# 1985/60. Long/short normal resistivity tool supplement to the field logging handbook for the SIE logger

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*Abstract*

Instructions are given for operating the SIE logger Long Normal/Short Normal/SP tool.

## INTRODUCTION

This Long Normal/Short Normal/SP Tool User Manual is a supplement to the "Field logging handbook for the SIE logger" (Unpublished Report 1985/07) and should be used in conjunction with it. This manual is based on both field experience and the SIE manuals provided with the equipment. For the sake of brevity, the Long Normal/Short Normal/SP Tool will be referred to as the "LS Normal" tool.

## OPERATOR CHECK LIST

- Lower part LS Normal tool complete with end caps and in carrying case
- Upper part LS Normal tool complete with end caps and in carrying case
- Bridle, complete with end caps
- Calibrator, complete with calibrating leads
- Tool mudpit electrode belonging to single point resistivity/SP
- T26 LN/SN/SP module

## FIELD OPERATION

The LS/NS Normal tool provides three electric log functions, namely:

(1) 16" short normal resistivity (SN)
(2) 64" long normal resistivity (LN)
(3) SP

The LN and SN curves are obtained simultaneously and the SP is obtained separately. Thus, two recording runs will be required to obtain complete coverage with this tool. Time may be saved by running the LN/SN in one logging direction and the SP in the other. This has the disadvantage of not being able to knowledgeably choose the optimum chart scale for either run.

Set up the equipment in the logging position at the hole as described in the main manual. Connect the two halves of the tool. Connect the bridle to the cablehead and then the tool to the bridle, in that order, so as to avoid twisting the bridle or cable. (The bridle is stored coiled and taped and it is most convenient to connect it to the cablehead while in this form). If an SP log is to be obtained, insert the mudpit electrode lead into the appropriate socket on the winch connector block and insert the mudpit electrode in the mudpit.

At many boreholes a mudpit will not exist. In such cases a mudpit should be dug with a mudpit electrode installed (not the one provided but some suitable less valuable item) at least 24 hours before logging commences. The mudpit should be kept wet from digging to the end of logging. In many

cases this procedure will be impossible or inconvenient. Marked success has been achieved with the Single Point SP/Res mudpit electrical connection by having the drillers install, in the top of the hole, steel casing extending from ground surface or above to borehole standing water level or below, and making good electrical connection between steel casing and mudpit electrode.

Insert the T26 module into one of the logging module slots of the T201 recorder and the dummy module into the other slot. The T3 module, as always, occupies the far left slot. WARNING: do not fit the T26 module together with any other logging module.

- Set the winch NUCLEAR/ELECTRIC switch to NUCLEAR if recording LN/SN or ELECTRIC if recording SP.

- Turn the T201 recorder on, having made sure that the T26 module is the only log module fitted. The LED should illuminate giving indication of adequate battery power (for the recorder, but not necessarily for the motor).

- Prepare the pens so that the ink flows smoothly onto the chart paper as the paper drive mechanism is advanced.

- Now the calibration of the tool is to be carried out.

- Switch the T201 recorder off and connect the clips of the calibration cables to the tool, cablehead and mudpit electrode as shown in Figure 1 and insert the banana plugs at the other ends of the cables into the appropriate sockets of the calibrating box (fig. 1). The black leads 1 and 2 are indistinguishable and so both ends of one lead have been marked with insulating tape to aid identification. Switch the T201 back on, turn the T26 module function switch to the SN/LN position and set both RANGE switches to ZERO.

- Turn both the T26 RANGE switches to ZERO and adjust the pen zero controls to zero both pens on the left side of the chart. Turn both RANGE switches on the T26 module to the "10" position and check that both pens remain zeroed. Any significant variation from zero at this time indicates that the system needs to be recalibrated or that a fault condition exists. In such a case, refer the matter to J. Hudspeth.

- Set the calibrating box function switch to SN and check that the red pen (with the control module N/R switch in the N position) deflects by ten centimetres. Record the deflection on the chart for SN set to "10", "20", "50" and "100".

- Set the calibrating box to LN and check that the blue pen (with the control module N/R switch in the N position) deflects by ten centimetres. Record the deflections on the chart for LN set to "10", "20", "50" and "100".

- Turn the SN/SP switch to "10", then turn the T26 module function switch to "SP". Turn the calibrating box function switch to SP.

- While pressing the red button on the calibrating box, check that the red pen (with the control module N/R switch in the N position) deflects by five centimetres. It may be necessary to alter the red pen zero position in order to observe this deflection.

- Turn off the T201 power and remove the calibrating box connection from the tool.

- This completes the calibration.

- Lower the tool into the borehole so that the top of the cablehead (that is, the start of the cable) is level with the ground surface. The manufacturer states that the tool is now at zero depth and that the depth counters should now be set to zero. However, this depth will not be the depth of the resistivity or SP measurement and corrections will need to be applied. From the dimensions of the tool it is estimated that about 7.15 m should be added to LN depths and about 9.2 m to SN depths. Assuming that the SP electrode is also the SN electrode, about 9.2 m should be added to SP depths.

- Lower the tool down the hole. The speed is not critical (although very slow speeds have been found to reduce bad noise problems).

- If running an LN/SN log, the pens will jump to the right (usually) off the chart when the tool first enters the water until the armour also enters the water. After this point a proper log should begin to be recorded. If necessary, alter the range switches to obtain the best log presentation.

- When the bottom of the hole is reached set the brake if advisable but do not forget to release it before attempting to raise the tool or you will overload the motor and (hopefully) trip the circuit breaker.

- If the downward log was a trial run, select the chosen range(s). If it is desired to select the other logging mode, do not forget to alter the winch NUCLEAR/ELECTRIC switch accordingly.

- Turn the CHART SPEED switch to the desired scale.

- Move the CHART DIRECTION switch to NORMAL.

- Mark the depth measurement, identifying information and scales on the chart.

- Release the brake.

- Commence winding the tool up the hole. The cable speed is not critical. A speed of about 10 m per minute has commonly been used. However, as mentioned previously, in boreholes where noise is particularly bad (at this time it is not known if the instrument is partially or wholly at fault) and the trace is partially obscured by spikes, slowing the tool right down has been found to diminish the noise.

- Continue to wind to the top of the hole. Again the chart pens will go offscale when the cable armour leaves the mud or water. Mark zero depth and any other pertinent information on the chart.

- Switch off the T201 recorder and remove the tool from the borehole.

- After cleaning around the joints, disconnect the tool from the bridle and the bridle from the cablehead in that order, making sure that the "O" rings and threads are cleaned of any dirt or water and that protective caps are replaced. Separate the two halves of the tool, clean threads and "O" rings and replace protective caps. Remove the mudpit electrode from the mudpit if in use.

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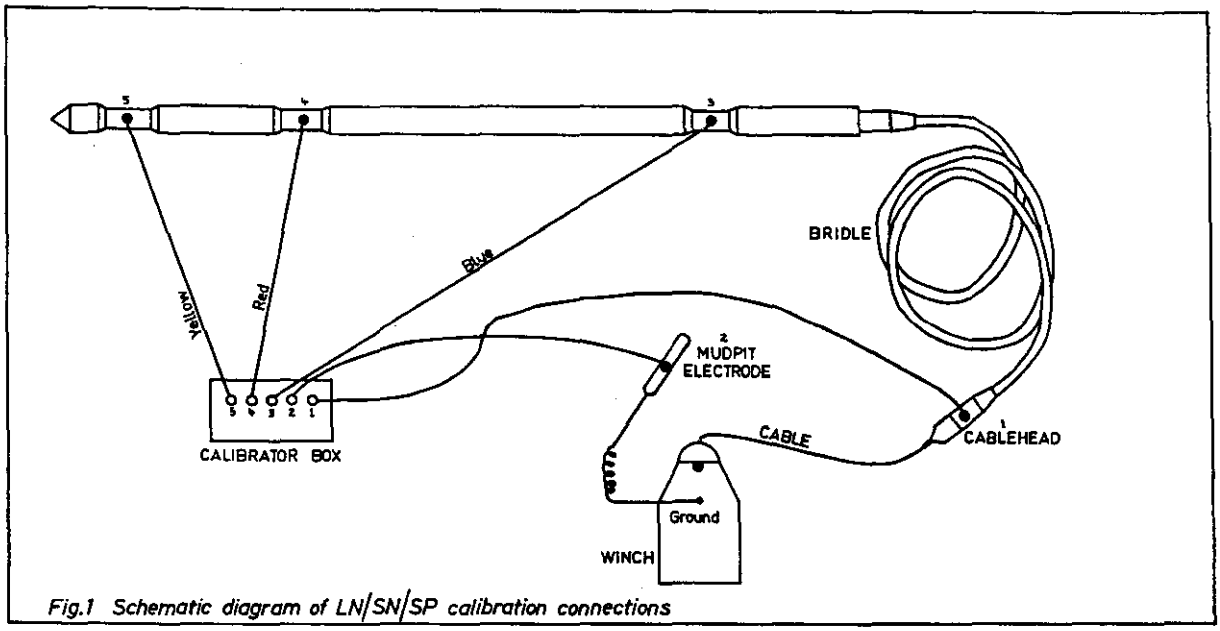


*Fig.1 Schematic diagram of LN/SN/SP calibration connections*