

SECTION 3

BATTERIES AND CHARGING

3-1 Battery Types

1 Rechargeable Ni-Cad Batteries

The RM4 is supplied fitted with eight 1.2V Nicad batteries, physical size AA, capacity 500mAh. The batteries should have a long life providing the charging and storage instructions of section 3-3 are followed, and should not need replacing for several years. If the batteries do eventually need replacing then follow the procedure described in section 3-2. The I.E.C. (International) designation for the battery size is KRH 15/51. A full charge of the batteries should power the instrument for 22 hours at 1mA current output.

Rechargeable batteries may be left in the instrument for long periods, in any state of charge, without permanent deterioration. However, switching on the instrument with the battery voltage below the recommended minimum may cause damage to both the instrument and batteries so make sure the batteries are given a full charge after long periods of non-use **BEFORE** switching on.

2 Primary Batteries

It is strongly recommended that the Nicad rechargeable batteries are used at all times if possible. This is to avoid any possibility of damage to the instrument when opening up to fit batteries and to avoid any water or contamination entering. If, however, it becomes imperative to fit primary cells, because of low battery charge during surveying then the procedure described in section 3-2 should be followed. **SEVEN** 1.5V primary batteries, zinc carbon or alkaline, physical size AA, I.E.C. (International) designation R6 or LR6 will be required - the eighth position **MUST** be occupied by the dummy battery supplied to ensure the total voltage is not too high for the RM4. **FAILURE TO OBSERVE THIS PROCEDURE MAY RESULT IN DAMAGE TO THE INSTRUMENT.** Alkaline batteries such as the Duracell MN1500, capacity 2250mAh, will give a much longer service life than ordinary Zinc-Carbon batteries and are to be preferred. They will power the instrument for approximately 4 to 5 longer than the times stated for Nicad Batteries.

WARNING

If the instrument is not to be used for any length of time, or the batteries have been exhausted, then primary batteries should be removed to prevent any chemical leakage from damaging the instrument.

3-2 Battery Installation and Replacement

The batteries may be replaced by using the following procedure. It may be useful on a first read of the manual to refer to figure 3-1 for a guide to the internal layout of the instrument.

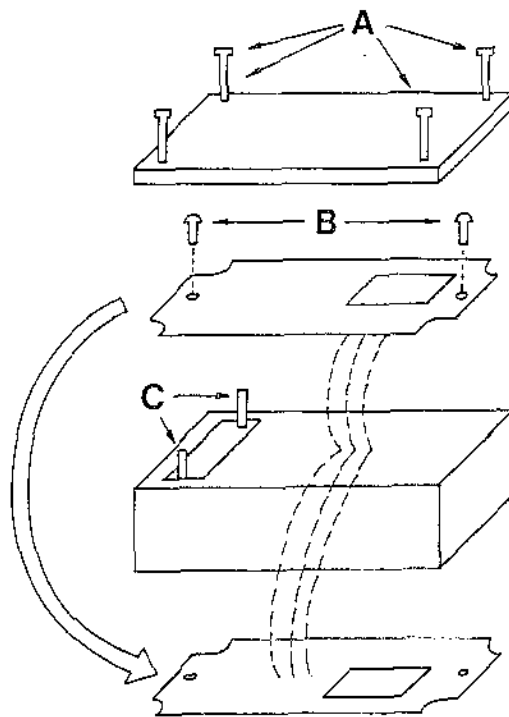


Figure 3-1. Gaining access to the battery pack.

1. Switch the RM4 off and allow 1 minute for voltages inside to decay to avoid any risk of a shock.
2. Undo the four screws (A) on the instrument front panel - there is no need to remove them entirely - and remove the transparent lid.
3. Undo and remove the two screws (B).
4. Carefully lift the lid about 5cm away from the main box and then very gently swing to one side.

Take great care not to strain the wire connections between the lid and the main case - loosen the wires gently with your fingers if they become caught.

5. The battery pack may now be removed from its compartment by gently pulling up vertically on the two straps (C) - do not pull out too far to avoid straining the leads to the battery pack connector. The battery pack connector can now be unplugged - remove by pulling on the moulded body not the leads.

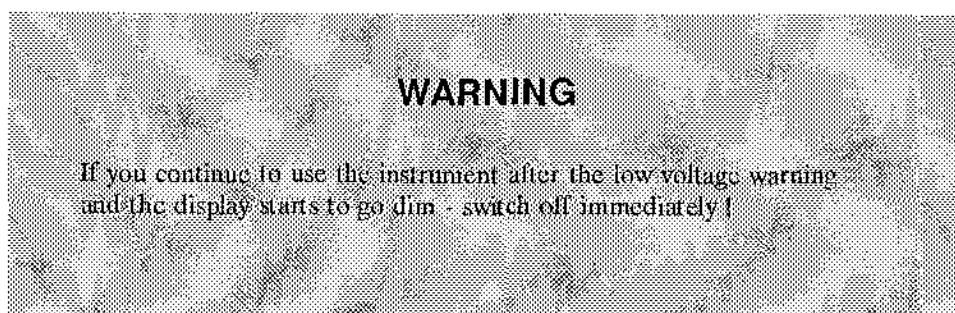
6 To re-install the battery pack back in its compartment, position the pack so that the battery connector is uppermost. With gentle pressure it should slide in smoothly - take care not to peel the neoprene strips off the battery bracket or main case. Do not forget that one of the battery positions must be occupied by the dummy battery if primary 1.5V cells are being used.

7 Reassembly is merely a reversal of the above procedure. Flip the front panel back to a position 5cm inches above the main case. Lower the panel down to the main case, locate the screws (B), and tighten up. When replacing the panel great care must be taken to feed the connecting wires between the panel and the main case back into their correct positions. Before tightening the two screws on the front panel, try gently pushing the panel down with your hands - this will enable you to verify that there are no trapped wires etc. Finally, replace the transparent lid and tighten the four screws (A).

3-3 Charging the Battery Pack

1 Battery Low Warning

A full charge of the batteries should power the instrument for 22 hours at 1mA current output. When the battery voltage drops below about 9 V, a flashing "Bat" message will appear in the top left hand corner of the display. As soon as you see this you have about 1/2 hour of operation left - if temperatures are high and the batteries were not fully charged before use then there may be less than 15 minutes operating time left. If you are using primary cells there is probably about 2 hours operating time left. You are strongly advised to stop surveying as soon as possible after this warning, since the battery voltage will drop rapidly after this point and if it is allowed to drop below 8.0V the instrument and batteries may be damaged.



2 The Battery Charger

The battery charger is supplied with voltage rating and mains input connector suitable for your country. Please check that the unit supplied is correct for your country before attempting to use. The four types that are available are :

- a 240V, 50/60 Hz, three pin connector moulded in the case, suitable for use in the UK.
- b 220V, 50/60 Hz, two pin connector moulded in the case, suitable for use in Europe.
- c 220V, 50/60 Hz, two pin connector on flying lead, suitable for use in Europe, Australia.
- d 120V, 50/60 Hz, two pin connector moulded in the case, suitable for use in USA, Japan.

The charger is protected internally by a thermal cutout and is doubly insulated. The output is 25V at a constant current of 70mA.

WARNING

You must **ONLY** use the RM4 charger supplied to charge the battery pack. Do **NOT** attempt to use an RM15 charger since that is a Constant Voltage charger. You will cause serious damage to the charger and instrument if you use the wrong charger.

If the charger does not operate correctly do **NOT** attempt to undo the fixing screws at the base of the charger since there are no user servicable parts. If the unit appears to be faulty it should be returned to Geoscan Research for repair or replacement.

Unlike the RM4, the battery charger is not waterproof. Since the charger is to be connected to the mains supply, do **NOT** expose it to wet or damp conditions - such as those encountered in the field.

3 Charging Instructions

WARNING

Ensure that the RM4 is fitted with rechargeable Nicad batteries before connecting the charger. **Under no circumstances attempt to charge any other sort of battery with the charger.**

Position the charger in a cool position if possible and plug into the mains supply. Switch the ON/OFF(CHARGE) switch of the RM4 to the OFF/CHARGE position and insert the six-way flying socket of the battery charger into the six-way chassis plug of the RM4, labelled (4) in figure 2-1. Insert the charger in to a mains socket and switch on power to the mains socket. The battery pack will not charge if the RM4 is switched to any other position than OFF/CHARGE.

An overnight charge of 10 hours will ensure that a battery pack is brought from an uncharged state to full charge. This charging period should not be greatly exceeded if at all possible, since prolonged overcharge will cause a progressive and irreversible decrease in charge capacity. If the battery pack is only partially discharged then the full charge time will not be required. In this case the charge time required is calculated from :

Charge time (hours) = number of hours use divided by 2.2

If the batteries are only partially discharged but you cannot leave the charger on for a period less than an overnight charge then this is permissible. Note that if the RM4 has not been used for some time, capacity available will be reduced, depending on temperature and storage time as shown in figure 3-2. For example capacity of a fully charged battery stored at 20 degrees C for 1 month is expected to be reduced to 70%. Therefore the battery should be charged for 30% of 10 hours = 3 hours to top up the battery to full capacity.

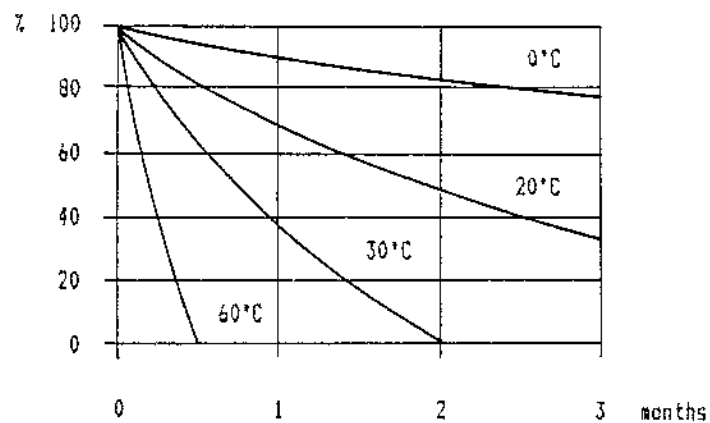


Figure 3-2. Capacity retention as a function of temperature and time.