

Wolverhampton Archaeology Group

How to do a Geophysics Survey

By

M R Holland

2010

Using the Resistivity Probes.....	3
Introduction.....	3
Setting up the mobile probes.....	3
Setting up the remote probes.....	3
Setting up the data logger.....	3
Checking the menus.....	3
Operation.....	4
Surveying.....	4
Laying out Grids.....	5
Taking readings.....	5
Downloading data.....	6

Using the Resistivity Probes

Introduction

Although these instructions may cover several pages, it is really quite easy to set up the RM 15 and its probes. You should be able to set everything up within 5 minutes, a little longer if you need to adjust the resistance using the remote probes.

Basically, you take readings at intervals by walking up and down a square grid previously laid out on the ground. The data logger records the resistance between the remote and moveable probes automatically for you. When all readings have been taken they can be downloaded into a computer and analysed using the Geoplot programme.

Setting up the mobile probes

- Attach the data logger to the probe frame using the captive screws (no need to tighten too hard).
- Connect the mobile probe plug to the mobile probe socket on the data logger. The plug and socket can only fit together one way round, you might have to rotate the plug to get the moulding and pins in alignment. Push firmly home and then tighten the locking ring.

Setting up the remote probes

These should be inserted into the ground at least 15 metres from the nearest point at which you intend to take measurements. This will ensure that the resistance readings are not affected to any significant extent by the changing distance between the mobile and remote probes.

- Unroll all the cable from the drum, there should be none coiled up.
- Connect the probes to the sockets on the drum by means of the green/yellow leads.
- Push the probes into the ground so they are about 1 metre apart
- Connect the plug on the end of the cable into the remote probe socket on the data logger. Use the cable grip to clip the cable to the frame.

Setting up the data logger

Switch the data logger on (it is the rotary switch on the side, turn it to ON-INT). The data logger remembers the settings from the last time it was used, so you should check these to make sure they are correct for your use.

Checking the menus

The settings can be accessed through a menu, press the MENU button, and the 5 submenus accessed by the buttons numbered 1 to 5. The items in each submenu can be selected by the up and down arrows and changed by the left and right arrows. The END MENU button takes you up to the menu and pressing it once again takes you out.

- | | |
|---------------------|------------------------------------------------------------------|
| Menu 1 | This menu sets the values for the data points |
| • Grid size | Set this to the grid size you are using, usually 10 or 20 metres |
| • Sample interval | The distance between readings, usually 1 metre |
| • Traverse interval | The distance between traverses, usually 1 metre |
| • Traverse mode | Commonly Zig-Zag, but can be parallel |
| Menu 2 | This menu sets the electrical parameters |
| • Gain | X1 is the usual setting for resistivity |
| • Current | 1mA for resistivity |

- Menu 3 Battery voltage
 - Battery voltage This should read about 10.6 volts for a fully charged battery. The unit needs an overnight charge after use.

- Menu 4 Hardware
 - Hardware PA1 Is the correct programme for resistivity
 - Configuration Twin – twin probes are used
 - Probe sep. 0.5m

- Menu 5 Data transmission speed
 - Baud Rate Set this to 9600 baud, make sure that Geoplot is set to the same baud rate when you come to download data.
 - Data Separator No space (this defines how the data is sent).

Operation

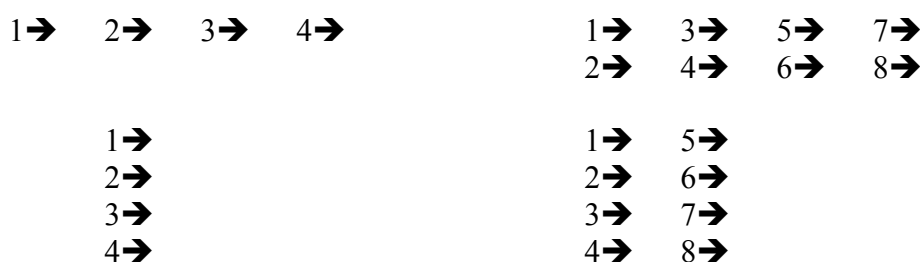
If you are sure that you no longer need any of the stored data, press ENABLE LOG, press and hold the CLEAR MEM button and wait for 4 beeps.

Check the data logger reading. This can give you a guide as to what type of ground you are taking readings in. If your first grid is adjacent to one that has already been measured, it helps if the reading of the first point is similar to the last reading of the previous grid. To match up the readings, get a helper to change the distance between the remote probes. Moving closer together will increase the reading and vice versa. **The data logger sends a moderate voltage to the remote probes so switch the unit off while they are being moved to avoid a mild shock (about 40 volts).** This process matches the resistivity of the new grid to the resistivity of the old adjacent grid and helps the Geoplot display. If you cannot do this (you may not know the reading from the old grid), don't worry, Geoplot can compensate.

When you are ready, put the probes in the ground at the first location, press the ENABLE LOG button then the START button. The data logger will take the first reading. A more detailed description of taking readings is in the next section.

Surveying

Geophysics measurements are done in 10 or 20 metre square grids. Before laying these out on the ground, try to visualise how the grids will relate to each other on the ground and on the computer screen. The grids must be generated the same way, Geoplot will draw the traverse line horizontally on the screen. When taking measurements, ideally, start at the top left hand corner of the grid. The first traverse line is then towards the top right hand corner. Note the compass direction of this line and also order in which the grids are generated, this will be the order in which the files are downloaded to Geoplot. It does not matter which order this is, so long as you know what it is so you can specify it later when creating the mesh. You will find it useful to arrange the grids so that the next one starts where the previous one finishes where possible. Suggested layouts are



Where → indicates the traverse direction

Grids **must** all be the same size and orientation. Any missing grids can be replaced with a dummy grid later. Make a drawing of how the grids relate to each other, you will need this to put the grids together in a mesh template, for example:

X→ Grid 1	X→ Grid 3	X→ Grid 2
X→ Grid 4	X→ Grid 6	X→ Grid 5

Where X→ marks the start point and traverse direction. The grids were measured in the order Grid1, Grid2, Grid3 etc. Later on, you will find it useful to add to this diagram the site name and mesh name and file it with the site records.

Laying out Grids

Try to align your first grid with a permanent feature such as a building wall or a fence. Having decided where your first grid will go, put a peg in the ground to mark the first corner and run a tape from it at least 20 metres to mark the first side and second corner. Using 2 tapes stationed at each end of the first side, mark up the third corner. One tape is a side (10 or 20 metres), the other is a diagonal (14.14 for a 10 metre square, 28.28 for a 20 metre square) – where they meet is the third corner. Repeat for the fourth corner then recheck the diagonals. They should agree to within 5cm. It is important to get this first square positioned correctly and square or all your subsequent grids will be out. You should also tie it in to known points on the site, either a site grid point or prominent object such as the corner of a building or telegraph post. Make a drawing of this in the site records. You can either:-

- Measure from one grid corner to two points
- Measure from two grid corners to one point.
- Measure from two grid corners to two points (and the distance between them).

The latter is better as it fixes the orientation of the first side.

Now the traverse lines must be laid. These are wires marked at half metre intervals with tape. Lay the first one in the direction of traverse, one metre in from the side. Lay as many others as you can at 2 metre intervals, the last should be 1 metre in from the far side. Peg them down so that they overlap the side tapes and hold them in place.

Taking readings

Having enabled the log put the probes in the ground for the first reading. This will be half a metre in from a side and adjacent to the first traverse wire. Press the start button and the data logger will take the first reading. Now put the probes in 1 metre further along using the half metre markings on the traverse wires as a guide. Keep taking readings at 1 metre intervals, each time you put the probes in the ground, the data logger will beep. When you reach the end of a line you will get a long beep. Turn round and come back along the same traverse wire (but on the other side of it). At the end of the first traverse wire and the second line, move to the next traverse wire. When you reach the end of the grid, the datalogger will beep twice. If you take a reading by accident, you can delete it by pressing the DEL key. If you cannot take a reading, for example, there is a hedge in the way or a path crosses press the DUMMY LOG key. If you put dummy readings in at the end of a line, you may have to enter the same number of dummy entries to start the new line. The easy way to do this is to press END LINE and then IMAGE

LINE on the datalogger which puts the readings in for you. When you have finished, it is safe to turn the datalogger off, the readings are safe. The datalogger remembers what you have done so you can turn it off over lunch, for example, and continue with new grids in the afternoon.

Downloading data

We do not have the software (geoplot) which came with the datalogger, so we use the programme geophys instead. This is described in a separate document.