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FOURTH CATALOGUE OF SPECTROSCOPIC BINARY STARS

BY

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Nearly twelve years have elapsed since the Third Catalogue of Spectroscopic Binary Stars¹ was issued. In this interval 346 stars have been added to the list of those known to have variable radial velocities and in the same period the orbital elements for 154 additional spectroscopic binaries have been determined. Much of the older data have been revised in the light of further observations. A number of stars announced earlier as having variable velocities have been withdrawn and in a few cases the orbital elements previously published have been shown to be quite erroneous. There is therefore need that the material relating to spectroscopic binaries be collected and presented anew for the use of those especially interested in this class of stars, and to this end a Fourth Catalogue has been prepared. It aims to present briefly the more important data concerning these stars, published prior to January 1, 1936, that were available to me on that date.

During the early days of radial velocity determination it was generally assumed that the variable velocity of a star was cogent evidence of its orbital motion in a binary system. The term "spectroscopic binary" was accordingly applied to all stars whose velocities in the line of sight were found to be variable. However, as the result of the more intimate study of the phenomena exhibited by certain classes of stars listed as spectroscopic binaries, it has become increasingly apparent that we are not justified in so interpreting many cases of variable radial motion. Thus for the Cepheids, the evidence seems to be conclusive that the observed variations in radial velocity which are synchronous with those in the star's light are not to be attributed to orbital motion, but to some form of pulsation in the atmosphere of a single star. To a similar origin

may also be ascribed the short period fluctuations in velocity of the type shown by a number of stars such as β Cephei, β Canis Majoris, δ Scuti etc. Likewise the binary hypothesis is untenable as an explanation of the changes in velocity which appear to follow more or less closely the variation in light of the long period variables, typical examples of which are α Ceti and α Orionis. Stars known to possess the characteristics of these three classes should obviously be excluded from a list of spectroscopic binaries.

In the preparation of the present catalogue an effort has been made to arrange the data in a form convenient for the different classes of investigators who may wish to use it. Certain changes in the form adopted in the Third Catalogue have therefore been introduced which it is believed offer a more logical presentation of the material. The data have been presented in three tables, which are described briefly in the following paragraphs.

Table I contains the orbital elements of 375 stars which in the present state of our knowledge may be regarded as spectroscopic binaries. Stars known to belong to the three groups noted above, have been excluded. Doubtless some of those retained in the table will be found later to have the peculiarities characteristic of these classes or perhaps others that would indicate them not to be binaries. In fact there is good reason for believing that several of the stars here listed might properly have been omitted. Since the observational evidence is at present insufficient to justify a definite decision as to these stars, the conservative procedure has been adopted of entering their elements in the table and of indicating, by an interrogation mark preceding the data for the star, those cases which in the author's judgement are probably not real bi-

¹ LOB 11, 141, 1924.

naries. The reasons for the rejection of these stars are in most cases apparent from the note relating to each placed at the end of the table. The statistical studies by Struve² and the more recent investigations by Beer³ have shown that there are grounds for grave suspicion of the binary character of Class B and Class A stars whose velocity variations take place in a period of less than a day. There is also reason from theoretical considerations for believing that binaries whose components are of low density cannot have such short periods. A few such stars appear in the list and these should probably be excluded where it is desired to have the data truly representative of binary systems.

The first column of Table I contains the serial numbers of the orbits entered, a separate one being assigned to each orbit of a triple or quadruple system. In the second column the usual designation of the star is quoted, the Boss numbers being indicated by the letter B. The visual components of a multiple star are designated in the customary manner by A, B, C, etc. and the spectroscopic components by a, b, c, etc. The third column contains the star's right ascension and declination for 1900. The visual magnitude, except where the value is enclosed in parentheses, and the spectral class in the fourth and fifth columns respectively, are taken from the *Henry Draper Catalogue*. The magnitudes of variables are with few exceptions those given in Prager's *Katalog und Ephemeriden Veränderlicher Sterne für 1936*. Photographic or photoelectric values are printed in italics. In the sixth column is entered the revised spectral class. For the most part these are quoted from *Contributions from the Mount Wilson Observatory*, No. 511. Columns seven to fifteen inclusive list the orbital elements as derived from the radial velocity curve of a spectroscopic binary, while the remaining columns give the computer and reference to the published elements. Additional information concerning the star, given in the notes following the table, is indicated by the letter R appearing in the final column. When two or more orbits have been published, only the best or most recent elements have been quoted. A number of exceptions to this rule, however, have seemed justified, especially where real changes in the elements appear to be indicated. For binaries in which the spectra of both components are visible the values of K , $a \sin i$ and $m \sin^3 i$ given on the first and second lines correspond respectively to the primary and secondary. The values of the other elements being the same for the two, except ω which differs by 180° , are not repeated. The orbits of several visual binaries have been included when radial velocity observations have shown variation in the velocity of one component or differences between the velocities of the two. Their introduction here, if it serves no other purpose, will emphasize the desirability of overlapping the two types of observation. Stars known to be eclips-

² MN 86, 63, 1925. ³ VBB 5, Pt 6, 1, 1927.

ing variables are marked in the table by an asterisk preceding the star's designation and those that are classed as ellipsoidal variables are indicated by a dagger.

Table Ia contains data of the absolute dimensions, masses and densities for the eclipsing variables having both spectra visible and for which good photometric elements are available. The letters A, β and W in the third column indicate the type of eclipsing variable, respectively *Algol*, β *Lyrae* and *W Ursae Majoris*. In the sixth column the magnitude at maximum is given. Column seven contains, above, the observed range in magnitude from maximum to the bottom of primary minimum, and below, the corresponding amount for the secondary minimum. The letters U and D entered in the eighth column signify whether the elements were derived on the assumption of a uniformly illuminated disk or of a darkening at the limb. Column nine contains the inclination i of the orbit; column ten, the ellipticity, or the ratio of the minor to the major equatorial axis of each star; column eleven, the light L , above, of the brighter star, and below, of the fainter, in terms of the combined light as unit. The remaining columns give radii, masses and densities of the two stars and the distance between their centers, all in terms of the Sun as unit.

The elements of a binary orbit and the quantities derived from them are defined as follows:

P = apparent period of revolution in mean solar days unless specified in mean solar years.

T = Greenwich mean time of periastron passage expressed in Julian Days, except that (1) for circular orbits T has been given significance by the computers as described in the Notes, and (2) T has been expressed in years where P is given in this unit.

ω = angular distance of periastron from the ascending node measured in the direction of orbital motion.

e = eccentricity of the orbit.

K_1 = semi-amplitude of velocity curve of the primary.

K_2 = semi-amplitude of velocity curve of the secondary.

a_1 = semi major-axis of the orbit of the primary with reference to the center of mass of the system.

a_2 = semi major-axis of the orbit of the secondary with reference to the center of mass of the system.

$a_1 + a_2$ = semi major-axis of the orbit of one component with reference to the other.

i = inclination of the orbital plane, and is defined as the angle between the line of sight and the normal to the orbital plane. Spectrographic observations leave the value of i undetermined, and micrometric observations of a visual binary leave the quadrant of i undetermined. By combining the two i is completely determined.

m_1 = mass of primary.

m_2 = mass of secondary.

$m_1 + m_2$ = mass of system.

$\odot$ = mass of Sun.

γ = radial velocity of the center of mass of the system.

r_1 = radius of the primary.

r_2 = radius of the secondary.

r_s = radius of the Sun.

ρ_1 = mean density of the primary.

ρ_2 = mean density of the secondary.

ρ_s = mean density of the Sun.

d = apparent separation of components in seconds of arc.

p = parallax.

Table II has been prepared for those who may be especially interested in a study of the variations in velocity which arise from other causes than that of orbital motion. Although orbital elements have been derived from the observed velocity curves for these stars, it is recognized that they have no significance other than that of offering a convenient method of describing the particular form of these curves. Most of the stars listed belong to one of the three classes noted above, which may perhaps be referred to in a general way as pulsating stars. The present list of 44 probably should be extended to include a dozen or more of the orbits entered in Table I. It may thus be regarded as a convenient receptacle for those stars which in the course of time lose their standing as spectroscopic binaries. The form of the table follows closely that of Table I, except that the sixth column in this instance contains the designation of the type of light variation, the letters δ , ζ , β , RR and L being used to signify δ *Cephei*, ζ *Geminorum*, β *Canis Majoris*, RR *Lyrae* and long period variables. For many of these stars the shape and amplitude of the velocity curve changes so that the elements quoted give only an approximate description of the curve.

Table III contains information concerning those stars whose variable velocities have been established, but which have not been listed in either of the preceding tables. In view of the great number of such stars and the further fact that for most of them the status has not changed since the publication of the Third Catalogue, it has seemed unnecessary to reprint much of the data contained in Tables I and II of that catalogue. Accordingly the contents of the present table have been limited to: (1) those

stars whose variable radial velocities have been announced since July 1, 1934, and for which orbital elements have not been determined; (2) those previously announced as having variable velocity, but for which variation has later been disproved or at least has been found to depend upon insufficient or doubtful evidence; (3) stars listed in the Third Catalogue of whose velocity variation we have later information. Observers who may desire to know whether a particular star has variable radial velocity should consult Tables I and II of the Third Catalogue and the three of the present one. Generally speaking, those cases, in which the announced variation is merely suspected, or the variation depends upon too few observations, have not been included. The contents of the first six columns require no comment. The seventh column contains the observed range in velocity derived from the measures of the spectrum of one component. In the eighth column are entered brief notes relating, generally, to the present evidence concerning the announced variation. Notes too long for insertion here have been placed at the end of the table and attention called to them in the Remarks column. The final column gives the authority for the announcement of new cases of variable velocity or for the withdrawal of older ones. For those announced since July 1, 1924, which have later been regarded as of doubtful character or as having constant velocity, the references for both sources of information are given in the last column.

The total number of stars for which a variation in the radial velocity may reasonably be regarded as established is about 1420. This number includes the stars of Table I, II, and III of this catalogue and those previously announced and included in the Third Catalogue. The number of stars in Table I have been taken as equal to that of the orbits there listed. Of the 375 orbits entered in Table I probably not more than 365 refer to true spectroscopic binaries. Fifty-five of these stars are eclipsing variables, four are ellipsoidal variables, and of the remainder, 12 are visual doubles and 87 have both spectra visible. There can be no question, of course, of the binary character of these 158 stars.

LICK OBSERVATORY

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ABBREVIATIONS

The following abbreviations have been used in the reference to publications:

<i>AAS</i>	Publications of the American Astronomical Society
<i>ADS</i>	New General Catalogue of Double Stars, Aitken
<i>AJ</i>	Astronomical Journal
<i>AN</i>	Astronomische Nachrichten
<i>AO</i>	Publications of the Allegheny Observatory
<i>ApJ</i>	Astrophysical Journal
<i>ASP</i>	Publications of the Astronomical Society of the Pacific
<i>BA</i>	Bulletin Astronomique
<i>BAN</i>	Bulletin of the Astronomical Institutes of the Netherlands
<i>CA</i>	Annals of the Cape Observatory
<i>Contr Prin O</i>	Contributions from the Princeton University Observatory
<i>CR</i>	Comptes Rendus de l'Académie des Sciences
<i>DAO</i>	Publications of the Dominion Astrophysical Observatory, Victoria, B.C.
<i>DO</i>	Publications of the Dominion Observatory, Ottawa, Canada
<i>HCO Cir</i>	Circulars of the Harvard College Observatory
<i>Laws OB</i>	Bulletins of the Laws Observatory
<i>LO</i>	Publications of the Lick Observatory
<i>LOB</i>	Lick Observatory Bulletins
<i>Low OB</i>	Bulletins of the Lowell Observatory
<i>Lyon O</i>	Publications de l'Observatoire de Lyon
<i>MARS&L Denmark</i>	Memoires de l'Académie Royale de Sciences et des Lettres de Danemark
<i>Mem Acad StP</i>	Memoires de l'Académie Impériale des Sciences de St. Pétersbourg
<i>Mem Soc Astr Ital</i>	Memorie della Societa Astronomica Italiana
<i>MO</i>	Publications of the Observatory of the University of Michigan
<i>MN</i>	Monthly Notices of the Royal Astronomical Society
<i>PA</i>	Popular Astronomy

<i>Ptm O</i>	Publikationen des Astrophysikalischen Observatoriums zu Potsdam
<i>Pub Min O</i>	Publications of the Astronomical Observatory, University of Minnesota
<i>Pul Mit</i>	Mitteilungen der Russischen Hauptsternwarte zu Pulkowa
<i>Pul OB</i>	Bulletin of Poulkovo Observatory
<i>Pul O Cir</i>	Poulkovo Observatory Circular
<i>RASC</i>	Journal of the Royal Astronomical Society of Canada
<i>Rep Chief Astr Can</i>	Report of the Chief Astronomer of Canada
<i>SDS</i>	Southern Double Star Catalogue
<i>Sitz Ber Acad</i>	Sitzungsberichte der Preussischen Akademie der Wissenschaften, Berlin
<i>Tashkent Bul</i>	Bulletin of the Tashkent Astronomical Observatory
<i>Un O Cir</i>	Union Observatory Circular
<i>Vassar O</i>	Publications of Vassar College Observatory
<i>VBB</i>	Veröffentlichungen der Universitätssternwarte zu Berlin—Babelsberg
<i>VFPA</i>	Verein von Freunden der Physik und Astronomie
<i>WO</i>	Publications of Washburn Observatory
<i>YO</i>	Publications of the Yerkes Observatory
<i>Zf Astroph</i>	Zeitschrift für Astrophysik

The following abbreviations have been used for designation of observatories:

B	Bonn	O	Ottawa
C	Cape	V	Victoria
L	Lick	W	Mount Wilson
M	Michigan	Y	Yerkes

Other abbreviations or symbols used in the tables are:

- * Eclipsing variable.
- † Ellipsoidal variable.
- (?) Probably not spectroscopic binary.
- R Note at end of the table.
- 2 sp Two spectra visible.

TABLE I
ORBITAL ELEMENTS OF SPECTROSCOPIC BINARY STARS

	Star	α 1900 δ	Mag.	Spec. Class		P (days)	T (2,400,000)	ω°	e	K (km/sec)	γ (km/sec)	$a \sin i$ 10 ⁶	$\frac{m_2^3 \sin^3 i}{(m_1+m_2)^2}$	$m \sin^2 i$	Authority
				Hvd.	Rev.										
1	B 1	h^m 00.2 - 6 16	4.68	K0	K0	72.93	22530.330	337.71	0.272	16.43	- 6.56	15.856	0.030	.....	Harper DAO 3, 341, 1926 R
2	B 9	03.1 - 3 00	6.32	K0	K2	96.41	20006.84	222.1	0.124	23.88	+ 1.11	31.400	0.133	.....	Christie ApJ 77, 310, 1933
3	α And	03.2 + 28 32	2.15	A0p	A1n	96.67	17882.40	76.21	0.525	30.75	-11.55	34.790	0.180	.....	Baker AO 1, 17, 1908 R
4	+57°28	06.3 + 57 39	7.08	B5	cB9sek	55.904	25634.780	313.3	0.033	85.5	-24.5	65.700	.....	113.2	Pearce MN 92, 877, 1932
5	Σ 12 A	09.8 + 8 16	(6.1)	F0	B5n	0.84166	26974.194	119.55	0.027	87.96	+ 0.37	1.018	.....	44.9	MacCormack ApJ 80, 120, 1934 R
6	*AO Cas	12.5 + 50 53	(6.1-6.3)	B0	A9s	3.52341	24003.703	210.16	0.037	92.57	.....	1.071	.....	0.25	Pearce DAO 3, 283, 1926
7	*TV Cas	13.9 + 58 35	(7.30-8.35)	B9	O8.5nk	1.812635	20117.742	.....	0	234.59	.....	11.360	.....	16.40	Plaskett DAO 2, 141, 1922 R
8	α Phe	21.3 - 42 51	2.44	K0	A0	3849	16202	20	0.33	150	.....	3.739	.....	0.94	Lunt CA 10, Pt 7, 24 G, 1924
9	B 82	22.8 + 43 50	5.16	A2	G5	3.95583	18841.590	233.2	0.152	5.8	+75.2	290.000	0.066	.....	Udick AO 2, 191, 1912
10	13 Cet A	30.1 - 4 09	(5.6)	G0	F7	2.08189	18402.33	var	0.1	41.7	+ 2.04	2.240	0.0288	.....	Luyten ApJ 78, 225, 1933 R
11	13 Cet AB	30.1 - 4 09	5.24	.....	.....	6.91 yr	1925.94	73	0.73	37	var	106.000	0.0108	.....	Luyten ApJ 78, 225, 1933 R
12	π And	31.5 + 33 10	4.44	B3	B3	143.67	18564.144	350.53	0.573	47.66	+ 8.83	77.200	0.8892	.....	Jordan AO 2, 45, 1910 R
13	π Cas	37.9 + 46 29	5.02	A5	.....	1.96408	19970.035	45.1	0.010	117.32	+12.42	3.168	.....	1.35	Harper DO 4, 135, 1917 R
14	ρ Tuc	38.2 - 66 01	5.46	F5	.....	4.820223	19299.106	269.01	0.02	118.97	.....	3.213	.....	1.34	Lunt CA 10, Pt 7, 38 G, 1924 R
15	*YZ Cas	39.0 + 74 26	(5.68-6.09)	A2	F4	4.46718	23964.657	.....	0.00	25.7	+13.55	1.700	0.0085	.....	Plaskett DAO 3, 248, 1926 R
16	B 159	41.1 + 74 18	5.39	B8	A3s	33.75	20577.41	269.71	0.405	71.46	+ 9.97	4.390	0.169	.....	Young DO 2, 181, 1915
17	$\dagger$ ζ And	42.0 + 23 43	(5.13-5.23)	K0	B8s	17.7673	20037.675	80.60	0.017	16.32	- 4.06	7.020	0.0121	.....	S Jones CA 10, Pt 8, 35, 1928 R
18	ν And	44.3 + 40 32	4.42	B3	G8	4.28284	18155.661	.....	0.0	25.96	-23.75	6.342	0.0323	.....	Jordan AO 1, 191, 1910 R
19	*U Cep	53.4 + 81 20	(6.85-9.19)	A0	B5s	2.4929507	23966.644	25.0	0.474	75.63	-23.91	4.454	.....	1.10	Carpenter ApJ 72, 205, 1930 R
20	ζ Phe	1 04.2 - 55 47	4.13	B8	A0	1.66958	20709.85	90	0.14	104	.....	6.125	.....	.....	Colacevich ASP 47, 84, 1935 R
21	ζ Psc B	08.5 + 7 03	6.49	F8	G8	9.07504	39999.162	122.1	0.033	125	+18	2.840	.....	2.8	Christie ApJ 77, 313, 1933 R
22	α UMi	22.6 + 88 46	(2.54-2.71)	F8	F6	29.6 yr	1899.5	332.0	0.63	180	+10.35	6.340	0.124	.....	Moore ASP 41, 254, 1929 R
23	γ Phe	24.0 - 43 50	3.40	K5	cF7	193.79	17945.0	267	0.005	4.05	-17.4	466.000	0.035	.....	Wilson LOB 9, 116, 1918
24	Σ 145 A	35.7 + 25 14	6.26	F5	M1	4.43474	21940.9865	295.58	0.108	15.8	+25.7	42.100	0.079	.....	Sanford ApJ 53, 203, 1921 R
25	(?) ϕ Per	37.4 + 50 11	4.19	B0p	F3	126.5	18290.42	347.29	0.428	81.5	+ 4.6	4.942	.....	1.16	Cannon RASC 4, 195, 1910 R
					B0ne	(63.25	18324.37	257.14	0.107	88.6	.....	5.372	.....	1.06	Ludendorff AN 186, 17, 1910
						126.6	18518	.....	0	20	- 3.5	35.000	.....	2.5	S Jones CA 10, Pt 8, 40, 1928
26	ζ Cet	46.5 - 10 50	3.92	K0	K0	1652	14377.6	85.0	0.586	45	.....	78.000	.....	1.1	Harper DO 3, 113, 1915 R
27	α Tri	47.4 + 29 06	3.58	F5	F2	1.73652	20793.821	135.56	0.121	3.30	+ 9.21	60.750	0.0033	.....	Young DO 2, 89, 1915
28	ω Cas	48.2 + 68 12	5.03	B8	B8s	69.92	20426.02	49.97	0.30	12.10	-12.65	0.287	0.0003	.....	Ludendorff ApJ 25, 320, 1907
29	β Ari	49.1 + 20 19	2.72	A5	A3	107.0	17632	19.7	0.88	29.64	-24.82	27.190	0.164	.....	R Jones LOB 15, 117, 1931
30	κ Ari	2 01.0 + 22 10	5.08	A0	.....	15.2938	21844.1345	359.19	0.608	34.45	+11.48	5.752	.....	0.14	
										35.48	.....	5.924	.....	0.13	

TABLE I—Continued
ORBITAL ELEMENTS OF SPECTROSCOPIC BINARY STARS

	Star	α 1900 δ	Mag.	Spec. Class		P (days)	T (2,400,000)	ω°	e	K (km/sec)	γ (km/sec)	$a \sin i$ 10 ⁶	$\frac{m_2^2 \sin^2 i}{(m_1+m_2)^2}$	$m \sin^3 i$	Authority
				Hvd.	Rev.										
31	β Tri	α 03.6 -34 31	3.08	A5	A6	31.4009	25191.160	293.9	0.456	26.1	+10.4	9.930	0.0397	.....	Struve, Pogo <i>ApJ</i> 67, 336, 1928
32	Σ 227 A	06.6 +29 50	(5.5)	G0	G4	14.732	22243.157	5.39	0.043	56.53	-19.09	11.441	.....	1.12	Harper <i>DAO</i> 2, 129, 1921 R
33	Σ 227 B	06.6 +29 50	(6.7)	.....	F2	2.2365	22246.698	3.68	0.010	56.98	.....	11.532	.....	1.12	Harper <i>DAO</i> 2, 129, 1921 R
34	δ Tri	10.9 +33 46	5.07	G0	G0	9.92912	23309.427	21.50	0.059	95.43	-19.8	2.934	.....	0.91	Pearce <i>LOB</i> 11, 131, 1923 R
35	B 523	12.8 +1 17	5.82	F8	F8	93.50	23389.995	100.95	0.445	8.82	-6.4	1.200	0.0007	.....	Harper <i>DAO</i> 6, 1, 1930
36	Σ 5 A	31.2 +24 13	6.57	F5	F5	9.851	21586.899	129.6	0.146	19.43	+25.75	22.371	0.051	.....	Adams, Joy <i>ApJ</i> 49, 186, 1919 R
37	B 610	35.9 +39 46	4.99	G0	F9	331.0	15021.7	267.7	0.67	22.48	+14.42	3.013	0.0113	.....	Colacevich <i>ASP</i> 47, 284, 1935
38	B 613	36.2 +67 24	5.84	A2	.....	2.53636	21895.898	0.93	0.014	21.4	-22.5	72.100	.....	0.74	Harper <i>DAO</i> 4, 313, 1930 R
39	* RZ Cas	39.9 +69 13 (6.33-7.80)	.....	A0	.....	1.19525	19449.732	154.7	0.052	24.8	.....	83.600	0.044	0.64	Jordan <i>AO</i> 3, 137, 1914
40	π Ari	43.7 +17 03	5.30	B5	B8	3.854	20370.259	78.27	0.042	55.03	+4.22	1.137	0.0412	.....	Young <i>DO</i> 4, 69, 1917 R
41	+57°51	44.2 +57 53	6.27	A0	A1	8.2504	24854.892	212.74	0.227	12.78	-5.80	1.423	0.0017	.....	Harper <i>DAO</i> 4, 39, 1927 R
42	τ Per	47.2 +52 21	4.06	G0+A5	G1+A5	1515.6	15693.4	234.6	0.734	19.00	+2.15	268.900	0.337	.....	Colacevich <i>ASP</i> 48, 32, 1936 R
43	* β Per ab	3 01.7 +40 34 (2.2-3.5)	.....	B8	.....	2.8672965	1.424 267.8	0.033	0.083	43.96	+16.30	1.732	0.0253	.....	McLaughlin <i>MO</i> 6, 3, 1934 R
44	β Per abc	01.7 +40 34	.....	.....	.....	2.8672965	0.400 140.4	0.043	0.043	44.34	+4.09	1.747	.....	.....	McLaughlin <i>MO</i> 6, 3, 1934
45	* CC Cas	06.2 +59 11 (7.3-7.4)	.....	B5	O8	1.873 yr	1903.38	93.0	0.26	9.70	+2.21	88.000	0.0583	18.88	Pearce <i>DAO</i> 4, 67, 1927
46	+34°610	09.8 +34 19	6.42	A2	O8	5.54348	23080.361	90.66	0.040	291.79	.....	13.447	.....	9.17	Harper <i>DAO</i> 6, 79, 1932 R
47	B 804	25.4 +12 36	4.28	K0	G7	960	14889.565	326.32	0.397	62.18	+24.24	4.732	0.138	.....	Harper <i>DAO</i> 3, 145, 1924 R
48	B 809	26.9 +39 34	5.80	A0	A2	0.9171877	00000.3137	.....	0.0	8.25	+14.18	99.955	0.0433	.....	Harper <i>DAO</i> 6, 214, 1935 R
49	B 816	29.4 -21 58	4.32	B8	B8n	6.2236	24446.55	313	0.20	95.66	+2.72	1.206	0.0834	.....	Struve <i>ApJ</i> 63, 368, 1925
50	σ Per	38.0 +31 58	3.94	B1	B2k	4.41916	18217.924	.....	0.00	107	+15.0	8.970	.....	2.87	Jordan <i>AO</i> 2, 63, 1910 R
51	β Ret	42.9 -65 07	3.80	K0	G9	1911.5	20086.1	13.8	0.210	103	.....	8.640	.....	2.76	S Jones <i>MN</i> 88, 645, 1928
52	B 900	49.2 +50 24	5.47	F5p	F4	30.4338	23797.270	214.36	0.612	111.92	+18.46	6.801	.....	3.79	Harper <i>DAO</i> 4, 161, 1928 R
53	* λ Tau ab	55.1 +12 12 (3.77-4.14)	.....	B3	B3	3.952941	21510.707	72.6	0.055	57.10	.....	18.898	.....	0.88	McLaughlin <i>MO</i> 6, 19, 1934 R
54	λ Tau abc	55.1 +12 12	.....	.....	.....	30.0	23764.58	169	0.05	55.95	var	3.037	0.072	.....	McLaughlin <i>MO</i> 6, 19, 1934 R
55	* AG Per	4 00.6 +33 11 (6.33-6.63)	.....	B3	B3k	2.02858	24039.335	30.103	0.051	8.60	+16.5	3.540	0.0020	.....	Plaskett <i>DAO</i> 3, 184, 1925 R
56	μ Per	07.6 +48 09	4.28	G0	B3k	284	20061.97	301.99	0.062	164.97	+15.84	4.549	.....	4.86	Cannon <i>DO</i> 2, 353, 1915 R
57	$\dagger$ B 986	10.7 +50 03 (4.85-4.91)	.....	A2	cG2	1.52738	18956.662	271.53	0.017	187.32	.....	5.165	.....	4.29	Harper <i>DAO</i> 4, 309, 1930 R
58	+16°577	11.9 +16 41	8.3	G5	G5	5.6100	23102.193	88.6	0.040	20.50	+7.83	80.000	0.2526	.....	Sanford <i>ApJ</i> 59, 356, 1924 R
59	B 1001	14.1 -34 02	3.59	B9	.....	5.0105	17562.266	124.33	0.014	58.6	+38.2	4.517	0.1166	.....	Paddock <i>LOB</i> 8, 168, 1915 R
60	O Σ 82 A	17.1 +14 49 (7.24)	.....	G0	F8	4.00000	22274.8123	12.74	0.060	64.85	.....	4.468	.....	0.55	Sanford <i>ApJ</i> 53, 206, 1921 R
61	B 1018	17.7 +16 33	5.68	A2	A7s	8.4178	19818.843	189.2	0.101	36.1	+37.4	1.980	0.0193	.....	Jantzen, Harper <i>DAO</i> 6, 217, 1935 R

62	+72°27	4 21.9	+72 20	5.97	A5	.....	4 195	15950 989	18.90	0.043	31.81	+ 8.87	1.831	0.0140	.....	Harper DAO 4, 316, 1930 R
63	θ^2 Tau	22.9	+15 39	3.62	F0	A7s	140.70	18054.723	54.16	0.717	27.12	+42.59	37.471	0.0987	.....	Plaskett DO 2, 63, 1915 R
64	B 1074	29.7	+41 04	4.46	K0+A3	cG2	6270	22892	201	0.45	12.9	+ 4.2	993.500	0.9965	.....	Sanford ASP 43, 268, 1931 R
65	B 1076	30.2	+ 9 57	4.38	A3	.....	3.57124	19734.996	.....	0.0	76.32	+28.4	3.748	0.164	.....	Wilson LOB 7, 104, 1913 R
66	β GC2280A	32.0	+52 53	5.31	K0	G6	121	21137.55	285	0.019	28.19	-40.47	46.900	0.28	.....	Cannon DO 4, 175, 1918 R
67	+7°676	32.5	+ 7 07	6.89	B5	B3k	2.2075	24807.936	2.38	0.076	124.9	+25.3	3.780	.....	7.0	Pearce DAO 6, 60, 1932
68	B 1107	36.2	+22 46	4.33	B5	B5n	1.5047	17892.500	242.88	0.087	44.34	+13.55	0.914	0.0135	.....	Parker Rep Chief Astr. Can 1, 166, 1910
69	+32°840	42.8	+32 25	5.94	A3	.....	7.0507	26327.626	289.66	0.033	57.81	+20.32	5.602	0.141	.....	Harper DAO 6, 82, 1932
70	B 1131	42.8	+18 33	6.79	G5	G1	45.454	23030.461	26.48	0.391	13.57	+54.66	7.810	0.0092	.....	Sanford ApJ 61, 321, 1925
71	π^4 Ori	45.9	+ 5 26	3.78	B3	B2s	9.5191	18279.64	152.27	0.027	25.93	+23.27	3.393	0.0172	.....	Baker AO 1, 107, 1909
72	π^5 Ori	49.0	+ 2 17	(3.60-3.65)	B3	B2sk	3.70045	17921.64	.....	0.00	57.88	+23.4	2.945	0.0745	.....	Lee ApJ, 38, 175, 1913: 64, 1, 1926 R
73	β GC2406A	49.3	+53 35	(4.5)	A2	A2s	3.8846	18281.176	217.14	0.013	35.15	- 8.93	1.877	0.018	.....	Harper RASC 5, 112, 1911 R
74	* e Aur	54.8	+43 40	(3.08-3.79)	F5p	cF2	27.1 yr	1920.6	319.7	0.35	14.8	- 1.8	1887.000	2.7	.....	Ludendorff Sitz Acad Ber 49, 1924 R
75	* ζ Aur	55.5	+40 56	(4.9-5.6)	K0+B1	cK4+B	973	15122.471	330.13	0.411	23.78	+10.73	294.300	1.03	.....	Harper DAO 3, 151, 1924 R
76	B 1213	50.18	- 4 47	5.19	B9	B9	5.52242	23087.5753	335.9	0.074	97.0	+30.9	7.300	.....	2.5	Frost, Struve ApJ 60, 313, 1924 R
77	B 1216	02.0	+24 08	5.50	B3	B3k	58.31	24221.266	273.88	0.189	36.73	+16.22	28.900	0.280	.....	Hill ASP 42, 246, 1930 R
78	* TT Aur	02.8	+39 28	(3.06-9.02)	B5	B3	1.332732	19065.9041	.....	0.0	196.8	+10.2	3.600	.....	6.7	Joy, Sitterly ApJ 73, 77, 1931 R
79	(?) +40°1196	03.7	+40 53	8.1	B3	B3e	3710	23412	77	0.31	31.5	+ 9.3	1528.000	10.4	.....	Merrill ApJ 79, 343, 1934 R
80	Σ 653 A	08.8	+32 34	(5.3)	A2	A7s	3.789	20802.715	19.70	0.033	21.56	-10.74	1.123	0.0039	.....	Harper DO 3, 221, 1916 R
81	α Aur	09.3	+45 54	0.21	G0	G1	104.022	14899.5	117.3	0.0164	25.76	+30.17	36.848	.....	1.19	Reese LOB 1, 32, 1901 R
82	(?) β Ori	09.7	- 8 19	0.34	B8p	cB8	21.90	17968.80	254.76	0.296	3.77	+22.62	1.109	0.0001	.....	Plaskett ApJ 30, 26, 1909 R
83	Σ 674 A	11.6	+20 01	(6.9)	F5	F4	3.4347	24837.932	.....	0	95.8	-27.4	4.525	.....	1.40	Sanford ApJ 68, 42, 1928 R
84	* AR Aur	11.8	+33 39	(6.4-7.1)	B9	F4	4.134586	28102.713	.....	0	101.3	.....	4.784	.....	1.33	Wyse ASP 48, 24, 1936 R
85	B 1275	14.9	+29 29	5.72	A0	A1n	2.15165	21138.241	.....	0.000	113.27	-19.70	3.351	.....	2.29	Harper DAO 3, 265, 1926 R
86	* η Ori A ab	19.4	- 2 29	(3.7-3.9)	B1	B0k	7.98922	15720.821	42.3	0.016	144.8	var	15.900	2.51	.....	Adams, Sanford ApJ 17, 68, 1903: 64, 173, 1926 R
87	η Ori A abc	19.4	- 2 29	.....	.....	.....	9.2 yr	1900.0	27.0	0.1	17.5	+19.5	805.000	1.84	.....	Pogo ApJ 68, 309, 1928
88	ψ Ori A	21.6	+ 3 00	4.66	B2	B2	2.52588	17916.36	184.71	0.065	144.12	+12.02	4.995	0.780	.....	Plaskett ApJ 28, 266, 1908 R
89	χ Aur	26.2	+32 07	4.88	B1	cB3ss	655.16	20629.78	135.52	0.171	20.53	- 0.15	182.300	0.56	.....	Young DO 4, 1, 1916 R
90	* δ Ori A	26.9	- 0 22	(2.48-2.63)	B0	B0k	5.732585	22391.5004	337.94	0.1066	101.53	+21.25	7.958	0.613	.....	Hnatek AN 213, 17, 1920 R
91	* VV Ori ab	28.5	- 1 14	(5.30-5.65)	B2	B2nk	1.48540	19836.021	.....	0.00	132.37	+20.77	2.704	0.358	.....	Daniel AO 3, 179, 1915 R
92	VV Ori abc	28.5	- 1 14	.....	.....	.....	120	19819	40	0.30	13.0	.....	20.460	0.0238	.....	Daniel <i>Ibid.</i> R
93	ϕ^1 Ori	29.3	+ 9 25	4.53	B0	B0ssk	8.4 yr	1908.3	105	0.22	13.3	+33.2	54.000	0.6954	.....	Struve ApJ 63, 60, 1925 R
94	-0°1009	30.1	- 0 48	8.1	B3	.....	4.623884	26991.561	272.64	0.116	48.10	+ 0.93	3.039	0.06	.....	Neubauer LOB 17, 185, 1936 R
95	θ^2 Ori A	30.5	- 5 29	5.17	B1	O0k	21.029	23741.362	154.7	0.27	93.7	+36.8	27.000	1.604	.....	Struve ApJ 60, 159, 1924 R
96	ι Ori	30.5	- 5 59	2.87	Oe5	O8sk	29.136	17587.991	112.37	0.742	113.68	+21.53	30.560	1.3394	.....	Plaskett, Harper ApJ 30, 373, 1909 R
97	(?) ζ Tau	31.7	+21 05	3.00	B3p	B3e	(29.136	17587.354	.....	0.0	8.38)	.....	19.290	0.016	.....	Losh MO 4, 1, 1931 R
98	B 1381	32.4	-64 18	5.30	G5	G8	133.0	10291.541	326.23	0.329	11.22	+29.82	47.900	0.1344	.....	Lunt CA 10, Pt 7, 19G, 1924

TABLE I—Continued

ORBITAL ELEMENTS OF SPECTROSCOPIC BINARY STARS

	Star	α 1900 δ	Mag.	Spec. Class		P (days)	T (2,400,000)	ω°	e	K (km/sec)	γ (km/sec)	$a \sin i$ 10 ⁶	$\frac{m_2^3 \sin^3 i}{(m_1+m_2)^2}$	$m \sin^2 i$	Authority
				Hvd.	Rev.										
99	B 1388	$5^h 33.5^m +25 50$	5.00	B3	B3	27.864	20471.607	335	0.55	25.5	+14.8	8.160	0.0280	.....	Cannon DO 3, 409, 1916
100	B 1399	$35.8 - 1 11$	5.00	B3	B3	27.160 (27.160)	17961.465	87.02	0.765	93.04	+26.12	22.380	0.6067	.....	Plaskett, Harper ApJ 30, 374, 1909 R
101	<i>TU</i> τ Cam	$46.0 +59 52$	(5.3-5.5)	A0	.....	2.93317	17973.791	359.25	0.030	76.02	- 3.86	3.065	0.1337	.....	Harper DAO 3, 159, 1924 R
102	B 1457	$47.0 +27 35$	4.54	A0	.....	5.969	21938.356	191.44	0.022	48.9	-17.1	4.011	.....	0.63	Cannon DO 2, 105, 1915 R
103	B 1464	$49.1 +19 44$	5.89	B2	B3k	7.8271	24141.590	67.0	0.250	74.3	+ 7.2	5.826	.....	0.44	Pearce DAO 6, 65, 1932
104	* β Aur	$52.2 +44 56$ (2.07-2.16)	.....	A0p	B5	3.960027	17100.7324	.....	0.00	108.96	-18.1	5.934	.....	3.9	Baker AO 1, 163, 1910 R
105	B 1492	$54.3 - 9 34$	5.10	A5	A0p	9.3553	19673.815	35.41	0.208	57.1	+22.2	7.200	.....	2.17	Elvey ApJ 60, 320, 1924
106	μ Ori A	$56.9 + 9 39$	(4.3)	A2	.....	4.44746	23862.224	.....	0	29.0	var	1.800	0.0113	.....	Bourgeois ApJ 70, 256, 1929 R
107	μ Ori AB	$56.9 + 9 39$	4.19	.....	A2s	17.5 yr	1911.75	43	0.76	14.9	+43.3	850.000	0.60	.....	Bourgeois ApJ 70, 256, 1929 R
108	B 1508	$58.0 +23 16$	4.30	G5	G5	9.590	21898.741	203.28	0.206	11.74	+19.71	1.510	0.0015	.....	Young DAO 1, 119, 1919
109	B 1515	$59.6 +38 29$	5.31	A3	.....	28.28	20468.197	178.41	0.556	51.38	+16.91	16.550	.....	1.35	Young DO 4, 95, 1917
110	ν Ori	$6 01.9 +14 47$	4.40	B2	.....	131.26	17975.16	1.58	0.599	34.09	+22.10	49.270	0.2773	.....	Harper RASC 5, 16, 1911
111	B 1593	$13.6 +53 30$	5.41	F5	B3s	6.5013	23634.166	330.60	0.019	31.74	- 1.52	2.837	0.0216	.....	Harper DAO 3, 189, 1925
112	* RR Lyn	$18.0 +56 20$ (5.60-5.98)	.....	A3	F4	9.944	19341.776	152.9	0.081	67.19	-13.74	9.127	0.3101	.....	Harper DO 2, 167, 1915 R
113	-3°1413	$18.0 - 3 14$	6.58	B5	A7s	1.19033	24942.706	9.2	0.036	172.8	+ 8.3	2.827	.....	6.2	Pearce DAO 6, 70, 1932
114	δ Col	$18.4 -33 23$	3.98	G5	B5n	868.78	19915.02	117.08	0.695	10.61	- 2.56	91.120	0.0405	4.1	S Jones CA 10, P 48, 45, 1928 R
115	* WW Aur	$26.0 +32 31$ (5.61-6.25)	.....	A0	G1	2.5248	21623.3637	.....	0.00	115.6	- 5.8	4.010	.....	2.2	Joy ASP 30, 254, 1918 R
116	+6°1309	$32.0 + 6 13$	6.06	B0p	A7	14.414	23031.870	181.95	0.035	135.1	+23.94	4.690	.....	1.9	Plaskett DAO 2, 147, 1922
117	α CMa	$40.7 -16 35$	-1.58	A0	O8ek	50.04 yr	1894.133	145.69	0.594	2.36	- 7.6	.....	.....	63.3	Aitken LOB 9, 184, 1918 R
118	τ Pup	$47.5 -50 30$	2.83	K0	A2s	1066.0	20992.8	64.0	0.088	4.14	+36.36	60.5	0.0078	.....	S Jones MN 83, 648, 1928 R
119	A Car	$47.6 -53 30$	4.38	G5	G8	195.32	21344.0	.....	0.0	24.8	+26.0	66.880	0.313	.....	Wilson, Huffer LOB 10, 17, 1918 R
120	+25°1594	$7 03.5 +25 54$	7.01	G0	G3	32.8092	23071.941	82.1	0.080	27.5	+19.7	12.383	0.0705	.....	Sanford ApJ 56, 447, 1922 R
121	* τ CMa	$14.5 -24 23$	4.90	Oe	O7sfk	4.39351	17240.248	37.6	0.156	217.1	-10.6	12.956	.....	32.2	Pearce DAO 6, 50, 1932 R
122	τ CMa	$14.5 -24 46$	4.40	Oe5	O9ek	154.80	25201.22	102.5	0.36	52.1	+40.4	103.700	1.86	24.3	Struve, Pogo ApJ 68, 335, 1928 R
123	≥ 1062 A	$14.7 +55 28$	5.61	B8	.....	2.25960	19031.632	126.1	0.076	106.4	+ 4.2	3.296	.....	4.3	Pearce DAO 6, 56, 1932 R
124	* R CMa	$14.9 -16 12$ (5.38-5.98)	.....	F0	.....	1.1359514	17966.576	195.86	0.138	199.1	-39.70	0.443	0.0027	2.3	Jordan AO 3, 49, 1913
125	B 1945	$21.8 +21 39$	5.27	F5	A9	1.93265	23430.048	104.84	0.002	94.56	+24.38	2.513	.....	1.05	Harper DAO 3, 226, 1925 R
126	γ CMi	$22.8 + 9 08$	4.60	K0	F4	389.0	00388.53	107.4	0.31	18.57	+46.80	94.400	0.26	0.85	Christie ApJ 80, 181, 1934 R
127	σ Pup	$26.1 -43 06$	3.27	K5	M0	257.8	20418.6	349.3	0.17	18.55	+87.3	64.800	0.164	.....	Wilson LOB 9, 117, 1918 R

128	α^1 Gem	7 28.2	+32 06	2.85	A0	A8s	2.928285	16828.057	102.52	0.01	31.76	-0.98	1.279	0.0097	.....	Curtis <i>LOB</i> 4, 55, 1906 R
129	α^2 Gem	28.2	+32 06	1.99	A0	A3s	9.218826	16746.385	265.35	0.503	13.56	+6.20	1.485	0.0015	.....	Curtis <i>LOB</i> 4, 55, 1906 R
130	α Gem	28.2	+32 06	.....	.....	.....	340 yr	1963	276.5	0.43	.....	+3.0	.....	.....	.....	Luyten <i>AJ</i> 42, 179, 1933 R
131	* YY Gem	28.2	+32 06	(9.0-9.6)	.....	dM1e	0.814266	23746.524	.....	0.0	114.0	+4.3	1.276	.....	0.63	Joy, Sanford <i>ApJ</i> 64, 250, 1926 R
132	α CMi	34.1	+5 29	0.48	F5	F3	40.23 yr	1886.50	65.7	0.310	126.7	-3.77	1.419	.....	0.57	S Jones <i>MN</i> 88, 403, 1928 R
133	+34°1657	36.2	+34 14	6.00	F0	F3	31.50	23884.45	44.0	0.208	45.18	-12.11	19.142	.....	1.53	Harper <i>DAO</i> 3, 269, 1926 R
134	σ Gem	37.0	+29 07	4.26	K0	K1p	19.605	15824.019	330.25	0.022	52.43	.....	22.214	.....	1.32	Harper <i>DO</i> 1, 265, 1911 R
135	(?) B 2035	39.8	-28 43	4.10	A2p	eA2ep	137.626	18188.339	270.0	0.198	34.21	+45.80	9.220	0.0812	.....	Neubauer <i>ASP</i> 44, 254, 1932 R
136	β GC 4310	47.1	-13 38	5.34	G0	G2	23.34 yr	1892.60	74.65	0.75	7.4	+23.7	13.730	0.0055	.....	Aitken <i>LO</i> 12, 51, 1914
137	* V Pup	55.4	-48 58	(4.14-4.78)	B1p	B1	1.454475	12778.327	72	0.08	.....	.....	.....	.....	.....	Struve <i>ApJ</i> 58, 141, 1923 R
138	ϵ Vol	8 07.6	-68 19	4.46	B5	B3	14.16833	19453.562	.....	0.00	66.67	+9.68	12.999	0.437	.....	Maury <i>PA</i> 29, 22, 1922 R
139	B 2227	19.6	-3 26	5.67	F5	F2	1.562975	22650.082	123.92	0.051	30.28	+71.3	0.650	0.0045	.....	Sanford <i>LOB</i> 8, 127, 1909 R
140	β GC 4638 A	25.2	+75 04	(6.3)	A5	.....	4.285	24971.150	101.71	0.109	63.53	-7.42	3.721	0.1123	.....	Sanford <i>ApJ</i> 55, 30, 1922 R
141	Σ 1245 A	30.5	+6 58	6.04	F5	F6	14.296	21599.474	220.80	0.276	22.74	+24.23	4.300	0.015	.....	Harper <i>DAO</i> 4, 319, 1930 R
142	β GC 4705 C	34.2	+19 54	7.15	A0	F1p	12.9117	25250.803	168.2	0.2	64.0	+32.1	11.134	.....	1.39	Joy, Abetti <i>ApJ</i> 60, 391, 1919 R
143	ϵ Hya AB	41.5	+6 47	3.48	F8	F1p	5588	15375	90.0	0.65	65.6	.....	11.395	.....	1.35	Sanford <i>ApJ</i> 74, 201, 1931 R
144	ϵ Hya C	41.5	+6 47	(7.5)	.....	F7	9.9047	23800.007	117.6	0.62	8.45	+36.79	493.000	0.1537	.....	Aitken <i>ASP</i> 24, 216, 1912 R
145	+8°2134	46.8	+8 26	6.59	G0	dG1	10.2504	24891.018	314	0.1	35.0	+31.2	3.700	0.0206	.....	Sanford <i>ApJ</i> 64, 179, 1926 R
146	H Vel	53.3	-52 20	4.77	B5	B5	0.91470	17967.119	44.33	0.131	24.5	+3.5	3.436	0.0154	.....	Sanford <i>ApJ</i> 74, 205, 1931 R
147	B 2421	56.3	-40 52	4.42	F8	.....	74.1469	22728.629	90.0	0.05	46.31	+22.20	0.534	0.0081	.....	Neubauer <i>LOB</i> 15, 104, 1931 R
148	κ Cnc	9 02.4	+11 04	5.14	B8	.....	6.393	16486.897	162.3	0.149	17.8	-7.4	18.130	0.0433	.....	Lunt <i>CA</i> 10, Pt 7, 33G, 1924
149	B 2447	02.9	+27 03	5.96	G5	G3	19.4589	22426.634	252.5	0.206	67.8	+26.3	5.890	0.200	.....	Ichinohe <i>ApJ</i> 25, 315, 1907 R
150	B 2463	06.4	+61 50	5.23	F8	F9	16.2382	23049.617	169.25	0.09	20.21	+12.3	5.296	0.0157	.....	Sanford <i>ApJ</i> 55, 33, 1922
151	B 2473	08.4	-58 33	3.56	B3	B3s	6.744	16533.81	115.84	0.18	34.78	-14.99	7.730	0.07	.....	Young <i>DAO</i> 2, 205, 1923
152	B 2484	10.8	+47 14	5.70	A0	A2	15.986	19408.027	355.2	0.504	21.5	+23.3	1.960	0.0066	.....	Curtis <i>LOB</i> 4, 153, 1907
153	B 2490	11.7	-5 56	5.40	K0	K4	922	18549.21	92.27	0.293	63.34	-13.11	12.026	.....	1.48	Harper <i>DO</i> 3, 391, 1916 R
154	κ Vel	19.0	-54 35	2.63	B3	B3	116.65	16459.00	96.23	0.19	9.98	-7.65	121.000	0.0832	.....	S Jones <i>CA</i> 10, Pt 8, 49, 1928
155	* S Ant	27.9	-28 11	(6.39-6.83)	F0	A8	0.64833872	10741.5248	.....	0	46.5	+21.9	73.200	1.15	.....	Curtis <i>LOB</i> 4, 155, 1907
156	$\circ$ Leo	35.8	+10 21	3.76	F5+A3	cF5	14.4980	14656.477	.....	<0.02	81	-5.0	0.722	.....	0.52	Joy <i>ApJ</i> 64, 287, 1926 R
157	* W UMa	36.7	+56 25	(8.3-9.1)	G0	F8p	0.3336392	18075.8176	.....	0.00	148	.....	1.320	.....	0.29	Plummer <i>LOB</i> 5, 21, 1908 R
158	m Vel	47.8	-46 05	4.56	G5	F8p	329.30	16967.60	311.48	0.019	63.1	.....	12.571	.....	1.12	Adams, Joy <i>ApJ</i> 49, 189, 1919 R
159	B 2665	51.6	+41 32	5.19	F5	F5	9.283	23498.595	351.09	0.048	14.07	+11.02	63.700	0.0953	.....	S Jones <i>CA</i> 10, Pt 8, 53, 1928
160	λ Hya	10 05.7	-11 52	3.83	K0	G9	1585.8	18795.1	238.9	0.138	15.24	-10.78	1.943	0.0034	.....	Harper <i>DAO</i> 3, 194, 1925 R
161	B 2754	16.9	+66 04	4.92	A0	.....	11.5832	18468.212	171.9	0.381	3.74	+19.39	80.800	0.0084	.....	S Jones <i>MN</i> 88, 652, 1928 R
162	B 2824	32.2	+34 36	6.65	K0	K2	1510.0	27408.4	37.6	0.65	34.07	-0.10	5.020	0.0376	.....	Schlesinger <i>AO</i> 2, 139, 1912
163	p Vel	33.2	-47 42	4.06	F2+A3	F0p	10.210955	20259.381	184.62	0.541	9.22	+12.62	145.000	0.054	.....	Christie <i>ApJ</i> 80, 181, 1934
164	* TX UMa	39.5	+46 05	(6.78-9.35)	B8	.....	3.063295	.....	242.3	0.153	42.34	+19.25	4.981	.....	0.28	Sanford <i>LOB</i> 9, 181, 1918 R
165	ω UMa	48.2	+43 43	4.84	A0	.....	15.8401	17991.101	11.95	0.264	52	.....	6.107	.....	0.24	Pearce <i>RASC</i> 29, 411, 1935
											20.64	-18.45	4.336	0.0130	.....	Parker <i>RASC</i> 5, 377, 1911 R

TABLE I—Continued

ORBITAL ELEMENTS OF SPECTROSCOPIC BINARY STARS

	Star	α 1900 δ	Mag.	Spec. Class		P (days)	T (2,400,000)	ω°	e	K (km/sec)	γ (km/sec)	$a \sin i$ 10 ⁶	$\frac{m_1^2 \sin^2 i}{(m_1+m_2)^2}$	$m \sin^2 i$	Authority
				Hvd.	Rev.										
166	+82°325	11 02.2	7.06	G0	dG3	18.8022	23154.071	332.97	0.282	40.1	-46.75	9.975	0.1111		Sanford <i>ApJ</i> 59, 359, 1924
167	ξ UMa B	12.9 +32 06	4.87	G0	dG0	3.9805	25000.000	.....	0.00	5.04	var	0.276	0.0000		Berman <i>LOB</i> 15, 109, 1930 R
168	ξ UMa A	12.9 +32 06	4.41	G0	dG0	669.17	18582.0	320.0	0.531	7.97	var	62.200	0.0214		Van den Bos <i>MARS&L Denmark</i> 8, Ser 12, 2, 1928 R
169	ξ UMa m	12.9 +32 06	.....	.....	.....	59.863 yr	1935.03	127.18	0.413	.....	-15.7	.....	.....		Van den Bos <i>Ibid.</i> R
170	B 2987	13.7 +38 44	4.78	A2	A0n	2.5	21412.762	173.4	0.11	38.5	-3	1.315	.....	0.12	Henroteau <i>PA</i> 27, 29, 1919 R
171	Σ 1561 B	33.5 +45 40	(8.6)	.....	dK5	23.5415	24303.000	0.00	0.35	54.5	.....	1.862	.....	0.08	Sanford <i>ApJ</i> 68, 46, 1928 R
172	+43°2135	33.7 +42 52	8.4	K2	K5	12.9167	23549.34	154.0	0.08	25.8	-13.8	7.806	0.0343		Sanford <i>ApJ</i> 61, 325, 1924
173	B 3098	42.8 +20 46	4.54	F8	F4	71.70	18088.405	270.81	0.008	28.8	+15.3	5.090	0.0316		Canon <i>RASC</i> 4, 452, 1924
174	+17°2402	44.1 +16 48	5.95	A2	A3	2.7818	23521.231	61.75	0.018	30.97	-24.21	1.184	0.009		Petrie <i>DAO</i> 3, 331, 1926
175	B 3102	44.5 +35 29	5.76	F5	.....	32.864	22059.507	223.58	0.087	37.29	-8.28	16.787	0.1750		Harper <i>RASC</i> 29, 411, 1935
176	B 3138	55.7 -19 06	5.28	B3	B4n	2.96310	16378.385	68.8	0.057	220.5	+3	4.900	.....	8.22	Van Arnem <i>ApJ</i> 75, 348, 1932 R
177	* AG Vir	56.0 +13 34	(8.6-9.4)	A0	.....	0.64265	26418.979	90	0.10	80	-16	0.700	0.0345	4.40	Sanford <i>ApJ</i> 79, 89, 1934
178	θ^1 Cru	57.9 -62 45	4.48	A5	.....	24.4828	19453.347	358.87	0.609	46.07	-2.75	12.301	.....	0.74	F Moore <i>LOB</i> 15, 144, 1931 R
179	θ^2 Cru	59.2 -62 36	4.98	B3	B3	3.4280	18747.367	.....	0.00	51.34	+16.3	14.978	0.0482	0.61	Grattan <i>ASP</i> 38, 393, 1926 R
180	B 3180	12 06.7 +26 25	5.81	K0	K4	461	22360.79	235.29	0.169	14.25	+21.30	89.032	0.1326		Harper <i>DAO</i> 4, 303, 1930 R
181	B 3182	07.5 +78 10	5.12	A5	.....	1.27100	20685.265	.....	0.00	63.2	+0.3	1.104	0.0333		Lee <i>ApJ</i> 43, 320, 1916 R
182	η Vir	14.8 -0 07	4.00	A0	.....	71.9	17644.410	191.63	0.336	30.51	+5.33	28.410	.....	1.50	Harper <i>DAO</i> 6, 227, 1935 R
183	+74°493	17.9 +73 48	8.2	G5	G6	5.41454	22853.120	.....	0.00	64.9	-97.4	4.833	.....	1.05	Sanford <i>ApJ</i> 56, 449, 1922 R
184	+27°2138	23.7 +26 47	6.48	A3	.....	11.782	24585.282	198.50	0.080	41.27	+1.79	5.510	0.0855	0.70	Harper <i>DAO</i> 3, 315, 1926 R
185	(?) α Dra	29.2 +70 20	3.88	B5p	B5e	0.89038	24650.4292	284.47	0.186	18.87	-11.43	0.227	0.0006		Hill <i>DAO</i> 3, 349, 1926 R
186	B 3323	40.6 +8 13	5.24	A5	.....	38.3	20573.455	223.35	0.072	40.99	-8.89	21.530	.....	4.62	Canon <i>DO</i> 2, 369, 1915 R
187	B 3354	48.3 +83 58	5.81	A0	.....	3.28655	24226.669	211.05	0.0408	80	.....	40.712	.....	2.37	Plaskett <i>DAO</i> 3, 255, 1926 R
188	ϵ UMa	49.6 +56 30	1.68	A0p	A2s	4.15 yr	1907.40	55.8	0.31	128.86	-0.05	6.454	.....	2.47	Ludendorff <i>AN</i> 195, 369, 1913 R
189	ξ^2 Cen	13 01.1 -49 22	4.40	B3	B3	7.649652	18077.493	308.63	0.353	38.8	+14.3	3.680	0.038		Neubauer <i>LOB</i> 15, 107, 1931 R
190	* RS CVn	06.0 +36 28	(8.12-10.03)	F8	F4n	4.797944	23579.344	.....	0.0	91.6	-8.9	6.040	.....	1.79	Joy <i>ApJ</i> 72, 41, 1930 R
191	ζ UMa A	19.9 +55 27	2.40	A2p	dG8	20.53644	19477.744	103.96	0.535	69.22	-9.64	6.530	.....	1.66	Hadley <i>MO</i> 2, 76, 1915 R
192	α Vir	19.9 -10 38	1.21	B2	A2s	4.014160	26041.26	40	0.10	68.83	.....	16.400	.....	1.70	Struve, Ebbighausen <i>ApJ</i> 80, 365, 1934 R
193	B 3511	30.3 +37 42	4.96	F0	B2	1.61100	17018.020	199.05	0.054	126.8	+0.5	11.096	.....	5.63	Harper <i>DO</i> 4, 223, 1918
194	B 3544	40.0 -32 33	4.36	F5	F0	9.94480	22737.382	137.7	0.247	10.06	+6.64	0.222	0.0002		S Jones <i>CA</i> 10, Pt 8, 57, 1928 R
195	M Cen	40.4 -50 56	4.68	K0	G5	437.00	24162.96	58.6	0.134	6.00	-23.91	0.795	0.0002		S Jones <i>CA</i> 10, Pt 8, 61, 1928 R

196	B 3555	13 42.1	+26 12	5.91	F5	F3	36.04	22014.483	258.15	0.490	54.01	+ 6.50	23.333	.....	2.34	Petrie DAO 3, 335, 1926
197	ν Cen	43.5	-41 11	3.53	B2	B2	2.62516	20301.39	.....	0.00	65.82	.....	28.435	.....	1.92	Wilson LOB 8, 130, 1914 R
198	h Cen	47.5	-31 26	4.76	B5	B7	6.927	18733.25	147.23	0.23	20.63	+ 9.05	0.745	0.0024	.....	Paddock LOB 9, 42, 1916 R
199	ζ Cen	49.3	-46 48	3.06	B2p	B2	8.024	12266.81	287	0.5	21.4	+ 5.2	1.984	0.0065	.....	Maury PA 29, 636, 1921 R
200	η Boo	49.9	+18 54	2.80	G0	F7	495	18225	305	0.232	8.0	- 0.15	53.101	0.0242	.....	Bianchi Mem Soc Astr Ital 1, 31, 1920 R
201	α Dra	14 01.7	+64 51	3.64	A0p	.....	51.38	17403.284	19.07	0.384	46.25	-17.03	30.173	0.4156	.....	Harper RASC 4, 91, 1910 R
202	B 3635	05.8	+25 34	4.82	F5	F5	9.6045	17679.523	273	0.169	68.40	+ 9.80	8.904	.....	1.36	Harper DO 1, 303, 1911 R
203	B 3644	08.5	- 0 22	5.81	F5	F4	2.6960	22744.103	.....	0.00	72.05	.....	9.380	.....	1.29	Duncan ApJ 54, 226, 1921 R
204	B 3649	09.2	+78 01	5.00	K0	K4	575.24	23104.38	287.3	0.07	11.57	+ 9.49	91.300	0.11	.....	Young DAO 4, 27, 1927
205	+11°2662	13.7	+10 58	7.13	A3	.....	7.369	26466.450	317.43	0.199	34.36	-28.99	3.344	0.029	.....	Harper DAO 6, 85, 1932 R
206	λ Vir	13.7	-12 55	4.60	A2	.....	206.9	16263.0	92.2	0.25	24.3	-10.9	66.900	.....	2.93	Colacevich Unpublished R
207	B 3673	13.8	+35 58	4.83	K0	K1	211.95	20561.18	223.42	0.54	18.02	-25.62	44.000	0.076	.....	Young DO 3, 95, 1915
208	α Cen	32.8	-60 25	0.33	G0	G5	80.089 yr	1875.759	52.132	0.521	3.90	-22.2	.....	.....	.....	Finsen UO Cir 68, 343, 1926 R
209	+22°2731	35.8	+22 24	6.17	F5	F1	101	23581.68	134.12	0.101	18.88	var	26.086	0.0695	.....	Harper RASC 20, 180, 1926 R
210	Σ 1890 B	46.3	+49 08	(6.8)	F5	F1	12.822	22379.490	97.05	0.394	58.31	-28.23	9.450	.....	.....	Harper DAO 2, 167, 1922 R
211	* δ Lib	55.6	- 8 07	(4.83-5.93)	A0	.....	2.32735	23204.1439	300.2	0.012	75.60	-35.38	2.419	0.1044	1.03	McLaughlin MO 6, 28, 1934 R
212	B 3827	56.0	+66 20	4.86	Mb	M5	750	22065.0	.....	0.00	6.67	+ 6.85	68.800	0.023	.....	Young DAO 4, 32, 1927 R
213	* U CrB	15 14.1	+32 01	(7.65-8.67)	B8	B5	3.4522008	25809.969	+23.8	0.072	80.1	- 7.65	3.79	.....	6.41	Pearce AAS 8, 219, 1935 R
214	+33°2574	15.4	+32 54	6.14	A2	A3	3.5753	23211.641	24.54	0.079	58.63	-25.85	2.865	0.0741	2.43	Christie DAO 4, 55, 1927
215	ϵ Lib	18.8	- 9 58	5.08	F0	F3	226.95	14785.116	339.52	0.68	14.00	- 9.66	32.037	0.0255	.....	R Jones LOB 15, 120, 1930
216	γ CrB	19.1	+30 39	5.58	G0	F9	41.56 yr	1892.269	217.98	0.27	4.5	- 6.0	903.900	0.128	.....	Lohse PtmO 20, 119, 1908 R
217	+47°2227	25.6	+47 35	5.96	A0	A3	105.8	24346	30	0.1	11.2	-17	16.210	0.015	.....	Chang ApJ 70, 185, 1929
218	* α Cr B	30.5	+27 03	(2.31-2.42)	A0	A1n	17.36	23175.835	304.22	0.377	34.83	+ 2.61	7.701	0.0605	.....	Christie Unpublished R
219	* T W Dra	32.4	+64 14	(7.70-10.04)	A5	A6	2.80654	18906.472	90	0.0536	65.78	- 0.34	2.535	0.0826	.....	McLaughlin MO 5, 91, 1933 R
220	* RW CrB	35.2	+29 56	(10.2-10.8)	F8	F0	0.7264171	25365.741	160	0.12	61	-11	0.600	0.0171	.....	Plaskett DAO 1, 145, 1919 R
221	ζ CrB A	35.6	+36 58	5.07	B8	B8n	12.58485	23855.681	90	0.030	134.82	-29.61	23.310	.....	13.35	Sanford ApJ 79, 89, 1934
222	B 4008	40.9	- 1 29	5.37	B8	.....	38.95	19528.597	208.46	0.773	50.52	-11.63	17.170	0.133	13.06	Plaskett DAO 3, 179, 1925 R
223	π Sco	52.8	-25 50	3.00	B2	B3	1.571	25047.023	90	0.05	138	- 3.0	2.977	.....	2.96	Jordan AO 3, 153, 1915
224	ξ Sco	58.9	-11 06	4.77	F8	F4	44.70 yr	1905.39	343.6	0.75	3.7	-29.4	3.884	0.024	2.27	Struve, Elvey ApJ 66, 217, 1927 R
225	β Sco	59.6	-19 32	2.90	B1	B2k	6.8283	19163.923	20.09	0.270	125.66	-11.0	11.360	.....	.....	Aitken LO 12, 102, 1912
226	θ Dra	16 00.0	+58 50	4.11	F8	F7	3.0708	15368.962	126.112	0.014	23.47	- 8.5	0.990	0.0041	13.0	Chang ApJ 70, 182, 1929 R
227	+8°3134	00.8	+ 8 22	6.14	A2	.....	8.855	22846.704	265.41	0.376	31.62	-21.54	3.568	0.023	8.3	Daniel, Schlesinger AO 2, 127 1912 R
228	+11°2910	01.2	+10 57	8.5	G5	K0	4.28503	22418.0522	82.49	0.089	38.1	-60.6	2.238	0.0244	.....	Curtis LOB 4, 156, 1907
229	B 4129	08.1	+36 41	5.68	K5	K4	2150	20000	350	0.5	15	-30	384.050	0.4895	.....	J W Campbell DAO 1, 315, 1921
															.....	Sanford ApJ 53, 210, 1921
															.....	Christie ASP 46, 238, 1934 R

TABLE I—Continued
ORBITAL ELEMENTS OF SPECTROSCOPIC BINARY STARS

	Star	α 1900 δ	Mag.	Spec. Class		P (days)	T (2,400,000)	ω°	e	K (km/sec)	γ (km/sec)	$a \sin i$ 10 ⁶	$m_2^2 \sin^2 i$ (m_1+m_2) ²	$m \sin^2 i$	Authority
				Hvd.	Rev.										
230	σ CrB A	$16^h 10^m 9^s +34^\circ 07'$	5.76	G0	F6	7.974	23216.694	90.0	0.081	60.12	-10.63	6.571	.....	0.94	Harper DAO 3, 231, 1925 R
231	(?) σ Sco	$15.1 -25 21$	3.08	B1	.....	34.08	21715.35	270	0.33	68.77	.....	7.516	.....	0.82	Henroteau LOB 9, 177, 1918 R
232	ζ TrA	$17.6 -69 52$	4.93	G0	.....	12.9762	18103.642	274.54	0.060	33	-3.2	14.600	0.107	.....	S Jones CA 10, Pt 8, 64, 1928 R
233	ϵ TrA	$18.7 -63 50$	5.30	F0	F3s	39.88796	23236.454	87.24	0.280	7.41	+7.58	1.320	0.0005	.....	S Jones CA 10, Pt 8, 64, 1928 R
234	B 4177	$19.3 +7 10$	5.72	A0	A1n	4.951	21773.086	355.92	0.511	38.72	-5.59	20.380	0.213	.....	Harper DAO 4, 179, 1928 R
235	β Her	$25.9 +21 42$	2.81	K0	G5	410.575	15500.374	24.6	0.550	12.78	-25.52	60.280	0.0014	.....	Plummer LOB 5, 25, 1908 R
236	ρ GC 7677 A	$29.6 +30 43$	6.66	F0	F0	3.39430	28006.493	355.23	0.025	68.18	-16.24	3.181	0.112	.....	McKellar DAO 6, 291, 1935 R
237	+17°3053	$30.9 +17 15$	6.27	A0	.....	10.56	22422.236	4.12	0.430	62.41	-9.88	8.180	.....	2.19	Young DAO 1, 233, 1920 R
238	* W UMa	$34.8 +86 26$ (8.61-9.73)	.....	A0	A4n	1.70116	24999.604	.....	0.0	101.36	.....	13.280	.....	1.35	Joy, Dustheimer ApJ 81, 479 1935 R
239	ζ Her	$37.5 +31 47$	3.00	G0	G0	34.46 yr	1893.77	66.7	0.46	4.6	-69.8	707.600	0.089	.....	Comstock AJ 30, 139, 1917 R
240	B 4247	$37.6 +27 07$	5.91	F2	F2	2.3076	23923.856	.....	0	97.4	-12.6	3.114	.....	1.11	Chang ApJ 68, 319, 1928 R
241	μ Sco	$45.1 -37 53$	3.09	B3p	B3n	1.44627	12375.571	190	0.05	108.7	.....	3.426	.....	0.99	Sanford ApJ 64, 184, 1926 R
242	+13°3258	$50.7 +13 47$	6.16	F2	.....	11.848	26576.200	267.65	0.308	28.50	-3.67	4.363	0.02	.....	Maury PA 29, 22, 1921 R
243	B 4322	$55.5 +65 17$	4.82	F5	F6	52.11	14816.015	351.05	0.149	17.14	-22.87	12.144	0.0263	.....	Harper DAO 6, 88, 1932 R
244	ϵ UMi	$56.2 +82 12$	4.40	G5	G1	39.482	18005.75	359.46	0.011	31.95	-11.40	17.346	0.1337	.....	Harper DAO 6, 236, 1935 R
245	ϵ Her	$56.5 +31 04$	3.92	A0	.....	4.0235	18086.253	180	0.023	70.39	-24.03	3.890	.....	1.6	Plaskett RASC 4, 460, 1910 R
246	+12°3161	$17 06.1 +12 35$	6.46	A0	.....	23.245	21780.290	129.85	0.427	112.1	.....	6.200	.....	1.0	Baker AO 2, 17, 1910 R
247	* AK Her	$09.5 +16 29$ (8.39-8.90)	.....	F8	.....	0.42152207	22977.254	.....	0.00	27.67	+3.51	7.997	0.038	.....	Harper DAO 1, 197, 1920 R
248	α Her B	$10.1 +14 30$	5.39	.....	F8	51.590	22468.581	27.89	0.028	78	-13	0.452	0.0208	.....	Sanford ApJ 79, 89, 1934 R
249	* U Oph	$11.4 +1 19$ (5.67-6.36)	.....	B8	B5nk	1.6773476	18026.703	.....	0.00	29.64	-37.2	2.103	0.1395	.....	Sanford ApJ 53, 212, 1921 R
250	* u Her	$13.6 +33 12$ (4.60-5.28)	.....	B3	B5nk	2.05102	18125.80	66.15	0.053	179.8	-11.5	4.147	.....	5.27	Plaskett DAO 1, 138, 1919 R
251	* TX Her	$15.4 +42 00$ (8.33-9.03)	.....	A5	B3	2.059801	22504.085	.....	0.0	204.6	.....	4.718	.....	4.63	Baker AO 1, 77, 1909 R
252	B 4423	$21.3 -5 00$	4.61	F0	A2	26.2742	18411.524	14.48	0.491	99.50	-21.16	7.120	.....	2.6	Baker LOws OB No 31, 1, 1921 R
253	+34°2971	$23.2 +34 47$	5.91	B9	F1	5.9182	23585.527	35.74	0.031	121.0	-6.4	3.427	.....	1.76	Baker LOws OB No 31, 1, 1921 R
254	+12°3241	$27.6 +12 00$	6.18	B9	A2	6.7984	22878.154	116.26	0.069	140.2	.....	3.971	.....	0.88	Parker DO 2, 331, 1915 R
255	B 4444	$28.1 -32 31$	5.71	Oe5	A2	3.36657	26461.928	.....	0	47.49	+0.44	14.947	.....	0.82	Christie DAO 3, 307, 1925 R
256	ζ Ser	$31.9 -15 20$	3.64	A5	A2	2.292285	19209.618	.....	0	50.67	.....	15.948	.....	.....	JW Campbell DAO 2, 159, 1922 R
257	ω Dra	$37.5 +68 48$	4.87	F5	A2	5.27968	17415.493	333.76	0.011	25.09	-22.73	2.041	0.0097	.....	Trumpler ASP 42, 342, 1930 R
258	+14°3329	$39.8 +14 27$	6.13	A3p	F4	3.894	24701.985	74.29	0.04	50.18	-12.79	4.680	0.0886	.....	Young LOB 6, 160, 1911 R
259	B 4507	$44.4 +47 39$	6.34	A0	A2	2.82424	22106.713	30	0.017	215	-4	9.952	.....	13.90	Turner LOB 4, 163, 1907 R
										108.14	.....	5.786	.....	1.83	Petrie DAO 4, 81, 1928 R
										60.15	-27.30	2.336	0.06	.....	Harper DAO 1, 125, 1919 R

260	B 4520	17 49.7	-32 27	6.62	Oe5	B05e	12.0040	24279.497	23.2	0.065	192.4	-41.8	31.700	8.84	.....	Humason, Nicholson <i>ApJ</i> 67, 341, 1928 R
261	* Z Her	53.6	+15 09	(7.10-7.90)	F5p	F2p	3.992775	.....	.....	0.00	88.2	-46.5	4.800	.....	1.5	Adams, Joy <i>ApJ</i> 49, 192, 1919 R
262	70 Oph A	18 00.4	+ 2 31	(4.28)	.....	dK0	18.101 yr	1900.643	97.51	0.279	101.8	.....	5.600	.....	1.3	Berman <i>LOB</i> 16, 24, 1932 R
263	70 Oph AB	00.4	+ 2 31	4.07	K0	dK0	87.710 yr	1895.965	193.352	0.499	1.37	var	119.6	0.0016	.....	Pavel <i>AN</i> 212, 347, 1921 R
264	B 4602	07.5	+79 59	6.18	F5	dK6	10.5217	21764.648	256.76	0.314	46.16	+ 2.93	6.341	.....	0.46	Boothroyd <i>DAO</i> 1, 245, 1920 R
265	μ Sgr	07.8	-21 05	4.01	B8p	eB8ea	180.2	17495.64	79.13	0.447	51.50	.....	7.074	.....	0.41	Kohl <i>AN</i> 219, 213, 1923 R
266	B 4622	12.9	+56 33	6.41	F0	F1	2.0476	22147.630	195.10	0.039	105.09	- 8.51	2.957	.....	1.04	Harper <i>DAO</i> 1, 307, 1921 R
267	ξ Pav	14.0	-61 32	4.25	K2	M1	2214	18076.27	187.2	0.264	108.12	.....	3.042	.....	1.01	S Jones <i>CA</i> 10, Pt 8, 72, 1928 R
268	B 4629	15.1	+24 24	5.49	K5	K4	478	23540.65	234.47	0.398	16.07	-14.36	96.904	0.16	.....	Harper <i>DAO</i> 3, 198, 1925 R
269	B 4643	17.1	+29 48	5.54	A2	A4s	5.51460	19551.742	.....	0.00	70.1	-20.2	5.320	.....	1.72	Daniel, Jenkins <i>AO</i> 3, 147, 1914 R
270	B 4669	22.1	+29 46	5.71	A2	A4s	9.6120	22048.711	326.43	0.468	101.7	.....	7.710	.....	1.18	Young <i>DAO</i> 1, 131, 1919
271	x Dra	22.9	+72 41	3.69	F8	F5	280.683	23565.521	126.03	0.419	28.49	+ 7.54	3.330	0.016	.....	Crawford <i>LOB</i> 13, 176, 1928 R
272	B 4678	24.5	- 2 03	5.44	K0	G8	3.1558	20000.146	.....	0.00	3.55	+28.03	0.154	0.0000	.....	Christie <i>ASP</i> 45, 190, 1933 R
273	* RX Her	26.0	+12 30	(7.20-7.88)	A0	A0	1.7785740	19658.5882	.....	0.00	130.6	-24.9	3.194	.....	2.08	Sanford <i>ApJ</i> 68, 51, 1928 R
274	+65°1276	31.0	+65 22	6.31	A3	A0	14.3450	24710.897	295.93	0.210	146.5	.....	3.583	.....	1.85	Petrie <i>DAO</i> 4, 85, 1928
275	B 4745	40.7	+55 26	5.08	A0	.....	9.810	27945.341	155.5	0.022	72.01	.....	13.885	.....	1.97	Petrie <i>RASC</i> 28, 411, 1935
276	ζ Lyr A	41.3	+37 30	4.29	A3	A9s	4.29991	18109.722	.....	0.00	34.11	.....	4.486	.....	0.10	Jordan <i>AO</i> 1, 115, 1909 R
277	β Scu	41.9	- 4 51	4.47	G0	eC7	834	22480.9	33.9	0.35	16.65	-21.9	178.000	0.33	.....	Young <i>DAO</i> 4, 35, 1927
278	β GC8849 A	45.0	+49 19	(7.3)	F5	F1	3.76468	22159.7691	.....	0.00	97.7	-18.8	5.058	.....	1.48	Sanford <i>ApJ</i> 53, 215, 1921 R
279	* β Lyr	46.4	+33 15	(3.36-4.33)	B8p	F1	12.921588	8.541	325.05	0.014	98.3	.....	5.089	.....	1.47	Rossiter <i>MO</i> 5, 67, 1933 R
280	B 4779	48.0	+21 18	5.33	B9	Bep	6.3624	24589.683	195.53	0.116	183.71	-19.02	32.600	8.32	.....	Meyer <i>LOB</i> 13, 49, 1927
281	B 4788	49.6	+75 19	5.37	A0	A0s	4.1175	20293.519	107.6	0.012	79.12	- 8.79	4.480	0.0036	.....	Harper <i>RASC</i> 13, 236, 1919
282	Σ 2420 A	49.7	+59 16	4.78	K0	G5	138.420	19258.16	274.31	0.114	83.90	.....	4.751	.....	0.90	Young <i>DAO</i> 1, 263, 1920 R
283	δ Lyr	50.2	+36 51	5.51	B3	B3	88.112	19220.727	204.55	0.28	23.46	-19.52	44.363	0.183	.....	Jordan <i>AO</i> 3, 119, 1914
284	β GC8908 A	50.5	+22 31	4.56	G0+A3	G0	245.3	19805.0	169.5	0.12	33.68	-25.85	39.220	0.309	.....	Wilson <i>LOB</i> 7, 106, 1913 R
285	+20°4022	57.0	+20 42	6.55	B3	B2	15.9526	24698.747	262.24	0.159	16.0	-23.8	53.580	0.102	.....	Millman <i>DAO</i> 4, 97, 1928
286	-10°4926	57.1	-10 52	6.68	B5	B8	1.849084	25074.648	156.16	0.033	55.08	-10.29	11.930	0.266	.....	Pearce <i>DAO</i> 4, 75, 1927
287	B 4864	19 02.3	+10 55	5.10	B8	.....	1.30226	18157.502	.....	0.00	180.58	-12.86	3.826	.....	7.10	Jordan <i>AO</i> 3, 77, 1914 R
288	B 4870	03.1	+41 16	6.15	B3	B3sk	1.03088	21735.6468	20.02	0.015	241.18	.....	6.129	0.0028	.....	Boothroyd <i>DAO</i> 2, 173, 1922
289	+16°3752	03.5	+16 43	5.99	G5	G4	21.998	28206.422	92.70	0.205	12.12	-21.19	0.172	0.0002	.....	Albitzky <i>Pul O Cir</i> 7, 1, 1933
290	+16°3758	04.2	+16 42	6.46	F5	F2	4.812	23630.622	59.16	0.073	12.77	+14.44	3.952	0.0045	.....	Harper <i>DAO</i> 3, 236, 1925 R
291	Σ 2469 A	04.4	+38 46	(7.8)	A3	.....	1.54039	22128.084	14.26	0.008	86.04	.....	5.677	.....	1.26	Harper <i>DAO</i> 6, 7, 1930 R
292	* RS Vul	13.4	+22 16	(6.90-7.63)	B8	B8	4.477325	19654.866	236.26	0.053	88.69	-29.79	1.878	0.112	.....	Plaskett <i>DAO</i> 1, 141, 1919 R
						B9					175.9	.....	10.842	.....	1.35	

TABLE I—Continued
ORBITAL ELEMENTS OF SPECTROSCOPIC BINARY STARS

	Star	α 1900 δ	Mag.	Spec. Class		P (days)	T (2,400,000)	ω°	e	K (km/sec)	γ (km/sec)	$a \sin i$ 10 ⁶	$\frac{m_2^3 \sin^3 i}{(m_1+m_2)^2}$	$m \sin^3 i$	Authority
				Hvd.	Rev.										
293	* U Sge	$19^h 14^m 4^s + 19^\circ 26'$	(6.52-9.40)	B9	B9n	3.38056	24721.4967	260	0.035	67.9	-15.1	3.155	.....	6.70	Joy <i>ApJ</i> 71, 336, 1930 R
294	+37°3413	15.5 +37 16	6.19	A0	G2	10.3932	23570.622	198.68	0.520	224.0	.....	10.411	.....	2.03	Harper <i>DAO</i> 4, 183, 1928 R
295	ν Sgr	16.0 -16 08	4.58	B8p, F2p	B3+A2	137.939	19648.72	28.6	0.087	84.0	.....	10.254	.....	0.84	Wilson <i>LOB</i> 8, 132, 1914 R
296	* Z Vul	17.5 +25 23	(6.97-8.60)	B3	B3n	2.45492	19679.911	.....	0.0	96.35	-15.08	3.252	.....	5.24	Plaskett <i>DAO</i> 1, 251, 1920 R
297	B 4947	19.8 +16 45	6.03	A0	B3n	7.390	20943.233	332.6	0.05	213.74	.....	7.215	.....	2.36	Young <i>DO</i> 4, 55, 1917 R
298	+55°2215	29.2 +55 32	6.52	K2+A3	A3s	108.5707	23375.760	87.0	0.054	52.95	+11.0	5.370	.....	0.91	Sanford <i>ApJ</i> 61, 326, 1924
299	* σ Aql	34.3 + 5 10	(4.99-5.17)	B3	B3	1.95022	20054.331	.....	0.0	73.8	.....	4.380	.....	5.3	Jordan <i>AO</i> 3, 189, 1916 R
300	B 5026	36.4 +54 44	5.86	F5	B3	7.6383	22201.398	46.74	0.527	199	.....	5.340	.....	4.4	Harper <i>DAO</i> 1, 157, 1919 R
301	* B 5070	47.2 +40 21	(5.6-5.8)	B2	F4	12.4255	19636.432	115.75	0.222	89.81	-15.59	8.017	.....	1.85	Harper <i>DAO</i> 6, 244, 1935
302	(?) S Sge	51.5 +16 22	(5.8-6.8)	G0p	B2k	682	20279.0	195.4	0.165	94.01	-3.87	15.590	.....	.....	Aldrich <i>MO</i> 5, 75, 1932 R
303	ϕ Aql	51.5 +11 09	5.29	A2	F8-G7	3.32088	23324.045	55.87	0.026	37.12	-28.24	1.694	.....	.....	Harper <i>DAO</i> 6, 245, 1935
304	ϕ Sgr	53.2 -35 33	4.39	B3	B5	2.10514	11140.645	.....	0.0	15.9	+ 0.9	0.460	.....	.....	Wilson, Huffer <i>PA</i> 29, 85, 1921
305	Σ 2613 A	56.6 +10 28	(7.5)	F2	F4	4.4696	23802.192	294.5	0.10	41.3	-43.0	2.526	.....	.....	Sanford <i>ApJ</i> 61, 330, 1924 R
306	O2 398 A	20 03.6 +35 26	(7.7)	B0	B0k	8.33425	24039.940	0.50	0.264	156.97	-5.44	17.351	.....	13.85	Plaskett <i>DAO</i> 3, 258, 1926 R
307	(?) B 5170	05.7 +36 33	4.82	B2p	B3me	226.0	22379.5	258.39	0.746	168.5	.....	18.626	.....	12.90	Losh <i>MO</i> 4, 199, 1932 R
308	θ Aql	06.1 - 1 07	3.37	A0	B9s	17.1224	17731.377	26.98	0.691	12.20	-13.60	25.249	.....	0.58	Harper <i>RASC</i> 6, 265, 1912 R
309	B 5173	06.4 +26 36	5.46	A2	A1np	9.316	20304.628	103.15	0.012	49.50	-25.93	8.424	.....	0.44	Harper <i>DO</i> 4, 199, 1918 R
310	B 5192	11.2 +23 12	5.38	G5	eG4	251.0	23415.850	121.0	0.042	66.0	.....	11.232	.....	2.27	Harper <i>DAO</i> 3, 201, 1924 R
311	B 5200	12.3 +47 24	4.16	K0+A3	eK5	1170	20700.39	281.05	0.182	78.49	-13.04	10.054	.....	2.06	Cannon <i>DO</i> 4, 151, 1918 R
312	β Cap	15.4 -15 06	3.25	G0+A0	F8	(390)	20515.821	.....	0	86.31	.....	11.055	.....	.....	S Jones <i>CA</i> 10 Pt 8, 76, 1928 R
313	+45°3139	15.6 +46 00	6.28	B1	B2k	1378.49	16031.49	122.76	0.437	16.64	-14.35	263.250	.....	2.90	Plaskett <i>DAO</i> 4, 103, 1928
314	α Pav	17.7 -57 03	2.12	B3	B3s	11.753	16379.90	224.80	0.01	22.44	-19.02	352.500	.....	2.35	Curtis <i>LOB</i> 4, 154, 1907
315	+25°4299	31.8 +25 34	6.29	A2	.....	11.088	26492.609	50.11	0.284	115.54	-8.93	4.719	.....	.....	Shajn <i>Pul O Cir</i> 8, 16, 1933
316	β Del	32.9 +14 15	3.72	F5	F3	26.79 yr	1883.04	351.20	0.35	58.7	-18.8	8.581	.....	.....	Aitken <i>LO</i> 12, 150, 1912
317	ι Del	33.0 +11 02	5.43	A2	A2s	11.039	22139.862	61.8	0.227	6.8	-21.0	857.000	.....	.....	Chang <i>ApJ</i> 68, 323, 1928 R
318	B 5294	33.2 - 1 27	4.51	K0	G5	205.0	22311.55	321.43	0.128	26.02	-4.92	3.846	.....	.....	Harper <i>DAO</i> 6, 247, 1935
319	* GO Cyg	33.5 +35 05	(8.23-8.77)	A0	B9n	0.717767	26953.0425	.....	0.0	9.78	-6.09	27.347	.....	.....	Harper <i>DAO</i> 3, 345, 1926 R
320	* V 367 Cyg	44.2 +38 55	(6.98-7.58)	F5+A3	A0n	18.60	1932.5	110	0.2	133.2	+ 3.2	1.315	.....	0.98	Pearce <i>RASC</i> 27, 62, 1933 R
321	B 5359	44.9 + 7 30	6.23	A0	eA7se	12.3 yr	26526.412	162.1	0.386	156.2	.....	1.542	.....	0.83	Christie <i>ApJ</i> 78, 200, 1933 R
					A2	10.883	.....	.....	.....	31.4	-30.2	4.335	.....	.....	Shajn <i>Pul O Cir</i> 7, 16, 1933

322	* Y Cyg	20 48.1	+34 17	(6.95-7.55)	B2	O9mnk O9mnk	2.996332	2.407	4.8	0.136	244.8	-51.8	9.96	.....	17.2	Redman DAO 4, 341, 1931 R
							2.996332	0.005	86.3	0.133	241.3	-61.8	9.86	.....	17.4	
323	B 5375	49.7	+44 00	4.68	B3	B3k	2.854822	18554.792	48.6	0.127	110.8	-17.3	4.314	.....	1.91	Pearce RASC 29, 411, 1935 R
							2.854822	27867.376	66.1	0.127	110.8	-17.3	4.746	.....	1.74	
324	+44°3639	53.1	+44 33	6.01	Oe5	O6k	48.608	22892.226	66.75	0.099	42.22	-5.78	28.076	0.374	.....	Plaskett DAO 2, 183, 1922
325	Σ 2762 A	2104.4	+29 48	(5.7)	A0	B8	3.3137	22521.230	.....	0.0	26	-26.8	1.185	0.0060	.....	Young DAO 1, 319, 1921 R
326	δ Equ	09.6	+9 36	4.61	F5	F3	5.70 yr	1929.85	104.5	0.39	.....	-15.4	.....	.....	.....	Aitken LO 12, 158, 1914 R
327	(?) σ Cyg	13.5	+38 59	4.28	A0p	cA0	11.043	21069.27	119.1	0.40	1.98	-3.80	0.276	0.0000	.....	Henrolean MO 3, 39, 1917 R
328	+57°2309ab	14.6	+58 10	6.41	B3	B3ek	5.41364	23635.140	58.5	0.114	40.0	var	2.960	0.0353	.....	Sanford ApJ 64, 186, 1926 R
329	+57°2306abc	14.6	+58 10	6.41	B3	B3	225.44	23808.98	16.6	0.226	21.9	-17.2	65.989	0.3956	.....	Sanford ApJ 64, 186, 1926 R
330	+32°4134	17.1	+32 11	6.03	A0	.....	20.30	24363.558	219.67	0.441	45.71	-3.98	10.278	.....	1.87	Harper DAO 3, 319, 1926 R
							3.24343	21801.549	357.55	0.022	62.23	+0.16	2.773	0.0810	.....	Plaskett DAO 1, 113, 1919
331	+39°4529	17.2	+39 55	6.46	F8	.....	21.724	23302.555	.....	0.0	41.45	-12.42	12.382	0.1607	.....	Harper DAO 4, 167, 1927 R
332	+18°4794	21.8	+18 58	6.06	A3	.....	8.4455	17978.327	12.2	0.039	79.71	-4.69	9.250	.....	1.79	Harper RASC 29, 411, 1935 R
333	B 5536	28.9	+75 58	7.67	F0	A6n	.....	.....	.....	.....	80.28	.....	9.316	.....	1.78	Colacevich ASP 47, 87, 1935 R
334	ν Oct	30.4	-77 50	3.74	K0	.....	1037	17506	90	0.25	8.0	+34.7	110.400	0.050	.....	Harper DAO 3, 241, 1925 R
335	+27°4107	30.9	+27 46	6.35	F0	F3	12.21	23710.068	46.79	0.318	51.95	-43.17	10.385	.....	0.97	Rufus MO 6, 45, 1934 R
							3.708611	23889.592	58.79	0.111	75.86	-7.65	3.761	0.165	.....	S Jones CA 10, Pt 8, 81, 1928 R
336	μ GCM 1160A	35.8	+57 02	(5.9)	Oe5	O6nk	13.17275	23689.424	172.48	0.195	23.32	var	4.130	0.0164	.....	Sanford ApJ 74, 205, 1931 R
337	B 5566	36.1	-14 30	5.28	C5	G1	.....	.....	.....	0	82.1	-25.5	7.191	.....	1.62	Harper DAO 3, 324, 1926 R
338	B 5575	37.8	-20 04	6.17	A3	A6n	6.3702	25486.567	.....	0.033	86.3	-25.47	2.607	.....	0.96	Sanford ApJ 53, 218, 1921 R
339	B 5579	38.4	+40 38	5.48	A0	A6n	1.72897	21774.161	256.0	0.189	109.70	+4.2	2.622	.....	1.19	Luyten ApJ 79, 449, 1934 R
340	B 5591	39.9	+28 19	6.90	A5	A9	3.74860	22175.1577	262.66	0.031	93.2	var	3.430	0.045	.....	Luyten ApJ 79, 449, 1934 R
341	κ Peg A	40.1	+25 11	(4.8)	.....	A9	5.97152	19054.957	148	0.30	65.67	-8.1	0.926	0.0301	.....	Crump ApJ 54, 127, 1921 R
342	κ Peg AB	40.1	+25 11	4.27	F5	F2	11.53 yr	1909.86	131	0.019	108.3	-6.5	25.170	.....	20.8	Pearce DAO 6, 73, 1932 R
343	δ Cap	41.5	-16 35	2.98	A5	A7s	1.02275	21451.86	149.06	0.224	165.8	.....	38.530	.....	13.6	Harper RASC 28, 173, 1934 R
344	B 5629	48.8	+55 20	5.54	B3	B7	17.3263	24415.682	269.9	0.34	18.5	-18.6	1770.300	4.2	.....	Pearce RASC 29, 411, 1935
345	VV Cep	53.8	+63 09	(4.9-5.7)	Map	M2e	7400	28104	36	0.122	147.0	-26.0	3.957	.....	2.56	Sanford ApJ 79, 95, 1934 R
346	* MR Cyg	55.0	+47 30	(8.50-9.30)	A0	.....	1.676970	26970.075	103.2	0	117.5	-17.5	3.509	.....	2.0	Joy ApJ 74, 101, 1931 R
347	* CM Lac	56.1	+44 04	(8.21-9.34)	A2	.....	1.60469	25922.284	.....	0	159±	-47.0	4.360	.....	1.9	A Farnsworth, R Jones LOB
348	* RT Lac	57.5	+43 24	(9.06-10.12)	G5	G9	5.073921	18204.444	.....	0	62.5	.....	8.090	0.0003	.....	16, 46, 1932 R
349	B 5671	59.6	-1 23	5.23	A3	K1	7.8327	21806.644	.....	0.00	116.0	.....	0.735	.....	.....	Sanford ApJ 65, 295, 1927 R
350	Σ 2873 B	22 01.9	+82 23	7.37	F5	A8s	1.1522143	23213.363	.....	0	105.6	-17.0	1.673	.....	0.65	Young DAO 1, 193, 1920 R
351	+47°3692	02.0	+47 45	6.16	B3	G5	2.1721	22138.172	.....	0.0	112.4	.....	1.781	.....	0.61	
						B3k	.....	.....	.....	.....	127.7	-17.76	3.810	0.47	.....	

TABLE I—Continued
ORBITAL ELEMENTS OF SPECTROSCOPIC BINARY STARS

	Star	α 1900 δ	Mag.	Spec. Class		P (days)	T (2,400,000)	ω°	e	$\frac{K}{(\text{km/sec})}$	$\frac{\gamma}{(\text{km/sec})}$	$a \sin i$ 10 ³	$m^2 \sin^3 i$ (m_1+m_2) ²	$m \sin^3 i$	Authority
				Hvd.	Rev.										
352	ϵ Peg	$22^{\text{h}} 02.4$	3.96	F5	F3	10.21312	14820.966	251.81	0.008	47.99	-4.12	6.740	0.117	.....	Curtis <i>LOB</i> 2, 169, 1904 R
353	* AR Lac	04.6 $+45.15$	$(6.96-7.78)$	G5	K0 G5	1.983244	26625.732	334.82	0.041	120.02	-36.25	3.270	.....	1.40	Harper <i>RASC</i> 27, 146, 1933
354	α Tuc	11.7 -60 45	2.91	K2	K5	4197.7	18666.4	48.5	0.385	119.19	.....	3.247	.....	1.41	S Jones <i>MN</i> 88, 657, 1928 R
355	B 5764	16.9 +46 02	4.66	B5	B5	2.6164	18193.30	180	0.015	7.23 +42.24	.....	385.100	0.1295	.....	Baker <i>AO</i> 1, 93, 1909 R
356	+28°4389	27.0 +29 02	6.32	A5	.....	2.34095	25940.381	49.36	0.031	80.3 -9.0	.....	2.890	.....	0.87	Albitzky <i>Pul O Ctr</i> 8, 10, 1933 R
357	B 5834	31.7 +49 33	6.20	B3	B3k	2.3409	24715.985	30.11	0.016	98.8	.....	3.550	.....	0.71	Harper <i>DAO</i> 6, 203, 1933
358	B 5846	34.8 -9 53	6.74	G0	F6	21.6997	25172.797	213.1	0.38	83.27 -15.28	.....	12.088	.....	6.01	Hill <i>DAO</i> 3, 358, 1926
359	η Peg	38.3 +29 42	3.10	G0	G2	818.0	15288.7	5.60	0.155	129.44	.....	18.789	.....	3.87	Sanford <i>AJ</i> 74, 209, 1931
360	* AH Cep	44.2 +64 32 (6.63-6.85)	.....	B3	B0nk B0nk	1.77476	24076.621	106.3	0.034	56.5 -39.3	.....	15.599	.....	1.47	Crawford <i>LOB</i> 1, 27, 1901 R
361	B 5900	48.2 +16 19	5.72	K0	K1	24.65	22240.992	.....	0	14.20 +4.31	.....	157.800	0.2345	.....	Pearce <i>RASC</i> 29, 411, 1935 R
362	B 5913	51.8 +41 04	5.54	B3	B3sk	12.3106	24063.894	7.8	0.10	225.3 -20.6	.....	5.495	.....	11.4	Harper <i>DAO</i> 1, 203, 1920 R
363	+45°4147	23 02.7 +45 33	6.56	B5	B3k	3.3372	22151.272	125.67	0.233	261.2	.....	6.371	.....	9.8	Struve, Bobrovnikoff <i>AJ</i> 62, 139, 1925 R
364	+58°2546	03.0 +59 13	6.28	B3	B3sk	7.25105	21825.038	71.6	0.376	33.20 -12.84	.....	11.254	0.094	.....	Young <i>DAO</i> 1, 239, 1920
365	π Cep A	04.7 +74 51	(4.7)	G5	B5	556.2	14126.33	5.70	0.281	22.2 -6.9	.....	3.650	.....	4.8	Pearce <i>DAO</i> 6, 53, 1932
366	ϵ Gru	04.7 -45 47	4.10	K0	G1	409.614	16115.569	240.76	0.656	146.7	.....	13.554	.....	2.9	Harper <i>DAO</i> 3, 204, 1925 R
367	* AN And	13.6 +41 14 (5.9-6.1)	.....	A3	G5	3.2195	21059.912	40.57	0.036	23.02 -19.63	.....	168.970	0.6228	.....	S Jones <i>CA</i> 10, Pt 8, 89, 1928
368	* AR Cas	25.4 +58 00 (4.9-5.0)	.....	B3	A9s	6.067	18223.762	3.35	0.224	73.56 -4.87	.....	57.900	0.0462	.....	Young <i>DO</i> 4, 83, 1917
369	B 6070	32.6 +16 16	6.18	A0	B3k	11.2298	21916.942	236.38	0.037	59.06 -14.78	.....	4.920	0.1203	.....	Baker <i>AO</i> 2, 25, 1910 R
370	λ And	32.7 +45 55	4.00	K0	.....	20.538	14571.81	336.2	0.132	26.70 -27.38	.....	4.120	0.011	.....	S Smith <i>DAO</i> 3, 163, 1925
371	* UU Cas	45.7 +60 21 (9.7-10.0)	.....	.....	G7	20.546	16683.46	301.0	0.086	6.48 +6.34	.....	1.810	0.0006	.....	Burns <i>LOB</i> 4, 87, 1906 R
372	B 6129	47.5 +74 59	6.55	K2	B1	8.520676	23450.42	.....	0	7.07 +7.43	.....	1.990	0.0007	.....	Sanford <i>AJ</i> 79, 84, 1934 R
373	+27°4642	49.9 +28 06	7.30	K0	dK5	7.75310	20001.264	.....	0.00	161 -56	.....	18.863	3.693	.....	Christie <i>AJ</i> 80, 181, 1934 R
374	B 6142	50.5 +56 51	6.05	B0	G8p	6.7217	22220.7403	18.6	0.059	39.88 +1.68	.....	4.260	.....	0.26	Sanford <i>AJ</i> 53, 221, 1921
375	B 6148	52.1 +55 09	5.69	F5	B0k	13.4187	20801.379	0	0.1	117.5 -24.3	.....	21.600	.....	13.5	Sanford <i>AJ</i> 83, 121, 1936 R
					F3	12.155	22162.601	213.45	0.278	144	.....	26.400	.....	11.0	Harper <i>DAO</i> 2, 263, 1923 R
										71.52 +11.98	.....	11.483	.....	1.70	
										72.97	.....	11.716	.....	1.67	

NOTES TO TABLE I

1. Recent observations at Victoria indicate no correction to elements needed. *DAO* 6, 208, 1935.
3. ADS 94, 2.9–11.2, $d=75''$. Ludendorff suspected double lines on some spectrograms.
5. ADS 191, 6.2–7.8, $d=12''$.
7. Pearce estimates spectrum of components Class B9, B5 respectively. Epoch is time of primary minimum.
- 10 & 11. ADS 490, 5.6–6.4, $d=0''.3$. Earlier orbits of 13 *Ceti* A by Fox (*ApJ* 27, 375, 1908), Paraskévopoulos (*ApJ* 52, 110, 1920) and Pogo (*ApJ* 68, 116, 1928); Luyten's very careful discussion of this triple system is based upon all available material, both spectroscopic and micrometric. He finds evidence of a rotation of line of apsides of short period binary but the observations at present are not sufficient to establish this with certainty. The value of ω is given by $\omega=180^\circ + 0.016(t-T)$. Additional data are: $i=+52^\circ$; $a=0''.244$; $\Omega=24^\circ$. For $p=0.050$, $a=4.9$ ast. units, $m_A=1.27\odot$ and $m_B=1.05\odot$.
12. ADS 513, 4.5–9.0, $d=36''$.
13. Revised elements by Victoria give $P=1.96418$, $T=2421295.789$ *DAO* 6, 208, 1935.
14. Neubauer finds his 21 observations of 1924 are represented by Lunt's elements. *ASP* 41, 371, 1929.
15. ADS 624, 6–9.7, $d=36''$. Epoch is time of nearest approach of primary.
17. Earlier orbit by Cannon. *DO* 2, 143, 1915.
18. Epoch is time of greatest positive velocity.
19. ADS 830, var–11.2, $d=18''$.
20. SDS, 4.2–7.8, $d=6''$. Elements provisional.
21. ADS 996, 4.2–5.3, $d=23''$.
22. ADS 1477, 2.0–9.0, $d=18''$. Short period variation in velocity 3.96809, amplitude 6 km/sec, is Cepheid variable.
24. ADS 1326, 6.0–10.6, $d=11''$.
25. $H\alpha$, $H\beta$, $H\gamma$, $H\delta$ appear as emission and absorption lines whose intensity and character change. Ludendorff and Jordan (*AO* 3, 31, 1913) find velocity curves vary for different revolutions of system. Cannon's orbit is based on 1-prism observations of the absorption lines $H\beta$, $H\gamma$, $H\delta$, K , $H\epsilon$, $\lambda 4471$ and $\lambda 3790$, which he is able to represent by elliptic elements with a period of 126.5 days after superimposing a secondary oscillation of half this period. Ludendorff obtains similar results for his high dispersion observation of the $H\gamma$ absorption line. On his spectrogram several faint absorption lines show two components, and from these he derives the provisional elements quoted. Further observations will be required to clear up the complex phenomena exhibited by this star, and small weight should be assigned to the present elements.
27. Revised elements by Victoria give $P=1.73631$; $T=2420500.349$. *DAO* 6, 211, 1935.
- 32 and 33. ADS 1697, 5.0–6.4, $d=4''$; Σ 227 A needs no correction to elements according to recent observations at Victoria. *DAO* 6, 212, 1935. For Σ 227 B revised elements by Victoria give $P=2.23655$; $T=2422635.849$. *DAO* 6, 212, 1935.
34. ADS 1739, 5.2–13.7, $d=64''$.
36. ADS 1982, 6.1–7.1, $d=38''$.
38. See note 1.
40. ADS 2151, 4.9–8.4, $d=3''$.
41. See note 1.
42. ADS 2202, 5–12, $d=51''$. Spectrum of primary is veiled by that of companion.
43. ADS 2362, var–12, $d=58''$. The epochs for the short-period orbits refer to the light minimum JD 2422619.7908 with added corrections for equation of light in the long period orbit and to the respective dates 1923.65 and 1924.65.
46. ADS 2433, 6.5–12.0, $d=30''$. See note 1.
47. See note 1.
48. Epoch is time when primary is nearest Sun.
50. ADS 2726, 4.0–8.5, $d=0''.8$. Earlier orbit by Vogel (*ApJ* 17, 212, 1903) and a later discussion by Ludendorff (*AN* 188, 211, 1911) who concludes that the velocity of the system is variable.
52. Spectrum F5 according to Harper.
53. Orbit by Schlesinger (*AO* 3, 23, 1913; 167, 1914). McLaughlin's elements were derived from the Allegheny observations after excluding those affected by rotation of the star, and differ very little from those of Schlesinger. McLaughlin also finds evidence on Ann Arbor plates of secondary spectrum from measures of which, together with Stebbins' light elements (*ApJ* 51, 217, 1920) he derives, for a mass ratio 3:1 radius of bright star = $5.35\odot$; radius of faint star = $4.00\odot$; mass of bright star = $3.71\odot$; mass of faint star = $1.24\odot$; density of bright star = $0.024\odot$; density of faint star = $0.019\odot$.
54. McLaughlin finds that the elements here quoted seem to satisfy the Ann Arbor observations better than those given by Schlesinger (l. c.) with a period of 34.60 days, and that with his elements, a definite indication of a rotation effect is shown. Both the long period orbit and rotational effect are still in an unsatisfactory state and further study of the system is needed.
55. ADS 2990, 7.0–9.0, $d=1''$.
56. ADS 3071, 4.5–12.0, $d=15''$.
57. Earlier orbit by Cannon (*DO* 1, 285, 1911) was based upon the Ottawa observations of 1910–11 which included measures of the secondary. Harper, from Victoria observations of 1930, was unable to find evidence of a secondary spectrum. He concludes that the velocity of system is probably variable.
58. Member of Taurus stream. Spectrum G7 according to Sanford.
59. SDS, 4.0–5.0, $d=0''.5\pm$.
60. ADS 3169, 7.0–9.0, $d=1''$. Sanford classifies spectrum as F9.
61. Elements are Harper's revision of Jantzen's orbit (*AN* 196, 117, 1913). Member of Taurus stream.
62. ADS 3267, 6–13, $d=40''$.
63. Member of Taurus stream.
64. Spectrum composite; spectrum of primary veiled by that of primary. Sanford (letter) says orbit should be revised.
65. ADS 3317, 4.5–8.5, $d=70''$. Revised elements of Victoria give $P=3.57104$, $T=2419643.013$ (*DAO* 6, 218, 1935). Epoch is time when secondary crosses line of sight nearest to solar system. Orbit by Harper (*DO* 1, 125, 1913) gives $\frac{m_2}{m_1}=0.47$; $m_1 \sin^3 i = 2.7\odot$. Later orbit by Daniel (*AO* 3, 96, 1914) is in close agreement with Wilson's. Spectrum of secondary not visible on the Victoria, Allegheny or Lick spectrograms.
66. ADS 3359, 5–12, $d=4''$.
72. Epoch is time of maximum positive velocity.
73. ADS 3536, 4.6–7.9, $d=1''$. Revised elements of Victoria give $P=3.8845$, $T=2418692.944$. *DAO* 6, 218, 1935.
74. ADS 3605, 3.2–14, $d=29''$. Ludendorff finds evidence of a superimposed oscillation for which he obtains periods of 142, 153, and 161 days for the different epochs. His investigation and a long series of observations made at Yerkes (Struve, *MN* 86, 63, 1925) show that much further work is needed to disentangle the long and short period variation. Orbit can be considered only as quite provisional and should be excluded in statistical studies.

75. Tremblot (*CR* 198, 1977, 1934) observed spectrum and radial velocity of B star in ultra-violet. From his observations and Harper's elements he finds $\frac{m_K s}{m_B} = 1.88$; $m_K \sin^3 i = 16.0 \odot$; $m_B \sin^3 i = 8.5 \odot$; $a_K + a_B = 847,600,000$ km.
76. ADS 3698, 6.0–9.2, $d = 53''$. On Lick spectrograms a faint third component line is visible between the other two lines but does not partake of their change in position (*ASP* 30, 351, 1918).
77. ADS 3709, 6.0–12.5, $d = 14''$.
78. Epoch is time of minimum light H.G.M.T.
79. Orbital elements were computed from data from hydrogen lines. Widely differing amplitudes are given by the displacements of lines of various elements; interpretation on binary hypothesis difficult.
80. ADS 3824, AC 5.0–7.2, $d = 15''$; AB 5.0 = 11.0, $d = 12''$. Revised elements by Victoria (*DAO* 6, 219, 1935) give $P = 3.78873$.
81. ADS 3841, 1.0–16.0, $d = 46''$. By comparison of Mount Wilson observations 1921 and 1922 with those made at Lick in 1900, Sanford concludes that Reese's period can not be in error by .01 day and that the velocity of the system may have changed about 1 km/sec. Merrill's orbit based on interferometer measures yields the following elements: $P = 104.022$, $T = 2422596.79$, $\omega = 114^\circ 30'$, $i = 41^\circ 08'$, $\Omega = 38^\circ 70'$, $e = 0.0086$, $a = 0^\circ 05360$. By combining the foregoing elements with the spectroscopic results he derived $a_1 + a_2 = 126,630,000$, $p = 0^\circ 0632$, $m_1 = 4.2 \odot$, $m_2 = 3.3 \odot$. *ApJ* 56, 40, 1922.
82. ADS 3823, 1.0–8.0, $d = 10''$. Plaskett finds amplitude of velocity curve is variable. Ludendorff (*AN* 183, 9, 1909) suspects that the velocity of system is variable.
83. ADS 3866, 6.5–9.5, $d = 10''$. Epoch is time when primary is at greatest positive velocity. Spectrum F2s (Sanford).
84. Epoch is time of primary minimum. Provisional elements derived by Harper (*AAS* 8, 213, 1935) in close agreement with those quoted. His $m_2/m_1 = 0.88$.
85. Epoch is time of closest approach of primary to the Sun.
86. ADS 4002, 4.0–5.0, $d = 1''$. Baker (*AO* 1, 136, 145, 1910) from observations of secondary finds $m_2/m_1 = 0.95$ and therefore $a_2 \sin i = 16,800,000$ km, $m_1 \sin^3 i = 11.2 \odot$, $m_2 \sin^3 i = 10.6 \odot$.
88. ADS 4039, 5.5–11.1, $d = 2.5''$. Baker (*AO* 1, 136, 145, 1910) from observations of secondary finds $m_2/m_1 = 0.76$, and deduces, $a_2 \sin i = 6,600,000$ km, $m_1 \sin^3 i = 5.53 \odot$, $m_2 \sin^3 i = 4.20 \odot$.
89. Young also obtained an orbit based on H and K lines which gave same elements except that value of K was about one-half. It is believed that the H and K lines in this star are blends of stellar and inter-stellar lines.
90. ADS 4134, 2.0–13.5, $d = 33''$. Orbits by Hartmann (*ApJ* 19, 278, 1904), Jordan (*AO* 3, 131, 1914), Curtiss (*ApJ* 42, 135, 1915) agree closely with that of Hnatek who used all available material.
91. Epoch is time when radial component of orbital velocity is zero and changing from negative to positive.
92. Orbit provisional.
93. Provisional orbit.
94. A preliminary set of elements by Neubauer was published in *ASP* 47, 282, 1935. Through a typographical error the period was given as 4.62032 instead of 4.624032.
95. ADS 4188, 4.8–6.1, $d = 52''$.
96. The orbital elements quoted were derived after introducing a secondary oscillation of the same period, the elements of which are given in the second line.
97. Elements were derived from measures of hydrogen absorption lines on spectrograms taken in 1923 and 1924. Comparison with velocity curves of 1914 and 1925-7 and with that of Adam's 1902-5 (*ApJ* 22, 115, 1905) indicates velocity of system is variable. The hypothesis of simple orbital motion is not sufficient to account for the observed irregularities and variations in the displacement of the hydrogen lines. Marked peculiarities are also shown by the lines of other elements.
100. See note 96.
101. See note 1.
102. ADS 4474, 6.0–12.0, $d = 15''$. Elements for secondary based on four Lick observations.
104. ADS 4556, 2.0–10.5, $d = 183''$. Baker finds period variable and given by $P = 3.960027 + 0.000010 (t - 1906)$; epoch is time of passage of primary through ascending node. Several orbits have been published, Rambaut, Vogel, Ludendorff, Belopolsky and Baker; present one is based upon all reliable data up to 1910 and is for epoch 1905.78. Tikhoff (*Pul Mit* 10, 205, 1925) derived orbits from displacements of different lines in an effort to investigate cause of variation in period.
- 106 and 107. ADS 4617, 4.3–6.6, $d = 0''.3$. Orbits of the brighter component were published by Frost and Struve (*ApJ* 60, 192, 1924), (*YO* 7, 28, 1929) in which the velocity of the system was found to be variable in a period of about 18 years. Epoch here quoted refers to time of minimum velocity.
- Orbit of long period system is based upon observations taken at nine epochs between 1906 and 1929, and is only provisional.
112. Revised elements at Victoria (*DAO* 6, 221, 1935) give $P = 9.9450$, $T = 2420375.952$.
114. Earlier orbit by Wilson and Huffer (*LOB* 10, 15, 1918). One quoted is based upon Cape and Lick (Chile) observations.
115. Epoch is time of primary minimum. Dugan (*Contr Prin* 10) gives $P_{\text{Min}} = 2421623.353 + 2.5250144E$.
117. ADS 5423, -1.6 – 8.4 , $d = 8''$. Aitken's visual orbit is in close agreement with later one by Volet (*BA* 7, 24, 1931). The velocity of the system was derived from 151 radial velocity observations of brighter star on the basis of Aitken's elements and Boss' mass ratio $m_2/m_1 = 0.29$. Aitken finds $i = +43^\circ 31'$, $\Omega = 42^\circ 71'$, $a = 7^\circ 570$. For $p = 0^\circ 376$, $m_1 = 2.53 \odot$, $m_2 = 0.73 \odot$, $a = 3009 \times 10^6$ km. Various shorter periods have been suspected by several investigators, the most recent one by Voronov (*Tashkent Bul* 4, 101, 1934) from Lick and Cape radial velocities. He finds $P = 4.55$ yrs and $K = 0.58$ km/sec. The evidence for this is not convincing.
118. Based upon 26 Lick (Chile) and 31 Cape observations.
119. Epoch is time of nearest approach of primary to Sun. Elements are provisional.
120. ADS 5827, 7.0–13.0, $d = 20''$.
121. Based upon Harper's orbit for the brighter component (*DO* 4, 115, 1917) and five later observations. Gaposchkin (*AAS* 8, 210, 1935) announced this star to be an eclipsing variable with minima of almost equal depths ($0^\circ 33$). He found $i = 68^\circ$ and therefore $m_1 = 40.0 \odot$, $m_2 = 31.0 \odot$.
122. ADS 5977, 5.0–10.5, $d = 8''$.
123. ADS 6012, 5.3–6.6, $d = 15''$. Based upon Harper's orbit for the brighter component (*DO* 4, 235, 1918) and ten later observations. See note 1.
125. ADS 6089, 5.3–9.5, $d = 43''$.
126. ADS 6100, 4.3–13.0, $d = 32''$.
127. SDS, 3.3–8.4, $d = 22''$. Earlier orbit by Lunt (*ApJ* 44, 261, 1916). Wilson's elements are based upon Cape and Lick (Chile) observations.
128. Orbits by Belopolsky (*ApJ* 5, 1, 1897; *Mem Acad St P* 11, No. 4, 1900), Lehmann-Balanovskaya (*Pul OB* 9, 365, 1922) and Barlow (*DO* 9, 149, 1929) have been published. More recently, Luyten (*Pub Min O* 2, 3, 1934) has made a discussion based upon all available material. His elements are in close agreement with those of Curtis' except that the value of the period derived by him, $P = 2.928315$, is undoubtedly more

- accurate than the one given by Curtis. Guthnick and Prager (*VBB* 1, 56, 1914) observed a slight variation in light of the system having the period of a_1 .
129. Later orbits by Rossowskaya (*Pul OB* 10, 192, 1924) and Barlow (*DO* 9, 149, 1929). From Curtis' data and this later material Luyten (*Pub Min O* 2, 5, 1934) finds an improved value of the period, $P=9.21316$. His other elements are much the same as those of Curtis here quoted.
 130. ADS 6175, 2.7-3.7, $d=6''$. From his elements of visual pair and the relative radial velocities of a_1 and a_2 , Luyten computes the parallax $=0''.068$. The mass of the system is then found to be $5.5\odot$, and with Rabe's mass ratio of $0.42/0.58$, the mass of $a_2=3.2\odot$, and of $a_1=2.3\odot$.
 131. Epoch is time when primary is farthest from Sun.
 132. ADS 6251, 1.0-13.5, $d=5''$. Orbit (of brighter star about center of mass of system) was derived from micrometric, meridian and radial velocity observations. Jones finds $i=+30^\circ 6$, $\Omega=307^\circ 8$, $a=1''.020$; and for $p=0''.308$, $m_1=1.24\odot$, $m_2=0.39\odot$, $a=495\times 10^6$ km.
 133. Revised type is that of Harper.
 134. Revised elements of Victoria (*DAO* 6, 224, 1935) give $P=19.603$, $T=2419117.659$.
 135. Elements provisional.
 136. ADS 6420, 5.6-6.7, $d=0''.4$. $m_2/m_1=0.4$.
 137. SDS, var-10.0, $d=6''$. Relative orbit $K_1+K_2=604$ km/sec, $(a_1+a_2)\sin i=12,041,000$ km, $(m_1+m_2)\sin^2 i=33\odot$.
 138. SDS, 4.5-6.0, $d=6''$. Epoch is time when primary is nearest Sun.
 140. ADS 6872, 6.5-10.0, $d=1''.7$.
 141. ADS 6886, 6.0-7.0, $d=10''$.
 142. ADS 6915, AC 7.0-8.0, $d=45''$. Member of Praesepe cluster. Sanford says each component is F1s.
 143. ADS 6993, 4.0-5.5, $d=0''.2$. Aitken's visual orbit gives $P=15.3$ yrs, $T=1900.97$, $\omega=270^\circ 0$, $i=49^\circ 95$, $\Omega=104^\circ 4$. From the visual and spectroscopic orbits and the mass ratio derived by Seeliger, $m_2/m_1=0.9$, are obtained, distance between components $=1,359,000,000$ km, $p=0''.025$, $m_1=1.75\odot$, $m_2=1.58\odot$.
 144. ADS 6993 C, -7.8, $d=3''.2$.
 146. SDS, 4.9-7.7, $d=3''$.
 148. Two spectra. Elements refer to brighter component.
 152. Revised elements at Victoria (*DAO* 6, 225, 1935) give $P=15.990$, $T=2420750.851$.
 155. Epoch is time of primary minimum.
 156. ADS 7480, 4.0-10.0, $d=84''$. Epoch is time when primary is nearest Sun. Earlier orbit by Zurhellen (*AN* 173, 353, 1907).
 157. ADS 7494, var-13.1, $d=7''$. The period is twice that given by Shapley and Vanderbilt (*ApJ* 46, 281, 1917) and epoch is that given by them for light minimum.
 159. See note 1.
 160. ADS 7671, 4-13.5, $d=55''$.
 163. SDS, 4.5-5.0, $d=0''.7$.
 165. Victoria revised elements (*DAO* 6, 226, 1935) give $P=15.8300$, $T=2418577.185$. Parker measured lines of secondary on three spectrograms from which he derived $m_2/m_1=0.17$. On Victoria plates Harper is unable to find evidence of second spectrum.
 167. Epoch is arbitrarily fixed.
 168. Elements derived by Van den Bos from photographic observations, $a=0''.0514$, $i=+95^\circ 5$, $\Omega=309^\circ 4$.
 169. ADS 8119, 4.0-4.9, $d=1''.7$. Elements are from Van den Bos' visual orbit for which $a=2''.5355$, $i=+122^\circ 301$, $\Omega=101^\circ 400$. From visual and spectroscopic elements Berman finds total mass of system $=2.27\odot$ and $p=0''.136$.
 170. Approximate orbit.
 171. ADS 8250, 5.9-8.0, $d=10''$.
 173. Cannon published a second orbit based upon micrometer measures of same plates.
 176. Earlier orbit by Cannon (*DO* 4, 125, 1917) was based on erroneous period.
 178. SDS, 4.5-13.8, $d=4''.5$. Earlier orbit of brighter component by Lunt (*CA* 10, Pt 7, 17G, 1924). Spectrum of secondary resembles that of primary.
 179. Epoch is time when primary is nearest Sun.
 180. Victoria's revised elements (*DAO* 6, 227, 1935) give $P=462.8$, $T=2424665.790$.
 181. Epoch is time of maximum velocity of recession.
 182. Earlier orbits by Ichinohe (*ApJ* 26, 282, 1907) and Harper (*ApJ* 27, 160, 1908). Quoted elements based upon 3-prism observations.
 183. Epoch is time of maximum velocity of recession of primary.
 184. Victoria's revised elements (*DAO* 6, 230, 1935) give $P=11.788$, $T=2424632.410$.
 185. Earlier orbit by Baker (*MO* 3, 33, 1920) shown by Hill to be based on wrong period. For this Be star Hill finds the velocity curve regular and that all lines give the same velocity.
 186. Revised elements at Victoria (*DAO* 6, 230, 1935) give $P=38.321$. From observations of secondary Cannon finds $m_2/m_1=0.51$. Harper has re-examined Ottawa plates and nine additional Victoria plates and concludes doubling of lines, while not pronounced, is occasionally present. His mass ratio is 0.6.
 187. ADS 8682, 4.9-5.4, $d=22''$.
 188. Measures of a component of Mg 4481, on the assumption that it is given by secondary, give $m_2/m_1=0.150$. Guthnick and Prager (*VBB* 2, Pt 3, 52, 1918) find light variable in period 0.95203, and evidence of variation in velocity in same period from Ludendorff's observations.
 189. SDS, 4.4-9.5, $d=25''$. Member of Scorpio-Centaurus cluster.
 190. Epoch and period are Schneller's elements for light variation. Epoch is that of minimum light given in H.G.M.T.
 191. ADS 8891, 2.1-4.2, $d=14''$. Orbits by Vogel (*ApJ* 13, 328, 1901), Ludendorff (*AN* 180, 276, 1909), Hnatek (*AN* 209, 49, 1919). The present one is from a discussion of Ludendorff's and Hadley's observations. From Pease's interferometer measures, Hadley's elements and recent Mount Wilson observations, Russell (*ASP* 39, 313, 1927) finds $p=0''.045$, $m_1=m_2=2.55$, $a=0''.0115$, $e=0.53$, $i=60^\circ$, $\Omega=282^\circ$, $\omega=104^\circ$, $T=1927$, June 12.38 G.C.T., $P=20.53851$. Parallax was derived from studies of Ursa Major group.
 192. Eclipsing Variable? Earlier orbits by Vogel (*Ptm O* 7, 136, 1892), Baker (*AO* 1, 72, 1909). Luyten-Ebbighausen (*ApJ* 81, 305, 1935) find rotation of line of apsides in a period of 114 years.
 194. Lines of spectrum are very diffuse and probable error of single observation is large, so that orbital elements are somewhat doubtful.
 195. SDS, 4.7-11.0, $d=32''\pm$.
 197. Epoch is time of perihelion.
 198. SDS, 4.8-8.0, $d=14''$.
 199. Relative orbit. $K_1+K_2=312$ km/sec, $(a_1+a_2)\sin i=29,800,000$ km, $(m_1+m_2)\sin^2 i=16.4\odot$. T =time when primary is nearest Sun.
 200. Elements based upon Harper's orbit (*RASC* 4, 191, 1910) and were derived from observations of Ottawa, Bonn, Cape and Lick. Revised elements at Victoria (*DAO* 6, 231, 1935) give $P=492.5$ days.
 201. Several orbits by Plaskett and Harper (*Rep Chief Astr Can*, App 3, 146, 1907) (*RASC* 1, 244, 1907). Victoria's revised elements (*DAO* 6, 232, 1935) give $P=51.41$, $T=2417711.564$.
 202. Revised elements at Victoria (*DAO* 6, 232, 1935) give $P=9.6047$, $T=2419081.780$.

203. Epoch is time of maximum positive velocity.
205. Victoria's revised elements (*DAO* 6, 233, 1935) give $P=7.3683$, $T=2426503.295$.
206. Orbit is provisional.
208. SDS, 0.3–1.7, $d=2''$ – $22''$. Finsen finds $i=+79^\circ 233$, $\Omega_b=25^\circ 445$, $\Omega_a=17^\circ 665$. The velocity of the system is the mean of the values derived by Wright (*LO* 9, 238, 1909) and Jones (*CA* 10, Pt 8, 206, 1928) the former on the basis of Lick (Chile) radial velocities and Robert's elements, the latter from Cape observations and Lohse's elements. K_1 and K_2 are quoted from Jones' discussion, from which is derived $m_2/m_1=0.65$. The value given by Boss is 0.85 and is undoubtedly entitled to greater weight. With this mass ratio and $p=0.756$, $m_1=1.08\odot$, $m_2=0.88\odot$, $a=3493\times 10^6$ km.
209. Period of triple system probably 5 or 6 years. Spectral class revision Harper's.
210. ADS 9406, 5.8–6.5, $d=3''.5$. Victoria's revised elements give $P=12.8244$, $T=2423187.276$. (*DAO* 6, 234, 1935.)
211. Earlier orbit by Schlesinger (*AO* 1, 126, 1910). The elements quoted are based on the Ann Arbor observations of 1924. The difference of 8 km/sec in the values of γ for the two orbits probably indicates that the velocity of the system is variable in a long period. McLaughlin obtains a rotation effect in the velocity curve.
212. Epoch is time of perihelion.
213. Earlier orbit by Plaskett (*DAO* 1, 187, 1920). Present one is based upon observations in 1919–20 and 1935. No change in elements between the two epochs is indicated.
216. ADS 9617, 5.2–5.7, $d=0''.5$.
217. Earlier orbit by Christie (*DAO* 3, 310, 1926) with erroneous period.
218. Earlier orbits by Jordan (*AO* 1, 85, 1909) and by Cannon (*RASC* 3, 152 and 421, 1909) are in satisfactory agreement with one quoted.
219. ADS 9706, var–9.5, $d=3''.5$.
221. ADS 9737, 4.1–5.0, $d=6''$.
223. ADS 9862, 6.0–12.0, $d=50''$.
224. ADS 9909, 4.9–5.2, $d=1''$.
225. ADS 9913, 2.0–9.7, $d=1''$. Later orbit by Duncan (*LowOB* 2, 21, 1912), based on 90 Lowell observations, is in close agreement for elements of primary as given by Daniel and Schlesinger. Duncan finds $K_2=166$ km/sec, $m_1 \sin^3 i=9.0\odot$, $m_2 \sin^3 i=6.8\odot$, $\gamma=-8.0$ km/sec, $a_1 \sin i=10,990,000$ km, $a_2 \sin i=14,450,000$ km.
229. Provisional elements.
230. ADS 9979, 5.0–6.1, $d=5''$. Victoria's revised elements (*DAO* 6, 234, 1935) give $P=7.975$, $T=2423814.744$.
231. Henroteau's later work based upon Ottawa 1-prism spectrograms (*DO* 5, 303, 1921; 8, 45, 1922, and 9, 91, 1925) indicates that the form and amplitude of the velocity curve changes. He finds that all observations 1915 to 1924 are represented better by a period of 33.0 days. The evidence for a variation in systemic velocity in a long period noted by him is made doubtful by the presence in his observations of a systematic error of +9.4 km/sec.
233. SDS, 5.3–9.7, $d=21''$.
234. Revised elements at Victoria (*DAO* 6, 235, 1935) give $P=5.0193$, $T=2425417.022$.
236. ADS 10116, 6.3–13.5, $d=3''$.
238. Epoch of minimum and period are Dugan's light elements. (*Contr Prin O* 10, 15, 1930).
239. ADS 10157, 3.0–6.5, $d=1''$.
240. Epoch is time when primary attains maximum positive velocity.
241. Relative orbit. $K_1+K_2=480$ km/sec, $(a_1+a_2) \sin i=9,-534,000$ km, $(m_1+m_2) \sin^3 i=16.5\odot$. Eclipsing variable?
245. Earlier orbit by Harper (*RASC* 4, 302, 1910) derived from blend of two components. See note 1.
246. Revised elements at Victoria (*DAO* 6, 238, 1935) give $P=23.253$, $T=2422454.395$.
247. ADS 10408, 8.0–12.0, $d=4''$. Epoch is time of light minimum. Epoch and period by Jordan (*AO* 7, 142, 1929).
248. ADS 10418, 3.0–6.1, $d=4''.7$.
249. ADS 10428, var–13.0, $d=20''$. Epoch is time of primary minimum.
250. ADS 10449, 4.8–10.2, $d=4''$. Similar set of elements derived by Carpenter (*ASP* 43, 30, 1931) based on same set of observations.
251. T is epoch of principal conjunction. Elements are revision of Plaskett's (*DAO* 1, 207, 1920).
255. SDS, 5.7–10.5, $d=5''$. Epoch is time of zero velocity. Elements are provisional and depend upon unpublished data.
256. Epoch is time of perihelion.
258. ADS 10749, 6.7–9.8, $d=38''$.
259. $P=2.82374$, $T=2422129.307$, according to revised element of Victoria (*DAO* 6, 239, 1935).
260. On account of the southern declination of the star, only one spectrogram was obtained in a night. The possibility of a period of about a day (1.08759 or 0.92081) is not excluded, although the one here adopted appears to give somewhat better representation of the observations.
261. Epoch of primary minimum is $2413086.365+3.992795$ E (Nijland, *Contr Prin O*, 15, 23, 1934).
262. The orbit is only provisional and was derived from thirty-one 3-prism observations 1897–1931.
263. ADS 11046, 4.1–6.1, $d=2''$. Pavel finds $i=-58^\circ 743$, $a=4''.495$, $\Omega=122^\circ 184$. Adopting $p=0''.20$ and Pavel's elements and mass ratio $m_B/m_A=0.36$, we find $m_A=1.09\odot$, $m_B=0.38\odot$, $a=3359\times 10^6$ km. Pavel finds evidence from micrometer measures of a period of 6.5 years while Jacob and See obtained periods of 26 and 36 years respectively. The elements here quoted appear to rest upon more reliable data.
264. ADS 11061, 5.4–6.1, $d=20''$.
265. ADS 11169, 4.0–11.0, $d=17''$. Earlier orbit by Ichinohe (*ApJ* 26, 161, 1907). Kohl's elements were derived from re-measures of same plates used by Ichinohe.
266. ADS 11213, 6.4–9.8, $d=95''$. Victoria's revised elements (*DAO* 6, 239, 1935) give $P=2.04765$, $T=2422557.150$.
267. SDS, 4.3–8.1, $d=3''$.
268. Victoria's revised elements (*DAO* 6, 240, 1935) give $P=485$, $T=2423540.650$.
269. Epoch is time of maximum positive velocity of primary. Earlier approximate orbit by Ludendorff (*AN* 197, 218, 1913).
271. Earlier orbit by Wright (*ApJ* 11, 133, 1900). Crawford's elements were based upon Wright's observations and a later Lick series of 1922–3 and 1928. Slight changes in elements in the interval of 25 years were indicated. Further observations are required to establish their reality. Luyten (*Pub Min O* 2, No. 1, 15, 1934), from a re-discussion of same material, derives elements in close agreement with those of Crawford.
272. Provisional.
273. Epoch is time of primary minimum.
276. ADS 11639, AD 4.2–5.5, $d=44''$. Epoch is time of maximum positive velocity. Revised elements of Victoria give $P=4.30002$ (*DAO* 6, 240, 1935).
278. ADS 11698, 6.5–8.5, $d=0''.4$. Epoch is time of maximum positive velocity.
279. ADS 11745, 3.0–6.7, $d=45''$. The more massive but fainter star has a spectrum of Class B2e. Its lines are nearly stationary, and across them the lines of the brighter star periodically oscillate. Earlier orbits by Belopolsky and others. Curtiss (*AO* 2, 73, 1911) made an extensive study of its spectrum.

- From measures of the broad emission line $H\beta$, which appeared to oscillate in position, he derived elements on the assumption that these displacements correspond to motion of secondary, from which $m_1/m_2 = 0.407$. Although the value is not inconsistent with light elements, Curtiss regarded this interpretation as doubtful. Curtiss suspected a variation in velocity of system, but Rossiter's work shows this to be constant within the errors of observation. Rossiter isolated and measured the rotational effect of the component stars. A number of solutions from light elements have been made, but the system still remains something of a puzzle.
282. ADS 11779, 4.6–7.6, $d = 32''$.
 284. ADS 11820, 6.0–12.5, $d = 35''$.
 287. Epoch is time of maximum positive velocity.
 290. Revised elements at Victoria (DAO 6, 241, 1935) give $P = 4.8126$, $T = 2424126.258$.
 291. ADS 12075, 7.6–8.7, $d = 1''.3$. See note 1.
 292. Pearce classifies spectrum of primary as B5, cannot see secondary.
 293. Radial velocity of secondary was observed during primary minimum and from slope of velocity curve, $m_1/m_2 = 3.3$.
 294. Victoria's revised elements (DAO 6, 242, 1935) give $P = 10.3932$, $T = 2425295.893$.
 295. Plaskett finds spectrum to consist of enhanced metallic lines, Class A2, and of helium lines, Class B3. Velocities derived from the metallic and helium lines are in close agreement, so that the two types of spectra originate in same star. He also finds hydrogen lines consist of several components, one in the normal position corresponding to displacements of metallic and helium lines, the others displaced to the violet. It was this effect that led to Harvard's announcement of double hydrogen lines from which Ludendorff computed masses of two components. Plaskett's radial velocities of 1924–25–26 are well represented by Wilson's elements. Merrill classifies spectrum as Av2.
 296. ADS 12352, var-12.0, $d = 13''$.
 297. Revised elements at Victoria (DAO 6, 243, 1935) give $P = 7.3919$, $T = 2421083.643$.
 299. ADS 12737, 5.5–12.4, $d = 47''$. Epoch is time of maximum positive velocity of primary.
 300. Revised elements at Victoria (DAO 6, 243, 1935) give $P = 7.6408$, $T = 2422201.398$.
 302. The orbital elements were derived from the variable systemic velocity of this Cepheid. Jacobsen (LOB 13, 112, 1928) found that the systemic velocities derived from his 3-prism observations of 1921–24–26 and 27 are not represented by Aldrich's elements, nor was he able to obtain a period which satisfied the observed variation. Further observations should be obtained for a revision of these elements which are probably quite uncertain.
 305. ADS 13256, 7.0–7.2, $d = 4''.4$.
 306. ADS 13405, 7.3–9.8, $d = 0''.9$.
 307. Variation in radial velocity observations cannot be fully explained by orbital motion. Miss Losh finds evidence of two oscillations with periods 45.33 days and 1.51775 days superimposed upon long period variation.
 308. Revised elements at Victoria (DAO 6, 245, 1935) give $P = 17.1230$, $T = 2418261.914$. Earlier orbit by Baker (AO 2, 43, 1910) agrees very closely with Harper's.
 309. Victoria's revised elements (DAO 6, 246, 1935) give $P = 9.314$, $T = 2421143.068$.
 310. Revised elements at Victoria (DAO 6, 246, 1935) give $P = 248.9$, $T = 2423666.850$.
 311. Second set of elements represents residuals from elliptic motion.
 312. Earlier orbit by Merrill (LOB 6, 6, 1910). Jones' orbit is based upon Lick and later Cape observations. Spectrum of primary veiled by that of secondary.
 316. ADS 14073, 4.0–5.0, $d = 0''.4$.
 318. ADS 14081, 6.0–12.5, $d = 32''$. Revised elements at Victoria (DAO 6, 248, 1935) give $P = 205.2$, $T = 2423541.550$.
 319. Epoch is time of primary minimum.
 320. ADS 14314, 6.7–13.7, $d = 2''.3$. A variation in velocity and in light with period of 18.60 days is present. The light curve is of the type of an eclipsing variable. Physical interpretation doubtful.
 322. The first orbit depends upon 28 plates 1919–21, mean epoch is 2422555.5; the second upon 36 observations in 1928–9, mean epoch 2425644.5. T for each orbit refers to epoch of primary minimum which was derived from the formula $JD\ 2418073.866 + 2^{\circ}996332E - 0^{\circ}143 \sin(0^{\circ}0667E) - 0^{\circ}008 \sin 2(0^{\circ}0667E)$. Redman finds evidence of a third body and that there is a slow precession of the line of apsides in a period of about 46 years.
 323. Earlier orbit by Baker (AO 2, 35, 1910). Pearce's two orbits were based on Allegheny 1910 observations and those of Victoria 1935. He finds evidence of rotation in line of apsides in period of about 525 years.
 325. ADS 14682, 6.0–8.0, $d = 3''.6$. Epoch is time of perihelion.
 326. ADS 14773, 5.3–5.4, $d = 0''.3$. Aitken's visual orbit gives $i = \pm 81^\circ$, $a = 0''.27$, $\Omega = 21^\circ$. The spectra of both components are visible and are separated near the time of periastron passage. From Aitken's orbit and the observed relative velocity of the two components the parallax is found to be $p = 0''.048$. The velocity of the system is assumed to be the measured radial velocity when lines are single. Luyten and Ebbighausen (PubMinO 2, 25, 1934) have derived a later orbit which is in close agreement with one quoted. They find the total mass of system = $4.9\odot$ and from relative velocities at periastron $m_1/m_2 = 1.03$.
 327. Earlier Lick observations are represented on Henroteau's curve with a period of 11.055.
 - 328–9. ADS 14832, 6.7–12.3, $d = 4''$.
 330. Revised elements at Victoria (DAO 6, 249, 1935) give $P = 20.342$, $T = 2424566.558$.
 332. Epoch is time of perihelion. Revised elements at Victoria (DAO 6, 249, 1935) give $P = 21.720$, $T = 2424953.579$.
 333. Elements approximate.
 334. Elements are only provisional.
 335. Victoria's revised elements (DAO 6, 250, 1935) give $P = 12.216$, $T = 2424051.948$.
 336. ADS 15184, AB 6.0–14, $d = 1''.6$, AC 6.0–7.9, $d = 12''$, AD 6.0–8.0, $d = 19''$. Brightest component of visual quadruple; earlier orbit Plaskett (DAO 4, 108, 1928). Present elements are based on hydrogen lines alone. Rufus finds assumption of binary system with an enveloping atmosphere gives fairly satisfactory interpretation of complicated observed spectral changes.
 337. Jones finds for velocity of system 1917, -4.58 ; 1918, -4.25 ; 1920, -1.63 ; 1923, -0.06 . Lunt (CA 10, Pt 6, 3F, 1921) found evidence of rotation of line of apsides but Jones shows this conclusion to be untenable.
 338. Epoch is time of maximum negative velocity for primary.
 339. See note 1.
 340. ADS 15275, 7.6–14.00, $d = 14''$.
 341. Earlier orbits for three different epochs by Henroteau (LOB 9, 122, 1918) from which he concluded there was evidence of rotation of line of apsides. Luyten's discussion of the material does not support this conclusion.

342. ADS 15281, 4.8–5.3, $d=0''.2$. The orbit of the visual pair AB is based upon all available micrometric observations. Luyten also finds $i=+109^\circ$, $a=0''.21$, $\Omega=111^\circ$, $p=0''.0247$, $M_{A+a}=3.3\odot$, $M_B=1.9\odot$ and estimates $M_A=2.1\odot$, $M_a=1.2\odot$, values which appear reasonable.
343. ADS 15314, 3.0–16, $d=69''$.
344. ADS 15405, 6.0–7.0, $d=19''$.
345. Irregular Variable of *W Cephei* type.
347. Epoch is time of primary minimum; second spectrum doubtful.
348. Epoch is time of primary minimum; epoch and period are those of Nijland's light elements.
349. Epoch is time of perihelion.
350. ADS 15571, 6.2–7.0, $d=14''$. Epoch is time when primary has maximum positive velocity.
351. Epoch is time of perihelion passage.
352. Zurhellen (*AN* 177, 333, 1908) found Bonn observations 1905–7 well satisfied by these elements.
354. Based upon Cape and Lick (Chile) observations.
355. ADS 15862, 4.6–10.8, $d=48''$.
356. Each set of elements was derived independently and based upon different data, Albitsky's upon 52 Simeis observations 1929–32, Harper's upon 28 Victoria plates 1926–33.
359. ADS 16211, 3.0–10.1, $d=90''$.
360. Earlier orbit by Pearce based on erroneous period (*DAO* 3, 176, 1925). Zverev (*VFPA* 4, 177, 1933), from photometric observations, found period to be 1.77454 days and derived new orbit on basis of Pearce's data. Period here quoted is that from photometric observations by Huffer.
361. Epoch is time of perihelion. Revised elements at Victoria (*DAO* 6, 251, 1935) give $P=24.649$, $T=2422378.892$.
362. ADS 16381, 6.0–12.0, $d=27''$.
365. ADS 16538, 5.2–7.5, $d=0''.8$. Victoria's revised elements (*DAO* 6, 251, 1935) give $P=556.0$, $T=2423581.730$.
368. ADS 16795, 6.5–10.9, $d=1''.3$.
370. First set of observations was derived from 18 spectrograms taken with the original Mills spectrograph 1897–1902 and second set from 38 taken with the re-mounted instrument 1904–1906. Burns suggested presence of third body and rotation of line of apsides. A re-discussion of this material by Luyten (*PubMinO* 2, No. 1, 19, 1934) shows both sets of observations to be satisfactorily represented by same orbital elements, period being 20.5214 days. Elements based upon 27 1-prism Ottawa plates 1924, were derived by Martin (*Mem Soc Astr Ital* 4, 93, 1927).
371. Epoch is time of maximum positive velocity. From his photometric observations Luizet (*AN* 194, 170, 1913) concluded that this star is a Cepheid variable with a period of 4.314 days. Sanford's period is half that obtained by Selivanow (*VFPA* 3, 151, 1931) for the variation in light. The radial velocity and light observations appear to indicate definitely that the star is an eclipsing binary of the β *Lyrae* type.
372. ADS 17062, 6.8–11.7, $d=5''.5$.
374. Earlier orbit by Young (*DO* 3, 373, 1916).
375. Revised elements at Victoria (*DAO* 6, 252, 1935) give $P=12.1565$, $T=2423232.241$.

TABLE Ia
DIMENSIONS, MASSES AND DENSITIES OF ECLIPSING BINARIES HAVING TWO SPECTRA

Star	Type	Period	Sp.	Mag.	Range	Solution	i	Ellipt.	L	r(r _s =1)	m(O=1)	ρ(ρ _s =1)	a ₁ +a ₂ (r _s =1)	Authority
6 AO Cas	β	3.52	O8.5nk	6.1	0.2									See footnote
7 TV Cas	A	1.81	O8.5nk	7.30	0.2								8.86	Plaskett DAO 2, 141, 1922
45 CC Cas	A	3.37	A0	7.3	1.05	D	74	0.97	0.84	2.50	1.83	0.118		No light elements
55 AG Per	A	2.03	O8		0.11									
			O8	6.3	0.11									
			B3k		0.20	D	78.3	(1.00)	0.724	3.75	5.18	0.10	14.26	Huffer WO 15, 192, 1931
78 TT Aur	β	1.33	B3	8.7	0.23				0.276	2.62	4.57	0.25		
			B3		1.05	U	87.1	0.84	0.68	4.5	6.7	0.11	11.65	Joy, Sitterly ApJ 73, 77, 1931
			B3		0.58				0.32	4.0	5.3	0.12		No light elements
84 AR Aur	A	4.13	B9	6.4	0.5				0.50	2.81	2.40	0.11	17.7	No light elements
104 β Aur	A	3.96	A0p	2.07	0.09	D	76.8	0.99	0.50	2.81	2.36	0.11		Shapley ApJ 38, 169, 1913
			A0p		0.09				0.564	2.20	2.19	0.206	12.52	Dugan Contr Prin O 10, 26, 1930
115 WW Aur	A	2.53	A7	5.70	0.66	U	87.7	(1.00)	0.436	2.09	1.90	0.207		
			A7		0.54				0.56	0.76	0.63	1.4	3.88	Joy, Sanford ApJ 64, 250, 1926
131 YY Gem	A	0.81	dM1e	9.0	0.60	U	86.4	(1.00)	0.44	0.68	0.57	1.8		
			dM1e		0.60				0.60	8.45	19.4	0.042	12.7	Shapley ApJ 38, 169, 1913
137 V Pup	β	1.45	B1p	4.14	0.64	D	74.0	0.88	0.40	7.70	19.4	0.055		
			B3		0.53				0.67	1.66	0.75	0.31	3.30	Joy ApJ 64, 293, 1926
155 S Ant	β	0.65	A8	6.39	0.44	U	62.2	0.75	0.33	1.29	0.42	0.38		
			A8		0.40				0.605	0.89	0.75	1.96	2.19	Huffer ApJ 79, 378, 1934
157 W UMa	W	0.33	F8p	8.3	0.76	D	74.6	0.81	0.395	0.72	0.54	3.33		
			F8p		0.68				0.69	1.6	1.88	0.45	18.4	Sitterly Contr Prin O 11, Pt 2, 1930
190 RS CVn	A	4.80	F4n	7.85	1.30	U	79.9	1.00	0.31	5.4	1.74	0.012		Solution unsatisfactory
			dG8		0.03									
213 U CrB	A	3.45	B5	7.5	1.1									
			B9		0.2									
249 U Oph	A	1.68	B5nk	5.67	0.69	D	84	0.94	0.54	3.23	5.36	0.18	12.8	Plaskett DAO 1, 140, 1919
			B5nk		0.59				0.46	3.23	4.71	0.16		
250 u Her	β	2.05	B3	4.6	0.68	U	77.6	0.92	0.71	4.64	7.3	0.094	14.6	Baker LOB 12, 136, 1926
			B3		0.26				0.29	4.64	2.8	0.036		
251 TX Her	A	2.06	A2	8.33	0.70	U	86.6	1.00	0.64	1.58	2.06	0.52	10.65	Baker Laws OB 3, 12, 1921
			A2		0.34				0.36	1.58	1.77	0.45		
261 Z Her	A	3.99	F2p	7.10	0.81	D	82.0	....	0.57	1.77	1.6	0.29	15.1	Adams, Joy ApJ 49, 192, 1919
			F2p		0.12				0.43	3.29	1.3	0.04		
273 RX Her	A	1.78	A0	7.20	0.68				0.585	1.95	2.09	0.280	9.72	Sanford ApJ 68, 55, 1928
			A0		0.60				0.415	1.75	1.86	0.344		
293 U Sge	A	3.38	B9n	6.5	2.88	U	84.5	....	0.93	3.4	6.80	0.171	19.59	Fetlaar BAN 3, 195, 1926
			gG2		0.03				0.07	5.7	2.03	0.011		Joy ApJ 71, 349, 1930
296 Z Vul	A	2.45	B3n	7.0	1.65	D	89.2	0.92	0.75	4.23	5.24	0.085	15.05	Plaskett DAO 1, 254, 1920
			B3n		0.34?				0.25	4.46	2.36	0.033		
299 σ Aql	β	1.95	B3	4.99	0.18		71.6	0.96	0.57	3.56	6.19	0.15	14.69	Wylie ApJ 56, 232, 1922
			B3		0.15				0.43	3.56	5.14	0.12		

TABLE Ia—Continued
DIMENSIONS, MASSES AND DENSITIES OF ECLIPSING BINARIES HAVING TWO SPECTRA

Star	Type	Period	Sp.	Mag.	Range	Solution	i	Ellipt.	L	r(r _s =1)	m(☉=1)	ρ(ρ _s =1)	a ₁ +a ₂ (r _s =1)	Authority
319	GO Cyg	β	B9n A0n	8.23	0.58 0.29	D	71.2	0.86	0.70 0.30	1.65 1.65	1.04 0.88	0.31 0.26	4.34	Liau <i>Lyon O 1</i> , Ser 1, fasc 13, 49 1935
322	Y Cyg	A	O9mnk O9mnk	7.0	0.6 0.6	U	88.2	....	0.5 0.5	5.86 5.86	17.1 17.3	0.085 0.086	28.44	Dugan <i>Contr Prim O 12</i> , 50, 1931
346	MR Cyg	A	A0	8.50	0.80									No solution available
347	CM Lac	A	A2	8.21	0.27 1.13									No light elements
348	RT Lac	β	G9 K1	8.83	1.00 0.60	D	89.2	0.96	0.58 0.42	5.0 5.0	1.0 1.9	0.01 0.02	17.90	Joy <i>ApJ</i> 74, 104, 1931
353	AR Lac	A	G5 K0	6.96	0.82 0.20	U	86.0		0.53 0.47	1.88 3.10	1.42 1.41	0.214 0.047	9.39	Schneller, Plaut <i>AN</i> , 245, 390, 1932 Harper <i>RASC</i> 27, 148, 1933
360	AH Cep	β	B0nk B0nk	6.63	0.22 0.16									No light elements

Pearce's photometric orbit (*DAO* 3, 275, 1926) is based on photoelectric observations by Guthnick during the interval 1919 September to 1920 March. Later observations by Guthnick and Pavel established a variation in the shape of the light curve. The ellipticity found by Pearce from the light curve is 0.0524 ± 0.05 . In view of these uncertainties, as well as the small total amplitude of 0^m.2, it is evident that the rectification of the light curve and the solution for the photometric elements are practically indeterminate. The dimensions as computed by Pearce are therefore entitled to little or no weight.

TABLE II
ELEMENTS FOR STARS HAVING VARIABLE RADIAL VELOCITY, BUT WHICH ARE NOT BINARIES

	Star	α 1900	δ	Mag.	Sp.	Type	P (days)	T (2,400,000)	ω°	e	K (km/sec)	γ (km/sec)	$a \sin i$ (10 ⁶)	$\frac{m^2 \sin^2 i}{(m_1+m_2)^2}$	Authority
1	TU Cas	h 20.9	+50 43	7.90-9.07	F5-G2	δ	2.139295	23738.56	47.29	0.19	(19)	-22.2	0.0000	Sanford <i>ApJ</i> 68, 169, 1928	
2	α UMi	1 22.6	+88 46	2.54-2.71	F7	ζ	3.9683		265.2	0.20	2.74	var	0.007	Kholodovsky <i>LOB</i> 11, 166, 1924 R	
3	σ Cet	2 14.3	- 3 26	2.0-10.1	M5e-M9e	L	330		178	0.17	5.9	+58.2	0.015	Joy <i>ApJ</i> 63, 281, 1926 R	
4	δ Cet	2 34.4	- 0 06	4.04	B2	β	0.1556	27097.145	.....	0.00	7.2	+14.8	0.0000	Crump <i>ApJ</i> 79, 354, 1934 R	
5	SU Cas	2 43.0	+68 28	6.0-6.4	F2-F9	δ	1.9495	20197.65	.....	0.00	11.0	- 7.0	0.0003	Adams, Shapley <i>ApJ</i> 47, 46, 1918	
6	ν Eri	4 31.3	- 3 33	4.1-4.2	B2s	β	0.23667		.....	0.00	var	var	0.0004	Henroteau <i>DO</i> 9, 119, 1927	
7	SZ Tau	4 31.4	+18 20	6.8-7.4	F4-G2	δ	3.1484	20016.187	76.66	0.24	10.94	- 3.15	0.0004	Haynes <i>LOB</i> 8, 85, 1913	
8	β Dor	5 32.7	-62 33	4.2-5.7	F2-F9	ζ	9.8417	22426.61	357	0.3	15.4	+ 7.4	0.0032	Applegate <i>LOB</i> 13, 12, 1927 R	
9	α Ori	5 49.8	+ 7 23	0.1-1.2	M2	L	(3.28)	25444.7	322.7	0.200	3.08	+20.33	0.0060	Sanford <i>ApJ</i> 77, 110, 1932 R	
10	β CMa	6 18.3	-17 54	1.99	B1	β	0.25714	18367.700	225	0.04	9.10	+33.06	0.0000	Henroteau <i>LOB</i> 9, 155, 1918 R	
11	RT Aur	6 22.1	+30 33	5.4-6.5	F1-G5	δ	3.7282	0003.423	95.02	0.368	17.96	+21.43	0.0018	Duncan <i>LOB</i> 5, 121, 1909 R	
12	W Gem	6 29.2	+15 25	7.8-8.0	F6-G5	δ	7.91543	25612.460	72.3	0.53	16.7	- 0.70	1.541	0.0023	Sanford <i>ApJ</i> 72, 46, 1930
13	ζ Gem	6 58.2	+20 43	3.7-4.1	eG1v	ζ	10.154	0001.313	333	0.22	13.2	+ 6.8	0.0023	Campbell <i>ApJ</i> 13, 93, 1901 R	
14	RU Cam	7 10.9	+69 52	7.9-9.0	K0-R0e	?	22.1622	17614.454	322	0.325	14.9	-23.9	0.0066	Sanford <i>ApJ</i> 68, 408, 1928 R	
15	1 Car	9 42.5	-62 03	3.6-4.8	F8-K0	δ	35.52778	19519.110	91.858	0.386	20.13	+ 4.08	0.0236	Jacobsen <i>ASP</i> 46, 255, 1934	
16	β UMa	10 55.8	+56 55	2.44	A0	β	0.31234	20530.90	315.4	0.124	0.62	-10.93	0.0000	Guthnick, Prager <i>VBB</i> 2, Pt 3, 59, 1918 R	
17	ϵ UMa	12 49.6	+56 30	1.68	A2s	β	0.95203	16000.50	5.0	0.495	1.28	-12.6	0.0000	Guthnick, Prager <i>VBB</i> 2, Pt 3, 52, 1918 R	
18	α^2 CVn	12 51.4	+38 51	2.90	A1s	—	5.50	3.84	110.0	0.3	21.5	+ 1	0.0049	Belopolsky <i>AN</i> 196, 1, 1913 R	
19	R TrA	15 10.8	-66 08	7.1-8.8	F5-G5	δ	3.3891	18407.179	58	0.17	16.0	-18.9	0.0014	Hellerich <i>AN</i> 219, 169, 1923	
20	γ UMi	15 20.9	+72 11	3.1-3.2	A2n	β	0.108449	23204.73	160.0	0.09	14	- 2	0.0000	Struve <i>PA</i> 31, 90, 1923 R	
21	σ Sco	16 15.1	-25 21	3.08	B1	β	0.246834	21687.972	15	0.11	41.2	var	0.0018	Henroteau <i>LOB</i> 9, 176, 1918	
22	α Sco	16 23.3	-26 13	1.22	M1	—	7.351 yr	1905.54	330.1	0.487	2.09	- 3.18	0.0017	S Jones <i>MN</i> 88, 669, 1928	
23	θ Oph	17 15.9	-24 54	3.37	B2	β	0.2862				14		0.0016	Henroteau <i>DO</i> 8, 3, 1922	
24	X Sgr	17 41.3	-27 48	4.8-5.9	F5-G9	δ	7.01185	16723.05	93.65	0.40	15.2	-13.50	0.0016	Moore <i>LOB</i> 5, 111, 1909	
25	Y Oph	17 47.3	- 6 07	7.2-8.1	F8-G7	ζ	17.11934	25015.812	286.85	0.244	9.9	- 6.1	0.0008	Sanford <i>ApJ</i> 81, 144, 1935 R	
26	W Sgr	17 58.6	-29 35	4.7-6.2	F2-G6	δ	7.59460	16336.06	70.0	0.320	19.5	-28.6	0.0050	Curtiss <i>LOB</i> 3, 36, 1904 R	
27	Y Sgr	18 15.5	-18 54	5.7-6.8	F5-G8	δ	(3.80)			0.0	4.8		0.0035	ten Bruggencate <i>HCO Ctr</i> 351, 1930 R	
28	δ Sct	18 36.8	- 9 09	4.7-4.9	F4	β	0.1938	27980.752	180	0.22	16.5	- 4.0	0.0000	Colacevich <i>LOB</i> 17, 171, 1935 R	
29	κ Pav	18 46.6	-67 21	4.2-5.1	F5-G5	δ	9.0874	16654.147	86.84	0.49	4.6	-45.3	0.0023	Jacobsen <i>LOB</i> 14, 60, 1929 R	
30	FF Aql	18 53.8	+17 14	6.4-6.9	eF6	δ	4.4714	25064.481	84.14	0.07	15.5	+36.5	0.0002	Sanford <i>ApJ</i> 81, 132, 1935 R	
31	δ Aql	19 20.5	+ 2 55	3.44	F0n	β	0.157				(18)	var	0.0006	Henroteau <i>DO</i> 8, 59, 1923	
32	RR Lyr	19 22.3	+42 36	7.2-8.9	B9-F2	RR	0.566826		96.853	0.271	22.2	-68.7	0.0006	Kiess <i>LOB</i> 7, 146, 1913 R	
33	U Aql	19 24.0	- 7 15	6.3-7.0	G0-G6	δ	7.02378	10168.860	60	0.40	20.8	- 7.0	0.0050	Sanford <i>ApJ</i> 72, 46, 1930	
34	U Vul	19 32.3	+20 07	7.7-8.9	F8-K0	δ	7.99148	0.849	58	0.45	18.8	-11.7	0.0039	Sanford <i>ApJ</i> 67, 326, 1928	
35	SU Cyg	19 40.8	+29 01	6.4-7.1	F0-G1	δ	3.845612	17425.06	108.0	0.31	14.0	var	0.0010	Hellerich <i>AN</i> 210, 68, 1919	
36	η Aql	19 47.4	+ 0 45	3.7-4.4	F2-G9	δ	7.176	6.210	68.91	0.489	20.59	-14.16	0.0043	Wright <i>ApJ</i> 9, 66, 1899 R	

TABLE II—Continued
ELEMENTS FOR STARS HAVING VARIABLE RADIAL VELOCITY, BUT WHICH ARE NOT BINARIES

Star	α	1900	δ	Mag.	Sp.	Type	P (days)	T (2,400,000)	ω°	e	K (km/sec)	γ (km/sec)	$a \sin i (10)^6$	$\frac{m^2 \sin^2 i}{(m_1+m_2)^2}$	Authority
37 S Sge	$19^h 51^m 15^s$	$+16^\circ 22'$		5.8-6.8	F8-G7	δ	8.381589 (4.191)	19895.01	52.8	0.34 0.09	15.1 3.5	var	1.635	0.0025	Aldrich PA 32, 218, 1924 R
38 B 5170	20 05.7	+36 33		4.82	B3nne	—	1.51775 45.33	19220.5294 22221.1387	255.863 180.767	0.2561 0.9012	4.89 21.10	+0.82 -0.56	0.099 5.700	0.0000 0.004	Losh MO 4, 199, 1932
39 X Cyg	20 39.5	+35 14		6.5-8.1	F8-K0	δ	16.38543	14.685	101.1	0.246	28.03	+9.32	6.121	0.034	Duncan ApJ 53, 95, 1921 R
40 T Vul	20 47.2	+27 53		5.5-6.4	F3-G5	δ	4.43578	3.678	104.03	0.440	17.63	-1.39	0.966	0.0018	Beal AO 3, 198, 1915 R
41 τ Cyg	21 10.8	+37 37		3.82	F0	β	0.1425	22522.641	263.0	0.306	8.0	-22.0	0.015	0.0000	Paraskévopoulos ApJ 53, 146, 1921 R
42 β Cep	21 27.4	+70 07		3.32	A3n	β	0.1904851	26580.568	2.66	0.052	16.91	-4.61	0.044	0.0001	Kohl AN 248, 403, 1933 R
43 δ Cep	22 25.4	+57 54		3.7-4.4	F4-G6	δ	5.3664	17888.428	85.385	0.484	19.675	-16.83	1.271	0.0028	Moore LOB 7, 153, 1913 R
44 12 Lac	22 37.0	+39 42		5.18	B1sk	β	0.193089	20761.1488	.....	0.0	16.92	-13.75	45.000	0.0001	Young DO 3, 88, 1915 R

NOTES TO TABLE II

2. Form of curve and amplitude variable.
3. Elements from absorption line velocities. The maximum positive velocity occurs at maximum light and greatest velocity of approach at minimum light. The relation is opposite to that shown by Cepheids. The presence of a secondary spectrum at minimum led the Mount Wilson observers to announce in 1920 the existence of a faint companion, which was detected visually in 1923 by Aitken (*ASP* 35, 323, 1923).
4. Form and amplitude of the curve vary and probably also γ .
8. Elliptic elements derived after superposition of curve with one-third the period.
9. Sanford finds that if the variation in velocity be considered as arising from the changing diameter of the star, then maximum light occurs at the time of least diameter and minimum light when the star reaches its greatest expansion. Interferometer measures of the star's diameter give the smallest value at maximum light and the largest at minimum light, which supports the above interpretation.
10. The elements quoted are the approximate ones from velocity curve of March 1, 1909. Henroteau found that amplitude of curve changes rapidly having a maximum of about 20 km/sec and a minimum of about 3 km/sec; that the period of velocity variation will not connect all minima of different epochs but will give either a maximum or minimum of the velocity curve; and that the lines change in width with a period of variation of 0^d25130. Meyer (*ASP* 46, 202, 1934) from his observations of 1930-32 with the Mills 3-prism and the earlier ones of Henroteau, has shown that the period for the variation in amplitude of velocity curve is 49.1 days, and that the velocity curve can be represented as the resultant of two sine curves, the first with period 0^d2513015 and semi-amplitude 4.2 km/sec and the second with period 0^d2500222 and semi-amplitude 5.8 km/sec. Fath (*LOB* 17, 116, 1935) from his photo-electric measures finds evidence that the light is variable with a range of 0.03 magnitudes in a period of 0.25 days and that probably the period agrees with the one for variation in line width.
11. Later elements by Keiss (*MO* 3, 131, 1917) derived from Michigan 1-prism observations. Petrie (*MO* 5, 9, 1932) has made an extended study of the radial velocity based upon 49 Lick 3-prism plates (1908-28) and 38 Michigan 1-prism plates. He concludes that period of 3^d7282 represents all data for this interval, and that there is evidence of variations in radial velocities at different levels, in general the trend being toward increase in range and lagging in phase for the higher levels of the star's atmosphere.
13. Residuals from curve representing elliptic motion satisfied by sine curve of one-third the period. Jacobsen (*LOB* 12, 148, 1926) from his 3-prism observations obtained in 1923 finds no change in elements in the interval of 24 years since Campbell's observations, but the period which will superpose the two velocity curves is 10^d15253.
14. The spectrum is K0 at maximum light, R0 from 8^d0 before to 1^d9 after minimum light and R0e at the time of maximum velocity of recession. Sanford shows that on assumption of symmetrical pulsation of a spherical star, light minimum is nearly coincident with maximum diameter and light maximum with minimum diameter.
16. Following Guthnick's and Prager's discovery that the light of this star was variable through a range of 0.02 magnitudes in a period of 0^d3122 and that Ludendorff's radial velocities could be represented with same period, three series of spectrograms were taken with 3-prism dispersion at Mount Hamilton on three nights in 1916 and another in 1917. Each series covered more than a whole period. The elements here quoted are for the 1916 series. Similar elements were derived for the 1917 series. The spectrum contains broad lines which are difficult to measure and the range in velocity is of the same order as the error of observation. If the variation is real then the form and amplitude of the velocity curve are variable and possibly the period also.
17. Guthnick and Prager found the light variable through a range of 0.04 magnitude in a period of 0^d95203. They then examined the deviations from elliptic motion shown by Ludendorff's velocity curve from which the orbital elements quoted in Table I were derived. They were able to satisfy these deviations by a curve having the same period as light variation.
18. From the investigations of the peculiar spectral variations of this star by Ludendorff, Baxandall and Belopolsky (*AN* 196, 1, 1913; *Pul Mit* 6, 161, 1915) and the more recent work of Keiss (*MO* 3, 106, 1919), it appears that there are three groups of lines whose intensities and character change, those of one group showing considerable variation, those of a second group less, while for the third little or no change is observed. The line displacements are practically constant except for the lines of one group. From the latter Belopolsky found the period of variable velocity as well as of variation in intensity to be 5^d50. Miss Farnsworth (*ApJ* 75, 364, 1932) presents strong evidence that the observed variation in displacement of certain lines is due to the effect of blends and that the radial velocity is probably constant. Guthnick and Prager (*VBB* 1, 38, 1914) found light variable in same period. More recently they show that the form and amplitude of light curve vary.
20. Form and amplitude of the velocity curve vary.
25. Earlier elements by Albrecht (*LOB* 4, 132, 1907) and by Miss Udick and by Zurhellen all from same data. Sanford finds evidence of change in shape of velocity curve and possible variation in γ .
26. Residuals from curve for elliptic motion satisfied by sine curve of half principal period. Jacobsen's 3-prism observations in 1923, -24, -25 (*LOB* 12, 150, 1926) indicate that shape of curve is different from that of Curtiss and that γ is probably variable.
27. The first set of elements was derived from the Lick and Mount Wilson plates of 1921-27 and the second set from Mount Wilson observations of 1929. Earlier elements based on observations at Lick 1903-8 and Mount Wilson 1922 were published by Duncan (*ApJ* 56, 340, 1922). The form of curve and γ are variable.
28. Form and amplitude of curve vary. Elements are for June 27, 1935, which are about mean values. Fath (*LOB* 17, 175, 1935) finds light variable in same period as velocity variation. Amplitude of light curve varies from 0^m23 to 0^m15.
29. Elements from 3-prism observations of 1904-7. Period variable.
30. Velocity of system variable through a range of about 15 km/sec in a period of 4109 days.
32. Prager (*VBB* 5, Heft 4, 1926) finds photometric data represented by the formula; Epoch of median magnitude = JD 2414856.4083 + 0^d56683735 E - 0^d0693 sin [0^d0155 (E - 1200)] + 0^d0086 sin [0^d0544 (E - 325)]. Mount Wilson radial velocity observations 1916-30 discussed by Sanford (*ApJ* 81, 149, 1934).
36. Jacobsen (*LOB* 12, 138, 1926) from a comparison of Wright's observations of 1906 and his own of 1923 finds evidence that period is lengthening and that γ has changed.
37. Deviations from curve for elliptic motion represented by sine curve of half the period.

39. Epoch, interval after light maximum.
40. Epoch, interval after maximum light. Elements derived by least squares solution from Albrecht's observations (*LOB* 4, 135, 1907).
41. Approximate elements.
42. Radial velocity of this star has been studied by a number of observers. Mendenhall (*LOB* 14, 133, 1930) and more recently Crump (*ApJ* 79, 246, 1934) have collected and discussed all available observations. They find that the shape and amplitude of the curve vary and that γ is variable. Kohl, whose elements for 1931 are quoted, shows that the period has lengthened during the interval of 26 years, and that the observations of recent years are represented better by the period here given. Variable light with range of 0^m.05 found by Guthnick and confirmed by other observers.
43. Jacobsen (*LOB* 12, 138, 1926), from comparison of his 1923 observations with Moore's for 1907, finds no change in amplitude or shape of velocity curve but that γ is probably variable.
44. Epoch, time when velocity changes from approach to recession. Amplitude of velocity curve varies from 0 to 70 kms/sec. Shape of velocity curve changes and γ is subject to long period variation. Spectral lines vary in width. See *DAO* 1, 105, 1918; *PA* 30, 20, 1922; *DAO* 3, 209, 1925.

TABLE III
APPENDIX TO THIRD CATALOGUE†

	Star	α 1900 δ	Mag.	Spec. Class		Range km/sec	Remarks	Authority
				Hvd.	Rev.			
1	β Cas	^h 03.8 ^m +58 ^s 36	2.42	F5	F2		Doubtful	LO 18
2	B 25	07.1 -18 30	5.47	K2	K5	8	Short period	Cape CA 10, Pt 8, 124, 1928
3	+26°23	10.0 +26 43	6.06	A0		75		Petrie DAO 4, 90, 1928
4	+57°85	22.1 +58.00	7.24	B3	B3k	57		Pearce DAO 5, 13, 1931
5	+61°101	25.1 +61 48	7.31	B3	B3	83		Pearce DAO 5, 14, 1931
6	B 149	38.8 +47 19	5.55	B3	B5n		Not confirmed by V	DAO 5, 113, 1931
7	δ Psc	43.5 + 7 02	4.55	K5	K5	8	B & L do not confirm	Cape CA 10, Pt 8, 124, 1928: LO 18
8	B 190	47.8 -24 33	5.59	K0	K2	11		Neubauer LOB 15, 46, 1930
9	γ Cas	50.7 +60 11	2.25	B0p	B0nne	20	Const. to 1929, var. since	Cleminshaw AAS 8, 108, 1934
10	+56°191	1 00.0 +57 14	7.10	B5	B5	38		Pearce DAO 5, 16, 1931
11	ϕ And	03.7 +46 42	4.28	B8		18	Doubtful	Yerkes ApJ 64, 11, 1926; LO 18
12	+60°188	07.7 +60 21	7.26	B3	B2k	65		Plaskett DAO 5, 16, 1931
13	+36°220	13.1 +36 52	6.34	A3	A9	small	Lines sharp	Christie DAO 3, 217, 1925
14	+42°288	16.4 +43 04	6.62	B5	B5n	42		Plaskett DAO 5, 16, 1931
15	+20°226	23.5 +21 12	7.9	G5	K1	64	"Probably not real"	Mt. Wilson Letter
16	χ And	33.3 +43 53	5.17	G5	G5			Moore ASP 38, 132, 1926
17	B 387	37.7 - 4 11	5.27	G5	K3	6	Not confirmed by L	Cape CA 10, Pt 8, 129, 1928: LO 18
18	ψ Phe	49.6 -46 48	4.41	Mb	M6	9		Cape CA 10, Pt 8, 124, 1928
19	+56°445	2 05.6 +56 50	9.4	A0	B8			Mt. Wilson Letter
20	+30°347	05.6 +31 03	6.20	A0			2 sp.	Albitzky Pul O Cir 2, 13, 1932
21	+14°419	27.5 +14 36	6.07	F5	F7	27		Albitzky Pul O Cir 2, 13, 1932
22	+39°582	31.1 +39 27	6.40	B8		62		Shajn Pul O Cir 2, 11, 1932
23	μ Cet	39.5 + 9 42	4.36	F0	F4			Cape CA 10 Pt. 8, 129, 1928
24	+36°566	43.2 +36 54	6.45	F5	F3		Y & L confirm	LO 18
25	B 638	43.3 -64 07	5.69	K0		16		Harper DAO 6, 151, 1934
26	+59°552	43.4 +60 01	7.11	B0	O7k	33		Neubauer LOB 15, 46, 1930
27	B 643	44.1 +26 51	3.68	B8		64		Plaskett DAO 5, 18, 1931
28	B 709	3 01.8 +17 30	6.09	B3	B2s	17		Struve ApJ 62, 434, 1925
29	B 728	08.9 -44 48	5.92	F2		24		Pearce DAO 5, 19, 1931
30	B 738	10.9 -79 22	5.70	F0		24		Neubauer ASP 42, 235, 1930
31	B 740	11.0 +43 39	5.38	B5	B7n	52	V confirms	Neubauer ASP 42, 235, 1930
32	-17°631	11.2 -17 12	7.82	B3		80	Fr lines	DAO 5, 19, 1931
33	B 742	11.5 +49 51	5.30	B3	B3	37		Neubauer ASP 48, 128, 1936
34	B 780	20.9 +48 43	4.94	B5	B5	38		Plaskett DAO 5, 19, 1931
35	B 783	21.7 +49 30	5.64	B5	B8nn	50		Struve ApJ 62, 434, 1925
36	+12°477	21.8 +12 23	6.20	A0		32		Plaskett DAO 5, 20, 1931
37	Σ 391 A	22.4 +44 42	7.37	B3	B3	18		Simeis MN 92, 771, 1932
38	+41°696	24.6 +41 25	7.15	B5	B5ne	46		Pearce DAO 5, 20, 1931
39	B 828	33.6 -78 41	5.64	K0		17		Plaskett DAO 5, 21, 1931
40	δ Per	35.8 +47 28	3.10	B5	B8n	50		Neubauer ASP 42, 235, 1930
41	+20°621	38.6 +20 37	6.03	B9		54		DAO 5, 117, 1931
42	+31°649	40.4 +32 00	6.51	B3	B5n	46		Shajn Pul O Cir 2, 11, 1932
43	+33°717	41.5 +33 18	6.36	B3	B3		2 sp	Pearce DAO 5, 21, 1931
44	+33°730	46.0 +33 53	7.49	B3	B5		2 sp	Plaskett DAO 5, 22, 1931
45	X Tau	47.8 + 7 29 (6.6-8.1)		F5		25		Plaskett DAO 5, 22, 1931
46	+47°912	48.8 +47 35	5.34	B5	B7n	58	W & L do not confirm	Mt. Wilson Letter
47	B 904	50.0 +34 47	5.48	B3	B3	39		Struve ApJ 62, 434, 1925: LO 18
48	ξ Per	52.5 +35 30	4.05	Oe5	O7nk		See note	Pearce DAO 5, 23, 1931
49	B 923	55.7 -24 18	4.69	A0p			See note	
50	B 926	56.5 - 1 50	5.25	B5	B7	33		
51	γ Ret	59.5 -62 27	4.46	Mb	M5	5		Pearce DAO 5, 22, 1931
52	+51°861	4 00.2 +51 11	7.49	B3	B3k		2 sp	Cape CA 10, Pt 8, 146, 1928
53	+31°703	00.3 +32 06	6.87	B3	B5n	33		Plaskett DAO 5, 24, 1931
54	B 961	06.0 + 5 16	5.71	F0			Withdrawn	Pearce DAO 5, 24, 1931
55	+22°649	07.0 +22 09	6.16	B8		24		Victoria Letter
56	+75°173	08.2 +75 52	6.63	B5	B5n	36		Simeis MN 92, 771, 1932
								Pearce DAO 5, 24, 1931

† For description of table see paragraph 3 on page 3.

TABLE III—Continued
APPENDIX TO THIRD CATALOGUE

	Star	α 1900 δ	Mag.	Spec. Class		Range km/sec	Remarks	Authority
				Hvd.	Rev.			
57	B 972	^h ₄ 08.5 ^m + ^s 9 01	4.98	G5	G5	4	Probably constant	LO 18
58	γ Tau	14.1 +15 23	2.86	K0	K0	6	Considered constant	LO 18
59	+45°931	18.2 +45 56	7.16	B3	B3sk	63		Pearce DAO 5, 24, 1931
60	θ^1 Tau	22.8 +15 44	4.04	K0	G8	8		Cape CA 10, Pt 8, 124, 1928
61	Σ 550 A	24.1 +53 42	5.86	B1	B2nk		2 sp	Pearce DAO 5, 25, 1931
62	δ Men	24.7 -80 27	5.62	K0p		14		Neubauer ASP 42, 235, 1930
63	B 1104	36.0 -24 41	5.59	K0	G6	24		Neubauer ASP 42, 235, 1930
64	+0°834	39.6 + 0 23	7.28	B3	B3	26		Plaskett DAO 5, 26, 1931
65	B 1139	44.1 +66 10	4.38	B0	O9seae		Constant: see note	DAO 5, 27, 1931
66	+43°1096	44.4 +43 24	7.37	B5	B5n	47		Pearce DAO 5, 27, 1931
67	B 1141	45.1 + 8 44	4.35	A0		82		Struve YO 7, 24, 1929
68	B 1157	48.7 -53 38	5.60	F0		35		Neubauer ASP 42, 235, 1930
69	AB Aur	49.4 +30 24 (7.2-8.4)		A0	A0ep	115	Irr.; dif. el. give dif. vel.	Merrill ApJ 77, 103, 1933
70	+0°893	49.7 + 0 19	5.86	B5	B6	48		Pearce DAO 5, 27, 1931
71	-5°1123	55.9 - 5 52	6.50	K0	K5	11	L & W	LO 18
72	B 1203	58.9 +15 16	4.65	B9		44		Struve ApJ 62, 434, 1925
73	+22°818	59.6 +22 56	6.66	B5	B5n	138		Hill DAO 5, 28, 1931
74	B 1205	59.7 -24 32	5.55	A2		100		Neubauer ASP 42, 235, 1930
75	γ Cae	5 00.8 -35 37	4.62	K0	K5	6		Cape CA 10, Pt 8, 125, 1928
76	105 Tau	02.0 +21 34	5.95	B3p	B3nek	32		Plaskett DAO 5, 28, 1931
77	λ Eri	04.4 - 8 53	4.34	B2	B3nk	92	Doubtful	DAO 5, 121, 1931
78	ϵ Lep	07.6 -11 59	4.54	B8		50	Var ?	LO 16, 68, 1928
79	B 1249	09.7 +34 12	5.81	B0p	O9ssk	11	10 V&Y pl. do not confirm	LO 18
80	B 1253	10.8 +58 01	6.23	B3	B5	26	Re-exam. does not confirm	DAO 5, 121, 1931
81	B 1254	10.9 -36 05	5.79	K0		12		Neubauer ASP 42, 235, 1930
82	τ Ori	12.8 - 6 57	3.68	B5	B8		L pl. show const. vel.	LO 18
83	θ Dor	13.8 -67 18	4.78	K0	K6	16	C does not confirm	CA 10, Pt 8, 125, 1928; LO 18
84	-1°859	14.6 - 1 31	6.42	B3	B3	67		Pearce DAO 5, 29, 1931
85	+37°1160	15.8 +37 35	7.39	B0	B0ne	59		Pearce DAO 5, 29, 1931
86	B 1282	16.3 + 8 20	5.71	B2	B2k	24	Uncertain	DAO 5, 122, 1931
87	$\circ$ Ori	16.7 - 0 29	4.65	B3	B3		Not confirmed by later data	DAO 5, 122, 1931
88	B 1297	18.9 -14 01	5.17	B3	B3s	18		Lick LO 16, 71, 1928
89	+2°947	19.4 + 2 15	6.32	B3	B3n	26		Yerkes ApJ 64, 44, 1926
90	B 1302	19.6 + 1 45	4.73	B3p	B3ne		2 sp	Plaskett DAO 5, 30, 1931
							Double E; see note	McLaughlin MO 4, 37, 1931; LO 18
91	γ Ori	19.8 + 6 16	1.70	B2	B2s		2 sp L's long series does not confirm	LO 18
92	+0°1056	20.7 + 0 25	6.02	B3	B3n	36		Plaskett DAO 5, 30, 1931
93	+33°1049	21.2 +33 52	7.50	B1	B1sk	31		Pearce DAO 5, 30, 1931
94	B 1315	21.6 +21 51	4.83	B3	B3sk	63	L & Y obs. indicate constant vel.	DAO 5, 123, 1931
95	-2°1254	22.8 - 2 14	7.36	B3	B5	39		Pearce DAO 5, 31, 1931
96	+35°1137	23.0 +35 18	6.71	B5	O9k	86		Pearce DAO 5, 31, 1931
97	+11°834	25.4 +12 01	7.3	B3	B3	43		Pearce DAO 5, 32, 1931
98	B 1345	27.6 +18 29	5.50	B3p	B3ne	47	Double E	Pearce DAO 5, 33, 1931
99	-6°1237	30.3 - 6 00	8.4	B5		60	Gd lines	Neubauer ASP 48, 128, 1936
100	-4°1183	30.4 - 4 34	6.54	B0	B2	31		Plaskett DAO 5, 34, 1931
101	θ^1 Ori B	30.4 - 5 27 (8.1-8.7)		B2	B2	120	Ecl. A; B M Ori	Pearce DAO 5, 34, 1931
102	θ^1 Ori D	30.4 - 5 27	6.85	Oe5	B0	44		Pearce DAO 2, 305, 1924
103	ϵ Ori	31.1 - 1 16	1.75	B0	B0k		97 M & L obs. show constant vel.	LO 18
104	+29°947	33.0 +29 10	6.00	B5	B3s	53		Plaskett DAO 5, 36, 1931
105	-6°1275	33.8 - 6 38	5.92	B3	B3	41		Pearce DAO 5, 36, 1931
106	B 1396	35.6 +16 29	4.87	B3	B3k		Confirmed by V	DAO 5, 126, 1931
107	ζ Ori A	35.7 - 2 00	2.05	B0	B0nk	20	39 M, Y & L pl. indicate constant vel.	LO 18

TABLE III—Continued
APPENDIX TO THIRD CATALOGUE

	Star	α 1900 δ	Mag.	Spec. Class		Range km/sec	Remarks	Authority
				Hvd.	Rev.			
108	ζ Lep	^h 42.4 ^m —14 ^s 52	3.67	A2			2 sp	Yerkes <i>YO</i> 7, 26, 1929
109	+24°1033	50.9 +24 14	6.02	B3	cB9s	26		Pearce <i>DAO</i> 5, 38, 1931
110	+16°926	51.1 +16 21	6.91	B3	B3k		2 sp	Plaskett <i>DAO</i> 5, 38, 1931
111	η Lep	51.9 —14 11	7	F5	F2		Var ?	Cape <i>CA</i> 10, Pt 8, 130, 1928
							8 L pl show const. vel.	<i>LO</i> 18
112	+46°1091	57.2 +46 33	6.98	B3	B3ne	36		Plaskett <i>DAO</i> 5, 38, 1931
113	+48°1339	58.2 +48 15	6.51	B0	O9nk		2 sp	Pearce <i>DAO</i> 5, 39, 1931
114	B 1512	59.4 — 6 42	5.12	B2p	B2e	65±		Plaskett <i>DAO</i> 5, 39, 1931
115	B 1534	6 03.7 +23 08	5.76	B1	B2sk	55		Pearce <i>DAO</i> 5, 40, 1931
116	+13°1147	05.1 +13 40	6.67	B5	B3	85		Plaskett <i>DAO</i> 5, 40, 1931
117	B 1550	06.2 +16 09	4.92	B3	B3nk	40±		<i>DAO</i> 5, 128, 1931
118	+7°1178	06.5 + 7 26	6.91	B2	B2	27		Plaskett <i>DAO</i> 5, 40, 1931
119	B 1568	09.6 +16 11	5.28	B9	B8n	62	Var ?	Yerkes <i>ApJ</i> 64, 53, 1926
							W & L do not confirm	<i>LO</i> 18
120	+3°1180	10.3 + 3 59	7.4	B5	B6	39		Pearce <i>DAO</i> 5, 41, 1931
121	+0°1349	10.4 + 0 51	7.19	B5	B5nn	96		Plaskett <i>DAO</i> 5, 41, 1931
122	+4°1181	10.5 + 4 19	6.44	B3	B5	51		Pearce <i>DAO</i> 5, 41, 1931
123	B 1598	14.9 — 7 47	5.13	B3	B3	120±		Moore <i>ASP</i> 38, 394, 1926
124	B 1605	17.0 —34 06	5.60	B2	B2n	50±		<i>LO</i> 18
125	B 1611	18.5 + 4 39	4.48	A5	A6n	43	30 pl	Yerkes <i>YO</i> 7, 29, 1929
126	ν Gem	23.0 +20 17	4.06	B5	B5ne		See note	
127	β Mon A	24.0 — 6 58	4.73	B2p	B3ne	17	See note	Struve <i>ApJ</i> 62, 434, 1925
128	+4°1291	26.0 + 4 54	7.96	B0	O8		Withdrawn	<i>DAO</i> 5, 130, 1931
129	B 1655	27.4 —50 10	5.32	F2		60±		<i>LO</i> 16, 93, 1928
130	B 1666	28.6 — 1 09	5.02	B3	B3n	46		Plaskett <i>DAO</i> 5, 42, 1931
131	—8°1480	29.9 — 8 32	8.9	B5		60	Gd. lines	Neubauer <i>ASP</i> 48, 128, 1936
132	—61°669	30.2 —61 48	6.34	B3	B5	200	2 sp ?	Neubauer <i>ASP</i> 42, 235, 1930
133	γ Gem	31.9 +16 29	1.93	A0	A3s		See note	
134	S Mon	35.5 + 9 59	4.68	Oe5	O7sk	30	Not confirmed by V	<i>DAO</i> 5, 130, 1931
135	B 1730	40.5 +67 41	5.04	B3	B3		Var in vel. probably not real	<i>LO</i> 18
136	B 1736	41.8 —30 51	5.91	B3	B3n	18	Var ?	Neubauer <i>LOB</i> 15, 62, 1930
137	—6°1775	46.7 — 6 51	6.62	B9	B8e		Lines dif. el. give dif vel.	Merrill <i>ApJ</i> 73, 348, 1931
138	B 1776	48.6 +58 33	4.54	G0	G6		L considers constant	<i>LO</i> 16, 101, 1928
139	B 1781	49.2 —20 06	4.66	B1	B0s		Now considered const.	<i>LO</i> 18
140	—21°1655	51.3 —21 54	6.81	B5		50		Neubauer <i>ASP</i> 48, 128, 1936
141	B 1802	54.5 —25 17	5.66	B3	B3	50±		<i>LO</i> 16, 103, 1928
142	—5°1912	55.4 — 5 40	6.97	B2	B2nk	68		Pearce <i>DAO</i> 5, 44, 1931
143	σ CMa	57.7 —27 47	3.68	K5	M0			Cape <i>CA</i> 10, Pt 8, 125, 1928
							11 L pl do not confirm	<i>LO</i> 16, 103, 1928
144	B 1817	58.8 —23 41	3.12	B5p	cB5s		Not confirmed by 13 L pl.	<i>LO</i> 18
145	+34°1530	7 00.9 +34 09	6.13	K0	K4	29		Christie <i>DAO</i> 3, 217, 1925
146	—10°1862	01.1 —10 30	6.38	B3	B2		2 sp	Pearce <i>DAO</i> 5, 45, 1931
147	—12°1777	01.1 —12 40	7.20	B5		90	Gd. lines	Neubauer <i>ASP</i> 48, 128, 1936
148	—30°3907	02.2 —30 30	6.38	B8	B5	40		Neubauer <i>ASP</i> 42, 235, 1930
149	B 1847	05.6 —25 04	5.76	B3	B3	40		<i>LO</i> 18
150	—10°1908	06.6 —10 16	7.16	B5	B4ne	44		<i>DAO</i> 5, 132, 1931
151	γ^2 Vol	09.6 —70 20	3.87	K0	F5		Var? not shown by 8 L pl.	<i>LO</i> 16, 107, 1928
152	—30°4146	10.1 —30 10	6.31	B3	B4	42		Neubauer <i>ASP</i> 42, 235, 1930
153	27 CMa	10.2 —26 11	4.66	B5p	B5e	250	See note	
154	ω CMa	10.8 —26 36	3.83	B3p	B3e	22	Doubtful: see note	
155	λ Gem	12.3 +16 43	3.65	A2	A2n		Sp pr.; probably const.	<i>LO</i> 18
156	B 1925	18.2 —51 54	5.50	B9	A0n	110		<i>LO</i> 18
157	B 1928	19.2 +49 25	4.45	A0		15	Probably constant	<i>LO</i> 18
158	β CMi	21.7 + 8 29	3.09	B8	B8ne	54		Struve <i>ApJ</i> 62, 434, 1925
159	—9°2069	23.8 — 9 50	6.62	B5	B5	50		Pearce <i>DAO</i> 5, 46, 1931
160	B 1967	25.2 —31 15	5.80	B3	B3s	28	Var ?	Neubauer <i>LOB</i> 15, 63, 1930
161	U Mon	26.0 — 9 34	(5.6–7.3)	G5	cG2e		RV Tau	Sanford <i>ApJ</i> 77, 120, 1933

TABLE III—Continued
APPENDIX TO THIRD CATALOGUE

	Star	α 1900 δ	Mag.	Spec. Class		Range km/sec	Remarks	Authority
				Hvd.	Rev.			
162	B 1985	^h 29.2 ^m —14 ^s 18	5.06	K5, B	M3ep	19	L & C	LO 18
163	B 1991	30.2 —36 07	5.51	B5p	B5e	107		Neubauer ASP 42, 235, 1930
164	+17°1623	31.4 +17 07	7.7	Oe5	O7nek		Doubtful	DAO 5, 133, 1931
165	Q Car	33.2 —52 19	4.92	K5	M0	11		Cape CA 10 Pt 8, 125, 1928
166	—37°3770	36.4 —37 20	6.02	B3	B5n	40		Neubauer ASP 42, 235, 1930
167	B 2041	40.3 —58 24	6.44	B8	B5	35		Neubauer ASP 42, 235, 1930
168	B 2064	44.8 —24 40	5.32	G0	G3	19		Moore ASP 38, 394, 1926
169	ξ Pup	45.1 —24 37	3.47	G0p	cG6	8		Cape CA 10, Pt 8, 125, 1928
170	B 2067	45.4 —46 50	4.64	K0	G8	5	L & C	LO 18
171	B 2072	46.9 —56 09	5.54	K0		23		Neubauer LOB 15, 54, 1930
172	+43°1754	51.7 +43 47	7.04	B3	B3	83		Hill DAO 5, 46, 1931
173	+16°612	55.8 +16 43	5.91	A0		49		Shajn Pul O Cir 2, 11, 1932
174	—2°2379	55.8 — 2 36	6.43	B3p	B2e	73		Hill DAO 5, 46, 1931
175	—54°1470	58.9 —54 14	5.99	B5	B5	91		Neubauer ASP 42, 235, 1930
176	B 2138	59.5 +13 24	5.11	A0		41	A, Y & L	LO 18
177	B 2158	8 04.5 —18 57	4.34	B3	B5n	86		Struve ApJ 62, 434, 1925
178	—63°896	07.1 —63 30	6.38	B8	B8ne	68	H lines have central E, variable as are also abs	Neubauer ASP 42, 235, 1930
179	B 2190	10.2 —31 50	6.10	B3	B5n		2 sp	LO 18
180	B 2217	17.6 —36 10	5.17	B3	B3	16		Neubauer ASP 42, 235, 1930
181	δ Hya	32.4 + 6 03	4.18	A0	B9n	88		Moore ASP 38, 132, 1926
182	B 2357	42.2 — 1 32	5.22	A0	B9n	70		Yerkes YO 7, 33, 1929
183	B 2371	45.8 —32 24	5.23	G5	G3	7	L & W confirm	Yerkes YO 7, 34, 1929
184	ν Cnc	56.9 +24 51	5.45	A0		20		LO 18
185	B 2428	57.6 —41 28	5.54	B5	B7	20	Gd. lines	LO 18: LO 16, 136, 1928
186	—29°7177	9 04.8 —30 00	9.55	A		164		Yerkes YO 7, 35, 1929
187	ϵ Pyx	05.7 —29 57	5.56	A3		63		Neubauer ASP 42, 235, 1930
188	B 2495	12.6 +37 14	3.82	A2	B9n	87		Van de Kamp ASP 37, 97, 1925
189	B 2535	22.8 — 5 38	5.44	G0	G1	10		Neubauer ASP 42, 235, 1930
190	I Vel	23.0 —52 56	5.22	B5	B5n	78		Yerkes YO 7, 36, 1929
191	τ^2 Hya	26.9 — 0 44	4.50	A3		20		Cape CA 10, Pt 8, 126, 1928
192	+29°1913	27.4 +28 49	6.35	A2		54		LO 16, 145, 1928
193	B 2619	40.3 —53 26	5.71	A0		24		Balmer LO 16, 146, 1928
194	B 2629	42.6 —44 18	5.68	B3	B5	39±	Gd. lines	Petrie DAO 4, 90, 1928
195	B 2636	45.3 + 4 49	6.24	F5	F6	205		Neubauer LOB 15, 54, 1930
196	B 2657	49.6 —25 28	5.00	K0	K3	12		Neubauer LOB 15, 68, 1930
197	B 2658	50.2 —18 32	5.16	Ma	M1	13	5 L pl constant	Shajn Pul O Cir 2, 11, 1932
198	+28°1824	52.8 +28 15	6.42	F0		92		Cape CA 10, Pt 8, 126, 1928
199	+53°1384	58.6 +52 50	6.15	A2		88	2 sp: sep. difficult	Cape CA 10, Pt 8, 126, 1928
200	B 2690	10 00.3 —12 35	4.72	B8			2 sp	Neubauer LOB 15, 55, 1930
201	μ Cha	03.4 —81 44	5.62	A0			2 sp: pr lines	Struve ApJ 62, 434, 1925
202	+27°1862	08.2 +27 39	6.10	G5		20		Neubauer LOB 15, 55, 1930
203	B 2748	15.9 + 2 48	6.53	B3	B3	25		Albitzky Pul O Cir 2, 11, 1932
204	I Car	22.4 —73 32	4.08	F5	F2s	11		Pearce DAO 5, 47, 1931
205	α Ant	22.6 —30 34	4.42	K5	M0	8		Cape CA 10, Pt 8, 126, 1928
206	—66°1291	27.1 —66 29	6.40	B5	B5	47		Cape CA 10, Pt 8, 126, 1928
207	TX Leo	29.8 + 9 10	(5.9–6.0)	A0		100	Ecl: P=2 ^d 445	Neubauer LOB 15, 69, 1930
208	B 2823	31.7 —57 02	4.54	K5	M0	9	L & C	Mohler PAAS 7, 224, 1933
209	B 2835	33.6 —58 13	5.57	A2p	cA2	50		Cape CA 10, Pt 8, 126, 1928
210	—56°3588	34.2 —56 44	6.35	B3	B3	82	Gd. lines	Neubauer ASP 42, 235, 1930
211	+20°2514	38.8 +20 17	6.10	A3		67		Neubauer ASP 42, 235, 1930
212	B 2863	39.7 —60 03	4.49	K5	M1	8		Petrie DAO 4, 91, 1928
213	α UMa	57.6 +62 17	1.95	K0	G7		See note	Cape CA 10, Pt 8, 126, 1928
214	+55°1446	11 06.9 +55 26	6.48	A2		40		Petrie DAO 4, 91, 1928
215	B 2965	08.0 —48 33	5.67	A2		58		Neubauer ASP 42, 235, 1930
216	B 2978	10.6 +13 51	5.48	K0	K3	14		Moore ASP 38, 394, 1926

TABLE III—Continued
APPENDIX TO THIRD CATALOGUE

	Star	α 1900 δ	Mag.	Spec. Class		Range km/sec	Remarks	Authority
				Hvd.	Rev.			
217	δ Crt	^h 11 ^m 14.3 ^s —14 14	3.82	K0	K0	11		Cape CA 10, Pt 8, 126, 1928
218	+57°1316	16.1 +57 37	6.32	A2		49		Petrie DAO 4, 91, 1928
219	B 3011	20.7 + 4 25	6.36	F0	A8n	34		Simeis MN 92, 771, 1932
220	B 3042	28.1 —31 18	3.72	G5	G7	8		Cape CA 10, Pt 8, 126, 1928
221	+37°2195	28.6 +37 23	6.33	K0	K1	16	Not confirmed by L	LO 18
222	β GC 5833 B	29.5 +17 21	(7.3)	B3	B5	76		Christie DAO 3, 218, 1925
223	+11°2377	30.5 +11 28	6.45	A2		54		Pearce DAO 5, 48, 1931
224	β GC 5858 A	33.5 +45 40	6.34	G0	G1	23		Petrie DAO 4, 91, 1928
225	B 3076	36.2 —61 32	4.88	G0	cG6	18	C does not confirm	Sanford ApJ 68, 42, 1928
226	B 3079	36.4 —42 32	5.69	A0		28		CA 10, Pt 8, 126, 1928
227	B 3143	57.0 +43 36	5.07	A3	A3	12		Neubauer ASP 42, 235, 1930
228	η Cru	12 01.7 —64 03	4.30	F0	F2	12		LO 16, 178, 1928
229	+28°2084	05.7 +27 50	5.78	A2		48		YO 7, 42, 1929
230	B 3230	19.2 +52 07	4.97	K0	G6	33	Considered doubtful	Cape CA 10, Pt 8, 126, 1928
231	α^1 Cru	21.0 —62 33	1.58	B1	B1n		See note	Petrie DAO 4, 92, 1928
232	α^2 Cru	21.0 —62 33	2.09	B1	B3n		See note	LO 18
233	B 3247	22.8 — 4 04	6.03	F2	A8n	50		Simeis MN 92, 771, 1932
234	B 3268	26.1 —58 52	5.44	F8p	cG2	8	L & C	LO 18
235	Σ 1669 A	36.1 —12 28	5.98	F5	F6	35		Simeis MN 92, 771, 1932
236	Σ 1669 B	36.1 —12 28	6.08	F2	F1	90		Simeis MN 92, 771, 1932
237	B 3351	47.5 —48 24	4.35	K2	K5	9		Cape CA 10, Pt 8, 127, 1928
238	B 3360	48.8 +12 58	6.34	A3	A8s		Probably constant	LO 18
239	+73°587	13 10.7 +73 20	6.43	A0		59		Petrie DAO 4, 92, 1928
240	B 3462	17.1 + 5 41	5.87	A0	A5s		5 W pl do not confirm	LO 18
241	—4°3472	19.3 — 4 39	5.76	F2	F3	19		Simeis MN 92, 771, 1932
242	κ Oct	24.7 —85 16	5.65	A0		30		Neubauer ASP 42, 235, 1930
243	—5°3706	25.2 — 5 57	6.07	A5		36		Simeis MN 92, 771, 1932
244	$\circ$ Vir	29.1 + 4 10	4.93	A2p	A3s		Not confirmed	LO 16, 199, 1928
245	+31°2540	41.7 +31 22	6.55	F5		45		Simeis MN 92, 771, 1932
246	η UMa	43.6 +49 49	1.91	B3	B3n	38	Not considered variable	DAO 5, 138, 1931
247	B 3575	45.6 —46 24	5.87	B3	B3s	26		Neubauer ASP 42, 235, 1930
248	B 3587	47.7 —35 10	5.64	F2		19		Neubauer ASP 42, 235, 1930
249	B 3677	14 14.3 —44 44	5.03	F0	F0s	32		Moore ASP 38, 394, 1926
250	+32°2482	25.5 +32 14	5.96	B9		23		Christie DAO 3, 219, 1925
251	+51°1957	46.3 +51 48	6.42	F2	F3	18		Young DAO 6, 179, 1934
252	+19°2881	48.9 +19 33	5.98	K0	K1	25		Harper DAO 6, 151, 1934
253	B 3805	49.2 —52 24	5.56	A2		22		Neubauer ASP 42, 235, 1930
254	B 3807	49.6 —33 27	5.34	A0			2 sp	LO 18
255	B 3808	49.7 —47 28	5.78	B9	B9	65		Neubauer ASP 42, 235, 1930
256	+6°3001	15 02.7 + 5 52	6.22	G5	G6	26		Harper DAO 6, 151, 1934
257	B 3859	04.1 +26 41	5.73	K0	K2		V & W	LO 18
258	+68°823	09.7 +68 10	6.15	A2		45		Petrie DAO 4, 93, 1928
259	β Lib	11.6 — 9 01	2.74	B8			126 pl. indicate const vel.	McLaughlin MO 4, 29, 1931
260	B 3892	12.4 —40 25	5.78	B8	B7	97		Neubauer ASP 42, 235, 1930
261	+24°2853	17.9 +24 45	9.61	A2		100		Van de Kamp LOB 12, 88, 1926
262	β CrB	23.7 +29 27	3.72	F0p	A7s		See note	
263	+62°1414	25.8 +62 37	6.37	A0		49		Petrie DAO 4, 93, 1928
264	δ Ser ftr.	30.0 +10 53	5.16	F0	A6n	13±	W, V, & L	LO 18
265	ω Lup	31.3 —42 14	4.27	K5	M0	10		Cape CA 10, Pt 8, 127, 1928
266	τ Lib	32.6 —29 27	3.80	B3	B3n	100		Moore ASP 38, 132, 1926
267	B 4004	40.1 +52 41	5.48	A0p		32		Yerkes YO 7, 55, 1929
268	γ Ser	51.8 +15 59	3.86	F8	F5	16		Victoria DAO 2, 3, 1921
269	—5°4234	16 00.4 — 6 01	6.36	F5		25		Cape CA 10, Pt 8, 127, 1928
270	B 4104	04.3 +17 28	6.07	A0			Withdrawn	Albitzky Pul O Cir 2, 11, 1932
								DAO 2, 88, 1921

TABLE III—Continued
APPENDIX TO THIRD CATALOGUE

	Star	α 1900 δ			Mag.	Spec. Class		Range km/sec	Remarks	Authority
		^h	^m	^s		Hvd.	Rev.			
271	ϵ Oph	16	13.0	— 4 27	3.34	K0	G7	11	12 L pl do not confirm	Cape CA 10 Pt 8, 127, 1928 LO 18
272	γ Her	17.5	+19 23		3.79	F0	A6n	48		Belopolsky AN 238, 49, 1930
273	η UMi	20.4	+75 59		5.04	F0	A8n		Not confirmed	LO 18
274	B 4213	28.2	+68 59		4.98	B8p	B9n		10Y & Lpl. do not confirm	LO 18
275	B 4219	29.8	—35 03		4.30	Ma		6		Cape CA 10, Pt 8, 127, 1928
276	ζ Oph	31.7	—10 22		2.70	B0	B0nnk	65		DAO 5, 141, 1931
277	+14°3086	32.4	+14 40		6.59	B2	B2k	38		Hill DAO 5, 49, 1931
278	—41°11036	47.1	—41 41		6.02	B0	B0sk	46		Neubauer ASP 42, 235, 1930
279	+13°3258	50.7	+13 47		6.16	F2		32		Shajn Pul O Cir 2, 11, 1932
280	+6°3332	55.6	+ 6 44		6.38	A5		44		Petrie DAO 4, 93, 1928
281	+8°3337	57.2	+ 8 36		6.24	A0		76		Petrie DAO 4, 93, 1928
282	—0°3224	17.00.4	— 0 45		5.62	B3*	B3k	28		Albitzky Pul O Cir 2, 11, 1932
283	—32°12460	06.5	—32 19		6.00	B3	B2	57	Gd. lines	Neubauer LOB 15, 75, 1930
284	B 4427	22.5	+20 10		5.42	B5	B5n	244	2 sp: lines pr	Struve ApJ 62, 434, 1925
									12 V, W & L pl do not confirm	LO 18
285	α Ara	24.1	—49 48		2.97	B3p	B3ne		Doubtful	LO 18
286	B 4432	24.4	+60 08		5.66	A2		30	Not confirmed by V	LO 18
287	λ Her	26.7	+26 11		4.48	K0	K4	10	L & W do not confirm	LO 18
288	B 4464	32.4	+68 12		5.21	K0	G9		Considered constant	LO 18
289	+13°3421	34.4	+13 23		6.29	F2		37		Simeis MN 92, 771, 1932
290	ι Her	36.6	+46 04		3.79	B3	B3s		Not confirmed by 20 V, Y & L pl	LO 18
291	—7°4487	38.3	— 7 02		6.20	B5	B5n	32		Plaskett DAO 5, 50, 1931
292	ι Sco	40.6	—40 05		3.14	F5p	cF6	16		Cape CA 10, Pt 8, 127, 1928
293	B 4496	42.3	—53 35		5.90	B3	B3s	300	2 sp	Neubauer ASP 42, 235, 1930
294	γ Oph	42.9	+ 2 45		3.74	A0			Very doubtful	Yerkes YO 7, 60, 1929
295	+11°3283	49.6	+11 10		6.26	F2		38		Simeis MN 92, 771, 1932
296	ξ Dra	51.8	+56 53		3.90	K0	K3		Doubtful	LO 18
297	+11°3299	52.8	+11 04		6.50	A0		65		Petrie DAO 4, 94, 1928
298	+0°3832	55.2	+ 0 38		6.29	A2p		55		Petrie DAO 4, 94, 1928
299	B 4545	55.3	+ 4 23		4.81	B3	B5ne		2 sp	Struve ApJ 62, 434, 1925
									Doubtful	LO 18
									Withdrawn	DAO 5, 143, 1931
300	—23°13804	56.3	—23 01		6.91	Oe5	O7			
301	B 4554	56.9	+72 00		5.54	F2	F2		Not B4504 as in 3d Bin. Cat.	
302	π Pav	58.9	—63 40		4.44	A5		11		Moore ASP 38, 132, 1926
303	+1°3578	59.6	+ 1 55		6.09	B3	B2nk	33		Plaskett DAO 5, 52, 1931
304	ι Pav	18.01.1	—62 01		5.48	G0	F5	8	L & C	LO 18
305	B 4581	02.6	+ 9 33		3.73	A3	A5s		Probably constant	LO 18
306	B 4590	04.5	+20 48		4.32	B3	B2sk		Now considered const.	LO 18
307	+49°2732	04.6	+49 42		6.31	A0		44		Petrie DAO 4, 94, 1928
308	B 4611	08.7	—56 03		5.54	B5	B5	64		Neubauer ASP 42, 235, 1930
309	B 4620	12.5	+42 08		5.42	B5	B8n	191	2 sp. Y, W, V & L agree- ment very close	LO 18
									Considered constant	LO 18
310	B 4636	16.1	— 2 55		3.42	K0	G8			Hill DAO 5, 52, 1931
311	+5°3704	16.5	+ 5 24		6.04	B5	B5n	36		LO 18
312	B 4654	19.3	—48 10		5.48	G5	G4	13	C & L	Cape CA 10, Pt 8, 131, 1928
313	B 4655	19.4	—20 35		4.96	G5	K1		Doubtful	LO 18
									Regarded constant	Pearce DAO 5, 53, 1931
314	B 4683	25.5	+23 48		5.72	B5	B5k	65		Sanford ApJ 73, 364, 1931
315	AC Her	26.0	+21 48	(7.2–9.0)		F8			RV Tau	Cape CA 10, Pt 8, 128, 1928
316	θ CrA	26.4	—42 23		4.69	G5	G5	9		Petrie DAO 4, 94, 1928
317	+20°3847	30.0	+20 23		6.44	A2		60		Pearce DAO 5, 54, 1931
318	+34°3245	31.6	+34 22		5.93	B5	B5n	89		Guthnick Sitz Ber Akad 1, 1930
319	α Lyr	33.6	+38 41		0.14	A0	A1s		See note	LO 16, 273, 1928
320	B 4735	38.0	—39 47		5.48	F8–A2	G5	7		

TABLE III—Continued
APPENDIX TO THIRD CATALOGUE

	Star	α 1900 δ	Mag.	Spec. Class		Range km/sec	Remarks	Authority
				Hvd.	Rev.			
321	+34°3285	^h 18 ^m 38.5 ^s +34 38	(6.7)	B5	B5	28	2 sp	Pearce DAO 5, 54, 1931
322	+34°3286	38.5 +34 38	(8.2)	B5	B9			Pearce DAO 5, 54, 1931
323	μ CrA	40.7 -40 31	5.28	G0	G2	9		Cape CA 10, Pt 8, 127, 1928
324	ϵ^1 Lyr btr.	41.0 +39 34	5.06	A3	A2n	3	21 W, V & L pl. fail to confirm	LO 16, 273, 1928
325	B 4764	43.8 -20 26	5.37	K0	K1	14		LO 18
326	+19°3798	44.6 +19 13	5.82	A0		63		Cape CA 10, Pt 8, 128, 1928
327	+37°3262	48.6 +37 24	7.08	B3	B5n	58	Now considered const. See note	Petrie RASC 23, 285, 1929
328	B 4799	50.7 +50 35	4.97	G5	G4			Hill DAO 5, 56, 1931
329	R Lyr	52.3 +43 49	(4.0-4.5)	Mb	M5			LO 18
330	B 4826	55.7 +26 06	5.28	K0	K2	5	L & O	LO 16, 279, 1928
331	+21°3634	57.0 +21 22	6.86	B3	B3	10		LO 18
332	B 4839	57.2 +26 09	5.50	B3	B3n	96		Pearce DAO 5, 57, 1931
333	+1°3872	59.2 + 1 13	9.5		G3	24	Considered const.	Hill DAO 5, 57, 1931
334	+9°3979	19 00.4 + 9 29	6.93	B5	B5n	43		Sanford Letter
335	+23°3549	00.5 +23 11	6.94	B3	B3e	80		Plaskett DAO 5, 58, 1931
336	β CrA	03.1 -39 30	4.16	G5		53	Constant Regarded const. Regarded const.	Hill DAO 5, 58, 1931
337	+24°3650	03.9 +24 34	6.66	B5	B5	8		Cape CA 10, Pt 8, 128, 1928
338	-39°13156	04.2 -39 10	6.24	B8	B8n			LO 18
339	η Lyr	10.4 +38 58	4.46	B3	B5s	40	Regarded constant	Plaskett DAO 5, 59, 1931
340	+33°3409	15.3 +33 13	6.32	B3	B3k	66		Neubauer ASP 42, 235, 1930
341	+19°4028	23.6 +20 02	7.15	B3	B3n	10		DAO 5, 146, 1931
342	B 4981	25.0 +20 04	6.39	B3	B5nn	49	Constant Regarded const. Regarded const.	Pearce DAO 5, 60, 1931
343	B 4992	28.1 +34 14	4.85	B3	B5s	105		Pearce DAO 5, 61, 1931
344	ι Aql	31.5 - 1 31	4.28	B5	B8n			DAO 5, 62, 1931
345	+3°4097	33.9 + 3 09	6.37	B3	B5	45	See note Var ? pr lines	LO 18
346	+40°3824	35.7 +40 24	7.47	B2	B2k	87		Pearce DAO 5, 63, 1931
347	B 5024	36.2 +42 35	5.39	B8	A0s	20		Plaskett DAO 5, 63, 1931
348	+23°3733	36.4 +23 29	6.41	B3	B8	50	Evidence insufficient	Struve ApJ 60, 319, 1924
349	QS Aql	36.5 +13 35	(6.1-6.2)	B3	B5			Pearce DAO 5, 63, 1931
350	B 5028	36.8 -16 22	5.10	F0		55		Hill DAO 5, 63, 1931
351	χ Aql	37.9 +11 35	5.32	F5-A3	F3	7	2 sp	Yerkes Y07, 67, 1929
352	+33°3602	45.0 +33 12	6.35	B0	B0nk			LO 16, 290, 1928
353	ϵ Dra	48.5 +70 01	3.99	K0	G3	5		Pearce DAO 5, 68, 1931
354	B 5087	49.3 - 8 29	5.78	B3	B5n	61	V & W	LO 18
355	B 5088	49.3 - 8 30	6.53	B	B9n	17		Pearce DAO 5, 69, 1931
356	ω Sgr	49.7 -26 34	4.81	G5	G5	10		LO 18
357	+47°2945	50.1 +47 34	6.15	B2	B2nnk	65	Probable V, Y & L	Cape CA 10, Pt 8, 128, 1928
358	+40°3948	52.3 +40 08	7.22	B3	B3	67		Plaskett, DAO 5, 69, 1931
359	B 5102	52.3 +38 13	4.87	B3	B7s	25		Pearce DAO 5, 69, 1931
360	B 5127	56.2 +36 46	5.15	B3	B3		Regarded constant	Yerkes ApJ 64, 16, 1926
361	+42°3562	57.9 +42 46	7.29	B5	B3	45		DAO 5, 149, 1931
362	B 5150	20 00.7 +31 56	5.69	B0	cB0e β			Plasket DAO 5, 72, 1931
363	+36°3883	03.7 +36 17	7.44	K5	M2	22	2 sp	DAO 5, 149, 1931
364	+35°3994 A	05.5 +35 11	7.7	B3p	B2k			Mt. Wilson Letter
365	B 5167	05.5 +20 36	7.29	K2	K2	33		Pearce DAO 5, 73, 1931
366	+35°4026	09.8 +36 02	7.12	B3	B3nek	62	Regarded constant	Sanford Letter
367	B 5184	09.9 +61 47	5.72	F5	F5			Pearce DAO 5, 73, 1931
368	+31°4001	10.3 +31 41	7.38	B5	B2sk	25		LO 18
369	α^1 Cap	12.1 -12 49	4.55	G0p	cG5	33	Considered constant	Pearce DAO 5, 74, 1931
370	α^2 Cap	12.5 -12 51	3.77	G5	G8			Harper DAO 6, 151, 1934
371	+31°4018	12.9 +32 04	7.02	B0p	B0ek	44		LO 18
372	+25°4189	14.0 +25 20	6.78	B3	B3	71	Insufficient evidence	Pearce DAO 5, 74, 1931
373	β GC 10146 A	17.1 +43 32	6.83	Oa	O5k+OW8	16		Pearce DAO 5, 75, 1931
374	B 5236	20.0 +37 10	5.68	B3	B3nek			DAO 5, 151, 1931

TABLE III—Continued
APPENDIX TO THIRD CATALOGUE

	Star	α 1900 δ			Mag.	Spec. Class		Range km/sec	Remarks	Authority
		^h	^m	^s ^d		Hvd.	Rev.			
375	π Aqr	20	20.2	+ 0 52	4.64	B1p			Vel. var. irr., associated with structural changes	McLaughlin <i>MO</i> 4, 37, 1931 <i>ApJ</i> 77, 221, 1933 Pearce <i>DAO</i> 5, 76, 1931
376	+43°3630	27.2	+43	59	7.15	B	B1se	47		
377	ϵ Del	28.4	+10	58	3.98	B5	B7		Considered constant	<i>LO</i> 18
378	+47°3136	29.3	+47	53	6.82	B2	B2k		2 sp	Plaskett <i>DAO</i> 5, 76, 1931
379	+44°3503	29.4	+44	39	7.50	B5	B5	55		Pearce <i>DAO</i> 5, 77, 1931
380	+42°3778	29.4	+42	51	6.41	B3	B6s	72		Hill <i>DAO</i> 5, 77, 1931
381	+41°3799	29.4	+41	32	7.04	G5	G9	29		Harper <i>DAO</i> 6, 193, 1934
382	+32°3862	29.5	+32	34	7.08	B3	B3s	50		Pearce <i>DAO</i> 5, 77, 1931
383	+29°4092	31.0	+29	55	7.41	B5	B5	39		Pearce <i>DAO</i> 5, 77, 1931
384	+29°4131	36.5	+29	27	6.09	A0		39		Simeis <i>MN</i> 92, 771, 1932
385	α Cyg	38.0	+44	55	1.33	A2p	cA2ea	8	See note	
386	ψ Cap	40.2	-25	38	4.26	F8	F1	12		Cape <i>CA</i> 10, Pt 8, 128, 1928
387	B 5356	44.6	-38	17	5.55	K0		16		Neubauer <i>ASP</i> 42, 235, 1930
388	B5361	45.5	+45	45	4.89	B2	cB2ea		Considered constant	<i>DAO</i> 5, 152, 1931
389	ω Cap	45.9	-27	18	4.24	Ma	M1			Cape <i>CA</i> 10, Pt 8, 128, 1928
									13 L pl do not confirm	<i>LO</i> 18
390	+37°4076	47.6	+37	36	6.97	B5	B3k	107		Pearce <i>DAO</i> 5, 79, 1931
391	B 5373	47.8	+26	43	4.76	G5	G2	9	Var ?	Bonn <i>AN</i> 198, 439, 1914
392	+27°3909	50.1	+28	08	6.44	B3	B1s	110		Hill <i>DAO</i> 5, 79, 1931
393	RV Cap	55.9	-15	37	(9.2-10.5)		A8	70	R R Lyr	Mt Wilson <i>ASP</i> 36, 137, 1924
394	B 5414	57.6	+45	46	5.24	B3	B3ne	57		Plaskett <i>DAO</i> 5, 80, 1931
395	B 5425	21 00.1	+41	14	6.33	F2	F0		Considered constant	<i>LO</i> 18
396	+54°2470	01.0	+54	51	7.16	B2	B2k	35		Hill <i>DAO</i> 5, 80, 1931
397	DT Cyg	02.3	+30	47	(5.7-5.9)	F5	F7		ζ Gem	Sanford <i>ApJ</i> 72, 46, 1930
398	B 5478	16.0	+49	05	5.65	B5	B5		Considered constant	<i>DAO</i> 5, 153, 1931
399	+61°2112	16.7	+61	25	6.64	B0p	B0nek	60		Plaskett <i>DAO</i> 5, 83, 1931
400	B 5506	20.6	-42	59	5.61	A3p		13		Neubauer <i>LOB</i> 15, 59, 1930
401	+11°4583	26.3	+11	43	5.94	A0			2 sp	Petrie <i>DAO</i> 4, 94, 1927
402	+56°2589	28.6	+57	04	7.36	B0	B0sk	31		Pearce <i>DAO</i> 5, 84, 1931
403	ϵ Cap	31.5	-19	55	4.72	B5p	B5pe		Considered constant	<i>DAO</i> 5, 154, 1931
404	B 5627	48.5	+25	27	5.05	B3	B3k	28		Struve <i>ApJ</i> 64, 69, 1926
405	B 5642	52.9	+64	52	5.85	B3	B3nek	17		<i>DAO</i> 5, 155, 1931
406	+60°2320	54.3	+60	49	6.90	B3	B2k	60		Pearce <i>DAO</i> 5, 86, 1931
407	+65°1691	54.7	+65	41	6.28	B3	B3k		2 sp	Plaskett <i>DAO</i> 5, 86, 1931
408	B 5667	58.7	+57	31	5.50	B0	O9nk		2 sp	Harper <i>DAO</i> 5, 88, 1931
409	B 5674	22 00.6	+ 4	34	4.90	K5	K5	10	L, W & V	Harper <i>DAO</i> 6, 196, 1934
410	B 5706	05.3	-12	03	5.40	B5	B5	7	Var ?	<i>LO</i> 16, 323, 1928
411	ζ Cep	07.4	+57	42	3.62	K0	cK5		Insufficient evidence	<i>LO</i> 18
412	μ^2 Gru	10.4	-42	07	5.19	G5	G5	10		<i>LO</i> 16, 324, 1928
413	+7°3834	11.0	+ 8	03	6.03	A0		89		Simeis <i>MN</i> 92, 771, 1932
414	ϵ Cep	11.3	+56	33	4.23	F0	A6n	84		Yerkes <i>YO</i> 7, 74, 1929
415	B 5757	15.5	+ 5	17	5.35	B5	B7	17		Moore <i>ASP</i> 38, 132, 1926
416	δ^2 Gru	23.8	-44	15	4.31	Mb	M4	8		Cape <i>CA</i> 10, Pt 8, 129, 1928
417	B 5810	26.2	+42	37	4.54	B3	B3k		Varnot confirmed by V	<i>DAO</i> 5, 157, 1931
418	+28°4389	27.0	+29	02	6.32	A5		167		Simeis <i>MN</i> 92, 771, 1932
419	B 5836	33.2	-33	36	5.60	A0			2 sp	Neubauer <i>ASP</i> 42, 235, 1930
420	+36°4898	34.6	+36	51	6.67	B3	B3k	128		Hill <i>DAO</i> 5, 91, 1931
421	B 5844	34.8	+38	32	4.91	Oe5	O9sk		Considered constant	<i>LO</i> 18
422	ξ Oct	41.0	-80	39	5.52	B5	B8s	32		Neubauer <i>LOB</i> 15, 78, 1930
423	B 5890	45.9	+41	25	5.84	B5	B3k		V pl give accordant vel. and no double lines	<i>DAO</i> 5, 92, 1931
424	γ PsA	47.0	-33	24	4.52	A0		14	Gd 4481	<i>LO</i> 16, 333, 1928
425	+58°2492	47.6	+58	28	7.16	B0	B0sk	27		Pearce <i>DAO</i> 5, 92, 1931
426	+59°2595	49.1	+59	34	6.32	K2	G3	20		Harper <i>DAO</i> 6, 198, 1934
427	B 5918	52.7	+48	09	5.20	B3	B3nek		Withdrawn	<i>DAO</i> 5, 958, 1931
428	+37°4744	56.3	+38	10	6.39	B3	B3ne	55		Pearce <i>DAO</i> 5, 93, 1931
429	β Peg	58.9	+27	32	2.61	Ma	M2		B, C & L do not confirm	<i>LO</i> 18

TABLE III—Continued
APPENDIX TO THIRD CATALOGUE

	Star	α 1900 δ		Mag.	Spec. Class		Range km/sec	Remarks	Authority
					Hvd.	Rev.			
430	+59°2631	^h 22 ^m 59.2	^s +59 54	6.57	B5	B3k	52	Insufficient evidence Regarded constant	Plaskett DAO 5, 94, 1931
431	B 5954	23 02.2	+24 56	4.98	K0	cK0			LO 18
432	B 5955	02.4	+58 53	4.93	B1	cB1s			DAO 5, 159, 1931
433	+48°3950	04.8	+49 07	6.53	B3	B3nk	42		Plaskett DAO 5, 94, 1931
434	B 5980	10.4	— 4 02	5.55	A2		57		Simeis MN 92, 771, 1932
435	ψ^1 Aqr	10.7	— 9 38	4.46	K0	K0	6	Doubtful 2 sp	Cape CA 10, Pt 8, 129, 1928
436	+60°2521	15.7	+60 36	6.82	B5	B5			LO 18
437	+35°5024	19.9	+35 49	6.82	B3	B5n	54		Pearce DAO 5, 95, 1931
438	B 6027	21.0	—53 17	5.54	F0		60		Pearce DAO 5, 96, 1931
439	ι Phe	29.7	—43 10	4.80	A2p		15		Neubauer ASP 42, 235, 1930
440	B 6085	37.3	—16 00	5.44	K2	K5	10	L & Y; lines brd.	LO 16, 341, 1928
441	ω^2 Aqr	37.5	—15 06	4.62	A0		18		LO 16, 342, 1928
442	+46°4169	42.6	+46 16	5.84	B3	B3k	95		LO 18
443	+1°4773	43.7	+ 1 39	6.42	F2		32		Pearce DAO 5, 96, 1931
444	B 6140	50.1	—32 29	6.05	B3	B5	140		Simeis MN 92, 771, 1932
445	ω Psc	54.2	+ 6 19	4.03	F5	F3	10	2 sp	Neubauer ASP 42, 235, 1930
446	+60°2656	56.3	+60 17	7.36	B5	B5	31		Cape CA 10, Pt 8, 129, 1928
447	B 6186	59.7	+57 58	6.51	B3	B3			Plaskett DAO 5, 97, 1931
									Hill DAO 5, 98, 1931

NOTES TO TABLE III

48. An orbit was derived from the interstellar H and K lines by Cannon (*DO* 1, 370, 1912). Further observations by Rufus (*PA* 33, 300, 1925) indicate that the displacements of the stellar lines are not represented by elliptic motion. Plaskett and Pearce (*DAO* 5, 23, 1931) from spectrograms found the velocity from stellar lines to be variable, with a range of 70 km/sec but were unable to obtain a period for this variation. The star is under investigation at Victoria.
49. Hujer (*ApJ* 67, 399, 1928) has derived two orbits with periods 0.8542336 and 5.9542159 days respectively. The sixty-four Yerkes 1-prism and the five Lick 3-prism are satisfied almost equally well by the two sets of elements with a slight advantage in favor of the longer period, but further observations are needed to settle which is the correct one.
65. Orbital elements from interstellar H and K were published by Lee (*ApJ* 37, 1, 1913). Seven spectrograms obtained at Victoria (*DAO* 5, 27, 1931) give no variation in velocity for either H and K or stellar lines.
90. Variation in velocity associated with structural changes of hydrogen emission. Changes not periodic.
126. Provisional orbital elements with a period of 9.6 years were derived by Harper (*DO* 4, 279, 1919), but in *RASC* 15, 148, 1921 he says that later observations at Victoria are not represented by these elements. They are therefore rejected pending further investigation.
127. An investigation of the complex spectrum of this star has been made by Miss Hawes (*Vassar O* 4, 29, 1930) based upon spectrograms from Lick, Yerkes and Michigan. She found that the radial velocities derived from absorption and emission lines are variable through ranges of 30 to 60 km/sec, the variations being associated with structural changes in the lines. The variation in velocity is not regarded as evidence of orbital motion.
133. An orbit was published by Harper (*RASC* 6, 185, 1912) but it was at once shown by Ludendorff (*AN* 192, 447, 1912) that these elements did not represent his observations of Jan-Apr 1910. A new set of elements, taking into account later Potsdam and Cape observations, was derived by Wesselink (*BAN* 6, 186, 1932). Colacevich (*ASP* 47, 283, 1935), however, has shown that Lick observations of recent years are not satisfied by these elements. The star is under investigation at Victoria and Lick.
153. Several orbits have been computed by Struve (*ApJ* 65, 280, 1927) but in his most recent discussion (*ApJ* 81, 346, 1935) he concludes that "the velocity curve does not represent orbital motion."
154. Variable radial velocity was announced by Paddock from measures of H γ emission line. It is doubtful whether the observed variation in displacement of the emission line is to be interpreted as arising from variable radial velocity of the star.
213. ADS 8035, 2.0–11.1, $d=0^{\circ}85$. Aitken (*ASP* 45, 190, 1933) finds period of revolution approximately 43 years. The radial velocity observations indicate a period of the same order, but they also lead to the suspicion of a superposed short period variation.
231. An orbit with period 0.977029 days was published by Neubauer (*LOB* 15, 191, 1932). Luyten (*ASP* 47, 263, 1935) has derived orbital elements from the same observations having a period of 59.31 days, which give somewhat smaller residuals. Further observations, however, will be required to decide definitely between these two periods.
232. Neubauer (*LOB* 15, 192, 1932) derived orbital elements with a period 0.97623 days, but Luyten (*ASP* 47, 263, 1935) has shown that the observations are almost as well satisfied by a period of 56 days. More observations are required to settle which is the correct period.

262. Cannon (*DO* 1, 405, 1912), on the basis of 1-prism observations, computed an orbit having a period of 40.9 days and $K=3.1$ km/sec. He found the velocity of the system variable in a period of 490.8 days and gave approximate elements for the long period variation. Neubauer (unpublished) has obtained 186 observations with the Mills 3-prism in the years 1930-36, which show no evidence of either of the above periods, but indicate that the period of variation is of the order of ten years.
319. Following Guthnick's announcement of an apparent correlation between the light and velocity variations of this star, Belopolsky (*Z. f. Astroph.* 2, 245, 1931), from his measures of 85 spectrograms taken on 12 nights in 1930, concluded that the radial velocity is variable with a range of 6.2 km/sec in a period of 0.19 days. A series of 133 spectrograms was taken with the Mills 3-prism instrument in 1931, 1933 and 1934. On six nights they were obtained in succession through an interval of 4 or 5 hours. Neubauer's measures of these spectrograms (*LOB* 17, 109, 193) indicate no variation in radial velocity greater than 0.2 km/sec. He regards the whole series of Lick Observations 1900-34 as affording strong evidence that the radial velocity of *α Lyrae* is constant within a small fraction of a kilometer.
329. Mrazek (*AN* 236, 281, 1929) found period of 41.3 days for light and velocity variation and that the velocity of the system is variable in a period of $5\pm$ years. Sanford (*ApJ* 71, 209, 1930), from a discussion of 18 Allegheny, 31 Lick and 39 Mount Wilson observations, obtained a period of 43.48 days, the amplitude given by the three sets of observations being respectively $6\pm$, $4\pm$, and $6\pm$ km/sec. He concluded that if there is a long period variation, the period is not 5 years.
349. Hill (*DAO* 6, 11, 1931) has derived the orbital elements with a period of 2.4968 days, but Guthnick (*Sitz Ber Acad* 521, 1934) was unable to represent the Babelsberg light and radial velocity observations with this period. He obtained 2.5133 days with which both the Victoria and Babelsberg observations are represented. This also fulfils the condition of agreement between the times of conjunction and minimum light. The system requires further study in order to clear up certain apparent deviations which Guthnick finds in both light and velocity curves.
385. An extended study of the radial velocity of *α Cygni* was made by Paddock (*LOB* 17, 99, 1935) on the basis of 795 Mills 3-prism observations in 1927-33. Measures of spectrograms taken consecutively throughout three whole nights show some evidence of variation in velocity with an amplitude of little more than 2 km/sec in a period of about 0.2 day, but if real the variation is only roughly periodic since the form, amplitude and period change from one night to another. In 1931 two observations were obtained each night for about 5 months and in 1932 and 1933 shorter series were obtained which yield a velocity curve whose character is quite complex. The observed curve may be briefly described as consisting of a number of curves, having periods between 8.0 and 16.5 days, with amplitudes ranging from 2.6 to 11.0 km/sec. No evidence was obtained that any particular form of curve was ever repeated at a later epoch.