

**PHOTOELECTRIC PHOTOMETRY OBSERVATIONS
IN V AND B OF SOME 15 NEARBY STARS: I**

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Abstract

Results of photoelectric observations in V and B light on the Johnson standard system are presented for 15 nearby stars ranging in spectral type from late F to early K along with determinations of their V and B magnitudes and B-V color indexes.

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1. Introduction

After the construction of the Tardis Observatory, a backyard amateur photoelectric observatory, in the fall of 1982, a project was sought that would be feasible for differential photometry done from a city location which may average 60 photometric nights per year. Some 80 stars were selected from the "Research Priorities for Nearby Stars: I and II" papers (Halliwell 1980). These stars are defined by Halliwell as those within 40 parsecs which are brighter than 10th magnitude without any previous photoelectric photometry and are in need of spectral type and/or parallax studies as of January 1980. The purpose of this paper is to determine if any of the 15 stars presented here are possibly new variables and to determine their V and B magnitudes and B-V color indexes.

2. Observations

Each observation on each star consisted of a minimum of three 10-second integrations on the star and on the sky. A diaphragm of 28 arc-seconds was employed on most nights and all stars were checked against the General Catalogue of Variable Stars (Kukarkin et al. 1969). None were referred to in this publication as either variable or suspected of variability. Therefore, the observations presented here are probably the first such photoelectric observations done on these stars. The observations were conducted on the 0.4 meter F/16 cassegrain equipped with an uncooled EMI Starlight-1 photon counting system. During the course of these observations, which spanned approximately one and one-half years starting in early 1983, several problems were uncovered with the photoelectric photometer system (Kaitting 1984; Kaitting and Welch 1984). One such problem, whose effect has not been taken into account in the observations presented here, is caused by instrumental drift. This drift in sensitivity of the photometer system over time is common to uncooled systems. It has been determined to be as much as 0.03 magnitude per hour on some nights at the Tardis Observatory. A typical observation is usually conducted in less than 20 minutes; however, not ruled out is the possibility of total errors (random and systematic) as large as 0.03 magnitude showing up on some nights despite the small Poisson errors that are calculated and reported herein.

3. Results

With the above factors in mind I have arbitrarily chosen to define "detected variability" as variability which exceeds 0.05 magnitude of the total change in magnitude found between a check and comparison star during the total time duration of the set of observations. None of the 15 stars presented here meet this criterion. I will further

define "microvariability" as variability which exceeds 0.02 magnitude of the total change in magnitude found between its check and comparison star during the total duration of the set of observations. Three stars meet this latter criterion. Keep in mind that these observations were the first such observations conducted by the author from a city location with bright background sky conditions (16.7 mag/arc-second²) under inferior skies as opposed to professional mountaintop sites. Further, the observations were sparse, spanning more than a year, and problems were discovered with the equipment. I state this not to belittle the quality of the data but to present the data in their true light. As of the writing of this paper the Tardis Observatory has been moved to a dark country site and means of handling the problems with the equipment have nearly been mastered. Again with the above in mind the author feels confident in stating that the following results show none of the 15 stars to be considered probable variable stars with variations exceeding 0.05 magnitude.

Values of V and B magnitudes and B-V color index along with their corresponding r.m.s. errors are presented in Table I. Many authors often quote the standard deviation of the mean instead of just the standard deviation. If I had followed this practice these error values would be substantially smaller. Typically for each observation the Poisson error was around the 0.005 magnitude range. Also presented in Table I are the stars' corresponding spectral types as given in Halliwell (1980), the number of observations on each star, and the time span of these observations in days.

On nights when the B-V of the star was measured, it was done so differentially and corrected to the Johnson standard system. A further check on these data was accomplished by taking the B-V values obtained on those same nights for the check star and comparing these values to their previously established B-V color index values.

Full data tables which include the heliocentric corrected Julian date of each observation, air mass, delta magnitudes of the star minus a comparison and a check star minus the comparison, Poisson errors of the observations, U.T., and L.S.T., along with figures that plot the delta magnitudes versus Heliocentric Julian date, may be obtained from the author for a modest fee to cover photocopying and postage expenses.

REFERENCES

- Halliwell, M. J. 1980, *Vistas in Astronomy* 24.
- Kaitting, M. K. 1984, *Int. Amateur-Prof. Photoelec. Photom. Comm.* 17.
- Kaitting, M. K., and Welch, D. L. 1984, *AAVSO Photoelec. Photom. Newsletter* 5, No. 2.
- Kukarkin, B. V. et al. 1969, *General Catalogue of Variable Stars*, 3rd Edition, Moscow.

TABLE I
Photoelectric Magnitudes (and RMS errors)

	Y	B	B-V	Spectrum	#Obs.	Days Spanned
HD 75332	6.21 (0.019)	6.72 (0.013)	0.51 (0.023)	F7V	10	45
HD 92786	8.13 (0.013)	8.83 (0.011)	0.70 (0.017)	G5	8	340
HD 99995	6.65 (0.01)	7.57 (0.005)	0.92 (0.011)	K0	7	394
HD 100360	7.83 (0.016)	8.49 (0.002)	0.66 (0.016)	K0	7	394
HD 108845	6.21 (0.012)	6.71 (0.014)	0.50 (0.018)	F6V	5	376
HD 108942	7.93 (0.018)	8.59 (0.03)	0.66 (0.034)	G5	8	376
HD 136923	7.15 (0.012)	7.90 (0.008)	0.75 (0.014)	K0	8	425
HD 156279	8.03 (0.008)	8.84 (0.005)	0.81 (0.009)	K0	11	347
HD 157102	8.0 (0.021)	8.80 (0.018)	0.80 (0.027)	K0	11	347
HD 163840	6.37 (0.011)	7.04 (0.011)	0.67 (0.015)	G0	13	114
HD 178330	7.40 (0.014)	8.44 (0.005)	1.04 (0.014)	K1	8	377
HD 179141	7.98 (0.019)	8.97 (0.013)	0.99 (0.023)	K0	5	267
HD 197369	8.25 (0.13)	9.13 (0.013)	0.88 (0.018)	K0	11	378
HD 216106	6.77 (0.004)	7.35 (0.009)	0.58 (0.009)	G0	7	315
HD 216275	7.23 (0.008)	7.82 (0.004)	0.59 (0.008)	G0	8	315