. Pry off the LED logic board.

Chemical inhalation hazard
27. Bend the display housing until the four magnets pop up. Pull off the magnets.
# Material Categorization of Output Fractions

All outputs from this process must be managed, handled, and disposed of in accordance with applicable waste laws and regulations, including but not limited to the Waste Framework Directive and its national enactments in Europe.

<table>
<thead>
<tr>
<th>Fraction</th>
<th>Downstream Processing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aluminum</strong></td>
<td></td>
</tr>
<tr>
<td>Bottom case</td>
<td></td>
</tr>
<tr>
<td>Trackpad plate</td>
<td></td>
</tr>
<tr>
<td>Trackpad enclosure</td>
<td></td>
</tr>
<tr>
<td>Display frame</td>
<td></td>
</tr>
<tr>
<td>Display housing</td>
<td></td>
</tr>
</tbody>
</table>

- **Primary Target Material**: Al
- **Potential Additional Materials**: PL
<table>
<thead>
<tr>
<th>Fraction</th>
<th>Downstream Processing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Batteries</strong></td>
<td><strong>Primary Target Material</strong></td>
</tr>
<tr>
<td><img src="image" alt="Batteries" /></td>
<td>BT</td>
</tr>
</tbody>
</table>

Lithium-ion polymer batteries (x4)

<table>
<thead>
<tr>
<th><strong>Ferrous</strong></th>
<th><strong>Primary Target Material</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Ferrous" /></td>
<td>Fe</td>
</tr>
</tbody>
</table>

Battery heat shield

Fasteners (x27)

<table>
<thead>
<tr>
<th><strong>Glass</strong></th>
<th><strong>Primary Target Material</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Glass" /></td>
<td>GL</td>
</tr>
</tbody>
</table>

Trackpad

<table>
<thead>
<tr>
<th><strong>Potential Additional Materials</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Potential Additional Materials" /></td>
</tr>
</tbody>
</table>

LCD cell
<table>
<thead>
<tr>
<th>Logic Boards</th>
<th>Primary Target Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply logic board</td>
<td>PMs</td>
</tr>
<tr>
<td>Trackpad logic board</td>
<td></td>
</tr>
<tr>
<td>Main logic board</td>
<td></td>
</tr>
<tr>
<td>Keyboard</td>
<td>GL</td>
</tr>
<tr>
<td>Camera with logic board</td>
<td>PL</td>
</tr>
<tr>
<td>Data board assembly</td>
<td></td>
</tr>
<tr>
<td>LED logic board</td>
<td></td>
</tr>
<tr>
<td>Fraction</td>
<td>Downstream Processing</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Mixed Electronics</td>
<td></td>
</tr>
<tr>
<td>Power adapter and charge cable</td>
<td><img src="image" alt="Power adapter and charge cable" /></td>
</tr>
<tr>
<td>Power supply cables</td>
<td></td>
</tr>
<tr>
<td>Sensor protective film</td>
<td></td>
</tr>
<tr>
<td>Fan</td>
<td></td>
</tr>
<tr>
<td>Ribbon cables</td>
<td></td>
</tr>
<tr>
<td>Camera cable</td>
<td></td>
</tr>
<tr>
<td>Antenna</td>
<td></td>
</tr>
</tbody>
</table>

### Primary Target Material

- **Cu** (Copper)

### Potential Additional Materials

- **Fe** (Ferrous)
- **PL** (Plastics)
- **PMs** (Precious Metals)
<table>
<thead>
<tr>
<th>Fraction</th>
<th>Downstream Processing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mixed Plastics</strong></td>
<td><strong>Primary Target Material</strong></td>
</tr>
<tr>
<td><img src="image" alt="Thermal duct" /></td>
<td>PL</td>
</tr>
<tr>
<td><img src="image" alt="Keyboard sheet" /></td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Antenna cover" /></td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Display films" /></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Rare Earth Magnets</strong></th>
<th><strong>Primary Target Material</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Speakers" /></td>
<td>REE</td>
</tr>
<tr>
<td><img src="image" alt="Magnets (x4)" /></td>
<td></td>
</tr>
</tbody>
</table>

**Potential Additional Materials**
- Cu  (Copper)
- Fe  (Ferrous)
- PL  (Plastics)