

Waves

3. Wave Effects

CONCEPT 2

LESSON GUIDE

MAKING AND RECORDING SOUND

PRECISE LEARNING POINTS

KNOW

I know what microphones and loudspeakers do.

APPLY

I can apply my knowledge to explain how microphones and loudspeakers work.

EXTEND

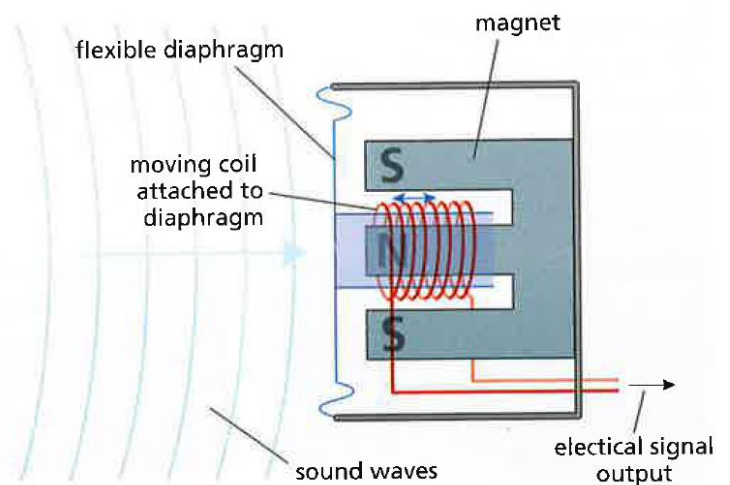
I can extend my knowledge to explain how different sounds are recorded and produced.

NOTES

Sound is detected using **microphone**, which transfers energy from pressure waves (sound) into an electrical **signal**. The reverse process can also happen where an electrical signal can be converted back into a pressure wave. This is done with a **loudspeaker**.

Microphones can have different technologies, but one type is where the microphone has a moving coil. The moving coil is attached to a thin, flat surface called a diaphragm. As sound waves arrive, the vibrations make the diaphragm move back and forth. This, in turn, makes the coil of wire move back and forth. Because the coil of wire has a magnet inside it, the movement produces small electrical current in the wire. The electrical current moves back and forth inside the wire with the same frequency as the sound waves that move the diaphragm and is the electrical signal.

Louder sounds make the diaphragm move a greater distance back and forth. This moves the coil of wire a greater distance and results in a greater electrical current in the wire. The electrical signal has a greater amplitude. So, the electrical signal matches the sound waves hitting the diaphragm. Its frequency and amplitude changes with the frequency and volume of the sound waves.



Loudspeakers can be thought of as a microphone but in reverse. There is a magnet with a coil of wire around it. An electrical signal or electrical current is given to the coil of wire. This causes the coil to vibrate back and forth at the same frequency and amplitude of the electrical signal. As with the microphone, the coil of wire in the loudspeaker is connected to a diaphragm. The diaphragm in the loudspeaker has a cone shape as this causes the sound wave it creates in the air to travel further by not spreading out as much as it would if the diaphragm was flat.

The sound pressure wave that the diaphragm produces can have different volumes and frequencies. Greater movement of the diaphragm will produce greater pressure waves and louder sounds. More vibrations per second will create sounds with higher frequencies. These motions follow the electrical signal that is given to the coil of wire.

