buoy with one setting of the protractor. The device is merely the center piece with celluloid bottom containing the cross lines and center hole; a second hole was drilled at a distance from the center corresponding to the length of towline (in this particular case it was 50 meters); on the upper part of the center piece a pointer was mounted in line with the two holes and reaching to the graduated limb of the protractor. In plotting, the fix gives the position of the boat (center hole), then the buoy angles are set with the pointer and spotted through the offset hole, the near buoy being plotted direct and a short direction obtained to far buoy. (This latter direction used as a check only as dual control was used).

Different lengths of towline or sheets of different scale would, of course, require different center pieces which could be made up easily.

A GRAPHICAL METHOD FOR CALCULATING THE CORRECTIONS ON DEEP-SEA REVERSING THERMOMETERS.

by

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The *Journal du Conseil Permanent International pour l'Exploration de la Mer,* Vol. XII, N° 1, Copenhagen, April, 1937, publishes under the above title an article stating that the calculation of the corrections on deep-sea reversing thermometers may be considerably shortened by the use of nomographs.

The nomograph peculiar to each thermometer furnishes thus straight off the correction to be applied to the reading on the deep-sea thermometer to obtain the temperature *in situ.*

THE MEASUREMENT OF SHORT DISTANCES BY RANGE-FINDER

by

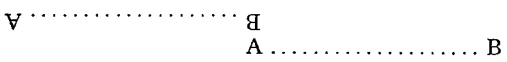
P. A. CLAYTON

(Reprint from *Geographical Journal,* Vol. XC N° 3, London, September 1937, page 265, by kind permission of the *Royal Geographical Society*).

Most range-finders of the patterns available to surveyors do not read shorter distances than 250 metres, or 250 yards when the instrument is graduated in yards. The following enables distances below these limits to be determined with about the same accuracy as by a tacheometer, and has been devised and used by the Desert Surveys in Egypt.

Two similar marks, big enough to be seen clearly through the range-finder at the required distance, are made on any convenient rod or stick at exactly 60 cms. apart for the 80-cms. base instruments, and at 75 cms. apart for those with the 1-metre base. In Egypt two white-painted rings, each 1 cm. wide, on the stick of the surveying umbrella, have proved very suitable. Where there is no such stick among the equipment, two white marks on a portion of a measuring tape would do. This marked stick or tape is held horizontally at the point whose distance is required, the stick being at right angles to the line of sight from the instrument.

Observing these marks through the range-finder, the images are moved by the "working head" as in taking a range, but until the image of the left-hand mark coincides with that of the right-hand mark. The marks will then appear thus (in the Barr and Stroud range-finders) :



and the reading of the range scale divided by 4 gives the distance from the instrument to the marks.

Using marks as above, distances down to 62.5 metres (or yards as the case may be) can be measured, which covers all normal requirements, but the same principle can be used for marks spaced at any distance apart less than the range-finder base. In general, for an 80-cms. base range-finder,

$$L = \text{scale reading} \times (1 - AB/80),$$

and for 1-metre base instrument

$$L = \text{scale reading} \times (1 - AB/100),$$

or for any size of range-finder

$$L = \text{scale reading} \times \left(1 - \frac{AB}{\text{Base of instrument in centimetres}}\right),$$

where L is the required distance in the units in which the range scale is graduated, and AB is the distance apart of the marks in centimetres.

A test was made with a 1-metre Barr and Stroud under working conditions in Egypt. The errors up to 120 metres distance were under 0.5 m., up to 200 m. less than 1 m. and up to 260 m. did not exceed 1.25 m.