DATA SHEET
Issue 2

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RM85

Resistance Meter System

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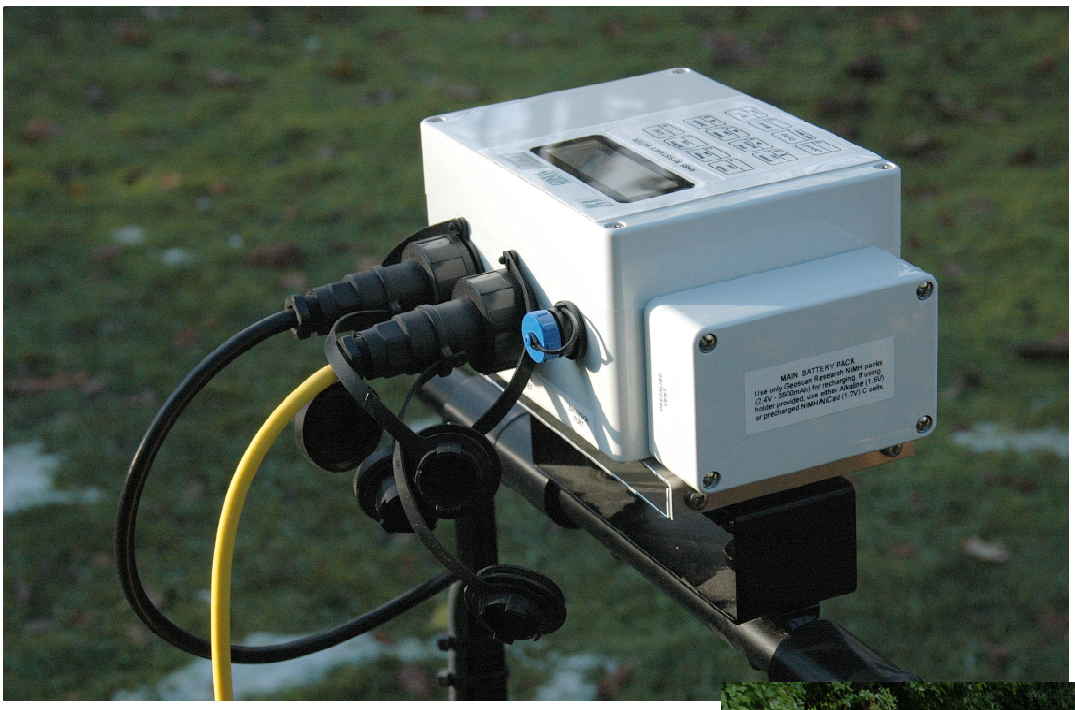

RM85 System

- Measurements made using probes or cart with spiked wheels
- Integral multiplexing via optional plug-in card
- GPS data logging option
- Flash memory for up to 200,000 readings, including GPS
- USB and RS232 communications, plus expansion port
- Future options of SP and IP measurements
- External compartment for main battery
- LCD backlight and contrast adjustment
- NiMH battery, 4hr fast charge with LED status
- Lightweight — 1.35 Kg, including batteries and multiplexer

Application

- Faster Twin and MSP40 operation - MSP40 rate of 0.8s/m with 8 samples/m and GPS logging
- Simplifies the MSP40 system by replacing the RM15(-D), DL256 and MPX40
- Compatible with PA20, PA5, PA3 (AD1 no longer required)
- Square or rectangular grid sizes of up to 100m

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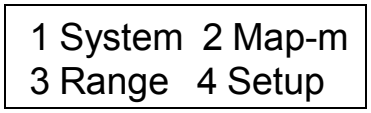
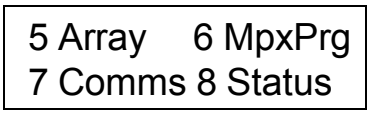
RM85

Resistance Meter System

Introduction

The RM85 Resistance Meter System is designed as a one man rapid location, mapping and identification system for a wide range of targets, which can be archaeological, environmental, forensic, utility, geological or military in origin. It can be used either in Probe Mode where conventional probes are inserted into the ground for area mapping or vertical profiling, or it can be used in Wheel Mode where it is mounted on an MSP40 Mobile Sensor Platform (with spiked wheels in place of the probes) for fast, detailed resistance mapping and, optionally, simultaneous magnetic surveys. It can optionally record GPS positions in memory along with each reading. Internal flash memory can store up to 200,000 readings including GPS location.

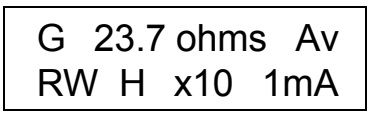




The RM85 menu system gives quick access to instrument settings

Resistance measurements - Probe Mode

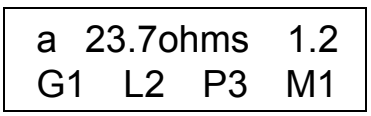
When used with a PA20 probe array (or earlier PA5), the RM85 can measure and log data with conventional single arrays such as the Twin, Pole-Pole, Double-Dipole, Wenner, Schlumberger, Gradient etc. Noise rejection is improved compared to an RM15, allowing faster operation. The external MPX15 multiplexer of the RM15 system is replaced by an optional internal multiplexer card. This card allows the RM85 to configure and control logging of data from multi-probe arrays on the PA20; for example parallel Twin arrays for faster ground coverage or more detailed area coverage, and multiple Twin arrays for multi-depth investigations. Readings may be logged manually, or automatically by a special current sense circuit.



A normal screen display shows if GPS is selected (G=On), resistance reading, Averaging status (Av=On), Measurement mode (RW=Wheel mode), voltage output (H=100V), selected gain and current ranges

Resistance measurements - Wheel Mode

When mounted on an MSP40 Mobile Sensor Platform, resistance data can be collected much faster and at higher spacial resolution than is practicable with conventional probes arrays. For example, when the MSP40 is configured as a square array, both alpha and beta data can be collected at a sample interval of 0.25m at a rate of better than 0.8s/m; thus a 20m square grid with traverse interval of 1m can be surveyed in 8 minutes with great detail. At this rate, simultaneous FM256 data can be collected with a sample interval of 0.125m if added to the MSP40. GPS data can also be logged in the RM85 at up to 10 readings per second. When downloaded into Geoplot, the GPS referenced data can be converted to local coordinate systems, and then sampled and regridded for further processing and presentation.



A Wheel mode logging display shows multiplex status (a=alpha), reading and current GPS HDOP, with survey position on the bottom line.

Typical Specifications (Advanced model, subject to change)

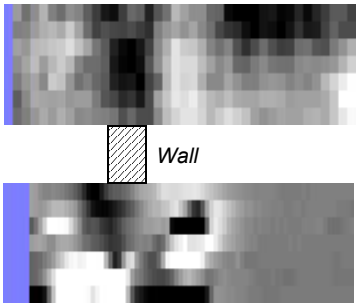
TRANSMITTER Output voltage	40 / 100 V					
Constant current ranges (p-p)	10 mA	5 mA	1mA	0.5mA	0.1 mA	0.05mA
Maximum contact resistance (at 100 V)	10 Kohm	20 Kohm	100 Kohm	200 Kohm	1 Mohm	2 Mohm
RECEIVER Resistance ranges (manual)	2 ohm	20 ohm	200 ohm	2000 ohm	20,000 ohm	
Logged resolution (ohms)	0.0005	0.005	0.05	0.5	5	
Operating frequencies	35, 85, 137 Hz					
Receiver input impedance	100 Mohm					

GENERAL Memory capacity	Up to 200,000 readings, including GPS, in flash memory
Communications	USB (2.0) and RS232 at up to 38400 baud
Weight (including batteries and multiplex card)	1.35 Kg
Overall case dimensions	200 x 120 x 90 mm
Charging time	4 hours, LED Status (NiMH battery pack)
Input voltage to charger	100-240 V, 47/63 Hz International pins, UK, Euro, USA, Japan, Asia

Example Survey 1

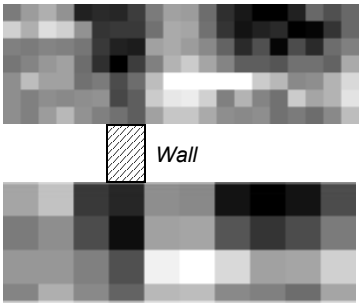
The data below were collected at our standard test area. This is small in scale, measuring just 3.5m by 10m, but it has a well defined wall across the area. Comparative surveys were done with a 0.5m Twin array (RM15 + PA20), and a 0.75m Square array (RM85 + MSP40 with experimental multiplexer); data was also collected with an FM256 gradiometer and DGPS (input to the RM85) mounted on the cart. A traverse interval of 0.5m was used. Twin data was collected at 0.5m intervals; alpha and beta data was collected at a 0.25m intervals (8 readings/m) and FM256 data at 0.125m intervals. DGPS data was collected at 5Hz. The cart was moved at 0.8s/m. The Square (merged alpha and beta) data and Twin data agree well, with the Square array providing more detail, especially compared to a standard 1m x 1m Twin survey. Unfortunately the test area is covered by a tree canopy, with adjacent building, that has prevented collection of good quality GPS data (also this is not RTK data). Neverthless, it does illustrate the functional capability of the GPS system.

0.75m Square (a+b) array (+/-2SD)

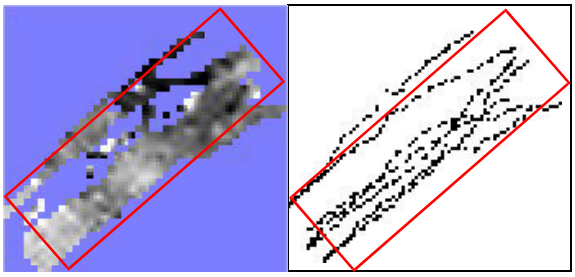


FM256 data (+/- 200 nT)

0.5m Twin array SI=TI=0.5m (+/-2SD)



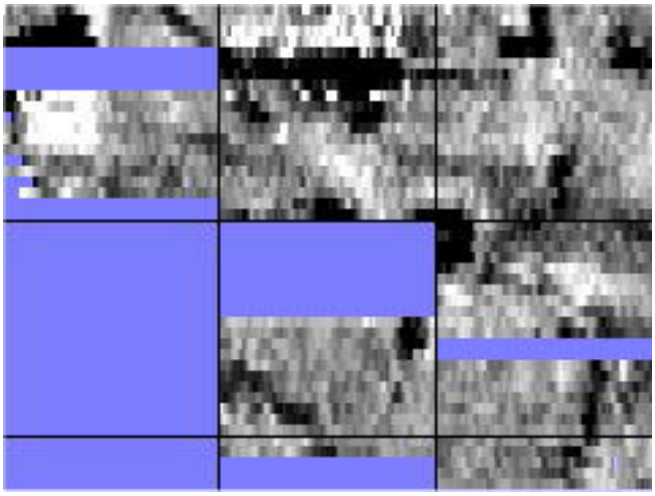
0.5m Twin array SI=TI=1m (+/-2SD)



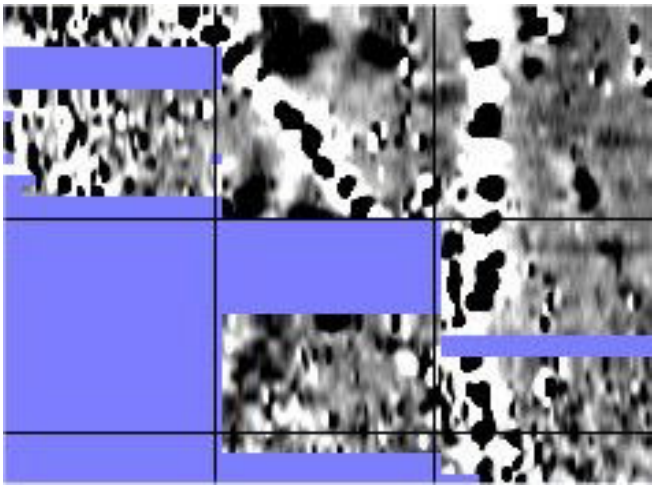
DGPS referenced data of the same area (DGPS points shown on the right), converted to local coordinates and sampled and regridded within Geoplot (+/-2SD)

Example Survey 2

The survey below is of the abandoned gardens of Parlington Hall (www. parlington.co.uk), made using an MSP40 cart system which was configured to collect 0.75m Square array alpha and beta resistance data, along with FM256 fluxgate gradiometer data (DGPS not collected). An RM85 with experimental multiplexer was used in place of the normal RM15, DL256 and MPX40. Alpha and beta data was collected at 0.25m sample intervals (8 readings/m), and FM256 at 0.125m sample intervals; traverse interval was 1m. Grid size was 20m and the cart was moved at 0.8s/m. The alpha and beta data has been merged in the plot below . The data sets shows a wealth of detail and if viewed separately, alpha and beta data show even finer individual detail due to their directional nature.



Merged alpha and beta resistance data (+/- 1 SD)



FM256 gradiometer data (+/- 10nT)

Resistance data was despiked, merged, low pass filtered (2x1), then high pass filtered (10x10). Gradiometer data was low pass filtered, and interpolated to 0.125m by 0.125m.

RM85

Resistance Meter System

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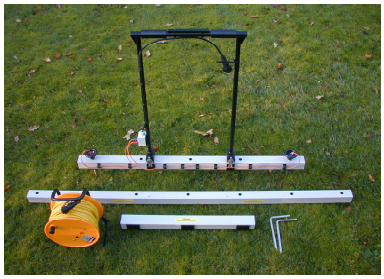
What versions of RM85 will there be ?
We anticipate there will be Basic and Advanced versions, just like the RM15(-D), offering a choice for amateur, student or professional use: maximum output voltage will be 40V or 100V, maximum current will be 1mA or 10mA. In addition there will be a half-current option allowing optimisation of signal to noise ratio and probe contact resistance compliance. There will be an optional integral multiplexer card that replaces the external MPX15 of an RM15(-D). We anticipate there will be only two memory sizes, one for Basic, one for Advanced. GPS will be an option for the Advanced model only, which will have sufficient memory to log GPS data.



PA20 Multiprobe Array System

How will I update or upgrade an RM85 at a later date ?
If a multiplexer card is purchased later on this can be fitted by the user. When upgrading from Basic to Advanced, we will supply a replacement main processor card. When upgrading to the GPS option you may be required to return the RM85 or main processor card to Geoscan Research for a firmware update.

MSP40 Mobile Sensor Platform

Is the RM85 compatible with my existing RM15(-D) accessories ?
The RM85 will be supplied with a mounting plate so it can be used in place of an RM15 on a PA5, PA20 or MSP40 (see below for MSP40 details). The AD1 adapter is no longer required for the PA5 and PA20 arrays. Existing adapters AD2 (gradient array) and AD3 (square, wenner, double-dipole array) will not be compatible and new versions will be required. If the RM85 has a multiplexer card then this can take the place of an AD3 adapter. The AD4 adapter (pole-pole array) is compatible with the RM85. A PA3 array will require one new adapter to interface with the RM85.

How will the RM85 be used with my existing MSP40 ?
The RM85 will replace the functions of the RM15(-D), DL256 and MPX40, presently part of an MSP40 system. A junction box will be required in place of the MPX40. An RM85 Advanced with multiplexer card will be required for use with a mobile sensor platform but the cart itself will be available at reduced cost since the DL256 and MPX40 are no longer required.

PA3 Probe Array

Can my software be used with the RM85 ?
You will be able to output data in RM15(-D) format. However, to take advantage of the higher RS232 baud rates of the RM85 or use the USB port you will need an updated version of Geoplot (only available with USB dongle versions of Geoplot). You will also need an updated version of Geoplot to download and process GPS data.

Can I upgrade my RM15(-D) to an RM85 ?
The RM85 is a completely new design so you cannot upgrade an RM15(-D) to an RM85. You can however use existing arrays and most accessories with the RM85.

When will the RM85 be introduced ?
We hope to have the RM85 available in the spring of 2010 in its standard form (Probe Mode) and ready for use with a mobile sensor platform (Wheel Mode).

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All specifications subject to change without prior notice.

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