

RM15-D

Resistance Meter System

Introduction

The RM15-D Resistance Meter forms the heart of a versatile measuring system for rapid area or vertical profile measurements. Used with a PA20 probe array (or the earlier PA5) the RM15-D is ideally suited for use with conventional single arrays such as the Twin, Pole-Pole, Double-Dipole, Wenner, Schlumberger, Gradient etc. An expansion port allows the RM15-D to control multi-probe systems via the MPX15 multiplexer module. This allows multiplexing multi-depth Twin and other arrays that can be configured using the PA20/PA5 probe array. The RM15-D is an integral part of the MSP40 Mobile Sensor Platform, a wheeled resistance array that will provide rapid and detailed resistance surveys.

The RM15-D is available in two versions, BASIC and ADVANCED, both having built-in data loggers with memory capacities of 3600, 15000 or 30000 readings. The logger provides powerful functions for fast and efficient surveys, permitting one person surveys, and keeps track of the survey position, giving both audible and visual indication of current survey position. Readings may be logged manually, or automatically by a special current sense circuit. The modular plug-in card design allows easy upgrade from BASIC to ADVANCED meter and increase of memory capacity. An analogue output is provided for interfacing to external devices.

It is possible to upgrade from the earlier RM15 to the RM15-D which has an internal detector that can distinguish between the special NiMH battery pack provided and the alternative alkaline battery holder, thus preventing accidental charging of alkaline cells.

RM15-D Basic

The BASIC RM15-D is ideal for general use by amateurs or students. It is designed primarily for use with the Twin array, though it can be used with other arrays such as the Wenner etc. with reasonable accuracy providing the baseline is small. It provides current ranges of 1mA and 0.1mA at an output voltage of 40V, giving a maximum logged resolution of 0.005 ohms. Synchronous detection and multipole filtering help reduce noise effects due to natural and power line earth currents, a problem which can be particularly serious on urban sites. Since it is not possible to have narrow bandwidth and fast settling at the same time, a choice of three filter time constants (measurement time, 0.25 second to 1 second) are provided which you can select depending on severity of the interference. AC operation overcomes polarisation and contact voltage effects between the probes and earth. The frequency of 137 Hz is carefully chosen to avoid power line operating frequencies and harmonics, thus giving maximum rejection of power line earth currents whilst still providing a fast reading response with the Twin array. The RM15-D BASIC can be easily upgraded to the RM15-D ADVANCED model.

RM15-D Advanced

The ADVANCED RM15-D is designed for professional or research purposes, where greater accuracy is required, and includes all the features of the RM15-D BASIC plus many more. The RM15-D ADVANCED provides an additional current range of 10mA and 100 V output, giving a maximum logged resolution of 0.0005 ohm. The 10 mA range can be used to further improve the noise rejection of the BASIC instrument and also provide improved accuracy with wider probe array spacings - this is because the system gain does not need to be so high, and hence measurement errors will be reduced. The 100 V output gives extra compliance, especially useful in dry conditions at higher currents, when it will improve the reliability of auto-logging and enable readings to be taken which may not otherwise be possible with the BASIC instrument. There is a choice of operating frequencies : 35 Hz, 85 Hz or 137 Hz, with the lower frequency providing the greatest accuracy for conventional four probe arrays, due to reduced capacitive and inductive errors.



*Carry Case for RM15-D
and accessories*



Data Logger

Readings are stored in a non-volatile memory which may be partitioned into grid sizes of 10m, 20m or 30m square, with reading interval being either 1m or 0.5m. The data logger keeps track of survey position for both zig-zag and parallel traverses and displays current grid, line number and line position. An additional survey tracking parameter is introduced when using the MPX15. Incorrect readings may be deleted singly, or as a complete line, with one keystroke. A dummy reading can be inserted if a physical obstacle prevents a true reading being taken or a line may be completed with dummy readings, again with one keystroke. A mirror image "complete" line key is also provided for zig-zag surveys when part of the standard grid cannot be surveyed. An ENABLE LOG key controls data logger functions thus preventing accidental loss of data.

Auto-logging

Due to a special current sense circuit in both the BASIC and ADVANCED RM15-D logging can be automatic with any probe configuration that has a current probe mounted on the mobile frame, for example the Twin array. The operator simply inserts the probes of the mobile frame into the ground and the RM15 will determine when the reading has settled, log it, and then give an audible beep to tell the operator to move onto the next reading. This mode of operation greatly reduces errors and operator fatigue, leading to a considerable increase in area survey speed - typically 400 readings may be taken in about 12 minutes. Auto-logging with the MPX15 multiplexer enables large data sets to be acquired very rapidly.

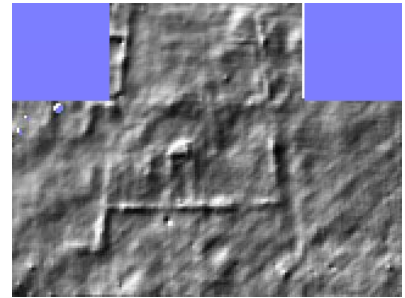
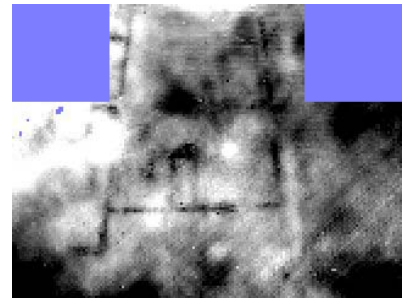
Accessories

The RM15-D requires a probe array to be able to take measurements and software to download, process and display the data. Accessories presently available include the PA3 Probe Array (017-003), the PA20 Multi-Probe array (017-020) and the MPX15 multiplexer (018-004). The MSP40 Mobile Sensor Platform is currently under development. The PA20 and MPX15 are especially recommended for detailed and rapid area surveys. An anti-vibration mounting kit (019-003) is also required if you wish to mount the RM15-D on a PA20 frame. Program Geoplot 3.0 (012-005) is recommended for data transfer, processing and presentation of the data - see separate data sheets for further details of these accessories. Recommended systems for a Basic Popular System or an Advanced Professional System are also available.

The RM15-D is supplied as standard with an instruction manual, battery charger, data dump cable and a robust executive style carrying case.

Guarantee

The equipment supplied by Geoscan Research is guaranteed against defective material and faulty manufacture for a period of 12 months from the date of despatch. Our responsibility is in all cases limited to the cost of making good the defect in the instrument itself. The guarantee does not extend to third parties or other equipment, nor does it apply to defects caused by abnormal conditions of working, accidents, neglect or wear and tear.



Example resistance survey showing walls of a medieval cemetery and buildings (associated with a hospital complex). Blue squares measure 20m x 20m. Shade plot range +1.5 to -1.5 SD.



MPX15 Multiplexer



PA20 Multiprobe Array System



PA3 Probe Array



MSP40 Mobile Sensor Platform

RM15-D

Resistance Meter System

Typical Specifications

RM15-D Basic

TRANSMITTER Output voltage	40 V			
Constant current ranges (p-p)	1mA	0.1 mA		
Maximum contact resistance	40 Kohm	400 Kohm		
Current variation with contact resistance	< 0.1 %			
RECEIVER Resistance ranges (manual)	20 ohm	200 ohm	2000 ohm	20,000 ohm
Logged resolution (ohms)	0.005	0.05	0.5	5
Reading variation with battery voltage (7-12 V)	< 0.01% / V			
Operating frequency	137 Hz			
Receiver input impedance	100 Mohm			
Measurement time	0.25, 0.5, 1 seconds programmable			
High Pass Filter	13 Hz			
SP correction range (automatic)	+ / - 2 V			
Analogue output	+ / - 2 V fsd each range			

RM15-D Advanced

TRANSMITTER Output voltage	40 / 100 V				
Constant current ranges (p-p)	10 mA	1mA	0.1 mA		
Maximum contact resistance (at 100 V)	10 Kohm	100 Kohm	1 Mohm		
Current variation with contact resistance	< 0.1 %				
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
Reading variation with battery voltage (7-12 V)	< 0.01% / V				
Operating frequencies	35, 85, 137 Hz				
Receiver input impedance	100 Mohm				
Measurement time	0.25, 0.5, 1 seconds programmable				
High Pass Filter	0.01, 0.05, 0.16, 1.6, 8, 13 Hz				
SP correction range (automatic)	+ / - 2 V				
Analogue output	+ / - 2 V fsd each range				

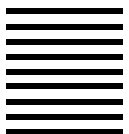
RM15-D Basic and Advanced

LOGGER Memory capacity	3600, 15000 or 30000 readings
Data retention time	> 10 years at 25 degrees C, less at higher temperatures
RS232 baud rate	600, 1200, 2400, 4800, 9600 baud
RS232 output	+ / - 6.5 V minimum, 3 state output when shutdown
RS232 connections	TXD, RCV, GND, CTS, RTS
GENERAL Power supply	8 AA Nickel-Cadmium 2300 mAH batteries
Battery life	37.5 hours at 1mA, 33 hours at 10 mA (40 V output) 26 hours at 10 mA (100 V output)
Battery voltage range	8 to 12 V
Working temperature	0 degrees C to + 50 degrees C
Weight (including batteries)	1.5 Kg
Case dimensions	200 x 120 x 90 mm
BATTERY CHARGER Output	300 mA, 17 V (Internal constant current and charge indicator within RM15-D)
Charge time for full capacity	30 hours (Nickel Metal Hydride)
Input voltage to charger	240 V, 220 V, 120 V, 50/60 Hz (specify UK, European, USA/Japan)

Geoscan Research

Heather Brae, Chrisharben Park, Clayton, Bradford,
West Yorkshire BD14 6AE. UK
Telephone : (+44) (0)1274 880568
Fax : (+44) (0)1274 818253
Website : www.geoscan-research.co.uk

All specifications subject to change without prior notice.



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