



MacBook Air (Retina, 13-inch, 2018)

MacBook Air (Retina, 13-inch, 2019)

MacBook Air (Retina, 13-inch, 2020)

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.

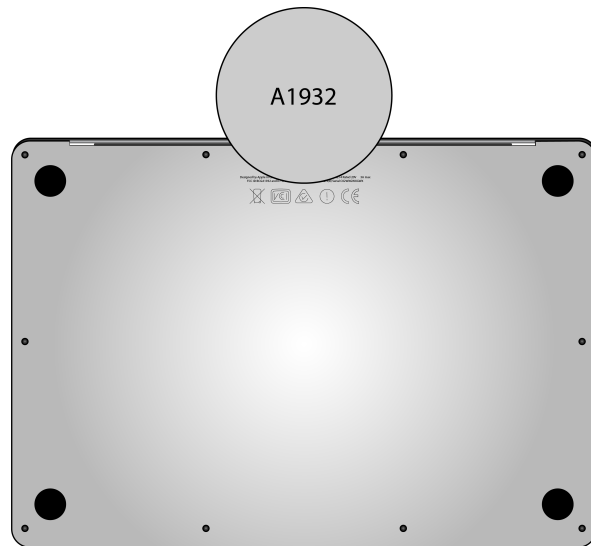
Disassembly procedures are intended to be performed only by trained electronics recycling professionals. The recycler is responsible for independently evaluating and ensuring compliance with all applicable environmental, health, and safety laws related to the work. These include but are not limited to 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.

Note: This guide may show images from other similar models, but the procedures are the same.

Identification

You can find the model number printed on the underside of the MacBook Air, near the regulatory markings.



Model numbers:
A1932, A2179

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	Main logic board, trackpad, keyboard, data board assembly, display logic board, light-emitting diode (LED) logic board	Follow steps 1–23
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 1–18
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 a mask



Wear eye protection



Wear foot protection



Wear protective clothing

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 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



Chemical exposure hazard



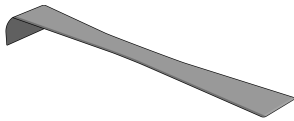
Broken glass hazard



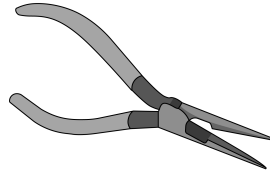
Chemical inhalation hazard

Recommended Tools

Flat surface scraper



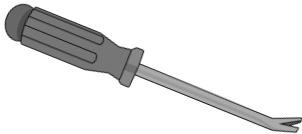
Long-nose pliers



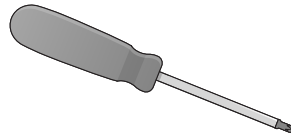
Miniature pry bar



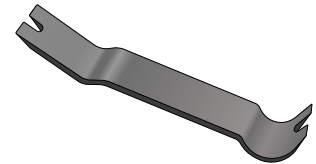
Nail-pulling screwdriver



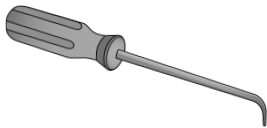
Phillips screwdriver



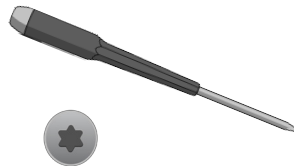
Plastic pry bar



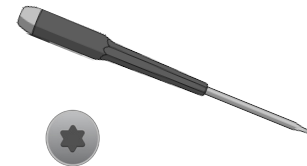
Precision pick



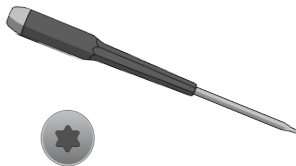
Torx T3 screwdriver



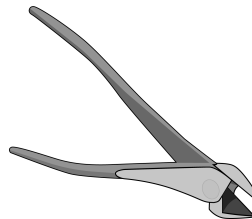
Torx T5 screwdriver



Torx T8 screwdriver



Wire cutters



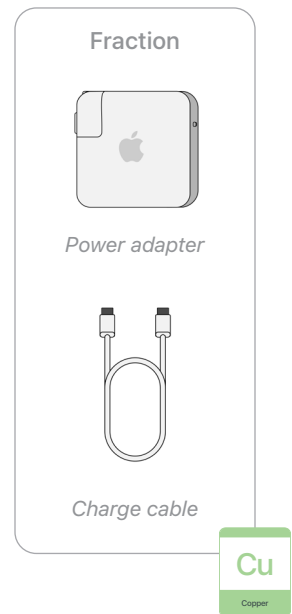
Disassembly Instructions

1. Remove the power adapter and the charge cable.

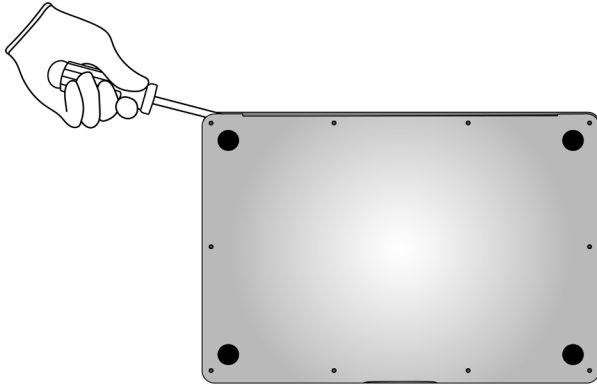
» *Ensure that the MacBook Air is turned off.*



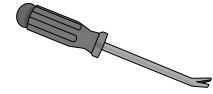
» *Unplug the power adapter. Disconnect both ends of the charge cable.*



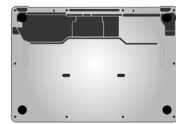
2. Carefully pry off the bottom case near the fasteners to avoid damage to the batteries.



Tools Used



Fraction



Bottom case

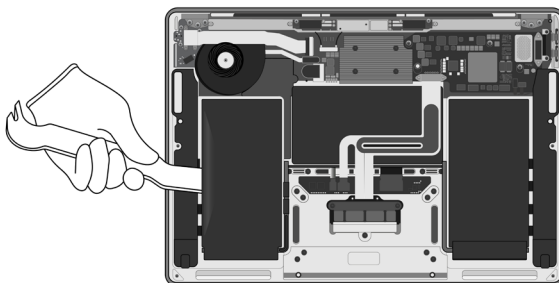
AI

Aluminum

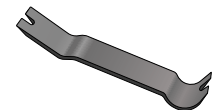
3. Carefully remove the three lithium-ion polymer batteries.



Rechargeable battery hazard



Tools Used



Fraction

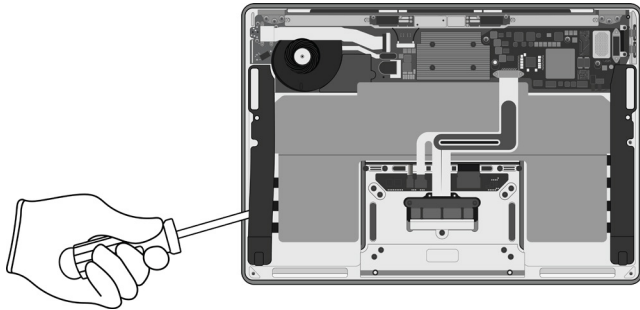


Lithium-ion polymer batteries

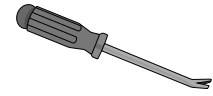
BT

Battery

4. Pry off both speakers.



Tools Used



Fraction

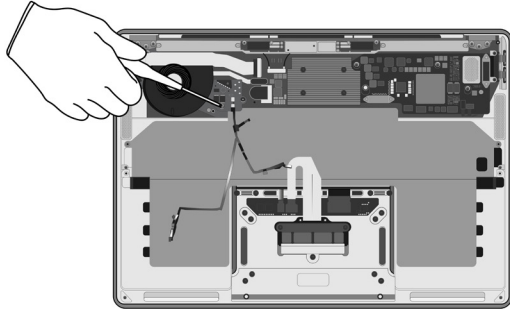


Speakers

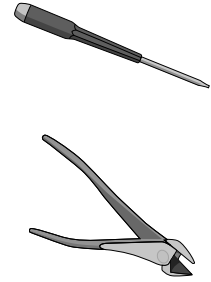


5. Remove the power supply logic board.

» Unscrew the two Torx T3 fasteners.



Tools Used



Fraction

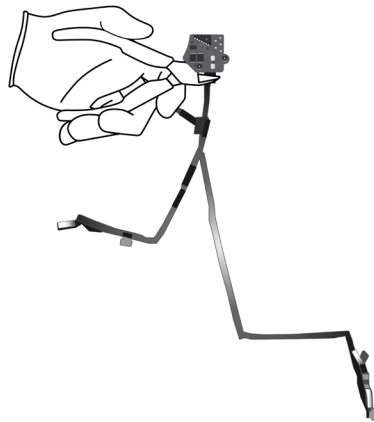


Fasteners (x2)

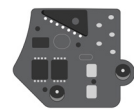
Fe

Ferrous

» Cut off the battery cables.



Fraction



Power supply
logic board

PMs

Precious
Metals

Fraction

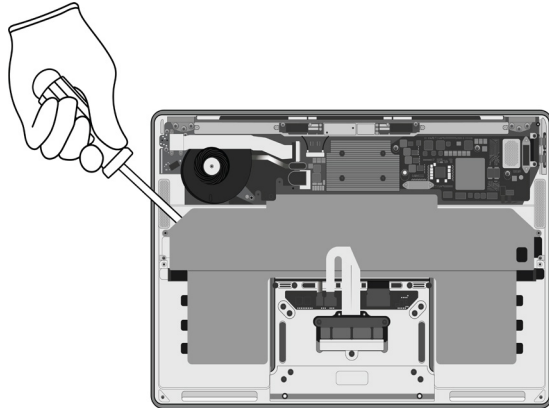


Battery cables

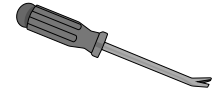
Cu

Copper

6. Pry off the cover plate.



Tools Used



Fraction

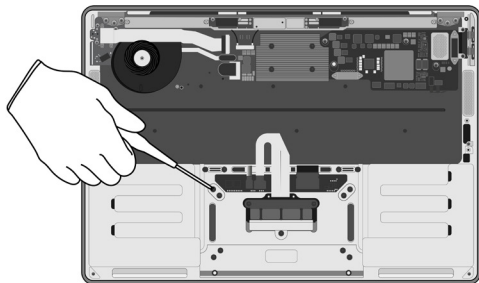


Cover plate

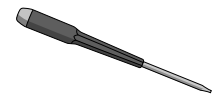
Fe

Ferrous

7. Remove the trackpad by unscrewing the nine Torx T5 fasteners.



Tools Used



Fraction

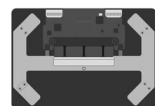


Fasteners (x9)

Fe

Ferrous

Fraction

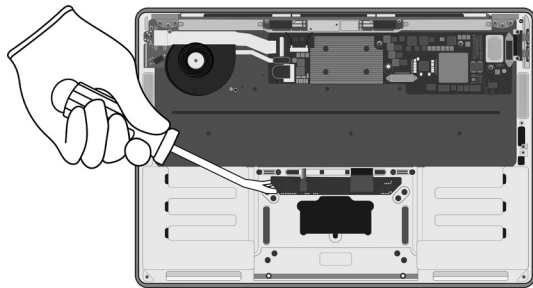


Trackpad

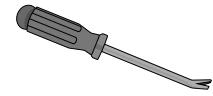
PMs

Precious Metals

8. Pry off the keyboard logic board.



Tools Used



Fraction

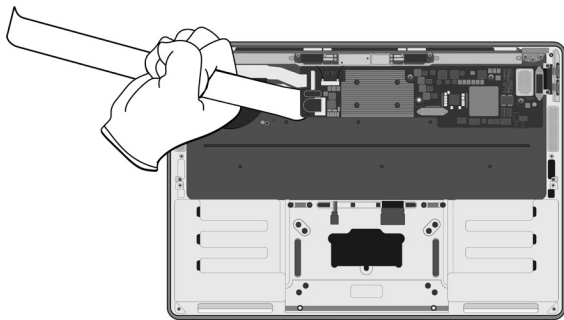


Keyboard logic board

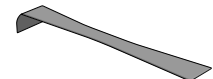
PMs

Precious Metals

9. Pry off the main logic board.



Tools Used



Fraction

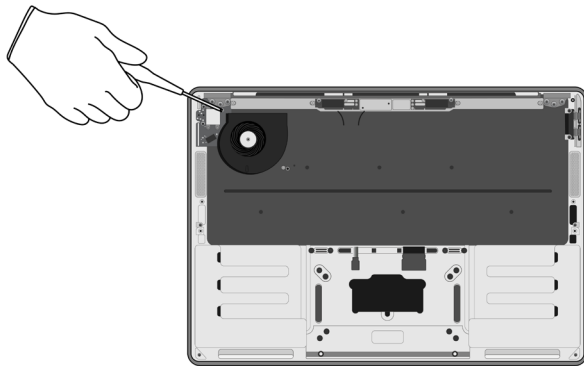
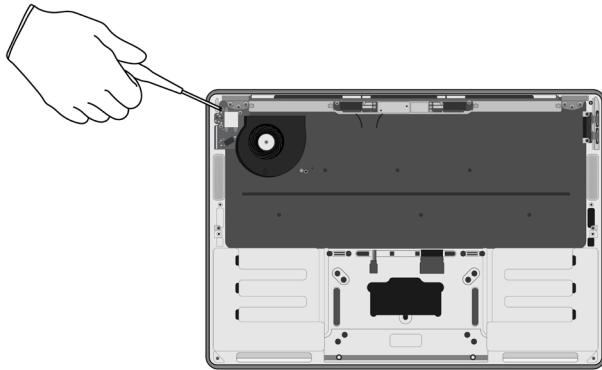


Main logic board

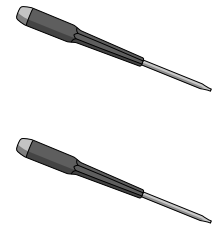
PMs

Precious Metals

- 10.** Remove the headphone jack logic board by unscrewing the two Torx T5 fasteners and one Torx T3 fastener.



Tools Used



Fraction

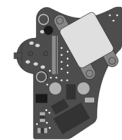


Fasteners (x3)

Fe

Ferrous

Fraction

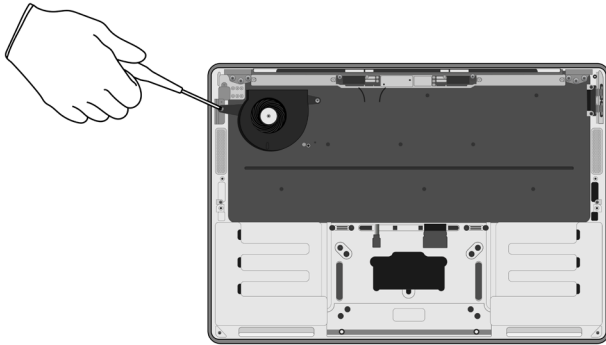


Headphone jack
logic board

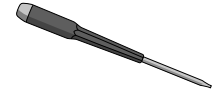
PMs

Precious
Metals

- 11.** Remove the fan by unscrewing the three Torx T5 fasteners.



Tools Used



Fraction



Fasteners (x3)

Fe

Ferrous

Fraction

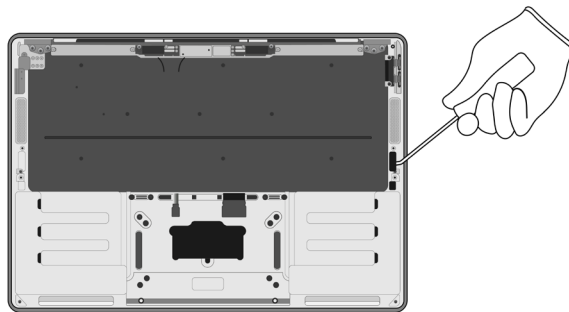


Fan

Cu

Copper

- 12.** Pry off the microphone.



Tools Used



Fraction

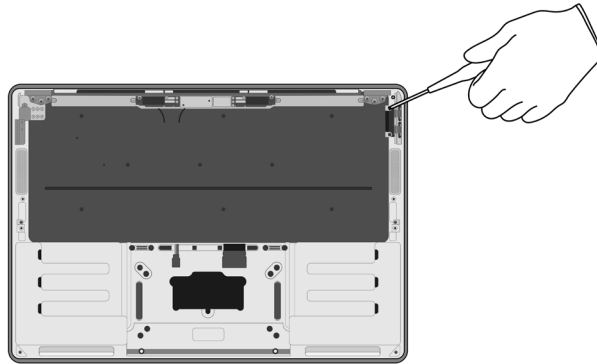


Microphone

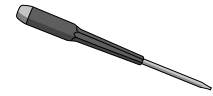
PMs

Precious Metals

- 13.** Remove the USB-C ports by unscrewing the two Torx T5 fasteners.



Tools Used



Fraction

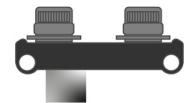


Fasteners (x2)

Fe

Ferrous

Fraction



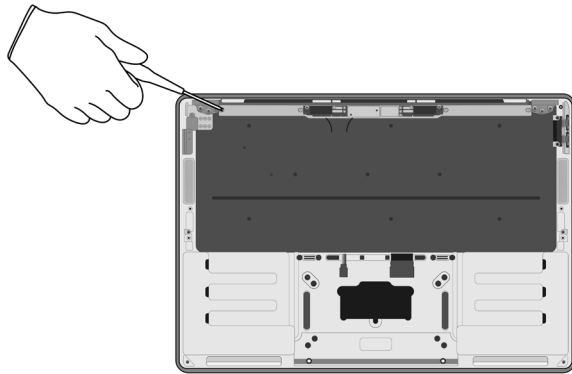
USB-C ports

PMs

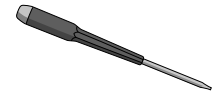
Precious Metals

14. Remove the antenna module.

» Unscrew the six Torx T5 fasteners.



Tools Used



Fraction



Fasteners (x6)

Fe

Ferrous

Fraction

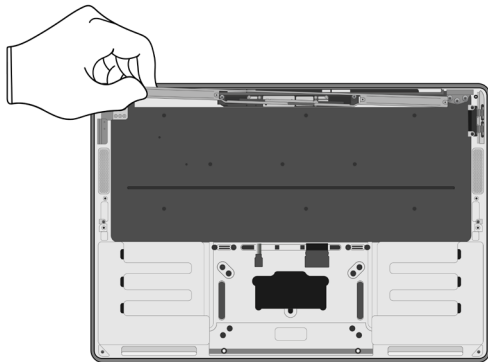


Antenna module

Cu

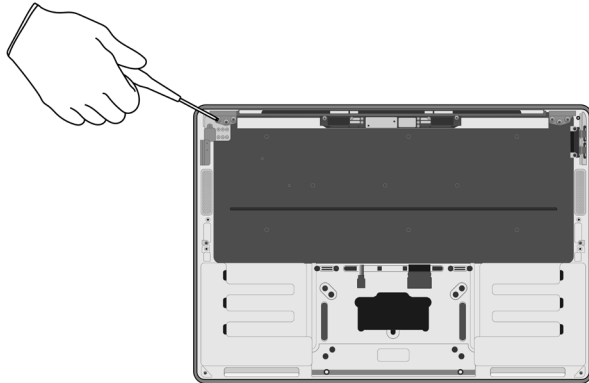
Copper

» Pull off the antenna module by hand.

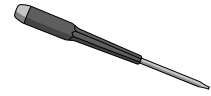


15. Separate the display and top case.

- » Remove the hinges by unscrewing the six Torx T8 fasteners.



Tools Used



Fraction

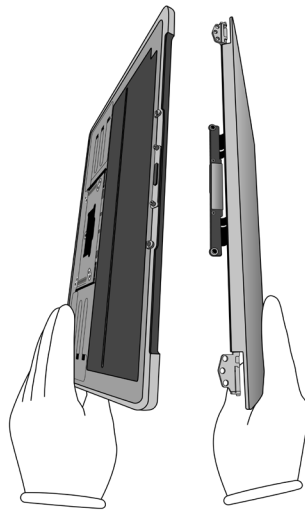


Fasteners (x6)

Fe

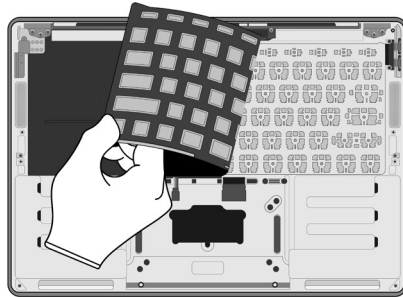
Ferrus

- » Pull apart the display and top case.

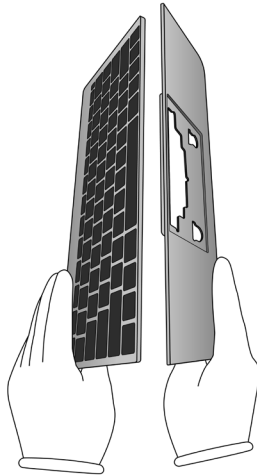


16. Disassemble the keyboard.

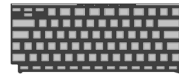
» Remove the keyboard foil from the keyboard.



» Separate the keyboard and the trackpad enclosure by snapping the top case in half.



Fraction



Keyboard foil



Trackpad enclosure

AI

Aluminum

Fraction



Keyboard

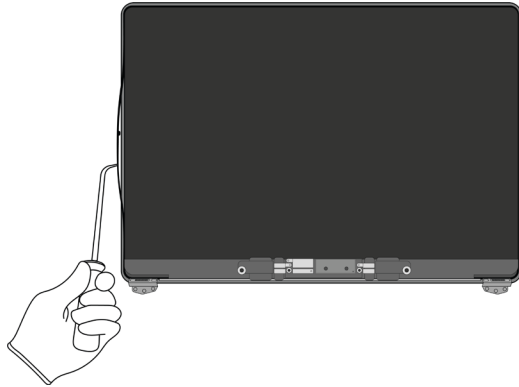
PMs

Precious Metals

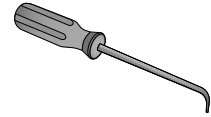
17. Remove the display gasket.



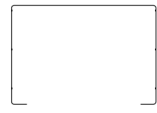
Broken glass hazard



Tools Used



Fraction



Display gasket

PL

Plastics

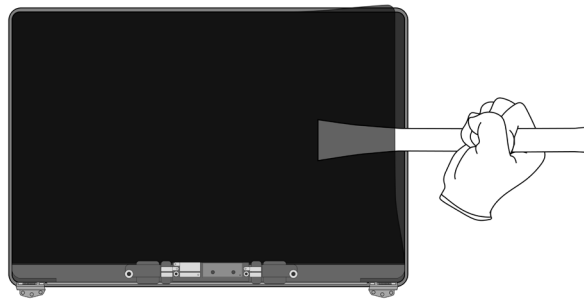
18. Pry off the LCD cell and display films.



Broken glass hazard



Chemical exposure hazard



Tools Used



Fraction



LCD cell

GL

Class

Fraction

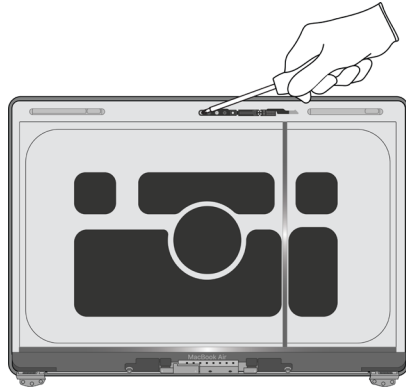


Display films

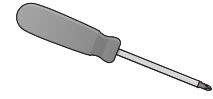
PL

Plastics

- 19.** Remove the camera with logic board by unscrewing the two Phillips fasteners.



Tools Used



Fraction



Fasteners (x2)

Fe

Ferrous

Fraction

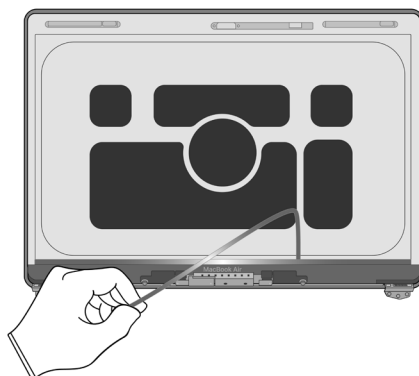


Camera with
logic board

PMs

Precious
Metals

- 20.** Remove the LED cable that goes to the LED logic board.



Fraction

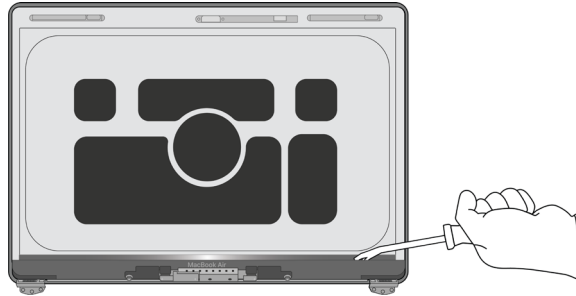


LED cable

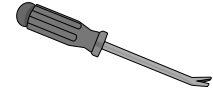
Cu

Copper

21. Pry off the data board assembly.



Tools Used



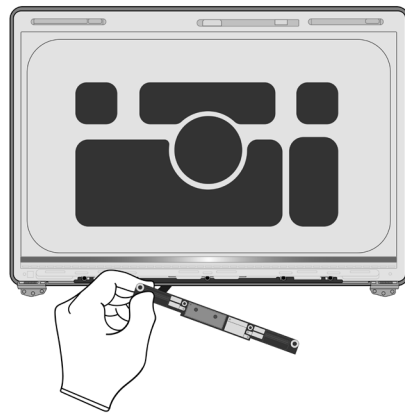
Fraction



Data board assembly



22. Remove the display logic board by hand.



Fraction



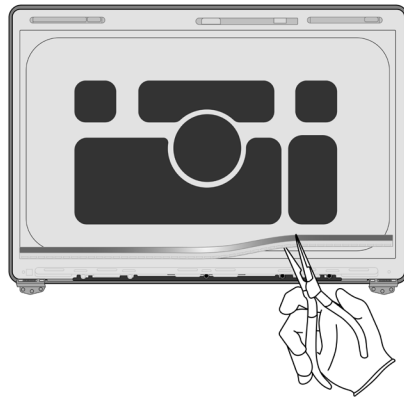
Display logic board



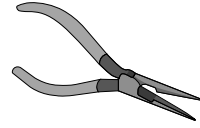
23. Remove the LED logic board from the display housing.



Chemical inhalation hazard



Tools Used



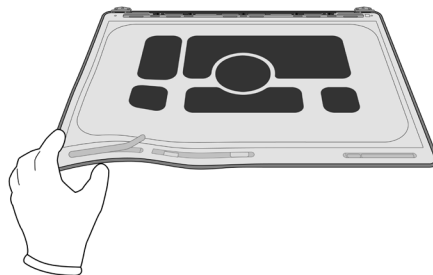
Fraction

LED logic board

PMS
Precious Metals

24. Remove the magnets.

- » Bend the display housing to pop up the four magnets.
- » Pull off the magnets.



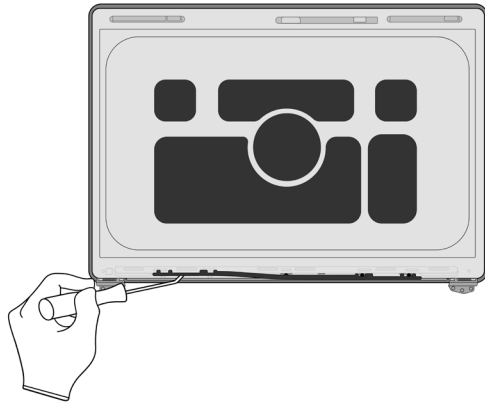
Fraction



Magnets

REE
Rare Earth Elements

25. Pry off the remaining plastic bracket from the display housing.



Tools Used



Fraction

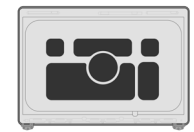


Plastic bracket

PL

Plastics

Fraction




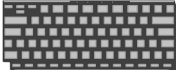

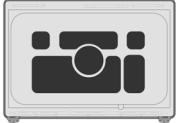




Display housing

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
<p>Aluminum</p>  <p><i>Bottom case</i></p>  <p><i>Keyboard foil</i></p>  <p><i>Trackpad enclosure</i></p>  <p><i>Display housing</i></p>	<p>Primary Target Material</p>  <p>Potential Additional Materials</p> 
<p>Batteries</p>  <p><i>Lithium-ion polymer batteries</i></p>	<p>Primary Target Material</p> 

Fraction **Downstream Processing**

Ferrous



Fasteners (x33)



Cover plate

Primary Target Material



Glass



LCD cell

Primary Target Material



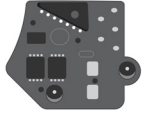
Potential Additional Materials



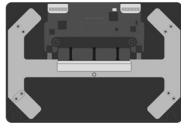
Fraction

Downstream Processing

Logic Boards



Power supply logic board



Trackpad



Keyboard logic board



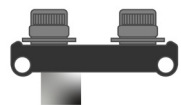
Main logic board



Headphone jack logic board



Microphone



USB-C ports

Primary Target Material



Potential Additional Materials



Logic Boards (cont.)



Keyboard



Camera with logic board



Data board assembly



Display logic board



LED logic board

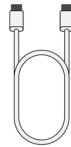
Fraction

Downstream Processing

Mixed Electronics



Power adapter



Charge cable



Battery cables



Fan



Antenna module



LED cable

Primary Target Material



Potential Additional Materials



Fraction

Downstream Processing

Mixed Plastics



Display gasket



Display films



Plastic bracket

Primary Target Material



Rare Earth Magnets



Speakers



Magnets

Primary Target Material



Potential Additional Materials

