



Apple Watch Ultra

Apple Recycler Guide

April 2023

Contents

3	About This Guide
4	Identification
5	Directive 2012/19/EU Annex VII Components
6	Safety Considerations
9	Recommended Tools
10	Disassembly Instructions
23	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.

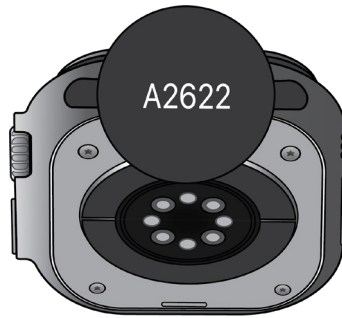
To conserve important resources, we work to reduce the materials we use and aim to one day source only recycled or renewable materials in our products. A key path to reaching that goal is resource recovery from end-of-life electronics.

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.

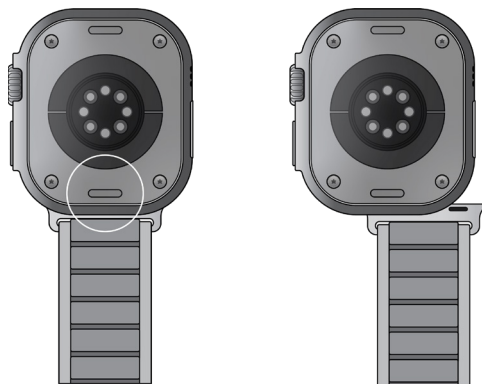
Identification

You can find the model number on the band slot of the Apple Watch Ultra.



Model numbers:
A2622, A2684, A2859

If the band is attached, press and hold the band release button; then slide the band across to remove it.



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	Display logic board, main logic board	Follow steps 1–17
External electric cables	Magnetic charging cable	Follow step 1
Battery	Lithium-ion polymer battery	Follow steps 1–4
Cover glass and organic light-emitting diode (OLED) display if the surface is greater than 100 square centimeters	OLED display	Follow steps 1–2
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.

Certain enclosure metals, such as titanium, if shredded together in quantity and to a small particle size (where the particles become finely divided), are capable of igniting spontaneously on exposure to air, can create sparks during shredding, and can be potentially reactive with water or humid air under certain conditions. Develop and apply preventative measures to store in properly rated/designed non-flammable containers to minimize the potential for an event to occur. Evaluate potential for emergency situations and ensure proper plans and materials are available to respond if an event were to occur. Ensure an adequate dust collection system is in place which has been designed for the specific combustibility hazard and to minimize airborne concentrations. Avoid using water or halogenated extinguishing agents for fire extinguishing, as exposure could introduce additional hazards.

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

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.

OLED Safety

Broken OLEDs must be handled properly to ensure the safety of your employees and mitigate any hazards. Package broken OLEDs 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



Broken glass hazard



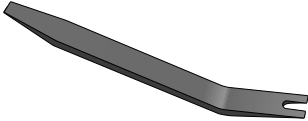
Rechargeable battery hazard



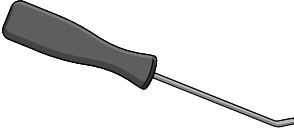
Chemical inhalation hazard

Recommended Tools

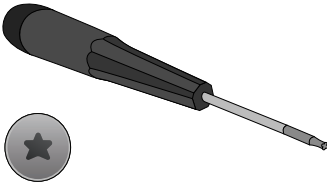
Miniature plastic pry bar



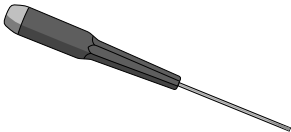
Miniature pry bar



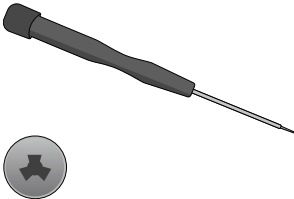
Pentalobe P4 screwdriver



Precision slotted screwdriver



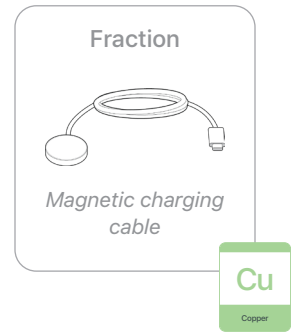
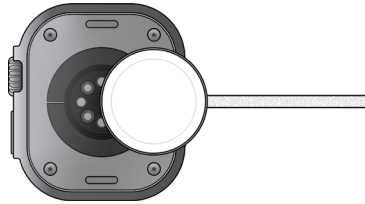
Precision tri-wing screwdriver



Disassembly Instructions

1. Remove the magnetic charging cable.

- » *Ensure that the Apple Watch is turned off.*
- » *Disconnect the magnetic charging cable.*



2. Remove the OLED display.

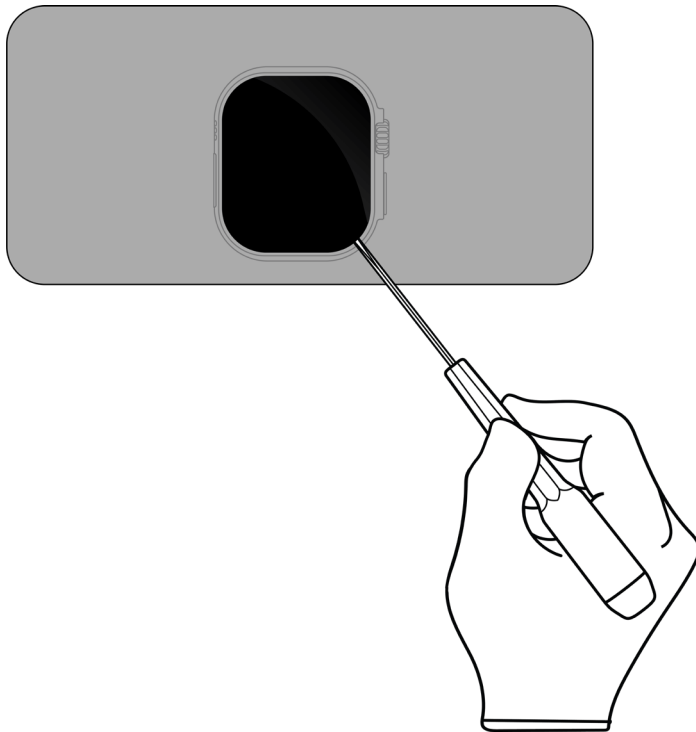


Broken glass hazard



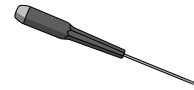
Chemical inhalation hazard

- » *Hold the Apple Watch Ultra at the edge of a counter with the display facing up.*
- » *Insert the tool tip between the display and the enclosure. Push the handle down to pry the display off the enclosure.*



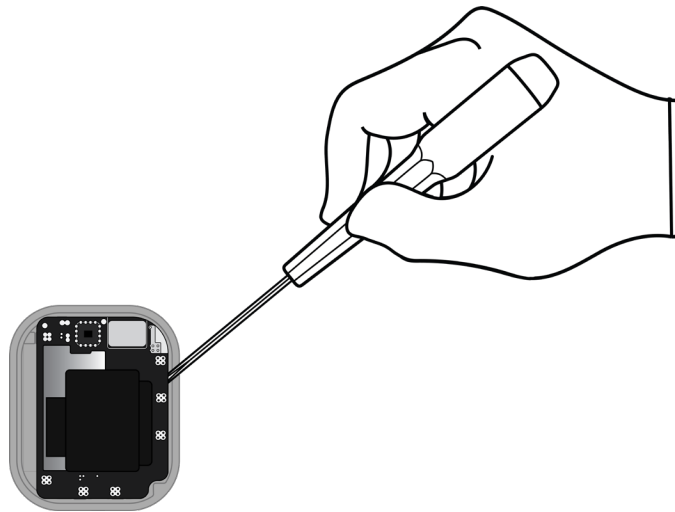
- » *Remove the display by hand. Set the enclosure aside.*

Tools Used

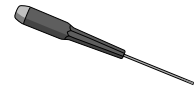


3. Remove the display logic board.

- » *Lay the display facedown.*
- » *Pry off the display logic board.*



Tools Used



Fraction



Display logic board

PMs
Precious Metals

Fraction

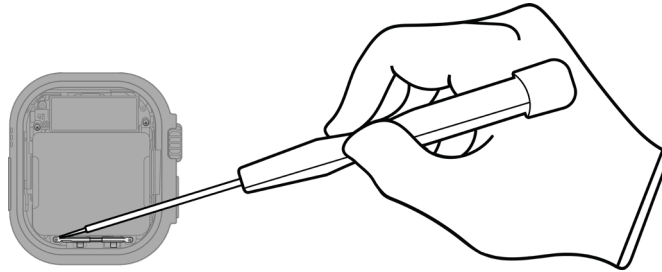


OLED display

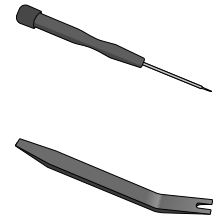
GL
Glass

4. Remove the lithium-ion battery.

- » *In the enclosure, unscrew the two tri-wing fasteners to remove the battery bracket.*



Tools Used



Fraction



Fasteners (x2)

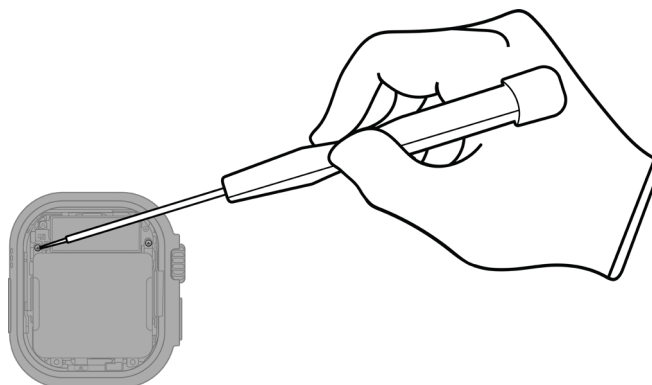


Battery bracket

Fe

Ferrous

- » *Unscrew the two tri-wing fasteners on the battery.*



Fraction




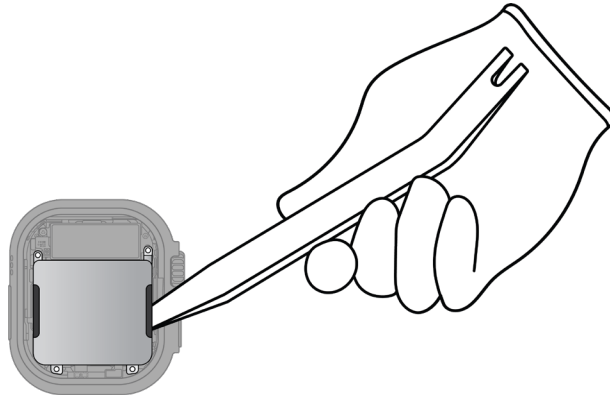
Fasteners (x2)

Fe


Ferrous

» Carefully remove the lithium-ion polymer battery using the miniature plastic pry bar.

 Rechargeable battery hazard



Fraction

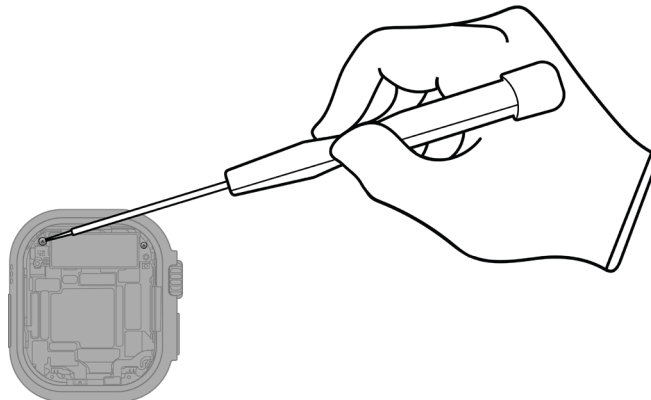


Lithium-ion polymer battery

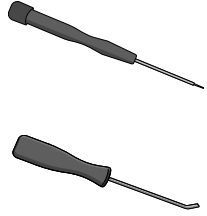
BT
Battery

5. Remove the Taptic Engine.

» Unscrew the two tri-wing fasteners.



Tools Used



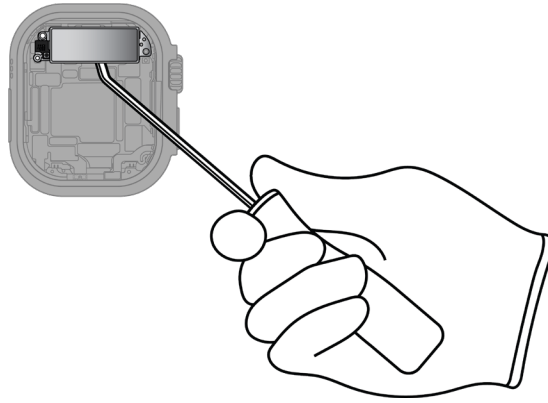
Fraction



Fastener (x2)

Fe
Ferrous

» *Pry off the Taptic Engine.*



Fraction

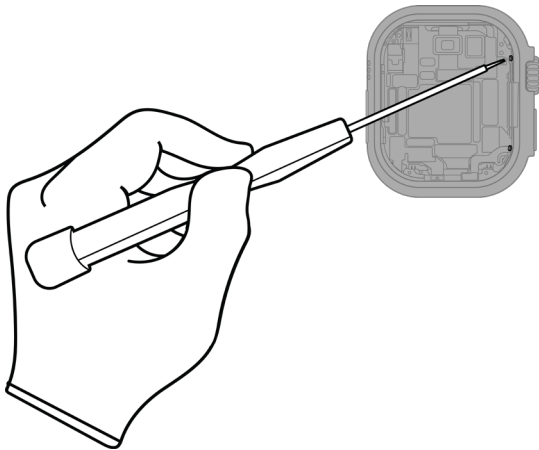


Taptic Engine

REE
Rare Earth
Elements

6. Remove the push connector.

» *Unscrew the two tri-wing fasteners.*



Tools Used



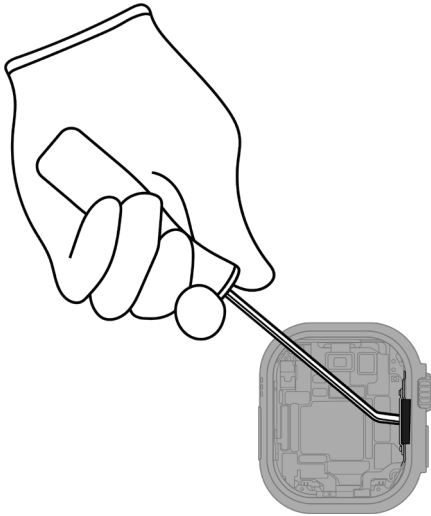
Fraction



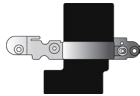
Fasteners (x2)

Fe
Ferrous

» Pry off the push connector.



Fraction

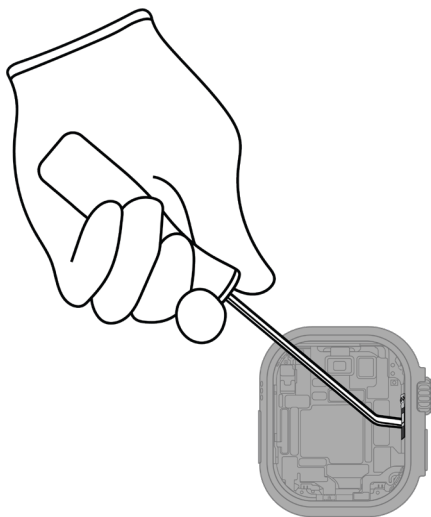


Push connector

Cu
Copper

A diagram of a push connector component, which is a small, rectangular metal piece with a central slot and two small circular features on either side. Below the diagram is a green box containing the chemical symbol 'Cu' and the word 'Copper'.

7. Pry off the digital crown flex segment.




Tools Used

A diagram of a screwdriver with a black handle and a metal shaft that ends in a curved tip.

Cu
Copper

Fraction

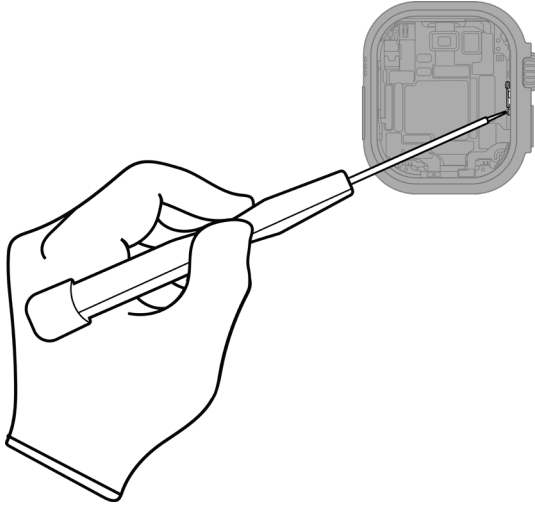


Digital crown flex-segment

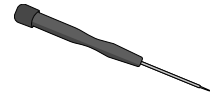
Cu
Copper

A diagram of a digital crown flex segment component, which is a small, rectangular metal piece with a central slot and two small circular features on either side. Below the diagram is a green box containing the chemical symbol 'Cu' and the word 'Copper'.

8. Remove the microphone bracket by unscrewing the two tri-wing fasteners.



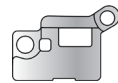
Tools Used



Fraction



Fasteners (x2)

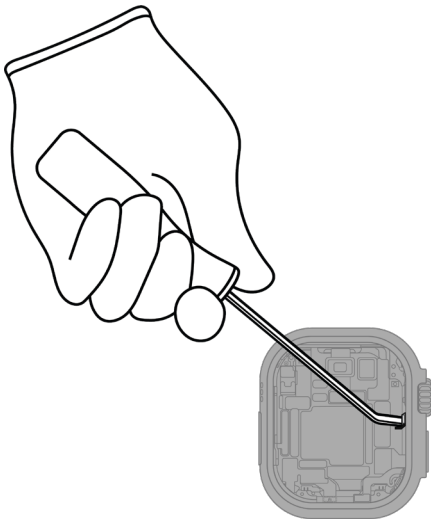


Microphone bracket

Fe

Ferrous

9. Pry off the microphone.



Tools Used



Fraction

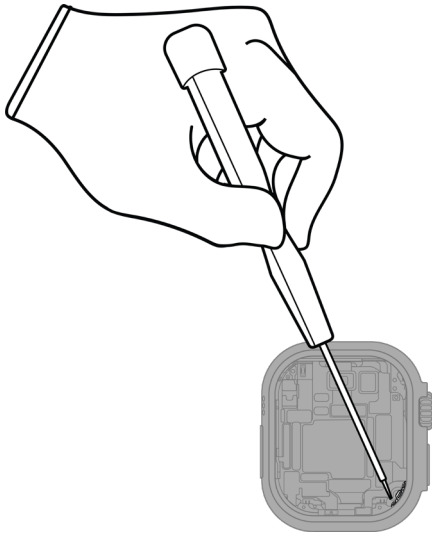


Microphone

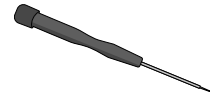
Cu

Copper

10. Remove the microphone array bracket by unscrewing the two tri-wing fasteners.



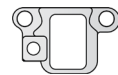
Tools Used



Fraction



Fasteners (x2)

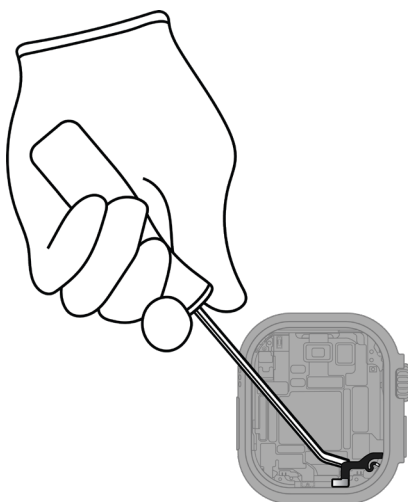


Microphone array bracket

Fe

Ferrous

11. Pry off the microphone array.



Tools Used



Fraction

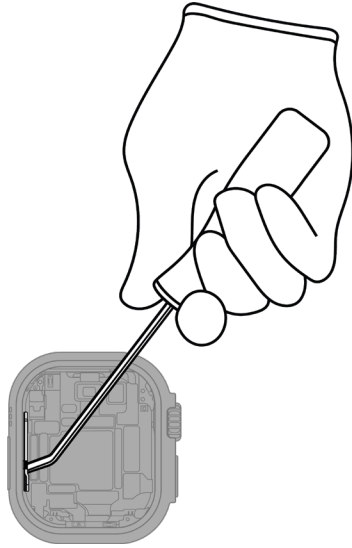


Microphone array

Cu

Copper

12. Pry off the speaker.



Tools Used



Fraction



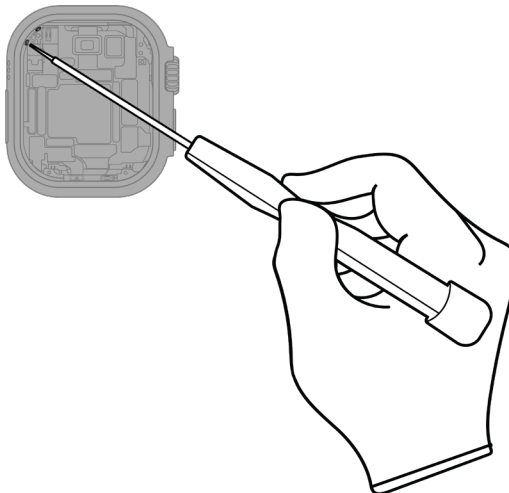
Speaker

REE

Rare Earth
Elements

13. Remove the other microphone array.

» *Unscrew the two tri-wing fasteners.*



Tools Used



Fraction

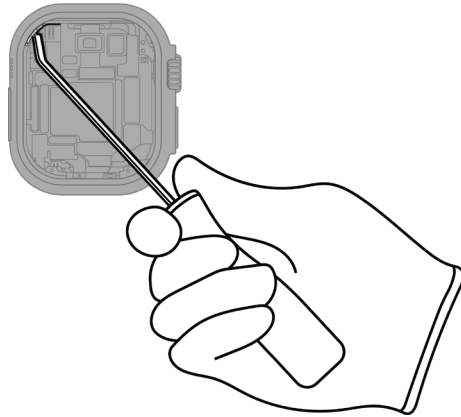


Fastener (x2)

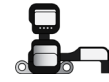
Fe

Ferrous

» Pry off the microphone array.



Fraction

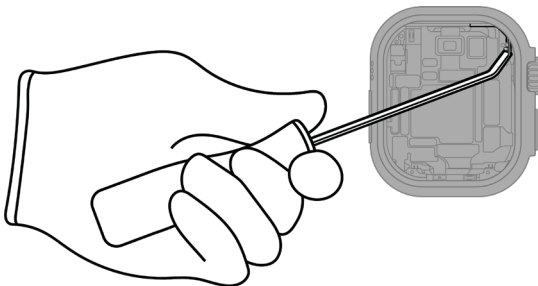


Microphone array

Cu

Copper

14. Pry off the depth sensor.



Tools Used



Fraction



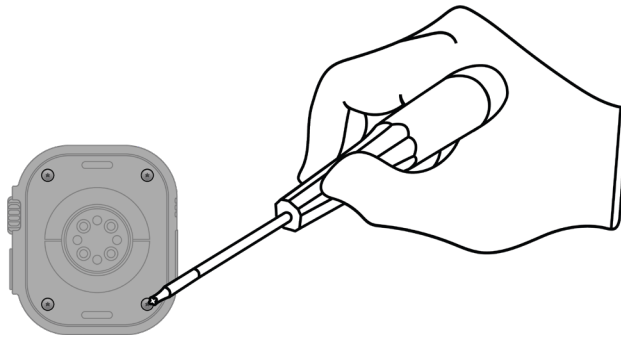
Depth sensor

Cu

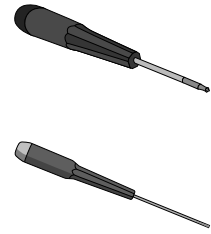
Copper

15. Remove the sensor array.

- » *Turn over the enclosure.*
- » *Unscrew the four fasteners with the pentalobe P4 screwdriver.*



Tools Used



Fraction

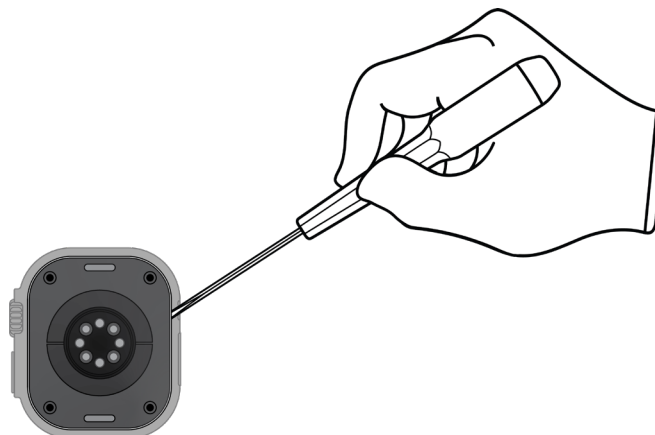


Fasteners (x4)

Fe

Ferrous

- » *Pry off the sensor array with the precision slotted screwdriver.*



Fraction

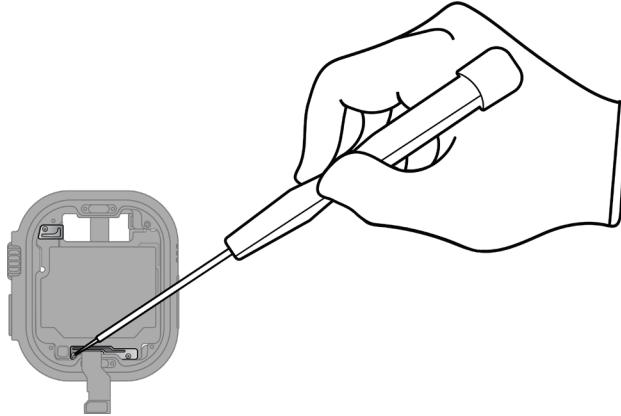


Sensor array

Cu

Copper

- 16.** Remove the main logic board brackets by unscrewing the three tri-wing fasteners.



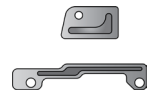
Tools Used



Fraction



Fasteners (x3)

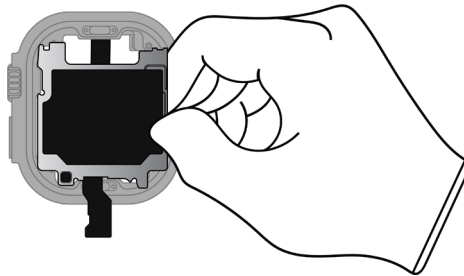


Main logic board brackets

Fe

Ferrous

- 17.** Remove the main logic board.



Fraction



Main logic board

PMs

Precious Metals

Fraction



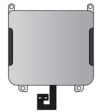


Enclosure


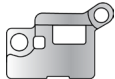
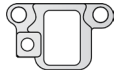

Ti

Titanium

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.

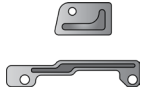
Fraction	Downstream Processing
<p data-bbox="440 554 561 581">Batteries</p>  <p data-bbox="367 762 634 789"><i>Lithium-ion polymer battery</i></p>	<p data-bbox="964 554 1276 581">Primary Target Material</p>  <p data-bbox="927 779 1313 806">Potential Additional Materials</p> 

<p data-bbox="448 1045 553 1073">Ferrous</p>  <p data-bbox="427 1211 574 1239"><i>Fasteners (x21)</i></p>  <p data-bbox="427 1350 574 1377"><i>Battery bracket</i></p>  <p data-bbox="404 1514 597 1541"><i>Microphone bracket</i></p>  <p data-bbox="378 1669 623 1696"><i>Microphone array bracket</i></p>	<p data-bbox="964 1045 1276 1073">Primary Target Material</p> 
---	--

Fraction

Downstream Processing

Ferrous (cont.)



Main logic board brackets

Glass



OLED display

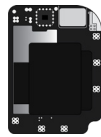
Primary Target Material



Potential Additional Materials



Logic Boards



Display logic board



Main logic board

Primary Target Material



Potential Additional Materials



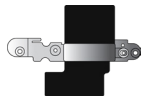
Fraction

Downstream Processing

Mixed Electronics



Magnetic charging cable



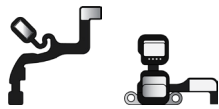
Push connector



Digital crown flex segment



Microphone



Microphone arrays



Depth sensor



Sensor array

Primary Target Material



Potential Additional Materials



Fraction

Downstream Processing

Rare Earth Magnets



Taptic Engine



Speaker

Primary Target Material



Potential Additional Materials



Titanium



Enclosure

Primary Target Material



Potential Additional Materials

