

MOLTCHANOFF RECORDING THEODOLITE FOR ATMOSPHERIC SOUNDINGS

The Askania-Werke A. G., 87-88 Kaiserallee, Berlin-Friedenau, has constructed a certain number of theodolites intended for the observation of pilot balloons for atmospheric soundings.

Of the various types, a description is given here of the MOLTCHANOFF Recording Theodolite, which is the most perfected.

The recording device consists of four registering drums, coupled in pairs. Each pair of drums is directly connected one with the motion in azimuth of the instrument and the other with the secondary axis of rotation in altitude of the prism telescope. The second drum of each pair is connected with the first by means of gear giving a tenfold motion. A separate record of the units and tenths is thus obtained. The records are made by means of a practically unwearable silver stilus and either ordinary paper or paraffined paper ensuring the necessary fineness of line for accurate reading may be used. The recording stiluses are fixed. They are simply lifted a certain distance after each reading by means of a hand worked key: thus the records are made at intervals. The divisions of the circle can readily be referred at any given moment to a standard position of the instrument without any ambiguity and the absolute value read off the circle may be inscribed on the graph against certain vertical lines which are drawn longer than the others. The drums are interchangeable and they are firmly secured on their shafts by means of pressure springs. The recording paper is gummed on one of its edges and can be stuck on the drum. It is detached by running a small sharp knife along the groove of the drum. The drum is $120 \frac{m}{m}$ in circumference, so that $1 \frac{m}{m}$ corresponds to an angular difference of 3° on the drum directly connected with the instrument; it corresponds, therefore, to 0.3° on the drum which turns 10 times as quickly.

Trials made at the Geophysical Institute of the University of Leipzig give a working accuracy of 2' for the diagrams. The accuracy of visual observation is 1'. The instrument gives the angular values of the differences between successive inscriptions by direct measurement on the record, the difference between a given inscription and the inscription corresponding to the fundamental value for which the reading has been inserted. In practice the two values provided by the unit drum and the tenths drum do not agree exactly, but from the position of the unit drum the whole degree can always be determined, and from the position of the tenths drum the exact values may be found.

The figure gives an external view of the recording theodolite; in the upper part the gear-case containing the four registering drums is seen. The diameter of the horizontal circle is $150 \frac{m}{m}$. It is divided into sixths of degrees and readings to one minute are made. The finder has a magnifying power of 3 and a field of 12° . The telescope has an aperture of $60 \frac{m}{m}$, a focal length of $300 \frac{m}{m}$, a magnifying power of 20 and a field of 3° . The instrument is fitted with a tubular level with 30" divisions. It weighs 12.5 kgs and stands on a tripod weighing 6.2 kgs. The dimensions of the instrument box are $30 \times 40 \times 42 \frac{cm}{m}$.

The following accessories are included:

a) A watch for taking observations, provided with a "stand by" signal and a "stop" signal by the ringing of a bell. The "stop" signal operates every minute; the "stand by" signal (warning for the "stop" signal) sounds 5 seconds earlier. Total period of operation: 1 hour.

b) An observation watch similar to the above, but with "stop" signals every 15 seconds during the first minute; from the first to the third minute every thirty seconds, and then continuously every 60 seconds, together with "stand by" signals as before. Total period: 1 hour.

The telescope is fitted with electric illumination of the cross-wires and divisions of the circle, for night observations.

There is also a set of coloured eye-piece shades, including a yellow glass and a violet glass, for the telescope and the finder. They are fitted on the eyepiece.

A compass $55 \frac{m}{m}$ in diameter is also provided.

