

MODIFICATIONS TO THE WILD THEODOLITES

(Extract from an article published in *The Geographical Journal*,
Vol. LXXXVIII, N° 5, London, November 1936, page 475).

There have been references during the past few years in many publications to some bold alterations to the axes of Wild theodolites made by J.L. RANNIE and W.M. DENNIS, two officials of the Geodetic Survey of Canada. They have recently published in the *Canadian Journal of Research* (Sec. A, vol. 14, May 1936), a paper entitled "Axis strain in theodolites, its effects and one method of removal". The fact of axis strain itself had been observed and a cure worked out before the methods of testing and separating errors described in the paper had been developed. The design and machining had become too refined for the material of which the axes were made, so that "minute deviations from cylindrical form existed in the steel cylindrical alidade and telescope bearing of a number of Wild Precision Theodolites, owing probably to slight dimensional changes in the metal during the years following manufacture. These imperfections of form produced changing strain in the steel axes as they revolved, and, through transfer of the strain through the instrument, caused changing deflection of the line of collimation which occasioned, in the measured values of angles, errors as large as two to four seconds of arc".

The alterations in design were in the direction of what is called a kinematic bearing, in which the restraining surfaces are never extensive, as they are in an ordinary journal bearing. The conventional V-bearing for the telescope trunnions, for example, has the necessary surfaces to restrict the motion of an axis; the surfaces of contact are small and do not require precise machining; they form a true kinematic bearing. The modifications made with the alidade axis of the Wild Universal Theodolite were to cut away metal until the bearing surfaces were reduced to 3 mm. in width. The tests show the results of the alterations to have been extremely successful.

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Manufactured by COOKE, TROUGHTON & SIMMS Ltd.
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(Extracted from a descriptive pamphlet issued by the Makers).

GENERAL CONSIDERATIONS: The accuracy with which level sights can be taken depends primarily upon the magnification of the telescope and the smallness of the vertical angle which the spirit level will register.

There is no constructional difficulty in producing and mounting a spirit level to correspond with a telescope of the largest practicable size. The limiting factor, therefore, is the ability of the telescope to reveal detail.

In the present instrument the designers have aimed at producing an instrument of the smallest possible dimensions which will allow an ample margin over and above the accuracy required for all ordinary levelling operations. In this they have been greatly helped by the introduction of certain new types of optical glass which will allow the aperture of the object glass — which is the factor which controls the power of resolution — to remain the same as that formerly employed in a 14 in. level and yet the length of the telescope is reduced to little more than half.