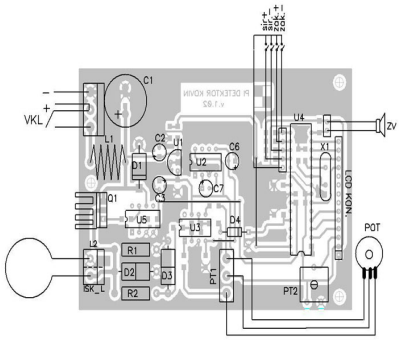


Did you ever want to discover a hidden treasure? One of the first devices that I built as a child was a simple metal detector. Later, I built various different metal detectors from plans published in electronics magazines. Today, the prices for metal detectors vary from a few hundred to a thousand Euro, and therefore I have decided to design one of my own – an improved version of the “pulse induction” metal detector.

With technology advancing every day, metal detectors have also improved. All of them are now based on microcontrollers that also handle the analogue circuitry. In this chapter, I will describe a “pulse induction” metal detector that is very sensitive and easy to assemble. However, it does have a drawback: it does not distinguish different metals. Let’s look at the history of metal detectors.

History



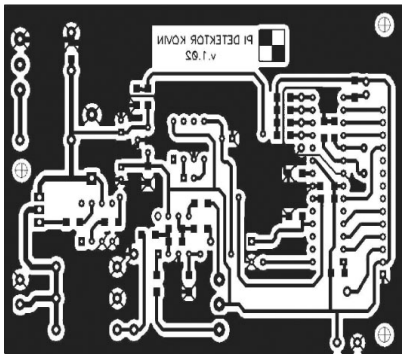
Long ago, people wanted an instrument that would help

them discover precious treasures. The first notes can be found in 1830, with experiments by

geologist R.W. Fox. The first detectors detected only the conductivity of the soil and the minerals within.

In the 1879, Prof. D.E. Huges introduced the first “induction balance – IB” metal detector. This detector was used in a London hospital to find metal parts within injured people. This principle is still used by many modern metal detectors.

In the 1881, Alexander Graham Bell used a metal detector to find a bullet that hit President James Garfield.



The first portable metal detectors appeared in 1925, invented by Gerhard Fischer, who later founded the A&S Company, which manufactured metal detectors commercially.

The principles of metal detectors have not changed much. Only the data interface has changed, which has improved the sensitivity and accuracy of metal detectors. The principle used is based upon the fact that a coil’s inductance changes in the presence of a metal object.

Metal detector Methods

There are a few methods used in metal detectors which I will describe.

Induction Balance (IB)

Figure 3 shows the block diagram of an IB metal detector. This is one of the oldest methods that is still in use today. The detector operates at very low frequencies between15 and 25 kHz. An oscillator produces an electromagnetic field in the search coil. This magnetic field travels through the air to the receiver coil. This signal is amplified, and then rectified by a peak detector. The resulting DC signal is amplified again by a DC amplifier. That DC signal is then chopped at an audio rate, changing it into an audible tone, with a volume proportional to the level of the DC signal itself. After the chopper, an audio amplifier is used to amplify the signal so it can feed a loudspeaker or a headphone.

Metal detector

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