A METHOD FOR TESTING RANGEFINDER COLLIMATOR IN RESPECT OF PARALLELISM OF BEAMS IN THE DIRECTIONS OF COINCIDENCE AND HALVING

by

K. P. Datta and R. C. P. Sinha

Instruments Research & Development Establishment, Dehra Dun

ABSTRACT

A method has been described for testing simultaneously the parallelism of the two beams of a Rangefinder Collimator in the directions of coincidence and halving.

Introduction

A Rangefinder Collimator consists of two Collimators placed in parallel and separated by a distance equal to the base length of the Rangefinder. The two collimated beams emerging from the two Collimators are required to be parallel to each other both in the directions of coincidence and halving. The parallelism of the two beams in the direction of coincidence can easily be tested by a pentag prism and a telescope focussed for infinity. This is done by first placing the pentag in front of one collimator and adjusting the telescope so that it receives the beam emerging from the pentag and its cross-wire is in coincidence with the image of the cross-wire of the Collimator. The pentag is then placed in front of the other Collimator, the beam emerging from it being again incident on the telescope. The image of the cross-wire of the second Collimator will then be seen in coincidence with telescope cross-wire if the two beams of the Collimators are parallel in the direction of coincidence. But this method does not check the parallelism of the beams in the direction of halving. The reason is that while the deviation of the beam by the pentag in the direction of coincidence is not affected by any small variation of the relative position of the pentag with respect to the incident beam, it is not so with regard to the deviation of the beam by the pentag in the direction of halving. In order that the parallelism in the direction of halving can also be checked, it is necessary to ensure that the pentag attains the same relative position with respect to the beam emerging from the second Collimator as it had with respect to the beam emerging from the first Collimator. Though, this can be ensured by a sensitive bubble, the accuracy obtained is less than that obtained by an optical method.

Experimental Details

An optical method has since been evolved by the authors to test the parallelism of the two beams both in the direction of halving as well as in coincidence simultaneously, and is described below:

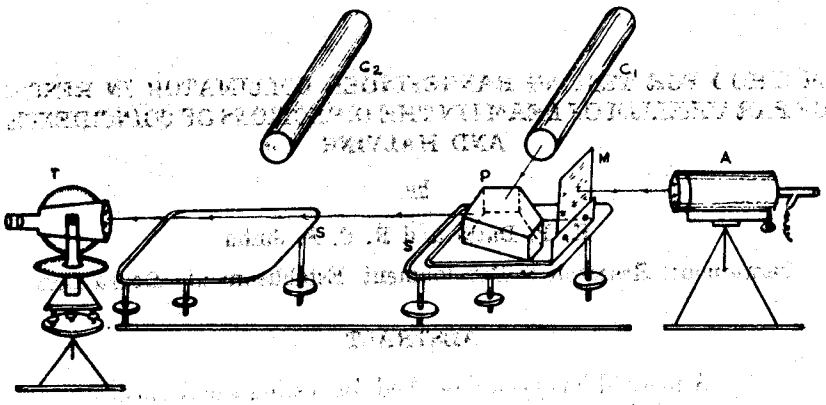

FIG 1—Experimental arrangement.

C_1 & C_2 are two Collimators the beams of which are to be tested for parallelism. A pentag P and a good quality plane mirror M are mounted rigidly on a plate. The mirror M is so mounted that its reflecting face is more or less vertical. The plate with the pentag and mirror, is put on a tripod S, having three levelling screws, in such a way that the pentag faces the objective of the Collimator C_1. An autocollimator A is directed towards the mirror M and its position is adjusted for coincidence of the direct and reflected images of the graticule as seen through its eyepiece. A theodolite T is then set to receive the beam from the Collimator C_1, deviated by the pentag P. The theodolite is then adjusted so that its cross-wire is in coincidence with the cross-wire of the Collimator C_1.

The plate carrying the pentag and mirror is then put over another tripod placed in front of the Collimator C_2 with the pentag facing the Collimator objective. The position of the plate and the level of the tripod are then adjusted until the auto-collimator is again seen in adjustment. On looking through the theodolite, the image of the Collimator cross-wire should be seen in coincidence with the cross-wire of the theodolite. The degree of misalignment in coincidence and halving, if any, can be obtained from the theodolite readings. The use of auto-collimator, in this method, ensures that the relative position of the pentag with respect to each of the collimated beam remains the same. Thus any misalignment observed can only be due to non-parallelism of the two beams. An additional advantage of this method is that it provides a reference mark for adjusting the Collimators should any misalignment be observed.

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