A MEASURING DEVICE FOR PERSONAL EQUATION

Fusakichi Ono

Abstract

A measuring device for personal equation is designed by applying a principle that terminal voltage of a condenser of C-R integrated circuit is proportional to duration of charging time. By making a time-scale on a moving-coil-type meter small time interval, e.g. personal equation, can be directly measured.

Value of personal equation for visual observation of astronomical phenomena is generally treated to be constant or nearly constant at least for a single observer. However, time lag of human reaction to recognize an optical phenomenon is, in practice, affected by brightness and clearness of light source, psychological and physical conditions of observer, and other surrounding conditions, variously. Therefore, it is necessary to measure this time lag immediately before and after each observation for the observer. Recently, the author designed a measuring device for this purpose, and its principle is explained in the following.

Fig. 1 is circuit diagram of this apparatus. In the figure, NL denotes a neon lamp, of which light intensity can be regulated by a resistance R_9. Light from the neon lamp, being switched by an assistant, reaches to the observing telescope through a pin hole P, situated in front of the neon lamp. RL denotes a relay, and rl_1 and rl_2 show contact points. V_1 is an electron tube of small grid current, and V_2 is a voltage regulator tube.

At the moment of switch-on or -off, the light is recognized by the observer, then key K is pushed by himself. Here, switching of the light can be made by a reversible switch S_1.

When switch BS is pushed by the assistant, the light of the neon lamp is put on, and condenser C_1 begins to be charged by RL, rl_1 and rl_2. This charging is stopped by the key K pushed by the observer recognizing the appearance or disappearance of the light. The cathode voltage of tube V_1 at this moment is shown on meter M. Since leak current of C_1 and grid current of V_1 can be assumed to be sufficiently small, the indication on the meter M is almost unchangeable during the time interval required to read the meter by the assistant.

If scale of the meter is calibrated for lapsed time and graduated in time interval previously, value of the time lag can be read straightly from the meter. It is preferable to graduate R_4 for regulating zero-point and R_9 in brightness scale. At the switch S, m-contact is used for put-on and b-contact for put-off of the light,

Provided that parts of the circuit are adequately designed, accuracy of measurement by this apparatus is estaimated to be within 2 %.

(Astronomical Section)

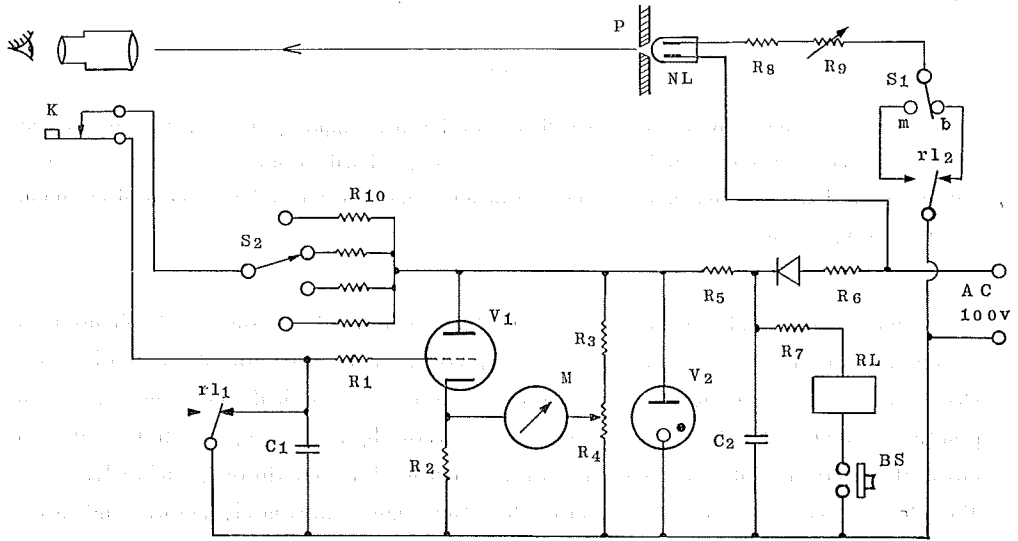Fig. 1. Circuit diagram