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A *uvby*, β PHOTOMETRIC SURVEY OF SOUTHERN HEMISPHERE ECLIPSING BINARY STARS

GEORGE W. WOLF[1] AND JANET T. KERN[1]
Department of Physics and Astronomy, Southwest Missouri State University
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ABSTRACT

A *uvby*, β photometric study of southern hemisphere eclipsing binary stars has been undertaken at Cerro Tololo Inter-American Observatory. The standardized colors and V magnitudes for 288 binaries at quadrature and/or at minimum are presented, along with an indication of the accuracy of the standardization and photometry. Discussions of the resolving time of the pulse-counting photometers and of the atmospheric extinction at CTIO are included.

Subject headings: photometry — stars: eclipsing binaries

I. INTRODUCTION

The availability of new and improved computer modeling techniques in the study of the nature and evolution of eclipsing binary stars has emphasized the need for accurate observational data on these systems. Among the most important information needed for detailed analyses are the temperature and luminosity of one, or preferably both, of the companions in a binary system under study. Two techniques available for determining these quantities are standardized photometry and spectroscopy.

Hilditch and Hill (1975) have published a *uvby* photometric survey and Hill *et al.* (1975) a spectrographic survey of eclipsing binaries observable from the northern hemisphere. The need for similar studies of southern hemisphere systems for which few data are available is particularly acute because of the great number of binaries discovered in recent, and not so recent, photographic surveys. Eggen (1978) has reported photometry on a number of early-type systems but has not done a general survey. The present authors have thus undertaken a similar, but modified, study to fill this need. This paper is a report of the photometric survey. The results of the spectrographic program and a comparative analysis of these and other temperature data will be published separately.

The present study utilizes the *uvby*, β photometric system, which is well calibrated for determining effective temperatures and luminosities, and includes specific phase coverage, usually at the minima and quadratures, for all binaries. This permits, in many cases, the determination of colors for the individual components in the binary systems, accurate depths of the minima for sparcely studied systems, and recent times of minimum.

[1]Visiting Astronomer, Cerro Tololo Inter-American Observatory, supported by the National Science Foundation under contract No. AST 78-27879.

II. THE OBSERVATIONS

All observations were made during three extensive runs at Cerro Tololo Inter-American Observatory between 1979 December and 1980 August. The *uvby*, β filter set No. 6 with the single-channel pulse-counting photometer on the Lowell 0.6 m and the No. 1 0.4 m telescopes were used throughout the study. All data were obtained on printed paper tape but were later punched onto cards to facilitate computer analysis of the information. Of the 58 nights scheduled, 45 were sufficiently photometric during all or part of the night to obtain useful, reliable measurements with the technique of all-sky photometry.

Prior to each observing run ephemerides for the duration of the run were calculated for photometric phases 0.00, 0.25, 0.50, and 0.75 for all stars on the program using the best available times of minimum and periods from the Eclipsing Binary Card Catalog of the University of Florida or from recent IBVS circulars. For a few stars with known elliptical orbits ephemerides at other appropriate phases were determined. Results were automatically edited to remove all occurrences during daylight and at an air mass greater than 2.0. The remaining events were then combined, sorted by date and time, and arranged into nightly observing lists. As a result of this program design, some stars were easily observed at all four phases, some at only one, two, or three phases, and some not at all. In certain cases, when it was obvious that a star was going to be missed because of the nonoccurrence of the chosen phases during the nights of observation, that star was observed at an arbitrary, convenient time.

On each night observations of the particular phases of the binary stars were interspersed with observations of standard stars selected from the lists of Gronbech, Olsen, and Strömgren (1976), Crawford and Barnes (1970), Gronbech and Olsen (1977), and Crawford and Mander (1966). The standard star measures were used for the determination of nightly extinction coefficients and for standardization. To increase the photometric accuracy and to insure that a minimum was actually occurring for calculated phases 0.00 and 0.50, multiple sets of observations on each star were always made. In addition, integration times were increased significantly for fainter stars to insure a standard error of measurement of less than 1% per individual observation. The minimum integration time for any single reading was 10 s, while the maximum was 90 s.

III. THE RESOLVING TIME CORRECTION

The use of pulse-counting photometers requires a knowledge of the resolving time (sometimes referred to as "dead time") of the pulse-counting system. Because of the extensive nature of this survey and the use of bright standards to calibrate mainly faint variables, it was felt desirable to have an accurately determined value of the resolving time for the system used at CTIO.

A technique developed by Blitzstein (1965) for measurement of resolving time was therefore adapted to the Lowell 0.6 m telescope. A cover for this instrument was constructed in the shops at CTIO having two equal apertures which can be alternately or simultaneously covered or uncovered from the floor of the dome with the telescope pointing toward the zenith. To measure the resolving time of the entire photometric system an arbitrary star is chosen near the zenith having an appropriate magnitude to produce approximately the maximum recommended count rate with both apertures open. The star is then measured successively with two apertures open and with each aperture open individually. For a positive resolving time the sum of the two single aperture measures will exceed that with two apertures open. The difference is the number of counts lost between the two count rates and can be used to determine an accurate value for the resolving time itself.

The actual measurement of the resolving time was made on three separate, very photometric nights during two separate observing runs. The measures were repeated for ~ 20 minutes on each occasion to insure a minimal error contribution from scintillation and minor extinction variations. The average resolving time was determined to be 62 ± 5 ns. This value is significantly higher than the 30 ns suggested by the CTIO facilities manual and the manufacturer of the PAR 1120 amplifier-discriminators. The difference probably results from differences in the conditions of measurement. The likely source of pulses for the manufacturer is a pulse generator with evenly spaced pulses of equal amplitude, while those from the photocell at the telescope are neither evenly spaced nor of equal amplitude.

IV. THE EXTINCTION

Atmospheric extinction values were determined for each night of observations by use of the photometric standards. For each run several standards of various spectral type were chosen as extinction stars and were always observed three or more times each night in addition to the regular standards, which were only observed once or twice. These extinction standards were observed over a sufficient range of air mass to permit the determination of extinction in either or both of two ways: the "Bouguer method" of determining the slope of a magnitude versus air mass relation, and the method of observing standards at differing air masses at approximately the same time. The two methods gave fairly consistent results, with the "Bouguer method" appearing somewhat superior for accurate determinations most of the time. Extinction variations during the night generally were quite small at CTIO, e.g., less than 0.01 mag in the y filter band.

As a result of the large number of completely photometric nights during each observing run, it was possible to see specific trends in the extinction values. For example, there is a definite seasonal variation in the average nightly extinction values at CTIO, and there is a possible second-order extinction coefficient in the c_1 index caused by the u filter. Table 1 summarizes the results of the extinction study. The second-order coefficient in the c_1 index is not easy to determine, even from multiple nights of observation. However, the early B-type extinc-

TABLE 1

AVERAGE EXTINCTION VALUES: CTIO 1980

Observing Run	Telescope	Number of Nights	$\bar{K}_y$	Variation[a]	$\bar{K}_{b-y}$	$\bar{K}_{m_1}$	$\bar{K}_{c_1}$
1979 Dec–1980 Jan	0.6 m	22	0.149	+0.011 −0.021	0.056	0.060	0.174
1980 May–1980 Jun ...	0.4 m	11	0.122	+0.020 −0.004	0.054	0.054	0.170
1980 Aug	0.6 m	12	0.126	+0.005 −0.003	0.053	0.061	0.167

[a]Maximum night to night variation in any nightly K_y coefficient from the average value given.

TABLE 2

THE PHOTOMETRIC RESULTS

Star	J.D.(Hel.)	Phase	V	b-y	m_1	c_1	Hβ	Note
RT Scl	44231.5602	0.546	10.41	0.264	0.114	0.560	2.693	
	44242.5689	0.066	10.52	0.273	0.115	0.564	2.674	
	44247.5642	0.831	10.28	0.264	0.121	0.524	2.667	
	44457.7817	0.763	10.21	0.259	0.117	0.546	2.678	
AA Hyi	44243.5805	0.568	11.55	0.362	0.085	0.527	2.658	
	44247.5955	0.059	11.73	0.326	0.148	0.469	2.706	
	44253.6448	0.318	11.57	0.324	0.139	0.511	2.663	
VV Scl	44243.5430	0.500	8.41	0.088	0.260	0.763	2.857	1
	44464.8307	0.743	8.42	0.078	0.259	0.805	2.870	
AD Phe	44244.5786	0.197	10.29	0.385	0.175	0.339	2.609	
	44250.5903	0.000	10.80	0.397	0.194	0.327	2.604	
	44461.8458	0.497	10.70	0.399	0.175	0.332	2.591	
	44464.9017	0.480	10.52	0.379	0.196	0.337	2.607	
VW Phe	44232.6185	0.250	10.57	0.465	0.167	0.369	2.596	
	44249.5961	0.005	11.14	0.608	0.359	0.253	2.522	
WY Cet	44253.5530	0.318	9.18	0.185	0.180	0.815	2.768	
	44469.7948	0.415	9.15	0.186	0.171	0.830	2.779	
WZ Cet	44457.8677	0.268	10.26	0.065	0.166	1.019	2.895	
	44462.8225	0.014	10.24	0.065	0.160	1.020	2.897	
TT Cet	44457.8383	0.512	11.30	0.277	-0.016	0.737	2.729	
	44457.8470	0.526	11.12	0.219	0.125	0.708	2.729	
	44468.7645	0.994	12.03	0.479	0.331	0.366		
	44470.8376	0.260	10.84	0.194	0.190	0.686	2.690	
TW Cet	44233.6124	0.999	11.16	0.458	0.257	0.298	2.580	
	44248.5859	0.256	10.38	0.422	0.216	0.304	2.574	
TX Cet	44230.6370	0.596	11.04	0.253	0.132	0.700	2.709	
	44457.8212	0.254	10.93	0.238	0.145	0.731	2.706	
	44468.7465	0.001	11.51	0.256	0.145	0.640	2.677	
	44469.8262	0.458	11.13	0.245	0.122	0.702	2.711	
AA Cet	44237.6183	0.258	7.16	0.256	0.160	0.587	2.698	2
	44238.5491	0.000	7.72	0.257	0.164	0.617	2.683	
YY Cet	44468.9131	0.320	10.49	0.182	0.170	0.824	2.777	3
	44470.7937	0.003	10.58	0.184	0.152	0.865	2.767	
RW Cet	44237.5622	0.249	10.22	0.233	0.163	0.634	2.708	
SU For	44458.8434	0.254	10.17	0.152	0.170	0.907	2.809	
	44461.8777	0.501	10.22	0.138	0.171	0.932	2.823	
CO Eri	44247.7059	0.00	10.11	0.623	0.405	0.393	2.564	
	44458.8152	0.502	9.27	0.406	0.160	0.501	2.633	
	44463.8681	0.375	9.13	0.426	0.176	0.472	2.623	
CW Eri	44239.5676	0.254	8.39	0.257	0.127	0.606	2.702	
	44241.6006	0.00+	8.90	0.281	0.104	0.584	2.679	
	44459.8675	0.998	8.89	0.263	0.140	0.543	2.689	
RY For	44244.5946	0.519	9.95	0.911	0.712	0.424	2.525	4
	44248.5998	0.769	9.96	0.914	0.708	0.409	2.548	
	44460.8772	0.003	9.96	0.903	0.756	0.404		
WX Eri	44239.5568	0.521	9.61	0.208	0.183	0.748	2.785	
	44240.5779	0.761	9.39	0.248	0.158	0.746	2.762	
	44246.5465	0.011	10.29	0.300	0.144	0.718	2.721	
TT Hor	44469.8556	0.445	11.06	0.115	0.155	0.990	2.830	
AS Eri	44232.5780	0.997	8.97	0.146	0.167	0.945	2.836	
	44236.5771	0.498	8.39	0.083	0.168	0.959	2.869	
	44238.5863	0.252	8.30	0.113	0.160	0.952	2.856	
BT Eri	44232.7298	0.004	10.45	0.050	0.115	1.049	2.865	
	44239.5798	0.247	9.57	0.039	0.109	1.074	2.856	
	44248.5573	0.497	9.62	0.014	0.134	1.084	2.874	
CD Eri	44459.8355	0.574	9.48	0.179	0.136	0.926	2.820	
	44464.8403	0.314	9.48	0.189	0.121	0.952	2.788	
	44469.8796	0.067	9.57	0.176	0.134	0.963	2.820	
RU Eri	44238.7006	0.753	9.32	0.273	0.153	0.580	2.673	
	44248.6626	0.511	9.58	0.266	0.137	0.614	2.679	
	44249.6178	0.000	10.02	0.292	0.151	0.577	2.689	
RY Eri	44461.9098	0.753	10.03	0.489	0.181	0.333	2.585	
BL Eri	44247.6462	0.284	11.49	0.584	0.403	0.387	2.536	
	44253.5754	0.500	11.49	0.584	0.416	0.350	2.509	
YY Eri	44234.6036	0.00+	8.85	0.435	0.225	0.300	2.583	
	44237.5766	0.241	8.19	0.421	0.210	0.311	2.581	
BZ Eri	44230.5910	0.513	9.99	0.306	0.159	0.449	2.673	
	44231.5961	0.000	10.16	0.330	0.152	0.435	2.644	
	44233.5816	0.000	10.17	0.326	0.172	0.411	2.662	
	44459.9105	0.785	9.73	0.311	0.154	0.441	2.651	
TZ Eri	44230.7324	0.016	11.44	0.459	0.171	0.574	2.709	
	44236.6047	0.269	9.61	0.206	0.177	0.809	2.803	
	44456.8586	0.785	9.58	0.189	0.201	0.827	2.832	

TABLE 2—*Continued*

Star	J.D.(Hel.)	Phase	V	b-y	m_1	c_1	Hβ	Note
CT Eri	44241.5919	0.748	10.15	0.208	0.164	0.733	2.709	
	44245.5550	0.00+	10.64	0.224	0.144	0.708	2.720	
RZ Eri	44242.5473	0.017	8.30	0.537	0.219	0.593	2.663	
	44463.9168	0.652	7.75	0.432	0.174	0.739	2.710	
UZ Oct	44239.6106	0.480	9.50	0.391	0.127	0.612	2.669	
	44241.6253	0.232	9.04	0.389	0.098	0.655	2.677	
	44243.6574	0.000	9.56	0.382	0.137	0.605	2.674	
W Cae	44231.6949	0.001	10.52	0.641	0.359	0.315	2.551	
	44233.5474	0.266	9.76	0.472	0.205	0.350	2.602	
RV Pic	44230.8116	0.243	9.65	0.093	0.143	1.058	2.875	
	44233.8055	0.000	11.97	0.494	0.183	0.581	2.588	
ER Ori	44241.5478	0.028	9.93	0.389	0.162	0.364	2.600	
	44241.6512	0.280	9.36	0.360	0.177	0.344	2.611	
	44247.6721	0.500	10.02	0.387	0.174	0.331	2.615	
RR Lep	44235.5776	0.758	9.98	0.149	0.174	0.955	2.840	
	44235.8108	0.00	10.57	0.166	0.164	0.958	2.810	
	44236.7359	0.010	10.58	0.164	0.164	0.957	2.836	
RS Col	44232.5941	0.015	9.93	0.368	0.167	0.351	2.609	
	44236.6181	0.000	9.94	0.371	0.162	0.379	2.598	
	44469.9222	0.998	9.92	0.365	0.165	0.375	2.610	
SU Pic	44248.7355	0.243	10.15	0.054	0.127	1.092	2.863	
	44253.8118	0.00	10.64	0.065	0.145	1.029	2.833	
RZ Col	44234.7370	0.00+	11.47	0.200	0.133	0.788	2.760	
	44470.8895	0.82	11.03	0.189	0.127	0.822	2.731	
TY Men	44239.7228	0.701	8.19	0.186	0.120	0.794	2.744	
	44253.6794	0.933	8.39	0.195	0.122	0.758	2.748	
	44253.7108	0.000	8.59	0.180	0.144	0.762	2.749	
EY Ori	44232.5566	0.998	10.13	0.544	0.107	0.865	2.765	
	44240.5651	0.475	9.63	0.485	0.141	0.987	2.781	
UX Men	44244.5441	0.504	8.83	0.362	0.162	0.399	2.615	
	44250.7998	0.00+	8.98	0.376	0.167	0.378	2.623	
TZ Men	44239.6822	0.253	6.23	0.007	0.151	0.918	2.829	
RS Lep	44242.6136	0.492	9.94	0.018	0.163	1.025	2.905	5
	44245.8286	0.00+	11.53	0.099	0.123	0.950	1.884	
CF Pup	44240.7333	0.746	10.27	0.115	0.181	0.943	2.811	
V Lep	44248.5744	0.500	9.81	0.160	0.158	0.936	2.784	
	44470.9051	0.257	9.67	0.151	0.156	0.955	2.799	
TX Cma	44234.6771	0.475	9.66	0.018	0.103	0.586	2.762	
	44237.7044	0.737	9.63	0.026	0.108	0.578	2.741	
TU Cma	44232.8355	0.989	10.47	0.175	0.170	0.754	2.776	
	44236.7897	0.495	10.03	0.118	0.188	0.851	2.851	
	44241.5762	0.739	9.86	0.130	0.200	0.822	2.834	
	44244.6730	0.485	10.02	0.105	0.202	0.850	2.840	
TZ Cma	44232.7999	0.255	10.03	0.092	0.152	1.015	2.874	
	44245.6975	0.00	10.05	0.074	0.185	0.990	2.878	
RU Mon	44234.6316	0.00+	10.83	0.102	0.070	0.676	2.780	
AU Mon	44237.7267	0.253	8.33	0.101	0.040	0.315	2.608	
	44245.8449	0.983	8.77	0.153	0.014	0.172	2.611	
FZ Cma	44239.7571	0.756	8.09	0.176	-0.001	0.095	2.623	
	44245.7941	0.498	8.27	0.164	0.041	0.095	2.631	
VV Mon	44237.6591	0.002	10.03	0.668	0.387	0.268	2.580	
	44240.6705	0.499	9.58	0.487	0.265	0.302	2.578	
	44248.6317	0.815	9.45	0.530	0.216	0.318	2.600	
FQ Cma	44382.5075	0.253	10.80	0.185	0.226	0.795	2.761	
AO Mon	44238.6319	0.828	9.70	0.069	0.170	1.133	2.896	19
	44243.7996	0.570	9.71	0.059	0.193	1.115	2.861	
SW Cma	44235.8501	0.011	9.29	0.095	0.207	1.035	2.856	6
	44237.6422	0.189	9.15	0.095	0.209	1.036	2.863	
	44245.8571	0.003	9.16	0.101	0.199	1.035	2.846	
SX Cma	44243.7804	0.00	11.07	0.221	0.173	0.962	2.823	
FF Cma	44236.6871	0.989	7.81	-0.079	0.096	0.204	2.638	
	44237.5924	0.776	7.41	-0.079	0.093	0.170	2.630	
	44244.5655	0.482	7.67	-0.089	0.109	0.145	2.632	
VW Cma	44250.7364	0.563	9.84	0.062	0.060	0.434	2.717	
	44253.7748	0.778	9.43	0.046	0.078	0.360	2.698	
GZ Cma	44234.6610	0.00	7.99	0.086	0.194	1.050	2.890	4
	44240.6571	0.249	8.00	0.062	0.243	1.028	2.882	

TABLE 2—*Continued*

Star	J.D.(Hel.)	Phase	V	b-y	m_1	c_1	Hβ	Note
R Cma	44232.8620	0.268	5.69	0.221	0.169	0.672	2.725	
	44241.6618	0.015	6.26	0.236	0.176	0.659	2.714	
	44250.7453	0.011	6.28	0.236	0.166	0.666	2.717	
AR Mon	44235.8409	0.294	8.65	0.671	0.386	0.295	2.557	
BV438 (N)	44235.7052	0.005	8.44	0.008	0.121	0.832	2.832	7
(S)	44235.7052	0.005	9.58	0.047	0.160	0.991	2.903	
CW Cma	44235.5941	0.961	8.63	0.039	0.169	1.033	2.895	
	44235.6772	0.000	8.96	0.036	0.185	1.009	2.898	
FS Mon	44245.5903	0.029	10.24	0.286	0.140	0.552	2.674	
	44250.8156	0.771	9.62	0.266	0.148	0.594	2.688	
AN Pup	44246.8499	0.505	10.49	0.604	0.356	0.452	2.586	
	44250.8335	0.998	11.27	0.197	0.011	0.414	2.713	
MQ Pup	44234.5664	0.000	10.55	0.121	0.140	1.051	2.842	
	44238.5983	0.758	9.03	0.038	0.098	0.496	2.720	
	44245.5718	0.506	9.39	0.015	0.088	0.415	2.703	
YY Pup	44247.5765	0.513	9.21	0.167	0.080	0.831	2.778	
TY Pup	44241.6738	0.472	8.60	0.281	0.164	0.636	2.691	4
	44243.8497	0.127	8.86	0.295	0.125	0.685	2.694	
	44247.6216	0.732	8.56	0.274	0.168	0.637	2.690	
UZ Pup	44231.7808	0.522	10.00	0.246	0.157	0.744	2.734	
	44245.6826	0.010	10.30	0.305	0.153	0.579	2.684	
	44253.6225	0.000	10.34	0.303	0.148	0.599	2.683	
	44253.8296	0.261	9.35	0.237	0.151	0.766	2.749	
RR Pup	44231.6707	0.004	11.37	0.684	0.382	0.434	2.545	
	44239.7087	0.254	10.34	0.137	0.094	0.817	2.753	
KV Pup	44237.8228	0.000	10.34	0.206	0.119	0.983	2.823	
	44249.7010	0.239	9.63	0.151	0.132	1.031	2.845	
ZZ Pup	44244.6102	0.970	10.04	0.310	0.163	0.865	2.749	
	44244.7305	0.000	11.05	0.564	0.267	0.382	2.598	
	44247.8365	0.490	9.43	0.193	0.134	0.991	2.799	
TU Mon	44240.6471	0.748	9.28	-0.025	0.141	0.261	2.652	
MW Pup	44233.6377	0.003	9.32	0.037	0.149	0.959	2.864	8
	44246.8242	0.50+	9.67	0.035	0.152	0.938	2.864	
	44248.6458	0.260	9.32	0.021	0.162	0.958	2.879	
FW Mon	44245.7490	0.00-	11.88	0.395	0.082	0.458	2.576	
	44246.7080	0.249	9.98	0.122	0.054	0.347	2.669	
V Pup	44234.5969	0.001	4.93	-0.061	0.063	-0.017	2.592	
BO Mon	44230.7713	0.990	12.64	0.496	0.162	0.303	2.608	
	44235.7924	0.247	9.90	0.088	0.167	0.999	2.852	
BV1594 Mon	44243.7508	0.003	7.53	0.524	0.246	0.493	2.601	
	44248.7133	0.748	7.31	0.431	0.170	0.655	2.649	
BH Pup	44239.7429	0.763	9.01	-0.030	0.082	0.311	2.680	
	44248.8318	0.507	9.10	-0.032	0.073	0.297	2.678	
	44249.7871	0.006	9.43	-0.027	0.096	0.315	2.691	
BK Pup	44247.7226	0.504	10.40	0.169	0.179	0.816	2.788	9
	44382.4733	0.262	10.38	0.163	0.213	0.774	2.794	
XZ Pup	44248.8557	0.754	7.78	0.055	0.098	1.017	2.816	
	44253.7890	0.004	9.88	0.240	0.089	0.790	2.715	
AU Pup	44238.6571	0.503	9.29	0.052	0.108	1.112	2.830	
	44240.6254	0.251	8.59	0.035	0.116	1.091	2.844	
	44242.5854	0.991	9.46	0.060	0.143	0.980	2.794	
AZ Pup	44237.6899	0.769	9.84	0.090	0.063	0.393	2.694	4
	44238.7735	0.018	9.53	0.094	0.045	0.375	2.675	
	44242.6741	0.515	9.53	0.086	0.062	0.363	2.696	
SW Pup	44230.6858	0.007	9.01	0.240	0.164	0.812	2.746	
	44245.7735	0.498	9.02	0.241	0.172	0.812	2.720	
AY Vel	44235.7425	0.006	9.48	0.200	0.025	0.712	2.739	4
	44393.4679	0.508	9.46	0.198	0.014	0.735	2.744	
AW Pup	44245.8142	0.504	9.72	0.308	0.168	0.578	2.692	
NO Pup	44231.8135	0.453	6.57	-0.037	0.123	0.649	2.766	
	44238.7187	0.946	6.59	-0.028	0.110	0.651	2.767	
AS Vel	44234.6158	0.00+	8.89	0.110	0.200	0.878	2.850	
	44393.5210	0.995	8.92	0.101	0.239	0.817	2.841	
AL Vel	44243.7061	0.031	8.87	0.797	0.340	0.358	2.605	
VZ Hya	44233.7585	0.002	9.64	0.333	0.145	0.370	2.629	
	44236.6520	0.000	9.68	0.332	0.146	0.365	2.619	
X Car	44231.8513	0.261	7.85	0.054	0.117	1.006	2.840	
	44232.6721	0.020	8.55	0.077	0.101	1.067	2.857	
	44233.7431	0.009	8.65	0.066	0.114	1.063	2.845	
	44253.7623	0.500	8.70	0.067	0.117	1.043	2.850	

TABLE 2—*Continued*

Star	J.D.(Hel.)	Phase	V	b-y	m_1	c_1	Hβ	Note
EU Hya	44232.7573	0.750	10.30	0.270	0.141	0.535	2.696	
	44233.7158	0.00+	10.67	0.268	0.153	0.506	2.678	
TX Pyx	44232.8167	0.684	10.01	0.247	0.142	0.688	2.717	
	44253.6079	0.185	10.12	0.244	0.151	0.692	2.701	
RS Cha	44236.7667	0.000	6.70	0.175	0.164	0.829	2.763	
	44238.8492	0.254	6.05	0.139	0.178	0.879	2.788	
TT Pyx	44234.7325	0.956	9.26	0.033	0.106	1.121	2.817	
	44234.7990	0.000	9.48	0.033	0.114	1.146	2.832	
	44242.6522	0.181	8.80	0.036	0.102	1.074	2.812	
RZ Pyx	44230.6536	0.541	9.49	-0.014	0.098	0.427	2.696	
	44245.7209	0.500	9.84	-0.017	0.118	0.420	2.700	
	44249.8202	0.747	8.98	-0.027	0.103	0.407	2.708	
	44253.5975	0.502	9.84	-0.011	0.106	0.438	2.690	
TY Pyx	44250.7570	0.50+	7.44	0.438	0.229	0.377	2.594	
	44383.5017	0.001	7.48	0.448	0.229	0.369	2.606	
CV Vel	44232.6416	0.000	7.19	-0.063	0.106	0.247	2.668	
	44237.8420	0.755	6.71	-0.063	0.091	0.268	2.646	
	44249.8597	0.500	7.17	-0.061	0.091	0.265	2.656	
CW Vel	44248.6873	0.970	10.10	0.174	0.029	0.445	2.688	
	44248.7188	0.983	10.61	0.204	0.037	0.454	2.682	
	44248.7563	0.999	11.12	0.286	0.021	0.472	2.675	
	44248.7698	0.006	11.05	0.272	-0.003	0.479	2.681	
RX Hya	44234.8607	0.00-	12.01	0.659	0.362	0.449	2.606	
	44237.7463	0.278	9.52	0.187	0.179	0.806	2.791	
GG Vel	44231.7342	0.014	9.07	0.071	0.106	1.144	2.829	
	44238.7349	0.760	8.72	0.071	0.095	1.159	2.832	
BZ Vel	44249.8051	0.001	10.71	0.267	0.097	0.890	2.777	
DN Vel	44240.7179	0.251	9.62	0.149	0.100	0.972	2.783	
SV Pyx	44250.6958	0.746	10.73	0.081	0.181	0.977	2.868	
S Ant	44242.7014	0.998	6.82	0.209	0.177	0.713	2.725	
	44245.7881	0.759	6.33	0.207	0.187	0.684	2.723	
	44246.7524	0.365	6.33	0.204	0.170	0.717	2.725	
S Vel	44248.8458	0.750	7.79	0.171	0.138	0.970	2.831	
QW Car	44249.6510	0.270	11.68	0.166	0.111	0.916	2.795	
GW Car	44233.6584	0.503	10.03	0.040	0.047	-0.001	2.604	
	44247.7537	0.989	9.43	0.762	0.432	0.407	2.597	
	44249.7527	0.760	9.63	0.024	0.060	0.020	2.605	
XX Ant	44240.6834	0.00+	8.70	0.258	0.214	0.507	2.678	10
	44248.7882	0.993	8.61	0.292	0.135	0.553	2.685	
	44382.5734	0.495	8.64	0.283	0.156	0.540	2.684	
DX Vel	44253.7272	0.004	10.74	0.137	0.190	0.923	2.834	
ST Car	44240.8500	0.731	9.66	0.057	0.142	0.986	2.859	
	44383.5543	0.001	10.73	0.156	0.080	0.825	2.768	
YZ Ant	44232.7800	0.003	9.89	0.204	0.151	0.774	2.744	
XY Ant	44244.8271	0.996	9.95	0.333	0.158	0.504	2.643	
	44245.7620	0.505	9.96	0.325	0.179	0.481	2.663	
CO Car	44246.7862	0.500	8.34	1.003	0.607	0.274	2.574	
XZ Ant	44382.5877	0.754	9.60	0.565	0.234	0.299	2.573	
HP Car	44241.7470	0.000	9.23	0.193	-0.024	0.011	2.614	
HS Hya	44231.7574	0.129	8.10	0.294	0.142	0.420	2.645	
	44238.8123	0.628	8.11	0.298	0.147	0.398	2.655	
V348 Car	44237.8514	0.124	8.70	0.283	-0.042	0.000	2.559	
	44244.7935	0.372	8.69	0.285	-0.051	0.002	2.560	
GM Car	44250.7246	0.761	9.15	0.005	0.080	0.635	2.699	
ZZ Vel	44244.8399	0.00-	10.39	0.052	0.118	1.160	2.856	
	44383.6248	0.282	9.93	0.039	0.163	1.068	2.880	
HW Car	44249.7701	0.00	9.17	0.643	0.281	0.574	2.631	
QZ Car	44458.4829	0.391	6.35	0.176	-0.027	-0.124	2.525	
FW Vel	44233.6852	0.00+	11.09	0.205	0.139	1.099	2.852	
AC Vel	44249.7293	0.502	9.11	0.144	0.011	0.328	2.623	
	44250.8508	0.747	8.88	0.155	-0.013	0.331	2.629	
HI Car	44464.4990	0.767	10.57	0.215	-0.007	0.256	2.620	
χ^2 Hya	44247.7378	0.998	5.92	-0.020	0.106	0.850	2.764	
SU Cen	44382.4875	0.564	9.27	0.320	0.155	0.680	2.662	

TABLE 2—*Continued*

Star	J.D.(Hel.)	Phase	V	b-y	m_1	c_1	Hβ	Note
EM Car	44239.7748	0.991	8.77	0.304	-0.042	-0.063	2.567	
	44387.4674	0.248	8.39	0.306	-0.061	-0.094	2.569	
TT Hya	44232.7008	0.250	7.29	0.153	0.113	0.918	2.751	
	44244.8615	0.999	9.08	0.670	0.297	-0.002	2.429	
V338 Car	44470.5013	0.251	9.19	0.415	-0.057	0.840	2.570	
GL Car	44238.7486	0.253	9.54	0.241	-0.062	-0.031	2.590	4
	44383.4984	0.000	9.67	0.240	-0.073	-0.049	2.594	
RV Crt	44247.7998	0.982	10.21	0.389	0.166	0.353	2.628	
	44247.8208	0.000	10.30	0.394	0.152	0.368	2.623	
V742 Cen	44233.8453	0.499	9.58	0.068	0.079	0.750	2.784	
	44246.8332	0.500	9.59	0.074	0.070	0.751	2.774	
MN Cen	44239.8032	0.502	8.97	0.057	0.049	0.149	2.612	
LT Cen	44253.7419	0.492	9.56	0.035	0.085	0.82	2.784	
	44463.4833	0.496	9.54	0.037	0.097	0.791	2.792	
TU Mus	44235.7770	0.997	8.82	0.130	-0.025	-0.074	2.577	
	44383.5177	0.494	8.70	0.129	-0.038	-0.095	2.581	
	44468.4983	0.751	8.24	0.117	-0.007	-0.135	2.576	
BF Cen	44382.7022	0.753	8.54	0.054	0.029	0.172	2.609	
V646 Cen	44392.4906	0.000	11.09	0.638	0.551	0.869	2.990	
	44392.5097	0.010	10.80	0.298	0.124	0.421	2.678	
LW Cen	44250.7118	0.503	9.14	0.117	0.016	-0.007	2.580	10
	44382.5534	0.007	9.17	0.105	0.016	0.018	2.599	
	44459.4863	0.742	9.17	0.058	-0.001	-0.081	2.603	
MO Cen	44239.8326	0.500	9.96	0.196	0.024	0.449	2.621	
	44244.8492	0.020	9.98	0.206	0.005	0.471	2.619	
	44459.5118	0.250	10.00	0.190	0.023	0.444	2.626	
V346 Cen	44393.5073	0.750	8.52	0.056	0.025	0.015	2.596	
	44461.4812	0.501	8.52	0.058	0.014	0.025	2.597	
MP Cen	44243.7289	0.499	10.34	0.218	-0.007	0.036	2.596	
	44249.7138	0.498	10.32	0.234	-0.018	0.025	2.580	
MQ Cen	44387.4876	0.762	10.04	0.183	0.019	0.489	2.669	
	44469.4935	0.004	10.38	0.160	0.018	0.572	2.698	
MR Cen	44242.7602	0.499	10.35	0.178	0.032	0.203	2.610	
	44243.8311	0.772	10.30	0.174	0.013	0.262	2.622	
	44244.7452	0.006	10.39	0.160	0.038	0.272	2.645	
SV Cen	44239.8507	0.471	8.82	0.108	0.033	0.055	2.592	
RS Crt	44250.7892	0.005	10.67	0.373	0.179	0.299	2.607	
V350 Cen	44247.7709	0.001	10.82	0.269	-0.023	0.123	2.622	
	44458.4961	0.506	10.58	0.277	-0.041	0.014	2.594	
	44462.5010	0.751	10.35	0.280	-0.029	0.035	2.587	
LZ Cen	44231.8367	0.256	8.13	0.114	0.013	0.020	2.575	
VZ Cen	44246.7672	0.999	8.51	0.084	0.028	0.147	2.615	
	44383.5779	0.757	8.27	0.087	0.010	0.110	2.603	
AE Cru	44459.5236	0.500	9.38	0.094	0.063	0.469	2.700	
DZ Mus	44246.7326	0.978	9.08	0.092	0.084	0.705	2.774	
	44246.7591	0.986	9.25	0.086	0.079	0.730	2.773	
	44246.7763	0.992	9.36	0.091	0.079	0.721	2.785	
	44246.7984	0.000	9.46	0.090	0.082	0.710	2.773	
	44463.5280	0.733	8.81	0.091	0.075	0.720	2.785	
ZZ Cru	44240.8378	0.245	9.59	0.108	0.018	0.188	2.649	
W Cru	44468.5163	0.823	8.14	0.640	0.291	0.666	2.555	
AB Cru	44393.4986	0.00-	9.19	0.186	-0.025	-0.100	2.571	
	44457.5063	0.758	8.39	0.182	-0.033	-0.119	2.562	
	44463.4907	0.512	8.83	0.173	-0.030	-0.132	2.576	
SW Cen	44468.5068	0.250	10.17	0.127	0.081	0.896	2.808	
RV Crv	44238.8346	0.004	9.17	0.268	0.143	0.694	2.678	
V377 Cen	44382.6158	0.254	8.90	0.079	0.168	1.070	2.885	
V754 Cen	44469.5486	0.504	11.56	0.200	0.076	1.061		
V495 Cen	44468.5299	0.169	10.72	0.463	0.208	0.350	2.620	
RZ Cen	44464.5306	0.756	9.04	0.198	-0.022	0.075	2.595	
UY Vir	44469.4830	0.311	8.00	0.234	0.144	0.772	2.761	
SS Cen	44248.8012	0.00	10.46	0.084	0.127	0.989	2.897	
	44382.6487	0.999	10.42	0.103	0.097	0.992	2.897	
	44385.7691	0.258	9.54	0.117	0.077	0.721	2.781	

TABLE 2—*Continued*

Star	J.D.(Hel.)	Phase	V	b-y	m_1	c_1	$H\beta$	Note
UW Vir	44463.5092	0.257	8.98	0.169	0.180	0.891	2.847	
NP Cen	44461.5240	0.757	10.32	0.258	-0.035	0.299	2.657	
V606 Cen	44380.5949	0.00+	9.64	0.272	-0.077	0.031	2.609	
V379 Cen	44386.7300	0.499	9.19	0.071	0.018	0.337	2.673	
	44387.6702	0.001	9.95	0.078	0.093	0.780	2.784	
	44464.5206	0.992	9.79	0.096	0.045	0.696	2.763	
V380 Cen	44460.5125	0.001	9.59	0.108	0.044	0.365	2.676	4
	44463.5371	0.782	9.63	0.111	0.048	0.348	2.688	
V701 Cen	44464.4862	0.704	9.12	0.027	0.098	0.709	2.800	
V747 Cen	44469.5317	0.005	10.48	0.261	0.154	0.634	2.700	
T Cir	44460.5331	0.254	10.13	0.154	0.035	0.653	2.712	
	44469.5783	0.997	10.95	0.165	0.050	0.634	2.695	
SX Hya	44383.5373	0.575	8.87	0.134	0.192	0.923	2.868	
V775 Cen	44468.5845	0.020	10.25	0.315	0.165	0.587	2.688	
V621 Cen	44382.7956	0.001	10.51	0.203	0.009	0.480	2.723	
AT Cir	44460.5005	0.000	7.99	0.228	0.156	0.844	2.769	
	44464.5627	0.247	7.65	0.214	0.158	0.872	2.770	
DM Vir	44460.5481	0.751	8.73	0.318	0.171	0.476	2.660	
	44470.5532	0.892	8.73	0.330	0.164	0.464	2.648	
V759 Cen	44388.7233	0.729	7.65	0.389	0.172	0.392	2.619	
RR Cen	44469.5056	0.767	7.29	0.209	0.193	0.672	2.722	
	44470.5465	0.485	7.64	0.235	0.166	0.666	2.709	
V745 Cen	44468.6131	0.263	9.34	0.174	0.014	0.272	2.655	
V762 Cen	44392.5463	0.008	12.30	0.442	-0.051	0.566	2.501	
	44461.5647	0.501	11.49	0.364	-0.069	0.576	2.750	
RV Lib	44461.5105	0.001	9.24	0.669	0.347	0.334		10
	44469.5613	0.752	9.04	0.672	0.332	0.291		
DT Lup	44459.5899	0.502	10.42	0.148	0.142	0.924	2.835	
	44470.4863	0.001	10.43	0.146	0.145	0.912	2.836	
V Cir	44463.6174	0.750	10.70	0.482	0.141	0.430	2.608	
BD Cir	44469.6236	0.004	10.27	0.368	-0.062	0.373	2.654	
FT Lup	44470.5113	0.00+	10.09	0.294	0.144	0.544	2.668	
δ Lib	44382.7160	0.006	5.86	0.058	0.104	0.944	2.789	
BF Cir	44380.6259	0.003	9.23	0.385	-0.031	0.548	2.718	
	44383.8529	0.503	8.96	0.363	-0.064	0.476	2.673	
RR Nor	44386.7416	0.050	10.03	0.138	-0.054	0.775	2.763	
EV Lup	44387.6975	0.50+	11.61	0.757	0.450	-0.001	2.614	11
	44464.5497	0.519	11.61	0.727	0.383	0.388		
ES Lib	44458.5449	0.965	7.54	0.145	0.152	1.000	2.837	
	44458.5752	0.000	7.58	0.146	0.148	1.004	2.843	
BN Cir	44383.5886	0.252	10.14	0.097	0.059	0.778	2.775	
GG Lup	44385.8150	0.001	5.59	-0.050	0.114	0.521	2.749	4
	44460.4842	0.503	5.59	-0.050	0.119	0.523	2.747	
	44468.6259	0.265	5.59	-0.045	0.107	0.524	2.747	
HP Tra	44382.7792	0.00	8.99	0.052	0.090	0.518	2.770	4
	44463.5208	0.273	9.25	0.059	0.104	0.518	2.753	
S Cir	44470.6141	0.919	10.21	0.648	-0.218	0.348	2.636	
BV532 Tra	44469.5149	0.776	9.21	0.107	0.081	0.935	2.815	
TV Nor	44387.7295	0.747	9.00	0.185	0.146	0.988	2.876	
Z Nor	44457.5364	0.505	9.52	0.211	-0.027	0.233	2.636	
	44464.5710	0.256	9.15	0.218	-0.013	0.336	2.663	
EQ Tra	44382.8762	0.757	8.16	0.057	0.049	0.296	2.571	
V718 Sco	44382.6853	0.643	8.98	0.325	0.167	0.959	2.853	
IT Nor	44470.5992	0.500	10.40	0.380	-0.028	1.156	2.818	
GQ Tra	44462.6932	0.00-	10.78	0.182	0.162	0.929	2.845	
	44468.5454	0.505	9.89	0.100	0.193	1.008	2.876	
V760 Sco	44461.6411	0.002	7.40	0.173	0.020	0.376	2.699	
	44462.5089	0.503	7.33	0.169	0.023	0.392	2.698	
PQ Nor	44390.7551	0.740	7.72	0.055	0.087	0.889	2.794	4
	44463.6298	0.014	7.72	0.054	0.101	0.863	2.797	

TABLE 2—*Continued*

Star	J.D.(Hel.)	Phase	V	b-y	m_1	c_1	Hβ	Note
V349 Ara	44463.5976	0.003	9.06	0.176	0.205	0.967	2.799	
R Ara	44386.7149	0.228	6.80	0.122	0.048	0.644	2.664	4,12
	44387.8364	0.482	6.79	0.095	0.075	0.676	2.708	
	44469.6957	0.980	6.85	0.094	0.065	0.556	2.716	
V881 Sco	44470.6820	0.502	9.26	0.245	0.089	1.063	2.850	
V1010 Oph	44461.6864	0.512	6.39	0.131	0.180	0.874	2.808	
	44462.6650	0.992	6.84	0.172	0.162	0.812	2.755	
V889 Sco	44390.8314	0.150	11.35	0.570	-0.096	0.789	2.736	13
	44462.7261	0.00+	12.37	0.739	-0.097	0.722		
V616 Ara	44382.7611	0.252	8.18	0.320	-0.060	0.195	2.627	
FV Sco	44456.7132	0.344	7.95	0.103	0.017	0.338	2.657	
	44460.4764	0.001	8.72	0.118	0.044	0.726	2.730	
DW Aps	44385.8877	0.015	9.80	0.069	0.073	0.446	2.696	
	44458.7237	0.505	8.96	0.010	0.091	0.430	2.693	
	44461.6502	0.771	8.89	0.038	0.074	0.447	2.711	
V499 Sco	44387.6570	0.499	8.63	0.382	-0.123	0.037	2.585	
	44457.6528	0.497	8.61	0.381	-0.110	0.016	2.603	
	44460.6296	0.773	8.17	0.367	-0.098	0.024	2.585	
	44463.4989	0.003	8.67	0.371	-0.093	0.027	2.603	
RW Ara	44385.8398	0.110	8.89	0.097	0.116	1.046	2.871	
V701 Sco	44390.7942	0.987	9.05	0.155	-0.014	0.098	2.618	
	44392.6969	0.484	9.04	0.142	0.008	0.081	2.615	
	44458.6083	0.996	9.04	0.149	-0.005	0.095	2.629	
	44460.6963	0.737	8.63	0.141	0.002	0.074	2.610	
V535 Ara	44458.5295	0.502	7.70	0.228	0.133	0.645	2.692	
	44460.7363	0.009	7.74	0.244	0.107	0.649	2.695	
	44469.7046	0.261	7.16	0.226	0.127	0.650	2.702	
V777 Sgr	44383.8353	0.995	8.72	1.393	0.690	0.489		14
	44468.6418	0.085	8.61	1.264	0.197	0.004		
V620 Ara	44460.7221	0.503	9.95	0.072	0.116	0.837	2.805	4
	44462.7063	0.779	9.96	0.083	0.089	0.839	2.816	
	44464.6071	0.001	10.02	0.066	0.095	0.854	2.843	
BN Sgr	44457.6209	0.500	9.37	0.456	0.120	0.528	2.640	
	44464.6280	0.281	9.25	0.468	0.104	0.533	2.636	
UW Ara	44386.7959	0.001	9.54	0.102	0.114	0.987	2.873	15,4
	44457.6880	0.501	9.53	0.112	0.105	0.992	2.966	
	44458.5146	0.752	9.51	0.087	0.140	0.990	2.888	
V537 Ara	44386.8998	0.946	8.86	0.012	0.088	0.532	2.716	4
	44464.6976	0.50+	8.83	0.014	0.086	0.546	2.728	
V885 Sco	44462.6194	0.502	9.73	0.098	0.099	1.030	2.857	
V393 Sco	44459.5351	0.442	7.68	0.125	0.042	0.395	2.676	
V539 Ara	44456.6730	0.633	5.71	-0.030	0.083	0.282	2.663	
	44462.5915	0.500	6.04	-0.028	0.079	0.267	2.659	
	44470.5211	0.002	6.21	-0.025	0.088	0.294	2.667	
V453 Sco	44382.8372	0.252	6.39	0.441	-0.102	-0.050	2.502	
	44385.8231	0.500	6.77	0.448	-0.113	-0.028	2.496	
V907 Sco	44468.6053	0.002	9.05	0.138	0.078	0.976	2.854	
	44469.6592	0.281	8.61	0.141	0.066	0.992	2.852	
V1647 Sgr	44382.9269	0.761	7.10	0.040	0.174	1.020	2.899	
RW Cra	44385.9112	0.500	9.58	0.038	0.096	0.890	2.812	
	44462.5344	0.000	10.46	0.151	0.104	0.837	2.771	
	44464.6480	0.255	9.42	0.075	0.091	0.833	2.767	
WX Sgr	44456.5964	0.412	9.38	0.328	0.090	0.991	2.829	
	44463.6857	0.741	9.40	0.321	0.096	0.958	2.858	
WY Sgr	44469.7361	0.325	9.59	0.246	-0.021	0.474	2.687	
W Ser	44469.7457	0.106	8.99	0.502	0.050	0.408	2.412	
V2509 Sgr	44382.8620	0.484	7.50	0.064	0.131	1.087	2.841	
	44383.9248	0.461	7.48	0.063	0.132	1.101	2.849	
	44387.7712	0.000	7.71	0.082	0.126	1.034	2.820	
	44460.5839	0.987	7.69	0.084	0.123	1.037	2.820	
	44462.4824	0.747	7.35	0.074	0.127	1.067	2.835	
V Ser	44458.6255	0.996	10.50	0.318	-0.027	0.671	2.726	
	44464.7183	0.760	9.50	0.305	-0.042	0.307	2.648	
	44470.7156	0.496	9.85	0.288	-0.030	0.237	2.648	
RS Sgr	44383.9050	0.253	6.02	-0.035	0.098	0.320	2.662	
	44385.7082	0.001	6.97	-0.011	0.111	0.451	2.707	
	44386.9132	0.50	6.28	-0.034	0.059	0.267	2.653	
TZ Cra	44468.6818	0.003	10.66	0.170	0.154	0.905	2.818	
	44470.7283	0.00+	10.81	0.187	0.142	0.890	2.822	

TABLE 2—*Continued*

Star	J.D.(Hel.)	Phase	V	b-y	m_1	c_1	$H\beta$	Note
XZ Sgr	44385.8065	0.756	8.84	0.283	0.103	0.987	2.884	
	44458.6662	0.000	10.83	0.765	0.312	0.289		
MX Pav	44462.7517	0.764	11.45	0.315	0.149	0.805	2.750	
W Sct	44459.6444	0.794	9.92	0.617	-0.147	0.295	2.647	
	44461.7615	0.001	10.57	0.621	-0.116	0.538	2.693	
RY Sct	44385.8507	0.822	9.12	0.856	-0.193	-0.129	2.437	
	44388.6366	0.073	9.53	0.850	-0.184	-0.122	2.397	
EG Ser	44456.7291	0.902	8.18	0.141	0.156	0.992	2.909	
	44459.7074	0.501	8.22	0.136	0.164	0.981	2.915	
	44463.5505	0.274	8.22	0.144	0.156	0.984	2.905	
RZ Sct	44385.7189	0.982	8.52	0.631	-0.125	0.203	2.585	
V2349 Sgr	44382.9161	0.424	8.64	0.178	-0.023	-0.043	2.604	
	44386.8626	0.210	8.73	0.204	-0.056	-0.067	2.589	
V2351 Sgr	44387.7419	0.253	10.21	0.103	0.037	0.387	2.633	
	44461.7859	0.004	10.73	0.114	0.058	0.364	2.682	
	44463.6670	0.506	10.31	0.087	0.047	0.372	2.689	
V1331 Aql	44456.6504	0.723	7.76	0.305	-0.080	0.104	2.629	4
	44462.4895	0.003	7.77	0.306	-0.065	0.108	2.618	
V681 Cra	44390.8145	0.710	7.74	0.023	0.137	0.947	2.851	
	44460.6109	0.964	7.95	0.025	0.122	0.945	2.857	
	44460.6355	0.976	8.06	0.018	0.132	0.932	2.859	
	44460.6590	0.987	8.15	0.016	0.126	0.932	2.840	
	44460.6884	0.000	8.19	0.020	0.118	0.924	2.845	
	44460.7095	0.010	8.15	0.020	0.130	0.909	2.870	
	44461.7732	0.492	7.75	0.022	0.142	0.924	2.871	
UU Cra	44456.6145	0.00+	11.32	0.054	0.092	0.791	2.756	
	44460.7948	0.880	10.74	0.033	0.098	0.793	2.780	
	44463.5784	0.120	10.73	0.036	0.088	0.784	2.783	
ER Sct	44394.7774	0.005	9.34	0.246	-0.008	0.747	2.766	4
	44456.6617	0.473	9.33	0.245	-0.013	0.764	2.784	
	44468.6330	0.269	9.30	0.249	-0.013	0.742	2.772	
YY Sgr	44458.7081	0.00+	10.73	0.187	0.012	0.559	2.762	
	44463.6495	0.870	10.02	0.171	0.045	0.502	2.746	
	44464.6610	0.255	10.02	0.174	0.033	0.514	2.741	
SX Sgr	44385.6806	0.252	9.51	0.305	0.117	0.884	2.760	
	44461.4937	0.502	9.62	0.271	0.123	0.912	2.786	
	44463.5631	0.001	10.72	0.440	0.142	0.675	2.692	
V356 Sgr	44382.8277	0.269	6.85	0.175	0.012	0.562	2.680	
	44460.4906	0.999	7.66	0.204	0.029	1.272	2.752	
	44464.7724	0.481	7.20	0.162	-0.002	0.419	2.661	
RS Sct	44458.7585	0.50	10.08	0.396	0.101	0.582	2.694	
	44461.7493	0.010	10.91	0.481	0.134	0.498	2.669	
ZZ Sgr	44469.7598	0.774	10.02	0.149	0.127	1.081	2.871	
U Sct	44459.5694	0.480	10.31	0.429	0.082	0.894	2.804	
	44460.7726	0.740	10.08	0.440	0.087	0.907	2.795	
	44468.6624	0.000	11.04	0.515	0.048	0.768	2.750	
CW Sct	44468.6977	0.001	10.01	0.221	-0.014	0.660	2.706	4
	44469.6051	0.509	9.97	0.222	-0.028	0.659	2.734	
V599 Aql	44470.7506	0.770	6.66	0.215	-0.001	0.288	2.659	
V523 Sgr	44461.6147	0.503	9.58	0.280	0.144	0.739	2.735	
	44462.7881	0.007	9.90	0.288	0.148	0.723	2.740	
	44464.5923	0.784	9.57	0.282	0.147	0.733	2.765	
V337 Aql	44386.9213	0.271	8.58	0.429	-0.101	-0.062	2.574	
	44462.7715	0.016	9.19	0.427	-0.092	-0.039	2.596	
	44469.5953	0.512	9.06	0.420	-0.094	-0.074	2.573	
BL Tel	44470.6671	0.563	7.19	0.337	0.117	1.232	2.630	
V805 Aql	44385.7481	0.015	7.99	0.212	0.155	0.864	2.818	
	44461.6046	0.514	7.85	0.174	0.174	0.968	2.863	
	44464.6399	0.774	7.59	0.186	0.176	0.914	2.843	
V525 Sgr	44386.8132	0.995	8.93	0.185	0.136	0.929	2.802	
	44387.8776	0.504	8.51	0.152	0.175	0.937	2.819	
	44469.5221	0.292	8.28	0.151	0.161	0.969	2.825	
V526 Sgr	44459.4948	0.025	10.36	0.102	0.166	0.935	2.873	
	44464.7960	0.786	9.79	0.084	0.141	0.976	2.885	
BQ Sgr	44460.5740	0.753	9.40	0.119	0.107	1.168	2.834	
	44462.5663	0.002	11.87	0.728	0.413	-0.306		
	44462.6065	0.007	11.77	0.703	0.307	-0.083		
V822 Aql	44385.7955	0.544	7.12	0.187	-0.022	0.347	2.650	
	44386.8765	0.749	7.00	0.196	-0.031	0.431	2.664	
	44462.5495	0.041	7.27	0.190	-0.025	0.503	2.686	
BO Pav	44385.6978	0.771	9.48	0.565	0.289	0.276	2.535	4
	44457.4925	0.504	9.42	0.542	0.297	0.310	2.564	

TABLE 2—*Continued*

Star	J.D.(Hel.)	Phase	V	b-y	m_1	c_1	$H\beta$	Note
HO Tel	44387.8279	0.50	8.67	0.147	0.215	0.871	2.809	
	44456.7736	0.241	8.27	0.140	0.227	0.854	2.829	
	44459.6105	0.999	8.73	0.159	0.223	0.813	2.811	
V505 Sgr	44459.7747	0.461	6.58	0.087	0.140	0.962	2.854	
	44460.6806	0.227	6.46	0.096	0.150	0.936	2.832	
	44461.5469	0.963	7.03	0.148	0.141	0.854	2.808	
	44461.5755	0.987	7.39	0.203	0.138	0.756	2.753	
	44461.5949	0.000	7.46	0.214	0.128	0.747	2.747	
V524 Sgr	44468.5639	0.502	10.51	0.437	0.109	0.626	2.684	4
	44469.7759	0.797	10.54	0.430	0.113	0.626	2.696	
	44470.6295	0.004	10.54	0.431	0.120	0.622	2.673	
RW Cap	44385.9249	0.441	10.18	0.165	0.126	1.068	2.838	
	44386.7787	0.693	10.19	0.159	0.123	1.062	2.838	
MW Pav	44390.7668	0.00	9.05	0.248	0.158	0.702	2.684	
	44461.7267	0.259	8.63	0.230	0.158	0.708	2.701	
	44469.8687	0.501	9.00	0.246	0.141	0.719	2.701	
VY Mic	44387.8451	0.502	9.56	0.164	0.149	1.038	2.808	4
	44468.8193	0.757	9.55	0.156	0.167	1.054	2.852	
SU Ind	44461.8890	0.762	9.55	0.314	0.136	0.463		
KZ Pav	44385.9000	0.725	7.71	0.283	0.146	0.578	2.682	16
	44468.7743	0.970	8.77	0.349	0.191	0.461	2.629	
	44468.8011	0.000	9.30	0.485	0.219	0.290	2.638	
DV Aqr	44387.8121	0.996	6.23	0.149	0.196	0.879	2.786	
	44456.7862	0.774	5.95	0.126	0.209	0.919	2.819	
	44462.6553	0.500	6.06	0.130	0.198	0.936	2.813	
BV1570 Mic	44463.8528	0.853	9.33	0.171	0.170	0.851	2.797	
RY Aqr	44456.7503	0.019	9.60	0.299	0.144	0.660	2.705	
	44457.6994	0.502	8.93	0.218	0.145	0.706	2.747	
	44458.6867	0.004	10.10	0.371	0.152	0.568	2.667	
	44460.6430	0.001	10.15	0.370	0.170	0.563	2.646	
BV791 Ind	44458.7024	0.501	7.57	0.217	0.103	0.718	2.688	17
	44461.6764	0.001	8.10	0.225	0.099	0.712	2.687	
	44462.8385	0.196	7.50	0.222	0.094	0.717	2.694	
U Gru	44382.8935	0.505	11.67	0.563	0.223	0.358	2.569	
RS Ind	44458.8706	0.754	9.51	0.224	0.159	0.716	2.716	
	44469.6438	0.017	9.52	0.229	0.160	0.691	2.728	
AD Cap	44459.8908	0.752	9.70	0.588	0.259	0.305		
V Gru	44460.8200	0.826	9.55	0.271	0.150	0.505	2.691	18
	44460.8602	0.909	9.77	0.271	0.164	0.492	2.684	
	44460.8955	0.982	10.12	0.291	0.157	0.485	2.666	
	44463.8040	0.000	10.16	0.290	0.144	0.504	2.663	
	44464.7473	0.952	10.15	0.291	0.136	0.500	2.670	
	44464.8187	0.100	9.70	0.274	0.134	0.514	2.680	
	44468.7081	0.147	9.58	0.265	0.161	0.496	2.687	
	44468.7317	0.196	9.49	0.269	0.158	0.489	2.674	
	44468.8440	0.428	9.64	0.261	0.155	0.515	2.682	
FF Aqr	44463.8326	0.808	10.37	0.345	0.123	0.428		
ST Aqr	44456.7994	0.563	9.36	0.300	0.148	0.719	2.732	
	44460.8509	0.751	9.18	0.280	0.158	0.752	2.723	
	44461.8328	0.008	9.68	0.306	0.149	0.713	2.723	
	44470.8157	0.510	9.37	0.298	0.148	0.732	2.717	
BW Aqr	44236.5585	0.011	10.61	0.331	0.192	0.464	2.611	
	44456.8410	0.793	10.34	0.328	0.165	0.432	2.650	
	44464.8477	0.984	10.49	0.343	0.139	0.454	2.641	
	44464.9200	0.994	10.89	0.357	0.127	0.509	2.644	
EE Aqr	44383.8607	0.502	8.13	0.226	0.157	0.642	2.709	
	44457.7926	0.752	7.96	0.236	0.149	0.647	2.727	
	44470.6461	0.005	8.58	0.248	0.154	0.627	2.698	
RV Gru	44461.8073	0.173	11.11	0.587	0.360	0.344		
	44462.9123	0.432	11.40	0.586	0.433	0.277		
	44462.9268	0.488	11.72	0.574	0.441	0.261		
	44469.6786	0.512	11.72	0.596	0.416	0.272		
W Gru	44456.8873	0.033	9.29	0.316	0.162	0.437	2.634	
	44457.8818	0.703	8.93	0.322	0.148	0.465	2.641	
	44459.7240	0.946	9.12	0.317	0.164	0.444	2.648	
	44459.7636	0.971	9.32	0.322	0.149	0.465	2.652	
	44459.7832	0.984	9.43	0.319	0.165	0.437	2.635	
	44459.8068	0.000	9.49	0.321	0.156	0.463	2.646	
π Psa	44235.5557	0.005	5.12	0.195	0.152	0.686	2.734	
X Gru	44457.6745	0.771	10.67	0.072	0.172	1.017	2.881	
	44468.8294	0.024	11.56	0.093	0.167	1.008		
CZ Aqr	44459.8469	0.523	10.98	0.129	0.210	0.818	2.812	
	44460.9203	0.767	10.74	0.176	0.168	0.865	2.795	
	44462.8497	0.004	12.16	0.301	0.096	0.743		
	44468.8529	0.962	11.48	0.212	0.170	0.764		
	44468.8858	0.000	12.22	0.305	0.174	0.590		
BC Oct	44239.5972	0.738	10.33	0.415	0.100	0.483	2.636	

NOTES TO TABLE 2

(1) Not an eclipsing binary according to Eggen 1978. (2) The eclipsing binary of this visual double is the SE star; observed separately. (3) The minima are occurring early. (4) The ephemeris needs revision. (5) The change in Hβ appears to be real. (6) The minima are occurring late. (7) One of the two stars in this visual binary is the variable. (8) The phases do not agree with the magnitudes, period off? (9) The changes in m_1 and c_1 are not due to random errors of measurement. (10) The phases may be significantly off. (11) The differences in c_1 are due mainly to differences in u magnitude and appear to be real. (12) A close visual double; the companion is included in the measurement. (13) Visual triple star; the north component is the variable and was measured separately. (14) A very red, K star. (15) The variations in Hβ are not due to errors of measurement. (16) The eclipsing binary of this visual double is the N star; observed separately. (17) IBVS No. 120 indicates an incorrect star on identification chart; CoD and CPD positions are correct. (18) The phases are based on the new period of $0^{d}.4833$, determined during this study. (19) Observations do not agree with those of Eggen 1978; misidentification?

tion stars appeared to give a higher average c_1 extinction than did the F-type extinction stars. Unfortunately there was not enough data to determine the actual $b-y$ behavior of this possible coefficient, but its value may be ~ 0.02 for an assumed linear relationship. Further study may be worthwhile.

V. THE STANDARDIZATION

In determining the transformation coefficients to the standard system *uvby* and Hβ standards ranging in spectral type from B0 to K1 have been used. The V magnitudes have been determined from the y magnitudes using the measurements of Johnson *et al.* (1966) and Gronbech, Olsen, and Strömgren (1976).

Separate least-squares standardizations were done for each of the three observing runs. Small, but nonnegligible, differences in the determinations of the standardization coefficients from run to run indicated that it was best not to combine all data into one standardization. The differences noted may be due to changes in the condition of the filter set and use of more than one telescope. Night corrections were determined for the Hβ transformation, but they were generally very small.

In order to ascertain the accuracy of the final transformation the differences were calculated between the published standard values and the nightly transformed values of the standard stars used in this program. The average rms scatter of one difference for V, $b-y$, m_1, c_1, and Hβ is, respectively, 0.010, 0.004, 0.006, 0.009, and 0.005. These values compare quite well with those of Gronbech, Olsen, and Strömgren (1976) and Gronbech and Olsen (1977) in the analyses of their standard star catalogs. The major cause of this scatter appears to be the inevitable, small variations in extinction during each night and the intrinsic scatter in the standard catalogs themselves.

VI. THE PHOTOMETRIC CATALOG AND DATA ACCURACY

The final results of the survey are presented in Table 2. Column (1) lists the variable star designation with the stars presented in order of increasing right ascension. Columns (2) and (3) list the heliocentric Julian Date and the best determination of the photometric phase for the V observation in column (4). Many of the phases should be considered approximate, since the epochs and minima on which they are based may be quite old. If the phase listed is exactly 0.000 or 0.500, a minimum was observed and the time determined to be at the Julian Date of column (2). A "+" or "−" in the third decimal place of the phase indicates that the brightness of the star was increasing or decreasing, respectively, even though the calculated phase indicated that it should be doing the opposite. Columns (5)–(8) list the average colors and indices at the approximate time of the V magnitude. A number in column (9) refers to a remark at the end of the table.

For the program stars brighter than $V=9$, the rms scatters listed for the standard stars in § V are a good indication of the accuracy to be expected in the final results since the program and standard stars were all observed over the same range of air mass. For fainter stars the less favorable counting statistics will decrease the accuracy somewhat. However, analysis of the scatter in the individual observations which were averaged to form the data in Table 2 indicates that, in almost all cases, the error in the tabulated values should be less than 0.020. For the few very faint stars where a higher error was indicated for the colors and indices, the results are given to only two decimals or are not listed at all.

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JANET T. KERN: 1139 E. Seminole St., Springfield, MO 65807

GEORGE W. WOLF: Department of Physics and Astronomy, Southwest Missouri State University, Springfield, MO 65804