# A PHOTOMETER

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ABSTRACT. One–channel photometer is presented on the basis of a personal–professional computer designed for receiving information in 6 filters. It has control of a photoelectron tract by means of a radio–luminescence source. Information is brought out to the display and a file. The photoreceiver is cooled and thermostated. The maximum cooling amounts to 230K with ±0.5–precision of maintenance. The time of information accumulation ranges from 10 ms to 10 s with the discreteness of 10 ms.

**Key words:** Instrumentation: Photometer, Photoreceiver, Filter

Observations of stars constantly require still more precise data while investigation demand still fainter objects. These conditions imply the use of modified apparatus or the manufacturing of new ones, the application of modern photoreceivers, another procedure of carrying out observations and their processing.

At Odessa astronomical observatory, works are permanently carried out on the modernization of old apparatus and the producing of new ones (Pereversentsev et al. 1989, 1990), on the improvement of methods of observations and their processing.

In the given work, a one–channel photometer is presented which has been created at the Observatory. Its basis is a personal–professional computer intended for automation of a wide score of problems and IBM–compatible on parameters.

The photometer incorporates an optical–mechanical unit, a photoreceiver unit with thermostating, an amplifier–discriminator, a counter, a timer, and a matching circuit.

The optical–mechanical unit represents a cylinder inside of which a toothed disk is fixed with eighth holes in it. In rotating the disk the center of each hole crosses the optical axis of the photometer. The stepping motor gives a possibility of setting any hole with a filter fixed at the optical axis. An input radiation flux passes through the filter and gets to the jumping diaphragm and farther on to the Fabry lens and the photoreceiver. In one of the disk holes, a radio–luminescence radiation source is secured which is used for the control of an optical and electronic tract.

The transformed optical signal in the form of electronic signal pulses runs to the amplifier–discriminator [Pereversentsev A.F. at al. 1988] with a passband up to 100MHz and a gain of 1000.

The amplified and shaped signal in the standard emmiter–coupled logic (ECL) through a coaxial cable 15m long is applied to an eight digit counter. A less significant digit of the counter is executed at the fast–acting ECL, whereas the rest are executed at the transistor–transistor logic (TTL).

Information from the pulse counter is carried into the computer memory, displayed and recorded on a floppy disk 5.25" in diameter.

One of important problems is that of cooling photoreceivers aimed at decreasing thermo–electronic noises. We have developed and manufactured a number of thermo–electric cooling devices which have been used and are being used at different observatories [Kirpatch et al. 1988, 1989; Filin et al. 1990]. In our photometer, the system of thermo–cooling and thermostating [STOE] is applied which has been described in work [Shwets et al. 1990]. Tem-

perature difference between hat and cold seals of the thermoelectrorefrigerator under load amounts to 70K whereas the depth of cooling depending on the type of a photoreceiver reaches 230K. The thermostating is kept with precision of $\mp 0.5$K.

The control of processes of setting a necessary filter, time storage jobs, diaphragm input/output and information recording are performed with the computer program. The photometer work represents a series of subsequent operations, and this circumstance is used for the coincidence of timer functions and the control of a step–by–step motor. The coincidence circuit upon which the work of a timer and a step–by–step motor are based is used for both time storage jobs and for the job of step numbers. The time storage can vary from 10 ms to 10s with 1ms discreteness, more over, due to inner switches one can change the storage from 1ms to 1000 and more seconds.

The information processing can be carried out both at the site of the observation station and in the center.

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