

SONY

PAGE BY PAGE

BY IZA BOSCH



SONY

PAGE BY PAGE

a graduation project by Iza Bosch

INTRODUCTION

Congratulations on your new headphones!

While you might not know what's going on inside them, your headphones are full of carefully designed parts and valuable materials. This book will guide you through your headphones, step by step, page by page. It invites you to take a closer look, understand what each part does, and discover how everything fits together.

Whether you're simply curious, planning a repair, or wondering how to keep your headphones working for as long as possible, this book has you covered. You'll learn how to take care of, maintain and repair your headphones, and eventually say goodbye to them responsibly. No technical background required.

And if your headphones ever stop working and can't be repaired, or if you simply no longer have a use for them, there's no need to worry about keeping them around forever "just in case." This book can be your keepsake instead. It holds all the stories, parts, and memories, without taking up all the space or letting valuable materials gather dust in a drawer. After all, those materials are too valuable to just leave locked away. By passing on or recycling your headphones, they can be put to good use again.

Now, let's open things up!

Headband padding	Replacement part ID: 45862
Headband slider cover	Replacement part ID: 45872
Headband structural band	Replacement part ID: 68453
Shell Right	Replacement part ID: 29301
Shell Left	Replacement part ID: 29302
Main PCB	Replacement part ID: 31026
Battery module	Replacement part ID: 82974
Power board	Replacement part ID: 70865
USB-C PCB	Replacement part ID: 32585
Audio module Right	Replacement part ID: 49301
Audio module Left	Replacement part ID: 49302
Input PCB	Replacement part ID: 37715
Joystick PCB	Replacement part ID: 59217
Base Right	Replacement part ID: 22261
Base Left	Replacement part ID: 22262
Earpad	Replacement part ID: 98032

SPARE PARTS

On this page you can find an overview of all spare parts, in order of appearance in this book.

IMPORTANT! If you don't feel comfortable repairing the headphones by yourself, contact our Customer Support and they will arrange a repair for you.

If a part is broken and you can't repair or reuse it, don't throw it in the regular trash. Many components contain valuable or hazardous materials that require proper recycling.

Instead, bring your old parts to your local recycling centre, an e-waste collection point, or a store that sells electronics. In many countries, these stores are required to accept old electronic devices and ensure they're discarded responsibly.



These parts are replaceable!

For spare parts, scan the QR-code or go to www.sony.com/store/product/XXX/PartID



OVERVIEW

The headphone can be divided into 6 different functions: **Comfort**, **Structural**, **Power**, **Processing**, **Audio**, and **Sensing**.

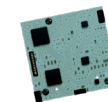
Comfort ensures the correct fit of the headphones and that you can wear them for prolonged periods of time. It consists of the **headband** and the **earpads**.



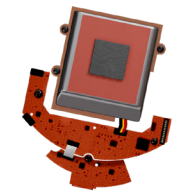
Structural ensures the structural integrity of the headphone and protection of internal components. It consists of the **shell** and the **base**.



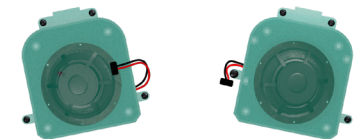
Processing is the brain of the headphones. It receives all the information, and gives commands to the drivers so you hear your music. It consists of the **main PCB**.



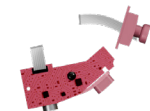
Power ensures all electrical components get the energy they need to fulfil their function and enables wireless use. It consists of the **battery**, the **power board**, and the **USB-C PCB**.



Audio transforms the electrical signals given by the main PCB get transformed into sound waves. It includes the **audio module**.



Sensing ensures that you as a user can control your headphones. It consists of the **input PCB** and the **joystick PCB**.



HEADBAND

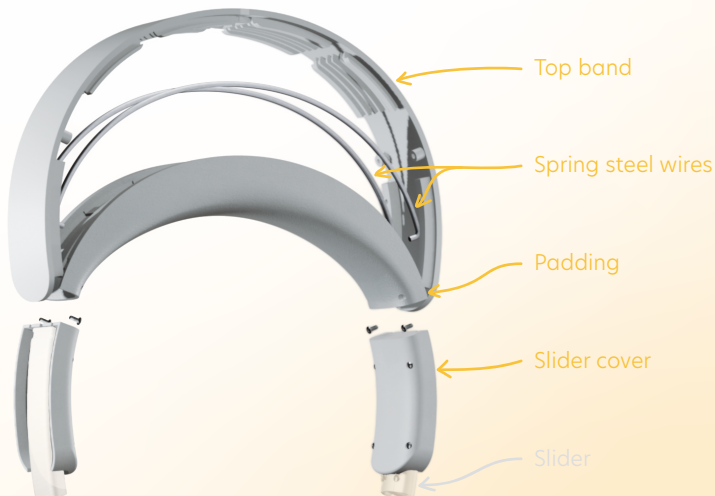
WHAT DOES IT DO?

The headband holds the ear cups in place and ensures a comfortable fit on the user's head. It consists of the following parts:

- ① **Padding:** The soft cushioning on the underside of the headband improves comfort and reduces pressure on the head.
- ② **Structural band:** The main frame that supports the rest of the headband structure. It consists of the ABS top band and two spring steel wires. The wires provide support and shape while being flexible enough to create a good fit for many sizes of heads.
- ③ **Slider covers:** These are part of the sliding mechanism that enables adjustments of the headband's length, allowing for a better fit. It keeps the sliders of the earcups in place, connecting the headband to the earcups.

HOW DOES IT WORK?

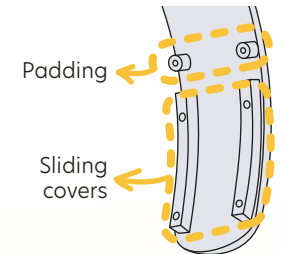
The spring steel wires snap into the top band, forming the **structural band**. The cables coming from the earcups also snap into the top band.





HEADBAND

The headband connects to the **earcup shells** through the **sliders**. To detach them, both the slider covers and the padding have to be removed. Detaching the headband from the earcups only needs to be done for repairs to the headband itself or to the shell.

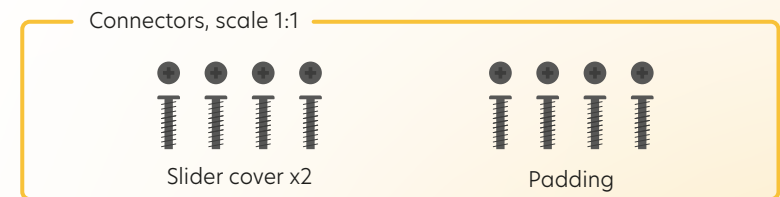


PADDING: ATTACHMENT AND ERRORS

The padding is attached to the **top band** with **four M1.7 screws**, which can be removed using a **Phillips #00 screwdriver**. After these screws have been removed, the padding can simply be slid off. Reattachment can be done in the opposite way.

After prolonged use, the padding on the headband can start to wear down. To prolong the life of the padding, use a damp cloth to wipe it down after each use.

Replacement part ID: 45862



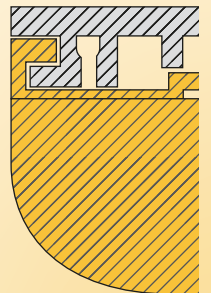
SLIDER COVERS: ATTACHMENT AND ERRORS

Each slider cover is attached to the **top band** with **four M1.7 screws**, which can be removed using a **Phillips #00 screwdriver**.

If the sliders do not stay in place during use, ensure that the slider cover is screwed on tightly.

Replacement part ID slider cover: 45872

Replacement part ID structural band: 68453



EARCUP SHELL

WHAT DOES IT DO?

The earcups house the majority of the electronics, like the battery, drivers, and printed circuit boards (PCBs). The housing protects these internal components. The top half of the housing is the **shell** and consists of the following parts:

- ❶ **Slider:** The other part of the sliding mechanism that enables the headband to expand. It also connects the earcup to the headband.
- ❷ **Earcup arm:** The earcup arm contains the hinge and enables the earcups to rotate in two directions for a better fit.
- ❸ **Housing shell:** The hard, outside shell protects the more fragile components inside of the earcups. It also plays a large role in the look of the headphones.
- ❹ **Cable:** The two cables run through the sliders, earcup arms, and the headband to connect both earcups, transmitting power and audio signals.

HOW DOES IT WORK?

The internal cable runs from one earcup to the other and must be protected from strain caused by movement due to the rotation of the earcup or extension of the headband.

The cable is routed through the centre of the earcup's pivot points. This ensures it moves along with the hinge rather than potentially bending.

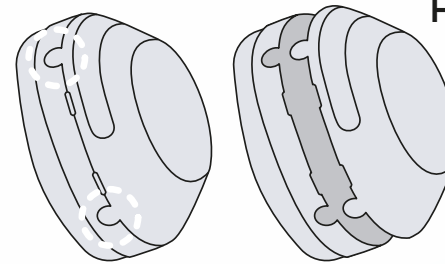
The cable follows a zigzag path inside of the slider. This provides extra slack, allowing the headband to extend or retract without putting tension on the cable.





EARCUP SHELL

HOW IS IT ATTACHED?

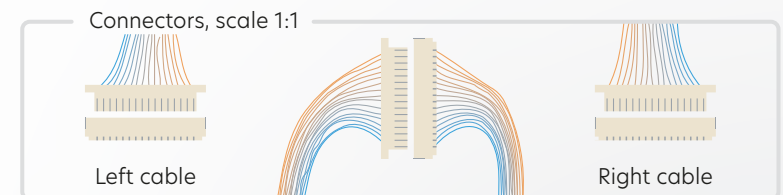


The earcup shell is connected to both the **headband** and the **base**.

The shell is attached to the base with **four visible snap fits** located around the perimeter of the earcup. These snap fits can be released by pulling the shell upward.

The cable is connected to the **main PCB** on the left side and to the **power board** on the right side, both with a **sliding connector**. To disconnect them, use your fingernail or a spudger to carefully wiggle the connector out of its socket. Do not pull on the cable directly, as this can cause damage to the internal wiring!

The left and right cable are connected to each other with a **wire-to-wire sliding connector**. This connector slots into the **headband's top band**. To reach it and detach the shell from the headband fully, both the slider covers and the padding have to be removed, as described on the headband page.



HOW TO RECOGNISE AN ERROR?

If there are severe issues that only seem to be located in one earcup, check if the connectors of the right and left cable are fully inserted into their respective sockets.

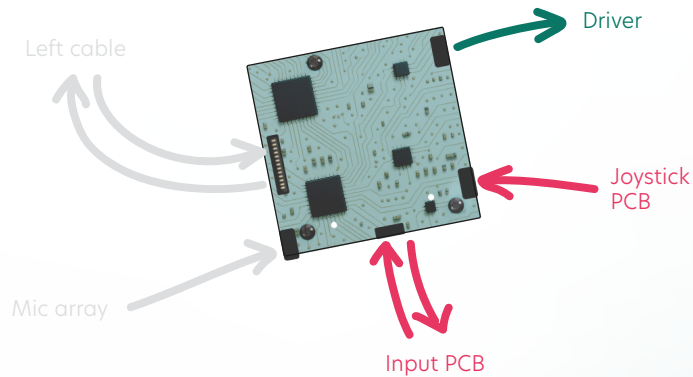
Replacement part ID: 29301 (Right)

Replacement part ID: 29302 (Left)

MAIN PCB

WHAT DOES IT DO?

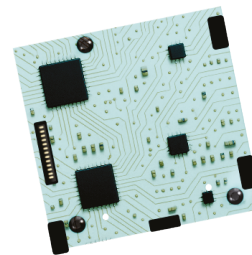
The main PCB is the brain of the headphones. It processes all input signals and controls the core functions of the device. It handles Bluetooth communication, processes audio signals, enables Active Noise Cancelling (ANC), and processes and responds to user input from the button and joystick.



HOW DOES IT WORK?

Signals from the microphones, input components, and Bluetooth module are received by the main PCB. The microcontroller on the PCB processes these inputs and determines what action to take. For example:

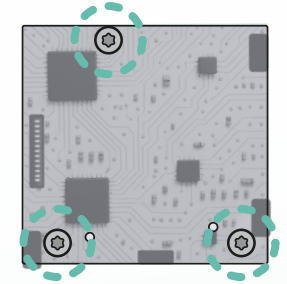
- Ambient sound picked up by the microphones is analysed by the ANC chip, which generates an inverted sound wave that cancels the ambient noise.
- The Bluetooth chip receives audio signals sent out by the connected device. The Digital to Analogue Converter (DAC) then converts these digital audio signals into analogue audio signals, which are electrical signals used to instruct the speaker driver.



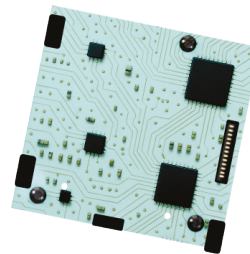
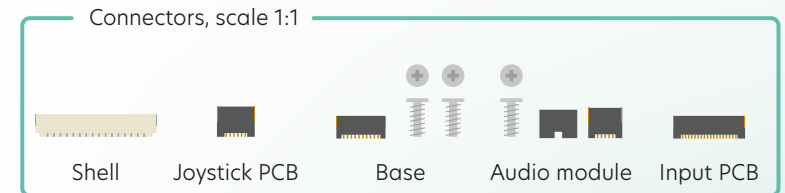
MAIN PCB

HOW IS IT ATTACHED?

The main PCB is located in the left ear cup. The headband **cables**, **left driver**, **left feedback microphone**, **input PCB**, **joystick PCB**, and **the microphone array** are all connected to the main PCB through cables. The headband cables and driver use **sliding connectors**, which can be disconnected using a fingernail or spudger. The other components use **no-fuss ribbon cable connectors** that can be pulled out by hand or with tweezers.



The main PCB is attached to the **audio module** with **one M1.7 screw** and to the **base** with **two M1.7 screws**, which can be removed using a **Phillips #00 screwdriver**.



HOW TO RECOGNISE AN ERROR?

If the headphones fail to connect via Bluetooth, or the ANC doesn't work, the main PCB may be faulty. Other signs include erratic control response or no sound output.

Replacement part ID: 31026

BATTERY

Important! Always disconnect the battery when you disassemble your headphones

WHAT DOES IT DO?

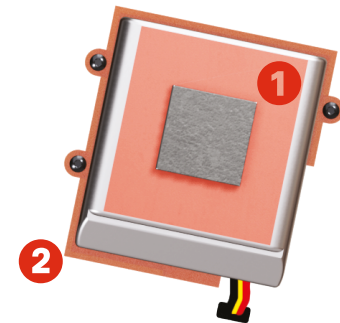
The battery is part of the power system and is the main power source of the headphones. It enables wireless use by storing and releasing energy safely. It consists of:

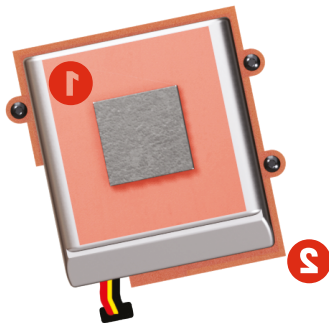
- ❶ **Battery cell:** A rechargeable lithium-ion cell that stores chemical energy.
- ❷ **Battery plate:** This structural plate connects the battery to the audio module.
- ❸ **Temperature sensor:** This sensor monitors the battery's temperature to avoid unsafe operating conditions.
- ❹ **Battery protection PCB:** This circuit board ensures the battery operates safely.

HOW DOES IT WORK?

When charging, energy flows from the USB-C PCB through the power board into the battery, where it's stored as chemical energy. During use, the battery converts this back into electrical energy to power the headphones. Inside the lithium-ion cell, **chemical reactions move lithium ions between a positive and a negative electrode through a liquid electrolyte. This movement stores energy during charging and releases it during use.**

Fully charging the battery takes approximately 3.5 hours and provides up to 30 hours of playback with noise cancelling.



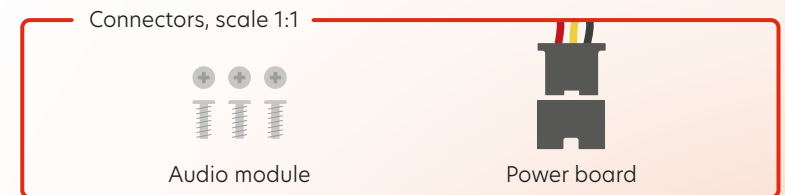
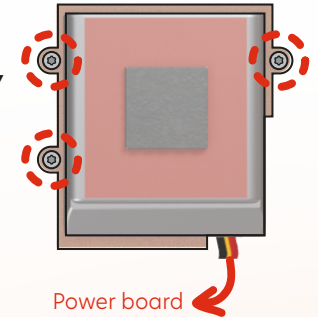


BATTERY

HOW IS IT ATTACHED?

The battery is located in the right earcup. It is connected to the **power board** with a **sliding connector** and to the **audio module** with **three M1.7 screws**. The screws can be removed using a **Phillips #00 screwdriver**.

Always disconnect the battery cable before disassembling the headphones. This can be done using the point of a spudger or your fingernail to carefully wiggle the sliding connector out of its socket.



HOW TO RECOGNISE AN ERROR?

Over time, the battery slowly degrades, this is most noticeable through the decrease in battery life. Other issues might include overheating, or not turning on.

If the battery is swollen or deformed, stop using your headphones immediately.

Replacement part ID: 82974

POWER PCBS

WHAT DOES IT DO?

These two printed circuit boards (PCBs) manage how power enters, moves through, and is distributed within the headphones. It consists of:

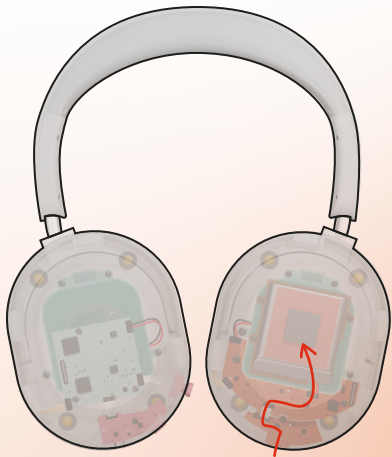
1 Power board: This PCB is responsible for controlling all the power within the headphones. It controls charging speed, prevents overvoltage or undervoltage, and monitors how power is distributed.

2 USB-C PCB: The USB-C PCB is the entry point for external power. It contains the charging port and an LED that gives feedback about the battery status and charging.

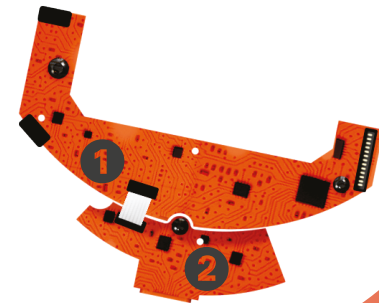
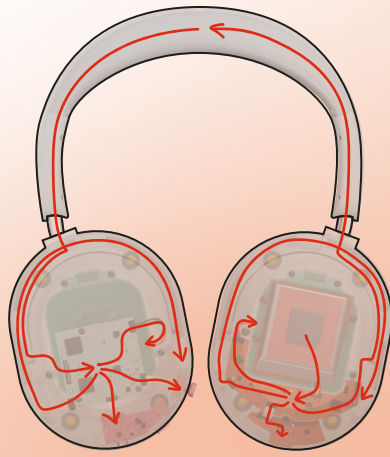
HOW DOES IT WORK?

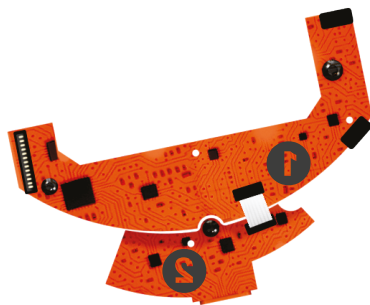
When a charger is connected, the USB-C PCB transfers incoming power to the power board. The power board regulates this current to safely charge the battery. During use, the power board supplies energy to all electrical components through the cables connecting the different components. It ensures that the voltage remains stable and that each component gets the correct amount they need to function.

Energy flow during charging



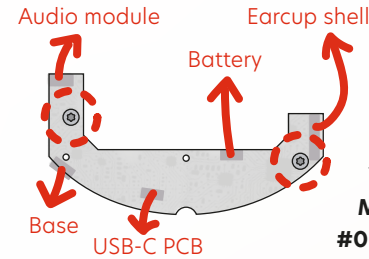
Energy flow during use





POWER PCBS

POWER BOARD: ATTACHMENT AND ERRORS

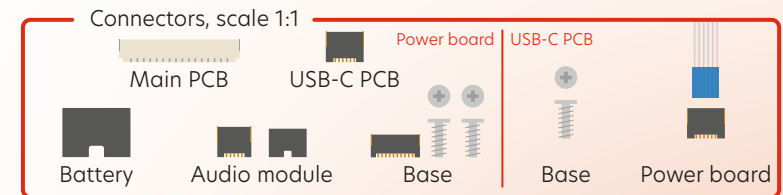


The power board contains **sliding connectors** for the **headband cable**, **battery**, and the **speaker driver**, and **no-fuss ribbon cable connectors** for the **USB-C PCB**, **feedback microphone**, and **ANC microphones**.

The power board is attached to the **base** using **two M1.7 screws**, which can be removed using a **Phillips #00 screwdriver**.

Power problems like random shutdowns, unstable operation, or the headphones not turning on after charging could indicate issues with the power board or its connectors.

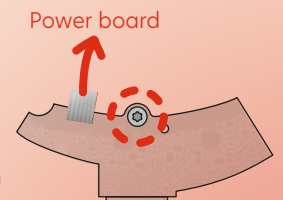
Replacement part ID: 70865



USB-C PCB: ATTACHMENT AND ERRORS

The USB-C PCB is connected to the **power board** with a ribbon cable, which uses a **no-fuss ribbon cable connector**. It's secured to the **base** with **one M1.7 screw**, which can be removed using a **Phillips #00 screwdriver**.

If the LED indicator doesn't light up while charging, and the charger has been ruled out, there may be a problem with the USB-C PCB or the port itself. A common cause is **debris stuck inside the port**, which can be carefully removed using compressed air or a thin wooden toothpick. Avoid metal tools.



Replacement part ID: 32585

AUDIO MODULE

WHAT DOES IT DO?

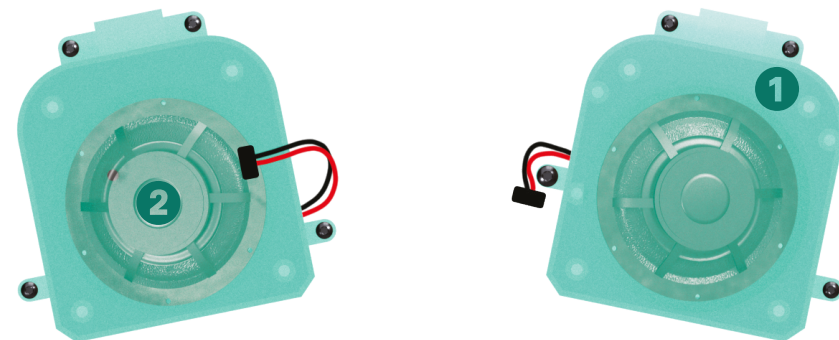
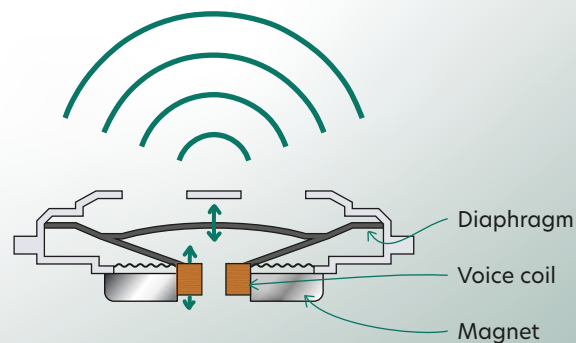
This module is responsible for playing audio and includes several components:

- ❶ **Driver housing:** This plastic housing holds the whole module together, correctly positions and protects the driver, and acts as an acoustic chamber.
- ❷ **Driver:** The speaker drivers convert the electrical audio signals into sound waves you can hear. It's the module's core component that produces the actual sound.
- ❸ **Feedback microphone:** These microphones listen inside the ear cup to detect how well the noise cancelling is working. It allows the system to adjust the noise cancelling signal in real-time for better performance.

HOW DOES IT WORK?

There are different types of drivers. These headphones use **dynamic drivers**.

As current flows through the electromagnetic voice coil, it creates a magnetic field that moves towards or away from the magnet, depending on the direction of the current. This motion causes the diaphragm to vibrate, pushing and pulling air to create sound waves.



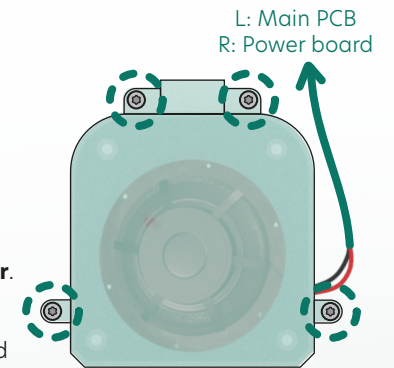
AUDIO MODULE

HOW IS IT ATTACHED?

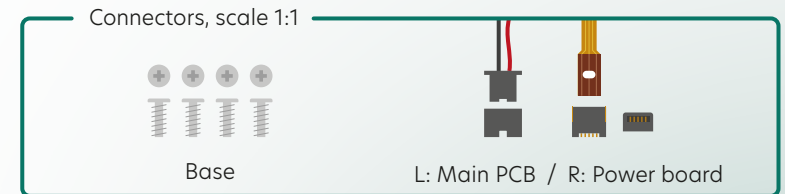
Before you can reach the audio module, you have to remove the **main PCB** for the left module and the **battery** for the right module.

The left audio module is connected to the **main PCB**, the right to the **power board**. The feedback mics use a **no-fuss ribbon cable connector**, the drivers use a **sliding connector**.

The audio module is attached to the **base** using **four M1.7 screws**, which can be removed using a **Phillips #00 screwdriver**.



Important! Do not try to disassemble the two parts of the driver housing, as this can impact the acoustic chamber and sound quality of your headphones.



HOW TO RECOGNISE AN ERROR?

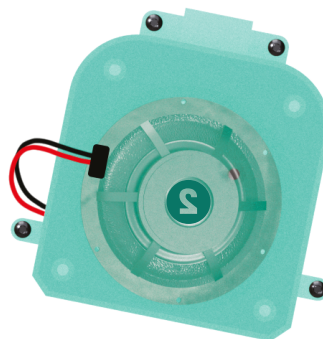
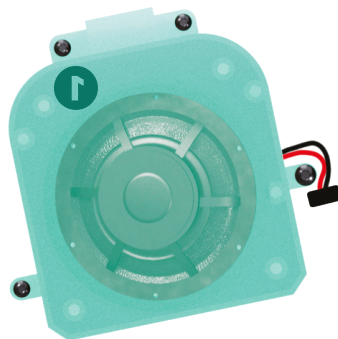
Sound issues such as distorted audio, unexpected high-pitch noises, or no sound at all could all indicate issues with the audio module. These issues typically affect only one side, which can help you identify the specific module that needs attention.

Before replacing the module, try the following:

- Restart the headphones and the connected device.
- Test with a different audio source to rule out software or connection issues.
- Disconnect and reconnect the driver cable.

Replacement part ID: 49301 (Right)

Replacement part ID: 49302 (Left)



USER INPUTS

WHAT DOES IT DO?

These components are responsible for receiving all user inputs and passing them on to the main PCB, so you can control your headphones.

- 1 Input PCB:** This circuit board hosts the NC button and the 3.5mm audio jack. You can plug in a cable to connect the headphones to your device.
- 2 Button:** This physical button is mounted on the input PCB and lets you switch between different noise cancelling and ambient sound modes.
- 3 Joystick PCB:** This five-directional joystick is used for turning the headphones on and of, Bluetooth pairing, playback control, and volume adjustment.

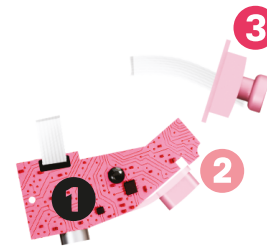
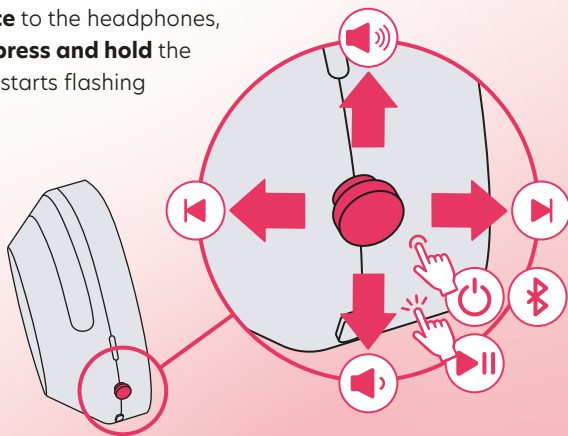
HOW DOES IT WORK?

All information received by the input and joystick PCBs is sent to the main PCB, which processes it and ensures that the commands you have given via the controls are actually executed.

To **turn the headphones on**, **press** the joystick straight down until the indicator light flashes twice in blue. To turn it off, do the same but hold until the indicator light lights up for two seconds.

To **pair a new Bluetooth device** to the headphones, turn on your headphones and **press and hold** the joystick until the indicator light starts flashing blue.

Playing/pausing music, adjusting the volume, or skipping to the next or previous track can all be done with a **single press or movement**.

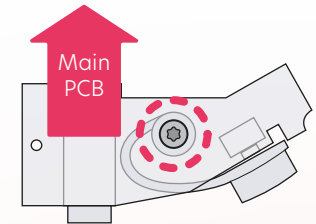


INPUTS

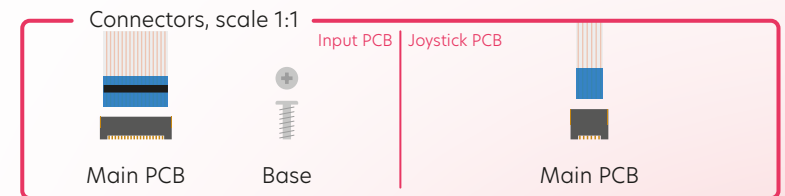
INPUT PCB: ATTACHMENT AND ERRORS

If you're experiencing issues with the sound when connecting your headphones via the audio cable, make sure the plug is fully inserted until it clicks.

The input PCB is connected to the **main PCB** with a **no-fuss ribbon cable connector** and attached to the **base** using **one M1.7 screw**, which can be removed using a **Phillips #00 screwdriver**. The button is sandwiched between the base and input PCB and uses the same screw.



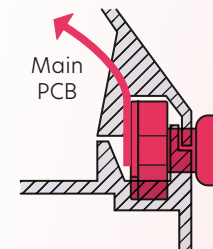
Replacement part ID: 37715



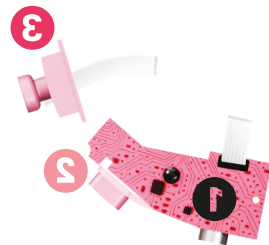
JOYSTICK PCB: ATTACHMENT AND ERRORS

If the headphones are not responding to joystick inputs, first make sure the ribbon cable is connected properly. If it looks fine but still doesn't respond, the joystick PCB might need to be replaced.

The joystick PCB is also connected to the **main PCB** with a **no-fuss ribbon cable connector**. It simply slots into **base** and gets clamped into place by the **earcup shell**.



Replacement part ID: 59217



BASE

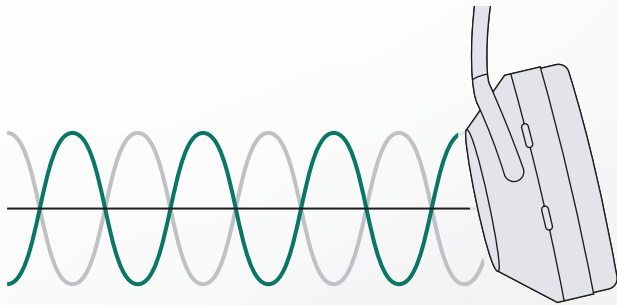
WHAT DOES IT DO?

The base serves as the central structure of the earcup to which the internal components are attached. It consists of:

- ① **Housing base:** This structural part holds the internal components in place and protects them from damage.
- ② **Microphone array:** These microphones detect the surrounding sound to help generate noise-cancelling signals. They also pick up your voice during phone calls.
- ③ **Earpad attachment:** Four flanged silicon plugs keep the earpads in place, while allowing easy disassembly.

HOW DOES IT WORK?

The ambient sound waves picked up by the microphones are analysed and used to generate opposing waves to cancel them out. This process is called **phase inversion**. The resulting inverted sound waves are played through the speakers at the same time as your music, reducing the background noise. Because the system reacts to detected sound, it works best in environments with consistent noise.

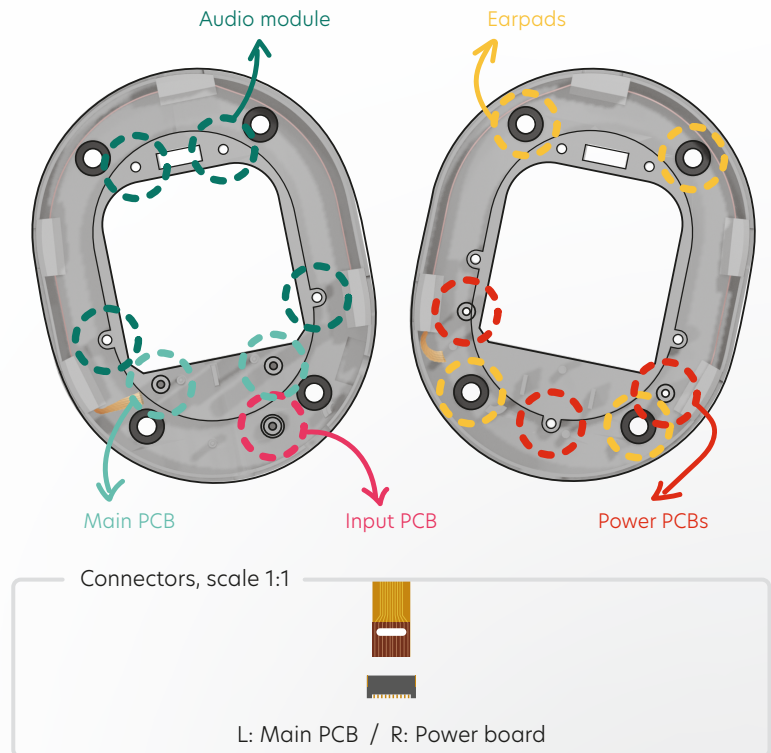




BASE

HOW IS IT ATTACHED?

The base is the part that remains after all other components are removed. The **housing shell, main PCB, power board, USB-C PCB, audio modules, input PCB, button, joystick PCB, and earpads** are all attached to it.



HOW TO RECOGNISE AN ERROR?

A crackling, hissing or static sound when the noise cancelling is active could indicate a malfunctioning microphone. Malfunctioning microphones may also cause feedback-like sounds or audio distortion.

Replacement part ID: 22261 (Right)

Replacement part ID: 22262 (Left)

EARPADS

WHAT DOES IT DO?

The earpads serve multiple purposes. Most importantly, they ensure a comfortable fit on the user's head, even during extended use. Next to this, they form a seal around the ears, which helps with passive noise cancellation.

HOW DOES IT WORK?

The earpads are filled with soft memory foam which conforms to the shape of the user's head and ears. This cushioning reduces pressure on the skin and distributes the headphone's weight more evenly. The outer surface is covered in PU leather, which is smooth to the touch and easy to clean.

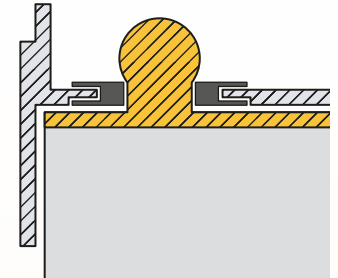


EARPADS

HOW IS IT ATTACHED?

The earpads are attached to the **base** using a **friction fit**. Each earpad has four **pins** that push into the flanged silicon plugs in the base. These silicon plugs compress slightly to hold the pins firmly in place through friction.

To remove the earpads, simply pull them straight off. Reattaching them only requires pressing the earpads onto the base until they sit securely.



HOW TO RECOGNISE AN ERROR?

Over time, the earpads can start to show signs of wear. Common indicators include the PU leather cracking or flaking, the foam becoming compressed or uneven, or a noticeable decrease in comfort and noise isolation.

To prolong the life of the earpads, use a (damp) cloth to wipe them down after each use.

Replacement part ID: 98032

