

## Magnetic Gradiometer Program

### General Remarks

The program provides a - reduced to the pole – simulation of the magnetic response from a total field gradiometer over a target of spherical geometry. The inclination and strength of the Earth's magnetic field are, therefore, set to be 60° and 60000nT respectively. The magnetic susceptibility of the targets is set to be 0.3 cgs as a representation of the magnetic susceptibility of steel.

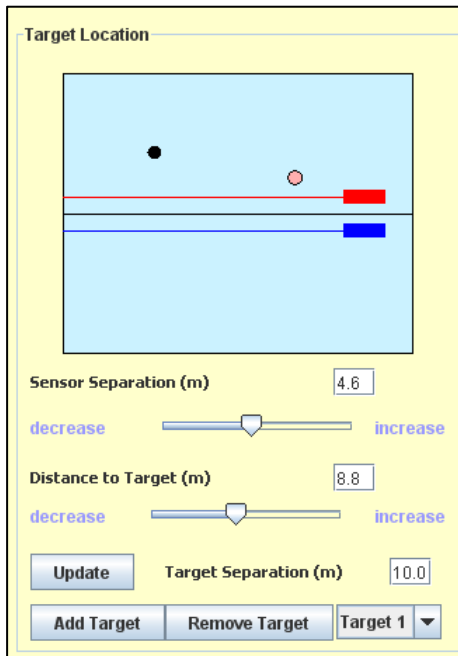
The purpose of the program is to use graphical displays to highlight the recorded magnetic response from a buried target for a given set of gradiometer separations, survey speeds and sampling separations.

The survey direction is from left to right on the screen and all anomaly signatures are presented along this 50m center line. The gradiometer separation allows each sensor to move outward from the survey line at a factor of half the sensor separation.

### Using the Program

**THE ENTER KEY MUST BE PRESSED AFTER ENTERING TEXT INTO A BOX**

### Target Location



The target location panel provides a bird's eye view of the target (circle) location in respect to the survey line (black line) and the gradiometer (port sensor red, starboard sensor blue). The distance to the target from the survey line can be altered from 0 to 20m using the distance to target slider and text entry boxes.

Here the sensor separation can be altered. If the sensor separation is set to 0m (default) then only one sensor response will be displayed in the anomaly panel. If the separation is set to >18m the second target will not be displayed.

An additional target can be added/removed from the calculations with the use of the "Add Target" and "Remove Target" buttons. The selected target can be changed using the target drop down choice box. This allows target characteristics to be individually altered

## Target Characteristics Survey Parameters

Target			
Sensor height above sea bed (m)	<input type="text" value="5"/>	Survey speed (knots)	<input type="text" value="8"/>
Depth of target below sea bed (m)	<input type="text" value="1"/>	Instrument sample rate (readings per sec)	<input type="text" value="1"/>
Region of magnetic influence (m)	<input type="text" value="1"/>	Display sample lines	<input checked="" type="radio"/> On <input type="radio"/> Off
Maximum Gradient value (nT): Target 1	<input type="text" value="0.0"/>		
Maximum Gradient Value (nT): Target 2	<input type="text" value="0.0"/>		

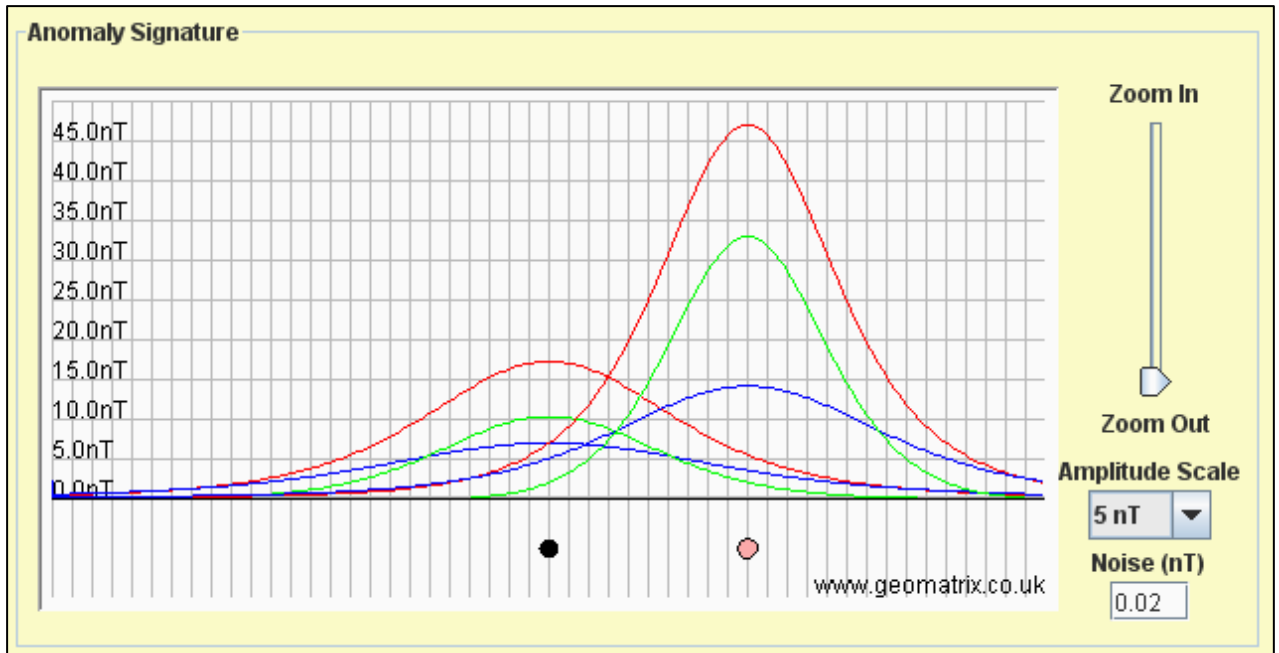
The Target panel provides a series of input area to hold characteristics of the target and the survey. Values for depth of target and region of magnetic influence will alter values for the currently selected target.

The region of magnetic influence is the diameter of the sphere to be modeled. This should be the spherical representation of the magnetic portion of the target.

Here the survey speed and the sampling frequency of the instrument can be entered to give an idea as to the effects of spatial aliasing. The number of samples recorded along the 50m survey line can be seen by selecting the display sample frequency radio button to the "on" position.

The target panel also provides an output from the maximum gradient achieved for both targets if a sample is taken directly over the target, regardless of the sample frequency or speed. These values can be used as a comparison to those obtained when sample lines are set to "on".

## Anomaly Signature



The anomaly signature area shows the response along the survey line for both buried targets. The red line represents sensor 1 (port), the blue line sensor 2 (starboard) and the green line the gradient.

The targets are displayed in the plotting region at a location corresponding to their separation distance, with the first target always plotted at  $x = 25\text{m}$ , half way along the survey line.

Zooming in on small anomalies can help determine if the targets are detectable above a background or instrument noise threshold (indicated by a solid grey rectangle). This in turn can be set by entering a value in the "noise" text entry box.

The amplitude scale drop down box allows the y axis increments to be set between 0.1nT and 10nT. These are drawn as horizontal light grey lines. The vertical light grey lines represent two features. When "display sample lines" is set to off, they represent 1m intervals only the survey line. When "display sample lines" is set to on, the vertical lines represent points at which readings are taken along the survey (sample points). [NB: if many samples are recorded the plotting area will have a grey appearance due to the presents of multiple closely spaced vertical lines.]