

# Hardware

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# Types of Audio Cables

There's a difference between analog and digital audio cables:

- Analog Cables are using electricity to transmit information
- Digital Cables use strings of data (1's and 0's) to transmit information

In the Blackbox, you will find both of these types of cables, for most setups we use analog cables such as Jacks, XLR, Tulp, and sometimes Speakon. Digital cables are used more as 'interface cables' and common ones are USB and Network cables.

## Analog Cables



XLR



Tulp



Jack



Speakon

## Digital Cables



Network



USB

## Analog Cables

Most analog cables are used to transmit 3 types of signals:

- Line level: is the standard strength we use with audio equipment
- Mic/Microphone level: needs to be boosted to line level, because it's a low signal.
- Instrument level: such as coming from guitars/synths, also need to be boosted to line level.

This 'boosting' of the signal can be accomplished using amplifier equipment such as mixers, audio interfaces, and DI (Direct-In) Boxes.

UNBALANCED cables have only 2 wires:

1. Signal
2. Ground

BALANCED cables have 3 wires:

1. Signal (+)
2. Signal (-)
3. Ground

Balanced cables are generally better for noise cancellation, we're not going to deep dive into this for now, but the use of 2 Signal (+) and (-) makes that the interfering noise that occurs between sender and receiver is canceled out.

## Jack Cables

### JACK CABLES



#### **MONO (TS)**

Mono Jack cables are sometimes also called 'Unbalanced'.



#### **STEREO (TRS)**

Stereo Jack Cables are called 'Balanced', and carry both the Left and Right channels for stereo connection



#### **STEREO WITH MICROPHONE (TRRS)**

TRRS Jacks can mostly be found when using headphones because the extra Ring channel is used for microphone connection



A TRS cable consists of:

- Tip (Signal +)
- Ring (Signal -)
- Sleeve or Ground

When working with Jack cables, you can choose between unbalanced and balanced cables. A lot of instruments such as guitars and keyboards have unbalanced connections. When building sound setups over longer distances, we always advise balanced (TRS) cables.

## XLR Cables

## XLR CABLES

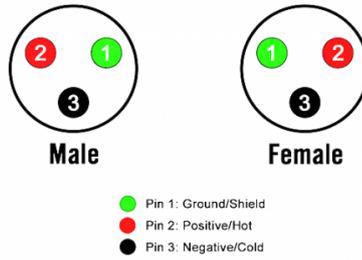


### XLR CABLE

Very common in audio applications, sometimes also referred to as "Microphone cable" and is generally "Balanced"

### XLR Connector Pinout - Pin 2 Hot

Rear View  
(The side with cup terminals for soldering)



### XLR PINOUT

Inside we can see 3 pins, very similar to TRS Jack Cables with a ground, hot and cold connector



### (MINI)JACK TO XLR

There's multiple ways to split XLR and (mini) Jack cables to get Left and Right channels for stereo setups with speakers

XLR cables are always balanced and are also used commonly as microphone cables and also have 3 contact points. (Signal +, Signal -, Ground)

XLR connectors are much sturdier and the cables are generally better shielded than Jack connectors.

## Tulp/Cinch cables

Tulp cables are not that common anymore to use, but they are mentioned in some of the patch setups in the submenu (<-). Tulp cables are also called **RCA** or '**phono**' connectors and you can find them still used in audio hi-fi systems, turntables, DJ controllers, and some audio interfaces.

*Example:*

We can use two 2x RCA -> 2x Jack cables to connect 4 different outputs of the Focusrite Scarlett 2i4 Audio interface to 4 different speakers for a quadraphonic speaker setup. (SEE PAGE)



## Speakon

Speakon connectors and cables are used for connecting more power-hungry speaker equipment and amplifiers together. They are used for bigger systems and can be found in theaters and at festivals. Generally, you will only use these cables in bigger setups.



# Using Audio Interfaces

Use an audio interface for recording sounds onto your computer, or to play sound from the computer back into the space.

## Audio Interfaces



**For recording audio into the PC, or playing from the PC via speakers**

## Example with the Focusrite Scarlett 2i4

For recording some simple sounds you can use the Focusrite Scarlett 2i4 that is available in most Blackboxes and uitleen, or any other similar audio interface. For now we stay to the Scarlett 2i4, since it's been used the most in the workspace. An audio interface lets us interact with sound in different ways, you can use the interface for example to:

- Connect instruments and/or microphones to a Speaker setup (no computer)
- Connect instruments and microphones to the computer via USB for recording
- Play sounds from your computer via USB to speakers using the audio interface

Different audio interfaces vary in number of inputs and/or outputs. Also some might include software for recording your sounds with, this is called a **DAW** (Digital Audio Workstation). Some popular DAW's are Ableton Live, Reaper or Studio One.

Depending on the audio interface, you will need to install additional **Drivers** (group of files that enable hardware devices to communicate with the computer). You can check if your operating system needs a driver by going to the website of the interface's manufacturer. In this case for the Focusrite Scarlett 2i4, no additional drivers are needed on Mac.

# Focusrite Scarlett 2i4



## Front

Inputs:  
microphone, guitar, instrument



Jack



XLR



## Back

Outputs:  
Speakers, Mixer, Exiters



Jack



Tulp

USB connector to computer/PC

## Connecting everything!

- Connect the Scarlett 2i4 to your Mac using the included USB cable
- In system preferences on your laptop/pc select "Scarlett 2i4" as the input and output device
- You can also select the "Scarlett 2i4" from your preferred Audio Software DAW (Digital Audio Workstation) such as AbletonLive, StudioOne, Reaper.

# Basic Stereo Speaker Setup

Making a stereo speaker setup using 2 speakers, audio interface, pc

## Generic Stereo Speaker Setup

To make a basic stereo setup with your computer you need the following items:

- An audio interface
- A USB cable (*USB cable type depends on your computer and audio interface*)
- A pair of audio cables for each channel (*Depending on the output type the audio interface you need the following connectors: RCA - mono Jack / mono Jack - mono Jack / mono mono Jack - XLR*)
- A pair of active speakers



# Quadrophonic Speaker Setup

Making a quadrophonic speaker setup using 4 speakers, audio interface, pc

# Zoom recorder

Quick guide: [https://zoomcorp.com/media/documents/E\\_H4n\\_Pro\\_QuickGuide.pdf](https://zoomcorp.com/media/documents/E_H4n_Pro_QuickGuide.pdf)

<https://www.youtube.com/embed/NK3GTaSH8CQ>