



PORTABLE CHRONOGRAPH

By the CAMBRIDGE INSTRUMENT COMPANY Limited

45, Grosvenor Place, London, S. W. I.

The Portable Chronograph illustrated in Fig. 1 is designed to give records of time intervals readable to an accuracy of 0.002 second. It is particularly suitable for use where extreme accuracy combined with robustness and portability is required, and has been employed in connection with the International Longitude Project by the Survey of India under the Geodetic Branch of the India Office. The instrument utilises a novel method of recording, which does not depend upon optical or photographic methods, and yet is capable of great accuracy. The records are obtained by the action of a moving stylus upon transparent celluloid film. The pressure of the stylus is extremely light and the celluloid flows plastically under the rounded point of the stylus, the line produced having such optical characteristics as to render any point on an enlarged image of the diagram readable to a high order of accuracy. Periodic phenomena of relatively high frequency are recorded accurately and practically undisturbed by instrumental inertia effects. In the instrument, a strip of transparent celluloid is caused to move under three styles operated by electro-magnets. One of the styles is connected to the signals to be recorded, while the other two styles may be connected to suitable time-marking mechanisms. One style operates on the back of the film, and the others operate side by side on the front, the three records being brought so close together as to render them simultaneously visible in the field of view of a microscope. (see Fig. 2).

The celluloid film is driven at a constant speed of 4 millimetres per second by clockwork mechanism, which is capable of running continuously for 30 minutes with a single winding. The film is 11.5 millimetres wide and about 460 centimetres long; spare films are carried in a drawer fitted in the case. The complete mechanism is enclosed within a compact case, fitted with a lid which gives access to the mechanism for renewing the film and adjusting.

The records made by the instrument are of small dimensions, and are permanent. They can be examined at once by means of a microscope, or direct enlargements can be obtained by photographic methods, by a camera lucida, or by projection upon a screen. A light and portable microscope has been designed for use with the instrument, having an eyepiece with a flat field of about 6.5 millimetres diameter and fitted with parallel movable reading lines which facilitate measurements of the records. A photographic enlargement ($30\times$) of a typical record is reproduced in Fig. 2. The central line shows the signal from the phenomena investigated, while the other lines show time intervals of fiftieths and tenths of a second respectively.
