A SEARCH FOR LONG PERIOD VARIABLES IN THE SMC

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ABSTRACT. A search for long period variables in the Small Magellanic Cloud (SMC) was made using I plates from the U.K. Schmidt telescope. Variables were identified using a blink comparator built specially for this project and plates were digitised to determine periods and light curves for suspected variables. Over 300 new variables with periods in excess of 100 days were found, some variables having periods in excess of 1000 days.

1. Introduction

Various searches by other researchers have been made for long period variables in the SMC. The early searches such as those carried out at Harvard, found few LPVs, largely due to a mismatch of the colour of these stars with the blue plates used. The current project was initiated by Dr. L. Turtle when the first I plates became available from the U.K. Schmidt telescope. These red plates are not only a better match to the colours of these stars but are also less affected by nebulosity. The central 2° square region of the SMC was well searched by blinking many pairs of plates. The outer areas of the Schmidt plates were also searched but less completely.
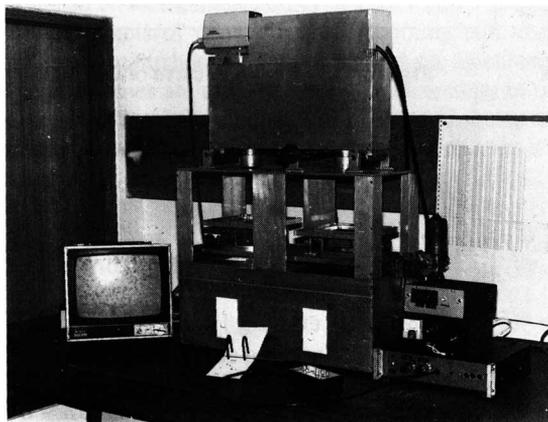
Figure 1. The Wollongong blink comparator

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2. Search techniques

The design of the Wollongong machine, shown in Fig. 1, is quite different from traditional comparators, which are not suited for crowded Schmidt plates. The display is on a video screen to avoid the physical stress of a fixed head position and the filed is limited to only 5 arcmin. Also on screen are the coordinates, allowing rapid comparison with finding charts. Photometry can also be performed on the screen as described by Moore and Ihnat (1984). Film copies mounted in glass are used to permit photographic background equalisation before blinking and to reduce the plates to the more manageable size of 120 mm^2. The comparator is driven at a variable rate in one coordinate direction during searching.

3. Results

Photometry, using the PDS at Mt. Stromlo Observatory, was carried out on suspected variables, found by blinking, and periods were determined using the phase dispersion minimisation techniques of Stellingwerf (1978). Of the variables found so far, over 300 have determined periods ranging up to 1000 days. The period distribution is shown in Fig. 2. The light curve of GM103, one of the longest period variables discovered, with a 1023 day period is shown in Fig. 3.
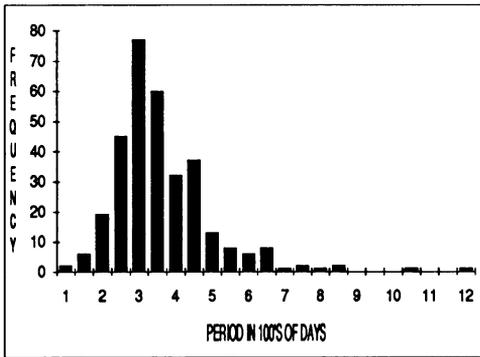


Figure 2. Period distribution of SMC LPVs
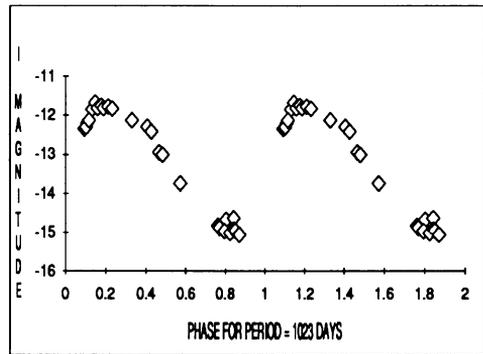
Figure 3. Light curve of GM 103.

4. References

Moore, G.K.G., Ihnat, P., (1984), *Pub. A.S.P.* **96**, 671.
Stellingwerf, R. (1978), *Ap. J.* **224**, 953.