

## **EOD062            GROUND PENETRATING RADAR**

The Ground Penetrating Radar was originally developed to meet a UK MOD requirement to located plastic landmines. Since then the technology and equipment has advanced significantly and now has a myriad of uses both within the military and public sector, including Police and Military Search, VIP Porotection, Counter Surveillance and commercial surveying.

By sending ultra wide spectrum RF energy pulses into the medium under investigation, the system is able to generate images of sub-surface features regardless of the material composition. Plastic, wood, metal, voids, concrete, rock...as long as there is a difference between the object and the surrounding material, the system can create an image.

A metal detector sends energy into the earth in a small number of frequencies (up to 17). When the transmitter passes over a metallic object, that object becomes energized and then in turn emits a signal of its own. The metal detector then receives this signal and translates this energy into a user recognizable tone. The **Ground Penetrating Radar** works on the same basic principles. However, by sending microbursts of a wide range (thousands) of frequencies, the Radar is actually able to detect a number of materials whether conductive or not.



**Photograph showing 500 MHz Trackercart mounted with RGO rough terrain attachment**

The **Ground Penetrating Radar** consists of 3 main parts, the controller (which in effect is a ruggedised PC personal computer), an antenna, and the TX/RX head electronics unit which transmits the information from the antenna to the controller. The standard

system is supplied with a 500MHz antenna which has a typical penetration depth of 1.5 to 2.5 metres in good conditions. The detection depth is dependent on a number of factors including soil conditions, the size of the object being search for, the actual make up of the object etc. The other antennas in the range are the 250MHz, the 1GHz and 2GHz. As a general guide, the lower frequency antennas (250MHz and 500MHz) are normally used for work below ground and the higher frequency for work above ground. As the penetration depth increases the resolution decreases. Hence the 1GHz and 2GHz are very useful for locating very small anomalies such as covert bugs and transmitters hidden behind or embedded in a wall.

The **Ground Penetrating Radar** is very flexible and can be used on a harness, mounted on a trolley or hand held if the smaller antennas are being used. The main features of ground penetrating radar are that it is non-destructive (no digging necessary), it is non-evasive (everyday work can carry on around a radar survey) and it can detect non-metallic objects e.g. plastics, ceramics etc.

Specifications:

**Radar Controller Computer**

Processor:	VIA C3 733 MHz
Radar Interface Card:	Proprietary
Memory:	128 Mbyte
Hard Disk(Program and Storage):	2 Gbyte
Display:	10.4" Transflective Daylight Readable Color TFT LCD
Dimensions:	335 mm x 235mm x 180mm
Weight:	5.0kg/ 11 lb.
Power Supply:	10.5-18VDC @ 45 W

**Control**

Windows based full screen menu system using touchscreen interface. Optional use of full keyboard and mouse.

**I/O Provision**

- PS/2 MiniDIN Connector for Keyboard
- PS/2 MiniDIN Connector for Mouse
- Parallel Port
- Radar Interface Port
- DC Power Port
- USB 2.0 Port

**Software**

- Windows 98 SE
- Control Software Including:
  - System Configuration
  - A Scan Display (Oscilloscope Mode)
  - B Scan Display (Cross Sectional View)
  - C Scan Display (area Scan)

Real Time Signal Processing  
Data Storage and Playback

### System Scan Modes

Logging scan rate of 250 scans per second typical with gain and remove average algorithms enabled.

Trigger Modes: Free run, timed interval, shaft encoder

Nominal Sampling Rate 1,000,000 samples per second

Time Varying Gain Maximum 40dB

### Radar Head Electronics

Total System Dynamic Range: >130 dB

Receiver Dynamic Range: >90 dB

Time Range Minimum: 6.3 ns

Time Range Maximum: 820 ns

Pulse Repetition Time: 1us

Effective Bandwidth (typ) 3GHz

Dimensions: 290mm x 210mm x 85mm

Weight: 2kg

Antennas:

250MHz	Pulse Duration (typ)	2.0 ns
	Dimensions:	560mm x 560mm x 270mm
	Weight:	6kg
500MHz	Pulse Duration (typ)	0.9 ns
	Dimensions:	400mm x 400mm x 250mm
	Weight:	4kg
1000MHz	Pulse Duration (typ)	0.4ns
	Dimensions:	200mm x 200mm x 95mm
	Weight:	2kg
2000MHz	Pulse Duration (typ)	0.2.ns
	Dimensions:	120mm x 120mm x 100mm
	Weight:	0.65kg

Optional Equipment:

Additional Battery Packs and Chargers

Data/control cables – various lengths

Remote Control Unit

Rough Ground Trackercart

Wall Shaft Encoder

Thermal Printer