

A note on a trawl-mounted thermograph

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In studies of the relationship between the distribution of demersal fish and the distribution of temperature it is usual to take the temperature at the sea-bed at the beginning and/or end of each trawl haul. This procedure does not necessarily give a true picture of the temperature conditions at the sea-bed throughout a haul, particularly in an area where steep temperature gradients or meandering fronts exist: to get a true picture a continuous record is required. This requirement has become more pressing as it is now possible to obtain the detailed distribution of fish along the line of a trawl haul by using sonar techniques, particularly such as those described by Richardson *et al* (1959) and Mitson and Wood (1961). To meet this need we have developed a trawl-mounted thermograph from the 'Minican' Temperature Recorder made by the Cambridge Instrument Co. Ltd., London.

The 'Minican' Temperature Recorder (Figure 1) consists of a chart (40 mm wide) mounted on a drum, which is operated by a built-in mechanical clock and which revolves at a constant rate, permitting a pen to trace a temperature record for 24 hours (2 hour and 12 hour models can also be obtained). The pen is moved by the expansion or contraction of a liquid in a stainless steel bulb, 13.5 cm long, 1.35 cm diameter, attached to the housing which holds the drum and the recording pen. A chromium-plated brass cylinder protects the recording mechanism and the action of fitting it automatically presses the pen on to the pressure-sensitive record chart. The instrument has an overall length of 23.0 cm, a diameter of 7.3 cm, and a weight of 1.01 kg. Its temperature range is -5 to $+20^{\circ}\text{C}$ and the temperature can be obtained with an accuracy of $\pm 0.1^{\circ}\text{C}$.

The 'Minican' Temperature Recorder as supplied by the manufacturers is not suitable for operation at the maximum depths normally fished. Moreover, it is not robust enough to stand up to the rough treatment given to a trawl. We have therefore given it a casing made of Dural-H (B.S.S.1476-HE 30) designed so as to withstand pressures equivalent to those at 800 m depth and yet ensure a rapid thermal response and easy access to the record. It consists essentially of a bulb attached to a cylinder, one end of which unscrews and has an O-ring to provide a watertight seal. The instrument in its latest form is shown in Figure 2. Its overall length is 29.3 cm, with the diameter 12.8 cm and weight 4.5 kg with the temperature recorder housed.

The thermograph is mounted on the trawl at a joint about 1 m behind the head-rope. Trials aboard R. V. ERNEST HOLT on the Faroe Bank in 70-90 fathoms

in June 1962 were satisfactory apart from damage to the watertight case at the screw thread by a blow of unknown origin. A fender of plastic foam will be used in future to prevent damage by knocks. The bottom temperatures obtained agreed closely with those obtained with reversing thermometers and the record was clear and not subject to any vibrations. The instrument proved itself to be reliable and easily handled: it in no way interfered with fishing operations.

We have often been asked by British fishermen for a simple instrument which will take the temperature at the sea-bed. Reversing thermometers and electrical resistance thermometers are not popular with them as they require the provision of special winches and wires or electric cables. Moreover, to make a lowering with these instruments in 150-200 fathoms depth may take 20-30 minutes and the fishermen cannot spare this time. The trawl-mounted thermograph may solve this problem. We have therefore made a new type of casing, that shown in Figure 2, with a window which will allow the temperature record to be read as required without unscrewing the end of the cylinder. Trials with this case will take place aboard R. V. ERNEST HOLT at East Greenland in October 1962.

Summary: A simple instrument which will give a continuous record of temperature at the sea-bed during a series of trawl hauls is described.

- References: Richardson, I. D. et al, 1959. Fish. Invest. Lond., Ser. 2, 22 (9).
Mitson, R. B. and Wood, R. J., 1961. J. Cons. int. Explor. Mer., 26, 281-91.

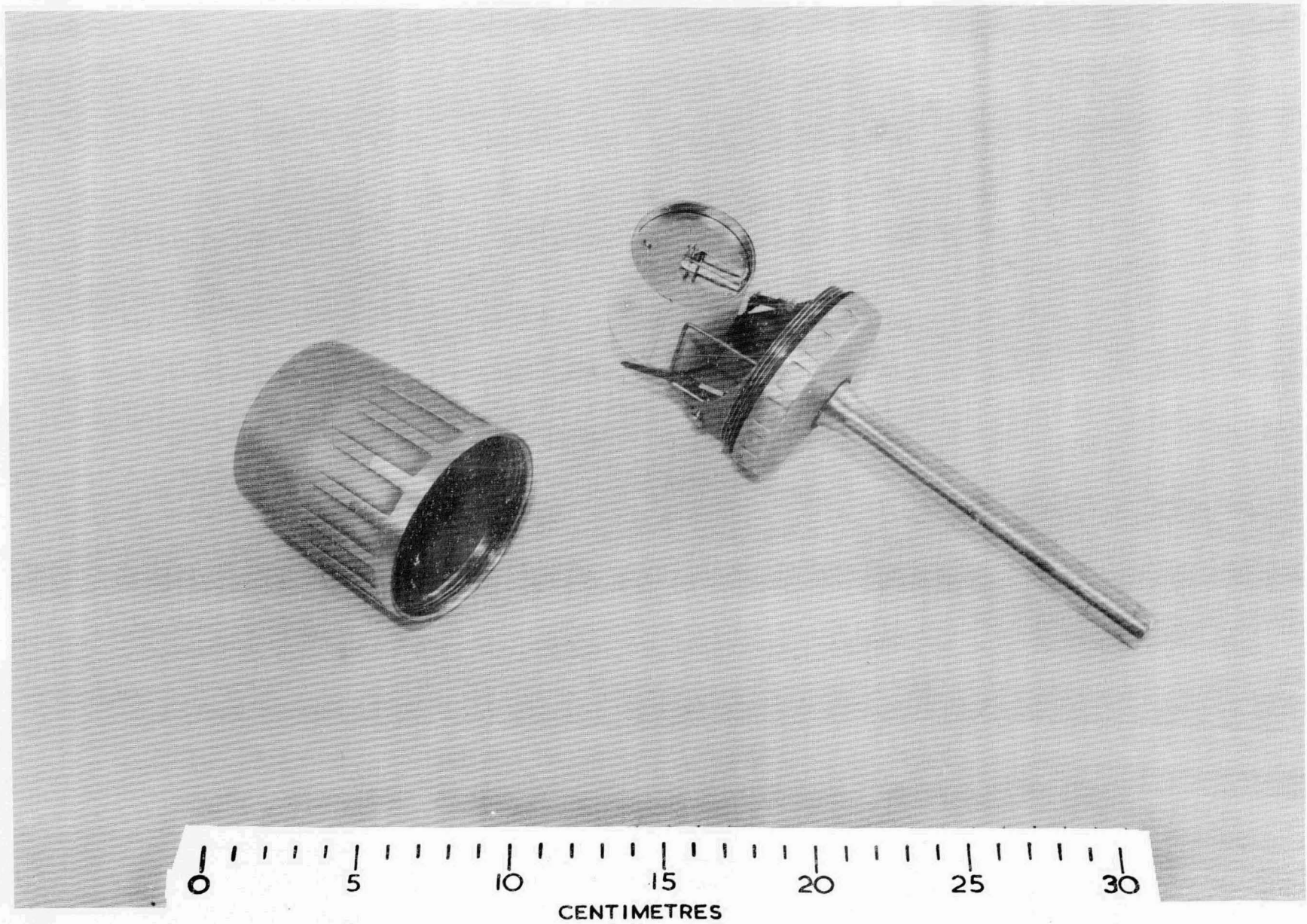


Figure 1. The 'Minican' Temperature Recorder.

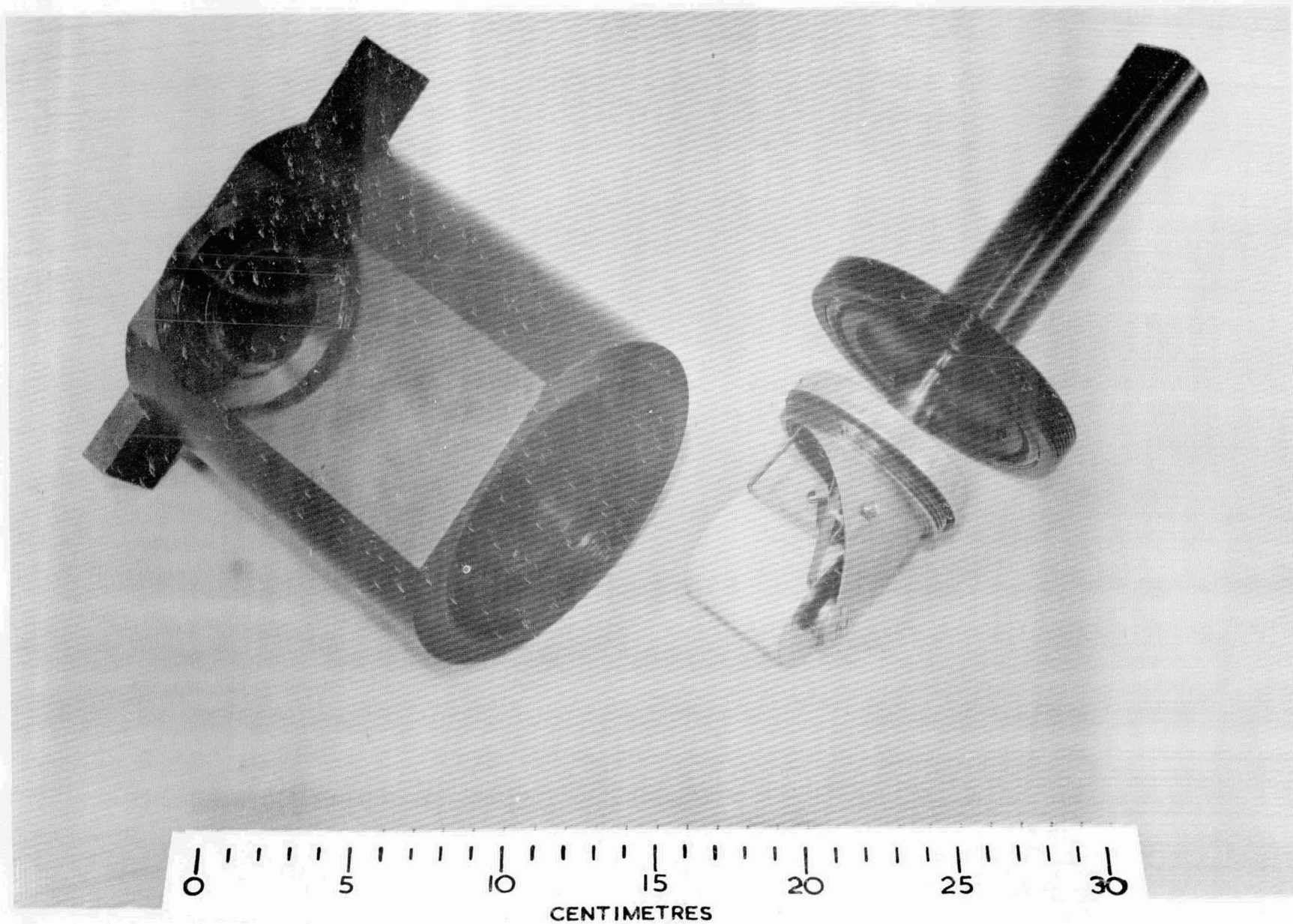


Figure 2. The Protective Casing with 'Minican' Temperature Recorder fitted.