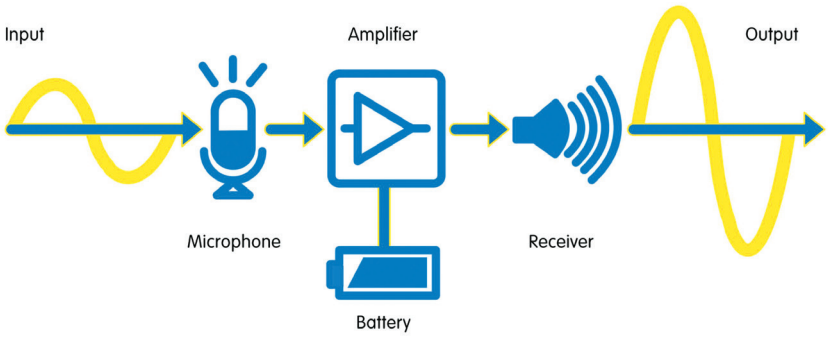
Amplifiers and oscillators

Amplifiers and oscillators are examples of electronic circuits which are commonly used in various types of electronic equipment and devices as they perform important functions connected to the amplification or the production of electric signals.



What is an amplifier?

An **amplifier**, also called **amp**, is an electronic device or circuit that increases the magnitude of voltage or current of an input signal, producing a bigger output signal. Amplifiers consist of a box or block containing the amplifying device, such as a bipolar transistor, a field effect transistor or an operational amplifier. The amount of amplification provided by an amplifier is called the **gain** of the amplifier.

How does it work?

Amplification is fundamental to modern electronics, and amplifiers are widely used in almost all electronic equipment. For example, in hearing aids a microphone is used to pick up sounds from the surrounding environment, which are converted into an electrical signal. Then, an amplifier takes this signal and amplifies it many times before feeding it into a small loudspeaker placed inside the ear; in this way, the user can hear a much stronger version of the original sound.

Sometimes, one single amplifier is not enough to get the amplification needed, so several amplifiers are connected together to get the desired level of amplification. These amplifiers are called **multistage** (or **cascade**) amplifiers.

1. Microphone
2. Microchip
3. Amplifier
4. Battery
5. Receiver

Distortion and negative feedback

The output signal from an amplifier must be as similar as possible to the input signal. However, the frequency or the amplitude of the two signals may vary considerably. This very common phenomenon is called **distortion.** To avoid it, it is possible to use a technique called **negative feedback.** With this technique, part of the output signal is sent back and compared to the input signal; in this way distortion can be prevented and almost completely reduced.

Oscillators

An **oscillator** is a circuit which produces a voltage or a current in a continuous and alternating waveform at a certain frequency. It converts DC current from a source into an AC waveform of the frequency needed by the circuit components, providing regular pulses and generating electromagnetic waves that carry signals. The kind of signals produced are, for example, audio and radio signals, which can be used for a variety of purposes. Oscillators are important components in many different types of electronic equipment such as computers.

amplitude: *ampiezza*
to feed into: *alimentare*
gain: *guadagno*
hearing aid: *apparecchio acustico*
to pick up: *raccogliere*
surrounding: *circostante*
waveform: *forma d'onda*

1 Read the sentences and say if they refer to an amplifier (A) or an oscillator (O).

		A	O
1.	It produces voltage or current.	☐	☐
2.	It makes a signal stronger.	☐	☐
3.	It is used to make sound louder.	☐	☐
4.	It changes DC into AC producing alternating waveforms.	☐	☐
5.	It often needs to be used in series.	☐	☐
6.	It generates waves at regular intervals.	☐	☐
7.	Its output signal is often distorted.	☐	☐
8.	Its output signal should be similar to the input one.	☐	☐
9.	It produces a gain.	☐	☐
10.	The waves produced carry signals.	☐	☐