Instruction Manual

RESISTANCE METER

RM4

Instruction Manual Version 2.4

April 2009

RM4 Addendum

For the RM4 Instruction Manual

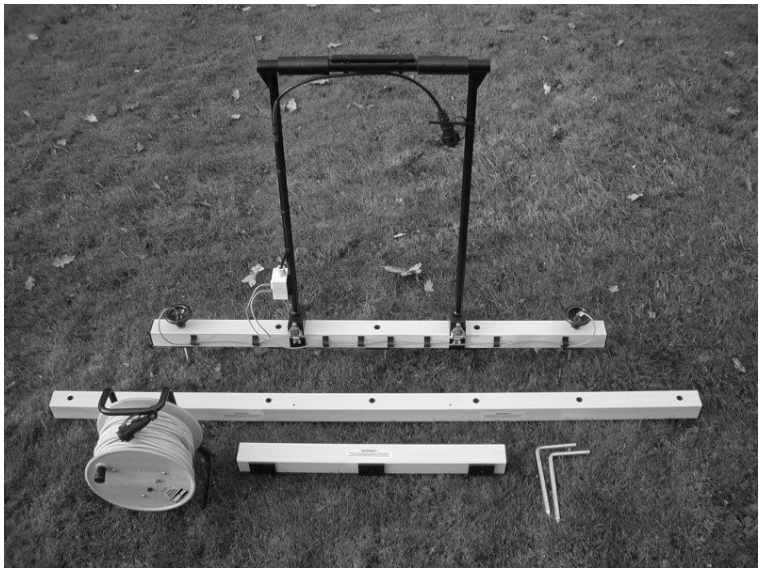
The following notes replace or supplement advice given in the instruction manual for the RM4 resistance meters. The PA5 probe array system has now been replaced by the PA20 system but offers the same functionality as the PA5. *Even if you have used an RM4 before you should read the following information.*

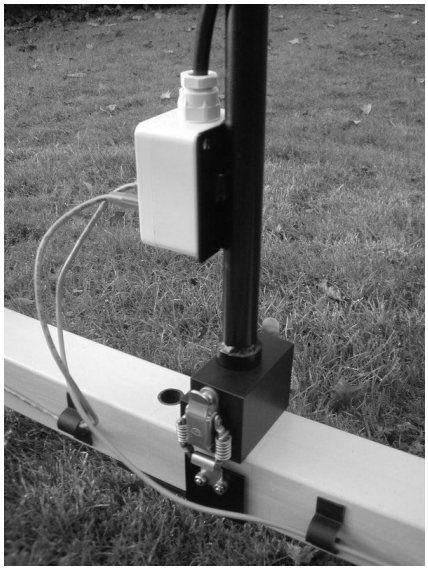
Section 1-4. Typical Specifications

The rechargeable battery type now supplied is Nickel Metal Hydride with a capacity of 2500mAh, replacing the Nickel Cadmium battery with 500mAh capacity. Therefore in the General section, Power Supply, replace "Nickel-Cadmium" with "Nickel Metal Hydride 2500mAh". In the General section, Battery life, replace "22 hr at 1mA" with "109 hr at 1mA". In the Charger section, "Charge time for full capacity", replace 10 hours with 36 hours. Section 3, Batteries and Charging, has also been revised – see that section for further information on charge time and capacity.

Section 2-4. Assembling the RM4 and PA5 Probe Array for Field Use

The PA5 is now replaced by the PA20 probe array. It offers the same functionality as the PA5 except that instead of the addition of wings to make the array wider, different sized beams are clipped into place. Electrical connections remain the same.





To fix the handle frame to a beam, place the beam on the ground, orientated so that the two small guide holes, offset from the center, are uppermost. Slide the two metal brackets (with latch plates) under the beam so they roughly align with each guide hole. The handle frame is an inverted U shape with nylon blocks at the each end. These blocks have small bolt heads on the underside, again offset from center; they are to aid alignment of the nylon blocks with the guide holes of the beam. Offer the handle frame to the beam, ensuring that the small bolt heads in the nylon blocks align with, and drop into, the beam guide holes. There are four latches in total on the pair of nylon blocks. Drop each latch down so it engages with the latch plate of the metal bracket and then pull the latch up to engage. It is easiest to engage the latches on each nylon block in pairs. The frame and beam are now ready to have probes and jump leads fitted.

Insulating tubes are already fitted permanently on the beams at the positions where the probes can be mounted. Please pay particular attention to the mounting of the probes onto the beam. Under the beam, in order, will be : M12 nut, M12 washer, probe support plate (see photo). *It is vitally important that you assemble probes with the support plate under the beam. If you do not the beam will crack under pressure.* Above the beam will be : M12 washer, M12 spring washer, M12 washer, M12 hand-wheel (M12 specifies a metric 12mm diameter).

If re-using probes from a PA5 system then the old nylon washers, insulating tubes and rubber grommets are no longer required.

The hand-wheels used in earlier systems are no longer manufactured and have been replaced by a slightly smaller hand-wheel. If you have used a PA5 or earlier PA20 before then this necessitates a slightly different approach when removing the jump lead. Whilst the jump leads are inserted into the hole at the top of the probe, as before, when it comes to removing them there is insufficient space at the top to insert your fingers into. Therefore you should undo the hand-wheel first, sliding it along the jump lead cable, to provide access to the 4mm connector at the end of the jump lead which may now be pulled out. Do *not* be tempted to just pull on the cable to remove the connector – if you do there is a good chance that over time the solder joint will be fatigued and will then break.

It is vitally important that you assemble probes with the support plate under the beam. If you do not the beam will crack under pressure.

Always wear stout protective footwear. Keep feet clear of the probes when inserting them into the ground.

Cover the probe tips with the protective tubing provided when storing.

Section 3. Batteries and Charging

Section 3-1. Battery Types

1 Rechargeable NiMH Batteries

The rechargeable battery type now supplied is Nickel Metal Hydride with a capacity of 2500mAh. The I.E.C. designation for the battery size is IEC HR6.

Section 3-3. Charging the Battery Pack

2 The Battery Charger

Depending on your country and availability, the RM4 charger will be supplied in one of two formats.

If the unit supplied is an Adapter 6201, Type FW1299 then the input voltage and pins will be supplied to match your country. Follow the instructions given in the main section of the manual, pages 3-3 to 3-5, with the amendments described below.

If the unit supplied is an adapter Type FM7650/18 then the charger will be supplied with worldwide pin adapters (UK, Euro, USA, Japan, Australia) and will operate with a input of 100V-240V, 47-63 Hz. The RM4 requires a constant current of about 70mA for charging. The 18V adapter has a voltage dropping resistor fitted in the connector so that it provides the required current to the battery pack. You should only use ***this*** charger with the RM4 and not an 18V substitute since this will not have the required dropping resistor fitted to regulate the current. Again follow the instructions given in the main section of the manual, pages 3-3 to 3-5, with the amendments described below.

3 Charging Instructions

The charger output remains the same at 25V, 70mA constant current. At this charge rate, full capacity will be achieved in 36 hours and the instrument will operate for 109 hr at 1mA. Unlike Nickel Cadmium batteries, you should not experience any noticable "memory" effects with Nickel Metal Hydride batteries. This means you can top up the charge whenever you wish though it is advisable to avoid prolonged overcharge.

If you are operating the instrument daily, a typical overnight charge of 10 hours will power the instrument for 32 hours at 1mA, that is approximately 4 days at 8 hours per day. In this case you might wish to charge the batteries every 4^{th} day for 10 hours.

The batteries will lose their charge by natural leakage if they are not used for a month or two. Therefore, if you wish to maintain a charge in the batteries in readiness for use you should do a full 36 hour charge every month or two, instead of a the normal 10 hour charge when used on a daily basis.

General safety information.

Nickel Metal Hydride cells are broadly similar to Nickel Cadmium cells in many ways but are less tolerant of abuse. Particular hazards are electrolyte leakage and gassing. The electrolyte used is potassium hydroxide. Under certain conditions NiMH cells may vent hydrogen. Remove electrolyte with water. If electrolyte comes into contact with skin or clothing, wash off with plenty of water. If a skin reaction occurs, contact a physician. If electrolyte enters the eye, flush immediately with copious amounts of water, holding the eyelids open and rolling the eye. Seek immediate medical help. Hydrogen gas may form an explosive mixture with air. If venting is suspected, ventilate immediately. Avoid sparks or naked flame.