the earth's magnetic field affects the sensitivity of the 1P21 photomultiplier tube. One photometer, made entirely of brass, is mounted on the iron tube and iron mounting of the 10-inch Cooke triplet lens, while the other photometer is of aluminum, and is used on the aluminum tube and aluminum polar axis of the 36-inch reflector.

Three series of observations, each determining the orientation corrections to be applied to readings in order to obtain the corresponding readings at $+90^\circ$ declination and 0^h hour angle, were made. In the first series, a diffusing screen and battery-powered lamp illuminated uniformly the whole of the 10-inch lens, and the field lens in the photometer formed a 6 mm image of the lens on the photomultiplier cathode. The second series used an artificial star placed in front of the 10-inch objective, and a lens of 25 mm diameter and 95 mm focal length, mounted just in front of the photometer, to form a star-like image in the diaphragm of the photometer. In the third series the artificial star was placed near the center of the 36-inch mirror, and the lens of 95 mm focal length was used to form a star-like image in the diaphragm of the refrigerated aluminum photometer.

Results of the tests, covering the observable region of the sky above 15° altitude, show the brass photometer on the 10-inch mounting to be very insensitive to orientation error. The average numerical correction required to reduce readings to corresponding readings at declination $+90^\circ$ and 0^h hour angle is only .004 mag., and the largest single correction is $-.008$ mag. at 5 hours west and declination $+45^\circ$. The 10-inch Fecker mounting is very rugged, and flexure effects may be considered very small. Here, the long axis of the phototube is perpendicular to the line of sight.

For the 36-inch, a preliminary series of measures indicated large corrections, but these were traced to flexure in the double-slide mechanism and in the Newtonian flat support system. When as much of the flexure as practicable was removed, a new series of measures was made, and the average numerical correction for orientation error was .023 mag. The three largest corrections, $-.104$, $-.061$, and $-.051$ mag., occur low in the east and west, where flexure has its maximum effect. Omitting these values the average correction is reduced to .013 mag. and the largest single correction is $-.028$ mag. at 12^h , $+60^\circ$. Here the long axis of the phototube is parallel to the line of sight.

It is concluded that in these photometers, orientation effects are small, and, in the case of the 36 inch, predominantly due to flexure.

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Dennison, Edwin W. and Albert Boggess, III. Modification of the Michigan direct-intensity microphotometer.

The University of Michigan photometer as described¹ has been modified by changing the pre-plate optical system to a single light source, making it possible to change the shape of the slits. A photomultiplier has been added and the entire electrical and mechanical system changed to give substantially increased sensitivity. Other changes have been made to increase the accuracy and ease of operation.

The photometer has been found to be extremely satisfactory for drawing isophotes of extra-galactic nebulae, and solar flares.

1. *Pub. Obs. Univ. Michigan* 8, 45, 1940.

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Dodson, Helen W., E. Ruth Hedeman and Leif Owren.* Solar flares and associated 1.5 meter radiation.

The McMath-Hulbert Observatory of the University of Michigan and the School of Electrical Engineering of Cornell University have for the last year and three-quarters conducted a cooperative program in which the goal has been the detailed comparison, hour by hour, of the solar radio radiations at 1.5 meters with solar activity observed photographically and visually. Different solar phenomena apparently influence the 1.5 meter records, but it is for solar flares that the relationships are most clear cut.

This study is based principally on those flares for which complete photographic records are available at the McMath-Hulbert Observatory, but it has been extended to include data reported by the International Astronomical Union and the Central Radio Propagation Laboratory of the National Bureau of Standards. Between the start of the Cornell Radio records on July 18, 1948 and December 31, 1950, there are 141 flares for which the optical and radio data permit definitive comparison.

It should be emphasized that a solar flare is a

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