Speakers and Microphones – Solutions

1. 1. Speakers produce loud noise when the cone vibrates a great deal, or soft noise when it moves a small amount. Why?

When the cone vibrates a great deal, it pushes and pulls more air particles, creating larger pressure changes in the air. These larger vibrations produce louder sounds. When the cone moves only slightly, it displaces fewer air particles, resulting in smaller pressure changes and softer sounds.

2. 2. Explain how the amount of current flowing through the wire influences the volume.

A larger current produces a stronger magnetic field in the electromagnet. This stronger field causes the speaker cone to move more, producing greater air vibrations and a louder sound. A smaller current produces a weaker magnetic field, so the cone moves less and the sound is softer.

3. 3. What is the relationship between the amount of current flowing through the coils of wire and the strength of the electromagnet produced?

The strength of the electromagnet is directly proportional to the amount of current flowing through the coil. As the current increases, the magnetic field becomes stronger. If the current decreases, the magnetic field becomes weaker.

4. 4. What type of current produces a soft noise from the speakers? Explain why.

A small alternating current produces a soft noise because it creates only small changes in the magnetic field strength. This causes the cone to move only slightly back and forth, resulting in gentle air vibrations and a lower sound volume.

5. 5. Knowing that a microphone contains a diaphragm, permanent magnet and coil of wire, explain how a microphone works.

When sound waves hit the microphone diaphragm, it vibrates back and forth. These vibrations cause the attached coil of wire to move within the magnetic field of the permanent magnet. As the coil moves through the magnetic field, a changing electric current is induced in the wire. This electrical signal corresponds to the sound wave pattern and can then be amplified or recorded.

6. 6. A loud sound would produce a ____ current. Explain your answer.

A loud sound would produce a large current. This is because a loud sound makes the diaphragm and coil move more, cutting through more magnetic field lines. The greater the movement, the greater the resulting current.