Mac Pro (Rack, 2019)

Apple Recycler Guide

May 2023

Contents

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 back of the Mac Pro (Rack, 2019).

Model number:
A2304

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, graphics processing unit (GPU) logic board, power supply logic board, input/output (I/O) card, memory modules, and processor	Follow steps 1–44
External electric cables	Power cord	Follow step 1
Battery	Coin cell battery	Follow steps 1–20
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 eye protection

Wear protective clothing

Wear hand protection

Wear foot protection

Hazard Warning

Sharp edges—cut hazard

Recommended Tools

4.5 mm L-key
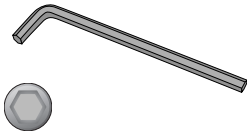
Miniature pry bar
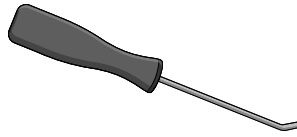
Nail-pulling screwdriver
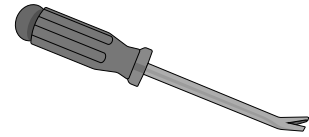
Phillips screwdriver
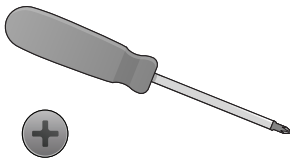
Screwdriver-handle pry bar
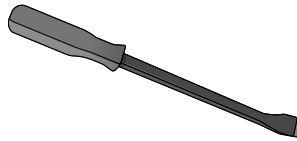
Torx T3 screwdriver
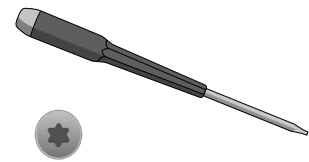
Torx T5 screwdriver
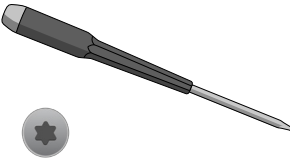
Torx T8 screwdriver
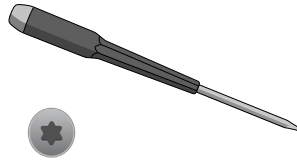
Torx T10 screwdriver
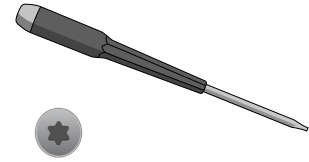
Torx T15 screwdriver
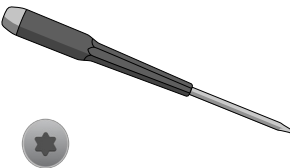
Wire cutters
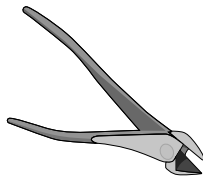
Disassembly Instructions

1.   Remove the power cord.

》 *Ensure that the Mac Pro is turned off.*

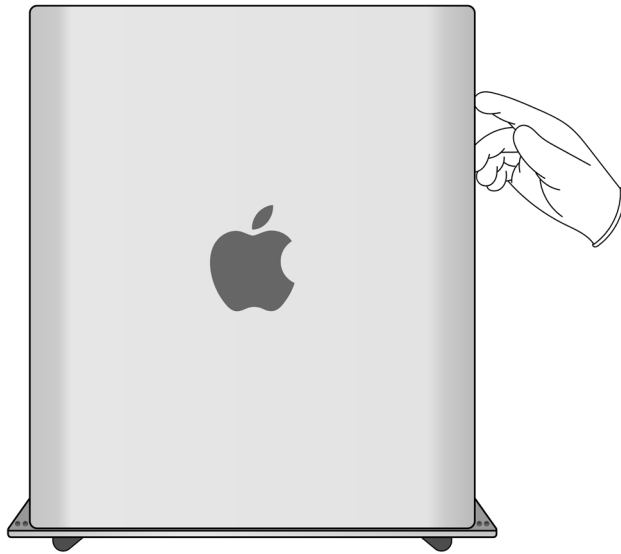》 *Unplug the power cord from the back of the computer.*

Fraction

Power cord

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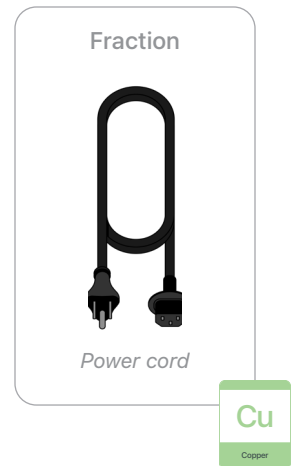
Warning: Before continuing disassembly, wait 10 minutes after unplugging the device for stored energy to discharge.

2. Remove the top panel.

» *With the handles facing forward, release the latch on each side of the housing.*

» *Pull off the top panel.*

Fraction

Top panel

Al
Aluminum
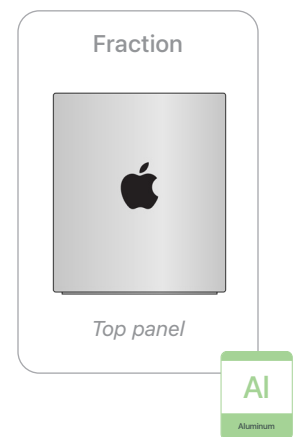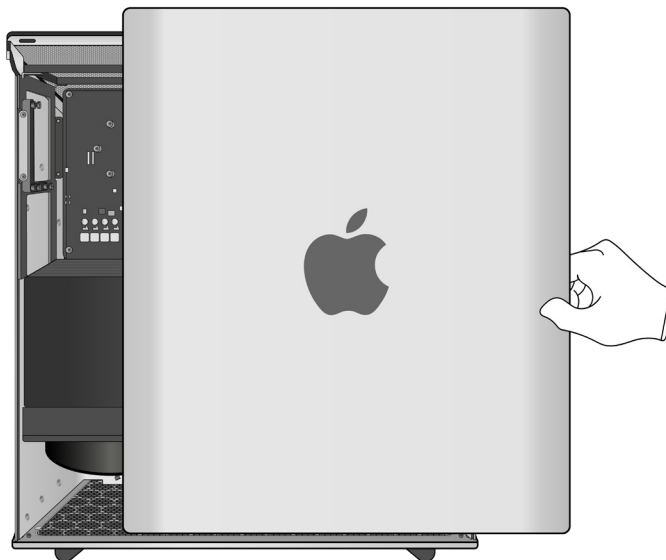
3. Unscrew the 11 Torx T10 fasteners on each side of the housing.
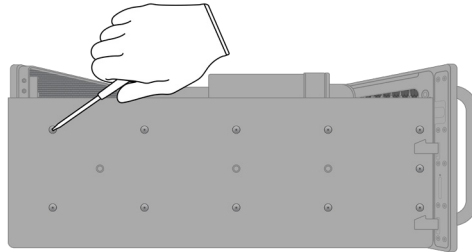
Tools Used
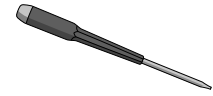
Fraction

Fasteners (x22)

Fe

Ferrous

4. Pull off the front plate. Set the housing aside.
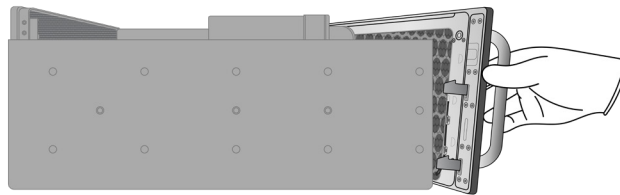
5. Remove the power button logic board by unscrewing the four Torx T5 fasteners.
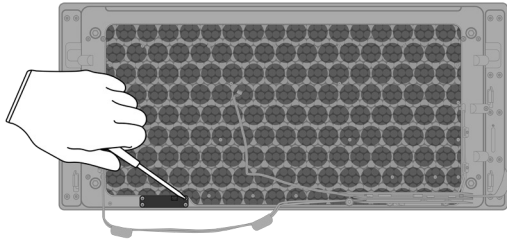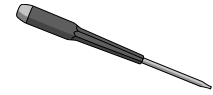
Tools Used

Fraction

Fasteners (x4)

Fe
Ferrous

Fraction

Power button logic board

PMs
Precious Metals

6. Remove the top I/O card.

» *Unscrew the three Torx T10 fasteners.*
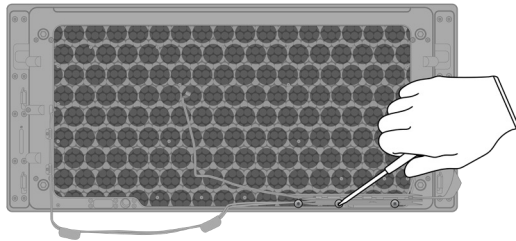
» *Cut off the surrounding wires to remove the top I/O card. Set the front plate aside.*
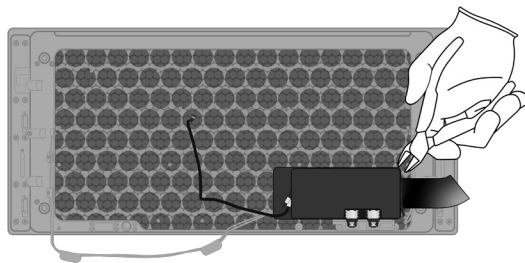
Tools Used
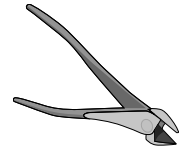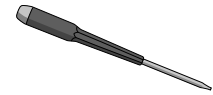
Fraction

Fasteners (x3)

Fe
Ferrous

7. Pull the plastic sheets off the top I/O card.

<div>

Fraction

Plastic sheets

PL
Plastics

</div>

<div>

Fraction

Top I/O card

PMs
Precious Metals

</div>
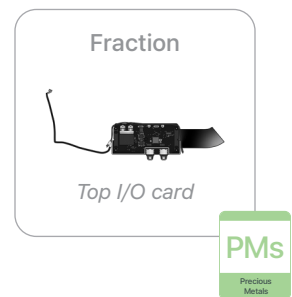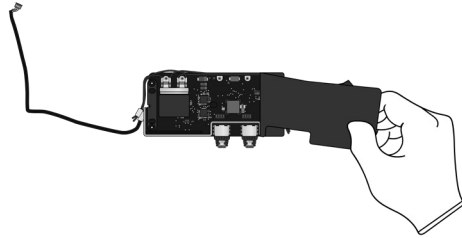
8. On the front plate, remove the handles by unscrewing the four 4.5 mm fasteners.

<div>

Tools Used

</div>

<div>

Fraction

Fasteners (x4)

Handles (x2)

Fe
Ferrous

</div>
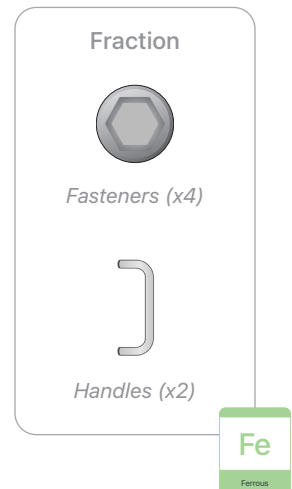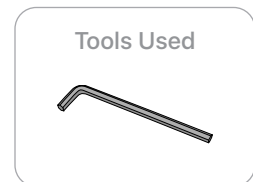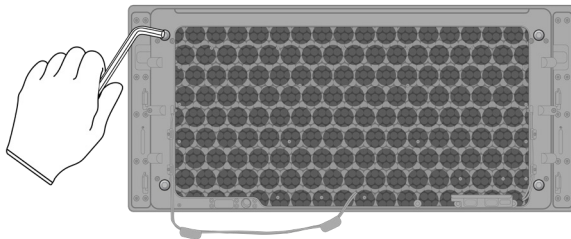
9. Remove the antennas.

» *Unscrew the eight Torx T5 fasteners.*
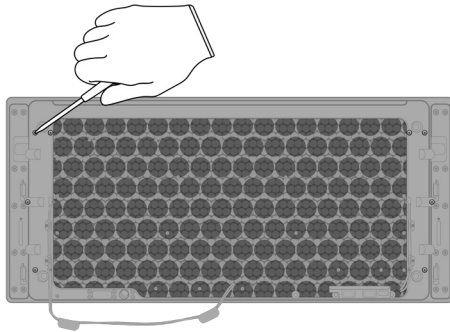
Tools Used
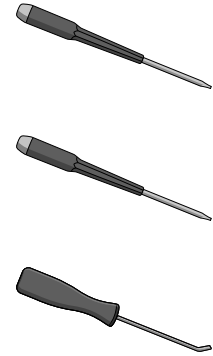
» *Unscrew the eight Torx T3 fasteners.*
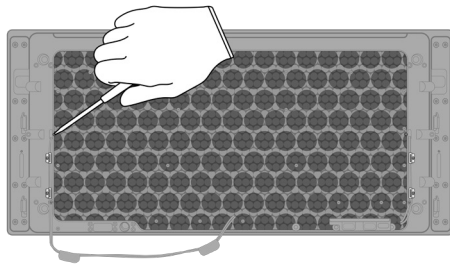
Fraction

Fasteners (x16)

Fe

Ferrous

» *Flip over the front plate and remove the antenna covers by hand. Set the front plate aside.*
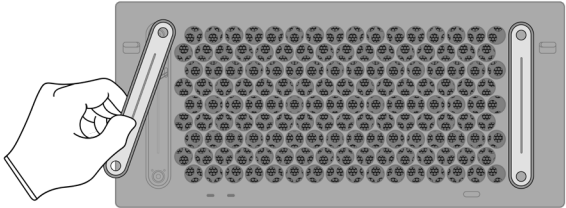
» *Using the miniature pry bar, pry off the antennas.*

Fraction

Antennas

Cu
Copper

Fraction

Antenna covers (x2)

Al
Aluminum
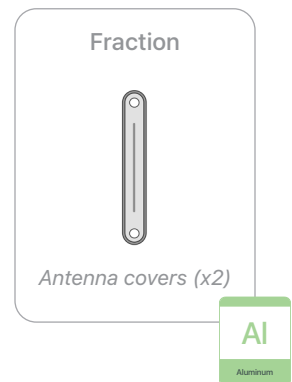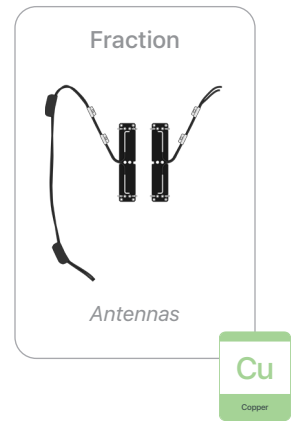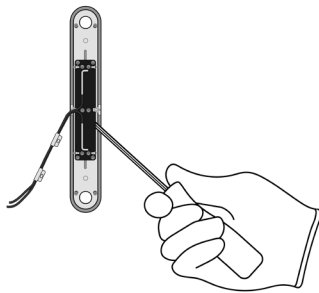
10. On the back of the front plate, unscrew the 10 Torx T8 fasteners from both latch assemblies.
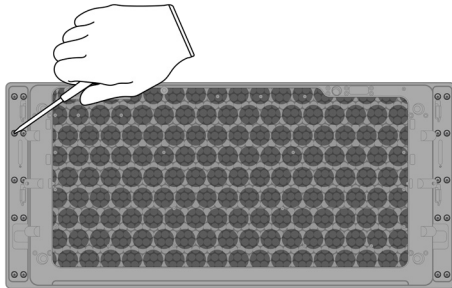
Tools Used
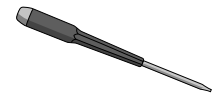
Fraction

Fasteners (x20)

Latch assemblies (x2)

Fe
Ferrous

Fraction

Front plate

Al
Aluminum

11. Slide the internal assembly out of the housing.
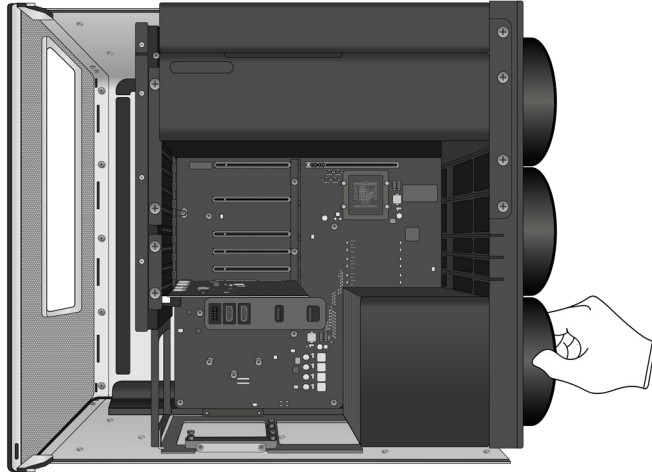
12. Pull the two foam cushions off the housing.

Fraction

Foam cushions

PL
Plastics
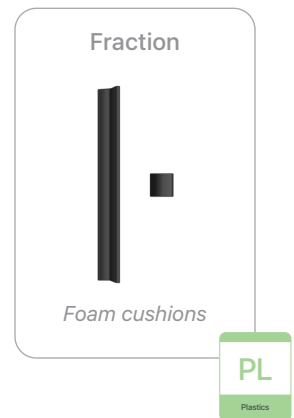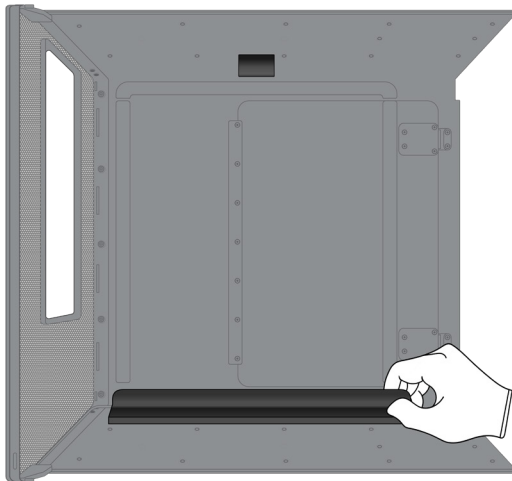
13. Pry off the Hall effect sensor.
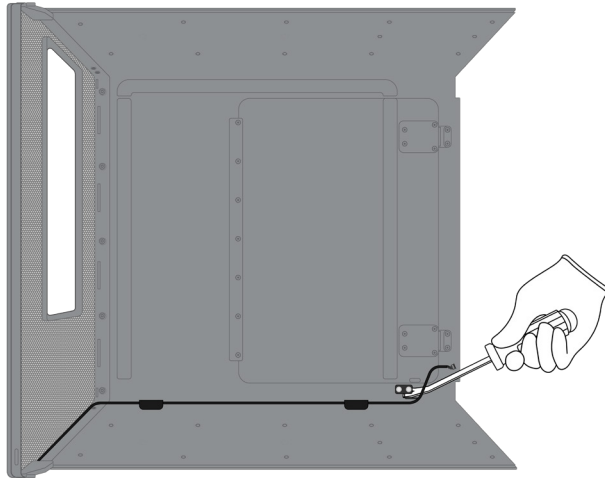
Tools Used
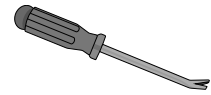
Fraction

Hall effect sensor

Cu
Copper

Fraction
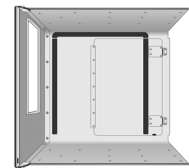
Housing

Al
Aluminum

14. Remove the retaining brackets.

» *On the internal assembly, loosen the four Phillips fasteners from the two retaining brackets on the right side. Then loosen the four Phillips fasteners from the left retaining bracket. Set the internal assembly aside.*
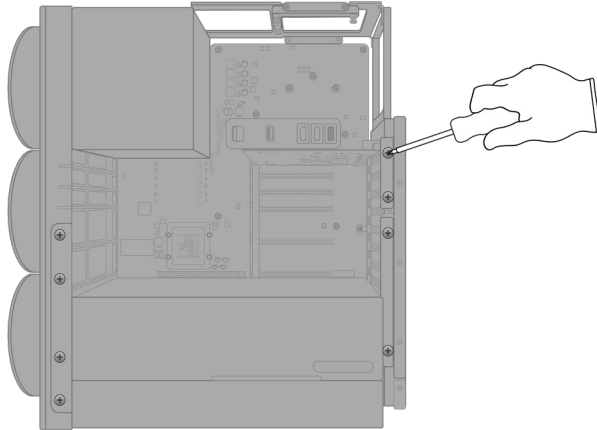
Tools Used
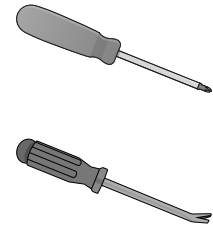
» *Pry off the fasteners and springs.*
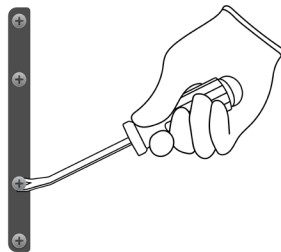
Fraction

Fasteners (x8)
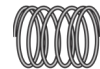
Springs (x8)

Fe
Ferrous

Fraction
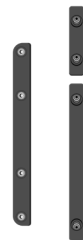
Retaining brackets

Al
Aluminum

15. Remove the I/O card by sliding the PCI Express lock to the unlocked position.

Fraction

I/O card

PMs
Precious
Metals
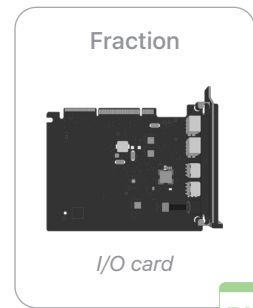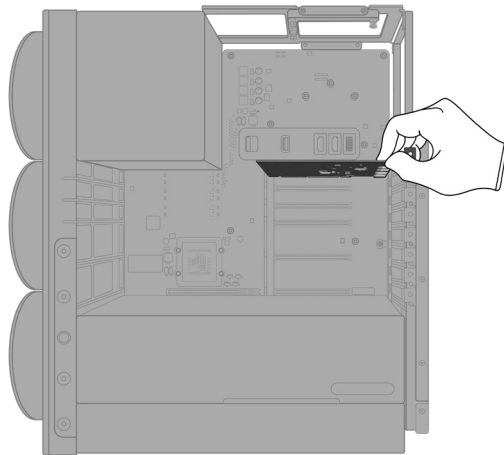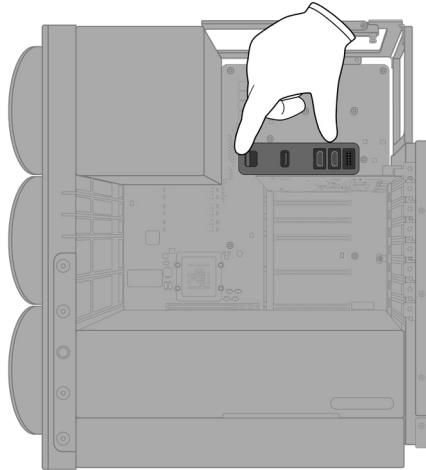
16. Using the ejector latch, slide the GPU off the main logic board.
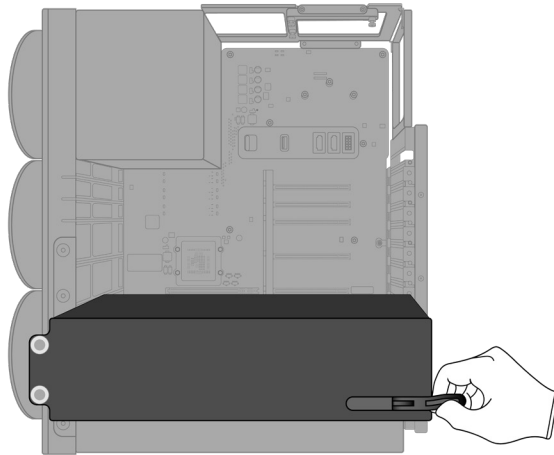
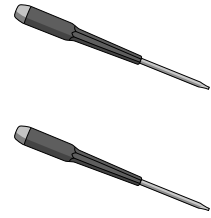## 17. Disassemble the GPU.

» *Peel off the Mylar film by hand.*

» *Unscrew the one Torx T8 fastener.*
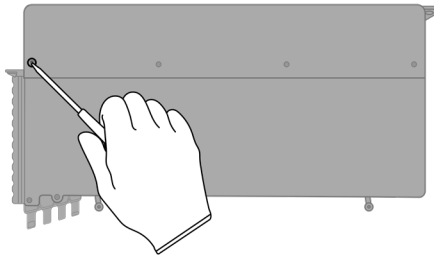
» *Unscrew the five Torx T5 fasteners.*
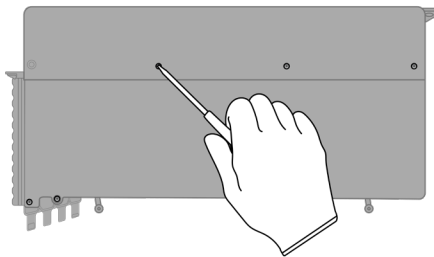
Tools Used

Fraction

Mylar film
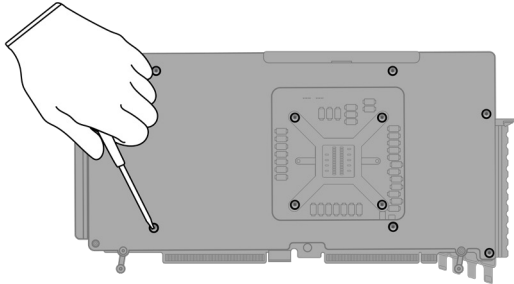
PL
Plastics

Fraction
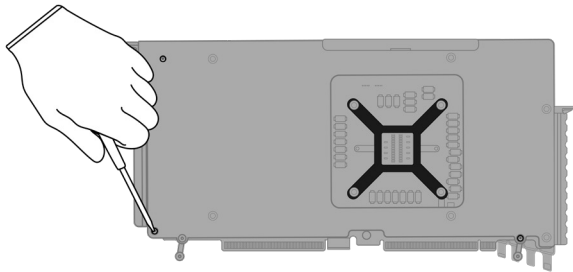
Fasteners (x6)

Fe
Ferrous

18. Remove the center bracket.

» *Flip the GPU over. Unscrew the 10 Torx T8 fasteners.*

» *Unscrew the three Torx T5 fasteners. Pull off the center bracket.*

Fraction

Fasteners (x13)
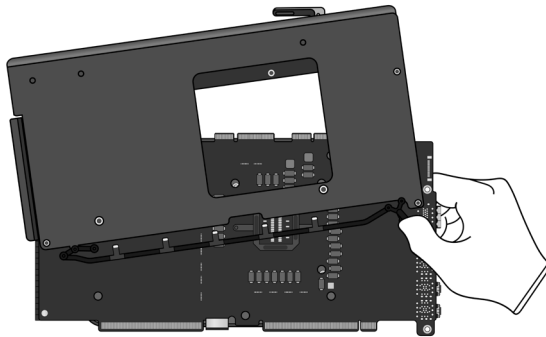
Fe

Ferrous

Fraction
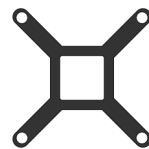
Center bracket

Al
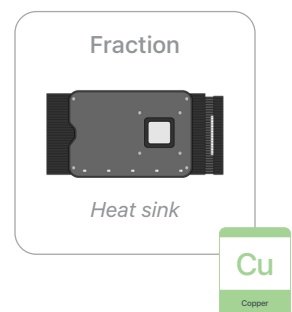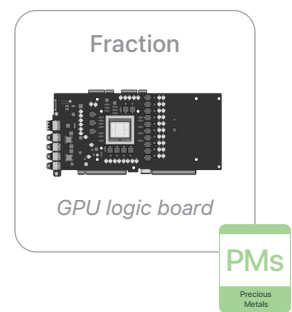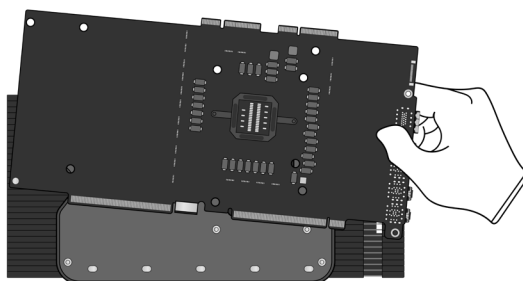
Aluminum

19. Remove the heat sink and GPU logic board.

» *Pull off the front face of the GPU.*

Fraction

Front face

Al
Aluminum
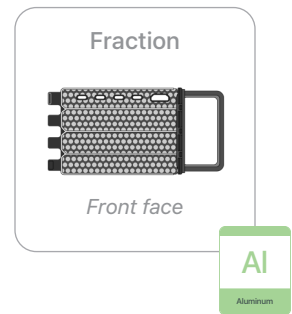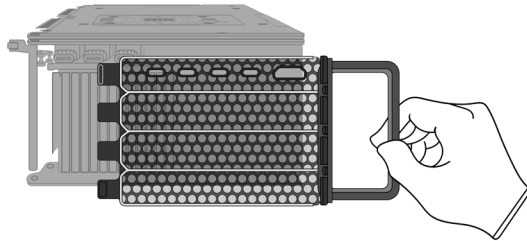
» *Separate the GPU housing from the heat sink.*

Fraction

GPU housing

Al
Aluminum
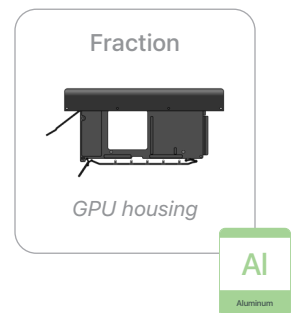
» *Pull the GPU logic board off the heat sink.*

Fraction

GPU logic board

PMs
Precious Metals

Fraction

Heat sink

Cu
Copper

20. Remove the coin cell battery from the main logic board.
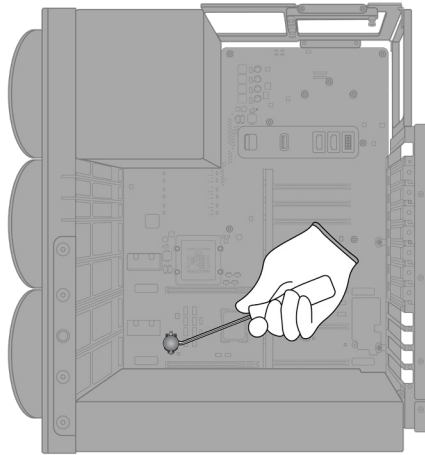
Tools Used

Fraction

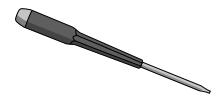
Coin cell battery

BT

Battery

21. Slide out the power supply enclosure by unscrewing the one Torx T8 fastener.
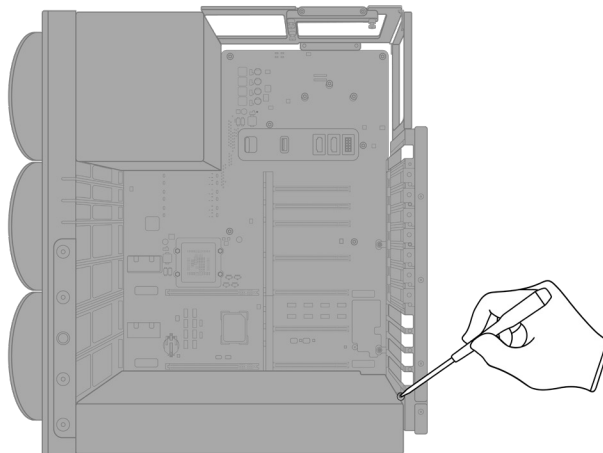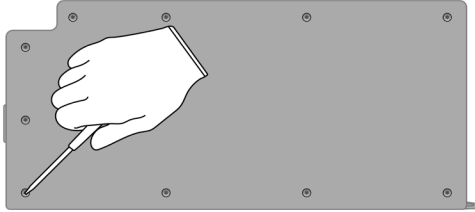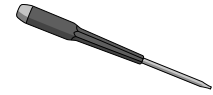

Tools Used

Fraction

Fastener

Fe

Ferrous

22. Unscrew the 10 Torx T8 fasteners from the power supply enclosure.
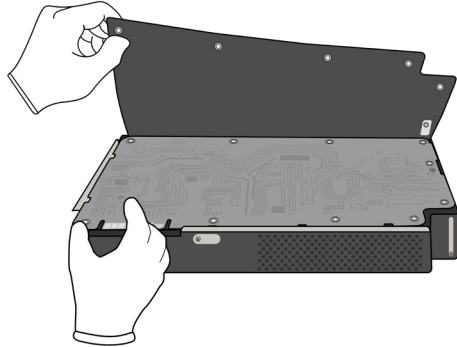

Tools Used

Fraction

Fasteners (x10)
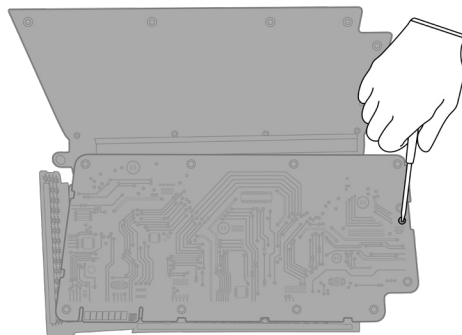
Fe

Ferrous

23. Remove the power supply logic board.
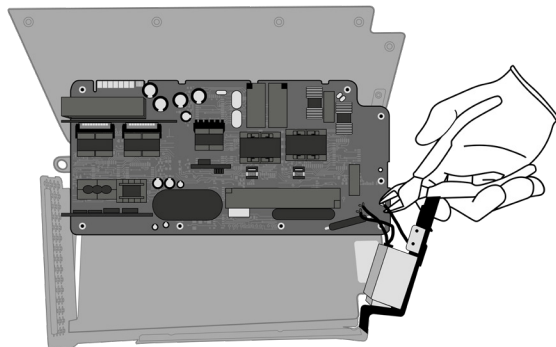
> ⚠️ Sharp edges—cut hazard

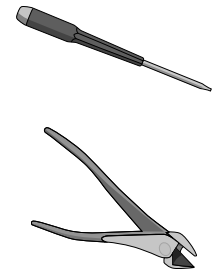» *Pry open the power supply enclosure by hand.*

» *Unscrew the one Torx T8 fastener from the power supply logic board.*

» *Separate the power supply logic board from its enclosure by cutting the wires.*
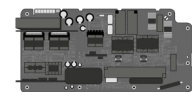

Tools Used

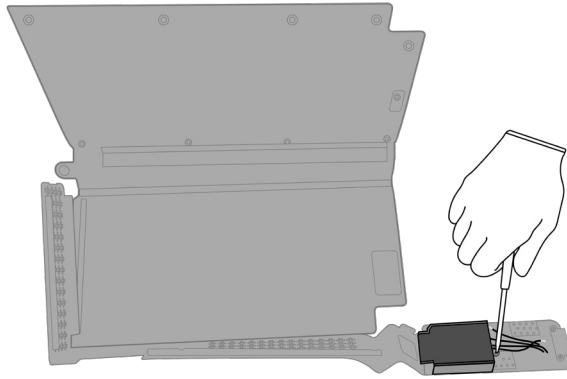**Fraction**

Fastener

Fe
Ferrous

Fraction

Power supply logic board
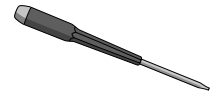
PMs
Precious Metals

24. Remove the power adapter by unscrewing the one Torx T8 fastener and washer.

Tools Used

Fraction

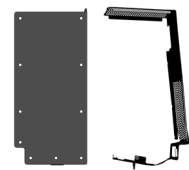*Fastener*

Washer

Fe
Ferrous
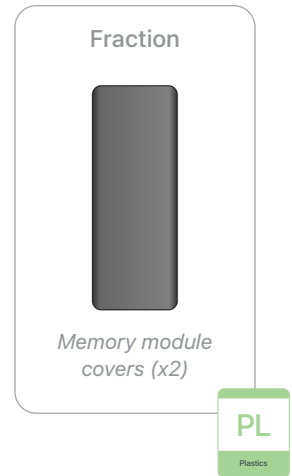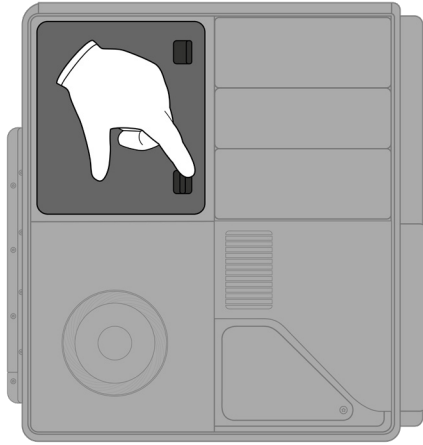
Fraction

Power adapter

Cu
Copper
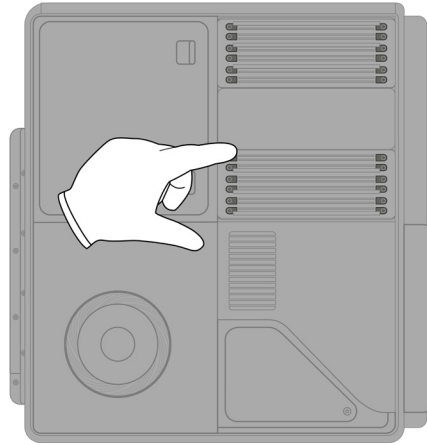
Fraction

Power supply logic board housing

Al
Aluminum

25. On the internal housing, slide the memory module cover latch to the unlock position. Remove both memory module covers.
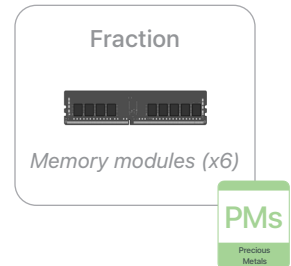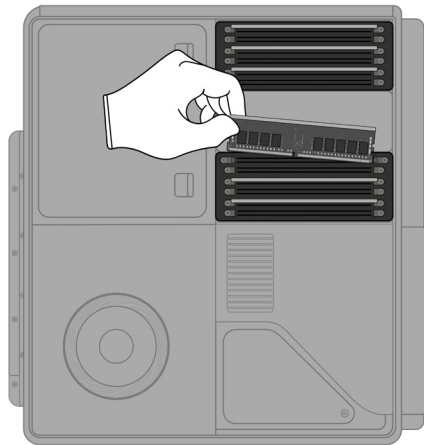

Fraction

Memory module covers (x2)
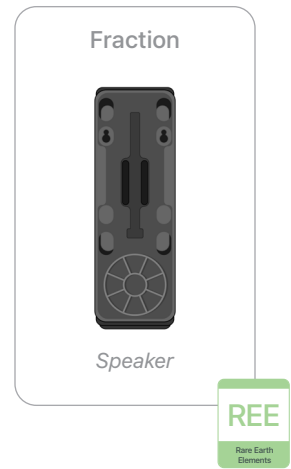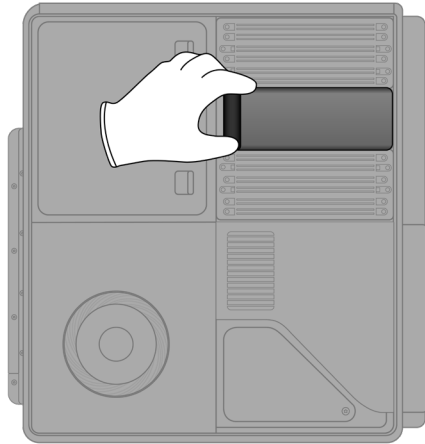
PL

Plastics

26. Remove the memory modules.

» *Unlatch the memory modules by pushing the memory module ejectors.*
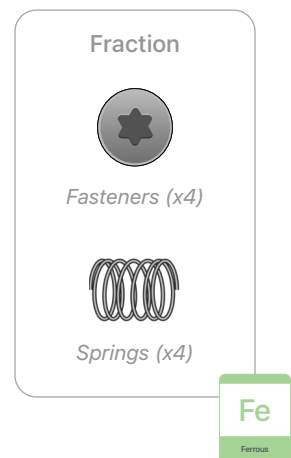

» *Pull out the six memory modules.*

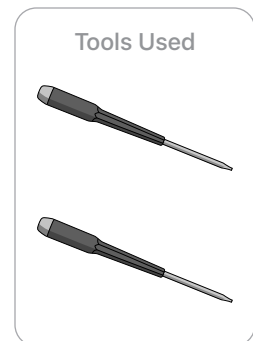Fraction

Memory modules (x6)

PMs

Precious
Metals

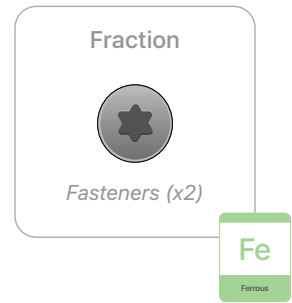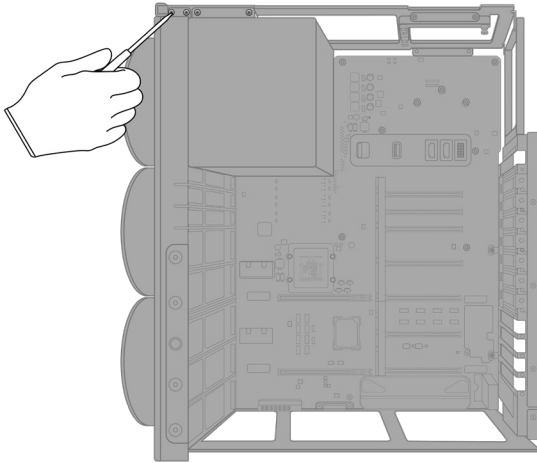**27.** Remove the speaker by sliding it to the left and tilting it forward.

Fraction

Speaker

REE

Rare Earth Elements

28. Remove the thermal module.

》 *Unscrew the four Torx T15 fasteners and springs.*

Tools Used

Fraction

Fasteners (x4)

Springs (x4)

Fe

Ferrous
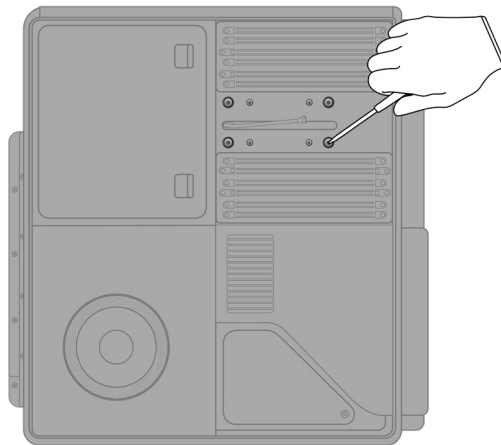
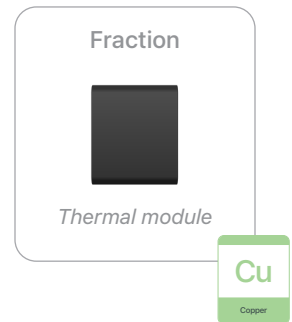» *Flip the assembly around. Unscrew the two Torx T8 fasteners from the thermal module.*
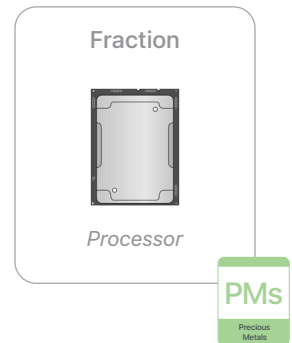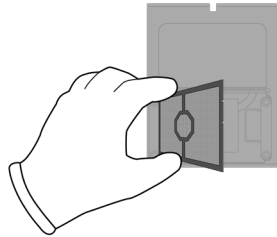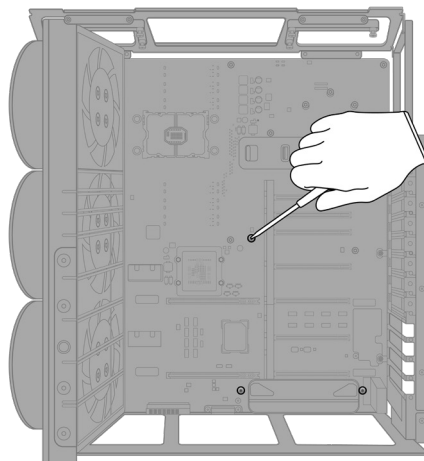
» *Slide out the thermal module.*
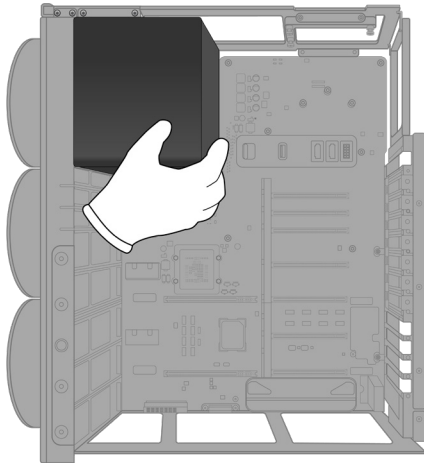
29. Lay the thermal module facedown. Lift out the processor.

Fraction

Processor

PMs
Precious Metals
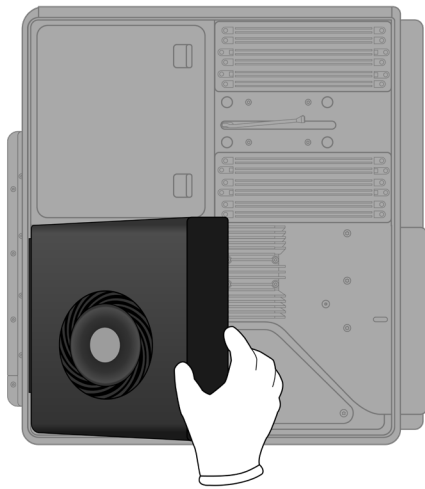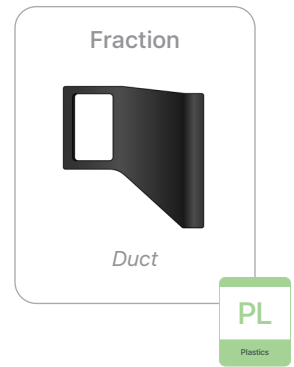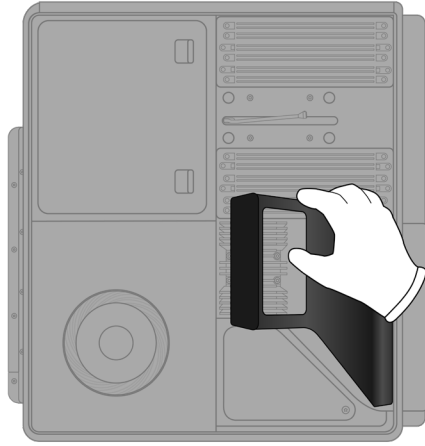
Fraction

Thermal module

Cu
Copper

30. Remove the duct and blower.

» *Unscrew the three Torx T8 fasteners from the main logic board.*

Tools Used

Fraction

Fasteners (x3)

» *Flip the assembly around and pull off the duct and blower.*

Fraction

Duct

PL
Plastics

Fraction

Blower

Cu
Copper

31. Remove the heat sink by unscrewing the four Torx T8 fasteners and springs.
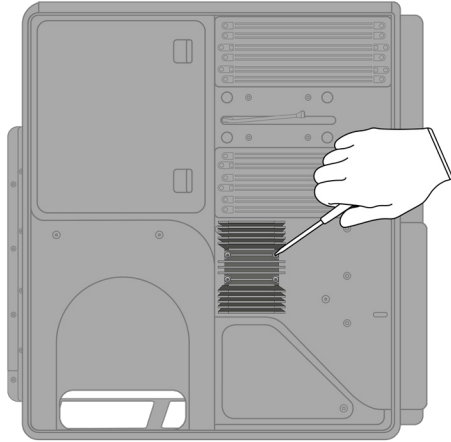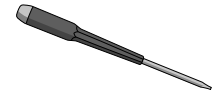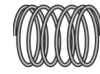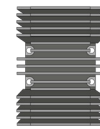

Tools Used

Fraction

Fasteners (x4)
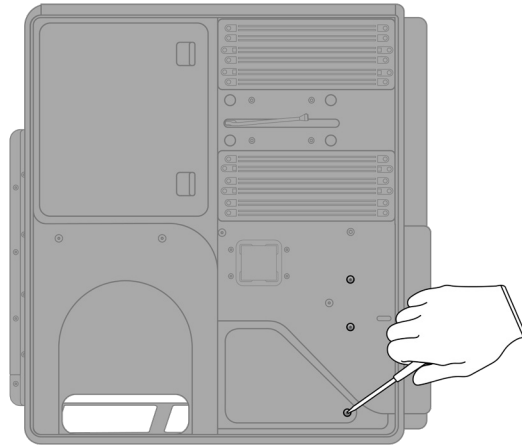
Springs (x4)

Fe
Ferrous

Fraction

Heat sink

Cu
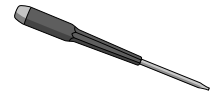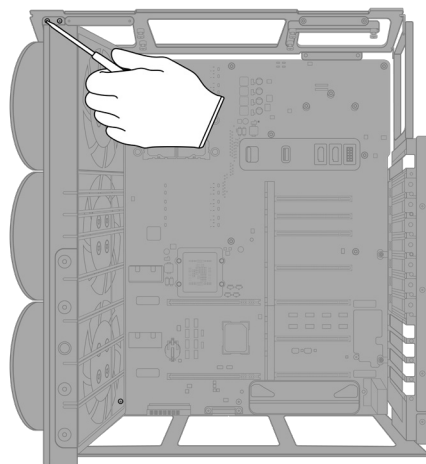Copper

32. Remove the fan assembly.

» *Unscrew the three Torx T8 fasteners from the fan assembly.*

» *Turn the internal assembly around. Unscrew the two Torx T8 fasteners from the top of the fans. Then unscrew the one Torx T8 fastener at the bottom.*
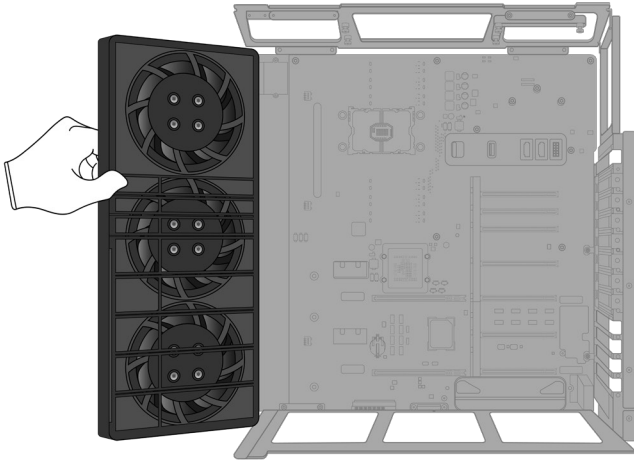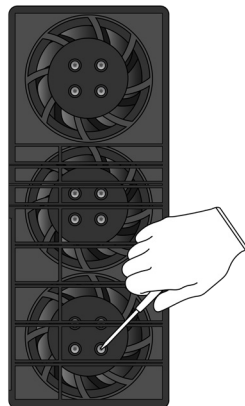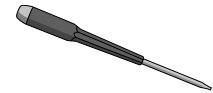

Fraction

Fasteners (x6)

Fe
Ferrous

» *Separate the fan assembly from the internal assembly. Set the internal assembly aside.*

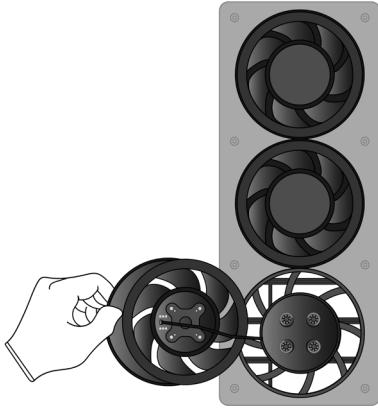## 33. Unscrew the 12 Torx T8 fasteners from the fan assembly.
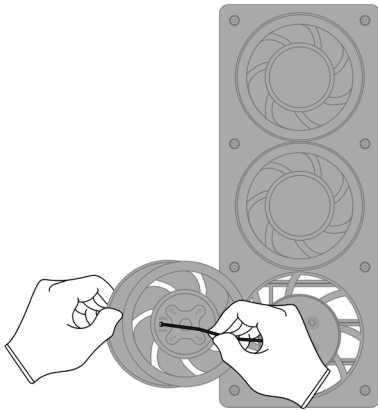
Tools Used

Fraction

Fasteners (x12)

Fe
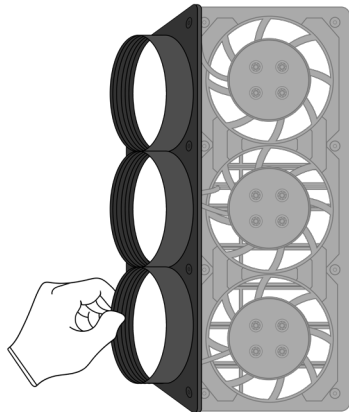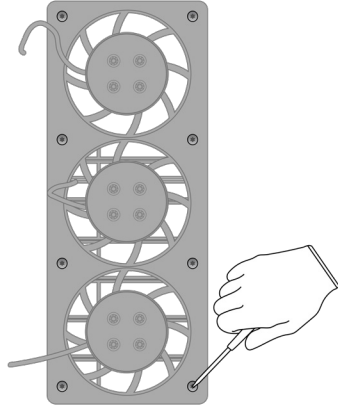Ferrous

34. Remove each fan.
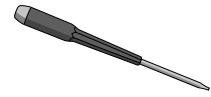
» *Flip the fan assembly over and lift out the fans.*

» *Disconnect the ribbon cable from each fan. Set the fans aside.*

35. Unscrew the eight Torx T8 fasteners from the fan assembly. Lift up the top piece.
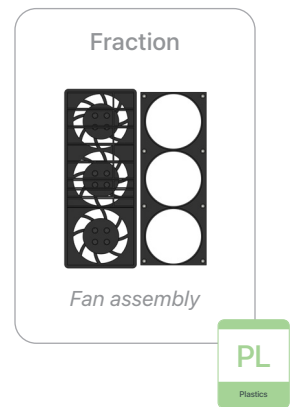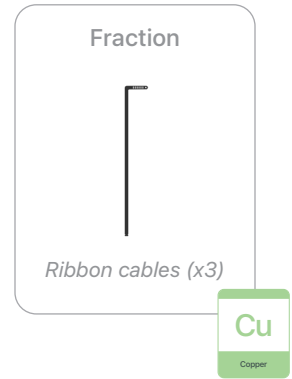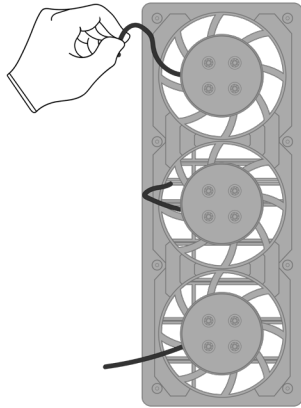

Tools Used

Fraction

Fasteners (x8)

Fe
Ferrous

36. Remove the three ribbon cables from the fan assembly housing.

Fraction

Ribbon cables (x3)

Cu
Copper

Fraction

Fan assembly

PL
Plastics

37. Pry the motor off each fan.
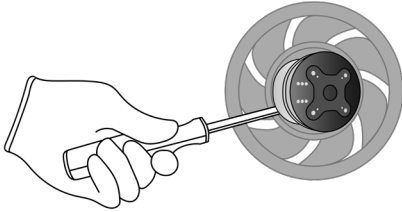
Tools Used

Fraction

Fan motors (x3)

Cu
Copper

Fraction

Fans (x3)

PL
Plastics

38. Slide out the seven PCI slot covers.

Fraction

Slot covers (x7)

Al
Aluminum

39. Remove the top I/O card cable.

» *Remove the top I/O card cable cover by unscrewing the two Torx T5 fasteners.*

Tools Used

Fraction

Fasteners (x2)

Fe
Ferrous

Fraction

Top I/O card cable cover

Al
Aluminum

» *Pull off the top I/O card cable by hand.*

Fraction

Top I/O card cable

Cu
Copper

40. Remove the lower housing frame by unscrewing the five Torx T8 fasteners.
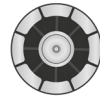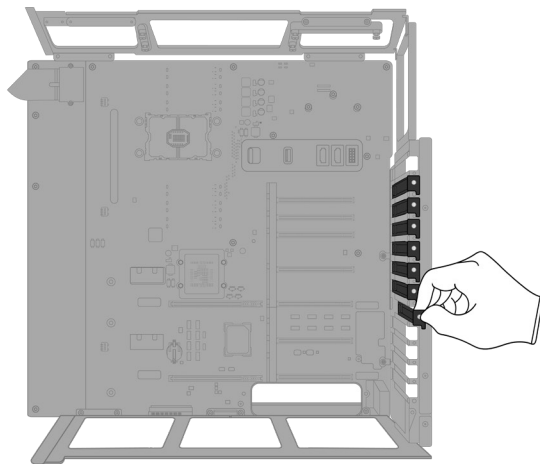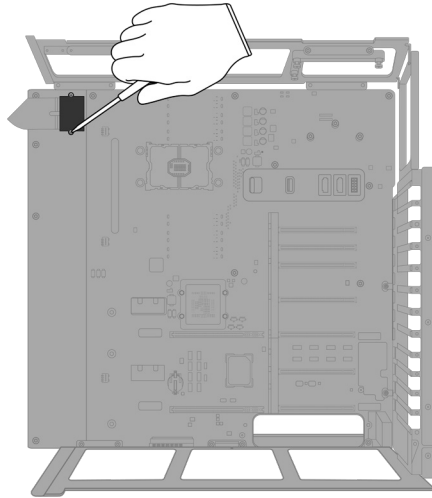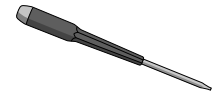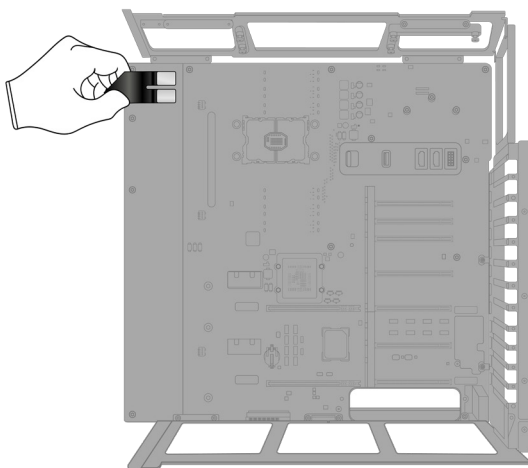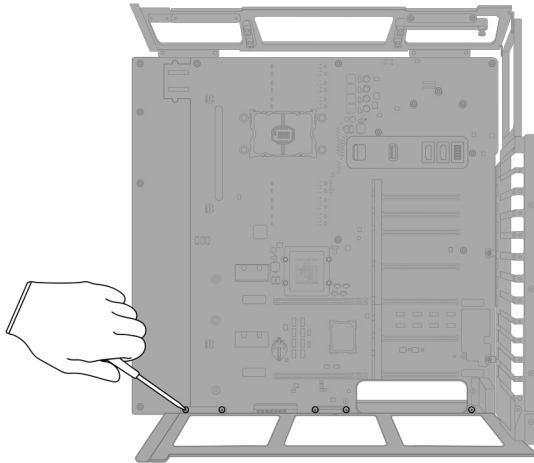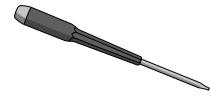

Tools Used

Fraction

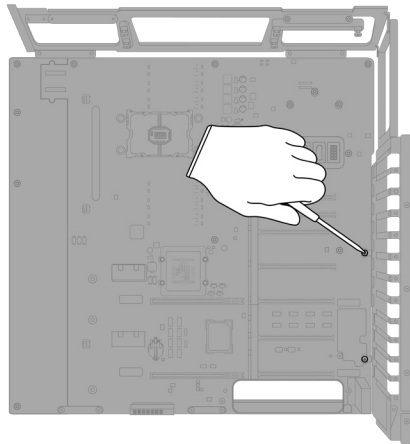

Fasteners (x5)

Fe
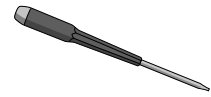Ferrous

Fraction

Lower housing frame

Al
Aluminum

41. Remove the side and upper housing frame.
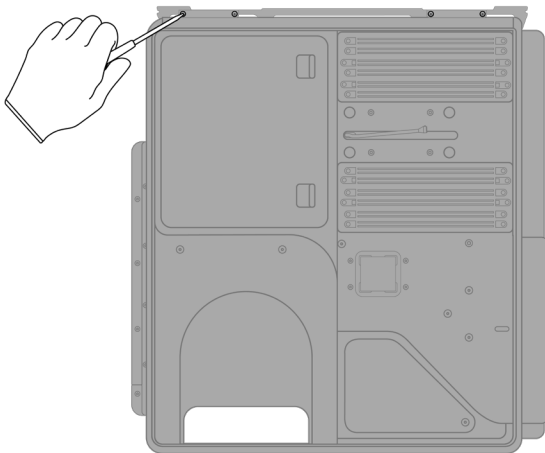
» *Unscrew the two Torx T8 fasteners.*

Tools Used

» *Flip the assembly over and unscrew the four Torx T8 fasteners.*

Fraction

Fasteners (x6)
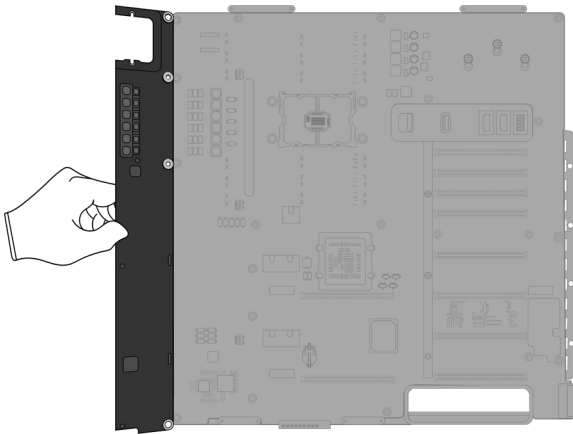
Fe
Ferrous

Fraction
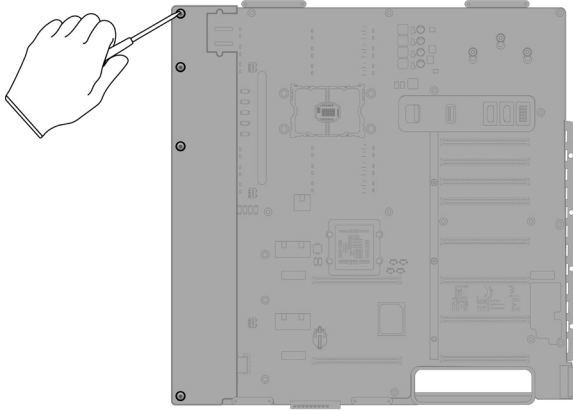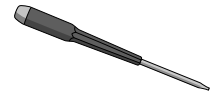

Side and upper housing frame

Al
Aluminum

42. Remove the heat channel by unscrewing the four Torx T8 fasteners.

Tools Used

Fraction

Fasteners (x4)

Fe
Ferrous

Fraction

Heat channel
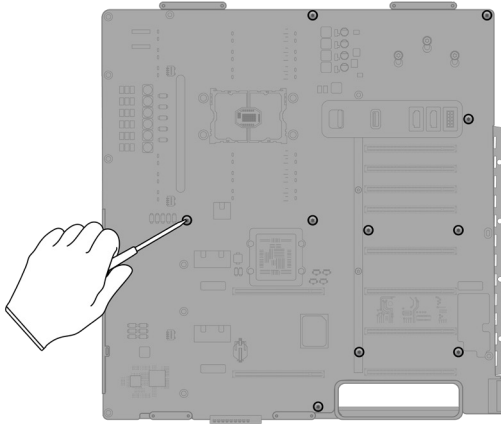
Al
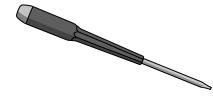Aluminum

43. Remove the back plate.

» *Unscrew the 10 Torx T8 fasteners from the main logic board.*

» *Unscrew the three Torx T8 fasteners.*
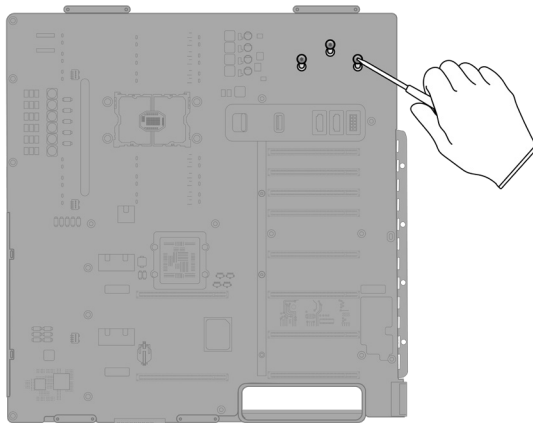
Fraction

Fasteners (x13)

Fe
Ferrous

» *Pull the aluminum back plate from the main logic board.*

» *Pull the plastic cover off the back plate.*

Fraction

Plastic cover

PL
Plastics

Fraction

Back plate

Al
Aluminum
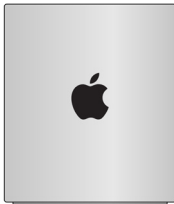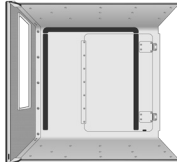
44. Remove the plastic gasket from the main logic board.

Fraction

Plastic gasket

PL
Plastics

Fraction

Main logic board

PMs
Precious
Metals

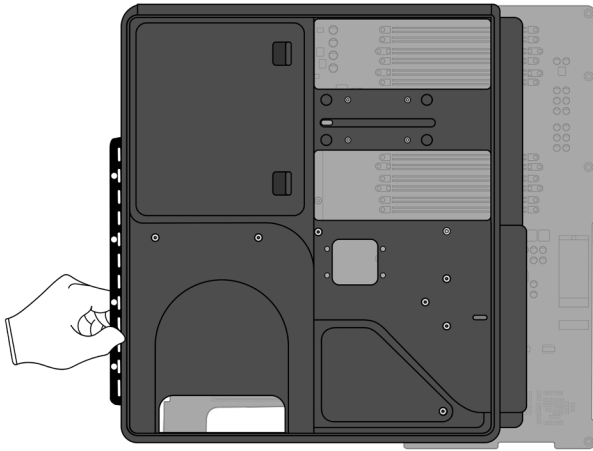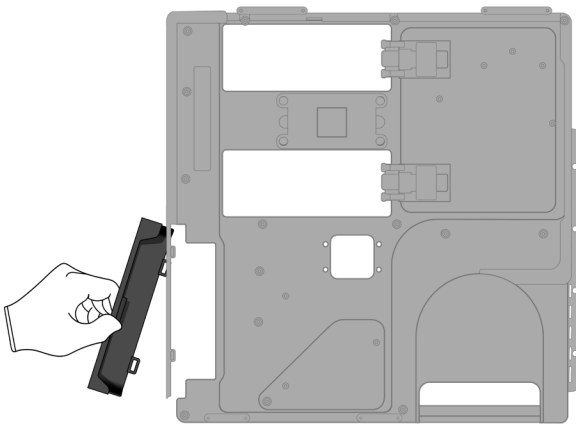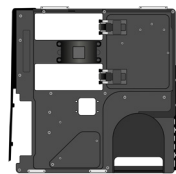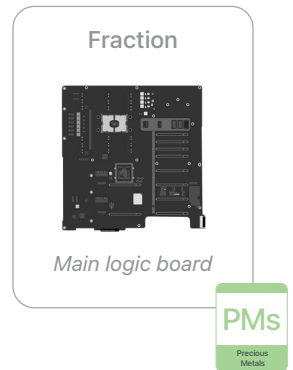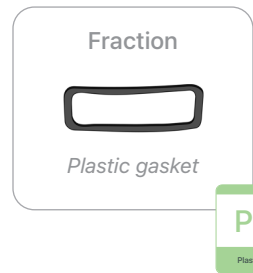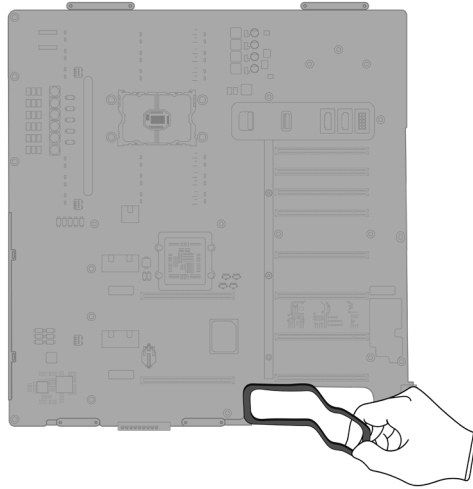# Material Categorization of Output Fractions

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	**Primary Target Material**

Top panel

Antenna covers (x2)

Front plate

Housing

Primary Target Material

Al
Aluminum

Potential Additional Materials

Fe
Ferrous

PL
Plastics

Fraction	Downstream Processing
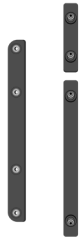
Aluminum (cont.)

Retaining brackets
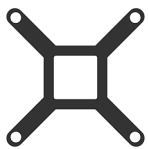
Center bracket

Front face
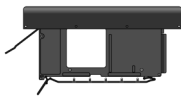
GPU housing
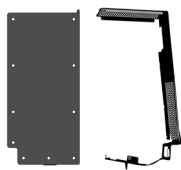
Power supply enclosure

Slot covers (x7)
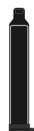
Fraction	Downstream Processing

Aluminum (cont.)

Top I/O card cable cover

Lower housing frame

Side and upper housing frame

Heat channel
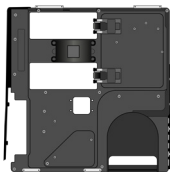
Back plate

Fraction	Downstream Processing
Batteries	**Primary Target Material**

Coin cell battery

Ferrous	**Primary Target Material**

Fasteners (x178)

Handles (x2)

Latch assemblies (x2)

Springs (x16)

Washer

Fraction	Downstream Processing

Logic Boards

Power button logic board

Top I/O card

I/O card
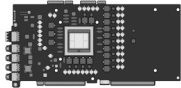
GPU logic board
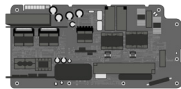
Power supply logic board

Memory modules (x6)
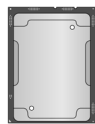
Processor

Primary Target Material

PMs
Precious
Metals

Potential Additional Materials

Cu
Copper

Fe
Ferrous

PL
Plastics

Fraction	Downstream Processing

Logic Boards (cont.)

Main logic board

Mixed Electronics
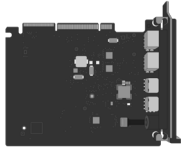

Power cord

Antennas

Hall effect sensor
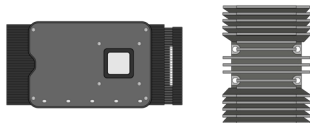
Heat sinks

Primary Target Material

Cu
Copper

Potential Additional Materials

Fe
Ferrous

PL
Plastics

PMs
Precious Metals

Fraction	Downstream Processing

Mixed Electronics (cont.)

Power adapter

Thermal module

Blower

Ribbon cables (x3)

Fan motors (x3)

Top I/O card cable

Fraction	Downstream Processing
Mixed Plastics	**Primary Target Material**

Plastic sheets

Foam cushions

Mylar film

Memory module covers (x2)

Duct

PL

Plastics

Fraction	Downstream Processing

Mixed Plastics (cont.)
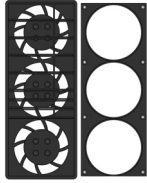
Fan assembly

Fans (x3)

Plastic cover

Plastic gasket

Rare Earth Magnets

Speaker

Primary Target Material

REE
Rare Earth Elements

Potential Additional Materials

Cu
Copper

PL
Plastics

Fe
Ferrous