

“Metal Detector”

¹Rashmi Kumari; ²Swapnil Rai & ³Subha Kaushik

¹ Student of ECE Dept. in Dronacharya College of Engineering, Gurgaon under MDU University

rashmi.15217@ggnindia.dronacharya.info

² Student of ECE Dept. in Dronacharya College of Engineering, Gurgaon under MDU University

swapnil.15236@ggnindia.dronacharya.info

³ Student of ECE Dept. in Dronacharya College of Engineering, Gurgaon under MDU University

subha.15254@ggnindia.dronacharya.info

ABSTRACT

In this paper we are going to describe the construction and working concept of metal detector. The simplest metal detector consist of an oscillator. So, we are covering the working and how a metal detector interacts with a metal carrying body and surface. The metal detectors are useful for finding metal inclusions hidden within objects, or metal objects buried underground. They often consist of a handheld unit with a sensor probe which can be swept over the ground or other objects.

Keywords:

Metal detector; oscillator; sensor

INTRODUCTION

The metal detector is an electronic device which detects the presence of metal nearby. The metal is sensed by the metal detector device, the device gives some indication by changing the sound in earphones. It basically works on the concept that closer the metal higher the sound produced by the device and higher the deflection in the needle. The simplest form of metal detector consists of an oscillator circuit which has an alternating current flowing in it and it passes through a coil producing an alternating magnetic field. If a body carrying conductor or a conductor is inside the object is close to the coil, eddy currents will be induced in the metals and this produces a magnetic field of its own. If another coil is used to measure the magnetic field, the change in the magnetic field due to the metallic object can be detected. So there are several components of metal detector and these are: 1 Stabilizer, 2 Control Box, 3 Shaft and 4 Search Coil as shown in the Fig 1. below.

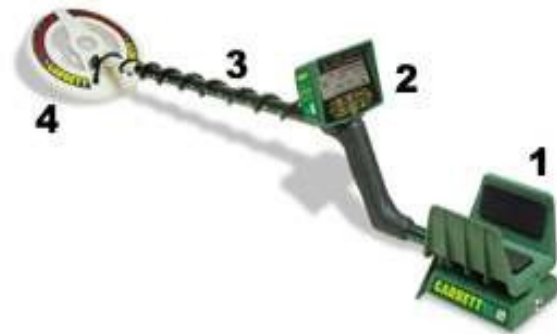


Fig 1. Metal Detector

STABILIZER

The 1 in the fig 1. Shows the stabilizer of metal detector. It is the optional part of the metal detector. It used to keep the unit steady as you sweep it back and forth. As the term stabilizer means to make stable something. As from the meaning it makes the whole circuit of metal detector stable. It maintains the stability.

CONTROL BOX

The 2 in fig 1. Shows the control box fitted in the metal detector. It contains the main circuitry of metal detector. All the controls is here on the control box. It also has speaker built in with batteries. And the task is performed by the metal detector is comprised by the microprocessor.

SHAFT

The 3 in fig 1. Shows the shaft of metal detector. It connects the control box and the coil. It is often adjustable such that we can set it at a comfortable level with respect of our height.

SEARCH COIL

The no. 4 in the fig 1. Is the searching coil. It is the main part of the metal detector. It is used to sense the metal up to some specific range. The search coil is also known as the “search head”, “loop” or “antenna”.

PRINCIPLE OF OPERATION

The operation of metal detector is based upon the principle of electromagnetic induction. Since, metal detectors contain inductor coils that are used to interact with metallic elements on the ground. The pulsating current is applied to the coil, which then induces a magnetic field. When the magnetic field of the coil moves across metal, such as the coin, induce their own magnetic field, which generates an opposite current in the coil, which induces a signal indicating the presence of metal, as shown in fig 2a and fig 2b.

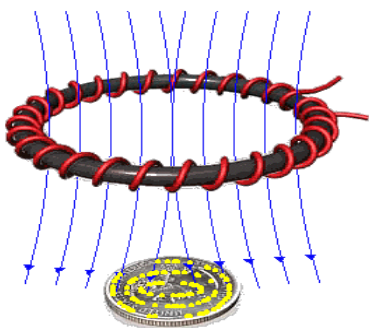


Fig 2a.

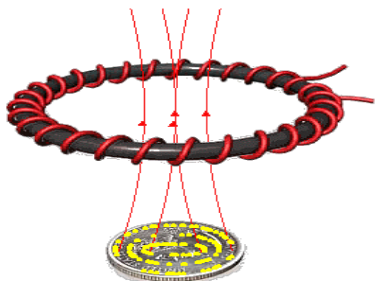


Fig 2b.

CONCLUSION

So we have discussed the components of metal detector and its principle of operation. From the point of applications metal detector is very useful. It plays a very major role in defense services. It offers greater security level at airport security, as it screen people before allowing access to the boarding area and the plane. It also secures building as it screen the people entering in the particular building. The metal detector is also helpful by detecting the metallic composition of soil or rock formations.

REFERENCES

- [1]. En.wikipedia.org
- [2]. Electronics.howstuffworks.com/gadgets/other-gadgets/metal-detector
- [3]. Smi-elec.com
- [4]. Electroschematics.com/1075/simple-metal-detector-circuit/
- [5]. Electronicshub.org