



MacBook Air (M2, 2022)

Apple Recycler Guide

July 2023

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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.

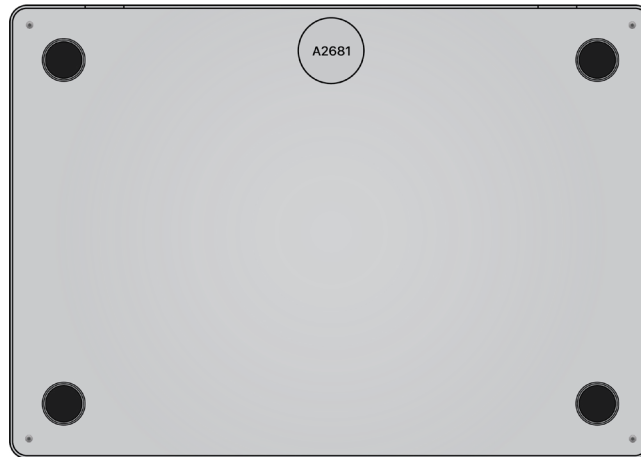
To conserve important resources, we work to reduce the materials we use and aim to one day source only recycled or renewable materials in our products. A key path to reaching that goal is resource recovery from end-of-life electronics.

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:
A2681

Directive 2012/19/EU Annex VII Components

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

| Substance/Component | Apple Part Name | Removal Instructions |
|---|--|-----------------------------|
| Printed circuit board if the surface is greater than 10 square centimeters | Trackpad, main logic board, audio board, data board assembly, light-emitting diode (LED) logic board | Follow steps 1–18 |
| External electric cables | Charge cable | Follow step 1 |
| Battery | Lithium-ion polymer batteries | Follow steps 1–3 |
| Cover glass and liquid crystal display (LCD) cell if the surface is greater than 100 square centimeters | LCD cell | Follow steps 1–15 |
| No further substances or components as listed in Annex VII | | |

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 foot protection



Wear eye protection



Wear a mask



Wear protective clothing

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.

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.

Hazard Warnings



Rechargeable battery hazard



Sharp edges—cut hazard



Chemical exposure hazard



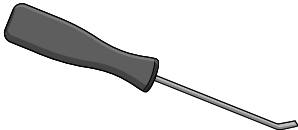
Broken glass hazard



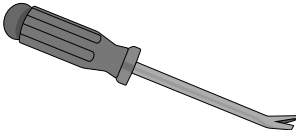
Chemical inhalation hazard

Recommended Tools

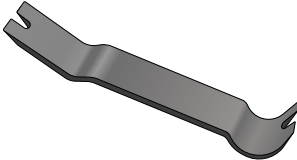
Miniature pry bar



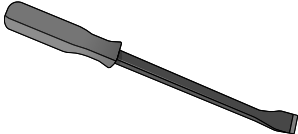
Nail-pulling screwdriver



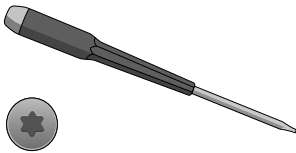
Plastic pry bar



Screwdriver-handle pry bar



Torx T5 screwdriver



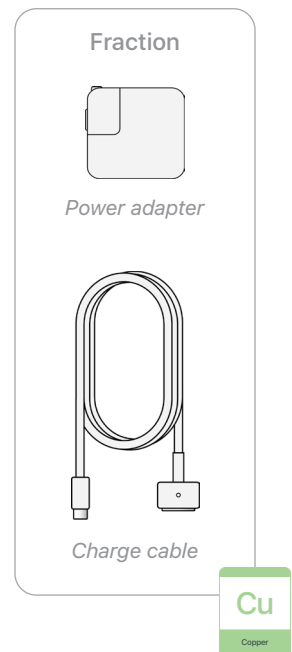
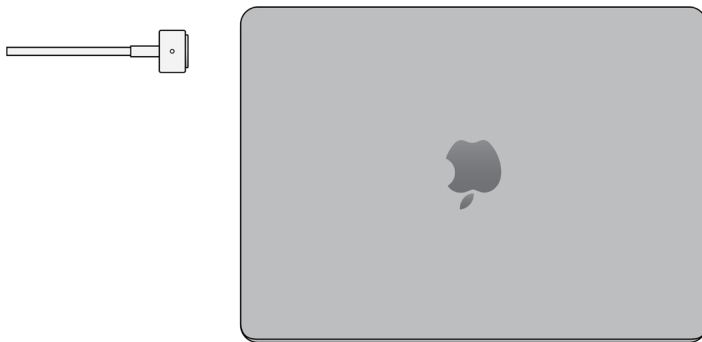
Disassembly Instructions

1. Remove the power adapter and the charge cable.

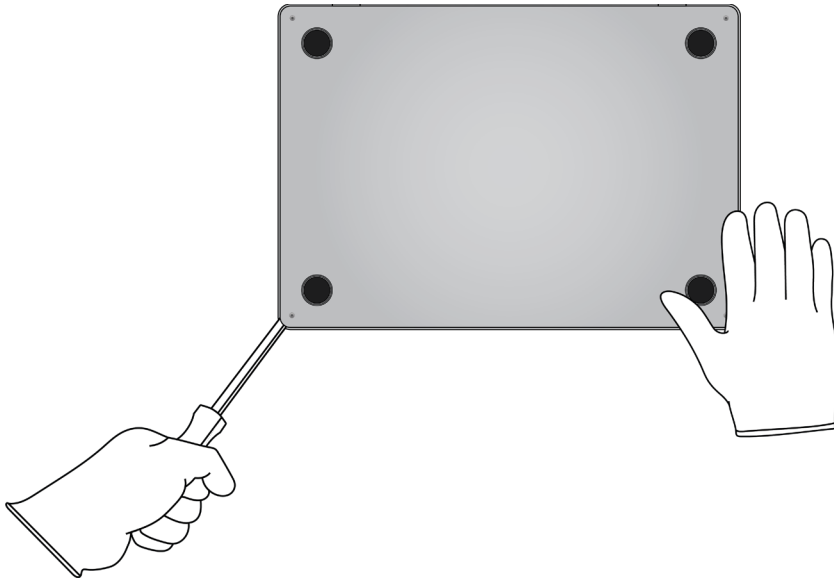
» *Ensure that the MacBook Air is turned off.*



» *Unplug the power adapter. Disconnect the charge cable.*



2. Carefully pry off the bottom case near the fasteners to avoid damaging the batteries.



Tools Used



Fraction



Bottom case

Al

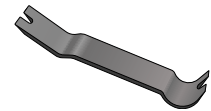
Aluminum

3. From the top case, carefully remove the four lithium-ion polymer batteries.



Rechargeable battery hazard

Tools Used



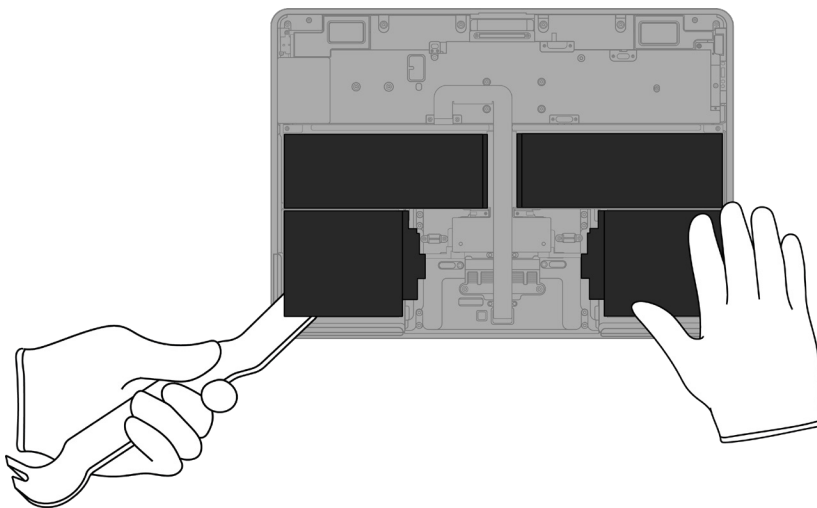
Fraction



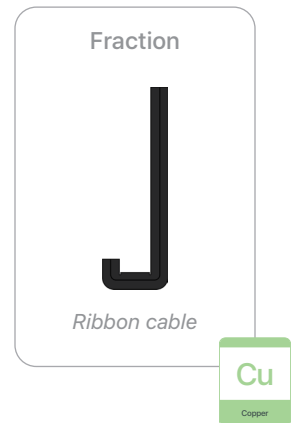
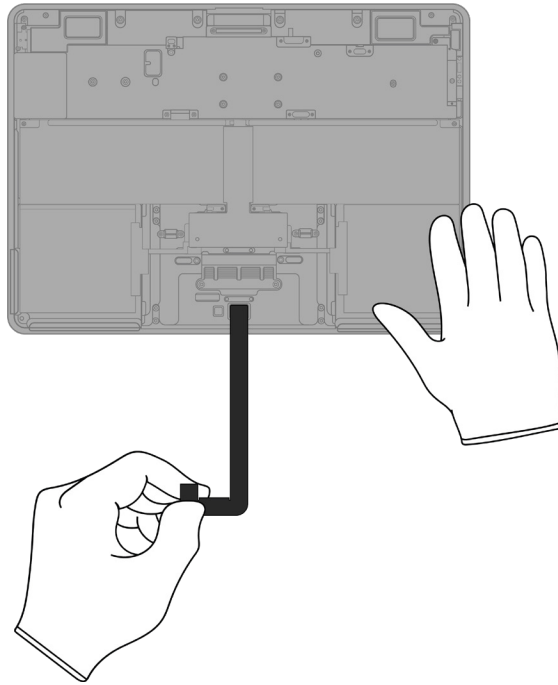
Lithium-ion polymer
batteries (x4)

BT

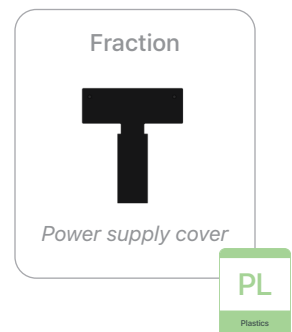
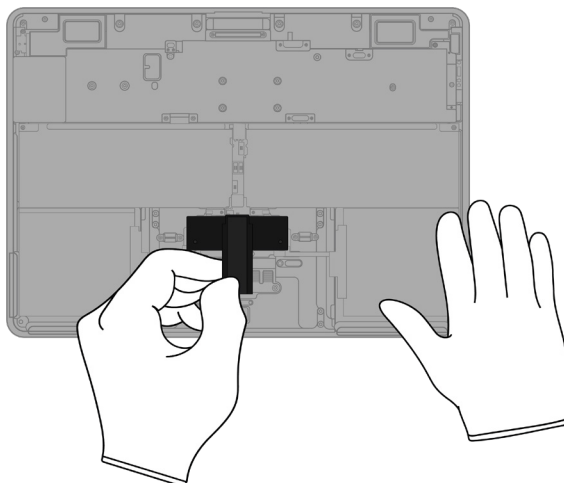
Battery



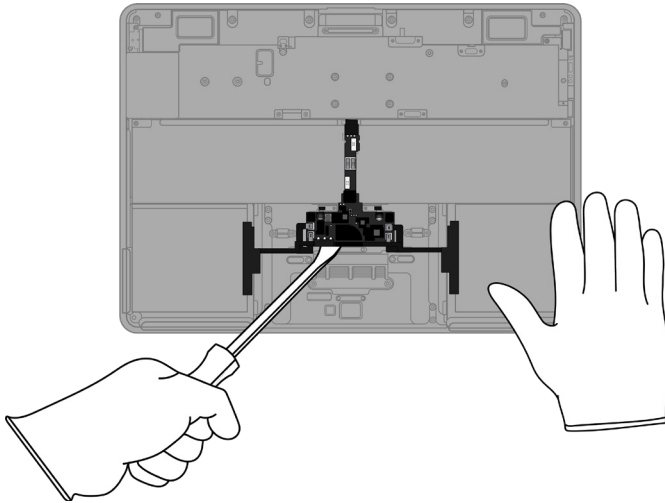
4. Pull off the ribbon cable.



5. Remove the power supply cover.



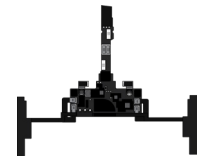
6. Pry off the power supply logic board.



Tools Used



Fraction

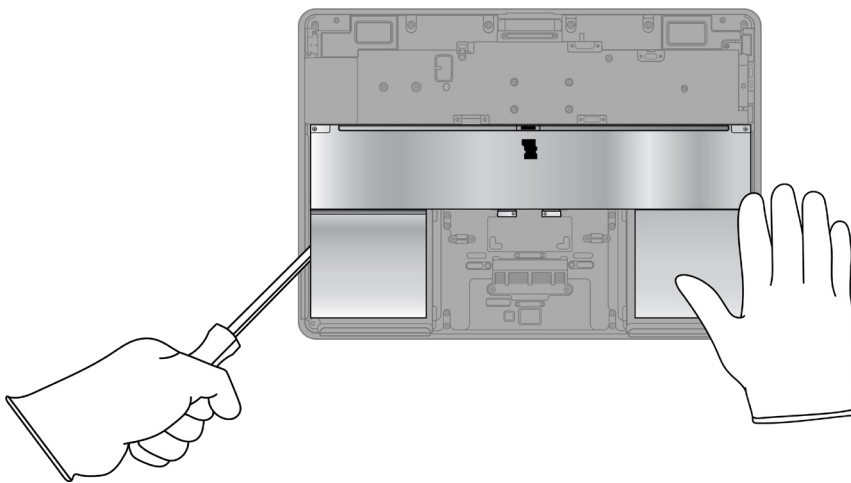


Power supply logic board

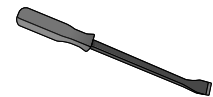
PMs

Precious Metals

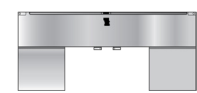
7. Pry off the battery shield.



Tools Used



Fraction

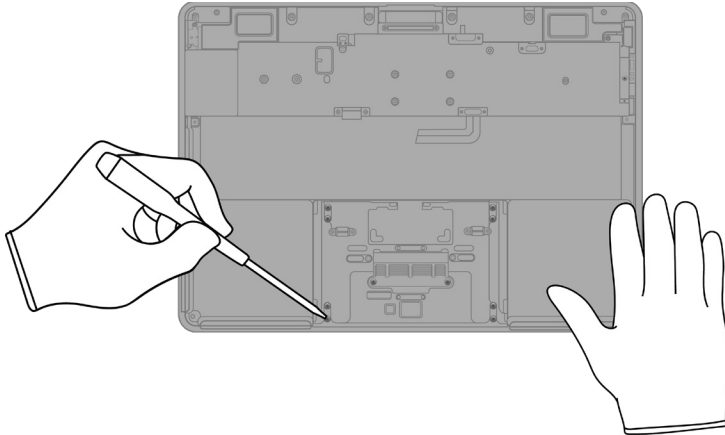


Battery shield

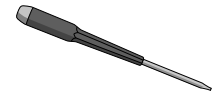
Fe

Ferrous

8. Remove the trackpad by unscrewing the 10 Torx T5 fasteners.



Tools Used



Fraction



Fasteners (x10)

Fe

Ferrous

Fraction

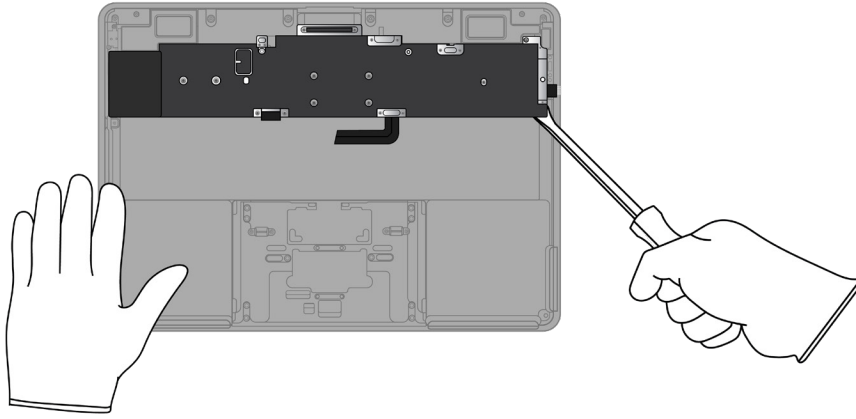


Trackpad

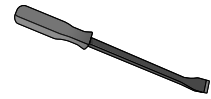
PMs

Precious Metals

9. Pry off the main logic board.



Tools Used



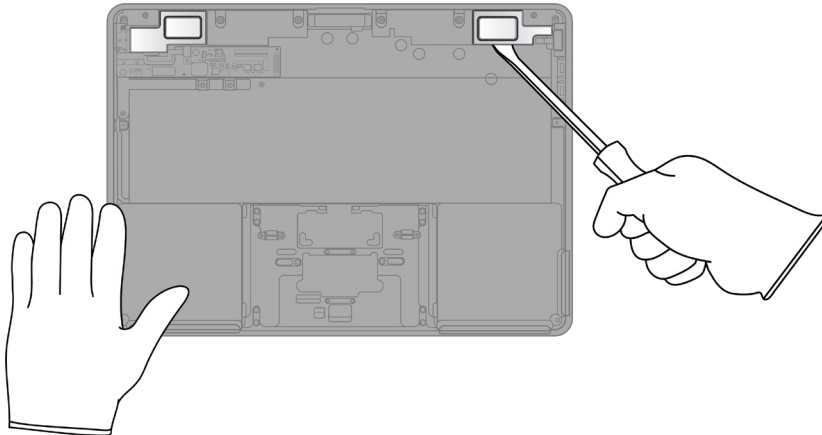
Fraction



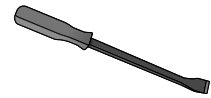
Main logic board

PMs
Precious Metals

10. Pry off both speakers.



Tools Used



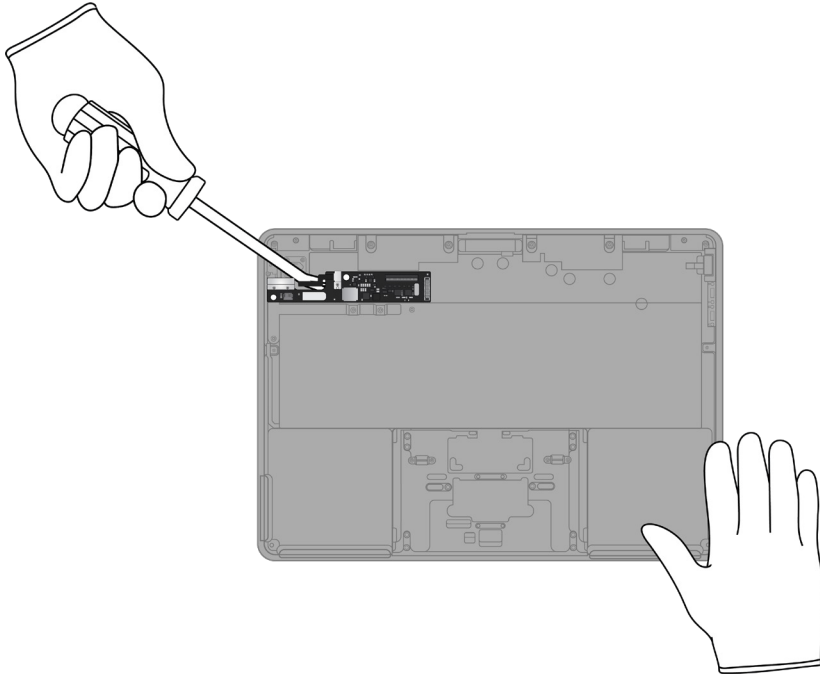
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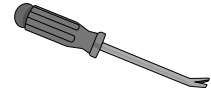
Speakers (x2)

REE
Rare Earth Elements

11. Pry off the audio board.



Tools Used



Fraction



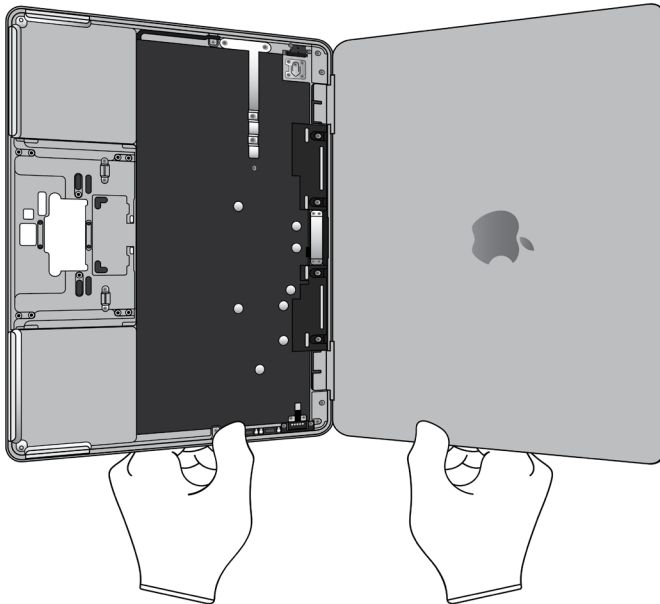
Audio board



12. Separate the display and top case by bending them back and forth until the hinges break apart. Set the display aside.



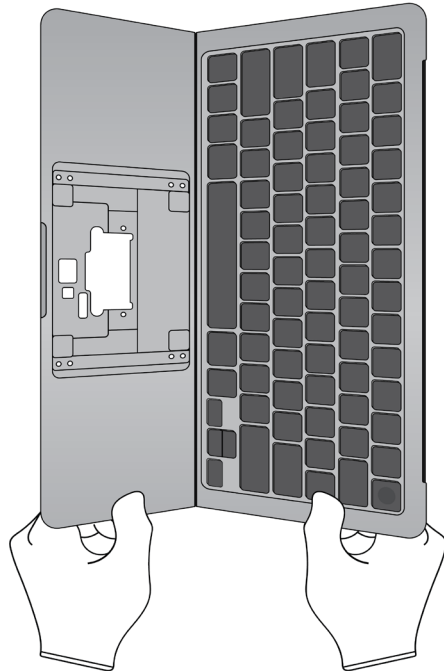
Sharp edges—cut hazard



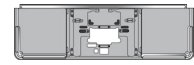
13. Separate the keyboard and trackpad enclosure by breaking the top case in half.



Sharp edges—cut hazard



Fraction



Trackpad enclosure

Al

Aluminum

Fraction

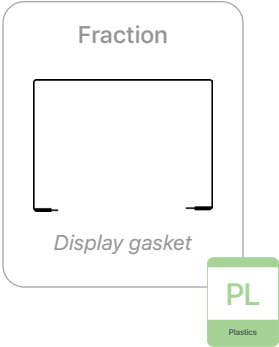
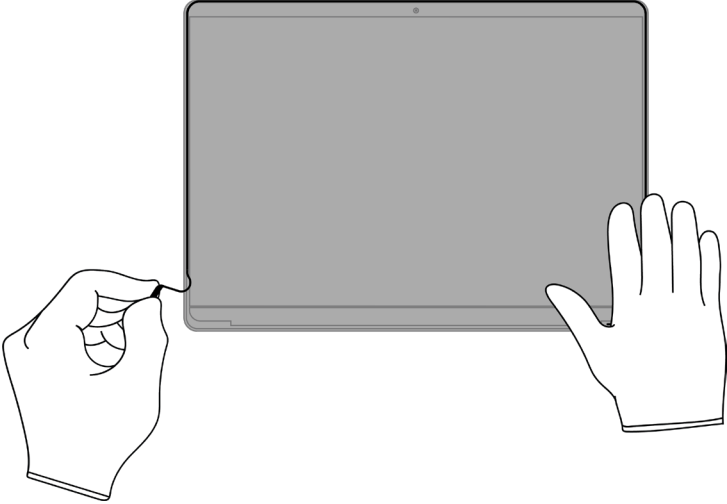


Keyboard

Cu

Copper

14. On the display, pull off the display gasket.



15. Remove the LCD cell and plastic films.

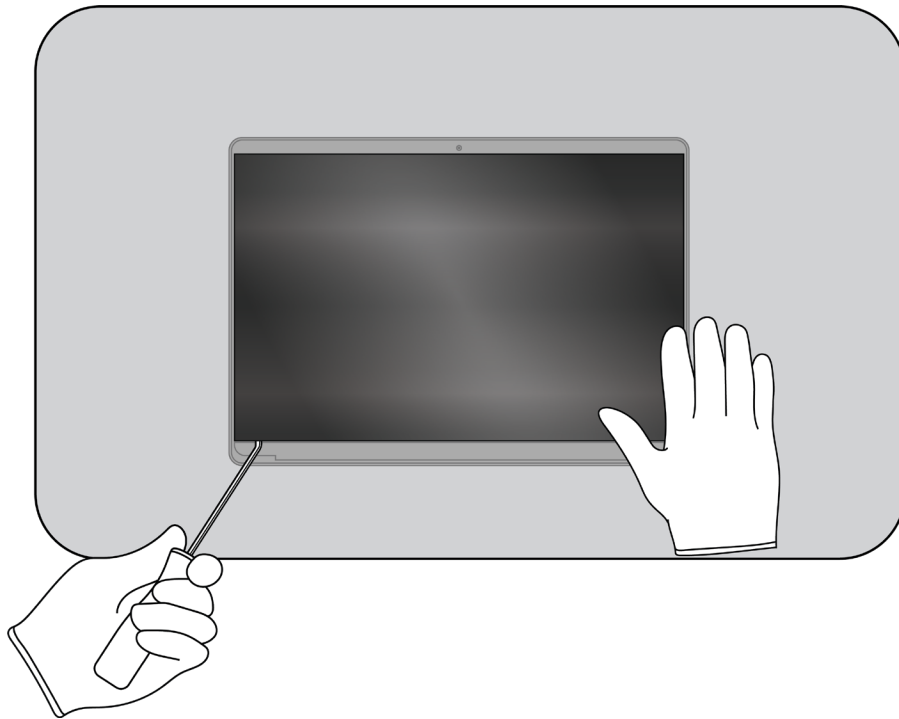
- » *Pry the LCD cell and display films away from the display housing.*
- » *Separate the LCD cell and display films by hand.*



Chemical exposure hazard



Broken glass hazard



Tools Used



Fraction



LCD cell

GL

Glass

Fraction



Display films

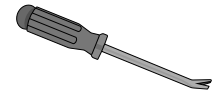
PL

Plastics

- 16.** Pry the data board assembly off the display housing.



Tools Used



- 17.** Separate the data board assembly cover from the data board assembly.



Fractions



Data board assembly cover

PL

Plastics

Fraction



Data board assembly

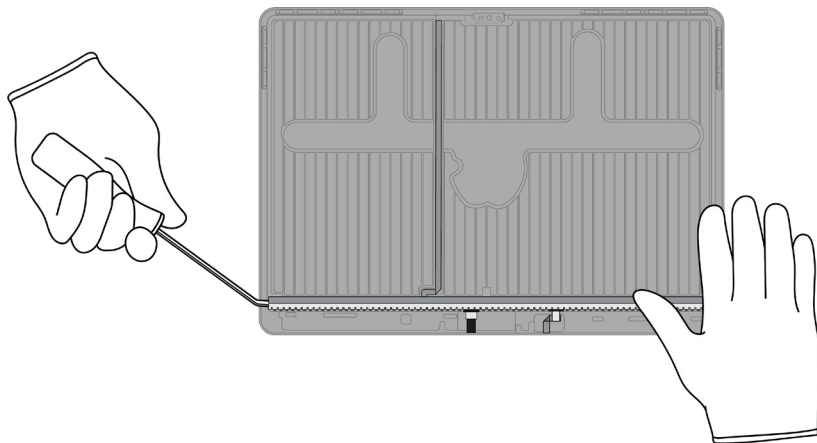
PMs

Precious Metals

18. Pry the LED logic board off the display housing.



Chemical inhalation hazard



Tools Used



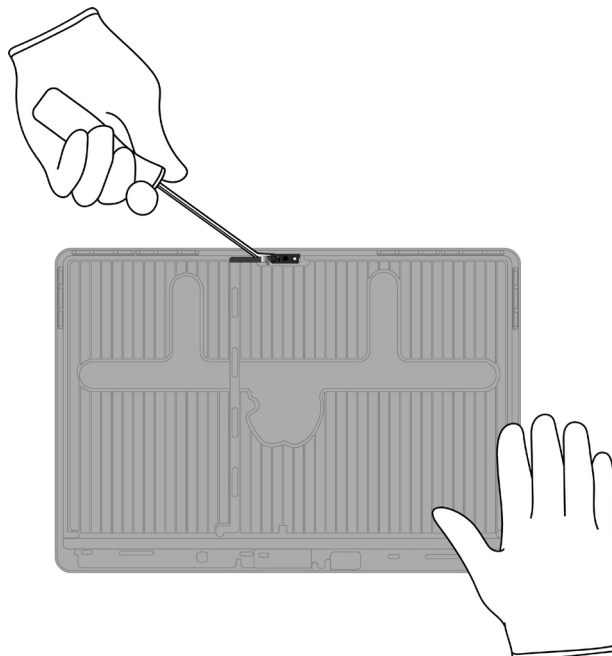
Fraction



LED logic board

PMs
Precious Metals

19. Pry off the camera.



Tools Used



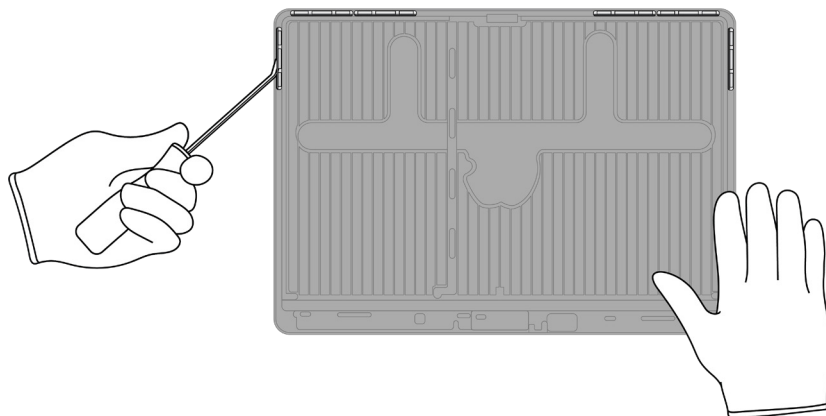
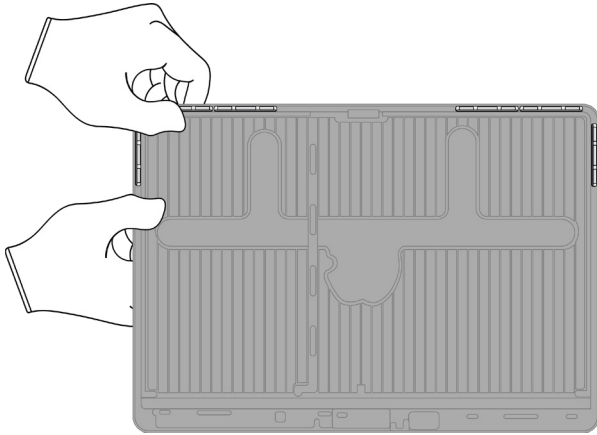
Fraction



Camera

PMs
Precious Metals

20. Bend the display housing until the six magnets pop up. Pry off the magnets.



Tools Used



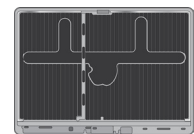
Fraction



Magnets (x6)

REE
Rare Earth
Elements

Fraction



Display housing

Al
Aluminum

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.

| Fraction | Downstream Processing |
|----------|-----------------------|
|----------|-----------------------|

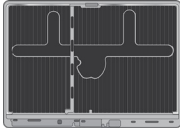
Aluminum



Bottom case



Trackpad enclosure



Display housing

Primary Target Material



Potential Additional Material



Batteries



Lithium-ion polymer batteries (x4)

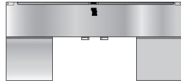
Primary Target Material



Fraction

Downstream Processing

Ferrous



Battery shield

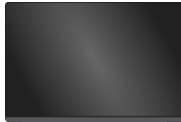


Fasteners (x10)

Primary Target Material



Glass



LCD cell

Primary Target Material



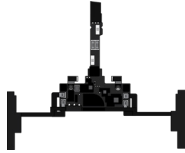
Potential Additional Materials



Fraction

Downstream Processing

Logic Boards



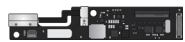
Power supply logic board



Trackpad



Main logic board



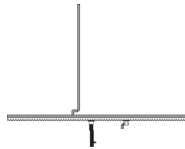
Audio board



Camera



Data board assembly



LED logic board

Primary Target Material



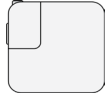
Potential Additional Materials



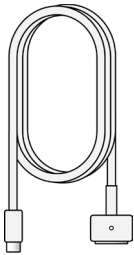
Fraction

Downstream Processing

Mixed Electronics



Power adapter



Charge cable



Ribbon cable



Keyboard

Primary Target Material



Potential Additional Materials



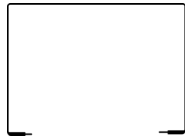
Fraction

Downstream Processing

Mixed Plastics



Power supply cover



Display gasket



Display films



Data board assembly cover

Primary Target Material



Rare Earth Magnets



Speakers (x2)



Magnets (x6)

Primary Target Material



Potential Additional Materials

