



# **Thunderbolt Display (27-inch) LED Cinema Display (27-inch)**

**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.

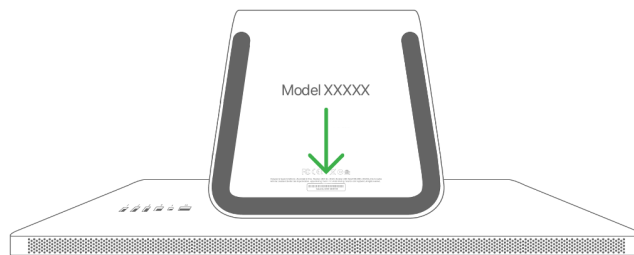
Disassembly procedures are intended to be performed only by trained electronics recycling professionals. The recycler is responsible for independently evaluating and ensuring compliance with all applicable environmental, health, and safety laws related to the work. These include but are not limited to 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](mailto: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 of the display on the bottom of the display stand. To view the model number, hold the sides of the display and gently lay the display facedown on a soft, clean towel or cloth.



*Model numbers:*

*A1407, A1316*

# 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 boards, display logic boards, light-emitting diode (LED) logic boards, power supply logic board	Follow steps 1–16
Liquid crystal display (LCD) cell if the surface is greater than 100 square centimeters	LCD cell	Follow steps 4–9
External electrical cables	Built-in Thunderbolt cable, built-in universal MagSafe cable, power cord	Follow steps 1–3
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

## 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



Broken glass hazard



Chemical exposure hazard



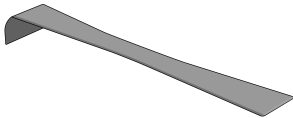
Sharp edges—cut hazard



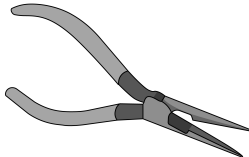
Chemical inhalation hazard

# Recommended Tools

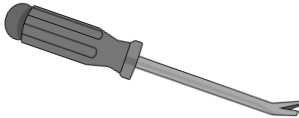
Flat surface scraper



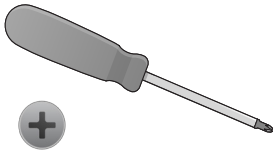
Long-nose pliers



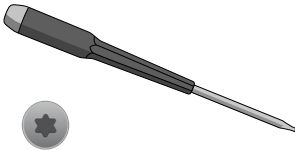
Nail-pulling screwdriver



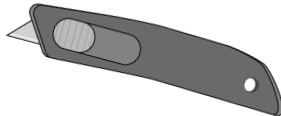
Phillips screwdriver



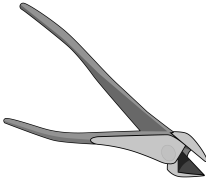
Torx T10 screwdriver



Utility knife

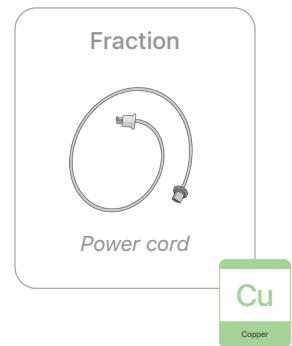
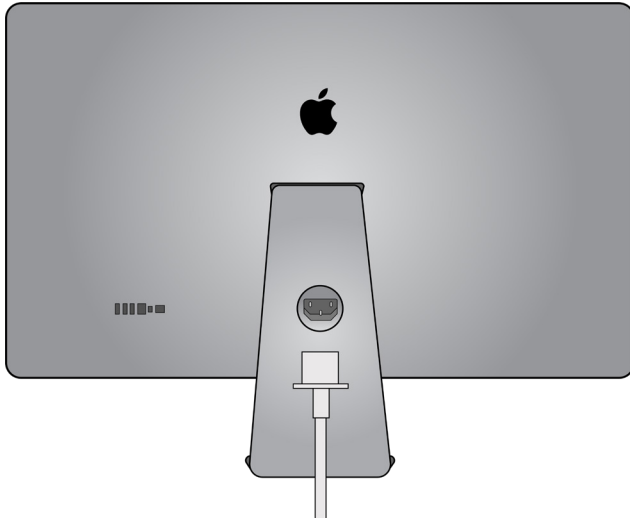


Wire cutters



# Disassembly Instructions


1. Unplug the power cord.

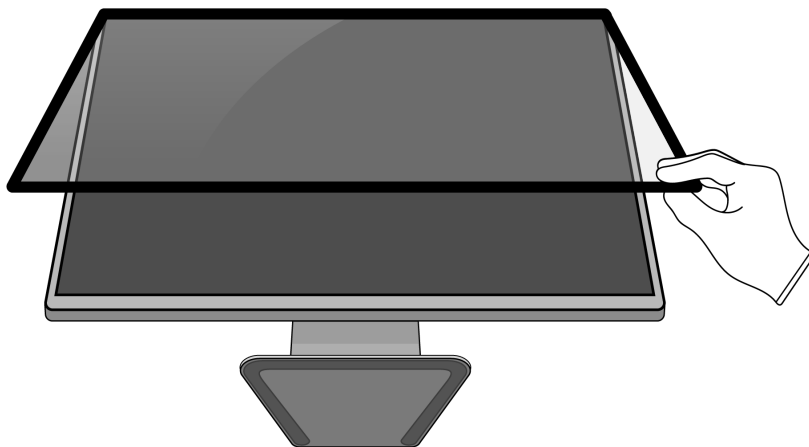


**Warning:** Before continuing disassembly, wait 10 minutes after unplugging the device for stored energy to discharge.



2. Lift the cover glass to remove it from the magnets.

 Sharp edges—cut hazard



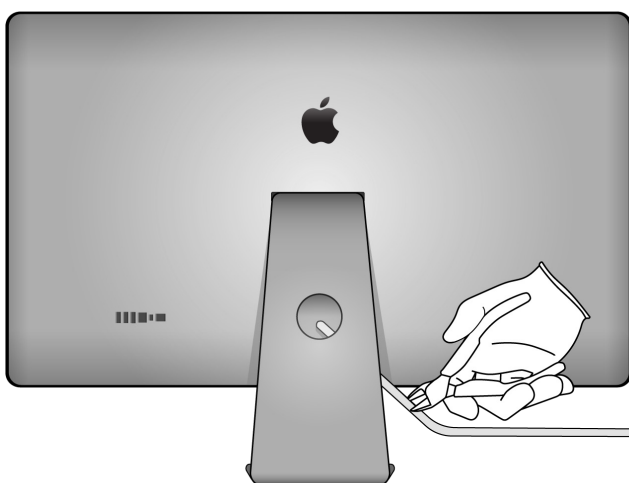
Fraction




Cover glass

GL  
Glass


3. Cut off the cables from the back side of the display.



Tools Used



Fraction

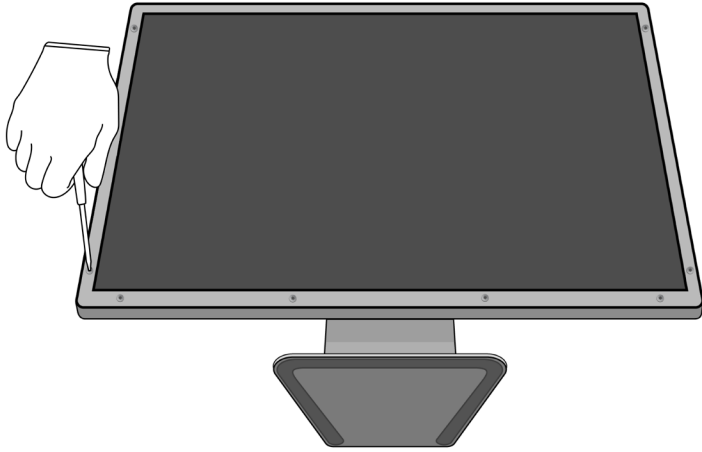


Cables

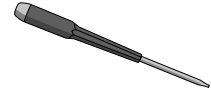
Cu  
Copper

## 4. Remove the LCD assembly.

- » *Remove the eight fasteners holding the LCD assembly to the enclosure.*



### Tools Used



### Fraction





Fasteners (x8)

Fe

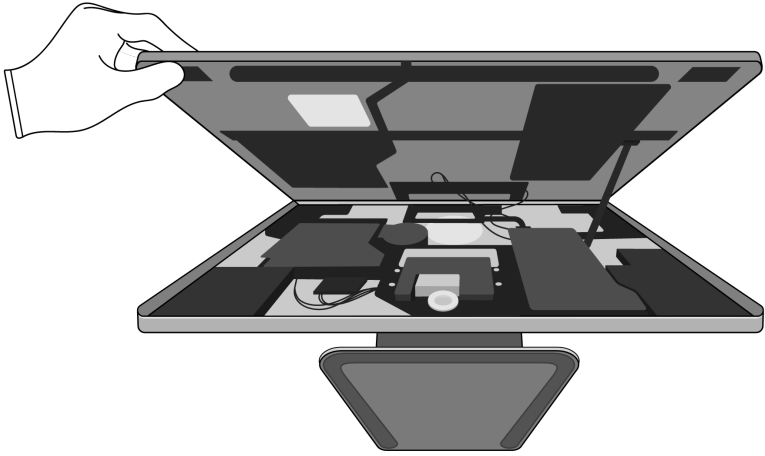
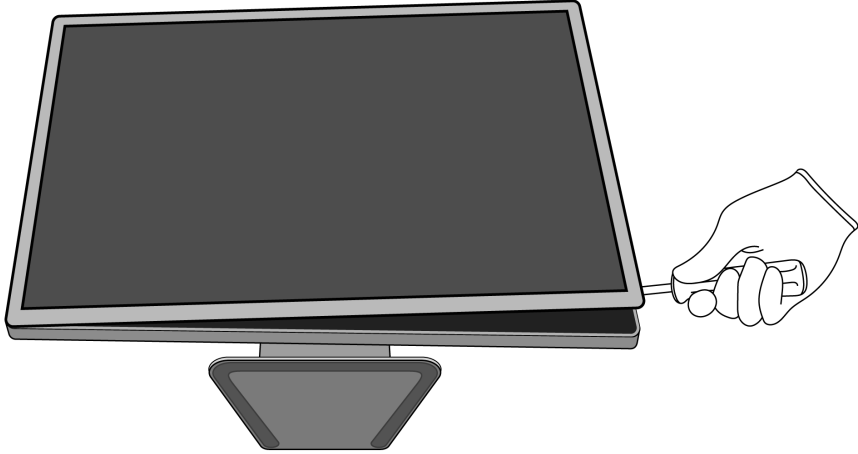
Ferrous

» *Pry up the LCD assembly to remove it from the enclosure.*

 Chemical exposure hazard

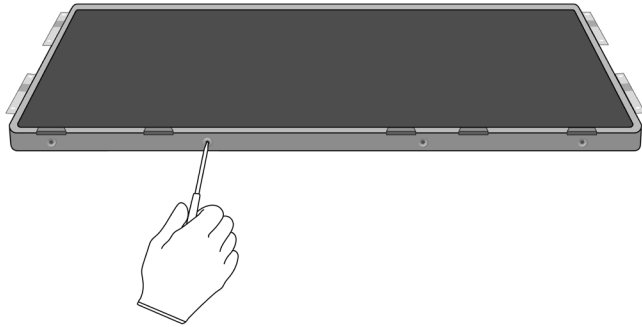
 Sharp edges—cut hazard

Tools Used

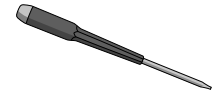


## 5. Remove the first metal frame.

» Remove the 12 fasteners around the LCD assembly.



Tools Used



Fraction

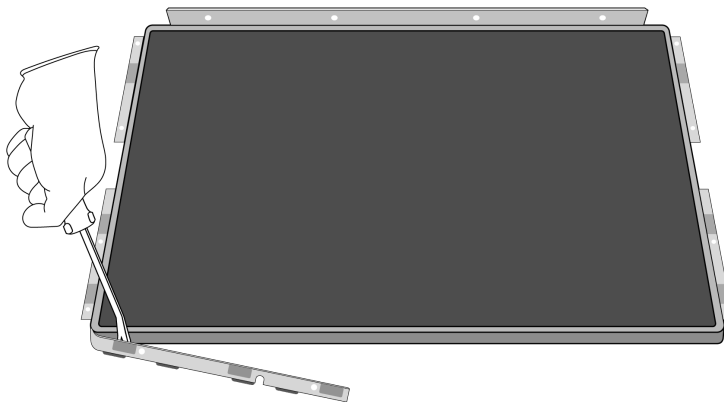


Fasteners (x12)

Fe

Ferrous

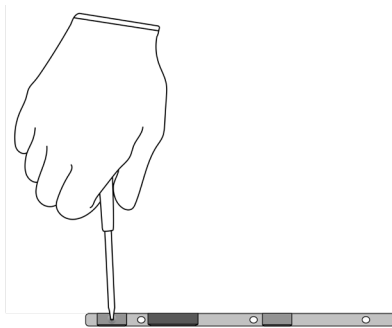
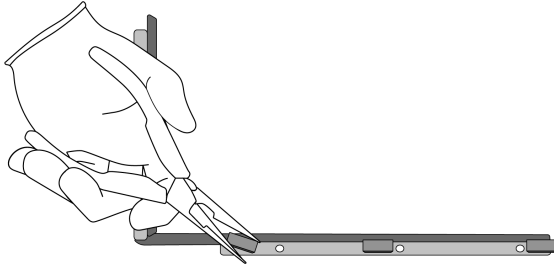
» Pry off the metal frame.



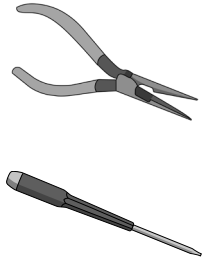
Tools Used



» Remove the 16 magnets and four fasteners from the frame.



Tools Used



Fraction



Magnets (x16)

REE  
Rare Earth  
Elements

Fraction



Fasteners (x4)



Metal frame

Fe  
Ferrous

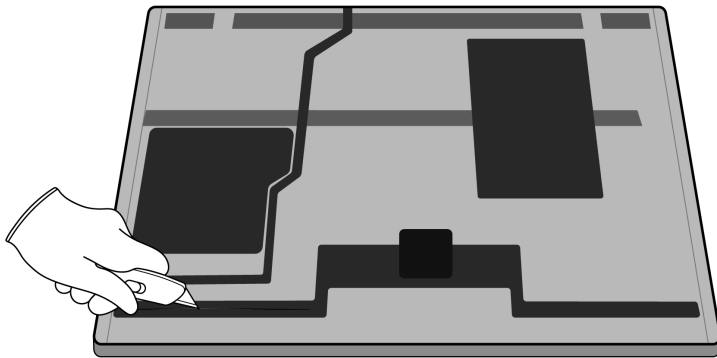
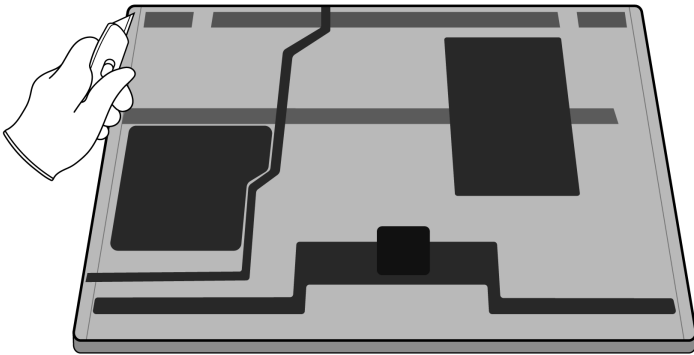
## 6. Remove the metal cover.

- » *Flip the LCD assembly over and cut the foil surrounding the display and logic board cover.*

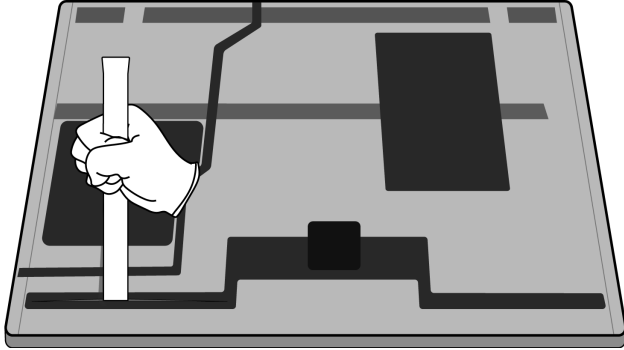


Sharp edges—cut hazard

### Tools Used



» Pry off the metal cover, exposing the three logic boards.



Tools Used



Fraction

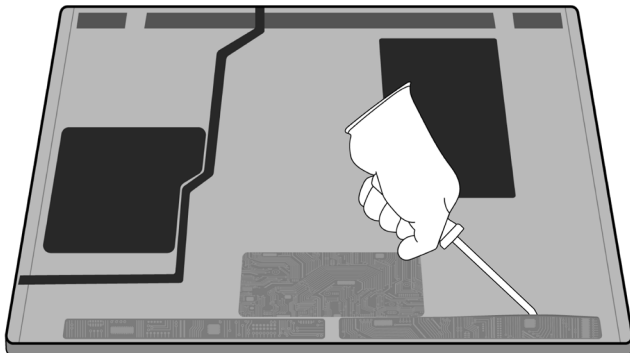


Metal cover

Fe

Ferrous

7. Pry off the three logic boards.



Tools Used



Fraction

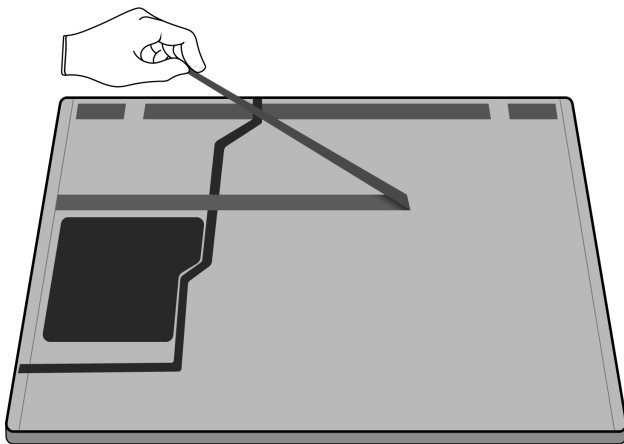
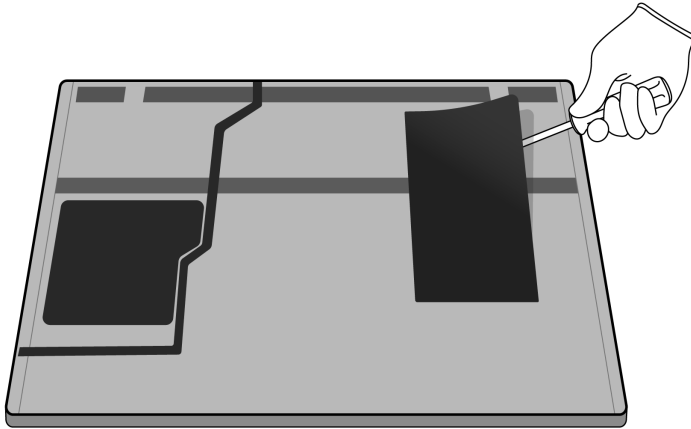


Logic boards

PMs

Precious Metals

8. Remove the remaining plastic sheets and wires from the display module.



Tools Used



Fraction



Plastic sheets

PL

Plastics

Fraction



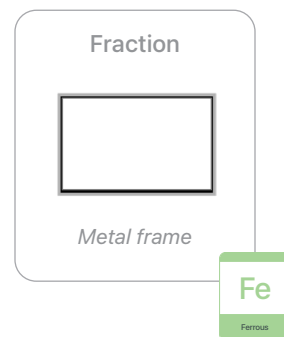
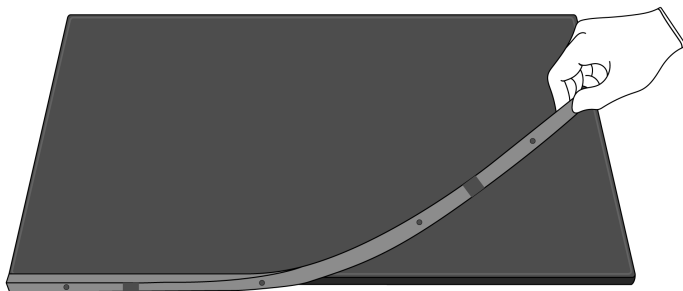
Wires

Cu

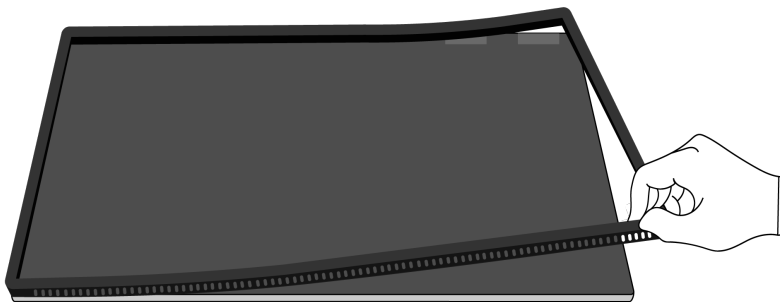
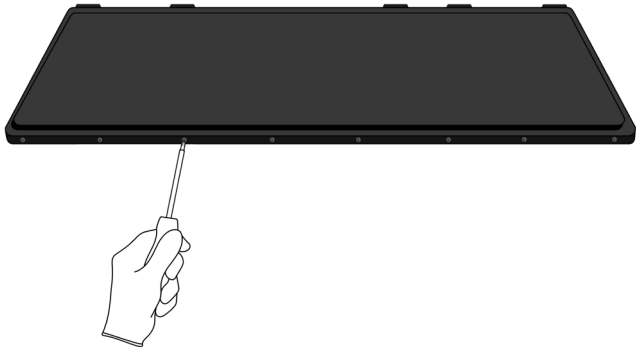
Copper



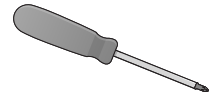
9. Turn the display over and pull off the remaining metal frame.



**10.** Remove the five fasteners from the plastic frame and lift the frame away.



Tools Used



Fraction



Fasteners (x5)

Fe

Ferrous

Fraction




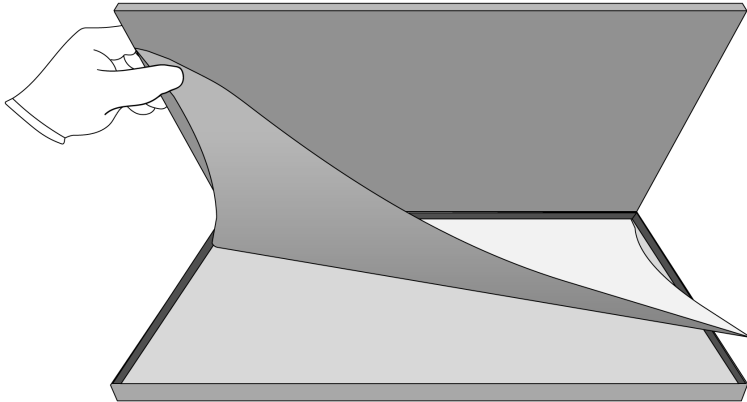
Plastic frame

PL

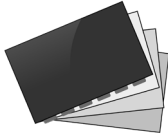
Plastics

# 11. Remove the LCD cell and the display films.

 Broken glass hazard




Fraction



Display films

PL  
Plastics

Fraction



LCD cell

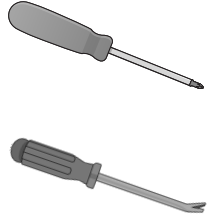
GL  
Glass

12. Remove the 20 fasteners from the LED logic boards. Pull off the LED logic boards from the bottom of the mid plate.


 Chemical inhalation hazard



Tools Used




Fraction



Fasteners (x20)

**Fe**  
Ferrous


Fraction



LED logic boards

**PMs**  
Precious Metals

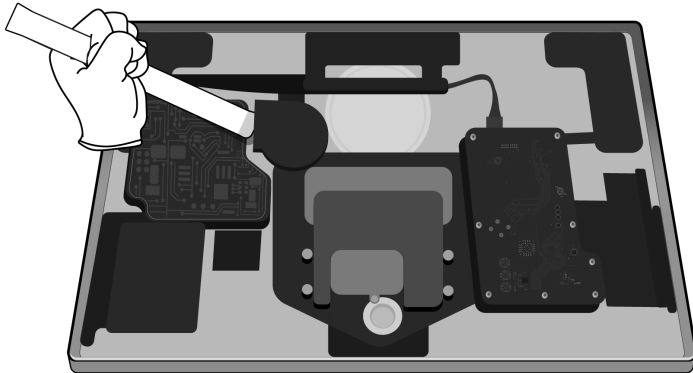
Fraction



Mid plate

**Al**  
Aluminum

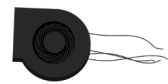
### 13. Pry off the fan.



#### Tools Used



#### Fraction

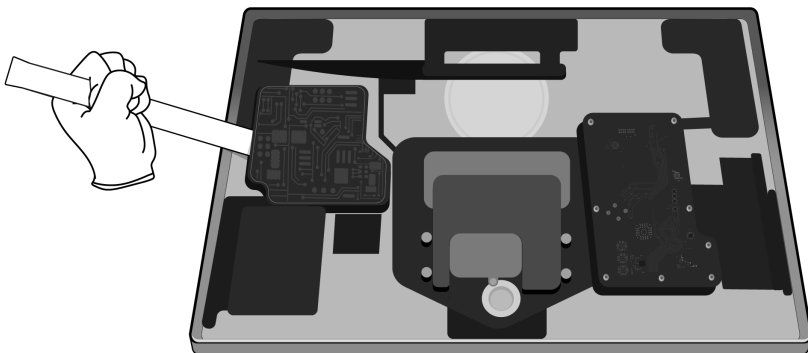


Fan

Cu

Copper

### 14. Remove the power supply logic board.



#### Tools Used



#### Fraction



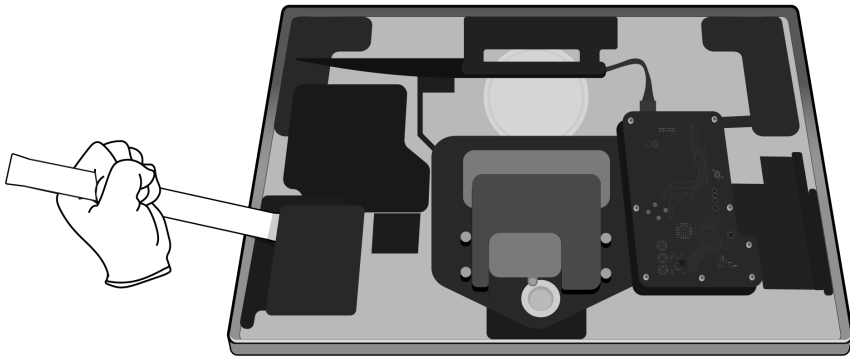
Power supply  
logic board

PMs

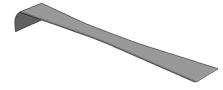
Precious  
Metals

## 15. Remove the speakers.

» Remove the left speaker.



Tools Used



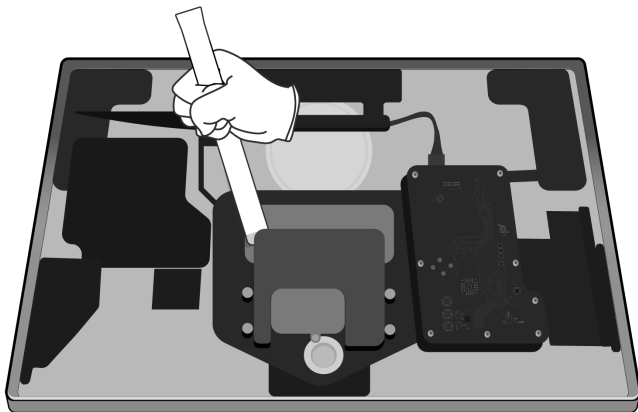
Fraction



Speaker

REE  
Rare Earth  
Elements

» Remove the middle speaker.



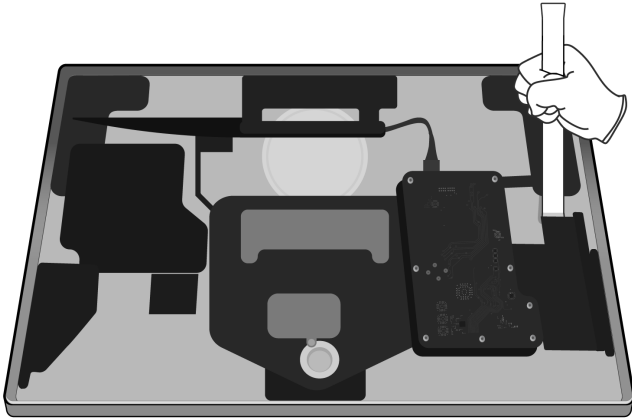
Fraction




Speaker

REE  
Rare Earth  
Elements

» Remove the right speaker.



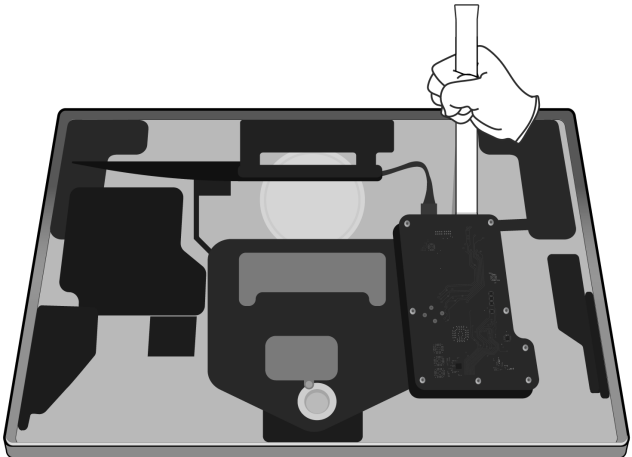
Fraction



Speaker

**REE**  
Rare Earth Elements


**16.** Remove the logic board.



Tools Used



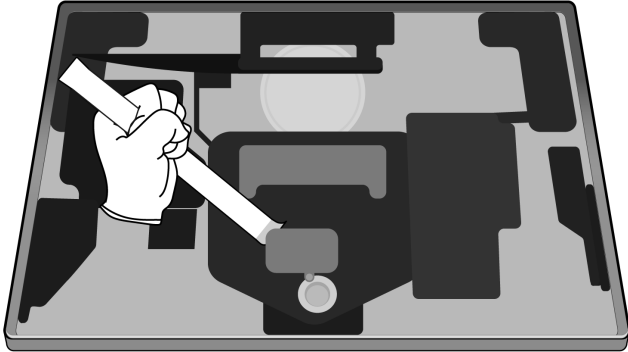
Fraction



Logic board

**PMs**  
Precious Metals

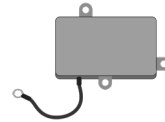
**17.** Remove the power adapter.



Tools Used



Fraction

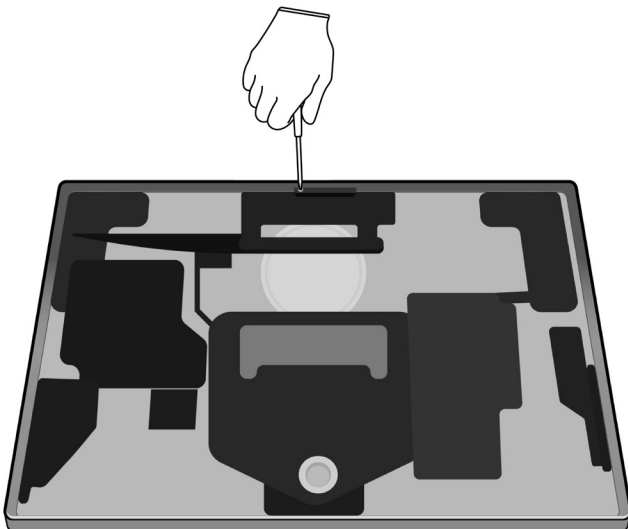


Power adapter

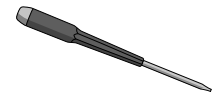
Cu

Copper

**18.** Remove the two fasteners holding down the camera and microphone. Remove the camera.



Tools Used



Fraction



Fasteners (x2)

Fe

Ferrous

Fraction



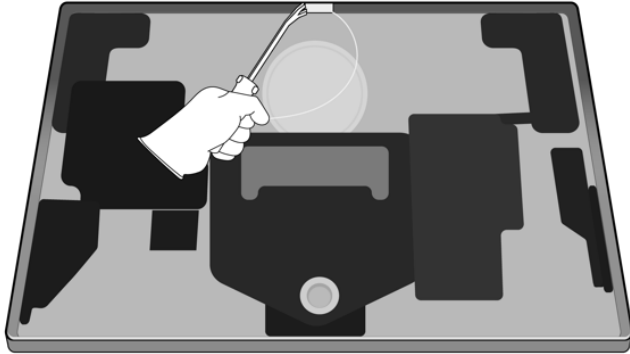
Camera

Cu

Copper



## 19. Remove the external microphone.



### Tools Used



### Fraction



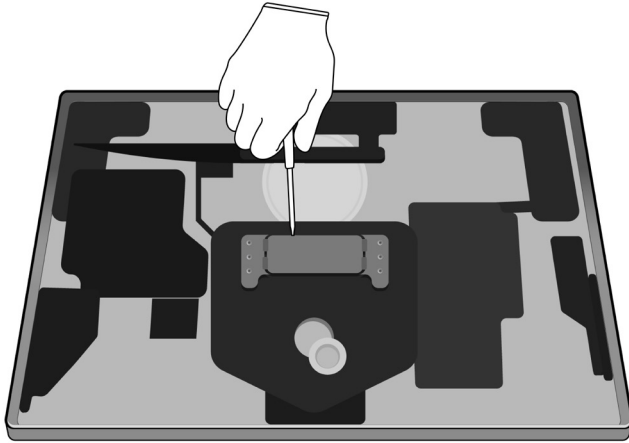
Microphone

Cu

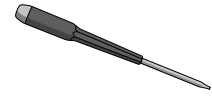
Copper

## 20. Remove the stand.

- » Remove the eight fasteners holding the display stand to the hinge.



### Tools Used



### Fraction

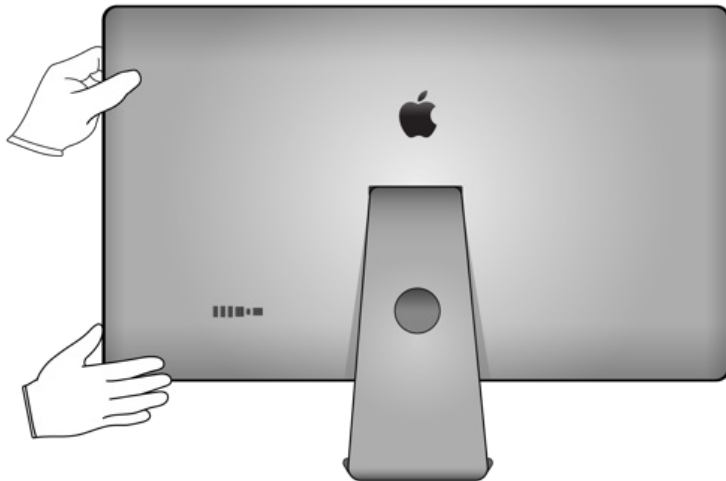


Fasteners (x8)

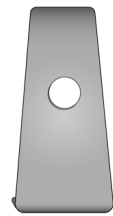
Fe

Ferrous

- » Slide the enclosure away from the stand.



### Fraction



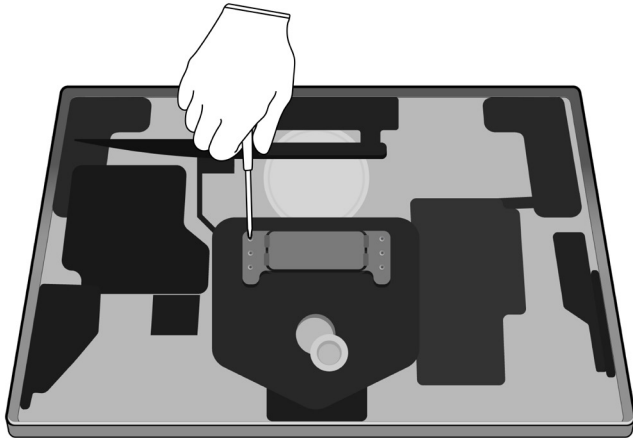
Stand

Al

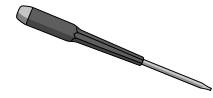
Aluminum

## 21. Remove the hinge.

» Remove the eight fasteners surrounding the hinge.



### Tools Used



### Fraction

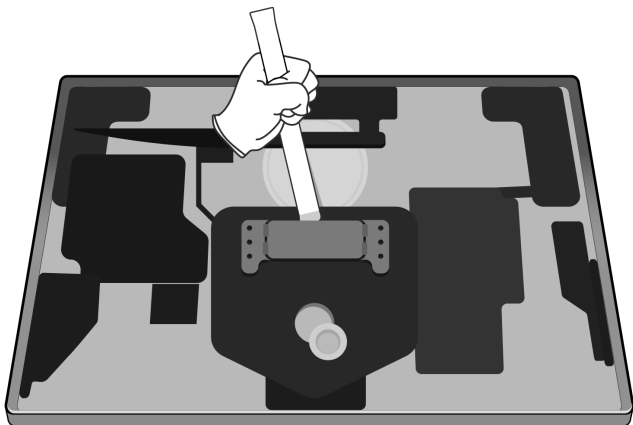


Fasteners (x8)

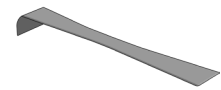
Fe

Ferrous

» Pry off the hinge.



### Tools Used



### Fraction

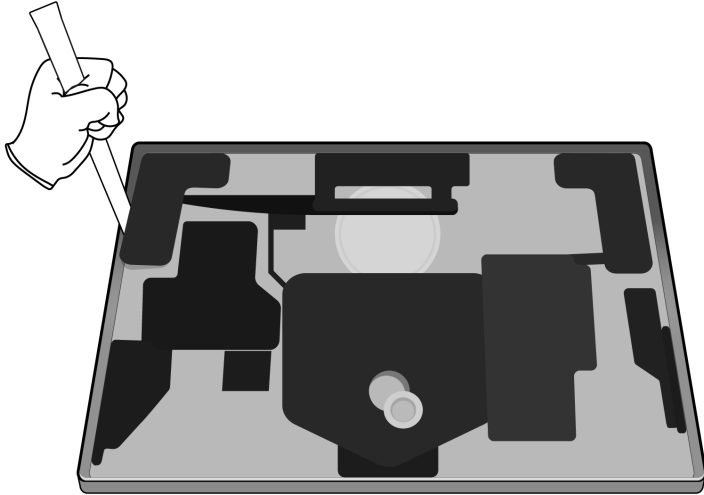


Hinge

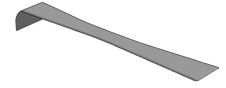
Fe

Ferrous

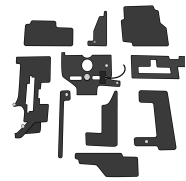
**22.** Pry off all remaining plastic pieces from the aluminum enclosure.



Tools Used



Fraction



Plastic

PL

Plastics

Fraction




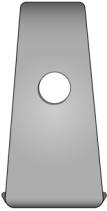




Aluminum enclosure

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 data-bbox="435 583 566 611"><b>Aluminum</b></p>  <p data-bbox="451 829 550 852"><i>Mid plate</i></p>  <p data-bbox="467 1129 524 1152"><i>Stand</i></p>  <p data-bbox="402 1404 596 1428"><i>Aluminum enclosure</i></p>	<p data-bbox="963 583 1273 611"><b>Primary Target Material</b></p>  <p data-bbox="922 835 1312 863"><b>Potential Additional Materials</b></p>  

**Fraction**

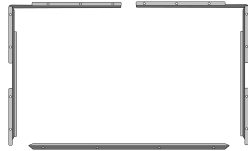
**Downstream Processing**

**Ferrous**

**Primary Target Material**



*Fasteners (x67)*



*Metal frames*



*Metal cover*



*Hinge*

**Fraction**

**Downstream Processing**

**Glass**



*Cover glass*



*LCD cell*

**Primary Target Material**



**Potential Additional Materials**



**Logic Boards**



*Logic boards*



*LED logic boards*



*Power supply logic board*

**Primary Target Material**



**Potential Additional Materials**



**Fraction**

**Downstream Processing**

**Mixed Electronics**



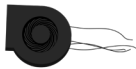
*Power cord*



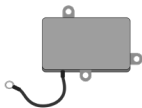
*Cables*



*Wires*



*Fan*



*Power adapter*



*Camera*



*Microphone*

**Primary Target Material**



**Potential Additional Materials**





**Fraction**

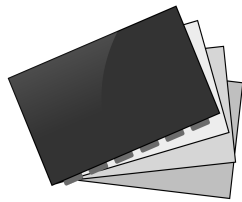
**Downstream Processing**

**Mixed Plastics**

**Primary Target Material**



*Plastic*



*Display films*



*Plastic sheets*

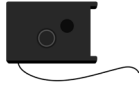


*Plastic frame*

**Fraction**

**Downstream Processing**

**Rare Earth Magnets**



*Speakers*



*Magnets (x16)*

**Primary Target Material**



**Potential Additional Materials**

