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NUMERAL CONTROL INSTRUMENTATION PTY LTD

SIROTEM DRILLHOLE RECEIVER PROBE

MODEL DHR-1S

OPERATOR'S MANUAL

SIROTEM DRILLHOLE RECEIVER PROBE*

MODEL DRR-1S

SPECIFICATIONS

Overall Length	2 metres
Outside Diameter	25 mm
Casing Material	Polycarbonate, Epoxy and Delrin lined
Core Material	Mu-Metal Laminations
Total Weight	2.4 kg
Pressure Rating	5,000 Kpa (500mH_2O)
Power Requirement	4 x 3.5V Lithium Thionyl Chloride "AA" Cells
Resonant Frequency	45 Khz Typical
Inductance	170 mH Typical
Coil	Equivalent to 100 m square loop ($10^4 m^2$)

* Originally designed and developed by C.S.I.R.O., Division of Mineral Physics.

1. GENERAL INFORMATION

1.1 Introduction

This manual is designed to familiarise users with operational procedures for the DHR-15 Slimline Drill-hole Receiver Probe when used with Sirotem MK I or MK II.

1.2 Description

The probe is designed to assist in detection and localisation of conductors, either intersected by, or adjacent to, boreholes. It's diameter (25mm) makes it useable in small diameter (lower cost) holes down to "AQ" size. The general principles of T.E.M. apply and a surface transmitter loop is used to energise the ground.

2. OPERATION

2.1 Equipment Required

A logging cable with at least two inner conductors and armour is required for use of DHR-15. Both the inner conductors and armour should be connected to the surface by good quality slip rings.

(i.e. 3 required). This ensures optimum performance with minimum noise pick-up.

Typical connection cabling is shown diagramatically in Figure 1. Note especially that a connection between the metal top-piece of the probe and the case of the Sirotem must be made via the logging cable armour and interconnection cable screen respectively.

The probe is fitted with a standard Conhart-Owen 4-pin 1" fitting.

2.2 Operational Procedure

The probe contains mercury switches which turn-on once the probe is approximately at an angle of 45° to the horizontal with the cable connector upwards. Hence for logging most holes encountered, the probe switches on automatically. To ensure turn-off after logging, and particularly prior to storage, invert the probe and tap it gently on the ground. Then store it, preferably inverted, or return it gently to, but not beyond, the horizontal with a minimum of longitudinal movement.

A switch to override the mercury switches and switch on the probe regardless of orientation is located on the electronics assembly inside the probe. To access this facility, refer Section 3. This is useful for logging upwards as occasionally required in mines or for holes which deviate by more than 45° from the vertical direction.

Steps for taking a set of readings from a hole are basically as follows:-

(i) Before operation, check that the probe batteries have sufficient charge for operation. (Refer Section 3.)

(ii) Lay out the transmitter loop adjacent to the hole as required.

(iii) Set up the winch over the hole.

(iv) Interconnect the winch, Stratem and transmitter loop as per Figure 1.

(v) Remove the probe protective cap and connect it to the cable-head after spraying both parts with CRC or similar lubricant and moisture repellent. The probe should be

turned on by means of it's internal switch if hole direction requires it.

(vii) Readings are taken at 5 or 10 times depth intervals logging upwards with periodic repeats to verify data repeatability.

N.B. No connection which could result in a short circuit to the batteries should be made to pins 1 & 3 of the cable connector as battery voltage appears at these terminals for test purposes.

3. ROUTINE MAINTENANCE

3.1 Assembly & Disassembly

(a) Removal of Electronics Module

- Unscrew the electronics module by rotation of the metal top piece with a spanner or shifter with respect to the polycarbonate outer case.

- Once the thread is disengaged, pull the module out and clear of the remainder of the probe.

- If the black sleeve has come out with the module, this can then be slid off to reveal the electronics.

N.B. The sleeve orientation must be retained for correct reassembly

(b) Insertion of Electronics Module

- Insert the black sleeve into the open end of the probe section. The end with the inner machined recess is the

top. This tube should be pushed down into the probe assembly until a stop is felt.

- Apply a smear of silicon grease to the electronics module "O"-rings.

- Insert the electronics module into the sleeve taking care as the "O"-rings engage the open-end of the polycarbonate tube.

- Push down and engage the threads and screw in until the metal shoulder of the module is flush against the top of the clear polycarbonate tube.

N.B. Do not overtighten. Turn only until the resistance of the shoulder meeting the tube top is felt.

3.2 Battery Testing

The probe contains 4 x 3.5 V batteries providing +7V and -7V rails for the preamplifier electronics. The batteries can be tested without disassembly of the probe using pins 1 & 3 of the cable connector and the steel top subassembly. Positive rail

voltage appears between pin 1 and the top sub case, and negative rail between pin 3 and the top sub-case. Batteries providing less than 6V rails with the probe turned on should be replaced.

3.2 Battery Replacement

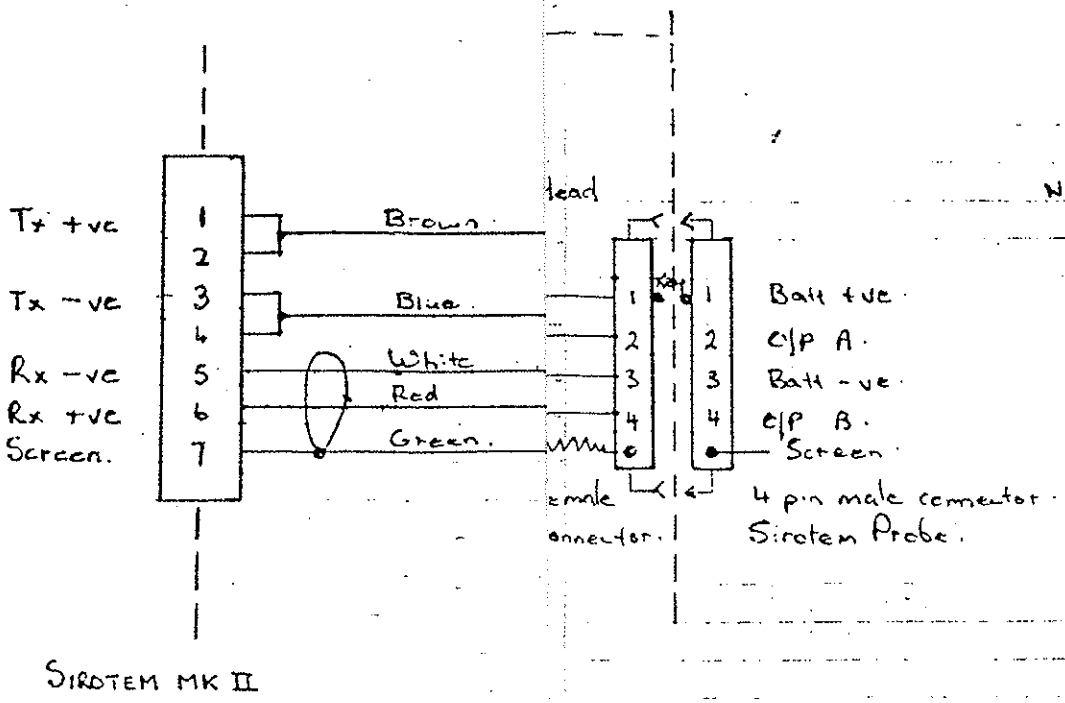
High quality Lithium Thionyl Chloride "AA" cells are supplied with the probe. These units provide extremely long shelf life and with 1.7A-h capacity to give approximately 280 hours of operation.

The correct replacement type is SAFT LS6AA. Other battery types with greater than 3 V terminal voltage (e.g. Mercuryl can be used but will be inferior in terms of capacity. Some other brands of Lithium battery have a delay in attaining their rated voltage of several minutes after turn-on.

When changing batteries, ensure that connecting clips are clean and are sprung sufficiently for good connection. Careful regard for battery polarity should be taken.

3.4 Circuit Details

A circuit diagram of the probe and preamplifier is shown in Figure 2.



SIROTEM MK II

Sirotem Probe.

FIG. 1.

Pink 4 Blue
Brown 2 Yellow

SIROTEM*

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Location : Darwin area, N.T. (See Fig. 1.)

Geology : Two massive sulphide bodies dip steeply east and are closest to the drill-hole at 150 m and 200 m. (See Fig. 2.)

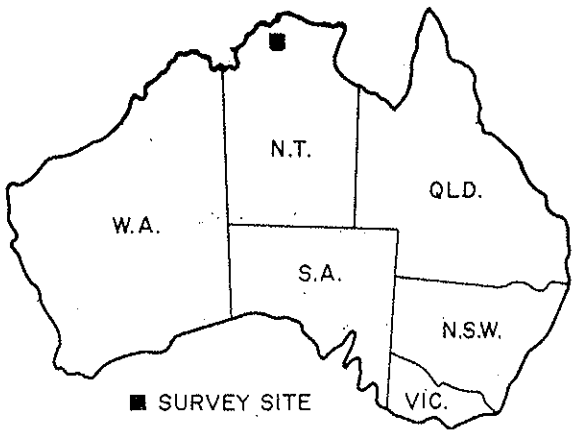


FIG. 1 LOCALITY MAP

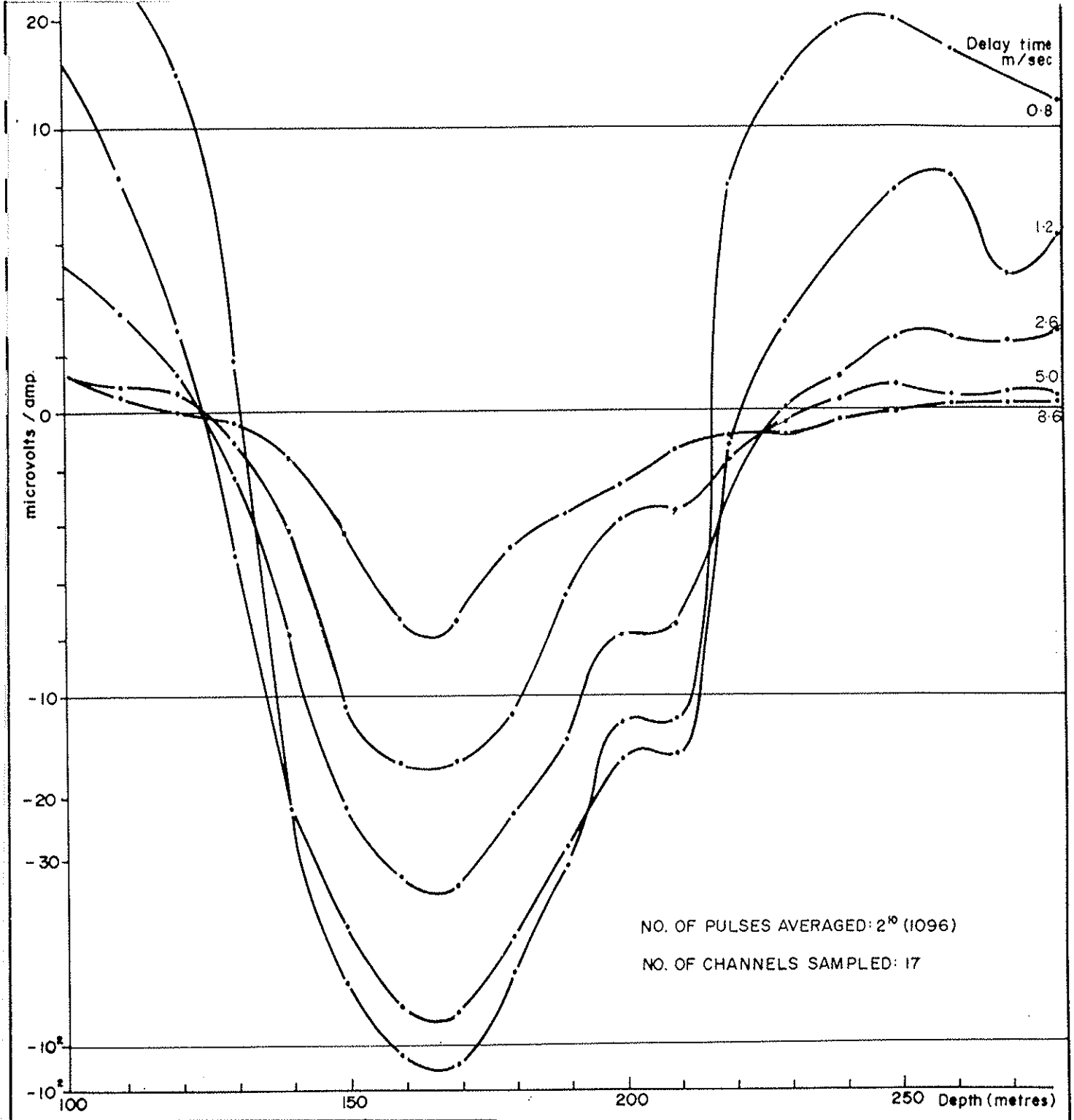
Survey Specifications :

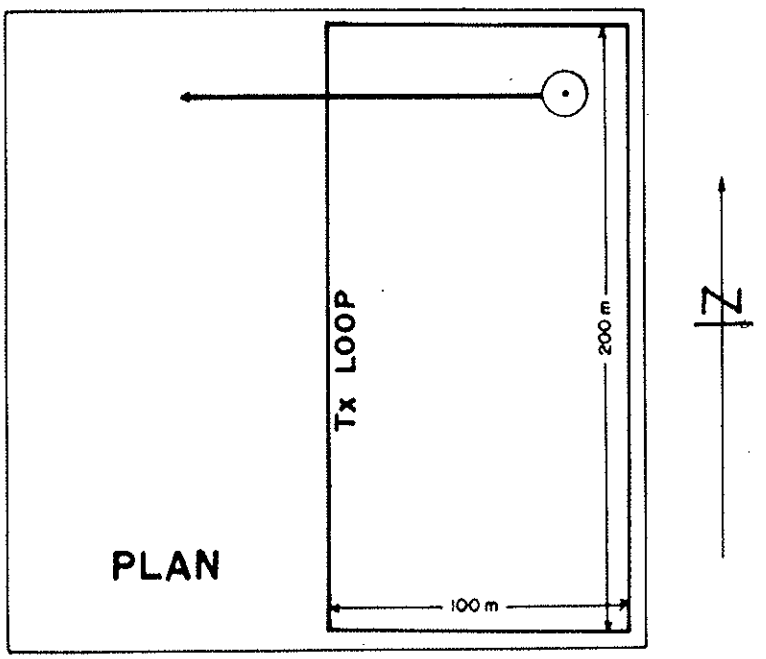
— Loop configuration	:	Coincident Tx and Rx loops
— Loop dimensions	:	100 m x 200 m
— Station interval	:	10 m
— No. of channels read	:	17 (19 msecs delay)
— No. of pulses averaged	:	1024 (2^{10})

Results : Figure 3 is a profile plot of the transient voltages for several channels observed at 10 m intervals in the bore hole with the Tx loop in the position shown in the diagram. Results from another position of the Tx loop adjacent to the drill-hole collar are similar.

Remarks : A marked excursion of early channels at 150 m is strongly indicative of a conductor in the vicinity of the drill-hole at this depth. The other conductor at 200 m is less well indicated, due apparently to its being shielded from the transmitted field by the conductor above it.

*Manufactured under licence from CSIRO (patent pending).





PLAN

SIROTEM

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DRILL HOLE SURVEY

PROSPECT 2 DARWIN AREA
NORTHERN AUSTRALIA
FIG. 2