



**Fortress Metal Detectors**



**METAL DETECTION - THE BASICS**  
**THEORY OF OPERATION**

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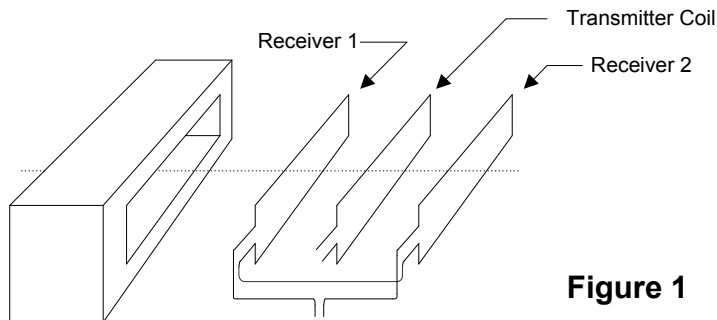
## METAL DETECTION - THE BASIC PRINCIPLES

### Theory of Operation

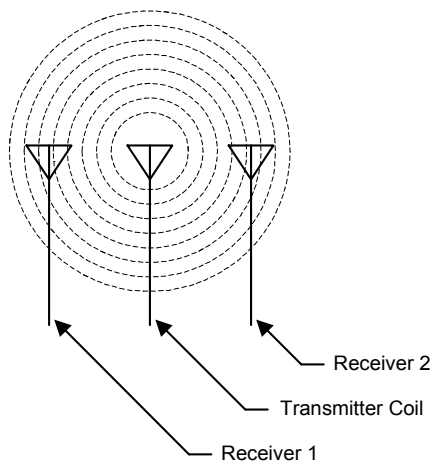
Most modern metal detectors, including the Gravity Model operate on the **balanced coil**, full loop system.

Three coils are wrapped around the aperture through which the product passes. In the centre of the enclosure is the transmitter coil that broadcasts a radio frequency signal and generates an Electro-magnetic field.

Equally spaced on either side of the transmitter coil are two receiver coils (figures 1 & 2).



**Figure 1**



**Figure 2**

The field is generally trapped inside the shielded enclosure of the detector but some field escapes from the aperture on both sides of the detector. Anything that enters into this field that is either **Magnetic**, or **Electrically Conductive** will cause a disturbance in the field strength around it. All metals have either one or both of these characteristics and will be detectable if the size of the signal is large enough.

The signals from the receiving coils are connected in opposition to each other and therefore when no disturbance is occurring there will be a net signal across the coils of zero – they are balanced. This forms the electrical equivalent of a balanced weigh scale.

As metal passes through the detector the balance will be offset as the contaminant enters the aperture and again as it leaves the exit side. This disturbance is amplified and analysed by the control electronics and detection will occur if the sensitivity threshold has been exceeded.

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