

ROYAL ASTRONOMICAL SOCIETY OF NEW ZEALAND.

VARIABLE STAR SECTION.

CIRCULAR No. 148.

SEQUENCE DETERMINATION.

Frank M. Bateson & B. Menzies.

SUMMARY: Publication has commenced in these Circulars of the results of a sequence programme carried out at the Auckland Observatory. The present Circular details the procedures adopted in this programme, the aim of which is to provide reliable V magnitudes in southern variable star fields for the use of visual observers.

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EQUIPMENT: The equipment used in this programme comprises the 50cm Zeiss Cassegrain reflector (f 13.3) of the Auckland Observatory, and the attached photometric apparatus. This latter has an E.M.I. 9502 tube, with standard visual filter and a digital readout display. The aperture for readings is 31 secs. diameter.

AIMS:-

The main objective of the Auckland Observatory's sequence programme is to establish reliable sequences of comparison stars in the fields of southern variable stars. Such sequences are required for use by visual observers and to enable their results to be published.

In particular it is planned to establish for each chart published by Bateson, Jones and Stranson (1) a sequence for those fields in which reliable magnitudes have not yet been established from some other source.

Secondary aims are to determine sequences for such other fields as are specially requested, and to follow variables at fainter limits, when they are generally invisible in the average instrument available to members of the Section. Thus special attention is paid to variables when they are fainter than magnitude 13.0 V.

CALIBRATION:

To calibrate the system extensive use was made of the data published by Stoy (2) (3), (4), (5); Cousins (6) and B.J. and P.F. Bok (7).

The differences between the readings at Auckland, after calibration, and the standard stars selected from the lists mentioned above were of the order of ± 0.01 to ± 0.03 magnitude in V. Since the main aim of this programme is to provide sequences of comparison stars to an accuracy of 0.1 V, after several determinations, no attempt has been made to apply small corrections.

OBSERVATIONAL PROCEDURE:

If possible all fields are observed at culmination. When this has not been possible observations have only been made within 30° Z.D.

Intensity readings are taken in sets of six and reduced to nett values for stars in the usual way. Sky readings are taken, on the average night, about eight times per hour, dependent on conditions. Readings on the standard star in each field are taken at both the beginning and at the end of each run, and interpolated for each comparison star. For stars fainter than 13.5 V several sets are taken.

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Whenever possible details of a standard star in each field to be used as the zero point for the sequence has been supplied by Bateson. Such stars have been selected from well determined lists of photoelectric magnitudes.

REDUCTION PROCEDURE:-

Each set of six intensity readings is totalled, not averaged. In the case of faint stars, for which more than one set of intensity readings have been taken, an average set-total is calculated. Normal reduction procedure is carried out, either by one assistant using two different methods, or by two assistants independently using the same method.

MAGNITUDES:

The minimum requirement for selection of a star as a suitable comparison star is that there have been at least three determinations having a maximum scatter of 0.1 in V. This limit appears to be accurate enough for the aims of this programme.

The sequences thus established are then used to reduce the visual observations that have been made using stars already selected for comparison purposes and denoted on the Charts for Southern Variables (1) by letters. The final V magnitudes of comparison stars for each field appear in Circulars of the Section, e.g. Nos. 141 (U Cru); 144 (RY PsA); 145 (T Ret). Other results will appear in future issues of these Circulars.

ACKNOWLEDGEMENTS:

We are greatly indebted to the Auckland Observatory Trust Board for the use of their facilities in carrying out this programme. The senior author would like to express his appreciation of the most careful work of B. Menzies and his assistants in carrying out these observations.

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1970 March 21

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GREERTON,
TAURANGA.
NEW ZEALAND.