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PERIOD CHANGES IN DWARF CEPHEIDS, II YZ BOOTIS, XX CYGNI AND DY HERCULIS

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ABSTRACT

The period changes in the dwarf cepheids YZ Boo, XX Cyg and DY Her are discussed and O-C diagrams of these stars are constructed. The period of XX Cyg changed abruptly in 1942 (ΔP = = $+87\times10^{-9}$day = +0.0075 sec). Besides the sudden increase of the period, it has also shown small fluctuations. With regard to YZ Boo there may be a slight continuous increase (at a rate β = = $+10.6\times10^{-13}$ day cycle^{-1} = $+3.2\times10^{-2}$ sec century^{-1}) in its period. The period of DY Her has shown a definite continuous decrease at a rate $\beta = -37.2\times10^{-13}$ day cycle^{-1} = -7.9×10^{-2} sec century^{-1} during the time interval covered by photoelectric observations (1951-1979).

INTRODUCTION

As a continuation of our previous work (*Mahdy* and *Szeidl*, 1980) we publish here our results on the period changes in the dwarf cepheids YZ Boo, XX Cyg and DY Her. A description of the equipment used both for our photographic and our photoelectric observations can be found in several publications of the Konkoly Observatory (see e.g. *Olah* and *Szeidl*, 1978).

The observations presented here represent the work of the staff of Konkoly Observatory. The photographic plates were obtained by *Dr. Julia Balazs* (2 plates, 40 exp.), *Mr. D.Elter* (2 plates, 36 exp.), *Mr. K.Gefferth* (1 plate, 11 exp.) and *Mr. S. Horvath* (1 plate, 17 exp.). The table below summarizes the photoelectric observations of all observers concerned.

Table 1

Observer	YZ Boo	XX Cyg	DY Her	Total
L. Csank	427	126	-	553
L. Detre	60	175	-	235
M. Lovas	24	-	-	24
K. Olah	95	-	-	95
G. Paal	233	36	-	269
P. Sarkany	71	-	-	71
L. Szabados	101	-	-	101
B. Szeidl	261	349	224	834
Total	1272	686	224	2182

All the available observations on each star are discussed separately. We constructed the O–C diagrams using only photographic and photoelectric observations, and then by making use of the diagrams we studied the period changes of YZ Boo, XX Cyg and DY Her.

YZ BOOTIS

The variability of the star YZ Boo = BD +37°2635 = S 4768 = CSV 2335 was discovered by *Hoffmeister* (1949) at Sonneberg Observatory. He reported a light variation of one magnitude by estimating the Sonneberg sky-patrol plates. *Eggen* (1955) observed the star photoelectrically at Lick Observatory in 1955 and found it to vary in light with a period near 2 1/2 hours. He obtained 32 photoelectric observations without filters but did not give any epoch of maximum. Nevertheless two epochs could be determined in his figure.

Tsesevich (1958, 1966), using old Moscow and Odessa sky-patrol plates, determined two photographic epochs for the years 1939 and 1954. He also made some visual observations in 1957. In his book (*Tsesevich*, 1966) he also published some visual epochs of maximum observed by *Migach* and *Sacharov*.

Broglia and *Masani* (1957) carried out extensive photoelectric photometry of the star. During five nights in 1956 they obtained 95 blue and 97 yellow observations. They deduced 6 epochs of maximum and arrived at a period of 0.104 113 8 day. They found some evidence of the variations of the light curve from cycle to cycle even though their data cover only about 6 cycles out of a possible 105 in an 11 day interval.

In the fifties *Spinrad* (1959) made a detailed investigation of RR Lyrae stars. YZ Boo was also included in the programme and he collected 32 yellow and 31 blue photoelectric observations of this star during three nights. *Spinrad* also found some evidence for light curve variation, but the amplitude variation was less than 0.1 mag in blue.

Ahnert (1959) and *Strelkova* (1960, 1964) observed the star visually and obtained six maxima in 1959 and one maximum in 1958, respectively.

The first systematic photographic photometry of the star was carried out by *Tremko* and *Antal* (1959) at Skalnate Pleso Observatory in 1959. Based on their 162 photographic magnitudes they gave five epochs of maximum light and determined a period of 0.104 001 91 day.

In 1960 *Broglia* (1961) secured 189 blue observations of the variable at Merate Observatory and obtained six new epochs of maximum. Combining these new maxima with the old ones he was able to determine a highly accurate value of the period of YZ Boo: 0.104 091 543 day.

Heiser and *Hardie* (1964) obtained a total of 216 photoelectric observations on the UBV system. They found that the ascending branches of the light curve and the amplitudes were relatively repetitive but the descending branch might be subject to small changes from cycle to cycle. Near the 0.2 phase they detected undoubtedly real variations among various cycles. They also carried out a detailed investigation of the colour variation of the variable at different phases of light variation.

Fitch et al. (1966) obtained 48 UBV observations in 1964; these observations also provided an opportunity to determine the accurate photometric characteristics of the star and a new epoch of maximum.

Gieren et al. (1974) carried out photoelectric UBV photometry of the star on one night in 1974. They observed three consecutive cycles and found distinct changes in shape and amplitude of the light curve and mean luminosity of the variable. Since *Gieren* et al. did not investigate the constancy of the comparison star they used, some doubts arise in connection with the light curve changes (especially with the change in mean luminosity). They used all available photoelectric data and found the improved period: 0.104 091 56 day.

At Konkoly Observatory we commenced to observe YZ Boo in two colours in 1959. Since that time we have obtained 628 yellow and 644 blue observations. These are transformed to the international UBV system and are given in Tables 8 and 9, respectively, in the sense variable minus comparison. As comparison star we used BD +37°2634 (9.0). On two fairly poor nights we made tie-in observations of this star into the UBV system and obtained the magnitude and colour: V = $10^{m}_{\cdot}14$ and B-V = $0^{m}_{\cdot}60$.

The comparison star mostly used by others was BD +37°2639 for which *Spinrad* (1959) determined the following visual brightness and colour: V = $9^{m}_{\cdot}02$ and B-V = $1^{m}_{\cdot}38$.

The light curves obtained at Konkoly Observatory in the years 1959, 1973 1974, 1975 and 1979 show slight differences which can be ascribed to the observational errors and uncertainties in the transformation to the international system. The fairly large scatter of the observations in 1959, however, indicates that some real light curve variation may be present among the different cycles. It may well be worth trying to subject the homogeneous 1959 data to a careful period analysis in order to search for a beat period. In Figure 1 we plotted the 1959 data according to phase.

In Table 2 we have gathered all reliable data available to us pertaining to times of maximum brightness except the visual observations. Because of the large errors in the visual epochs of maximum we have simply ignored them. We used only the yearly means of those photoelectric maxima that are certain when carrying out a least-squares solution for the period. The resulting linear ephemeris is:

$$\text{Max. hel.} = \text{J.D. } 2442\ 146.3544 + 0.104\ 091\ 551 \cdot E$$
$$\pm.0003 \qquad\qquad \pm 6$$

or if we take into account the quadratic term, as well:

$$\text{Max. hel.} = \text{J.D. } 2442\ 146.3543 + 0^{d}.104\ 091\ 580 \cdot E + 5^{d}.3 \times 10^{-13} E^2.$$
$$\pm.0002 \qquad\qquad \pm 14 \qquad \pm 2.6$$

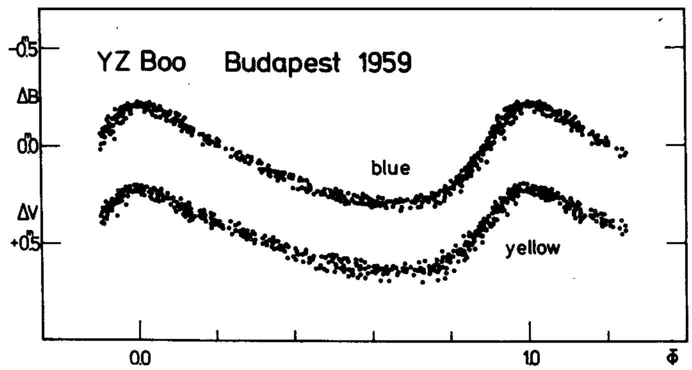

Figure 1: ΔV and ΔB observations of YZ Boo made in the year 1959, plotted against phase

It appears from the photoelectric works of *Eggen* (1955), *Broglia* and *Masani* (1957), *Spinrad* (1959), *Broglia* (1961), *Heiser* and *Hardie* (1964), *Fitch* et al. (1966), *Gieren* et al. (1974) and ourselves that the times of maximum recur periodically within the accuracy of measurements (about ±0.0015 day). Nevertheless, a slight continuous increase of the period (10.6×10^{-13} day/cycle) may have taken place in the interval 1955-1979. Further photoelectric observations will enable a decision to be made on the constancy of or the increase in the period.

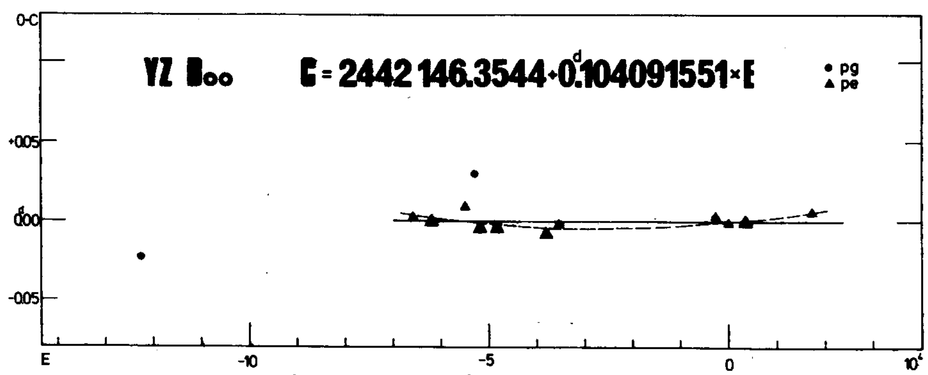

Figure 2: O–C diagram of YZ Boo

Table 2

Photographic and photoelectric maxima of YZ Boo

year	J.D.max.hel.	Remarks		O–C	E	$\overline{O-C}$	$\overline{E}$	n
1939	2429403.3603	pg	Ts	−0.0023	−122421	−0.0023	−122421	1
1954	(34926.3665:	pg	Ts	+0.0103:	− 69362)			
1955	35282.766	pe	Eg[1]	+0.0003	− 65938	+0.0002	− 65937	2
	.870	pe	Eg[1]	+0.0002	− 65937			
1956	35688.4090	pe	BM	−0.0015	− 62041	−0.0001	− 61993	5
	35689.4497	pe	BM	−0.0017	− 62031			
	35695.3862	pe	BM	+0.0016	− 61974			
	.4900	pe	BM	+0.0013	− 61973			
	35698.4032	pe	BM	−0.0001	− 61945			
	(35699.341:	pe	BM	+0.0009:	− 61936)			
1958	36428.8140	pe	Sp	+0.0003	− 54928	+0.0009	− 54923	2
	36429.7520	pe	Sp	+0.0015	− 54919			
1959	36603.4867	pg	TA	+0.0074	− 53250	+0.0030	− 53210	5
	36606.4985	pg	TA	+0.0005	− 53221			
	36607.4397	pg	TA	+0.0049	− 53212			
	.5403	pg	TA	+0.0014	− 53211			
	36613.4727	pg	TA	+0.0006	− 53154			
	36709.5510	pe	Pp	+0.0024	− 52231	−0.0005	− 52148	13
	36712.4634	pe	Pp	+0.0002	− 52203			
	36713.3985	pe	Pp	−0.0015	− 52194			
	.5031	pe	Pp	−0.0010	− 52193			
	36714.4389	pe	Pp	−0.0020	− 52184			
	36716.4174	pe	Pp	−0.0012	− 52165			
	.5222	pe	Pp	−0.0005	− 52164			
	36717.3545	pe	Pp	−0.0010	− 52156			
	36723.4963	pe	Pp	−0.0006	− 52097			
	36724.4332	pe	Pp	−0.0005	− 52088			
	.5380	pe	Pp	+0.0002	− 52087			
	36725.3701	pe	Pp	−0.0004	− 52079			
	.4733	pe	Pp	−0.0013	− 52078			
1960	37077.5112	pe	Br	−0.0010	− 48696	−0.0005	− 48376	5
	37098.4340	pe	Br	−0.0006	− 48495			
	37120.3975	pe	Br	−0.0005	− 48284			
	.5010	pe	Br	−0.0010	− 48283			
	37137.3654	pe	Br	+0.0005	− 48121			
	(37168.385:	pe	Br	+0.0008:	− 47823)			
1963	38206.6955	pe	HH	−0.0019	− 37848	−0.0009	− 37785	4
	38209.8200	pe	HH	−0.0001	− 37818			
	38214.7130	pe	HH	+0.0006	− 37771			
	38221.6845	pe	HH	−0.0021	− 37704			
1964	38466.9260	pe	FA	−0.0003	− 35348	−0.0003	− 35348	1
1973	41860.4151	pe	Pp	+0.0002	− 2747	+0.0002	− 2747	1
1974	42146.3546	pe	GA	+0.0002	0	−0.0002	+ 197	2
	(42183.4164	pg	Bu	+0.0054	+ 356)			
	42187.4700	pe	Pp	−0.0006	+ 395			
1975	42464.5624	pe	Pp	+0.0001	+ 3057	−0.0001	+ 3338	4
	.6666	pe	Pp	+0.0002	+ 3058			
	42522.4374	pe	Pp	+0.0002	+ 3613			
	42523.4772	pe	Pp	−0.0009	+ 3623			
1979	43936.6255	pe	Pp	+0.0005	+ 17199	+0.0005	+ 17199	1

Remarks to Table 2: pg = photographic; pe = photoelectric; Ts = Tsesevich (1958, 1966); Eg = Eggen (1955); BM = Broglia and Masani (1957); Sp = Spinrad (1959); TA = Tremko and Antal (1959); Br = Broglia (1961); HH = Heiser and Hardie (1964); FA = Fitch et al. (1966); GA = Gieren et al. (1974); Bu = Busch (1976); Pp = Present paper; [1] = epoch determined by us

Unfortunately, not only do the visual observations usually have large errors but the photographic ones, too. *Tremko*'s and *Antal*'s (1959) careful photographic work shows that the accuracy of the photographic maximum is, at best, about 0.005 day. It may, however, exceed 0.01 day in an average case (see, for example, the maximum determined by *Tsesevich*, 1958, from the Odessa photographic material for the year 1954). In view of this, we should not attribute too much weight to the early photographic maximum obtained from the Moscow plate material. We cannot, however, preclude the possibility of a sine wave-like O-C diagram, i.e. a long-term periodic change in the period of YZ Boo.

XX CYGNI

The variability of this star was announced by *Ceraski* (1904) who stated that the range of light variation was from 10.7 to 11.6 magnitude, the period about 3.2 hours, and the light curve resembled the "cluster variables". The star received the preliminary designation 14.1904.

Shortly after the discovery of the light variation of XX Cygni its visual observations were commenced. Between 1904 and 1911 more than 2600 visual estimations had been obtained and almost 150 visual epochs of light maximum were deduced from these observations. *Schwab* (1906) gave a period of 0.134 859 day and found the light maximum and minimum to be fairly constant. *Graff* (1906) obtained a slightly shorter period: 0.134 846 day. *Blazhko* (1906) using his own visual observations of the years 1904, 1905 and 1906 arrived at the elements:

$$\text{Max. hel.} = \text{J.D. } 2416\ 563.411 + 0\overset{d}{.}134\ 864\ 3 \cdot E.$$

He found that light curve variation was present. *Luizet* (1908) and *Nijland* (1911) made further visual observations and gave the values of the period: 0.134 864 5 day and 0.134 865 0 day, respectively.

The first photographic observations were made by *Parkhurst* and *Jordan* (1906). Their 48 observations were obtained with 6 minute exposure time. The light variation was confirmed but their period was too short.

A comprehensive study of the light variation of XX Cyg was carried out by *Kron* (1912). He reduced all the visual observations obtained up to 1911 to the Potsdam visual system and critically discussed the data. He derived 140 epochs of maximum light and gave the elements with a quadratic term:

$$\text{Max. hel.} = \text{J.D. } 2416\ 563.41065 + 0\overset{d}{.}134\ 865\ 22 \cdot E - 0\overset{d}{.}1578 \times 10^{-10} \cdot E^2.$$

According to *Kron* there exists a secondary maximum on the descending branch of the light curve about half a period from the main maximum, and this secondary maximum oscillates in the way given by the formula:

$$0\overset{d}{.}0625 - 0\overset{d}{.}0160 \sin\left[\frac{2\pi}{7.2}\left(\frac{E}{1000} + 0.8\right)\right]$$

Shapley and *Shapley* (1915) observed the star at Mt. Wilson in 1914 and 1915 and obtained 40 photographic observations with 1 minute exposure time and 37 photovisual observations with 2 minute exposure time. They argued against the existence of a secular term introduced by *Kron* (1912) but they found that neither the shape of the light curve nor the range was constant for successive periods and suspected a short-period oscillation in the time of maximum. *Shapley* and *Shapley* gave three epochs of maximum light for 1914 and one epoch for 1915. Two of the epochs of 1914 were, however, very uncertain and therefore we omitted them from our list of photographic and photoelectric maxima (Table 3).

A further 265 visual observations were obtained by *Blazhko* (1922) in 1919 and 1921. Supplementing the list of maxima by his 7 and 8 visual maxima from the years 1919 and 1921, respectively, *Blazhko* also questioned the secular variation of the period but he stated that periodic variations were present and gave the new elements:

$$\text{Max.hel.} = \text{J.D. } 2416\ 563.4098 + 0\overset{d}{.}134\ 865\ 027 \cdot E + 0\overset{d}{.}00175 \sin(0\overset{\circ}{.}0103 \cdot E + 22\overset{\circ}{.}6)$$

Nijland (1923) published his 227 original visual observations which had already been discussed by *Kron* (1912). A rediscussion of these data definitely showed that no secondary wave was present, and that the period of XX Cyg was sensibly constant: P = 0.134 865 27 day. *Nijland* also doubted *Kron*'s quadratic term.

Important photographic observations were made by *Jordan* (1929) in the years 1915 and 1921. He obtained 17 plates (containing 74 exposures) on six different nights. Exposures were in general 10 minutes in length. *Jordan* did not find any definite difference in the shape of the light curve or the phase of maximum at different cycles. He gave the period as P = 0.134 864 907 day.

Blazhko (1936) continued his visual observations and obtained a further 576 visual estimates from 1923 to 1934. Curiously enough, in contrast with *Jordan* (1929), *Blazhko* again found a periodic variation in the phase of light maxima:

$$\text{Max. hel.} = \text{J.D. } 2416\ 563.410 + 0\overset{d}{.}134\ 865\ 014 + 0\overset{d}{.}0019 \sin(0\overset{\circ}{.}01 \cdot E + 20^\circ).$$

Table 3

Photographic and photoelectric maxima of XX Cyg

year	J.D.max.hel.	Remarks		O–C	E	$\overline{O-C}$	$\overline{E}$	n
1905	2417172.596	pg	PJ[1]	+0.0050	-100089	+0.0043	-100072	3
	17175.564	pg	PJ[1]	+0.0060	-100067			
	17176.504	pg	PJ[1]	+0.0019	-100060			
1914	20366.8729	pg	SS	+0.0027	- 76404	+0.0027	- 76404	1
1915	20574.9729	pg	SS	+0.0059	- 74861	+0.0041	- 74221	4
	20687.716	pg	Jo[1]	+0.0018	- 74025			
	20689.742	pg	Jo[1]	+0.0048	- 74010			
	20692.708	pg	Jo[1]	+0.0038	- 73988			
1921	22963.699	pg	Jo[1]	+0.0019	- 57149	+0.0019	- 57149	1
1933	27189.560	pg	Kl	+0.0008	- 25815	+0.0008	- 25815	1
1935	27961.392	pg	De	0.0000	- 20092	+0.0006	- 19854	7
	27962.471	pg	De	+0.0001	- 20084			
	27979.465	pg	De	+0.0011	- 19958			
	27980.410	pg	De	+0.0020	- 19951			
	27983.511	pg	De	+0.0011	- 19928			
	27993.490	pg	De	+0.0001	- 19854			
	28093.290	pg	De	-0.0001	- 19114			
1937	28694.520	pg	Kl	+0.0015	- 14656	+0.0015	- 14656	1
1950	33538.468	pg	Pp	+0.0007	+ 21261	+0.0007	+ 21261	1
1952	34150.486	pg	Pp	+0.0011	+ 25799	+0.0011	+ 25799	1
1953	34576.390	pg	Pp	+0.0012	+ 28957	+0.0012	+ 28957	1
	(34630.213	pg	Al	+0.0130	+ 29356)			
1954	35035.336	pg	Pp	+0.0013	+ 32360	+0.0013	+ 32360	1
1955	35258.5370	pe	De[2]	+0.0006	+ 34015	+0.0010	+ 34518	2
	35394.3468	pe	De[2]	+0.0013	+ 35022			
1957	36077.4395	pe	De[2]	+0.0024	+ 40087	+0.0017	+ 40320	7
	.5734	pe	De[2]	+0.0015	+ 40088			
	36080.4055	pe	De[2]	+0.0014	+ 40109			
	36081.4852	pe	De[2]	+0.0022	+ 40117			
	36136.2395	pe	De[2]	+0.0013	+ 40523			
	36143.2538	pe	De[2]	+0.0026	+ 40575			
	36165.2350	pe	De[2]	+0.0008	+ 40738			
1958	36403.4079	pe	Pp	+0.0020	+ 42504	+0.0020	+ 42635	3
	.5430	pe	Pp	+0.0022	+ 42505			
	36456.4096	pe	Pp	+0.0017	+ 42897			
1959	36815.4216	pe	Pp	+0.0029	+ 45559	+0.0023	+ 45666	4
	.5565	pe	Pp	+0.0029	+ 45560			
	36844.2818	pe	Pp	+0.0020	+ 45773			
	.4160	pe	Pp	+0.0013	+ 45774			
1965	38886.9495	pe	FA[3]	+0.0033	+ 60919	+0.0033	+ 60919	1
1972	41538.5311	pe	Pp	+0.0028	+ 80580	+0.0028	+ 80580	1
1974	42278.4010	pe	Pp	+0.0029	+ 86066	+0.0030	+ 86400	4
	42335.7191	pe	MF[3]	+0.0033	+ 86491			
	42338.6860	pe	MF[3]	+0.0032	+ 86513			
	42340.7085	pe	MF[3]	+0.0027	+ 86528			
1975	42655.7548	pe	MF[3]	+0.0042	+ 88864	+0.0042	+ 88864	1
1976	42973.7675	pe	MF[3]	+0.0051	+ 91222	+0.0045	+ 91276	5
	.9020	pe	MF[3]	+0.0047	+ 91223			
	42980.7795	pe	MF[3]	+0.0041	+ 91274			
	.9146	pe	MF[3]	+0.0043	+ 91275			
	42995.7495	pe	MF[3]	+0.0041	+ 91385			
1980	44455.3944	pe	Pp	+0.0043	+102208	+0.0043	+102208	1

Remarks to Table 3: PJ = Parkhurst and Jordan (1906); SS = Shapley and Shapley (1915); Jo = Jordan (1929); Kl = Kleißen (1938); De = Detre (1936); Pp = Present paper; Al = Alania (1954); FA = Fitch et al. (1966); MF = McNamara and Feltz (1980); [1] = determined by Detre (1936); [2] = from Detre's early unpublished photoelectric observations; [3] = determined by us

In order to disentangle the question of periodic variation *Detre* (1936) made a thorough investigation of XX Cyg. He made 316 photographic observations on 9 nights in 1935 between 6 June and 17 October. He discussed all the data on the star published up to 1935 and redetermined the epochs of maximum lights observed by different authors. He found no definite light curve variation and gave the linear elements:

$$\text{Max. hel.} = \text{J.D. } 2416\ 564.4897 + 0\overset{d}{.}134\ 865\ 016\ 2 \cdot E.$$

Kleißen (1938) also carried out photographic photometry on XX Cyg at Hamburg Observatory and obtained 44 observations in 1933 and 12 observations in 1937. Two maxima were covered and a secondary wave was found at phase 0.557 day.

Further visual observations were published by *Hacar* (1951), *Domke* and *Pohl* (1952) and *Oskanjan* (1953). Later on, *Alania* (1954) made some photographic observations and gave an epoch of light maximum which has turned out to be very uncertain.

Detre was the first who observed this star photoelectrically. He obtained 401 observations without filter on ten nights between 30 May 1955 and 23 November 1957. From these data nine photoelectric maxima could be determined. We give these maxima in Table 3.

Fitch et al. (1966) also observed this star and secured 30 UBV measures with the 36 inch telescope at Kitt Peak observing station of Steward Observatory on one night in 1965. We redetermined the time of maximum of their light curve using our mean light curve.

McNamara and *Feltz* (1980) obtained almost 1500 photometric uvbyβ observations of XX Cyg with the 24 inch telescope at Brigham Young University on eight nights in the time interval 1974-1976. They did not publish epochs of maximum light, but their data allowed us to determine nine times of maximum. Like *Fitch* et al., *McNamara* and *Feltz* also found the total light range of this star to be about 0.8 mag in V, which is the largest amplitude observed for any RRs variable. They also secured two single-trail spectrograms with the 200 inch telescope at a reciprocal dispersion of 18 A mm^{-1}. The total velocity range of XX Cyg is about 34 km sec^{-1} which is small compared with the large light amplitude.

Since 1950 a great number of unpublished photographic and photoelectric observations have been collected at the Konkoly Observatory, Budapest, in order to study the stability of the period of XX Cyg. The 87 photographic observations obtained on four nights in 1950, 1952, 1953 and 1954 are given in Table 10. In measuring the photographic plates we used the comparison stars of *Detre* (1936). These observations allowed us to determine 4 epochs of photographic maxima, one for each year.

The two colour (B,V) photoelectric investigation of this star was commenced at Konkoly Observatory in 1958. In all, 378 yellow and 308 blue observations have been obtained with the 24 inch reflector at Budapest with the exception of the 1974 and the 1980 observations. These were made with the 20 inch and 40 inch reflectors, respectively, at the Mountain Station of Konkoly Observatory. The differential photoelectric yellow and blue observations are given in Tables 11 and 12, and plotted against phase in Figure 3.

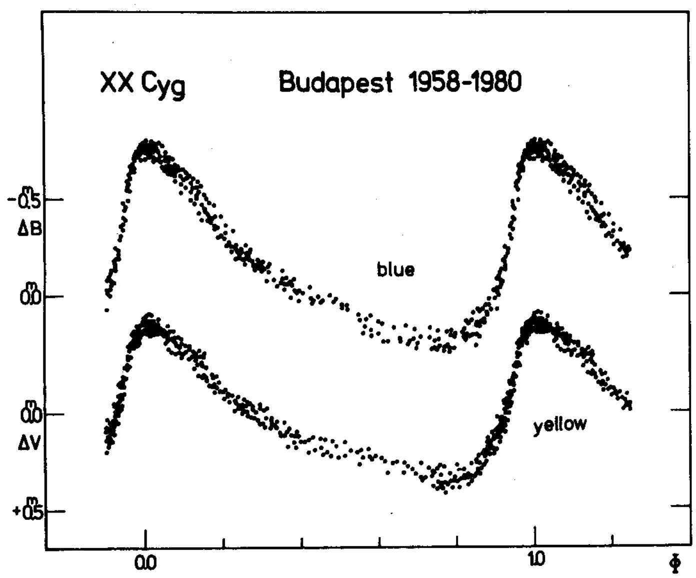

Figure 3: ΔV and ΔB observations of XX Cyg plotted against phase

The differential magnitudes (in the sense variable minus comparison) were corrected for transformation to the standard system and for differential extinction. As a comparison star we used star No. 7 of *Kron*'s list.

Our photoelectric data gave a further 10 epochs of maximum light.

All the available times of photographic and photoelectric maxima of XX Cyg are collected in Table 3. The O–C values were calculated by the formula:

$$C(J.D.\ max.hel.) = 2430\ 671.1010 + 0^{d}.134\ 865\ 070 \cdot E.$$

We formed yearly means of the epoch numbers and O-C values and then we calculated the mean epochs. These are given in Table 4. The O-C diagram of XX Cyg (Figure 4) was constructed by using the mean O-C values.

Table 4

Mean photographic and photoelectric maxima of XX Cyg

year	Mean Hel.Max.		W	E	O-C	$O-C_1$	$O-C_2$
1905	2417174.8880	pg	2	-100072	+0.0043	-0.0001	-
1914	20366.8729	pg	1	- 76404	+0.0027	-0.0007	-
1915	20661.2847	pg	2	- 74221	+0.0041	+0.0008	-
1921	22963.6990	pg	1	- 57149	+0.0019	-0.0006	-
1933	27189.5600	pg	1	- 25815	+0.0008	-0.0004	-
1935	27993.4905	pg	2	- 19854	+0.0006	-0.0003	-
1937	28964.5200	pg	1	- 14656	+0.0015	+0.0008	-
1950	33538.4680	pg	1	+ 21261	+0.0007	-	-0.0002
1952	34150.4860	pg	1	+ 25799	+0.0011	-	0.0000
1953	34576.3900	pg	1	+ 28957	+0.0012	-	-0.0001
1954	35035.3360	pg	1	+ 32360	+0.0013	-	-0.0001
1955	35326.3745	pe	1	+ 34518	+0.0010	-	-0.0005
1957	36108.8623	pe	2	+ 40320	+0.0017	-	-0.0001
1958	36421.0753	pe	2	+ 42635	+0.0020	-	+0.0002
1959	36829.8516	pe	2	+ 45666	+0.0023	-	+0.0003
1965	38886.9495	pe	1	+ 60919	+0.0033	-	+0.0007
1972	41538.5311	pe	1	+ 80580	+0.0028	-	-0.0007
1974	42323.4461	pe	2	+ 86400	+0.0030	-	-0.0007
1975	42655.7548	pe	1	+ 88864	+0.0042	-	+0.0004
1976	42981.0496	pe	2	+ 91276	+0.0045	-	+0.0005
1980	44455.3944	pe	1	+102208	+0.0043	-	-0.0001

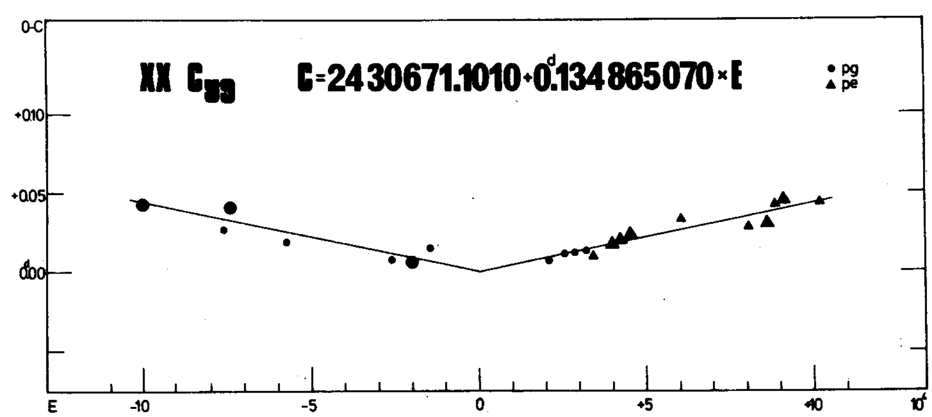

Figure 4: O-C diagram of XX Cyg

The O-C diagram of XX Cyg can be interpreted by two straight lines. This means that the period of this star has been constant, only it changed abruptly around 1942. Least-squares solutions give the following ephemerides before and after 1942:

$$C_1(\text{J.D. max. hel.}) = 2430\ 671.1010 + 0^{d}.134\ 865\ 026 \cdot E, \text{ before 1942,}$$
$$\pm.0004 \qquad\qquad \pm7$$

$$C_2(\text{J.D. max. hel.}) = 2430\ 671.1010 + 0^{d}.134\ 865\ 113 \cdot E, \text{ after 1942.}$$
$$\pm.0003 \qquad\qquad \pm4$$

In Table 4 the $O-C_1$ and $O-C_2$ values are also given; these clearly show that the period has indeed been constant during the past 75 years, apart from one sudden change by 87×10^{-9} day = 75×10^{-4} sec.

DY HERCULIS

DY Her = BD +12°3028 (9.5) was discovered to be variable by *Hoffmeister* (1935,1936), who gave the temporary designation 62.1935 Oph to the star and remarked that it was a short periodic variable star. *Soloviev* (1935) at first suspected the star to be a W UMa type variable, but shortly after (*Soloviev*, 1936, 1937) he determined the proper type of its variability and the preliminary and approximate value of its period (0.14858 day) from his 1936-37 visual observations. Later on he rediscussed his 240 visual observations made in the years 1936-1938, but he used a wrong period (*Soloviev*, 1952).

Tsesevich (1949) also observed the star visually in 1944 and 1947 and derived a new period: 0.148 586 65 day which, however, could not satisfactorily represent the observed maxima. Both *Soloviev* and *Tsesevich* claimed to notice light curve variation which has not been confirmed by modern photoelectric measurements.

Kühn (1951), and *Sauer* (1955) also made some visual estimates. They found some strange waves on the light curve which are not present either on the photographic or on the photoelectric light curves. There is little doubt that their observations were not sufficiently accurate.

From estimates on 1392 Harvard patrol plates *Gaposchkin* (1952) gave a period of 0.148 579 64 day. Oddly enough, his normal points formed with this period trace out a light curve with an amplitude of only some hundredth of magnitude. Thence it follows that his period is wrong. In addition to that, as *Gaposchkin* remarks, DY Her is an unsatisfactory object for the patrol plates because the average exposure time is about an hour, one third of the period. It is hardly surprising that he was unable to determine any epoch of maximum light from his observations.

With the help of 239 photographic observations secured between 23 March 1950 and 15 August *Ashbrook* (1954) succeeded in determining the correct period of DY Her. The new elements given by him are:

$$\text{Max. hel.} = \text{J.D. } 2433\ 439.4878 + 0^{d}.148\ 630\ 81 \cdot E$$

His observations yielded 7 maxima. In his paper *Ashbrook* also listed *Harlan Smith*'s unpublished photoelectric maxima.

Alania (1954) gave an epoch of photographic maximum. Because his observations were fairly poor, little weight should be ascribed to his value.

The first photoelectric measurements of this star were made by *Broglia* and *Masani* (1955) in 1951. They continued the observation in 1954 and obtained more than 450 photoelectric measurements in four colours. In determining the times of maximum we used only the blue and yellow observations and have ignored the ultraviolet and orange observations because the scatter of the observations in those colours was larger than in blue and yellow. Discussing the times of maximum available to them *Broglia* and *Masani* suspected a change in the period around 1952.

Lenouvel and *Daguillon* (1954) observed the variable photoelectrically on 9 nights in 1951. They obtained some 997 observations in two colours. As comparison star they used BD +12°3027 and as check star BD +12°3033. Although *Lenouvel* and *Daguillon* gave only two times of maximum five further epochs could be derived from their observations. It is rather curious that they could not determine the correct period although their observations were of excellent quality. These observations do not reveal any significant cycle-to-cycle change of the light curve.

Fitch (1957) observed the star in the photoelectric UBV system a total of 5.1 cycles on 5 nights in 1955 and 1956 and added five further epochs of maximum light to the list of observed maxima. According to his observations the light curve of DY Her appeared regular and he found no evidence of non-repetitive or extremely peculiar behaviour of the star near maximum light as reported by visual observers (*Tsesevich*, 1949; *Kühn*, 1951; *Soloviev*, 1952 and *Sauer*, 1955). Their misinterpretation can easily be explained by the underestimated errors of visual observations and by their use of an erroneous period. *Fitch* rediscussed all the available maxima and assuming a uniform increase in the period he gave the elements:

$$\text{Max. Hel.} = \text{J.D. } 2433\ 439.4872 + 0^{d}.148\ 631\ 13 \cdot E + 11^{d} \times 10^{-12} \cdot E^{2}.$$
$$\pm.0004 \qquad \pm.000\ 000\ 05 \qquad \pm 2$$

Among other RR Lyrae stars *Spinrad* (1959) observed DY Her on 4 nights in 1958 and obtained 74 yellow and 72 blue photoelectric observations. As comparison he used BD +12°3027. He found some changes in the shape of maximum and the rise to maximum light from cycle-to-cycle, but he also remarked that the amplitude of the light variation was fairly stable. However, it should also be noted that *Spinrad*'s observations are somewhat poorer than other photoelectric photometries.

In the course of his programme on dwarf cepheids *Broglia* (1961) observed DY Her, too. During 1958-1960 he obtained 37 blue and 124 yellow photoelectric observations. Discussing 52 epochs of maximum spreaded over 24 years or 59000 cycles *Broglia* found the period of DY Her variable and derived a new ephemeris with quadratic term:

$$\text{Max. hel.} = \text{J.D. } 2433\ 439.4875 + 0\overset{d}{.}148\ 631\ 18\cdot E + 53^{d}\text{x}10^{-13}\cdot E^{2}.$$
$$\pm.0003 \qquad \pm.000\ 000\ 02 \qquad \pm\ 10$$

Hardie and *Lott* (1961) secured over one thousand UBV observations on 11 nights in the spring and summer of 1959. According to their observations the light variations of this star appeared to be quite regular and repetitive and they also did not find any confirmation for the irregularities suggested by *Sauer* (1955) or the non-repetitive behaviour reported by *Tsesevich* (1949), *Soloviev* (1952) and *Spinrad* (1959).

Having discussed all available data *Hardie* and *Lott* suggested that the period of DY Her had been essentially constant from 1950 to 1959, and all observations in that interval could adequately be described by the relation:

$$\text{Max. hel.} = \text{J.D. } 2433\ 439.4871 + 0\overset{d}{.}148\ 631\ 27\cdot E.$$

They also investigated the serious departures of *Soloviev*'s and *Tsesevich*'s earlier observations from this relation and they found that "the data seemed insufficient to clarify whether the period had been different between 1936-1950, whether their times were in error, or whether the period was subject to continual change". Assuming the last possibility they derived from a second-degree solution the following ephemeris:

$$\text{Max. hel.} = \text{J.D. } 2433\ 439.4879 + 0\overset{d}{.}148\ 631\ 10\cdot E + 5\overset{d}{.}9\text{x}10^{-12}\cdot E^{2}.$$

In the course of their photoelectric observations of RR Lyrae stars *Fitch* et al. (1966) obtained 120 measurements of DY Her in UBV on three nights in 1964. Using our mean light curve we determined a new epoch different from that given by them.

In order to find interstellar absorption corrections *Epstein* (1969) observed a number of RR Lyrae and AI Velorum type stars in the uvby intermediate band photoelectric system. DY Her was also on the programme and was observed on six nights in 1966. From the 34 photoelectric V measurements we were able to determine a normal maximum.

Geyer and *Hoffmann* (1974) published one time of maximum light with a mean error of 0.001 day.

Engaging in a long-term programme to investigate the evolutionary status of the dwarf cepheid variables on a star-by-star basis *Breger* and his colleagues (*Breger* et al. 1978) studied DY Her in detail in the uvbyβ photometric system during 17 nights in May and July 1977. These observations are of high precision and make it possible to determine an accurate normal maximum. The maximum light was observed on seven nights (J.D. 2443280, 283, 285, 286, 341, 342, 343) and no light curve variations could be noticed.

At Konkoly Observatory this variable was observed photoelectrically on two nights: 9/10 July, 1972 and 25/26 June, 1979 and 182 and 42 observations were secured, respectively. As comparison star BD +12°3030 and as check star BD +12°3031 were used. The magnitudes and colours for these stars have been adopted from *Hardie* and *Lott* (1961). Table 5 gives the photometric data of the comparison stars used by different authors.

Table 5

star	V	B-V	U-B	References
BD +12°3027	10.35	+0.37	-0.10	Fitch (1957)
	10.28	+0.39		Spinrad (1959)
BD +12°3030	9.34	+0.56	+0.11	Hardie and Lott (1961)
BD +12°3031	8.52	+0.72	+0.33	Hardie and Lott (1961)

Our photoelectric observations are given in Tables 14 and 15 and are plotted against phase in Figure 5. Almost all the photoelectric observations confirm the stable and repetitive character of this variable. Therefore we have the well-grounded suspicion that the large fluctuations in the shape of the light curve of DY Her found by visual observers are not real.

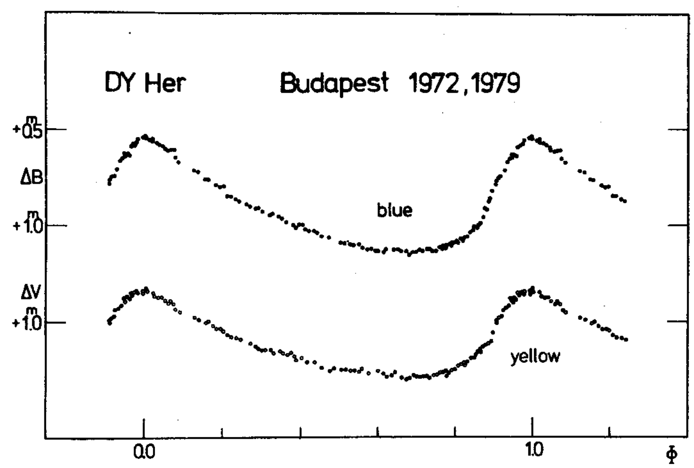

Figure 5: ΔV and ΔB observations of DY Her plotted against phase

In the plate collection of Konkoly Observatory we found a plate of DY Her with 17 multiple exposures made on 18 June, 1938. The measurements (Table 13) were made using *Ashbrook*'s (1954) comparison stars. Utilizing *Ashbrook*'s mean light curve we were able to determine a photographic epoch of maximum light. This epoch is very important because only visual observations of low accuracy existed before 1950.

All the photographic and photoelectric epochs available to us are gathered in Table 6. The O–C values were calculated by the ephemeris:

$$C = \text{J.D. } 2433\ 439.4865 + 0^{d}.148\ 631\ 201 \cdot E.$$

Table 6

Photographic and photoelectric maxima of DY Her

year	J.D.max.hel.	Remarks		O–C	E	$\overline{O-C}$	$\overline{E}$	n
1938	2429068.393	pg	Pp	+0.0015	–29409	+0.0015	–29409	1
1950	33366.807	pg	As	+0.0012	– 489	+0.0006	+ 125	7
	33371.857	pg	As	–0.0023	– 455			
	33442.607	pg	As	–0.0008	+ 21			
	33501.614	pg	As	–0.0003	+ 418			
	33506.671	pg	As	+0.0032	+ 452			
	33507.563	pg	As	+0.0034	+ 458			
	33509.640	pg	As	–0.0004	+ 472			
1951	33767.5172	pe	BM	+0.0016	+ 2207	+0.0002	+ 2333	3
	33775.837	pe	Sm^1	–0.0019	+ 2263			
	33815.5243	pe	BM	+0.0009	+ 2530			
1952	34068.940	pe	Sm^1	+0.0004	+ 4235	+0.0006	+ 4745	17
	34097.923	pe	Sm^1	+0.0003	+ 4430			
	34118.881	pe	Sm^1	+0.0013	+ 4571			
	34119.771	pe	Sm^1	–0.0005	+ 4577			
	34123.785	pe	Sm^1	+0.0005	+ 4604			
	34133.744	pe	Sm^1	+0.0012	+ 4671			
	34134.785	pe	Sm^1	+0.0017	+ 4678			
	34137.755	pe	Sm^1	–0.0009	+ 4698			
	34139.689	pe	Sm^1	+0.0009	+ 4711			
	34149.794	pe	Sm^1	–0.0010	+ 4779			
	34159.4570	pe	LD	+0.0010	+ 4844			
	34162.4295	pe	LD^2	+0.0008	+ 4864			
	34178.4818	pe	LD^2	+0.0010	+ 4972			
	34180.4140	pe	LD^2	+0.0010	+ 4985			
	34182.4950	pe	LD^2	+0.0011	+ 4999			
	34184.4277	pe	LD	+0.0016	+ 5012			
	34188.4390	pe	LD^2	–0.0001	+ 5039			
1953	(34568.346	pg	Al	+0.0055	+ 7595)			
1954	34875.5633	pe	BM	+0.0021	+ 9662	+0.0016	+ 9996	5
	34888.4937	pe	BM	+0.0016	+ 9749			
	34945.4190	pe	BM	+0.0012	+10132			
	34956.4177	pe	BM	+0.0012	+10206			
	34960.4316	pe	BM	+0.0020	+10233			
1955	35241.789	pe	Fi	+0.0006	+12126	+0.0017	+12144	3
	.939	pe	Fi	+0.0019	+12127			
	35249.817	pe	Fi	+0.0025	+12180			
1956	35622.881	pe	Fi	+0.0022	+14690	+0.0022	+14720	2
	35631.799	pe	Fi	+0.0023	+14750			
1958	36336.757	pe	Sp^2	+0.0025	+19493	+0.0024	+19590	5
	36337.799	pe	Sp^2	+0.0041	+19500			
	.947	pe	Sp^2	+0.0034	+19501			
	36338.834	pe	Sp^2	–0.0013	+19507			

Table 6 (cont.)

year	J.D.max.hel.	Remarks		O–C	E	$\overline{O-C}$	$\overline{E}$	
	36404.3850	pe	Br	+0.0033	+19948			
1959	36681.8780	pe	HL[2]	+0.0019	+21815	+0.0020	+22053	10
	36694.8097	pe	HL[2]	+0.0026	+21902			
	36695.7010	pe	HL	+0.0021	+21908			
	36696.7410	pe	HL	+0.0017	+21915			
	36703.7267	pe	HL[2]	+0.0018	+21962			
	36704.7676	pe	HL[2]	+0.0022	+21969			
	36730.4806	pe	Br	+0.0020	+22142			
	36733.7500	pe	HL	+0.0016	+22164			
	36747.7226	pe	HL[2]	+0.0028	+22258			
	36782.6496	pe	HL[2]	+0.0015	+22493			
1960	37075.4538	pe	Br	+0.0022	+24463	+0.0022	+24463	1
1964	38476.0061	pe	FA[2]	+0.0027	+33886	+0.0027	+33886	1
1966	39252.9024	pe	Ep[2]	+0.0037	+39113	+0.0037	+39113	1
1972	41508.3797	pe	Pp	+0.0026	+54288	+0.0026	+54288	1
1973	41840.4222	pe	GH	+0.0030	+56522	+0.0030	+56522	1
1977	43341.7445	pe	BE	+0.0015	+66623	+0.0015	+66623	1
1979	44050.4181	pe	Pp	+0.0015	+71391	+0.0015	+71391	1

Remarks to Table 6: Pp = Present paper; As = Ashbrook (1954); BM = Broglia and Masani (1955); Sm = Smith (Ashbrook, 1954); LD= Lenouvel and Daguillon (1954); Al = Alania (1954); Fi = Fitch (1957); Sp= Spinrad (1959); Br= Broglia (1961); HL = Hardie and Lott (1961); FA = Fitch et al. (1966); Ep = Epstein (1969); GH = Geyer and Hoffmann (1974); BE=Breger et al. (1978); [1] = given by Ashbrook (1954); [2] = determined by us

Mean O–C value and mean epoch number were formed for each observing season separately; these are given in Table 6 under the headings $\overline{O-C}$ and $\overline{E}$ and are plotted in Figure 6. Then the yearly mean epochs of the observed photographic and photoelectric light maxima were calculated (Table 7). The photoelectric data were used only to carry out a second order least-squares solution which resulted in the ephemeris:

$$C_{qr} = \text{J.D. } 2433\ 439.4865 \underset{\pm.0002}{} + 0^d.148\ 631\ 353 \underset{\pm 14}{}\cdot E - 18^d.6 \underset{\pm 1.9}{}\times 10^{-13}\cdot E^2.$$

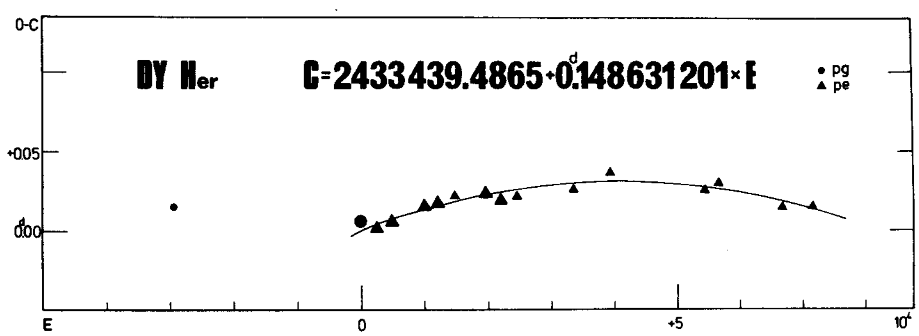

Figure 6: O–C diagram of DY Her

Table 7

Mean photographic and photoelectric maxima of DY Her

year	J.D.max.hel.		W	E	O-C	$O-C_{qr}$
1938	2429068.3930	pg	0	-29409	+0.0015	-
1950	33458.0660	pg	0	+ 125	+0.0006	+0.0006
1951	33786.2433	pe	2	+ 2333	+0.0002	-0.0001
1952	34144.7421	pe	2	+ 4745	+0.0006	-0.0001
1954	34925.2056	pe	2	+ 9996	+0.0016	+0.0003
1955	35244.4655	pe	2	+12144	+0.0017	+0.0001
1956	35627.3400	pe	1	+14720	+0.0022	+0.0004
1958	36351.1741	pe	2	+19590	+0.0024	+0.0001
1959	36717.2524	pe	2	+22053	+0.0020	-0.0004
1960	37075.4538	pe	1	+24463	+0.0022	-0.0004
1964	38476.0061	pe	1	+33886	+0.0027	-0.0003
1966	39252.9024	pe	1	+39113	+0.0037	+0.0006
1972	41508.3797	pe	1	+54288	+0.0026	-0.0002
1973	41840.4222	pe	1	+56522	+0.0030	+0.0003
1977	43341.7445	pe	1	+66623	+0.0015	-0.0004
1979	44050.4181	pe	1	+71391	+0.0015	+0.0002

The deviations $O-C_{qr}$ are within the observational errors therefore the continuous decrease of the period in the time interval covered by photoelectric observations (1951-1979) can be taken for certain, and the rate of period decrease is -37.2×10^{-13} day cycle^{-1}. In this context we are reminded of *Fitch*'s (1957), *Broglia*'s (1861) and *Hardie*'s and *Lott*'s (1961) result. They found a period increase if they took into account the visual observations. These contradictory results also prove clearly that the visual observations of dwarf cepheids are of inadequate precision and useless in a more refined period analysis.

Our photographic observations of the year 1938 show that the period of DY Her behaved in a different way before 1951 than after it. Our single photographic maximum (the only one before 1950) is not sufficient to trace the behaviour of the period of this variable up to 1950.

GENERAL REMARKS

The O-C diagram of both metal rich variables YZ Boo ($\Delta s = 0$, *Preston*, 1959) and DY Her (*McNamara*, 1978) indicates that the periods of these stars are changing continuously at a constant rate. The period of YZ Boo has been increasing, whereas the period of DY Her has shown a definite continuous decrease during the time interval covered by photoelectric observations. EH Lib, the third metal rich variable (investigated in our previous paper) has a constant period. Although the sample of stars investigated is too small, the following statement seems to be reasonable. The continuous change in or the constancy of the period may be characteristic of the population I dwarf cepheids. It may also be interesting to note that the scatter of the points on the O-C diagram of these three stars does not exceed the observational error.

XX Cyg, the third star studied in this paper is metal poor (*McNamara* and *Feltz*, 1980). The abrupt change in its period is conspicuous. The other metal poor dwarf cepheids, CY Aqr and DY Peg were studied in our previous paper. CY Aqr also exhibited and DY Peg seemed to show abrupt change in their respective periods. It is also remarkable that the periods are not stable, they show small fluctuations, too. The abrupt changes in the period of metal poor dwarf cepheids may be due to mixing in the semiconvective zone as suggested by *Sweigart* and *Renzini* (1979). In this context it is also interesting to note, that the period noise of the three investigated metal poor variables is larger than that of the metal rich dwarf cepheids.

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Budapest - Szabadsaghegy, 8 March 1981

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Table 8

Photoelectric yellow observations of YZ Boo

J.D.	ΔV	J.D.	ΔV	J.D.	ΔV	J.D.	ΔV
2436709		2436712		2436713		2436714	
.4952	+0.568	.4194	+0.634	.3799	+0.549	.4465	+0.286
.4973	.566	.4215	.650	.3815	.544	.4509	.347
.4994	.579	.4257	.642	.3849	.464	.4530	.357
.5039	.590	.4278	.661	.3866	.426	.4550	.379
.5059	.624	.4298	.647	.3881	.387	.4614	.411
.5080	.621	.4350	.649	.3915	.342	.4635	.426
.5132	.627	.4371	.637	.3932	.289	.4677	.442
.5153	.632	.4392	.635	.3948	.257	.4697	.439
.5191	.642	.4441	.595	.3967	.218	.4718	.456
.5233	.641	.4517	.431	.3987	.204	.4760	.490
.5254	.625	.4559	.318	.4029	.248	.4781	.496
.5275	.598	.4580	.270	.4049	.276	.4802	.512
.5320	.576	.4600	.237	.4066	.287	.4854	.569
.5341	.533	.4642	.209	.4105	.316	.4875	.590
.5362	.497	.4663	.234	.4165	.340	.4895	.619
.5431	.354	.4684	.242	.4179	.360	.4937	.627
.5452	.300	.4725	.282	.4202	.358	.4958	.651
.5494	.246	.4746	.300	.4248	.397	.4979	.650
.5514	.232	.4767	.338	.4267	.409	.5020	.657
.5535	.239	.4809	.371	.4290	.446	.5041	.655
.5577	.270	.4833	.386	.4336	.471	.5062	.660
.5598	.298	.4854	.413	.4359	.482	.5125	.659
.5619	.309	.4909	.434	.4378	.539	.5145	.665
.5660	.363	.4937	.446	.4420	.551	.5187	.661
.5681	+0.398	.4965	.476	.4443	.558	.5208	.652
		.5026	.512	.4461	.588	.5229	.657
2436712		.5050	.537	.4528	.633	.5281	.584
.3493	+0.322	.5078	.541	.4547	.638	.5302	.506
.3534	.229	.5149	.595	.4563	.644	.5322	.465
.3597	.208	.5174	.632	.4820	.637	.5353	.401
.3618	.241	.5202	.639	.4864	.563	.5366	.382
.3639	.248	.5264	.641	.4885	.468	.5380	.334
.3680	.271	.5291	.641	.4900	.450	.5408	.281
.3701	.276	.5320	.659	.4937	.369	.5422	.262
.3722	.296	.5381	.646	.4954	.298	.5436	+0.237
.3764	.335	.5408	.638	.4970	.278		
.3784	.351	.5507	.514	.5002	.231	2436716	
.3805	.391	.5530	.458	.5019	.212	.3269	+0.333
.3847	.411	.5581	.322	.5037	.205	.3293	.365
.3868	.467	.5602	.291	.5053	.215	.3344	.397
.3889	.483	.5623	+0.257	.5070	+0.233	.3366	.408
.3930	.500					.3387	.422
.3951	.493	2436713		2436714		.3436	.454
.3972	.526	.3494	+0.587	.4221	+0.540	.3456	.487
.4014	.559	.3542	.593	.4255	.470	.3477	.501
.4028	.560	.3561	.604	.4272	.459	.3519	.529
.4048	.581	.3637	.628	.4311	.348	.3540	.544
.4090	.574	.3667	.636	.4336	.277	.3561	.568
.4111	.575	.3711	.635	.4365	.230	.3602	.603
.4132	.593	.3751	.622	.4418	.234	.3623	.625
.4173	+0.613	.3783	+0.582	.4444	+0.262	.3644	+0.637

Table 8 (cont.)

Photoelectric yellow observations of YZ Boo

J.D.	ΔV	J.D.	ΔV	J.D.	ΔV	J.D.	ΔV
2436716		2436717		2436724		2436725	
.3717	+0.664	.3455	+0.351	.4244	+0.327	.3473	+0.546
.3741	.666	.3488	.282	.4275	.277	.3509	.514
.4012	.562	.3506	.248	.4293	.257	.3529	.467
.4043	.459	.3525	.231	.4312	.231	.3545	.450
.4064	.416	.3567	.225	.4344	.212	.3578	.399
.4106	.314	.3588	.227	.4358	.206	.3591	.383
.4127	.297	.3609	.266	.4372	.225	.3612	.318
.4147	.244	.3650	.292	.4404	.263	.3642	.287
.4189	.223	.3665	.307	.4454	.309	.3656	.269
.4210	.227	.3685	.323	.4475	.331	.3670	.223
.4231	.258	.3727	.374	.4513	.357	.3698	.222
.4272	.300	.3748	+0.425	.4534	.383	.3712	.223
.4293	.307			.4555	.412	.3726	.220
.4314	.318	2436723		.4603	.450	.3754	.235
.4363	.356	.4444	+0.570	.4624	.479	.3767	.239
.4383	.375	.4486	.585	.4645	.499	.3784	.247
.4404	.387	.4507	.623	.4694	.503	.3814	.311
.4446	.435	.4548	.636	.4714	.522	.3828	.329
.4522	.502	.4569	.634	.4735	.520	.3841	.346
.4543	.518	.4590	.631	.4784	.554	.3869	.360
.4585	.574	.4632	.636	.4805	.563	.3883	.389
.4606	.582	.4652	.631	.4825	.571	.3954	.455
.4627	.594	.4673	.639	.4874	.589	.3981	.458
.4668	.627	.4715	.625	.4895	.595	.4002	.461
.4689	.640	.4736	.599	.4916	.607	.4044	.508
.4710	.652	.4757	.584	.4964	.623	.4065	.532
.4752	.668	.4798	.510	.4985	.634	.4086	.535
.4772	.677	.4819	.465	.5006	.636	.4127	.538
.4793	.681	.4840	.430	.5051	.638	.4148	.550
.4835	.694	.4882	.312	.5072	.639	.4169	.578
.4856	.697	.4902	.282	.5093	.637	.4211	.600
.4943	.701	.4923	.264	.5147	.625	.4231	.613
.4988	.692	.4968	.239	.5161	.593	.4252	.622
.5006	.681	.4989	.223	.5175	.573	.4294	.621
.5025	.638	.5010	.226	.5203	.543	.4315	.624
.5055	.588	.5100	.334	.5217	.531	.4336	.635
.5069	.538	.5142	.355	.5231	.491	.4377	.644
.5082	.504	.5166	+0.353	.5258	.424	.4398	.652
.5115	.439			.5272	.398	.4416	.648
.5129	.396	2436724		.5286	.376	.4457	.641
.5143	.341	.4006	+0.610	.5314	.298	.4478	.620
.5170	.291	.4043	.603	.5328	.264	.4499	.610
.5184	.256	.4057	.594	.5342	.237	.4529	.586
.5198	.239	.4089	.588	.5369	.232	.4543	.572
.5240	.229	.4106	.578	.5383	.227	.4557	.555
.5282	.243	.4119	.564	.5397	.235	.4585	.505
.5295	.262	.4154	.536	.5425	.248	.4598	.477
.5309	.271	.4168	.500	.5439	.253	.4612	.458
.5337	.330	.4184	.461	.5453	.272	.4647	.400
.5351	.367	.4217	.397	.5481	.295	.4661	.354
.5365	+0.388	.4231	+0.364	.5503	+0.309	.4675	+0.312

Table 8 (cont.)

Photoelectric yellow observations of YZ Boo

J.D.	ΔV
2436725	
.4703	+0.246
.4716	.241
.4730	.231
.4758	.253
.4779	.272
.4793	.283
.4828	.306
.4841	.319
.4855	.324
.4883	+0.365
2441860	
.3875	+0.625
.3882	.615
.3899	.622
.3906	.607
.3924	.605
.3938	.598
.3951	.579
.3965	.563
.3982	.518
.4010	.457
.4021	.439
.4038	.404
.4066	.334
.4077	.314
.4093	.281
.4100	.264
.4118	.239
.4128	.218
.4146	.206
.4153	.211
.4174	.208
.4181	.211
.4204	.233
.4215	.247
.4239	.270
.4264	.307
.4271	.318
.4292	.343
.4302	.362
.4319	.387
.4329	+0.403
2442187	
.4478	+0.593
.4496	.550
.4545	.477
.4559	.460
.4568	.431
.4577	+0.413
2442187	
.4613	+0.320
.4623	.294
.4630	.279
.4638	.266
.4646	.250
.4654	.238
.4662	.209
.4672	.196
.4681	.195
.4692	.190
.4700	.198
.4707	.207
.4753	.235
.4761	.235
.4769	.238
.4778	.243
.4913	.337
.4929	.340
.4940	.349
.5021	.426
.5029	.442
.5038	.446
.5047	.453
.5057	+0.477
2442464	
.5606	+0.206
.5620	.195
.5648	.198
.5662	.214
.5711	.270
.5738	.295
.5749	.316
.6190	.598
.6207	.600
.6238	.601
.6248	.593
.6280	.621
.6294	.605
.6322	.603
.6377	.608
.6408	.595
.6440	.595
.6481	.540
.6502	.512
.6544	.429
.6572	.351
.6582	.322
.6606	.278
.6620	.245
.6648	+0.200
2442464	
.6662	+0.186
.6683	.206
.6693	.198
.6724	.229
.6734	.238
.6764	.276
.6778	.311
.6797	.335
.6811	+0.344
2442522	
.4057	+0.624
.4067	.619
.4091	.625
.4100	.598
.4141	.584
.4182	.564
.4215	.511
.4225	.487
.4249	.422
.4288	.352
.4344	.224
.4372	.193
.4386	.212
.4467	.281
.4477	.294
.4638	.448
.4648	.453
.4675	.483
.4691	+0.506
2442523	
.4132	+0.469
.4169	.519
.4184	.534
.4214	.542
.4259	.568
.4314	.599
.4348	.599
.4419	.660
.4447	.631
.4460	.647
.4493	.669
.4506	.663
.4538	.622
.4548	.622
.4617	.518
.4629	.458
.4655	.400
.4668	.374
.4789	+0.186
2442523	
.4822	+0.211
.4838	.233
.4875	.297
.4918	.312
.4942	.336
.4952	+0.348
2442524	
.4190	+0.181
.4204	.189
.4228	.243
.4276	.309
.4290	.318
.4321	.343
.4336	.370
.4378	.393
.4392	.411
.4422	.434
.4434	.436
.4474	.452
.4488	.458
.4522	+0.480
2443936	
.5305	+0.233
.5315	.235
.5333	.286
.5343	.287
.5364	.319
.5371	.330
.5392	.339
.5399	.339
.5420	.370
.5427	.383
.5440	.390
.5475	.440
.5486	.448
.5503	.450
.5513	.471
.5534	.466
.5541	.461
.5562	.476
.5572	.491
.5593	.483
.5604	.484
.5621	.503
.5628	.513
.5649	.517
.5656	.520
.5677	.521
.5683	+0.540

Table 8 (cont.)

Photoelectric yellow observations of YZ Boo

J.D.	ΔV	J.D.	ΔV	J.D.	ΔV	J.D.	ΔV
2443936		2443936		2443936		2443936	
.5704	+0.562	.5878	+0.634	.6128	+0.418	.6274	+0.173
.5711	.571	.5888	.639	.6145	.368	.6288	.174
.5729	.582	.5906	.655	.6152	.344	.6295	.187
.5739	.581	.5920	.650	.6190	.265	.6326	.233
.5760	.600	.5933	.642	.6197	.222	.6374	.290
.5784	.605	.5947	.633	.6211	.202	.6381	.297
.5795	.603	.6038	.632	.6222	.186	.6399	.307
.5815	.605	.6055	.592	.6236	.183	.6409	.325
.5829	.612	.6062	.568	.6246	.160	.6433	.342
.5847	.607	.6090	.513	.6263	+0.168	.6444	+0.360
.5857	+0.617	.6114	+0.453				

Table 9

Photoelectric blue observations of YZ Boo

J.D.	ΔB	J.D.	ΔB	J.D.	ΔB	J.D.	ΔB
2436709		2436712		2436712		2436713	
.4962	+0.244	.3607	−0.203	.4548	−0.075	.3484	+0.226
.4983	.240	.3670	.161	.4569	.143	.3533	.255
.5004	.246	.3691	.150	.4590	.171	.3552	.271
.5049	.266	.3712	.139	.4632	.202	.3596	.296
.5070	.268	.3753	.059	.4653	.214	.3703	.280
.5091	.269	.3774	.018	.4673	.195	.3722	.276
.5143	.278	.3795	−0.003	.4715	.173	.3743	.261
.5181	.290	.3837	+0.055	.4736	.160	.3774	.229
.5202	.291	.3857	.067	.4757	.147	.3791	.183
.5244	.249	.3878	.075	.4819	−0.013	.3807	.167
.5264	.224	.3920	.134	.4843	0.000	.3842	.099
.5285	.200	.3941	.159	.4896	+0.034	.3857	.057
.5330	.158	.3962	.180	.4923	.058	.3874	+0.014
.5351	.122	.4003	.221	.4951	.092	.3908	−0.081
.5372	+0.086	.4017	.226	.5012	.139	.3923	.098
.5421	−0.036	.4038	.237	.5034	.165	.3940	.149
.5441	.119	.4080	.241	.5063	.179	.3958	.172
.5462	.178	.4100	.235	.5161	.248	.3977	.191
.5504	.215	.4121	.240	.5190	.298	.4017	.176
.5525	.208	.4163	.263	.5251	.314	.4039	.160
.5546	.187	.4184	.298	.5278	.306	.4057	.147
.5587	.169	.4205	.307	.5305	.288	.4096	.113
.5608	.147	.4246	.308	.5367	.298	.4144	.074
.5629	.090	.4267	.315	.5394	.277	.4172	−0.059
.5671	.048	.4288	.331	.5420	.265	.4234	+0.017
.5691	−0.015	.4340	.316	.5495	.129	.4258	.039
		.4361	.290	.5520	+0.068	.4276	.061
2436712		.4382	.289	.5570	−0.065	.4325	.123
.3503	−0.092	.4430	.219	.5592	.150	.4350	.130
.3545	.203	.4486	.098	.5612	−0.189	.4369	.138
.3587	−0.226	.4507	+0.046			.4408	+0.154

Table 9 (cont.)

Photoelectric blue observations of YZ Boo

J.D.	ΔB
2436713	
.4434	+0.180
.4450	.180
.4538	.271
.4593	.288
.4851	.178
.4876	.136
.4893	+0.091
.4928	0.000
.4945	−0.084
.4962	.114
.4993	.197
.5011	.221
.5028	.213
.5045	.219
.5062	−0.211
2436714	
.4211	+0.225
.4245	.129
.4263	+0.083
.4301	−0.038
.4324	.134
.4347	.186
.4409	.203
.4432	.189
.4456	.152
.4500	.136
.4520	.119
.4540	.077
.4586	.045
.4604	−0.020
.4625	+0.006
.4666	.050
.4687	.061
.4708	.077
.4750	.125
.4770	.134
.4791	.157
.4843	.222
.4864	.229
.4885	.236
.4927	.268
.4947	.284
.4968	.301
.5010	.302
.5031	.304
.5052	.307
.5093	.287
.5114	.286
.5135	.290
.5177	+0.285

J.D.	ΔB
2436714	
.5197	+0.276
.5218	.279
.5270	.212
.5291	.148
.5312	.101
.5346	+0.019
.5359	−0.015
.5373	.060
.5401	.116
.5415	.140
.5429	−0.164
2436716	
.3258	−0.120
.3281	.095
.3331	.051
.3356	−0.022
.3377	+0.016
.3422	.056
.3446	.062
.3467	.079
.3508	.136
.3529	.152
.3550	.155
.3592	.228
.3613	.249
.3633	.249
.3675	.276
.3699	.301
.3731	.297
.4002	.198
.4033	.091
.4054	+0.040
.4095	−0.094
.4116	.139
.4137	.186
.4179	.204
.4199	.203
.4220	.177
.4262	.153
.4283	.110
.4304	.097
.4352	.057
.4373	.047
.4394	−0.035
.4436	+0.019
.4512	.095
.4533	.107
.4574	.142
.4595	.155
.4616	+0.170

J.D.	ΔB
2436716	
.4658	+0.236
.4679	.248
.4699	.261
.4741	.282
.4762	.291
.4783	.294
.4824	.303
.4845	.306
.4932	.320
.4977	.313
.4997	.282
.5015	.251
.5048	.185
.5062	.150
.5076	.109
.5108	+0.025
.5122	−0.017
.5136	.079
.5164	.139
.5177	.183
.5191	.206
.5219	.211
.5233	.210
.5247	.206
.5275	.183
.5302	.169
.5330	.142
.5344	.131
.5358	−0.097
2436717	
.3434	+0.046
.3448	0.000
.3478	−0.132
.3497	.167
.3515	.216
.3555	.216
.3578	.214
.3599	.191
.3640	.159
.3656	.139
.3675	.119
.3719	.044
.3738	−0.027
.3758	+0.022
2436723	
.4434	+0.263
.4475	.263
.4496	.279
.4538	+0.270

J.D.	ΔB
2436723	
.4559	+0.291
.4579	.294
.4621	.291
.4642	.281
.4663	.290
.4704	.270
.4725	.256
.4746	.233
.4788	.139
.4809	.097
.4829	+0.063
.4871	−0.066
.4892	.116
.4913	.167
.4954	.206
.4979	.209
.5000	.212
.5045	.169
.5069	.129
.5090	.099
.5132	.064
.5152	−0.032
2436724	
.3996	+0.284
.4036	.264
.4050	.257
.4082	.248
.4099	.236
.4113	.230
.4147	.186
.4161	.164
.4175	.112
.4210	+0.035
.4224	−0.018
.4238	.050
.4268	.106
.4286	.163
.4302	.190
.4337	.206
.4351	.210
.4365	.210
.4397	.180
.4446	.125
.4464	.109
.4503	.062
.4523	−0.026
.4544	+0.007
.4593	.038
.4614	.065
.4634	+0.092

Table 9 (cont.)

Photoelectric blue observations of YZ Boo

J.D.	ΔB	J.D.	ΔB	J.D.	ΔB	J.D.	ΔB
2436724		2436725		2441860		2442187	
.4683	+0.126	.3774	-0.171	.3920	+0.244	.4934	-0.013
.4704	.160	.3791	.128	.3931	.230	.4943	-0.011
.4725	.179	.3821	.074	.3947	.214	.4953	+0.002
.4773	.216	.3835	.070	.3958	.196	.5025	.077
.4794	.219	.3848	.056	.3979	.137	.5033	.092
.4815	.232	.3876	-0.012	.4007	.082	.5042	.097
.4864	.251	.3968	+0.067	.4035	+0.013	.5051	.097
.4884	.260	.3992	.082	.4042	-0.014	.5064	+0.111
.4905	.275	.4034	.125	.4063	.081		
.4954	.290	.4054	.151	.4070	.096	2442464	
.4975	.305	.4075	.165	.4090	.156	.5599	-0.222
.4996	.319	.4117	.170	.4097	.167	.5613	.234
.5041	.322	.4138	.176	.4114	.208	.5655	.215
.5062	.321	.4159	.206	.4125	.212	.5690	.182
.5082	.320	.4200	.231	.4139	.218	.5704	-0.181
.5140	.296	.4221	.244	.4149	.222	.6183	+0.265
.5154	.264	.4242	.254	.4167	.213	.6200	.268
.5168	.238	.4284	.258	.4177	.212	.6231	.285
.5196	.179	.4304	.268	.4201	.202	.6241	.295
.5210	.168	.4325	.280	.4208	.195	.6273	.276
.5224	.132	.4367	.289	.4229	.179	.6287	.275
.5251	.076	.4388	.299	.4236	.173	.6315	.288
.5265	+0.013	.4409	.291	.4257	.147	.6329	.283
.5279	-0.009	.4447	.276	.4267	.137	.6356	.281
.5307	.071	.4468	.266	.4299	.093	.6370	.281
.5321	.119	.4488	.243	.4316	.069	.6391	.269
.5335	.157	.4522	.234	.4326	-0.060	.6401	.255
.5363	.203	.4536	.217			.6433	.238
.5376	.206	.4550	.190	2442187		.6495	.120
.5390	.213	.4578	.130	.4483	+0.261	.6537	+0.029
.5418	.198	.4591	.102	.4501	.240	.6565	-0.034
.5432	.189	.4605	+0.088	.4554	.117	.6575	.077
.5446	.160	.4640	-0.017	.4563	.092	.6599	.159
.5474	.132	.4654	.045	.4573	.061	.6613	.173
.5489	-0.104	.4668	.098	.4580	+0.033	.6641	.213
		.4696	.188	.4618	-0.086	.6655	.223
2436725		.4710	.205	.4626	.111	.6676	.227
.3482	+0.216	.4723	.209	.4635	.134	.6690	.226
.3519	.155	.4758	.212	.4642	.160	.6717	.195
.3536	.118	.4772	.186	.4651	.186	.6731	.185
.3554	.081	.4786	.162	.4658	.208	.6759	.149
.3585	+0.010	.4821	.130	.4666	.219	.6771	.146
.3598	-0.040	.4835	.127	.4676	.221	.6794	.109
.3619	.084	.4848	.125	.4686	.240	.6804	-0.098
.3649	.136	.4876	-0.087	.4704	.230		
.3663	.181			.4710	.216	2442522	
.3677	.208	2441860		.4756	.169	.4050	+0.262
.3705	.219	.3871	+0.280	.4766	.164	.4062	.253
.3719	.208	.3878	.267	.4773	.162	.4087	.252
.3733	.222	.3896	.256	.4781	.155	.4096	.248
.3760	-0.199	.3903	+0.251	.4925	-0.027	.4135	+0.233

Table 9 (cont.)

Photoelectric blue observations of YZ Boo

J.D.	ΔB	J.D.	ΔB	J.D.	ΔB	J.D.	ΔB
2442522		2442523		2443936		2443936	
.4187	+0.171	.4455	+0.269	.5302	−0.189	.5864	+0.270
.4210	.127	.4485	.258	.5308	.192	.5885	.257
.4220	.103	.4533	.229	.5329	.177	.5892	.263
.4244	+0.055	.4542	.247	.5367	.135	.5913	.279
.4283	−0.048	.4567	.178	.5388	.087	.5923	.271
.4292	.100	.4579	.166	.5395	.079	.5940	.273
.4323	.176	.4611	.105	.5413	.051	.6017	.238
.4336	.208	.4649	+0.027	.5423	.052	.6052	.193
.4366	.240	.4698	−0.107	.5440	.027	.6058	.186
.4410	.220	.4730	.201	.5447	−0.009	.6086	.118
.4420	.198	.4744	.245	.5468	+0.034	.6107	.062
.4507	.126	.4769	.251	.5482	.045	.6121	+0.034
.4556	.061	.4782	.232	.5531	.085	.6149	−0.031
.4566	.040	.4812	.228	.5538	.082	.6163	.081
.4598	−0.009	.4830	.207	.5558	.094	.6170	.111
.4607	+0.012	.4859	.184	.5565	.102	.6183	.152
.4631	.027	.4910	.138	.5586	.113	.6194	.201
.4643	.051	.4936	.085	.5600	.131	.6208	.230
.4667	.058	.4948	−0.075	.5614	.159	.6218	.237
.4681	+0.076			.5624	.159	.6232	.245
		2442524		.5645	.167	.6239	.241
2442523		.4183	−0.252	.5652	.162	.6260	.249
.4097	+0.119	.4197	.232	.5670	.166	.6267	.251
.4126	.126	.4266	.161	.5680	.174	.6284	.241
.4137	.148	.4283	.125	.5701	.200	.6291	.249
.4163	.149	.4313	.120	.5708	.206	.6315	.233
.4176	.177	.4329	.082	.5725	.212	.6322	.219
.4222	.184	.4364	−0.014	.5732	.212	.6340	.207
.4252	.220	.4385	+0.009	.5753	.227	.6350	.207
.4265	.238	.4412	.033	.5767	.250	.6371	.179
.4296	.236	.4429	.025	.5788	.253	.6378	.167
.4308	.242	.4464	.064	.5798	.255	.6392	.134
.4341	.237	.4482	.091	.5822	.270	.6406	.121
.4398	.235	.4530	+0.138	.5833	.271	.6427	.097
.4412	+0.259			.5850	+0.272	.6440	−0.075

Table 10

Photographic observations of XX Cyg

J.D.	m_{pg}	J.D.	m_{pg}	J.D.	m_{pg}	J.D.	m_{pg}
2433538		2433538		2433538		2433538	
.3369	11.61	.3619	11.82	.3932	12.28	.4265	12.43
.3397	11.61	.3702	12.06	.3959	12.14	.4293	12.47
.3425	11.48	.3730	12.01	.3987	12.21	.4320	12.46
.3480	11.63	.3758	12.12	.4098	12.29	.4376	12.37
.3536	11.84	.3814	12.06	.4154	12.28	.4404	12.33
.3564	11.74	.3876	12.16	.4182	12.38	.4439	12.32
.3591	11.80	.3904	12.10	.4209	12.33	.4466	12.28

Table 10 (cont.)

Photographic observations of XX Cyg

J.D.	m_{pg}	J.D.	m_{pg}	J.D.	m_{pg}	J.D.	m_{pg}
2433538		2434150		2434576		2434576	
.4494	12.15	.4626	12.32	.3562	12.54	.4006	11.58
.4522	12.17	.4675	12.23	.3589	12.40	.4034	11.68
.4550	12.15	.4702	12.16	.3617	12.43		
.4578	12.03	.4730	11.98	.3645	12.35	2435035	
.4605	11.90	.4758	11.97	.3673	12.39	.3236	12.16
.4633	11.60	.4786	11.70	.3700	12.30	.3264	11.93
.4661	11.55	.4814	11.56	.3728	12.22	.3292	11.65
.4689	11.47	.4841	11.47	.3756	12.10	.3319	11.52
.4723	11.52	.4869	11.48	.3784	12.03	.3347	11.51
.4751	11.54	.4897	11.48	.3812	11.92	.3375	11.47
.4779	11.63	.4925	11.45	.3839	11.71	.3431	11.48
.4807	11.55	.4952	11.53	.3867	11.48	.3458	11.55
		.4980	11.63	.3895	11.46	.3486	11.57
2434150		.5008	11.63	.3923	11.45	.3514	11.60
.4571	12.39	.5064	11.75	.3950	11.44	.3545	11.68
.4598	12.30	.5091	11.80	.3978	11.49		

Table 11

Photoelectric yellow observations of XX Cyg

J.D.	ΔV	J.D.	ΔV	J.D.	ΔV	J.D.	ΔV
2436403		2436403		2436456		2436815	
.3936	+0.219	.5030	+0.351	.4001	+0.004	.4216	−0.441
.3964	+0.039	.5065	.333	.4032	−0.232	.4232	.439
.3989	−0.073	.5089	.367	.4050	.377	.4271	.405
.4013	.252	.5114	.421	.4069	.416	.4293	.419
.4051	.356	.5144	.343	.4103	.435	.4311	.370
.4077	.484	.5235	.267	.4117	.430	.4345	.319
.4107	.464	.5258	.158	.4136	.423	.4387	.294
.4151	.376	.5294	+0.028	.4173	.408	.4405	.266
.4184	.354	.5319	−0.048	.4210	.350	.4443	.189
.4260	.252	.5343	.164	.4247	.284	.4460	.163
.4284	.192	.5365	.285	.4265	.235	.4479	.079
.4312	.149	.5397	.379	.4284	.199	.4522	.056
.4334	.114	.5420	.498	.4341	.137	.4542	−0.003
.4366	.060	.5443	.516	.4360	.115	.4563	+0.012
.4388	.014	.5475	.448	.4379	.098	.4604	.054
.4409	−0.025	.5495	.371	.4418	.088	.4625	.023
.4445	+0.020	.5519	.327	.4437	.075	.4646	.056
.4488	.072	.5544	−0.309	.4455	.053	.4698	.099
.4509	.078			.4492	.045	.4722	.155
.4546	.116	2436456		.4511	−0.024	.4743	.151
.4568	.174	.3865	+0.334	.4529	+0.026	.4792	.192
.4595	.178	.3902	.227			.4813	.181
.4639	.207	.3920	.231	2436815		.4833	.207
.4690	.214	.3939	.196	.4165	−0.345	.4875	.231
.4717	.225	.3972	.153	.4189	.392	.4896	.226
.4815	+0.267	.3987	+0.036	.4200	−0.415	.4917	+0.199

Table 11 (cont.)

Photoelectric yellow observations of XX Cyg

J.D.	ΔV	J.D.	ΔV	J.D.	ΔV	J.D.	ΔV
2436815		2436844		2441538		2441538	
.4958	+0.233	.2750	−0.241	.4150	−0.331	.5340	−0.446
.4979	.232	.2765	.334	.4164	.310	.5361	.443
.5000	.226	.2771	.367	.4192	.203	.5368	.422
.5046	.315	.2777	.413	.4206	.192	.5385	.417
.5099	.312	.2783	.399	.4247	.091	.5392	.421
.5129	.297	.2790	.415	.4317	.054	.5421	.398
.5144	.319	.2796	.432	.4331	.037	.5435	.387
.5158	.340	.2802	.430	.4358	.026	.5463	.336
.5172	.341	.2816	.427	.4372	−0.015	.5477	−0.320
.5202	.403	.2822	.435	.4400	+0.036		
.5215	.397	.2828	.417	.4414	.044	2442278	
.5229	.328	.2835	.429	.4442	.049	.3692	+0.370
.5260	.318	.2841	.424	.4456	.087	.3703	.373
.5274	.357	.2849	.417	.4483	.099	.3724	.394
.5289	.392	.2871	.429	.4539	.126	.3779	.381
.5318	.328	.2877	.420	.4567	.136	.3791	.362
.5333	.270	.2882	.408	.4581	.140	.3803	.335
.5347	.260	.2888	.404	.4608	.141	.3814	.301
.5377	.204	.2893	−0.397	.4622	.172	.3823	.299
.5392	.133	.3990	+0.282	.4650	.152	.3885	.166
.5407	.107	.4009	.185	.4692	.207	.3896	.146
.5435	+0.049	.4022	.145	.4706	.195	.3905	.104
.5448	−0.055	.4029	.139	.4733	.189	.3916	+0.047
.5463	.095	.4034	.136	.4747	.247	.3926	−0.030
.5490	.242	.4040	.113	.4775	.235	.3936	.144
.5503	.330	.4045	.105	.4789	.253	.3948	.233
.5516	.394	.4051	.069	.4817	.263	.3959	.291
.5528	.456	.4056	+0.060	.4831	.257	.3979	.376
.5556	.503	.4069	−0.014	.4858	.263	.3990	.401
.5572	.516	.4073	.025	.4872	.281	.4000	.434
.5603	.492	.4078	.038	.4914	.266	.4009	.431
.5636	.452	.4083	.100	.4942	.291	.4020	.425
.5654	−0.382	.4087	.149	.4956	.315	.4031	.412
		.4093	.172	.4982	.278	.4044	.414
2436844		.4101	.237	.4996	.283	.4091	.333
.2640	+0.216	.4115	.328	.5039	.276	.4101	.318
.2645	.203	.4120	.344	.5067	.300	.4114	.312
.2652	.206	.4126	.370	.5108	.250	.4126	.314
.2658	.178	.4132	.415	.5146	.182	.4137	.293
.2664	.151	.4137	.427	.5178	.153	.4214	.199
.2676	.131	.4142	.453	.5205	+0.070	.4223	.174
.2685	.092	.4148	.456	.5212	−0.014	.4233	.147
.2693	.085	.4161	.461	.5229	.078	.4244	−0.139
.2699	.075	.4167	.468	.5236	.105		
.2705	+0.039	.4173	.447	.5254	.353	2444454	
.2719	−0.011	.4179	.450	.5261	.367	.4141	+0.386
.2725	.056	.4184	.455	.5278	.428	.4153	.401
.2730	.069	.4189	.444	.5285	.444	.4165	.385
.2736	.144	.4194	.433	.5306	.463	.4177	.395
.2740	.166	.4207	.431	.5313	.473	.4189	.369
.2745	−0.193	4212	−0.415	.5330	−0.469	.4202	+0.363

Table 11 (cont.)

Photoelectric yellow observations of XX Cyg

J.D.	ΔV	J.D.	ΔV	J.D.	ΔV	J.D.	ΔV
2444454		2444454		2444455		2444455	
.4214	+0.361	.4673	−0.280	.3793	+0.187	.4136	−0.252
.4226	.361	.4698	.194	.3805	+0.161	.4148	.241
.4238	.348	.4710	.175	.3867	−0.184	.4211	.121
.4255	.341	.4735	.110	.3879	.300	.4223	.089
.4365	.193	.4813	.034	.3892	.371	.4235	.098
.4377	.126	.4825	.038	.3904	.428	.4248	.066
.4389	.081	.4837	.011	.3916	.459	.4260	.041
.4401	+0.003	.4849	−0.008	.3928	.478	.4272	.047
.4413	−0.043	.4874	+0.022	.3941	.487	.4284	.041
.4425	.147	.4886	.037	.3953	.476	.4309	.023
.4438	.241	.4898	+0.053	.3965	.480	.4321	−0.005
.4450	.346			.3977	.468	.4380	+0.060
.4518	.460	2444455		.4039	.394	.4391	.074
.4530	.461	.3695	+0.336	.4050	.377	.4404	.107
.4542	.452	.3707	.340	.4063	.367	.4416	.117
.4555	.435	.3719	.340	.4075	.356	.4441	.114
.4567	.426	.3732	.329	.4087	.352	.4453	.112
.4579	.411	.3745	.323	.4100	.321	.4465	.119
.4592	.389	.3756	.278	.4112	.317	.4477	.141
.4604	.394	.3768	.260	.4124	−0.296	.4489	+0.150
.4661	−0.294	.3781	+0.225				

Table 12

Photoelectric blue observations of XX Cyg

J.D.	ΔB	J.D.	ΔB	J.D.	ΔB	J.D.	ΔB
2436403		2436403		2436403		2436456	
.3923	+0.027	.4558	−0.033	.5431	−0.784	.4201	−0.594
.3950	−0.099	.4579	+0.010	.5455	.721	.4238	.565
.3977	.198	.4607	.026	.5485	.671	.4256	.542
.4001	.345	.4655	.035	.5506	.638	.4275	.514
.4026	.614	.4829	.196	.5532	−0.629	.4327	.383
.4063	.709	.4860	.209			.4351	.308
.4091	.741	.4883	.199	2436456		.4370	.300
.4122	.710	.4916	.239	.3856	+0.206	.4409	.264
.4167	.643	.4956	.222	.3893	.148	.4427	.244
.4200	.583	.4986	.253	.3911	.133	.4446	.222
.4234	.500	.5015	.271	.3930	.102	.4483	.190
.4273	.398	.5076	.274	.3965	+0.071	.4502	.178
.4298	.411	.5129	.292	.3980	−0.039	.4520	−0.152
.4324	.355	.5224	.143	.3994	.134		
.4355	.261	.5246	.130	.4022	.403	2436815	
.4388	.195	.5268	+0.018	.4041	.497	.4160	−0.676
.4421	.166	.5306	−0.120	.4059	.649	.4183	.725
.4456	.138	.5329	.199	.4096	.708	.4194	.740
.4478	.131	.5355	.397	.4110	.720	.4208	.747
.4499	.078	.5386	.664	.4127	.699	.4224	.743
.4533	−0.051	.5406	−0.733	.4163	−0.656	.4262	−0.700

Table 12 (cont.)

Photoelectric blue observations of XX Cyg

J.D.	ΔB	J.D.	ΔB	J.D.	ΔB	J.D.	ΔB
2436815		2436815		2441538		2444454	
.4285	−0.674	.5549	−0.758	.5275	−0.717	.4193	+0.261
.4302	.634	.5564	.781	.5282	.752	.4218	.216
.4336	.534	.5580	.781	.5303	.778	.4250	.217
.4380	.480	.5598	.758	.5310	.787	.4259	+0.211
.4396	.429	.5629	.705	.5327	.782	.4369	−0.017
.4435	.383	.5646	−0.672	.5337	.770	.4381	.079
.4451	.351			.5354	.755	.4393	.175
.4470	.313	2441538		.5364	.728	.4405	.239
.4511	.233	.4143	−0.596	.5382	.727	.4417	.364
.4532	.200	.4157	.571	.5389	.707	.4429	.456
.4553	.194	.4185	.485	.5414	.672	.4442	.551
.4594	.170	.4199	.476	.5428	.659	.4454	.680
.4615	.135	.4226	.416	.5456	.615	.4522	.803
.4636	.126	.4240	.370	.5470	−0.587	.4534	.791
.4685	.088	.4268	.338			.4546	.799
.4712	.070	.4310	.264	2442278		.4559	.785
.4733	−0.018	.4324	.240	.3697	+0.271	.4571	.748
.4782	+0.012	.4393	.161	.3719	.277	.4583	.724
.4803	.024	.4435	.135	.3730	.273	.4596	.713
.4823	.031	.4449	.094	.3809	.262	.4608	.679
.4865	.019	.4476	.085	.3818	.219	.4665	.565
.4886	.047	.4532	−0.043	.3829	+0.132	.4677	.524
.4907	.068	.4560	+0.007	.3890	−0.001	.4689	.474
.4948	.125	.4574	+0.022	.3901	.068	.4702	.452
.4969	.159	.4601	0.000	.3911	.153	.4714	.392
.4990	.176	.4615	+0.031	.3921	.220	.4739	.366
.5032	.237	.4643	.059	.3931	.295	.4817	.230
.5089	.231	.4657	.051	.3942	.450	.4829	.231
.5122	.238	.4699	.098	.3953	.585	.4853	.224
.5136	.227	.4726	.122	.3964	.649	.4865	.181
.5151	.244	.4740	.106	.3974	.707	.4878	.167
.5165	.216	.4768	.133	.3995	.780	.4890	.172
.5195	.220	.4782	.145	.4004	.795	.4902	−0.145
.5209	.235	.4824	.163	.4015	.809		
.5222	.225	.4865	.153	.4026	.786	2444455	
.5252	.189	.4893	.176	.4038	.796	.3699	+0.232
.5267	.206	.4949	.166	.4049	.773	.3711	.215
.5282	.202	.4975	.186	.4096	.658	.3724	.205
.5310	.176	.5018	.184	.4120	.645	.3736	.208
.5325	.144	.5032	.211	.4131	.626	.3748	.162
.5340	.129	.5060	.193	.4143	.603	.3760	.142
.5369	.080	.5074	.134	.4218	.440	.3773	.092
.5384	.072	.5101	.088	.4228	.429	.3785	.074
.5400	+0.050	.5115	.075	.4238	.403	.3797	+0.013
.5429	−0.086	.5143	+0.050	.4249	−0.411	.3809	−0.031
.5442	.134	.5171	−0.025			.3871	.459
.5456	.252	.5198	.058	2444454		.3884	.588
.5484	.489	.5208	.181	.4145	+0.276	.3896	.688
.5496	.568	.5226	.313	.4157	.280	.3908	.728
.5510	.662	.5233	.372	.4169	.267	.3920	.773
.5522	−0.731	.5257	−0.637	.4181	+0.284	.3933	−0.778

Table 12 (cont.)

Photoelectric blue observations of XX Cyg

J.D.	ΔB	J.D.	ΔB	J.D.	ΔB	J.D.	ΔB
2444455		2444455		2444455		2444455	
.3945	−0.767	.4091	−0.624	.4240	−0.260	.4383	−0.083
.3957	.784	.4104	.612	.4252	.248	.4408	.068
.3969	.755	.4116	.568	.4264	.220	.4420	.063
.3982	.756	.4128	.539	.4276	.191	.4432	.062
.4042	.683	.4141	.523	.4289	.198	.4445	.061
.4055	.663	.4153	.506	.4301	.191	.4457	.027
.4067	.662	.4215	.329	.4313	.161	.4469	.023
.4079	−0.646	.4227	−0.277	.4325	−0.145	.4481	−0.015

Table 13

Photographic observations of DY Her

J.D.	m_{pg}	J.D.	m_{pg}	J.D.	m_{pg}	J.D.	m_{pg}
2429068		2429068		2429068		2429068	
.3843	10.24	.3975	10.20	.4107	10.35	.4211	10.39
.3864	10.13	.4003	10.21	.4149	10.32	.4232	10.29
.3885	10.15	.4045	10.26	.4170	10.34	.4253	10.41
.3906	10.19	.4086	10.30	.4191	10.30	.4302	10.44
.3954	10.17						

Table 14

Photoelectric yellow observations of DY Her

J.D.	ΔV	J.D.	ΔV	J.D.	ΔV	J.D.	ΔV
2441508		2441508		2441508		2441508	
.3723	+0.899	.4147	+1.083	.4522	+1.246	.4879	+1.285
.3737	.880	.4161	.095	.4550	.251	.4890	.297
.3761	.845	.4203	.117	.4564	.250	.4904	.280
.3772	.847	.4220	.129	.4585	.255	.4911	.278
.3789	.840	.4227	.142	.4599	.255	.4932	.267
.3800	.824	.4244	.150	.4619	.261	.4939	.266
.3828	.853	.4254	.149	.4626	.246	.4953	.260
.3855	.874	.4279	.149	.4654	.269	.4964	.270
.3893	.906	.4286	.166	.4689	.259	.4976	.258
.3904	.909	.4314	.154	.4713	.273	.4983	.251
.3987	.980	.4321	.166	.4720	.288	.5001	.231
.4001	0.990	.4342	.173	.4744	.283	.5011	.226
.4029	1.006	.4348	.167	.4754	.263	.5025	.214
.4036	.002	.4365	.182	.4782	.292	.5032	.210
.4057	.022	.4372	.202	.4800	.302	.5050	.191
.4067	.038	.4396	.192	.4810	.297	.5061	.189
.4085	.038	.4417	.215	.4828	.280	.5075	.159
.4092	.048	.4446	.212	.4838	.286	.5081	.159
.4112	.070	.4473	.242	.4855	.292	.5098	.130
.4126	+1.079	.4508	+1.257	.4862	+1.289	.5108	+1.124

Table 14 (cont.)

Photoelectric yellow observations of DY Her

J.D.	ΔV	J.D.	ΔV	J.D.	ΔV	J.D.	ΔV
2441508		2441508		2444050		2444050	
.5126	+1.074	.5233	+0.860	.3995	+1.150	.4189	+0.855
.5133	1.048	.5240	+0.848	.4023	.119	.4203	.841
.5150	0.995			.4064	1.006	.4231	.869
.5157	.981	2444050		.4078	0.976	.4245	.874
.5171	.939	.3856	+1.259	.4106	.919	.4273	.891
.5182	.934	.3870	.284	.4120	.884	.4287	.902
.5203	.877	.3939	.227	.4148	.851	.4314	.938
.5213	+0.871	.3981	+1.177	.4162	+0.848	.4328	+0.951

Table 15

Photoelectric blue observations of DY Her

J.D.	ΔB	J.D.	ΔB	J.D.	ΔB	J.D.	ΔB
2441508		2441508		2441508		2441508	
.3717	+0.622	.4282	+0.936	.4796	+1.131	.5175	+0.706
.3730	.629	.4307	.950	.4807	.149	.5196	.647
.3758	.569	.4317	.960	.4821	.136	.5210	.623
.3765	.551	.4335	.979	.4835	.132	.5230	.574
.3786	.538	.4362	0.997	.4848	.122	.5237	+0.579
.3793	.536	.4369	1.004	.4858	.128		
.3814	.550	.4386	0.992	.4876	.119	2444050	
.3821	.556	.4393	0.995	.4883	.119	.3849	+1.114
.3848	.574	.4410	1.018	.4901	.130	.3863	.112
.3862	.585	.4420	.025	.4908	.130	.3891	.083
.3890	.606	.4442	.023	.4925	.111	.3905	.080
.3897	.605	.4449	.031	.4935	.108	.3932	.079
.3980	.710	.4470	.051	.4950	.100	.3946	.055
.3994	.717	.4501	.058	.4960	.097	.3974	.000
.4022	.756	.4543	.086	.4973	.100	.3988	1.001
.4032	.758	.4557	.088	.4980	.083	.4016	0.906
.4064	.787	.4581	.094	.4998	.087	.4030	.872
.4078	.796	.4592	.099	.5008	.064	.4057	.780
.4088	.795	.4616	.096	.5022	.061	.4071	.742
.4109	.843	.4623	.112	.5047	.030	.4099	.661
.4119	.844	.4647	.120	.5057	.020	.4113	.642
.4140	.858	.4661	.118	.5071	1.004	.4141	.583
.4154	.868	.4678	.127	.5078	0.985	.4196	.538
.4182	.886	.4685	.130	.5094	.951	.4224	.546
.4196	.899	.4710	.134	.5105	.911	.4238	.564
.4217	.910	.4717	.120	.5119	.852	.4266	.595
.4223	.909	.4751	.121	.5129	.816	.4280	.609
.4241	.923	.4765	.118	.5147	.760	.4307	.646
.4272	+0.941	.4779	+1.130	.5154	+0.743	.4321	+0.664

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TUDOMÁNYOS AKADÉMIA
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INTÉZETÉNEK
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MITTEILUNGEN
DER
STERNWARTE
DER UNGARISCHEN AKADEMIE
DER WISSENSCHAFTEN

BUDAPEST — SZABADSÁGHEGY

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PHOTOELECTRIC UBV PHOTOMETRY OF NORTHERN CEPHEIDS, II

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PHOTOELECTRIC UBV PHOTOMETRY OF NORTHERN CEPHEIDS, II

ABSTRACT

New UBV photoelectric observational data on 42 northern Cepheids with periods of 5-10 days are presented. The period changes and the variations in the light curve of the observed Cepheids are investigated. No secular light curve variation has been discovered.

The O-C diagrams of CV Mon and RS Ori show a period jump and a subsequent rejump to the earlier value of the period. These two Cepheids as well as the shorter period ones with a rejumping period are probably members of binary systems. Another effect can be pointed out in AW Per and DD Cas which are also members of binary systems: the apparent period changes due to the orbital motion around the common centre of gravity can be seen. Both the orbital period and the value of $a \cdot \sin i$ can be determined for these latter two stars. The combined effect (i.e. the effect of the orbital motion and the rejumping period) can be seen in the O-C diagram of the short period Cepheid SU Cygni.

INTRODUCTION

This paper is the second part of a series dealing with the new UBV photometry of northern Cepheids performed at the Konkoly Observatory, and it contains the observational data and O-C diagrams of Cepheids with periods longer than 5 days but shorter than 10 days. The first part of this Cepheid survey included Cepheids with periods shorter than 5 days (*Szabados* 1977, hereinafter this paper is referred to as Paper I). The third part will cover the longest period Cepheids (P > 10 days).

The original purposes outlined in Paper I were as follows:

1. To search for double-mode Cepheids in the northern sky;
2. To investigate period changes;
3. To examine secular variations of the light curves provided that they can be determined;
4. To obtain photoelectric light curves of those Cepheids which have not previously been observed photoelectrically.

Since the existence of the beat phenomenon in the case of Cepheids with periods longer than five days is improbable, the first item may hardly be a real aim when observing Cepheids with periods as long as 5 days or more.

Item 4 also has less importance because the overwhelming majority of the stars dealt with in this programme has been observed photoelectrically; however, photoelectric photometry of several faint Cepheids was carried out for the first time as recently as in the seventies (*Pel* 1976, *Wachmann* 1976). The major contribution of the present photoelectric observations towards developing our knowledge about the light curves of the Cepheids is that the observational points are well spread in phase on the normal light curves. There are at least a dozen Cepheids in this sample the periods of which are almost equal to an integer (e.g. VW Cas: P=$5\overset{d}{.}994$; BK Aur: P=$8\overset{d}{.}002$), thus it is impossible to obtain a complete light curve of these variables at a given geographical longitude during one observational season. The present photometry carried out between 1974 and 1978 yielded reliable photoelectric light curves for this rather arbitrary group too.

After having revealed the existence of period rejumps in Paper I, the investigation of period changes is the most important purpose. The term rejump was introduced in Paper I.

During the course of this present part of the work 42 Cepheids and one star which subsequently proved to be non-variable were observed. Of these 43 stars, 19 were observed in three colours of the UBV system, the other 24 in B and V lights only.

THE OBSERVATIONS

The stars dealt with in this programme were selected from the General Catalogue of Variable Stars (*Kukarkin* et al. 1969-1970) and from the current astronomical literature, with the restrictions that their declination should be north of 0° and B magnitude (or m_{pg} for lack of photoelectric observations) at light minimum brighter than $12\overset{m}{.}5$. This sample contains Cepheids of both populations with a period $5^{d}<P<10^{d}$.

The stars investigated are listed in Table 1. The number of observations on each star, the colours, serial numbers of the pages where the individual observations and the O-C diagram with additional remarks on the given star can be found are indicated in the successive columns. The total number of observations is 804. The star V 1165 Aql is not a Cepheid variable. Judging by present photometry this star is a non-variable, but very small amplitude light variations cannot be ruled out. The observational data and a detailed analysis on V 1165 Aql are published

Table 1 The programme

Star	N	Col.	Page obs.	Page rem.
FM Aql	20	UBV	10	54
FN Aql	18	UBV	10	108
KL Aql	18	BV	10	52
V 336 Aql	18	BV	11	81
V 600 Aql	18	BV	11	80
V 733 Aql	19	BV	11	58
V 1165 Aql	9	BV	—	4
η Aql	20	UBV	12	73
AO Aur	16	BV	13	72
BK Aur	18	UBV	13	99
RX Cam	23	UBV	14	91
RS Cas	19	BV	14	62
SW Cas	21	BV	14	40
VV Cas	17	BV	15	59
VW Cas	18	BV	15	50
DD Cas	19	BV	16	109
DL Cas	13	UBV	16	98
FM Cas	17	BV	16	47
IX Cas	19	BV	17	106
CR Cep	19	BV	17	61
δ Cep	19	UBV	17	32
VY Cyg	17	BV	18	89

Star	N	Col.	Page obs.	Page rem.
GH Cyg	19	BV	18	87
MW Cyg	18	BV	19	49
V 386 Cyg	18	BV	19	29
V 538 Cyg	19	BV	20	55
V 924 Cyg	18	BV	20	46
TX Del	20	UBV	20	56
W Gem	17	UBV	21	93
RZ Gem	19	BV	21	44
BB Her	20	BV	22	83
X Lac	19	UBV	22	42
RR Lac	19	UBV	23	66
BG Lac	17	UBV	23	30
CS Mon	20	BV	24	71
CV Mon	18	BV	24	39
RS Ori	23	UBV	25	85
GQ Ori	23	UBV	25	105
AW Per	23	UBV	25	68
HR 690(Per)	18	UBV	26	84
S Sge	20	UBV	26	101
U Vul	20	UBV	27	95
X Vul	21	UBV	28	64

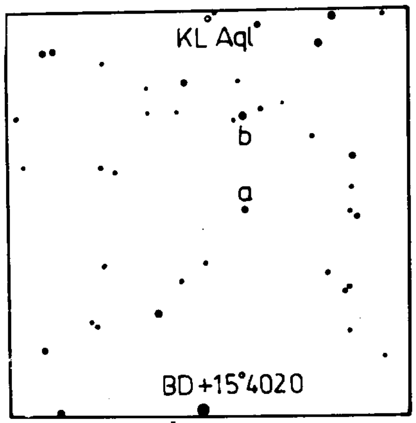

Fig. 1a KL Aql

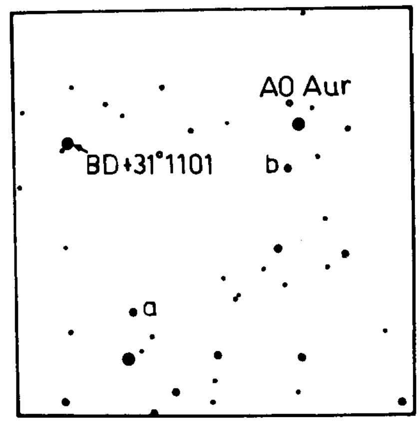

Fig. 1b AO Aur

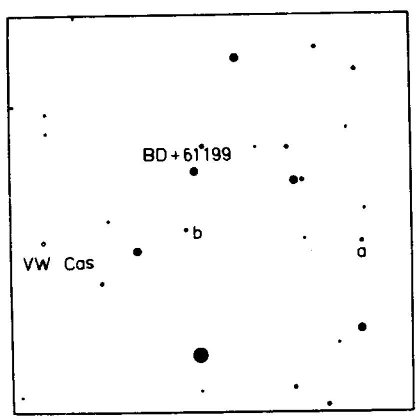

Fig. 1c VW Cas

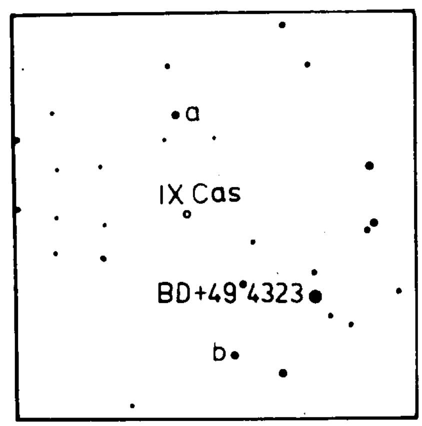

Fig. 1d IX Cas

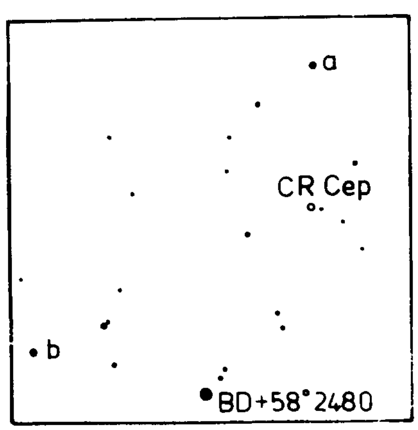

Fig. 1e CR Cep

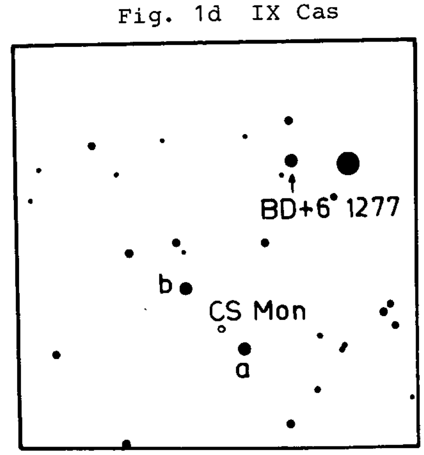

Fig. 1f CS Mon

Figure 1a-f Identification charts

elsewhere (*Szabados* 1979).

A full description of the observational technique, the telescopes and filters used can be found in Paper I (p. 6). The V magnitudes and colour indices of the comparison and check stars are listed in Table 2. The tie in observations were made with the aid of UBV standard stars taken from the catalogue of *Blanco* et al. (1968). An asterisk instead of the name of the star in Table 2 denotes that the star is not in the Bonner Durchmusterung, in which case the identification charts in Fig. 1a-f should be consulted. In these charts the letter *a* denotes the comparison star and the star marked *b* is the check one. The size of the charts is about 25'x25' except for VW Cas (40'x40'); north is at the top.

The comparison between the present photometric system (UBV_{sz}) and *Schaltenbrand* and *Tammann*'s (1971) standard one (UBV_{scht}) gives the following transformation formulae:

$V_{sz} = 0.997V_{scht} + 0.026$ (38 common stars)

$B_{sz} = 0.993B_{scht} + 0.083$ (38 common stars)

$U_{sz} = 1.002U_{scht} - 0.021$ (17 common stars)

Table 3 contains the observations in alphabetical order of the constellations. The observations made with the 20" telescope are marked with asterisks in the column of the Julian Date. Some unpublished observations made by Prof. L. Detre in 1953 and by Dr. J. Abaffy in 1967 are also listed in Table 3. Unfortunately, since the comparison stars used by them are unknown in several cases these two sets of observations have not been transformed to the standard system, and only the magnitude differences are given in the instrumental system.

THE LIGHT CURVES AND PERIOD CHANGES OF THE INDIVIDUAL VARIABLES

This section contains the light curves, the tables and the graphs of the O-C values and some remarks on the observed Cepheids. It was not my intention to give the full history of the variables which would have increased considerably the volume of this paper. The variables were arranged according to the length of their period as in Paper I.

The light and colour curves are constructed from the obser-

Table 2

Variable	Comp.	V	B-V	U-B	Check	V	B-V	U-B	Remark
FM Aql	+10° 3813	$7^m.09$	$1^m.42$	$1^m.09$	+10° 3801	$7^m.13$	$1^m.92$	$2^m.03$	
FN Aql	+ 3° 3938	9.31	1.26	1.21	+ 4° 4009	variable			1
KL Aql	*	10.04	1.47		+15° 4019	9.72	0.34		2
V 336 Aql	+ 0° 4078	10.03	0.78		+ 0° 4081	10.57	0.71		
V 600 Aql	+ 8° 4050	10.41	0.71		+ 8° 4049	10.60	0.72		
V 733 Aql	+10° 4111	10.41	0.64		+10° 4110	9.55	0.55		
η Aql	+ 6° 4357	3.71	0.86	0.49	+ 2° 3879	3.36	0.33	0.04	
AO Aur	*	11.10	0.78		*	11.03	1.23		
BK Aur	+49° 1310	9.43	0.40	0.08	+49° 1319	9.74	0.43	0.06	
RX Cam	+58° 687	8.14	1.36	0.95	+58° 672	8.31	0.64	0.20	
RS Cas	+61° 2481	9.91	1.12		+61° 2492	9.20	0.16		3
SW Cas	+57° 2694	9.75	0.60		+57° 2689	8.39	0.34		3
VV Cas	+59° 327	10.40	0.71		+59° 325	9.60	0.33		
VW Cas	+60° 145	10.12	1.23		*	10.58	0.55		
DD Cas	+61° 2577	10.06	1.12		+61° 2576	9.82	0.37		3
DL Cas	+59° 67	8.88	0.97	0.64	+59° 72	8.92	0.25	0.18	
FM Cas	+55° 29	9.16	1.67		+55° 28	9.18	0.30		
IX Cas	*	10.69	0.41		*	10.75	1.26		
CR Cep	*	10.26	1.18		*	10.34	0.69		
δ Cep	+57° 2475	3.32	1.51	1.79					
VY Cyg	+39° 4425	10.74	1.01		+39° 4426	possible varies			4
GH Cyg	+29° 3835	9.72	1.10		+28° 3565	10.39	0.58		
MW Cyg	+32° 3738	9.33	1.14		+32° 3739	9.31	0.33		

Table 2 (cont.)

Variable	Comp.	V	B-V	U-B	Check	V	B-V	U-B	Remark
V 386 Cyg	+41° 4062	$8^m.63$	$1^m.63$		+40° 4455	$10^m.23$	$0^m.22$		
V 538 Cyg	+50° 3397	9.88	1.21		+50° 3395	9.98	1.02		
V 924 Cyg	+32° 3498	9.77	0.31		+32° 3499	10.46	0.20		
TX Del	+ 2° 4257	9.27	0.20	$0^m.15$	+ 2° 4256	8.86	0.07	$0^m.15$	
W Gem	+15° 1230	7.17	0.69	0.29	+15° 1255	7.36	0.25	0.10	
RZ Gem	+22° 1141	10.31	0.47		+22° 1148	9.65	0.52		
BB Her	+12° 3652	9.66	0.65		+12° 3640	10.22	0.23		
X Lac	+55° 2830	7.37	0.56	0.11	+55° 2827	8.45	0.21	0.15	
RR Lac	+55° 2792	8.71	0.24	-0.06	+55° 2791	8.79	1.05	0.83	
BG Lac	+42° 4273	8.64	0.68	0.39	+42° 4275	9.14	0.59	0.06	
CS Mon	*	10.70	0.19		*	10.72	0.28		
CV Mon	+ 3° 1319	10.10	1.55		+ 3° 1317	10.21	1.88		
RS Ori	+14° 1260	8.32	0.69	0.22	+15° 1176	8.06	0.29	-0.46	
GQ Ori	+ 9° 1117	8.85	0.37	0.21	+ 9° 1121	9.79	0.32	0.18	
AW Per	+37° 968	7.77	1.30	1.03	+36° 948	6.73	1.14	1.03	
HR 690	+55° 598	5.18	0.37	-0.11	+54° 539	7.58	0.10	-0.15	
S Sge	+16° 4121	5.79	0.62	0.12	+16° 4081	6.02	0.02	-0.15	
U Vul	+20° 4210	6.48	1.08	0.98	+20° 4218	6.54	0.42	-0.48	
X Vul	+26° 3739	8.87	0.30	0.17	+26° 3746	9.55	0.16	0.08	

Remarks:
1 The star BD +4° 4009 is a new Cepheid variable (*Kovács* and *Szabados* 1979).
2 The check star has a faint companion within the edge of the diaphragm.
3 The comparison star has a faint companion within the edge of the diaphragm.
4 The check star is a suspected variable. The available observations do not allow to determine the type of the variability.

Table 3 The observations

FM Aquilae

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2229.521	8.63	1.45	0.92	2673.294	8.15	1.25	0.88
2277.419	8.39	1.46	0.94	2708.258	8.14	1.31	0.76
2297.338	8.64	1.48	1.06:	2900.514	8.30	1.46	0.92
2304.375	8.41	1.36	0.78	2939.526	8.64	1.47:	0.98:
2308.315	8.49	1.45	0.86	2971.395	8.06	1.22	
2591.433	8.54	1.45	0.78:	2976.399	8.63	1.41	0.93
2620.459	8.50	1.44	0.95	3287.553	8.68	1.43	0.98
2623.449	7.96	1.13	0.74	3340.389	8.24	1.39	0.83
2642.338	8.04	1.26	0.68:	3363.461	7.96	1.17	0.71
2669.333	8.50	1.54	0.86	3705.366	7.89	1.16	0.71

FN Aquilae

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2277.376	8.39	1.23	0.97	2673.318	8.26	1.07	
2297.316	8.53	1.33		2708.247	8.64	1.31	
2304.320	8.22	1.16	0.83:	2871.597	8.37	1.13	0.98
2308.297	8.74	1.38	1.13	2900.567	8.26	1.09	0.92
2523.581	8.31	1.28	0.98	2960.468	8.40	1.30	
2589.444	8.31	1.13		3287.531	8.53	1.23	
2620.385	8.62	1.34	1.11	3337.519	8.22	1.14	
2623.434	8.61	1.21:	1.09:	3390.380	8.74	1.40	1.11
2669.317	8.75	1.39	1.09	3705.378	8.47	1.20	

KL Aquilae

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2904.556	9.97	0.90		3275.539	10.52	1.13:	
2960.519	9.95:	0.84:		3337.413	10.46	1.08	
2990.415	9.85	0.82		3340.467	10.18	1.01	
3016.368	10.12	1.05:		3342.464	10.52	1.17	
3075.239	10.16	0.95		3363.429	9.84	0.82	
3078.250	10.22	1.08		3382.345	9.98	0.86	

Table 3 (cont.)

(KL Aql)

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
3390.368	10.35	1.11		3761.315	9.98:	1.06:	
3476.189	10.42	1.15		3795.309	10.47:	1.21:	
3722.511	10.29	0.95:		3800.250	10.55:	1.17:	

<u>V 336 Aquilae</u>

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2276.367*	9.72	1.31		3075.212	10.29:	1.46:	
2299.287*	9.98	1.44		3092.202	9.50	1.23:	
2302.298*	9.84	1.30		3342.436	9.77	1.30	
2548.503*	10.09	1.42:		3350.412	9.81	1.41	
2712.205*	9.51	1.15		3351.493	10.01	1.51	
2976.387	9.69	1.22		3390.303	10.00	1.44:	
2990.364	9.56	1.20		3425.240	10.18	1.55	
3046.270	10.25	1.39:		3763.326	9.74	1.29	
3064.246	9.79	1.21		3800.228	9.60	1.09:	

<u>V 600 Aquilae</u>

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2276.382*	9.97	1.52		2976.363	9.73	1.37:	
2299.415*	10.20	1.65:		2990.343	9.92	1.37	
2302.314*	10.13	1.53:		3046.286	10.34	1.66	
2623.403	9.90	1.55		3064.259	9.87	1.45	
2634.429	10.37	1.60		3304.515	10.05	1.50:	
2636.474	9.73	1.32:		3342.449	10.30	1.64	
2900.532	10.25	1.60		3390.326	9.95	1.50	
2904.538	9.78	1.37		3401.336	10.40	1.68	
2960.504	10.33	1.54		3435.224	10.12	1.61	

<u>V 733 Aquilae</u>

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2276.396*	9.73	0.85		2277.464	9.84	1.01	

Table 3 (cont.)

(V 733 Aql)

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2278.469	9.96	1.03		2669.297	10.17	1.06	
2289.358	9.87:	0.84:		2712.243*	10.16	1.04	
2291.330	10.10	1.01		2715.231	9.74	0.86	
2299.454*	10.00	0.92		2904.521	10.04:	1.12:	
2302.398*	9.90	1.04		3075.228	9.92	1.03	
2304.341	10.09	1.09		3078.234	9.97	0.90	
2356.232	9.72	0.80		3388.374	9.75	0.85	
2522.582	9.80	0.86		3403.286	10.06	1.02	
2543.535	9.94	0.99					

η Aquilae

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2277.442	3.78	0.72	0.39	2708.272	3.60	0.61	0.34
2289.377	4.18	0.94	0.84:	2720.212	4.22	0.99	0.75
2591.487	4.30	0.97	0.79	2960.423	3.61	0.63	0.37
2620.507	4.30	0.99	0.72	2990.376	3.80	0.80	0.54
2622.495	3.58:	0.59:	0.31:	3030.341	4.13	0.86	0.54
2623.482	3.67	0.71	0.45	3046.301	3.59	0.66:	
2642.369	4.27	0.97	0.69	3350.426	4.02	0.89	0.67
2645.405	3.78	0.74	0.47	3363.362	3.82	0.77	0.53
2669.305	4.07	0.93	0.70	3382.306	3.96	0.78	0.47
2675.310	3.85	0.84	0.51	3386.300	4.00	0.90	0.53:

Observations in 1953

J.D.hel. 2430000+	V	B-V	U-B	J.D.hel. 2430000+	V	B-V	U-B
4581.561	4.35	1.01		4605.319	3.91:	0.82:	0.42:
4583.412	4.13	0.84	0.59	4606.366	3.59	0.66	0.35
4584.428	3.58	0.60	0.45	4608.349	3.79	0.82	0.62
4585.434	3.69	0.71	0.48	4609.419	4.09	1.00	0.58
4588.447	4.26	0.98	0.72	4614.417	3.71	0.79	0.45
4600.371	3.79	0.81	0.60	4619.354	4.04	0.85	0.53
4601.543	3.73	0.91	0.57	4621.415	3.72	0.74	0.45
4602.348	4.20	0.90	0.71	4622.393	3.92	0.93	0.72

Table 3 (cont.)

(η Aql)

J.D.hel. 2430000+	V	B-V	U-B	J.D.hel. 2430000+	V	B-V	U-B
4623.378	3.95:	1.00:	0.51:	4642.308	3.56	0.68	0.44
4624.438	4.35:	0.90:	0.77:	4653.316	4.29	1.08	
4625.376	4.47:	0.95:	0.87:	4654.382	4.40	0.99	0.63
4626.370	4.24	0.86	0.67	4656.296	3.61	0.60	0.39
4627.363	3.84:	0.69:	0.35:	4660.313	4.19	0.99	0.73
4628.408	3.64	0.73	0.29	4663.277	3.54	0.65	0.46
4629.323	3.80	0.83	0.47	4664.276	3.77	0.77	0.41
4630.378	3.89	0.87	0.63				

AO Aurigae

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2424.407*	10.57	0.98		2775.336*	10.37:	0.88:	
2453.457	10.95	1.13		2776.370*	10.65	1.02	
2473.259	10.90	1.12		2816.264	10.55:	0.83:	
2711.553*	11.21	1.28:		3124.470	11.19	1.29	
2712.522*	11.30	1.28		3192.369	11.31	1.24	
2715.594	10.75	1.05		3214.302	10.70	0.83	
2743.488*	10.82	1.08		3423.544	10.94	1.09	
2756.532	10.83	1.06		3789.499	10.44	0.83	

BK Aurigae

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2404.597	9.54	1.15	0.76	2794.233	9.25	0.95	0.66
2443.408	9.27	1.03	0.52:	2816.242	9.58	1.04	0.68
2448.489	9.41	1.00	0.55	2829.266	9.62	1.15:	0.85:
2450.431	9.27	1.00	0.63	2831.253	9.78	1.26:	0.88:
2453.493	9.68	1.20	0.74:	3163.212	9.29	1.01	0.65
2454.363	9.82	1.23	0.92	3524.224	9.41	1.12	0.75
2455.463	9.73	1.17	0.84	3560.257	9.66	1.11	0.75
2465.278	9.13	0.92	0.60	3598.282	9.75	1.26	
2468.251	9.50	1.15	0.64:	3849.470	9.21	0.92	0.59:

Table 3 (cont.)

RX Camelopardalis

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2369.467	7.90	1.32	0.97	2767.339	7.44	1.17	0.75
2404.567	7.44	1.22	0.85	2777.455*	7.69	1.33	0.99
2424.357*	8.02	1.44	1.02	2794.427	7.82	1.40	
2443.388	7.48	1.22	0.81	2831.303	7.50	1.20	0.84
2450.412	7.34	1.10	0.73	2850.277	7.95	1.43	
2453.477	7.72	1.36	1.01	3217.278	7.38	1.11	0.78
2455.442	8.02	1.44	1.13	3219.280	7.47	1.20	0.78
2460.315	7.46	1.20	0.73:	3390.548	7.73	1.27	0.93
2465.305	7.51	1.20	0.74:	3437.348	7.98	1.39	1.00
2473.384	7.45	1.13	0.75	3481.298	7.55	1.29	0.92
2676.497	7.97	1.45	1.11	3490.353	7.78	1.33:	
2756.465	8.01	1.48	1.13:				

RS Cassiopeiae

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2299.567*	10.33	1.63		2776.405*	10.04	1.60	
2424.233*	10.17	1.61		2777.336*	10.24	1.62	
2426.222*	10.09	1.49		3163.255	9.83	1.38	
2710.416*	9.57	1.27		3340.496	9.58	1.33	
2711.496*	9.74	1.42		3342.479	9.98	1.59:	
2712.389*	9.94	1.51		3388.399	10.36:	1.56:	
2715.466	10.22:	1.59:		3390.563	9.56	1.28	
2738.406	10.03	1.54		3425.529	10.21	1.66:	
2743.301*	9.80	1.43		3490.389	10.01	1.46	
2756.219	9.95:	1.48:					

SW Cassiopeiae

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2364.330	9.43	1.03		2645.525	9.96	1.22	
2397.263	9.48	1.08		2712.293*	9.36	1.03	
2407.340	9.35	0.96		2715.447	9.87:	1.29:	

Table 3 (cont.)

(SW Cas)

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2720.414	9.83	1.25		3340.403	9.79	1.23	
2738.295	9.88	1.13		3342.492	9.67	1.10	
2990.556	9.52	1.08		3363.499	9.98	1.24	
3045.330	9.58	1.13		3437.486	9.67	1.17	
3045.572	9.63	1.19		3476.235	9.77	1.26	
3140.228	9.98	1.27		3481.262	9.74	1.25	
3163.238	9.52	1.02		3490.218	9.34	1.01	
3337.537	9.44	0.94					

VV Cassiopeiae

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2424.268*	10.98	1.28		2816.299	10.98:	1.39:	
2710.489*	11.08	1.30:		3078.365	10.66	1.12	
2711.536*	11.12	1.33		3124.449	10.72	1.27	
2715.569	10.84	1.33		3140.197	10.91	1.23	
2743.449*	10.39	1.01		3375.538	11.18	1.27:	
2775.295*	10.37	1.06		3390.456	10.62:	1.12:	
2776.387*	10.64	1.22		3437.367	11.17	1.33	
2777.337*	10.79	1.26		3483.265	10.45	1.14	
2787.250	10.28	0.94					

VW Cassiopeiae

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2424.283*	10.79	1.16		2776.211*	11.00	1.27	
2426.253*	10.59	1.15		2777.194*	11.04	1.36:	
2710.474*	10.99	1.31		2990.502	10.74	1.13	
2711.524*	10.97	1.27		3045.601	10.96	1.25	
2712.486*	10.45	1.06		3048.457	10.37	1.06	
2715.548	10.88	1.22		3124.431	11.05	1.32	
2738.445	10.70	1.14		3390.441	10.42	1.07	
2743.430*	10.44	1.13		3425.510	10.58	1.05	
2756.192	10.71	1.11:		3524.295	10.70	1.19	

Table 3 (cont.)

DD Cassiopeiae

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2407.320	9.63	1.11		2776.423*	10.18	1.34	
2424.328*	9.97	1.23		3045.547	9.59	1.10	
2685.526	9.88	1.42		3162.287	9.70	1.11	
2710.458*	9.80	1.14		3337.526	9.92	1.24:	
2712.433*	9.64	1.14		3363.487	10.02	1.45	
2715.509	9.97	1.41		3390.427	9.70	1.24	
2743.375*	9.77	1.29		3425.427	9.98	1.19	
2756.417	10.11	1.39		3426.317	9.83	1.14	
2767.247	10.07	1.28		3772.468	9.70:	1.23:	
2775.277*	10.16:	1.41:					

DL Cassiopeiae

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2308.580	8.69	1.05	0.78	2777.420*	9.26	1.30	0.80:
2685.558	8.84	1.11	0.78	2787.217	8.97:	1.05:	0.69:
2712.473*	9.15	1.31	0.77	2990.515	8.85	1.14	0.83
2715.527	8.79	1.07	0.83:	3490.201	9.22	1.28	
2738.421	9.11	1.29	0.74	3560.239	9.11	1.28	0.79
2743.410*	9.01	1.25	0.78	3830.210	8.84	1.09	0.72
2756.262	8.72	1.05	0.70				

FM Cassiopeiae

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2397.283	9.44	1.19		2794.256	8.91	0.89	
2407.357	9.19	1.12		2816.277	9.44	1.15	
2685.541	9.11	1.05		3140.242	9.31	1.16	
2712.447*	9.12	0.96		3364.564	9.00	0.89:	
2743.390*	9.15:	0.98:		3375.500	8.83	0.85	
2756.438	9.23	1.14		3390.354	9.34	1.19	
2767.263	9.12	1.12		3438.285	9.21	1.06	
2775.255*	9.48	1.11:		3546.232	9.22	1.12	
2777.399*	8.92	0.91					

Table 3 (cont.)

IX Cassiopeiae

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2276.568*	11.24	0.61		3050.496	11.69	0.75	
2299.586*	11.72	0.86		3075.271	11.36	0.79	
2424.250*	11.27	0.67		3162.304	11.34:	0.68:	
2426.236*	11.55	0.78		3163.271	11.22	0.63	
2710.436*	11.65	0.86		3382.402	11.32	0.60	
2711.515*	11.69	0.77		3385.373	11.33:	0.53:	
2712.403*	11.65	0.76		3390.576	11.56	0.68	
2743.551*	11.19	0.59		3403.443	11.19:	0.61:	
2777.374*	11.59:	0.68:		3426.479	11.69	0.71	
3048.585	11.50	0.85					

CR Cephei

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2318.428	9.53	1.45		2756.315	9.53	1.39	
2350.420	9.48	1.36		2775.316*	9.57	1.40	
2623.503	9.68:	1.45:		2777.291*	9.74	1.50	
2685.476	9.72	1.53		2990.542	9.78	1.54	
2712.378*	9.45	1.38		3075.256	9.54:	1.47:	
2715.316	9.76	1.54		3163.223	9.67	1.56	
2720.319	9.66	1.46:		3375.440	9.70	1.60:	
2728.291*	9.81	1.53		3382.537	9.79	1.48	
2738.276	9.53	1.50		3403.378	9.46	1.34	
2743.281*	9.45	1.35					

δ Cephei

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2318.384	4.02	0.78	0.52	2645.432	3.91	0.72	0.52
2365.323	3.63	0.57	0.40	2646.365	4.13	0.78	0.63
2591.498	3.84	0.69	0.48	2669.370	4.33	0.84	0.64
2620.418	4.27	0.85	0.63	2675.383	3.88	0.65	0.39
2622.546	3.51	0.50	0.33	2676.413	3.58	0.51	0.39

Table 3 (cont.)

(δ Cep)

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2756.293	3.50	0.46	0.36	3340.416	4.20	0.78	0.54
2767.209	3.53:	0.42:	0.34:	3342.509	3.73	0.67:	
2787.230	4.32	0.86	0.68	3390.540	3.69	0.59	0.37:
3045.480	3.99	0.63:	0.47:	3403.365	4.17	0.79	0.64
3048.471	4.03	0.79	0.53				

Observations in 1967

J.D.hel. 2430000+	Δv	Δ(b-v)	Δ(u-b)	J.D.hel. 2430000+	Δv	Δ(b-v)	Δ(u-b)
9787.385	+0.916	-0.566	-1.030	9808.428	+0.854	-0.550	-1.058
9791.462	+0.651	-0.566	-1.126	9809.431	+0.814	-0.625	-1.196
9795.320	+0.337	-0.772	-1.226	9810.266	+0.028	-0.909	-1.359
9796.506	+0.562	-0.597	-1.106	9812.305	+0.537	-0.662	-1.128
9799.335	+0.159	-0.864	-1.385	9821.285	0.000	-0.884	-1.356
9806.331	+0.389	-0.724	-1.219				

VY Cygni

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2307.424	9.32	1.12		3287.466	9.80	1.43	
2634.498	9.96	1.46		3363.442	9.62:	1.36:	
2685.411	9.46	1.11		3375.549	9.25	1.06	
2712.318*	9.89	1.43		3382.436	9.58	1.16	
2714.318	9.56:	1.29:		3425.280	9.43:	1.24:	
2715.291	9.20:	1.09:		3524.198	9.36	1.07	
2743.262*	9.77	1.40		3716.500	9.74:	1.28:	
3050.509	9.92	1.44		3724.471	9.63:	1.32:	
3275.507	9.43	1.16		3761.326	9.46	1.08	

GH Cygni

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2276.421*	9.65	1.21		2636.504	9.76	1.19	
2302.462*	10.11	1.44		2639.491	10.31	1.37	
2634.536	9.61:	1.11:		2712.257*	9.51	1.10	

Table 3 (cont.)

(GH Cyg)

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2715.253	9.90	1.30		3342.529	10.18	1.42	
2728.243*	9.50	1.11		3375.413	10.22	1.24	
2743.187*	9.62	1.16		3385.488	9.68	1.07	
2927.493	10.12	1.35		3388.385	10.05	1.29	
2960.438	10.29	1.34		3401.351	9.64	1.15	
3227.620	9.86	1.17		3438.296	10.12	1.12:	
3340.449	9.81	1.22					

MW Cygni

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2634.461	9.52	1.45		2927.477	9.82	1.52	
2639.537	9.44	1.34		3046.316	9.69:	1.49:	
2685.393	9.23	1.20		3227.608	9.16	1.20	
2712.301*	9.60	1.50		3275.524	9.17	1.22	
2720.263	9.77	1.46		3342.541	9.49	1.38	
2728.259*	9.27	1.32		3385.473	9.72	1.47	
2743.222*	9.81	1.56		3401.435	9.33	1.33	
2777.209*	9.49	1.45		3435.244	9.51	1.32	
2904.477	9.77:	1.63:		3490.179	9.25	1.23	

V 386 Cygni

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2307.446	9.98:	1.68:		2776.237*	9.77	1.63	
2634.516	9.65	1.57		2777.251*	9.26	1.42	
2636.537	9.52	1.65		2928.417	9.87	1.76	
2685.428	9.84	1.69		3078.390	9.57	1.63	
2714.335	9.31	1.40		3363.376	9.81	1.65	
2720.285	9.45	1.55		3420.446	9.67	1.61	
2728.276*	9.89	1.76		3426.285	9.77	1.66	
2738.261	9.90	1.71		3476.205	9.31	1.38	
2767.224	9.31:	1.50:		3481.213	9.48	1.47	

Table 3 (cont.)

V 538 Cygni

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2276.530*	10.40	1.25		2776.259*	10.61	1.47	
2299.533*	10.71	1.46		2948.438	10.75	1.42	
2302.410*	10.29	1.23		3075.431	10.64:	1.30:	
2424.198*	10.21	1.18		3078.348	10.35	1.18	
2426.194*	10.45	1.39		3337.357	10.41	1.34	
2634.556	10.55	1.31:		3340.530	10.71	1.39	
2636.555	10.71	1.46		3363.391	10.63	1.43	
2639.521	10.42:	1.25:		3403.431	10.25	1.15:	
2666.341	10.60:	1.55:		3426.349	10.60	1.32	
2712.342*	10.27	1.25					

V 924 Cygni

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2276.408*	10.63	0.86		3227.591	10.59	0.76	
2299.518*	10.76	0.94:		3275.491	10.77:	0.99:	
2302.447*	10.54:	0.82:		3287.414	10.78	0.87	
2712.270*	10.73	0.94		3304.406	10.82:	0.81:	
2715.271	10.56	0.83		3375.483	10.89:	0.86:	
2900.550	10.69	0.91		3390.398	10.62	0.88	
2927.461	10.58	0.80		3401.321	10.63	0.84	
2948.424	10.65	0.83		3437.309	10.85	0.90	
3064.275	10.80	0.88		3438.309	10.70	0.84	

TX Delphini

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2277.486	9.29	0.84	0.76	2379.187	8.94	0.59	0.52
2297.430	9.45:	0.97:	0.79:	2591.530	9.18	0.78	
2299.468*	8.89	0.54	0.45	2623.466	9.42	0.91	0.74:
2304.356	9.29	0.77	0.69	2634.395	9.11	0.74	0.77:
2307.387	9.07	0.75	0.67	2666.300	9.37	0.86	
2343.261	8.94	0.55:	0.47:	2960.536	9.00	0.70	0.65

Table 3 (cont.)

(TX Del)

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2990.402	8.88	0.55	0.51	3426.299	9.49	0.88	0.94
3351.517	9.49	0.94	0.97:	3481.242	9.53	0.95	0.89
3386.338	9.05	0.74	0.59	3743.438	9.02	0.64	0.56
3390.316	9.00	0.62	0.57	3772.307	9.17	0.65	0.61

W Geminorum

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2404.497	7.34	1.15	0.92	2756.505	6.81	0.84	0.67:
2429.452	7.15	1.02	0.65	2767.475	7.17	1.14	0.80:
2432.425	6.72	0.89	0.63	2794.405	6.73	0.69:	0.53:
2443.448	7.22	1.15	0.95:	2841.338	6.94	0.93	0.59
2450.377	7.10	1.06	0.81	3138.502	7.06	1.05	0.79
2454.428	6.54	0.75	0.52	3224.270	6.74	0.88	0.63
2455.403	6.74	0.83	0.59	3483.548	6.59	0.74	0.59
2460.350	7.34	1.13	0.89	3489.497	7.27	1.08	0.85
2473.319	7.00	1.00	0.72				

Observations in 1967

J.D.hel. 2430000+	Δv	Δ(b-v)	Δ(u-b)	J.D.hel. 2430000+	Δv	Δ(b-v)	Δ(u-b)
9777.538	+0.092	0.808	0.764	9786.570	-0.268	0.636	0.564
9780.604	-0.552	0.568	0.477	9796.555	-0.520	0.575	0.504
9781.533	-0.572	0.580	0.492	9812.594	-0.492	0.590	0.499
9782.521	-0.345	0.688	0.586	9819.575	-0.720	0.504	0.403
9783.557	-0.170	0.788		9825.617	-0.006	0.747	0.733
9784.574	+0.026	0.818	0.817				

RZ Geminorum

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2369.576	10.21	1.23		2448.469	10.45	1.20	
2404.473	10.37	1.17		2450.392	9.69	1.06	
2429.433	10.04	1.19		2453.428	10.35	1.25	
2443.463	10.15	1.05		2455.424	9.61	0.90	

Table 3 (cont.)

(RZ Gem)

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2460.379	9.58	0.90		3219.310	9.82	1.09	
2473.300	9.89	1.14:		3227.274	10.28:	1.26:	
2714.551	9.88	0.94		3483.515	9.49	0.86	
2715.612	9.68	0.95		3490.482	9.93	1.10	
2756.399	10.15	1.21		3598.305	10.49:	1.19:	
2816.320	10.05	1.14					

BB Herculis

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2202.506	10.18	1.19		2640.330	10.40:	0.93:	
2206.462	9.81	0.89		2646.323	10.40	1.25	
2255.444	10.30	1.22		2927.510	9.86	0.89	
2277.397	10.21	1.10		2949.374	9.79	0.89	
2471.611	10.02	1.07		3304.426	9.95	1.00	
2522.526	9.95	0.95		3375.471	10.36	1.18:	
2543.473	10.02	0.88		3388.305	10.18	1.07	
2591.385	10.01	0.95		3679.395	9.96	0.92	
2620.473	9.93	0.95		3714.398	10.07	0.97	
2639.326	10.44	1.14:		3722.424	9.91	0.84	

X Lacertae

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2365.298	8.54	1.02	0.70	2738.327	8.17	0.86	0.56
2407.297	8.28	0.96	0.54:	2939.500	8.22	0.83	0.51
2620.522	8.44	0.95	0.70	3075.353	8.23	0.82	0.56
2642.425	8.46	0.96	0.73	3337.501	8.23	0.81	0.63:
2646.418	8.22	0.91	0.54	3340.522	8.58	1.06	0.78
2675.479	8.48	1.03	0.67	3390.341	8.49	0.98	0.73
2676.449	8.53	1.04	0.72	3423.518	8.34	0.89	0.62
2685.512	8.41	0.94	0.74:	3425.267	8.27	0.90	0.63
2715.420	8.43	0.94	0.65	3438.245	8.56	1.03	0.73
2720.336	8.54	1.00	0.73				

Table 3 (cont.)

(X Lac)

Observations in 1967

J.D.hel. 2430000+	Δv	Δ(b-v)	Δ(u-b)	J.D.hel. 2430000+	Δv	Δ(b-v)	Δ(u-b)
9720.506	-0.684	0.409	0.879	9737.455	-0.911	0.294	0.865
9724.495	-0.537	0.472	1.007	9739.514	-0.717	0.392	0.988
9726.458	-0.882	0.301	0.810	9756.601	-0.611	0.436	0.988
9727.456	-0.916	0.326	0.894	9757.317	-0.583	0.499	1.062
9731.478	-0.688	0.345	0.961	9763.562	-0.579	0.451	0.965
9732.428	-0.953	0.296	0.839	9770.327	-0.960	0.293	0.848
9733.522	-0.835	0.361	0.896	9779.588	-0.524	0.418	0.967

RR Lacertae

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2289.494	8.51	0.74	0.45	2756.348	9.03	1.00	0.61
2318.452	9.17	1.10	0.70	2767.282	9.13	1.01	0.74
2407.233	8.96	0.97		2776.325*	8.54	0.78	0.48
2646.403	9.25	1.05:	0.83:	2960.401	9.15	1.12	0.78
2672.526	9.14	1.10	0.66	3045.521	8.75	0.83	0.49
2675.464	8.74	0.91		3375.452	8.86	0.95	0.59
2676.351	8.90	0.94	0.74:	3424.547	8.46	0.75	0.47
2714.350	8.80	0.93	0.55:	3425.493	8.61	0.78	0.51
2728.329*	8.99	1.03		3464.354	8.64	0.86	0.59
2738.342	8.44	0.73	0.44				

BG Lacertae

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2278.492	8.56	0.84	0.44:	2676.366	9.06	1.08	0.69:
2289.468	8.56	0.84	0.55:	2685.458	8.79	1.03	0.73
2297.457	9.03	1.01:	0.70:	2712.364*	8.85	1.05	0.69
2314.331	9.21:	1.03:	0.79:	2720.301	8.99	0.98	0.61
2318.408	8.97	1.09	0.68	2743.358*	8.65	0.93	0.61
2365.278	8.76	0.97	0.70	2939.423	8.63	0.89	0.50
2407.193	8.59	0.86	0.55	2960.483	8.83	0.88	0.66:
2591.444	9.14	1.06	0.80	3050.472	9.09:	1.06:	0.72:
2675.365	8.88	1.11	0.75				

Table 3 (cont.)

(BG Lac)

Observations in 1967

J.D.hel. 2430000+	Δv	Δ(b-v)	Δ(u-b)	J.D.hel. 2430000+	Δv	Δ(b-v)	Δ(u-b)
9738.499	+0.525	0.383	0.359	9780.488	+0.381	0.344	0.401
9760.564	+0.562	0.367	0.449	9782.500	+0.236	0.238	0.144
9762.527	-0.016	0.158	0.134	9783.386	-0.114	0.142	0.111
9763.472	+0.180	0.262	0.272	9787.478	+0.514	0.365	0.367
9769.468	+0.291	0.313	0.306	9788.502	-0.080	0.119	0.046
9777.354	+0.133	0.212	0.138				

CS Monocerotis

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2404.546	10.71	1.11		2454.286	11.08	1.25	
2424.390*	10.71	1.07		2455.325	11.22	1.25	
2429.412	11.21	1.20		2473.278	10.89	1.23	
2432.440	10.86	1.20		2743.507*	11.00	1.24	
2443.370	11.04	1.21		2775.472*	10.78	1.23:	
2448.369	11.20	1.26		2837.289	11.02:	1.21:	
2449.248	11.28	1.25		2841.267	10.79	1.12	
2450.321	10.94	1.21		2869.323*	10.75	1.14	
2451.319	10.71	1.12		3217.266	11.11:	1.26:	
2453.343	10.93	1.20		3437.602	11.15	1.26	

CV Monocerotis

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2424.424*	10.04	1.34		2743.525*	10.36	1.46:	
2448.389	10.54	1.42		2775.491*	10.33	1.48:	
2449.263	10.52	1.36:		2816.355	9.94	1.20	
2450.341	9.98	1.15		2831.322	10.51	1.35	
2453.357	10.46:	1.40:		2841.284	10.57	1.42	
2454.305	10.55	1.44		2869.305*	10.23	1.37:	
2455.344	10.11	1.24		3162.418	10.30	1.43	
2473.290	10.13:	1.41:		3424.621	10.03	1.32:	
2715.632	10.25	1.41		3483.530	9.99	1.21	

Table 3 (cont.)

RS Orionis

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2404.448	8.05	0.82	0.51	2767.402	8.12	0.86	0.53
2443.428	8.21	0.92	0.55	2816.336	8.55	1.05	0.77
2448.454	8.75	1.10	0.74	2837.304	8.26	0.95	0.66
2450.362	8.08	0.82	0.53	2850.295	8.33	0.93	0.58
2453.413	8.61	1.11	0.75	3140.373	8.27	0.99	0.54
2455.379	8.86	1.18	0.85	3209.281	8.37	0.97	0.60
2460.364	8.45	1.04	0.76:	3214.317	8.02	0.81	0.50
2467.314	8.24:	1.01:	0.58:	3219.295	8.79:	1.19:	0.82:
2471.334	8.66	1.08	0.61	3228.284	8.56	1.05	0.58
2473.417	8.17	0.90	0.52	3483.637	8.76	1.20	0.90:
2522.306	8.72	1.19	0.75	3560.402	8.86	1.16	0.95:
2756.515	8.65	1.13	0.73				

GQ Orionis

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2404.426	8.74	0.90	0.67	2777.476*	9.16	1.20	0.88
2424.437*	9.19	1.17	0.94	2794.386	9.16	1.12	
2448.411	8.95	1.06	0.72	2816.371	8.71	0.89	0.62
2451.335	9.27	1.18	0.74:	2831.271	9.13	1.05	0.68
2453.378	8.70	0.81	0.61	2841.301	8.65	0.81	0.61
2454.329	8.66	0.85	0.62	2850.262	8.69	0.85	0.60
2460.397	9.30:	1.04:	0.90:	2869.342*	8.74	0.91	
2711.619*	8.73	0.90	0.65	3124.553	9.00	0.99	0.59:
2743.569*	9.27	1.22	0.73:	3228.274	8.90	0.87	0.69
2756.489	8.76	0.90	0.74	3437.591	8.80	0.94	0.75
2767.529	8.96	1.03:		3490.421	8.82	0.98	0.88:
2776.455*	9.01	1.14	0.76				

AW Persei

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2404.520	7.52	1.08	0.59	2424.370*	7.12	0.95	

Table 3 (cont.)

(AW Per)

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2432.301	7.27	1.03	0.61	2743.469*	7.37	1.12	0.79:
2448.432	7.81	1.21	0.79	2756.377	7.36	1.18:	0.70:
2451.352	7.22	0.98	0.65	2767.361	7.06	0.91	0.66
2453.397	7.56	1.19	0.75	2777.317*	7.70	1.23	0.85:
2454.345	7.77	1.25	0.75	2829.336	7.74	1.23	0.83
2455.361	7.84	1.22	0.74	2831.286	7.39	1.01	0.65
2460.332	7.66	1.21	0.76	2837.271	7.67	1.13	0.79:
2465.252	7.40	1.10	0.68	2869.283*	7.82	1.18	0.77
2471.317	7.36	1.04	0.68	2871.278	7.16	1.00	0.58
2685.584	7.43	1.16	0.65:	3426.457	7.06	0.92	0.51:
2711.631*	7.46	1.15	0.77				

HR 690

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
3162.361	6.26	0.90	0.52:	3489.357	6.23	0.87	0.68
3178.234	6.29	0.87	0.56	3546.260	6.25	0.88	0.63
3202.294	6.26	0.79:	0.64:	3560.283	6.20	0.86	0.60
3385.549	6.18	0.84	0.67	3737.465	6.30	0.86	0.62
3420.487	6.31	0.88	0.66	3777.394	6.22	0.82	0.72
3424.448	6.24	0.85		3788.540	6.22	0.85	0.63
3425.472	6.25	0.90	0.63	3789.391	6.28	0.85	0.56
3437.417	6.22	0.85	0.56	3803.313	6.26	0.83	0.68
3483.346	6.22	0.84	0.64	3830.263	6.22	0.86	0.71

S Sagittae

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2289.398	5.84	0.98	0.82:	2620.433	5.32	0.63	0.42
2297.406	5.79	0.98	0.72	2622.521	5.44	0.75	0.47
2343.276	5.33	0.61	0.39	2623.494	5.67	0.91	0.64
2543.570	5.65	0.82	0.49	2635.329	5.85	0.85	0.58
2591.468	5.89	1.00	0.80	2642.356	5.97	1.03	0.80
2613.428	5.38	0.75	0.41	2646.337	5.43	0.77	0.43

Table 3 (cont.)

(S Sge)

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2673.362	5.56	0.91:	0.56:	3351.505	5.39	0.72	0.50
2676.324	6.02	1.01	0.76	3403.404	5.76	0.90	0.72
2904.508	5.45	0.69	0.39	3724.500	5.97	0.97	0.70
2948.470	5.41	0.74	0.45	3743.299	5.35:	0.62:	0.35:

Observations in 1953

J.D.hel. 2430000+	Δv	Δ(b-v)	J.D.hel. 2430000+	Δv	Δ(b-v)
4584.510	+0.115	1.068	4623.463	-0.173	0.691
4585.517	+0.357	1.273	4624.486	-0.055	0.761
4590.550	-0.192	0.876	4627.483	+0.240	1.026
4597.522	+0.139	0.941	4628.482	+0.451	1.127
4622.450	+0.211	0.940	4630.401	+0.370	1.015

U Vulpeculae

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2202.531	7.26:	1.45:	1.20:	2543.499	6.90	1.26	0.96
2206.483	6.81	1.15	0.80	2589.420	7.03	1.25	0.89
2229.506	7.19	1.33	0.94	2601.535	7.28	1.38	1.16
2289.420	7.15	1.36	0.98	2622.375	6.79	1.14	0.87
2307.406	7.44	1.51	1.20	2640.346	6.96	1.32	0.85:
2308.334	7.42	1.51	1.16	2645.449	6.99	1.22	0.82
2343.244	6.85	1.21	0.90	2871.580	6.93	1.28	0.98
2522.549	7.32:	1.55:	1.20:	2928.404	7.05	1.33	0.93
2523.522	7.50	1.44:		2939.407	7.48	1.44	
2532.552	7.36	1.44	1.09	2948.457	7.27	1.32	0.98

Observations in 1953

J.D.hel. 2430000+	Δv	Δ(b-v)	J.D.hel. 2430000+	Δv	Δ(b-v)
4584.468	0.447	0.186	4597.482	1.052	0.398
4585.456	0.479	0.267	4598.443	0.737	0.264
4590.513	0.709	0.292			

Table 3 (cont.)

X Vulpeculae

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2202.473	9.18	1.61	1.11	2646.433	8.71	1.33	0.94
2206.441	8.81	1.48	1.07	2666.310	8.49	1.33	1.05
2266.369	9.16	1.61	1.13	2669.356	9.08	1.63	1.22
2289.444	8.88:	1.53:	1.24:	2673.346	8.65	1.39	1.12
2471.633	8.80	1.42	1.08	2675.326	9.02	1.55	1.05:
2532.534	8.78	1.38	1.07	2949.389	8.91	1.44	
2563.548	9.17	1.41:	1.19:	2960.450	9.12	1.60	1.35:
2591.402	8.70	1.39	1.15	2990.386	8.83	1.50	1.00:
2622.533	8.55	1.37	0.99	3363.474	8.90	1.53	1.24
2639.343	9.16	1.50:	1.16:	3386.372	8.52:	1.26:	1.02:
2640.400	8.47	1.28	1.01				

vations listed in Table 3 using the actual periods available after constructing the O-C diagrams. The value of the actual period is indicated for each light curve. It is the B light curve that is shown in the figures instead of the V one because the determination of the normal maxima was made with the help of the B light curves.

The method of using the other published observational data in constructing the O-C diagrams is the same as described in Paper I (p. 32). The O-C values determined on the basis of visual, photographic and photoelectric observations are marked with open circles, filled circles and triangles, respectively. The size of these marks denotes the weight of the O-C values to be found in the figures of this section.

The columns in the tables of the O-C residuals for each variable contain the following data:

1. The moment of normal maximum (or that of median brightness)
2. The corresponding epoch
3. The O-C residual in days
4. The type of observation (vis for visual, pg for photographic and pe for photoelectric observations)
5. The weight of the O-C residual depending on the type, number and quality of the observations

6. The source of the observational data. When the name of the observer is not identical with the name (or one of the names) given in the reference the observer's name is indicated in the footnote to the table.

The determination of the O-C curves was by a weighted least squares fitting procedure. The O-C residuals with zero weight are not plotted in the diagrams, those with 0.5 weight are plotted but were usually omitted in the curve fitting procedure (otherwise the use of the O-C residuals with 0.5 weight is indicated in the remarks relating to the given variable).

The formula by which the O-C residuals have been calculated is indicated at each variable. These formulae usually refer to maximum light. If O-C diagrams for both maximum and median brightnesses are presented, the two different calculated ephemerides are marked with C_{max} and C_{med} , respectively. O-C diagrams for the median brightness are published here only if they are fairly complete.

<u>V 386 Cygni</u>

The light and colour curves of this Cepheid which has a blue

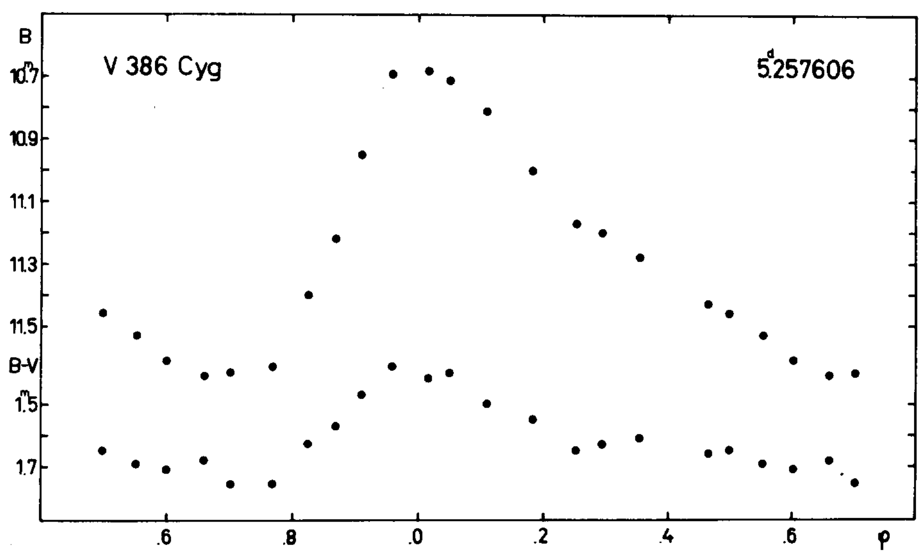

Figure 2 B and B-V curves of V 386 Cyg

photometric companion of spectral type B9 (*Madore* 1977) are shown in Fig. 2. The available observational material is not too rich. This is the reason for also using the 0.5 weight points in determining the correct value of the period.

The O-C residuals have been computed by the formula:

$$C = 2442777.118 + 5\overset{d}{.}257606 \times E \quad .$$

The period of this Cepheid has remained constant since the discovery of its light variation (see Fig. 3).

Table 3 O-C residuals for V 386 Cyg

Obs.Max.J.D.	E	O-C	Type	w	Reference
2416347.178	-5027	+0ᵈ045	pg	0.5	Parenago (1940)
2427977.09	-2815	+0.13	vis	0.5	Selivanov (1936)
2428045.352	-2802	+0.046	vis	0.5	Szafraniec[1] (1961)
2428555.275	-2705	-0.019	pg	0.5	Parenago (1940)
2429144.169	-2593	+0.023	pg	0.5	Ishchenko (1948)
2429454.348	-2534	+0.004	pg	0.5	Ishchenko (1948)
2429827.585	-2463	-0.049	pg	0.5	Ishchenko (1948)
2434149.248	-1641	-0.139	pg	1	Shteiman (1958)
2435689.768	-1348	-0.097	pg	1	Shteiman (1958)
2436094.879	-1271	+0.178	pg	0.5	Korovkina (1958)
2436762.403	-1144	-0.014	pe	3	Weaver et al. (1960)
2436804.456	-1136	-0.022	pe	3	Oosterhoff (1960)
2437251.385	-1051	+0.011	pe	2	Mitchell et al. (1964)
2438224.025	-866	-0.006	pg	1	Dultsev (1967)
2442777.160	0	+0.042	pe	3	present paper

Remark: [1] Observer: Piegza

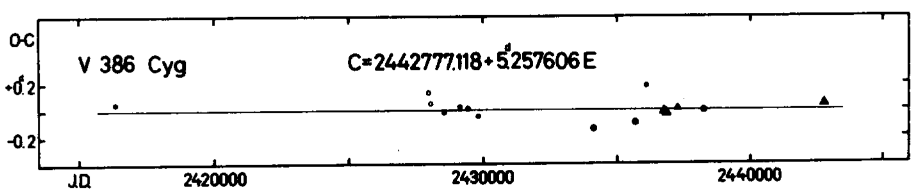

Figure 3 O-C diagram of V 386 Cyg

<u>BG Lacertae</u>

There is a faint NW companion within the edge of the diaphragm. The present amplitudes in B and U bands are smaller than those given by *Schaltenbrand* and *Tammann* (1971), which can be attributed to the effect of this optical companion (see Fig. 4). According to *Madore* (1977) BG Lac has a B8 type photometric companion. This physical companion is obviously not identical with the optical companion star.

The O-C residuals plotted in Fig. 5 have been computed with the formula:

$$C = 2442673.222 + 5\overset{d}{.}331932 \times E \quad .$$

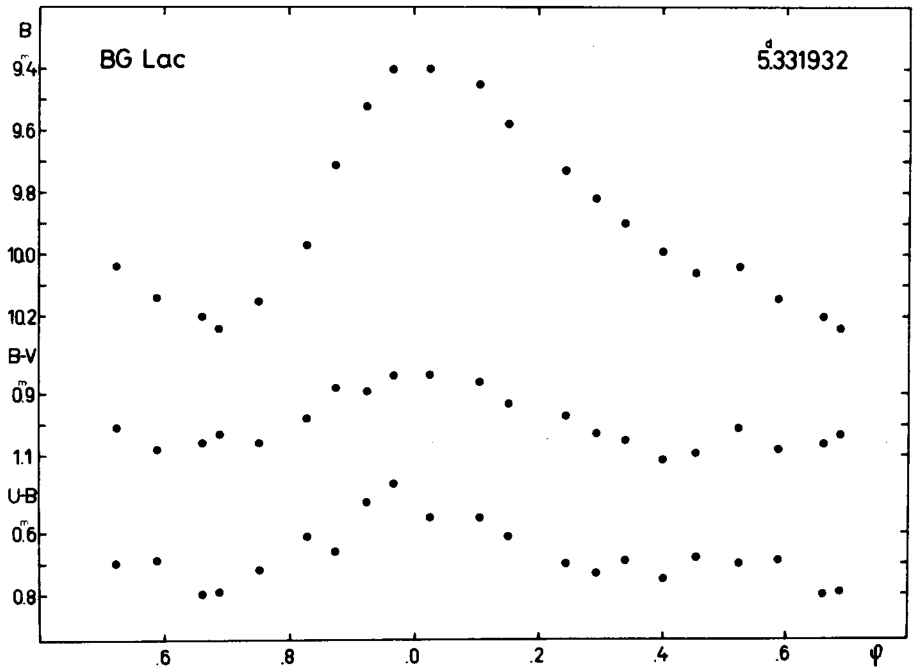

Figure 4 B, B-V and U-B curves of BG Lac

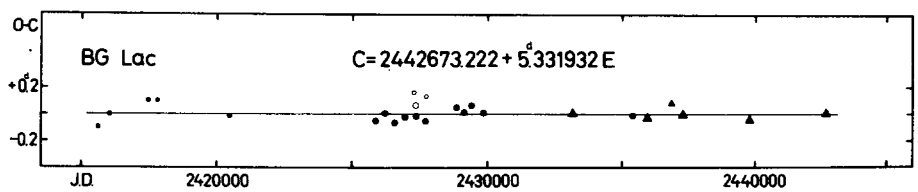

Figure 5 O-C diagram of BG Lac

The O-C diagram can be approximated by a straight line which shows the constancy of the period.

Table 5 O-C residuals for BG Lac

Obs.Max.J.D.	E	O-C	Type	w	Reference
2414899.7	-5209	+0^{d}.5	pg	0	Parenago (1934a)
2415256.1	-5142	-0.3	pg	0	Parenago (1934a)
2415613.6	-5075	-0.1	pg	0.5	Parenago (1934a)
2416024.2	-4998	0.0	pg	0.5	Parenago (1934a)
2417469.3	-4727	+0.1	pg	0.5	Parenago (1934a)
2417826.5	-4660	+0.1	pg	0.5	Parenago (1934a)
2420455.051	-4167	-0.010	pg	0.5	Robinson (1933)
2425850.928	-3155	-0.049	pg	1	Wachmann (1935)
2426192.223	-3091	+0.003	pg	1	Wachmann (1935)

Table 5 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2426560.056	-3022	$-0^{d}.068$	pg	1	Wachmann (1935)
2426928.005	-2953	-0.022	pg	1	Wachmann (1935)
2427258.761	-2891	+0.154	vis	0.5	Iwanowska et al. (1938)
2427295.998	-2884	+0.068	vis	1	Florya et al. (1953)
2427333.241	-2877	-0.013	pg	1	Gesundheit (1938)
2427695.773	-2809	-0.052	pg	1	Gesundheit (1938)
2427727.949	-2803	+0.132	vis	0.5	Iwanowska et al. (1938)
2428826.250	-2597	+0.055	pg	1	Ishchenko (1948)
2429114.135	-2543	+0.016	pg	1	Ishchenko (1948)
2429439.435	-2482	+0.068	pg	1	Ishchenko (1948)
2429844.602	-2406	+0.008	pg	1	Ishchenko (1948)
2433129.068	-1790	+0.004	pe	3	Eggen (1951)
2435389.791	-1366	-0.012	pg	1	Mashnauskas (1960)
2435938.962	-1263	-0.030	pe	3	Bahner et al. (1977)
2436834.834	-1095	+0.078	pe	2	Bahner et al. (1962)
2437261.307	-1015	-0.004	pe	3	Mitchell et al. (1964)
2439772.614	-544	-0.037	pe	3	present paper[1]
2442673.231	0	+0.009	pe	3	present paper

Remark: [1] Observer: Abaffy

δ Cephei

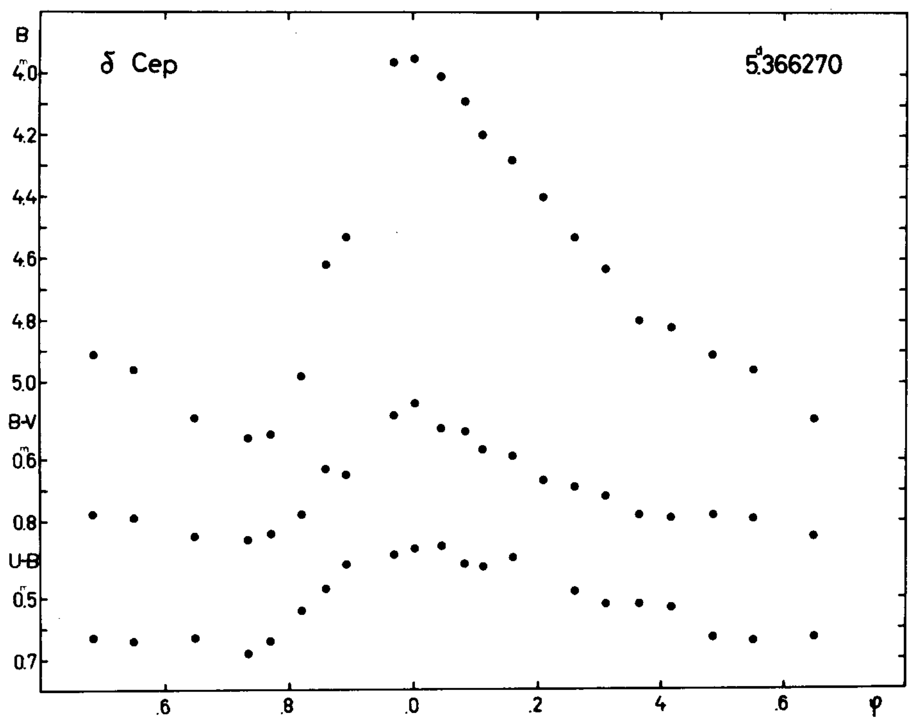

Figure 6 B, B-V and U-B curves of δ Cep

This star is one of the most frequently observed Cepheid variables. Its light and colour curves are plotted in Fig. 6. The large number of the photoelectric observational series made it possible to construct the O-C diagram not only for the maximum brightness but also for the median brightness.

The O-C residuals for this star have been obtained by the formulae:

$$C_{max} = 2442756.490 + 5^{d}.366270 \times E \quad ,$$
$$C_{med} = 2442755.850 + 5^{d}.366270 \times E \quad .$$

Although several sudden period changes have been reported (e.g. *Kukarkin* et al. 1969-1970) the O-C diagram in Fig. 7 can be approximated by a parabolic curve better than by three (or more)

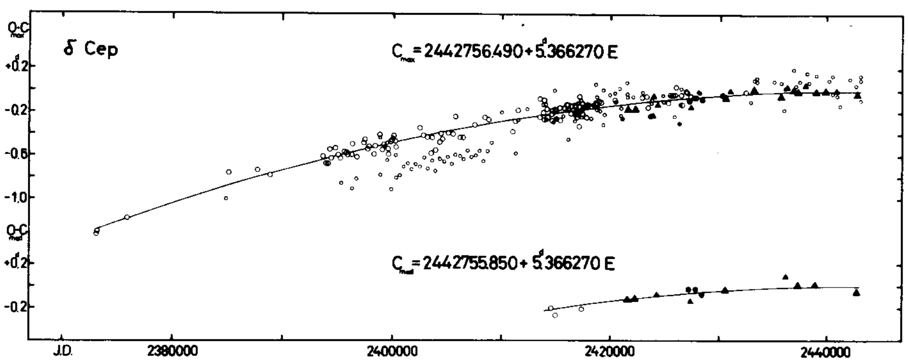

Figure 7 O-C diagram of δ Cep

straight lines. The equation of the parabolic curve for the maximum brightness is as follows:

$$C_{par} = 2442756.490 + 5.366270 \times E - 7.6 \times 10^{-9} \times E^{2} \quad .$$

Table 6 O-C residuals for δ Cep
(maximum brightness)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2373090.249	-12982	$-1^{d}.324$	vis	1	Goodricke (1786)
2373101.003	-12980	-1.302	vis	1	Goodricke[1] (1786) Pigott (1786)
2375870.126	-12464	-1.175	vis	1	Nielsen[2] (1933)
2384874.9	-10786	-1.0	vis	0.5	Müller et al.[3] (1918-1920)
2385105.889	-10743	-0.762	vis	1	Westphal (1817, 1818)
2387670.994	-10265	-0.734	vis	1	Müller[4] (1925)
2388862.263	-10043	-0.777	vis	1	Müller[4] (1925)
2393606.216	-9159	-0.607	vis	1	Argelander (1869)
2393842.265	-9115	-0.674	vis	1	Hagen[5] (1903)
2394008.616	-9084	-0.677	vis	1	Argelander (1869)
2394201.933	-9048	-0.546	vis	1	Hagen[5] (1903)

Table 6 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2394389.669	-9013	-0^d.629	vis	1	Argelander (1869)
2394711.741	-8953	-0.534	vis	1	Argelander (1869)
2394958.528	-8907	-0.595	vis	1	Hagen[5] (1903)
2395173.145	-8867	-0.629	vis	1	Argelander (1869)
2395258.781	-8851	-0.853	vis	0.5	Schmidt (1857b)
2395522.016	-8802	-0.565	vis	1	Argelander (1869)
2395752.752	-8759	-0.579	vis	1	Hagen[5] (1903)
2395860.058	-8739	-0.598	vis	1	Argelander (1869)
2396235.803	-8669	-0.492	vis	1	Argelander (1869)
2396240.757	-8668	-0.905	vis	0.5	Schmidt (1857b)
2396241.068	-8668	-0.594	vis	1	Hagen[5] (1903)
2396611.115	-8599	-0.819	vis	0.5	Schmidt (1857b)
2396729.378	-8577	-0.614	vis	1	Hagen[5] (1903)
2397287.837	-8473	-0.247	vis	0	Hagen[5] (1903)
2397319.799	-8467	-0.483	vis	1	Argelander (1869)
2397400.321	-8452	-0.455	vis	1	Johnson (1853)
2397690.007	-8398	-0.548	vis	1	Argelander (1869)
2397738.331	-8389	-0.520	vis	1	Hagen[5] (1903)
2398248.058	-8294	-0.589	vis	1	Hagen[5] (1903)
2398328.628	-8279	-0.513	vis	1	Argelander (1869)
2398763.398	-8198	-0.411	vis	1	Argelander (1869)
2398800.942	-8191	-0.430	vis	0.5	Schönfeld (1861)
2398848.890	-8182	-0.779	vis	0.5	Schmidt (1857b)
2398999.378	-8154	-0.546	vis	1	Hagen[5] (1903)
2399171.144	-8122	-0.501	vis	1	Argelander (1869)
2399197.960	-8117	-0.516	vis	0.5	Schönfeld (1861)
2399455.415	-8069	-0.642	vis	0.5	Schmidt (1858a)
2399487.769	-8063	-0.486	vis	0.5	Schönfeld (1861)
2399509.180	-8059	-0.540	vis	1	Argelander (1869)
2399589.627	-8044	-0.587	vis	1	Zinner et al.[6] (1931)
2399739.997	-8016	-0.473	vis	1	Müller[4] (1925)
2399841.969	-7997	-0.460	vis	1	Argelander (1869)
2399852.250	-7995	-0.911	vis	0.5	Schmidt (1859)
2399976.139	-7972	-0.447	vis	0.5	Auwers (1859)
2400088.858	-7951	-0.419	vis	1	Hagen[5] (1903)
2400180.032	-7934	-0.472	vis	1	Argelander (1869)
2400206.736	-7929	-0.599	vis	0.5	Schönfeld (1869)
2400228.275	-7925	-0.525	vis	1	Zinner et al.[6] (1931)
2400270.922	-7917	-0.808	vis	0.5	Schmidt (1860b)
2400609.023	-7854	-0.782	vis	0.5	Schmidt (1861)
2400957.910	-7789	-0.703	vis	0.5	Schmidt (1862)
2401322.843	-7721	-0.676	vis	0.5	Schmidt (1863)
2401698.433	-7651	-0.725	vis	0.5	Schmidt (1864)
2402063.387	-7583	-0.678	vis	0.5	Schmidt (1865)
2402407.160	-7519	-0.346	vis	1	Valentiner[7] (1900)
2402449.731	-7511	-0.705	vis	0.5	Schmidt (1866)
2402739.798	-7457	-0.417	vis	1	Valentiner[7] (1900)
2402803.996	-7445	-0.614	vis	0.5	Schmidt (1867)
2403110.059	-7388	-0.428	vis	1	Valentiner[7] (1900)
2403152.700	-7380	-0.717	vis	0.5	Schmidt (1868)
2403458.716	-7323	-0.579	vis	1	Valentiner[7] (1900)
2403533.775	-7309	-0.648	vis	0.5	Schmidt (1869)
2403539.356	-7308	-0.433	vis	1	Zinner et al.[6] (1931)
2403871.758	-7246	-0.740	vis	0.5	Schmidt (1870)
2403893.411	-7242	-0.552	vis	1	Valentiner[7] (1900)

Table 6 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2404242.293	-7177	$-0\overset{d}{.}477$	vis	1	Valentiner[7] (1900)
2404268.974	-7172	-0.628	vis	0.5	Schmidt (1871)
2404392.631	-7149	-0.395	vis	1	Zinner et al.[6] (1931)
2404601.859	-7110	-0.451	vis	1	Valentiner[7] (1900)
2404628.487	-7105	-0.655	vis	0.5	Schmidt (1872)
2404998.802	-7036	-0.612	vis	0.5	Schmidt (1873)
2405020.493	-7032	-0.386	vis	1	Valentiner[7] (1900)
2405352.911	-6970	-0.677	vis	0.5	Schmidt (1874)
2405417.586	-6958	-0.397	vis	1	Valentiner[7] (1900)
2405701.804	-6905	-0.592	vis	0.5	Schmidt (1875)
2405712.890	-6903	-0.238	vis	1	Valentiner[7] (1900)
2406087.955	-6833	-0.812	vis	0	Chandler (1877)
2406114.996	-6828	-0.602	vis	0.5	Schmidt (1876)
2406136.633	-6824	-0.431	vis	1	Valentiner[7] (1900)
2406372.746	-6780	-0.433	vis	1	Belyavsky[8] (1910)
2406436.939	-6768	-0.636	vis	0.5	Schmidt (1877)
2406812.658	-6698	-0.556	vis	0.5	Schmidt (1878)
2407193.609	-6627	-0.610	vis	0.5	Schmidt (1879)
2407198.766	-6626	-0.819	vis	0	Schwab (1879)
2407499.780	-6570	-0.316	vis	1	Schur (1895)
2407563.892	-6558	-0.599	vis	0.5	Schmidt (1880)
2407907.375	-6494	-0.558	vis	0.5	Schmidt (1881)
2408277.556	-6425	-0.649	vis	0.5	Schmidt (1882)
2408412.117	-6400	-0.245	vis	1	Wilsing (1897)
2408637.187	-6358	-0.558	vis	0.5	Schmidt (1883)
2408766.269	-6334	-0.267	vis	1	Schur (1895)
2409018.272	-6287	-0.479	vis	0.5	Schmidt (1884)
2409957.650	-6112	-0.198	vis	0.5	Hagen (1891)
2410955.596	-5926	-0.378	vis	1	Valentiner[7] (1900)
2411197.178	-5881	-0.278	vis	1	Valentiner[7] (1900)
2411255.897	-5870	-0.588	vis	0.5	Yendell (1890b)
2411395.744	-5844	-0.264	vis	0.5	Porro (1896)
2411481.686	-5828	-0.182	vis	1	Valentiner[7] (1900)
2412275.908	-5680	-0.168	vis	0.5	Hertzsprung[9] (1919)
2413424.210	-5466	-0.248	vis	1	Stratonov (1904)
2413483.411	-5455	-0.076	vis	1	Plassmann (1900)
2413783.874	-5399	-0.124	vis	0.5	Hertzsprung[10] (1919)
2413789.159	-5398	-0.206	vis	1	Plassmann (1900)
2413826.659	-5391	-0.269	vis	1	Stratonov (1904)
2413832.202	-5390	-0.093	vis	1	Pickering (1904)
2413918.031	-5374	-0.124	vis	0.5	Belyavsky (1904)
2413950.090	-5368	-0.263	vis	0.5	Nijland (1923)
2414111.171	-5338	-0.170	vis	1	Plassmann (1900)
2414170.120	-5327	-0.250	vis	1	Stratonov (1904)
2414513.534	-5263	-0.277	vis	1	Plassmann (1900)
2414551.158	-5256	-0.217	vis	1	Stebbins (1908)
2414556.556	-5255	-0.185	vis	1	Luizet (1912)
2414615.484	-5244	-0.286	vis	0.5	Zinner[11] (1932)
2414782.125	-5213	+0.001	vis	0.5	Belyavsky (1904)
2414873.181	-5196	-0.170	vis	1	Luizet (1912)
2414878.531	-5195	-0.186	vis	1	Plassmann (1900)
2414926.748	-5186	-0.266	pg	1	Wirtz (1901)
2415243.464	-5127	-0.160	vis	1	Luizet (1912)
2415307.747	-5115	-0.272	vis	1	Plassmann (1901)
2415560.003	-5068	-0.231	vis	0.5	Belyavsky (1904)

Table 6 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2415608.375	-5059	$-0^{d}.155$	vis	1	Plassmann (1906)
2415640.568	-5053	-0.160	vis	1	Luizet (1912)
2415930.377	-4999	-0.129	vis	1	Plassmann (1906)
2415989.364	-4988	-0.171	vis	1	Bilt (1924b)
2415994.773	-4987	-0.129	vis	1	Luizet (1912)
2416032.294	-4980	-0.171	vis	0.5	Roy et al. (1905)
2416085.679	-4970	-0.449	vis	0.5	Lau (1903)
2416305.935	-4929	-0.210	vis	1	Plassmann (1906)
2416370.401	-4917	-0.139	vis	1	Luizet (1912)
2416622.474	-4870	-0.281	vis	0.5	Götz (1906)
2416676.288	-4860	-0.130	vis	1	Plassmann (1906)
2416692.311	-4857	-0.206	vis	0.5	Terkán (1905)
2416703.028	-4855	-0.221	vis	1	Bilt (1924b)
2416762.133	-4844	-0.145	vis	1	Luizet (1912)
2416799.644	-4837	-0.198	vis	0.5	Nijland (1923)
2416858.625	-4826	-0.246	vis	1	Tass[12] (1925)
2416912.417	-4816	-0.117	vis	0.5	Schiller (1906)
2416998.171	-4800	-0.223	vis	0.5	Zinner[11] (1932)
2417035.634	-4793	-0.324	vis	1	Plassmann (1906)
2417073.335	-4786	-0.187	pg	1	Meyermann (1907)
2417111.036	-4779	-0.050	vis	1	Luizet (1912)
2417169.937	-4768	-0.178	vis	1	Bilt (1924b)
2417196.860	-4763	-0.086	vis	0.5	Furness[13] (1913)
2417255.729	-4752	-0.246	vis	0.5	Lohnert (1909)
2417336.251	-4737	-0.218	vis	1	Nijland (1923)
2417390.011	-4727	-0.121	vis	1	Plassmann (1906, 1908)
2417481.212	-4710	-0.146	vis	1	Luizet (1912)
2417701.232	-4669	-0.143	pg	1	Jordan (1919)
2417744.061	-4661	-0.245	vis	1	Bilt (1924b)
2417776.361	-4655	-0.142	vis	0.5	Zinner[11] (1932)
2417792.470	-4652	-0.132	vis	1	Plassmann (1908)
2417846.134	-4642	-0.131	vis	1	Luizet (1912)
2418125.055	-4590	-0.256	vis	0.5	Scheller (1912)
2418216.390	-4573	-0.147	vis	1	Luizet (1912)
2418291.535	-4559	-0.130	vis	0.5	Favaro (1909)
2418517.109	-4517	+0.061	vis	0.5	Mündler (1911)
2418586.700	-4504	-0.110	vis	1	Luizet (1912)
2418629.620	-4496	-0.120	vis	1	Bemporad (1910)
2418661.769	-4490	-0.169	vis	0.5	Scheller(1912),Kaiser(1915)
2418661.882	-4490	-0.056	vis	0.5	Olivier (1952)
2418956.993	-4435	-0.090	vis	1	Luizet (1912)
2418983.728	-4430	-0.186	vis	0.5	Padova (1911, 1912)
2419075.037	-4413	-0.103	vis	1	Bemporad (1916)
2419230.769	-4384	+0.007	vis	0.5	Hornig (1915)
2419294.847	-4372	-0.311	vis	0.5	Lau (1913)
2419380.800	-4356	-0.218	vis	0.5	Zinner[11] (1932)
2419685.646	-4299	-1.249	vis	0	Breson (1913)
2419858.581	-4267	-0.035	vis	0.5	Olivier (1952)
2420320.098	-4181	-0.017	vis	0.5	Lazzarino (1915)
2420346.859	-4176	-0.087	vis	1	Bemporad (1915)
2420379.047	-4170	-0.097	vis	0.5	Zinner[11] (1932)
2420722.611	-4106	+0.026	vis	0.5	Olivier (1952)
2420910.17	-4071	-0.23	vis	0.5	Vogelenzang (1921)
2420980.007	-4058	-0.159	vis	0.5	Luyten (1922)
2421001.382	-4054	-0.249	pg	0.5	Robinson (1933)

Table 6 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2421237.822	-4010	+0.075 d	vis	0.5	Paci (1918)
2421430.903	-3974	-0.030	vis	0.5	Zinner[11] (1932)
2421457.714	-3969	-0.050	vis	0.5	Luyten (1922)
2421559.551	-3950	-0.173	pe	3	Guthnick (1919)
2421940.673	-3879	-0.056	vis	0.5	Luyten (1922)
2422241.065	-3823	-0.175	pe	3	Guthnick (1923)
2422278.640	-3816	-0.164	vis	0.5	Olivier (1952)
2422852.978	-3709	-0.017	vis	0.5	Zinner[11] (1932)
2422895.866	-3701	-0.059	vis	1	Nielsen (1926)
2423223.218	-3640	-0.049	vis	1	Zverev (1936)
2423335.809	-3619	-0.150	vis	1	Nielsen (1926)
2423620.263	-3566	-0.108	vis	0.5	Parenago (1938a)
2423646.971	-3561	-0.232	pg	1	Henroteau (1924)
2423679.314	-3555	-0.086	vis	0.5	Hopmann (1926)
2423829.432	-3527	-0.224	pe	2	Danjon (1927)
2423904.733	-3513	-0.050	pe	1	Pettit et al. (1933)
2424291.029	-3441	-0.126	pe	2	Danjon (1928)
2424741.882	-3357	-0.040	vis	0.5	Parenago (1938a)
2424774.021	-3351	-0.098	vis	0.5	Kukarkin (1940)
2425235.510	-3265	-0.108	vis	1	Collmann (1930)
2425401.937	-3234	-0.036	vis	1	McLaughlin (1934a)
2425418.030	-3231	-0.042	vis	0.5	Kukarkin (1940)
2425707.813	-3177	-0.037	vis	1	Parenago (1938a)
2425798.842	-3160	-0.235	vis	0.5	Fesenkov (1930)
2425852.704	-3150	-0.036	vis	1	Zverev (1936)
2425965.467	-3129	+0.036	vis	1	McLaughlin (1934a)
2426297.842	-3067	-0.298	pg	0.5	Farnsworth (1933)
2426362.410	-3055	-0.125	vis	0.5	Kukarkin (1940)
2426421.584	-3044	+0.020	vis	0.5	Parenago (1938a)
2426464.461	-3036	-0.033	vis	1	McLaughlin (1934a)
2426507.295	-3028	-0.129	vis	1	Lipinski (1934)
2426888.424	-2957	-0.006	vis	1	Florya et al. (1953)
2426920.616	-2951	-0.011	vis	1	McLaughlin (1934a)
2427221.046	-2895	-0.092	pg	2	Wesselink (1946)
2427301.584	-2880	-0.048	vis	1	Florya et al. (1953)
2427371.242	-2867	-0.152	pe	2	Smart (1935)
2427687.939	-2808	-0.065	vis	1	Florya (1938)
2427843.563	-2779	-0.063	pg	2	Wesselink (1946)
2428031.438	-2744	-0.007	vis	0.5	Parenago (1938a)
2428079.73	-2735	-0.01	vis	0.5	Sures (1937)
2428412.368	-2673	-0.082	pg	2	Wesselink (1946)
2430226.213	-2335	-0.037	pg	1	Wesselink (1946)
2430553.527	-2274	-0.065	pe	3	Stebbins (1945)
2430950.696	-2200	0.000	pe	1	Canavaggia (1949)
2432453.239	-1920	-0.013	vis	1	Petrov (1949)
2432823.4	-1851	-0.1	vis	0.5	Pohl (1951)
2433134.784	-1793	+0.016	pe	3	Eggen (1951)
2433215.36	-1778	+0.10	vis	0.5	Pohl[14] (1951)
2433403.20	-1743	+0.12	vis	0.5	Domke and Pohl[14] (1952)
2433430.00	-1738	+0.09	vis	0.5	Domke and Pohl[15] (1952)
2434476.81	-1543	+0.48	vis	0	Pohl[16] (1955)
2435045.25	-1437	+0.09	vis	0.5	Rudolph[17] (1959)
2435694.56	-1316	+0.08	vis	0.5	Rudolph[18] (1959)
2435715.894	-1312	-0.050	pe	3	Sentsova (1957)
2435978.72	-1263	-0.17	vis	0.5	Rudolph (1959)

Table 6 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2436005.75	-1258	+0.^{d}03	vis	0.5	Rudolph[18] (1959)
2436139.92	-1233	+0.04	vis	0.5	Rudolph (1959)
2436172.119	-1227	+0.042	pe	2	Oke (1961b)
2436816.2	-1107	+0.2	vis	0.5	Braune et al.[17] (1962)
2436837.497	-1103	+0.003	pe	3	Bahner et al. (1962)
2437025.361	-1068	+0.047	vis	0.5	Azarnova (1962)
2437239.956	-1028	-0.008	pe	3	Mitchell et al. (1964)
2437379.58	-1002	+0.09	vis	0.5	Braune et al.[18] (1967)
2437391.06	-1000	+0.84	vis	0	Braune et al.[19] (1967)
2437937.634	-898	+0.054	pe	1	Williams (1966)
2438055.806	-876	+0.169	vis	0.5	Mayall[20] (1972)
2438232.804	-843	+0.080	vis	0.5	Mayall[21] (1972)
2438930.327	-713	-0.012	pe	3	Wisniewski et al. (1968)
2438968.05	-706	+0.15	vis	0.5	Braune et al. (1967)
2439805.040	-550	-0.002	pe	3	present paper[22]
2440111.0	-493	+0.1	vis	0.5	Braune et al.[23] (1970)
2440470.60	-426	+0.14	vis	0.5	Busch (1977b)
2440475.80	-425	-0.02	vis	0.5	Braune et al.[23] (1972)
2440878.298	-350	+0.003	pe	2	Evans (1976)
2440894.35	-347	-0.04	vis	0.5	Braune et al.[23] (1972)
2441173.31	-295	-0.13	vis	0.5	Braune et al.[24] (1972)
2442058.989	-130	+0.114	vis	0.5	Mosch et al. (1976)
2442686.781	-13	+0.053	vis	0.5	Mosch et al. (1976)
2442756.458	0	-0.032	pe	3	present paper
2443035.679	+52	+0.143	vis	0.5	Busch[25] (1977a)
2443041.003	+53	+0.101	vis	0.5	Busch[26] (1977a)
2443062.286	+57	-0.081	vis	0.5	Busch[27] (1977a)

Remarks: (observers) [1] Pigott; [2] Rittenhouse; [3] Gauss; [4] Schwerd; [5] Heis; [6] Winnecke; [7] Schönfeld; [8] Glasenapp; [9] Knopf; [10] Pannekoek; [11] Hartwig; [12] Terkán; [13] Whitney; [14] Sofronijevitsch; [15] Born; [16] Münster; [17] Pohl; [18] Masuch; [19] Fernandes; [20] Ross; [21] Baldwin; [22] Abaffy; [23] Eckert; [24] Bauer; [25] Bransk; [26] Reichenbächer; [27] Enskonatus.

Table 7 O-C residuals for δ Cep

(median brightness)

Obs.Med.J.D.	E	O-C	Type	w	Reference
2414550.530	-5256	-0.^{d}205	vis	1	Stebbins (1908)
2414926.104	-5186	-0.270	pg	1	Wirtz (1901)
2417335.618	-4737	-0.211	vis	1	Nijland (1923)
2421558.955	-3950	-0.129	pe	3	Guthnick (1919)
2422240.480	-3823	-0.120	pe	3	Guthnick (1923)
2424290.439	-3441	-0.076	pe	2	Danjon (1928)
2427220.466	-2895	-0.032	pg	2	Wesselink (1946)
2427370.620	-2867	-0.134	pe	2	Smart (1935)
2427842.962	-2779	-0.024	pg	2	Wesselink (1946)
2428411.735	-2673	-0.075	pg	2	Wesselink (1946)
2430552.916	-2274	-0.036	pe	3	Stebbins (1945)
2436171.529	-1227	+0.092	pe	2	Oke (1961b)
2437239.339	-1028	+0.017	pe	3	Mitchell et al. (1964)
2438929.715	-713	+0.016	pe	3	Wisniewski et al. (1968)
2442755.798	0	-0.052	pe	3	present paper

CV Monocerotis

This faint Cepheid has five very faint companions. Earlier CV Mon was thought to be a cluster member (*Arp* 1960). Under the influence of these surrounding stars the V and B-V amplitudes derived from the present photometry (see Fig. 8) are smaller than those given by *Schaltenbrand* and *Tammann* (1971). CV Mon has a physical companion with a spectral type of B7 (*Madore* 1977). It cannot be excluded that this B7 companion is the closest star among the visible companions but none of the photometries have so far been able to separate its photometric influence.

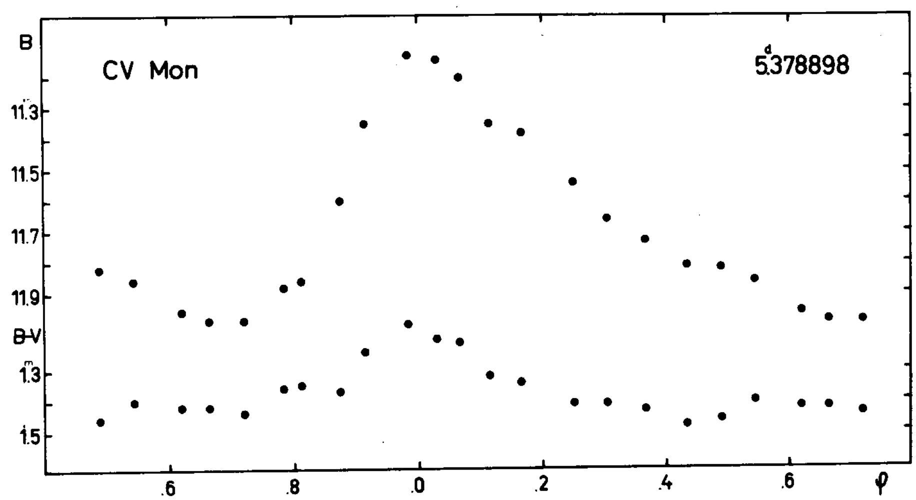

Figure 8 B and B-V curves of CV Mon

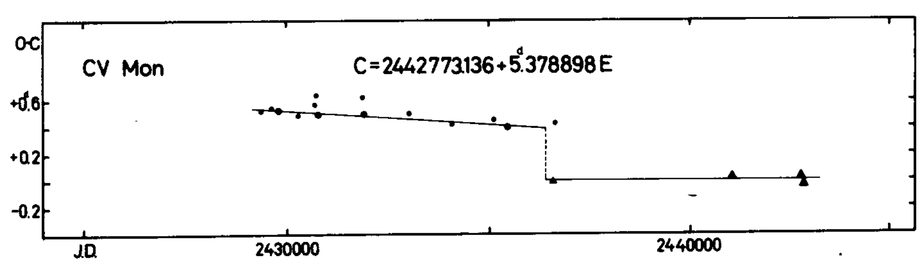

Figure 9 O-C diagram of CV Mon

The O-C residuals given in Table 8 were computed using the formula:

$$C = 2442773.136 + 5\overset{d}{.}378898 \times E$$

The O-C diagram in Fig 9. can be approximated by two almost parallel straight lines representing the phenomenon of the rejumping period (or stepwise O-C diagram). For CV Mon the jump and the subsequent rejump in the period occurred so suddenly that the intermediate period cannot be determined. The values of the period are:

before J.D. 2436000 $P = 5^{d}.378782$,

after J.D. 2436000 $P = 5^{d}.378898$.

Table 8 O-C residuals for CV Mon

Obs.Max.J.D.	E	O-C	Type	w	Reference
2429364.063	-2493	$+0^{d}.520$	pg	0.5	Wachmann (1964b)
2429638.41	-2442	+0.54	pg	0.5	Ahnert (1947)
2429805.142	-2411	+0.529	pg	1	Teplitskaya (1951)
2430289.20	-2321	+0.49	pg	0.5	Ahnert (1947)
2430698.081	-2245	+0.571	pg	0.5	Wachmann (1964b)
2430735.80	-2238	+0.64	pg	0.5	Ahnert (1947)
2430778.688	-2230	+0.495	pg	1	Teplitskaya (1951)
2431876.114	-2026	+0.625	pg	0.5	Wachmann (1964b)
2431908.261	-2020	+0.499	pg	1	Filatov (1961)
2433005.559	-1816	+0.502	pg	0.5	Wachmann (1964b)
2434086.634	-1615	+0.418	pg	0.5	Wachmann (1964b)
2435119.417	-1423	+0.453	pg	0.5	Wachmann (1964b)
2435447.480	-1362	+0.403	pg	1	Filatov (1961)
2436571.256	-1153	-0.011	pe	2	Arp (1960)
2436630.860	-1142	+0.426	pg	0.5	Wachmann (1964b)
2441035.777	-323	+0.025	pe	3	Pel (1976)
2442773.160	0	+0.024	pe	3	present paper
2442837.641	+12	-0.042	pe	3	Turner (1978)

SW Cassiopeiae

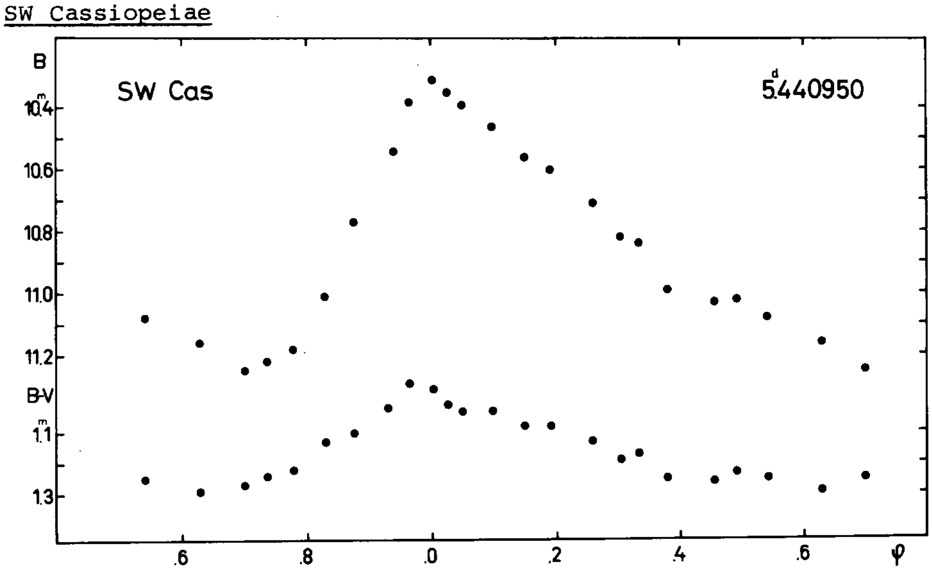

Figure 10 B and B-V curves of SW Cas

The light and colour curves of this variable are plotted in Fig. 10. The O-C diagrams are constructed for both maximum and median brightnesses (Tables 9 and 10, Fig. 11). The O-C residuals have been calculated using the formulae:

$$C_{max} = 2442989.590 + 5\overset{d}{.}440950 \times E \quad ,$$
$$C_{med} = 2442988.808 + 5\overset{d}{.}440950 \times E \quad .$$

The period has remained constant since the discovery of the light variation of SW Cas. The lines fitted to these two O-C diagrams are parallel to each other.

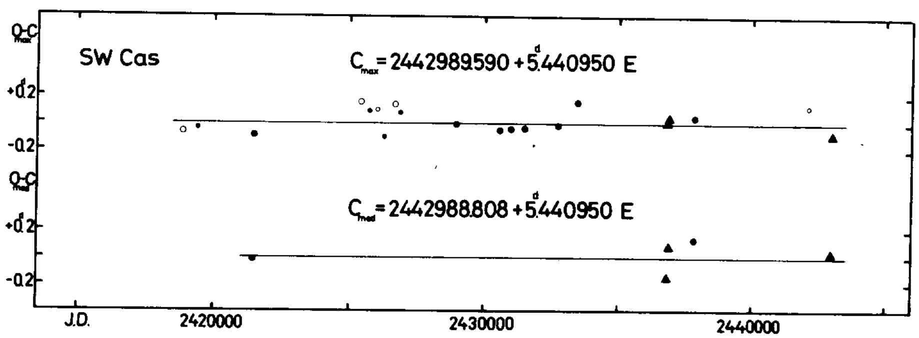

Figure 11 O-C diagram of SW Cas

Table 9 O-C residuals for SW Cas
(maximum brightness)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2418869.792	-4433	$-0\overset{d}{.}067$	vis	1	Enebo (1911)
2419403.033	-4335	-0.039	pg	0.5	Robinson (1933)
2421459.659	-3957	-0.092	pg	2	Jordan (1929)
2425415.478	-3230	+0.157	vis	1	Beyer (1930)
2425747.31	-3169	+0.09	pg	0.5	Kiehl, Hopp (1977)
2426041.129	-3115	+0.098	vis	0.5	Parenago (1938a)
2426269.45	-3073	-0.10	pg	0.5	Kiehl, Hopp (1977)
2426694.076	-2995	+0.131	vis	1	Kukarkin (1940)
2426873.58	-2962	+0.08	pg	0.5	Kiehl, Hopp (1977)
2428962.816	-2578	-0.005	pg	1	Tolmár (1940b)
2430578.733	-2281	-0.050	pg	1	Solov'yov (1954)
2430992.253	-2205	-0.042	pg	1	Solov'yov (1954)
2431498.269	-2112	-0.035	pg	1	Solov'yov (1954)
2432733.383	-1885	-0.016	pg	1	Solov'yov (1954)
2433457.203	-1752	+0.157	pg	1	Solov'yov (1954)
2436803.232	-1137	+0.002	pe	3	Weaver et al. (1960)
2436808.673	-1136	+0.002	pe	3	Oosterhoff (1960)
2436874.002	-1124	+0.040	pe	3	Bahner et al. (1962)
2437837.054	-947	+0.044	pg	2	Golovatyj (1964)
2442086.52	-166	+0.13	vis	0.5	Small (1974)
2442989.509	0	-0.081	pe	3	present paper

Table 10 O-C residuals for SW Cas
(median brightness)

Obs.Med.J.D.	E	O-C	Type	w	Reference
2421458.952	-3957	$-0\overset{d}{.}017$	pg	2	Jordan (1929)
2436807.737	-1136	-0.152	pe	3	Oosterhoff (1960)
2436873.257	-1124	+0.077	pe	3	Bahner et al. (1962)
2437836.358	-947	+0.130	pg	2	Golovatyj (1964)
2442988.840	0	+0.032	pe	3	present paper

X Lacertae

This star is a small amplitude Cepheid (type Is) but the light curve is not symmetrical (see Fig. 12). The O-C residuals

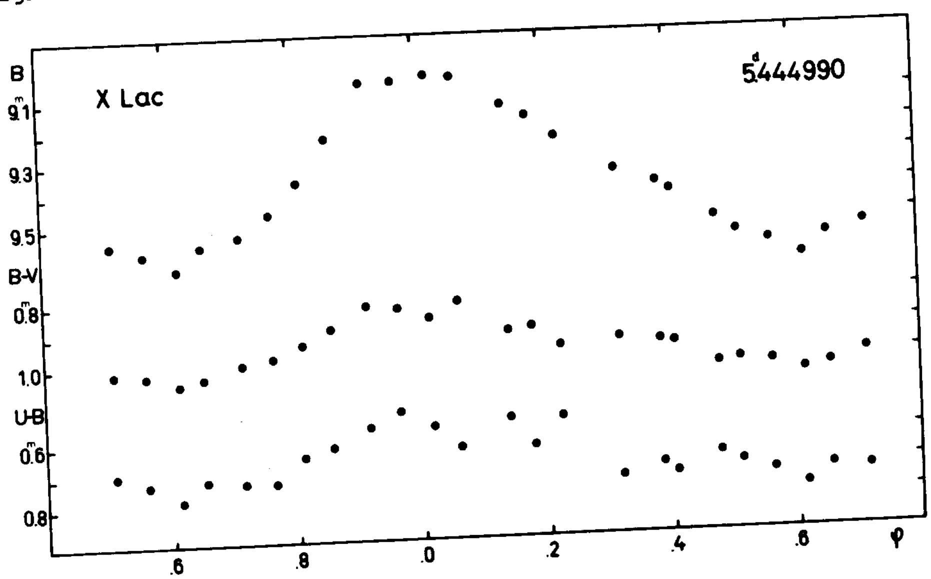

Figure 12 B, B-V and U-B curves of X Lac

have been derived using the formulae:

$$C_{max} = 2442738.132 + 5\overset{d}{.}444990 \times E \quad ,$$

$$C_{med} = 2442737.243 + 5\overset{d}{.}444990 \times E \quad .$$

The O-C diagram in Fig. 13 shows one change in the period:

before J.D. 2429500 $\quad P = 5\overset{d}{.}444212$

after J.D. 2429500 $\quad P = 5\overset{d}{.}444990$.

Grigorevski and *Motrich* (1973) tried to approximate the O-C diagram of X Lac by a parabolic curve too, but one can see in Fig. 13 that the proper approximation is that using two straight lines.

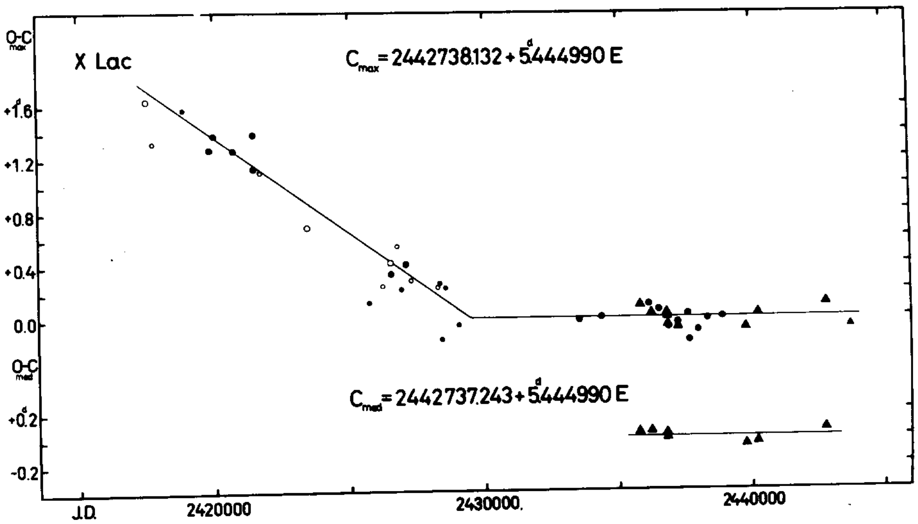

Figure 13 O-C diagram of X Lac

Table 11 O-C residuals for X Lac (maximum brightness)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2417551.255	-4626	+1.ᵈ647	vis	1	Seares (1906, 1907b)
2417768.734	-4586	+1.326	vis	0.5	Zeipel (1908)
2418890.652	-4380	+1.576	pg	0.5	Robinson (1933)
2419870.451	-4200	+1.277	pg	1	Martin, Plummer (1916)
2420012.124	-4174	+1.380	pg	1	Hertzsprung (1922)
2420741.644	-4040	+1.272	pg	1	Martin, Plummer (1916)
2421460.502	-3908	+1.391	pg	1	Hertzsprung (1922)
2421487.466	-3903	+1.130	pg	1	Jordan (1929)
2421737.914	-3857	+1.108	vis	0.5	Doberck (1920b)
2423458.111	-3541	+0.689	vis	1	Doberck (1924c)
2425744.43	-3121	+0.12	pg	0.5	Kiehl, Hopp (1977)
2425837.931	-3104	+1.048	vis	0	Parenago (1938a)
2426234.610	-3031	+0.243	vis	0.5	Terkán (1935)
2426539.709	-2975	+0.422	vis	1	Kukarkin (1940)
2426550.512	-2973	+0.335	pg	1	Zonn (1933)
2426757.627	-2935	+0.541	vis	0.5	Dziewulski et al. (1946)
2426801.263	-2927	+0.617	vis	0	Dziewulski et al. (1946)
2426931.54	-2903	+0.22	pg	0.5	Kiehl, Hopp (1977)
2427105.971	-2871	+0.405	pg	1	Zonn (1933)
2427296.426	-2836	+0.286	vis	0.5	Florya et al. (1953)
2428287.364	-2654	+0.235	vis	0.5	Dziewulski et al. (1946)
2428347.281	-2643	+0.258	pg	0.5	Dziewulski et al. (1946)
2428423.09	-2629	-0.16	pg	0.5	Fu De-Lian (1964)
2428565.052	-2603	+0.229	pg	0.5	Dziewulski et al. (1946)
2429049.37	-2514	-0.05	pg	0.5	Katz (1946)
2433536.080	-1690	-0.019	pg	1	Solov'yov (1952)
2434358.290	-1539	-0.002	pg	1	Romano (1955)
2435757.739	-1282	+0.084	pe	3	Bahner et al. (1971)
2436122.564	-1215	+0.095	pg	1	Makarenko (1969)

Table 11 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2436193.284	-1202	$+0^{d}.030$	pe	3	Bahner et al. (1971)
2436487.341	-1148	+0.058	pg	1	Makarenko (1969)
2436786.788	-1093	+0.030	pe	3	Weaver et al. (1960)
2436797.646	-1091	-0.002	pe	3	Oosterhoff (1960)
2436835.700	-1084	-0.063	pe	3	Bahner et al. (1962)
2436841.134	-1083	-0.074	pg	1	Makarenko (1969)
2437200.536	-1017	-0.041	pg	1	Makarenko (1969)
2437216.833	-1014	-0.079	pe	3	Mitchell et al. (1964)
2437576.301	-948	+0.020	pg	1	Makarenko (1969)
2437635.999	-937	-0.177	pg	1	Golovatyj (1964)
2437946.440	-880	-0.101	pg	1	Makarenko (1969)
2438305.897	-814	-0.013	pg	1	Makarenko (1969)
2438866.747	-711	+0.003	pg	1	Makarenko (1969)
2439743.308	-550	-0.080	pe	3	present paper[1]
2440195.346	-467	+0.024	pe	3	Asteriadis et al. (1977)
2442738.227	0	+0.095	pe	3	present paper
2443696.374	+176	-0.076	pe	2	Henden (1979)

Remark: [1] Observer: Abaffy

Table 12 O-C residuals for X Lac

(median brightness)

Obs.Med.J.D.	E	O-C	Type	w	Reference
2435756.797	-1282	$+0^{d}.031$	pe	3	Bahner et al. (1971)
2436192.407	-1202	+0.042	pe	3	Bahner et al. (1971)
2436785.895	-1093	+0.026	pe	3	Weaver et al. (1960)
2436796.752	-1091	-0.007	pe	3	Oosterhoff (1960)
2439742.437	-550	-0.062	pe	3	present paper[1]
2440194.383	-467	-0.050	pe	3	Asteriadis et al. (1977)
2442737.296	0	+0.053	pe	3	present paper

Remark: [1] Observer: Abaffy

<u>RZ Geminorum</u>

There is a very faint southern companion within the edge of the diaphragm. In spite of this the V and B amplitudes are larger than reported by *Schaltenbrand* and *Tammann* (1971). *Madore* (1977) pointed out that RZ Gem has a B5 photometric companion.

The O-C residuals have been computed with the formula:

$$C = 2442714.970 + 5^{d}.529286 \times E \quad .$$

The O-C diagram can be approximated either by two straight lines (sudden period change), or by a parabolic line (continuous period change). In the former case the values of the period are:

before J.D. 2432400 $\qquad P = 5^{d}.529716$,

after J.D. 2432400 $\qquad P = 5^{d}.529286$.

If a continuous period change is assumed, the equation of the approximate parabola is as follows:

$$C_{par} = 2442714.920 + 5.529143\times E - 8.85\times 10^{-8}\times E^2$$

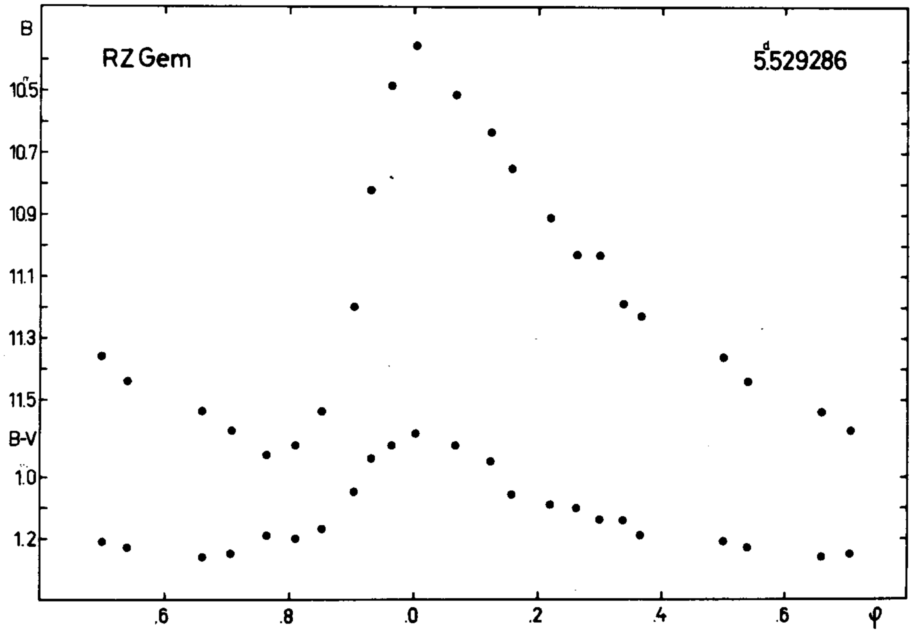

Figure 14 B and B-V curves of RZ Gem

Table 13 O-C residuals for RZ Gem

Obs.Max.J.D.	E	O-C	Type	w	Reference
2415028.54	-5007	$-1^d.29$	pg	0.5	Oosterhoff (1935)
2415791.59	-4869	-1.29	pg	0.5	Oosterhoff (1935)
2416034.80	-4825	-1.36	pg	0.5	Oosterhoff (1935)
2416460.74	-4748	-1.18	pg	0.5	Oosterhoff (1935)
2417339.82	-4589	-1.26	pg	0.5	Oosterhoff (1935)
2418291.142	-4417	-0.972	vis	0.5	Luizet (1909)
2418324.181	-4411	-1.108	vis	1	Enebo (1909)
2418351.55	-4406	-1.39	pg	0.5	Oosterhoff (1935)
2418832.935	-4319	-1.049	vis	1	Enebo (1911)
2419811.52	-4142	-1.15	pg	0.5	Oosterhoff (1935)
2420409.203	-4034	-0.627	pg	0	Robinson (1933)
2420458.75	-4025	-0.84	pg	0.5	Oosterhoff (1935)
2421277.055	-3877	-0.873	pg	1	Jordan (1929)
2421514.86	-3834	-0.83	pg	0.5	Oosterhoff (1935)
2422239.82	-3703	-0.20	pg	0	Oosterhoff (1935)
2424124.71	-3362	-0.80	pg	0.5	Oosterhoff (1935)
2424854.73	-3230	-0.65	pg	0.5	Oosterhoff (1935)
2425153.88	-3176	-0.08	pg	0	Oosterhoff (1935)
2425844.85	-3051	-0.27	pg	0.5	Oosterhoff (1935)
2426375.422	-2955	-0.508	vis	1	Kukarkin (1940)
2426712.86	-2894	-0.36	pg	0.5	Oosterhoff (1935)
2428189.08	-2627	-0.46	pg	0.5	Fu De-Lian (1964)
2428869.451	-2504	-0.187	pg	1	Koshkina (1963)

Table 13 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2429383.624	-2411	$-0^{d}.237$	pg	1	Koshkina (1963)
2429632.453	-2366	-0.226	pg	1	Chudovicheva (1952)
2431556.759	-2018	-0.112	pg	1	Chudovicheva (1952)
2432557.503	-1837	-0.169	pg	1	Chudovicheva (1952)
2433530.659	-1661	-0.167	pg	0.5	Chudovicheva (1952)
2433801.844	-1612	+0.083	pg	1	Koshkina (1963)
2434304.930	-1521	+0.004	pg	1	Koshkina (1963)
2434327.082	-1517	+0.039	pg	1	Rosino, Nobili (1955)
2436831.810	-1064	0.000	pe	3	Weaver et al. (1960)
2437401.48	-961	+0.15	pg	0.5	Ahnert (1962)
2437633.563	-919	+0.007	pe	3	Mitchell et al. (1964)
2439248.161	-627	+0.053	pe	3	Takase (1969)
2442714.927	0	-0.043	pe	3	present paper

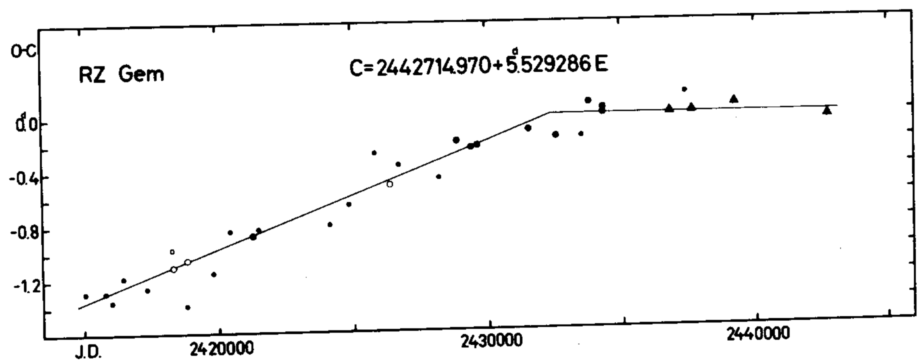

Figure 15 O-C diagram of RZ Gem

V 924 Cygni

Unfortunately, there are very few earlier observational data on this small amplitude Cepheid. The O-C residuals have been

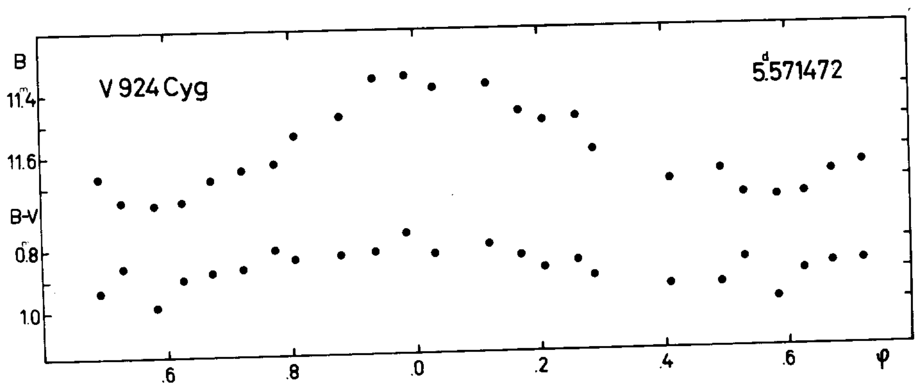

Figure 16 B and B-V curves of V 924 Cyg

calculated with the formula:

$$C = 2443066.075 + 5^{d}.571472 \times E \quad .$$

The present period seems to be reliable since it is based on three photoelectric observational series but we cannot say anything certain about the behaviour of the period before J.D. 2438000. The systematically larger O-C values before this date may be caused by the earlier points in the O-C diagram (with a weight of 0.5) not being derived on the basis of published observations but rather from the published normal maxima.

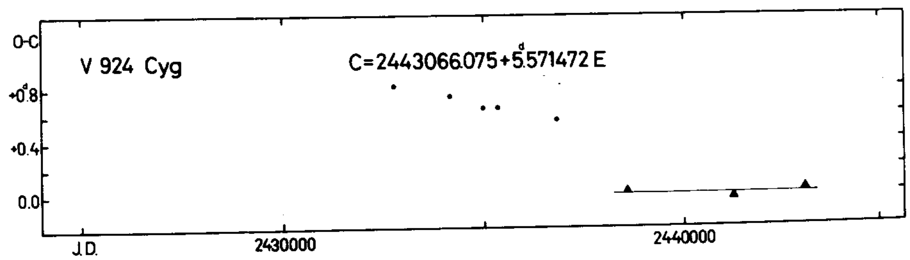

Figure 17 O-C diagram of V 924 Cyg

Table 14 O-C residuals for V 924 Cyg

Obs.Max.J.D.	E	O-C	Type	w	Reference
2432765.24	-1849	$+0^{d}.82$	pg	0.5	Miller, Wachmann (1961)
2434152.46	-1600	+0.74	pg	0.5	Wachmann (1976)
2434988.09	-1450	+0.65	pg	0.5	Wachmann (1976)
2435344.66	-1386	+0.65	pg	0.5	Wachmann (1976)
2436809.87	-1123	+0.56	pg	0.5	Wachmann (1976)
2438558.778	-809	+0.024	pe	2	Eggen (1969)
2441260.881	-324	-0.037	pe	3	Wachmann (1976)
2443066.098	0	+0.023	pe	3	present paper

<u>FM Cassiopeiae</u>

The light and colour curves of this Cepheid can be seen in Fig. 18. The number of reliable observational series is very small so I was obliged to take into account the O-C residuals with a weight of 0.5 (except the visual observations) when determining the value of the period. Finally, the O-C residuals have been computed with the formula:

$$C = 2442817.713 + 5^{d}.809284 \times E \quad .$$

The period has remained constant since the discovery of the light variation of FM Cas.

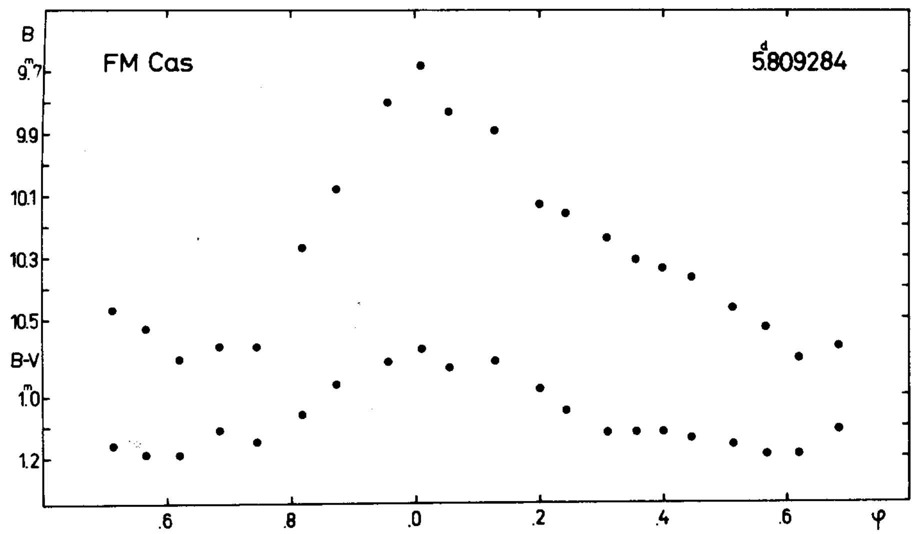

Figure 18 B and B-V curves of FM Cas

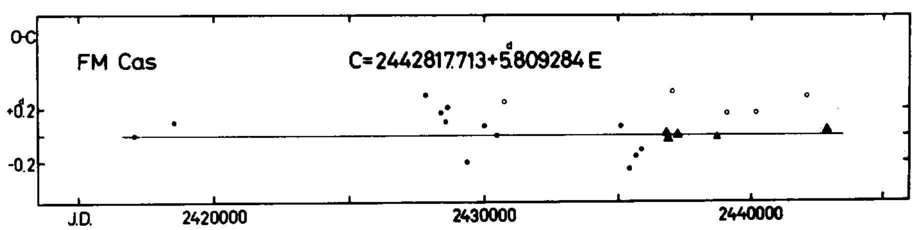

Figure 19 O-C diagram of FM Cas

Table 15 O-C residuals for FM Cas

Obs.Max.J.D.	E	O-C	Type	w	Reference
2415037.0	-4782	$-0^{d}.7$	pg	0	Chernova (1946)
2417065.2	-4433	0.0	pg	0.5	Chernova (1946)
2418529.2	-4181	+0.1	pg	0.5	Chernova (1946)
2426933.83	-2734	-1.30	pg	0	Kiehl, Hopp (1977)
2427812.6	-2583	+0.3	pg	0.5	Chernova (1946)
2427962.90	-2557	-0.47	pg	0	Ahnert et al. (1943)
2428393.43	-2483	+0.17	pg	0.5	Ahnert et al. (1943)
2428556.0	-2455	+0.1	pg	0.5	Chernova (1946)
2428649.08	-2439	+0.21	pg	0.5	Ahnert et al. (1943)
2429084.20	-2364	-0.37	pg	0	Ahnert et al. (1943)
2429351.59	-2318	-0.20	pg	0.5	Ahnert et al. (1943)
2429555.55	-2283	+0.43	pg	0	Ahnert et al. (1943)
2430002.50	-2206	+0.07	pg	0.5	Ahnert et al. (1943)
2430467.2	-2126	0.0	pg	0.5	Chernova[1] (1946)
2430746.273	-2078	+0.252	vis	0.5	Model, Löchel (1964)
2435108.856	-1327	+0.063	pg	0.5	Romano (1959)
2435428.047	-1272	-0.257	pg	0.5	Romano (1959)
2435654.711	-1233	-0.155	pg	0.5	Romano (1959)

Table 15 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2435875.51	-1195	-0.11	pg	0.5	Zonn, Semeniuk (1959)
2436805.114	-1035	+0.010	pe	3	Oosterhoff (1960)
2436863.167	-1025	-0.030	pe	3	Bahner et al. (1962)
2437020.373	-998	+0.325	vis	0.5	Emmrich (1973)
2437217.562	-964	-0.001	pe	3	Mitchell et al. (1964)
2438698.948	-709	-0.017	pe	1	Haug (1970)
2439076.702	-644	+0.168	vis	0.5	Emmrich (1973)
2440151.420	-459	+0.168	vis	0.5	Emmrich (1973)
2442068.60	-129	+0.29	vis	0.5	Small (1974)
2442817.752	0	+0.039	pe	3	present paper

Remark: [1] Observer: Solov'yov

MW Cygni

The light and colour curves of MW Cyg are plotted in Fig. 20. Its period (somewhat less than six days) is the shortest value when the hump appears on the descending branch of the light curve.

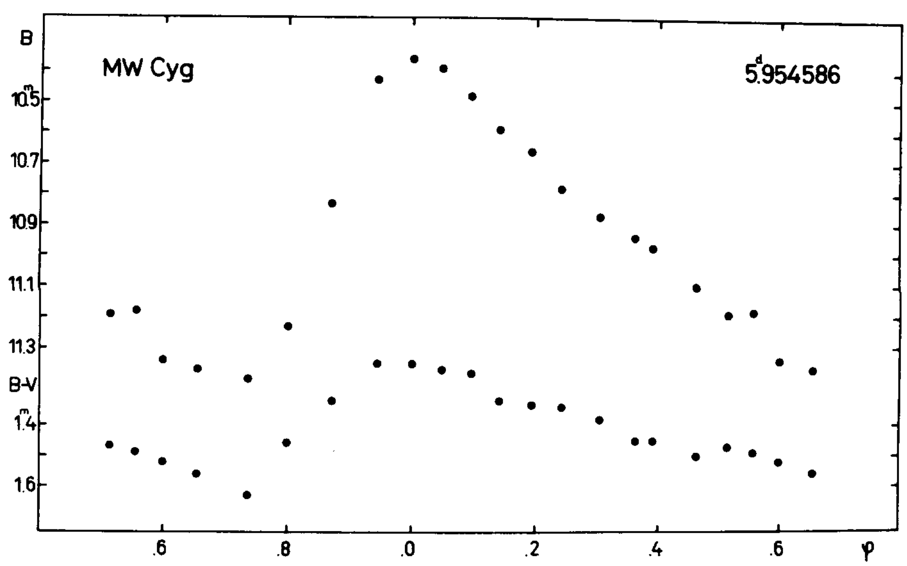

Figure 20 B and B-V curves of MW Cyg

When determining the correct value of the period all normal maxima listed in Table 16 were considered except the visual ones. Finally the O-C residuals have been calculated with the formula:

$$C = 2442923.839 + 5\overset{d}{.}954586 \times E$$

There is no sign of period change in the O-C diagram (see Fig. 21), although *Tsarevsky* (1967) included this Cepheid among the Cepheids with changing period.

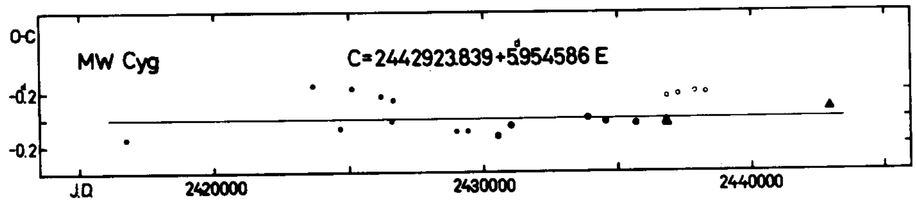

Figure 21 O-C diagram of MW Cyg

Table 16 O-C residuals for MW Cyg

Obs.Max.J.D.	E	O-C	Type	w	Reference
2416729.471	-4399	$-0\overset{d}{.}144$	pg	0.5	Parenago (1940)
2423661.00	-3235	+0.25	pg	0.5	Oosterhoff (1935)
2424678.92	-3064	-0.07	pg	0.5	Oosterhoff (1935)
2425113.90	-2991	+0.23	pg	0.5	Oosterhoff (1935)
2425816.69	-2873	+0.38	pg	0	Oosterhoff (1935)
2426179.71	-2812	+0.17	pg	0.5	Oosterhoff (1935)
2426572.53	-2746	-0.02	pg	0.5	Solov'yov[1] (1946a)
2426644.14	-2734	+0.14	pg	0.5	Oosterhoff (1935)
2427043.52	-2667	+0.56	pg	0	Oosterhoff (1935)
2429001.926	-2338	-0.091	pg	0.5	Parenago (1940)
2429418.75	-2268	-0.09	pg	0.5	Starikova et al. (1946)
2430532.222	-2081	-0.124	pg	1	Solov'yov (1946a)
2431038.435	-1996	-0.050	pg	1	Solov'yov (1946a)
2433884.781	-1518	+0.004	pg	1	Shteiman (1958)
2434539.757	-1408	-0.025	pg	1	Shteiman (1958)
2435677.074	-1217	-0.034	pg	1	Shteiman (1958)
2436802.499	-1028	-0.026	pe	3	Oosterhoff (1960)
2436820.339	-1025	-0.049	pe	3	Weaver et al. (1960)
2436844.37	-1021	+0.16	vis	0.5	Häussler (1964b)
2437249.30	-953	+0.18	vis	0.5	Häussler (1964b)
2437886.46	-846	+0.20	vis	0.5	Häussler (1964b)
2438285.41	-779	+0.19	vis	0.5	Häussler (1964b)
2442923.911	0	+0.072	pe	3	present paper

Remark: [1] Observers: Lange and Tsessevich

VW Cassiopeiae

This Cepheid has a faint companion SW. The present B-V amplitude is less than given in the catalogue compiled by *Schaltenbrand* and *Tammann* (1971); this may be an effect caused by this companion.

In the course of determining the correct value of the period the normal maxima with a weight of 0.5 were also used. Finally the O-C residuals have been derived using the formula:

$$C = 2442778.693 + 5^{d}.993859 \times E$$

The O-C diagram in Fig. 23 shows the constancy of the period.

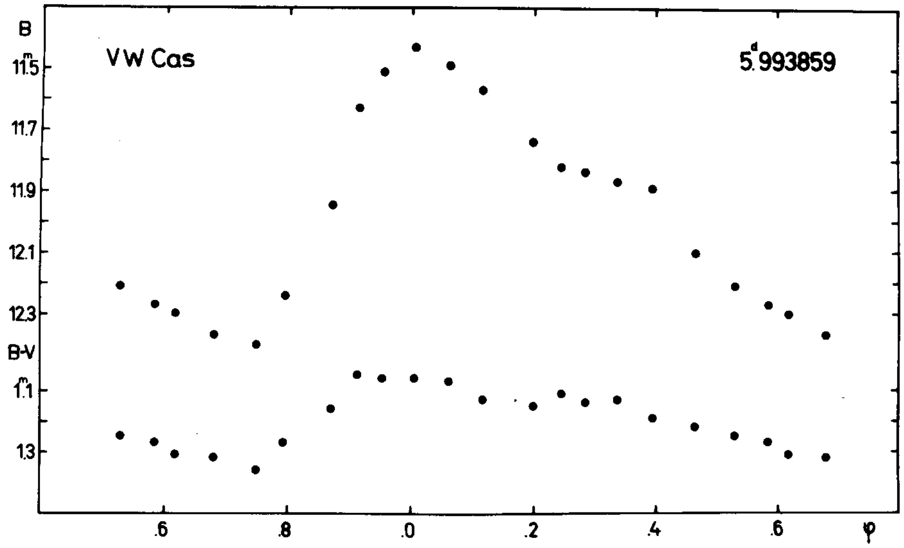

Figure 22 B and B-V curves of VW Cas

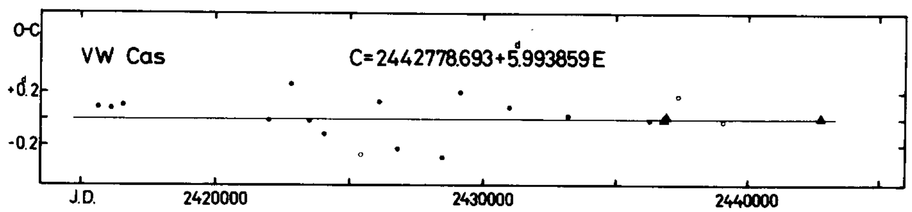

Figure 23 O-C diagram of VW Cas

Table 17 O-C residuals for VW Cas

Obs.Max.J.D.	E	O-C	Type	w	Reference
2412107.55	-5117	$-0^{d}.57$	pg	0	Oosterhoff (1935)
2413468.57	-4890	-0.15	pg	0.5	Oosterhoff (1935)
2415656.568	-4525	+0.087	pg	0.5	Oosterhoff (1935)
2416124.08	-4447	+0.08	pg	0.5	Tsepova et al. (1948)
2416585.633	-4370	+0.104	pg	0.5	Tsepova et al. (1948)
2418629.84	-4029	+0.41	pg	0	Oosterhoff (1935)
2420751.85	-3675	+0.59	pg	0	Oosterhoff (1935)
2421991.981	-3468	-0.009	pg	0.5	Balanowsky (1924)
2422837.387	-3327	+0.263	pg	0.5	Oosterhoff (1935)
2423472.463	-3221	-0.010	pg	0.5	Balanowsky (1924)
2424065.75	-3122	-0.11	pg	0.5	Oosterhoff (1935)
2425420.21	-2896	-0.27	vis	0.5	Kukarkin (1929)
2426097.911	-2783	+0.128	pg	0.5	Oosterhoff (1935)
2426816.819	-2663	-0.227	pg	0.5	Oosterhoff (1935)

Table 17 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2428465.07	-2388	$-0^{d}.29$	pg	0.5	Fu De-Lian (1964)
2429142.86	-2275	+0.20	pg	0.5	Tsepova et al. (1948)
2430994.853	-1966	+0.087	pg	0.5	Solov'yov (1954)
2433176.555	-1602	+0.024	pg	0.5	Solov'yov (1954)
2436287.334	-1083	-0.010	pg	0.5	Erleksova (1961)
2436808.793	-996	-0.016	pe	3	Weaver et al. (1960)
2436820.781	-994	-0.016	pe	3	Oosterhoff (1960)
2436880.749	-984	+0.013	pe	3	Bahner et al. (1962)
2437348.429	-906	+0.172	vis	0.5	Berthold (1975)
2439044.497	-623	-0.022	vis	0.5	Berthold (1975)
2442778.699	0	+0.006	pe	3	present paper

KL Aquilae

According to *Madore* (1977) this Cepheid is suspected in having a blue photometric companion. The light and colour curves of KL Aql shown in Fig. 24 are normal for a Population I Cepheid but the 2nd Supplement to the G.C.V.S. (*Kukarkin* et al. 1974) classifies it as a Population II Cepheid.

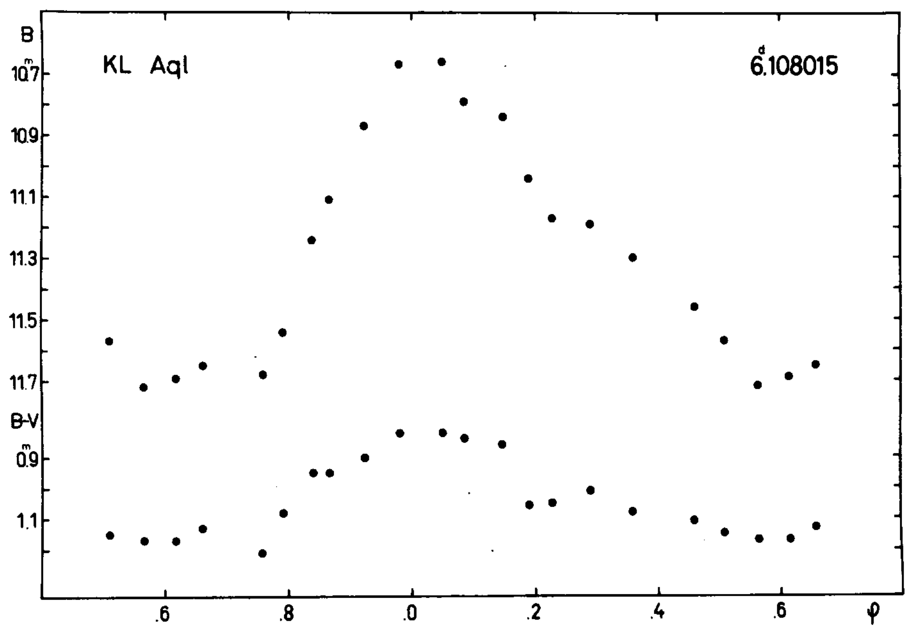

Figure 24 B and B-V curves of KL Aql

The O-C residuals have been computed with the formula:

$$C = 2443338.695 + 6^{d}.108015 \times E \quad .$$

The period of KL Aql has remained constant since the discovery of its light variation (see Fig. 25).

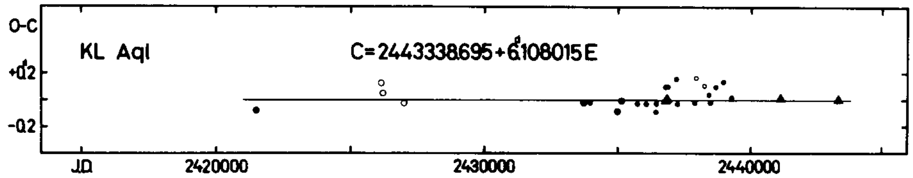

Figure 25 O-C diagram of KL Aql

Table 18 O-C residuals for KL Aql

Obs.Max.J.D.	E	O-C	Type	w	Reference
2421484.137	-3578	$-0\overset{d}{.}080$	pg	1	Parenago (1940)
2426126.433	-2818	+0.124	vis	1	Parenago[1] (1940)
2426187.441	-2808	+0.052	vis	1	Parenago[2] (1940)
2426981.409	-2678	-0.022	vis	1	Parenago[2] (1940)
2433645.0	-1587	-0.3	vis	0	Solov'yov (1953)
2433700.226	-1578	-0.021	pg	1	Solov'yov (1958a)
2433950.66	-1537	-0.02	pg	0.5	Tsessevich (1953)
2434982.845	-1368	-0.085	pvis	1	Solov'yov (1958a)
2435129.518	-1344	-0.005	pg	1	Solov'yov (1958a)
2435691.73	-1252	+0.27	pg	0	Huth (1966)
2435721.97	-1247	-0.03	pg	0.5	Vasil'yan. et al. (1970)
2436052.17	-1193	+0.34	pg	0	Huth (1966)
2436057.91	-1192	-0.03	pg	0.5	Vasil'yan. et al. (1970)
2436430.50	-1131	-0.03	pg	0.5	Vasil'yan. et al. (1970)
2436436.55	-1130	-0.09	pg	0.5	Huth (1966)
2436754.35	-1078	+0.09	pg	0.5	Huth (1966)
2436790.898	-1072	-0.005	pe	3	Oosterhoff (1960)
2436815.31	-1068	-0.02	pg	0.5	Vasil'yan. et al. (1970)
2436833.661	-1065	+0.002	pe	3	Weaver et al. (1960)
2436864.30	-1060	+0.10	vis	0.5	Voigtländer (1964)
2437188.08	-1007	+0.16	pg	0.5	Huth (1966)
2437273.41	-993	-0.03	pg	0.5	Vasil'yan. et al. (1970)
2437579.15	-943	+0.31	pg	0	Huth (1966)
2437811.35	-905	+0.41	pg	0	Huth (1966)
2437890.33	-892	-0.02	pg	0.5	Vasil'yan. et al. (1970)
2437939.38	-884	+0.17	vis	0.5	Voigtländer (1964)
2438153.50	-849	+0.51	pvis	0	Beyer (1968)
2438232.50	-836	+0.11	vis	0.5	Voigtländer (1964)
2438257.24	-832	+0.41	pg	0	Huth (1966)
2438421.78	-805	+0.04	pvis	0.5	Beyer (1968)
2438446.16	-801	-0.02	pg	0.5	Vasil'yan. et al. (1970)
2438672.27	-764	+0.10	pvis	0.5	Beyer (1968)
2438965.50	-716	+0.14	pvis	0.5	Beyer (1968)
2439295.21	-662	+0.02	pvis	0.5	Beyer (1968)
2441115.392	-364	+0.014	pe	3	Pel (1976)
2443338.696	0	+0.001	pe	3	present paper

Remarks: [1] Observer: Blazhko

[2] Observer: Nabokov

FM Aquilae

This Cepheid has a blue photometric companion of spectral type B9 (*Madore* 1977). As can be seen from Fig. 26, the U-B amplitude is too small.

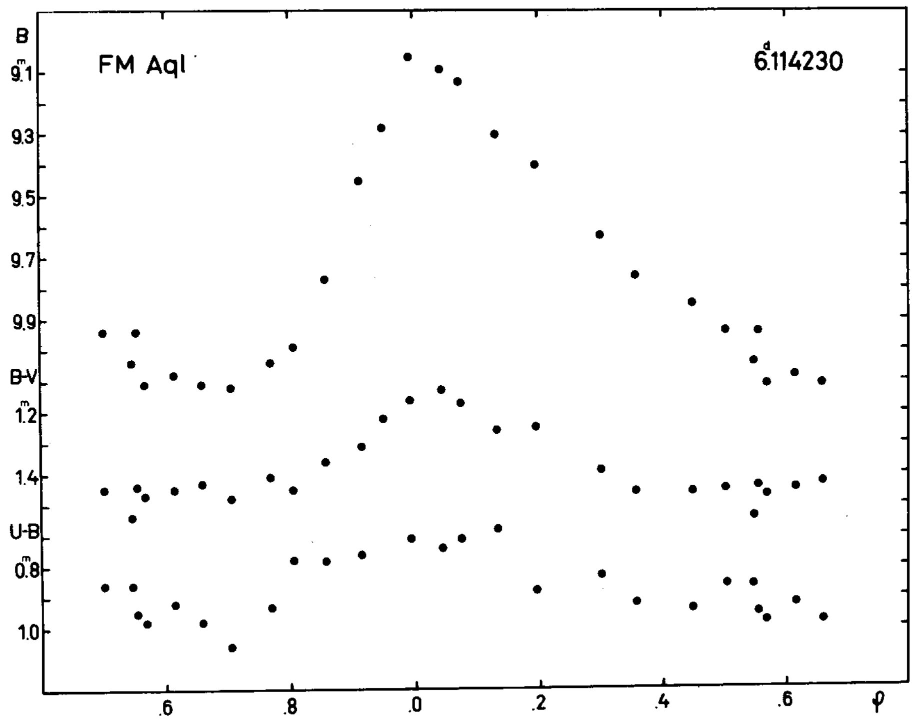

Figure 26 B, B-V and U-B curves of FM Aql

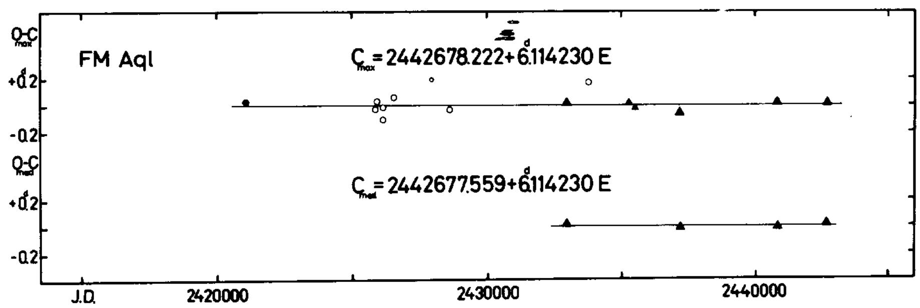

Figure 27 O-C diagram of FM Aql

The O-C residuals have been calculated with the formulae:

$C_{max} = 2442678.222 + 6^{d}.114230 \times E$

$C_{med} = 2442677.559 + 6^{d}.114230 \times E$

The period has been constant since the discovery of its light variation (see Fig. 27).

Table 19 O-C residuals for FM Aql
(maximum brightness)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2421095.021	-3530	+0.031 (d)	pg	1	Kukarkin (1940)
2425894.631	-2745	-0.030	vis	1	Ahnert (1938)
2425919.149	-2741	+0.031	vis	1	Lause (1930)
2426157.469	-2702	-0.104	vis	1	Kukarkin (1940)
2426163.675	-2701	-0.012	vis	1	Ahnert (1938)
2426555.059	-2637	+0.062	vis	1	Ahnert (1938)
2427979.805	-2404	+0.192	vis	0.5	Dziewulski et al. (1956)
2428627.686	-2298	-0.035	vis	1	Ahnert (1938)
2432962.724	-1589	+0.013	pe	3	Eggen (1951)
2433757.732	-1459	+0.172	vis	1	Filin (1952)
2435292.245	-1208	+0.013	pe	2	Irwin (1961)
2435500.086	-1174	-0.030	pe	2	Walraven et al. (1958)
2437108.485	-911	+0.327	pg	0	Huth (1964)
2437187.583	-898	-0.060	pe	3	Mitchell et al. (1964)
2440819.509	-304	+0.013	pe	3	Pel (1976)
2442678.229	0	+0.007	pe	3	present paper

Table 20 O-C residuals for FM Aql
(median brightness)

Obs.Med.J.D.	E	O-C	Type	w	Reference
2432962.063	-1589	+0.015 (d)	pe	3	Eggen (1951)
2437186.959	-898	-0.021	pe	3	Mitchell et al. (1964)
2440818.818	-304	-0.015	pe	3	Pel (1976)
2442677.581	0	+0.022	pe	3	present paper

V 538 Cygni

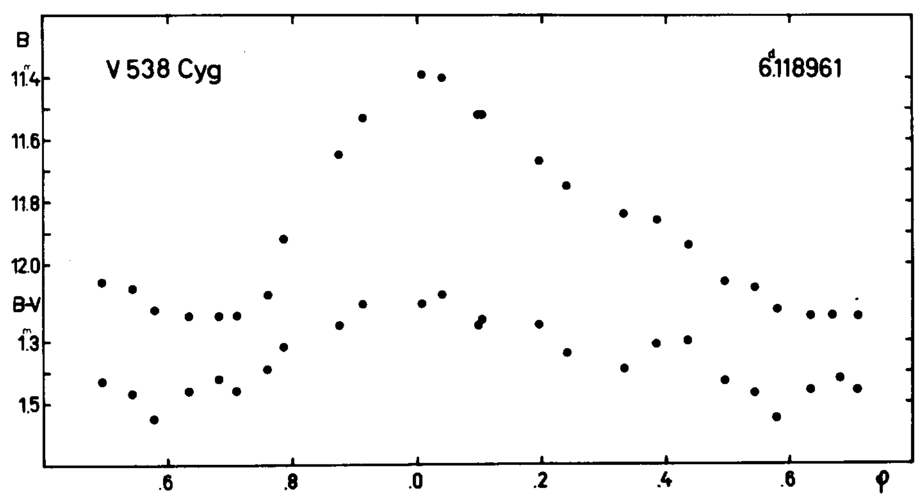

Figure 28 B and B-V curves of V 538 Cyg

The light and colour curves of this variable are shown in Fig. 28. When the correct value of the period was being determined all the normal maxima were considered, i.e. those with low weight too. The O-C residuals have been derived using the formula:

$$C = 2442772.924 + 6\overset{d}{.}118961 \times E \quad .$$

The O-C diagram is based on only four points so it is premature to declare the constancy of the period.

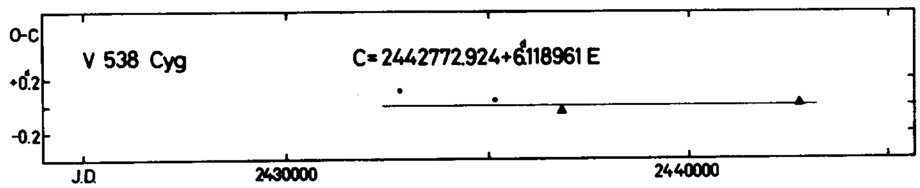

Figure 29 O-C diagram of V 538 Cyg

Table 21 O-C residuals for V 538 Cyg

Obs.Max.J.D.	E	O-C	Type	w	Reference
2432799.13	-1630	$+0\overset{d}{.}11$	pg	0.5	Manova (1950)
2435160.979	-1244	+0.042	pg	0.5	Nikulina (1970)
2436806.898	-975	-0.039	pe	3	Oosterhoff (1960)
2442772.938	0	+0.014	pe	3	present paper

TX Delphini

This Cepheid belongs to Population II (*Kukarkin* et al. 1969-1970), although the light and colour curves in Fig. 30 do not differ from those of Population I Cepheids with the same period.

Table 22 O-C residuals for TX Del

Obs.Max.J.D.	E	O-C	Type	w	Reference
2428067.22	-2413	$-1\overset{d}{.}45$	vis	0	Gur'yev (1935)
2428801.658	-2294	-0.760	pg	0.5	Leibovich (1952)
2429140.805	-2239	-0.738	pg	0.5	Leibovich (1952)
2429461.395	-2187	-0.775	pg	0.5	Leibovich (1952)
2429868.309	-2121	-0.811	pg	0.5	Leibovich (1952)
2429893.07	-2117	-0.71	pg	0.5	Vasil'yan. et al. (1970)
2430195.118	-2068	-0.795	pg	0.5	Leibovich (1952)
2430386.52	-2037	-0.54	pg	0.5	Vasil'yan. et al. (1970)
2430651.865	-1994	-0.325	vis	0	Model, Löchel (1964)
2430978.550	-1941	-0.434	vis	0.5	Model, Löchel (1964)
2431324.166	-1885	-0.108	vis	0	Model, Löchel (1964)
2431373.06	-1877	-0.54	pg	0.5	Vasil'yan. et al. (1970)
2433155.08	-1588	-0.47	pg	0.5	Vasil'yan. et al. (1970)
2433870.53	-1472	-0.26	pg	0.5	Vasil'yan. et al. (1970)
2434234.30	-1413	-0.28	pg	0.5	Vasil'yan. et al. (1970)
2434604.35	-1353	-0.19	pg	0.5	Vasil'yan. et al. (1970)
2434992.85	-1290	-0.14	pg	0.5	Vasil'yan. et al. (1970)

Table 22 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2435363.03	-1230	+0.09 d	pg	0.5	Vasil'yan. et al. (1970)
2435664.972	-1181	-0.101	pe	3	Walraven et al. (1958)
2435720.51	-1172	-0.06	pg	0.5	Vasil'yan. et al. (1970)
2435936.746	-1137	+0.373	pg	0	Nikulina et al. (1959)
2436065.84	-1116	-0.02	pg	0.5	Vasil'yan. et al. (1970)
2436460.50	-1052	+0.03	pg	0.5	Vasil'yan. et al. (1970)
2436818.04	-994	-0.06	pg	0.5	Vasil'yan. et al. (1970)
2437182.12	-935	+0.23	pg	0.5	Vasil'yan. et al. (1970)
2437292.994	-917	+0.122	pe	3	Mitchell et al. (1964)
2437576.53	-871	+0.03	pg	0.5	Vasil'yan. et al. (1970)
2437897.32	-819	+0.19	pg	0.5	Vasil'yan. et al. (1970)
2438273.17	-758	-0.08	pg	0.5	Vasil'yan. et al. (1970)
2438612.34	-703	-0.04	pg	0.5	Vasil'yan. et al. (1970)
2438994.48	-641	-0.18	pg	0.5	Vasil'yan. et al. (1970)
2439099.438	-624	-0.045	pe	3	Takase (1969)
2440819.842	-345	+0.071	pe	3	Pel (1976)
2442947.033	0	+0.024	pe	3	present paper

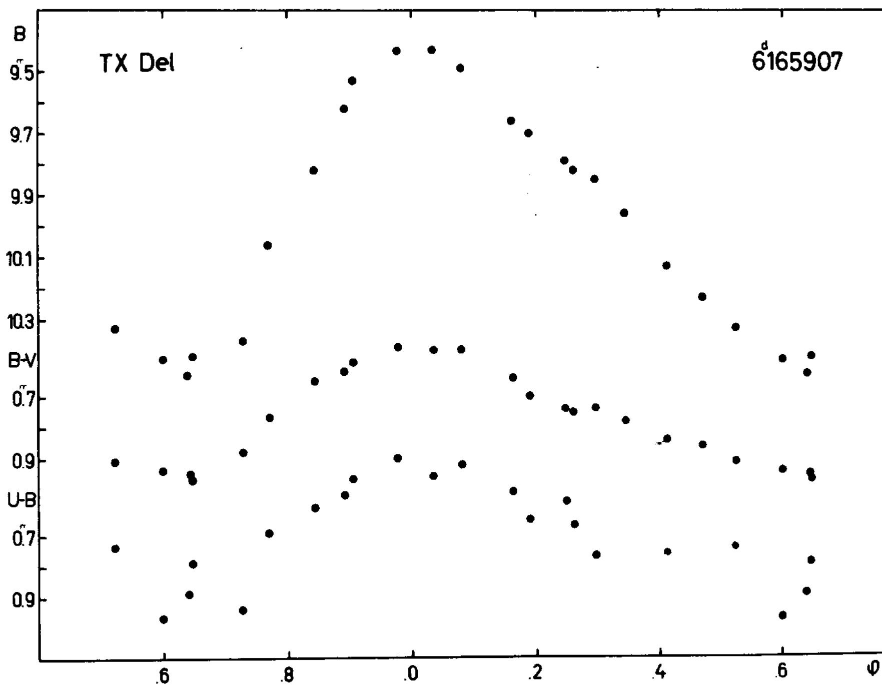

Figure 30 B, B-V and U-B curves of TX Del

When determining the correct value of the period the normal maxima with low weight were also taken into account before the change in the period. The O-C residuals have been computed with the formula:

$$C = 2442947.009 + 6\overset{d}{.}165907 \times E \quad .$$

The O-C diagram in Fig. 31 shows one period change:

before J.D. 2436600 $\quad P = 6\overset{d}{.}166585$,

after J.D. 2436600 $\quad P = 6\overset{d}{.}165907$.

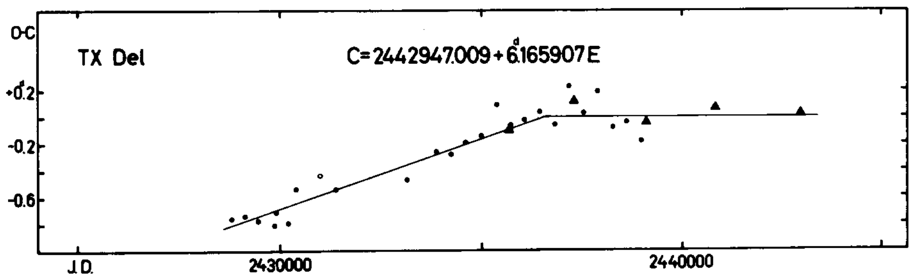

Figure 31 O-C diagram of TX Del

V 733 Aquilae

This Cepheid has not previously been observed photoelectrically. Its light and colour curves are plotted in Fig. 32. The amplitude of the light variation is small but the light curve is not symmetrical.

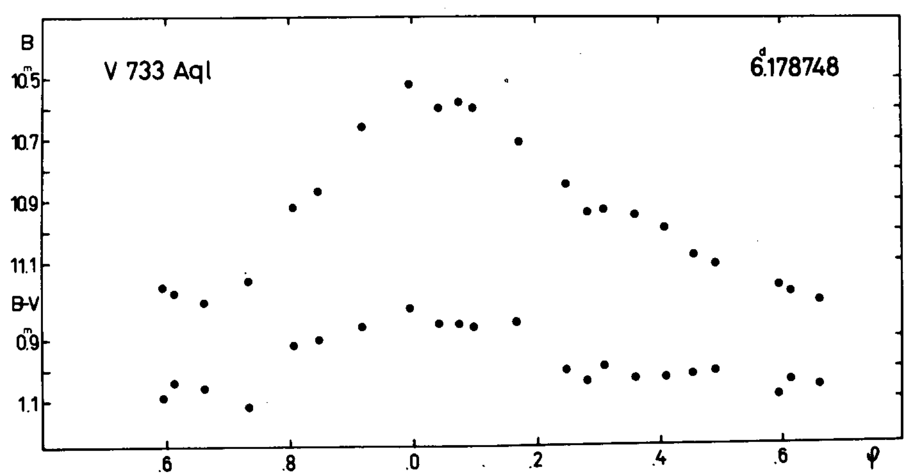

Figure 32 B and B-V curves of V 733 Aql

The O-C residuals have been calculated with the ephemeris:

$$C = 2442597.207 + 6\overset{d}{.}178748 \times E \quad .$$

There is no sign of a change in the period (see Fig. 33), although *Satyvaldiev* (1962) reported on a period change at about J.D. 2436000.

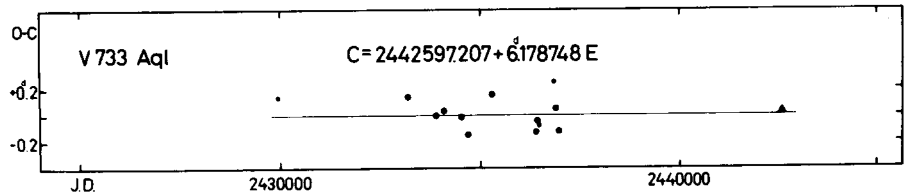

Figure 33 O-C diagram of V 733 Aql

Table 23 O-C residuals for V 733 Aql

Obs.Max.J.D.	E	O-C	Type	w	Reference
2417097.088	-4127	$-0^{d}.426$	pg	0	Satyvaldiev[1] (1962)
2429949.447	-2047	+0.137	pg	0.5	Satyvaldiev[1] (1962)
2433187.112	-1523	+0.138	pg	1	Filatov (1962)
2433872.813	-1412	-0.002	pg	1	Filatov (1962)
2434076.750	-1379	+0.036	pg	1	Satyvaldiev (1962)
2434324.236	-1339	+0.373	pvis	0	Satyvaldiev (1962)
2434521.569	-1307	-0.014	pg	1	Filatov (1962)
2434688.267	-1280	-0.143	pg	1	Satyvaldiev (1962)
2435281.723	-1184	+0.154	pg	1	Filatov (1962)
2435694.50	-1117	-1.05	pg	0	Busch, Wenzel (1960)
2435997.76	-1068	-0.54	pg	0	Busch, Wenzel (1960)
2436374.87	-1007	-0.34	pg	0	Busch, Wenzel (1960)
2436381.259	-1006	-0.128	pg	1	Satyvaldiev[1] (1962)
2436424.598	-999	-0.040	pg	1	Filatov (1962)
2436467.81	-992	-0.08	pg	0.5	Busch, Wenzel (1960)
2436716.043	-952	+1.004	pg	0	Busch, Wenzel (1960)
2436758.612	-945	+0.322	pvis	0	Satyvaldiev (1962)
2436851.221	-930	+0.250	pg	0.5	Busch (1961)
2436875.736	-926	+0.050	pg	1	Dultsev (1963)
2436949.707	-914	-0.124	pg	1	Satyvaldiev[1] (1962)
2437253.276	-865	+0.686	pg	0	Busch (1961)
2442597.232	0	+0.025	pe	3	present paper

Remark: [1] Observer: Tsessevich

VV Cassiopeiae

This variable has a B7 photometric companion (*Madore* 1977). The light and colour curves of VV Cas are plotted in Fig. 34. The normal maxima with weight of 0.5 listed in Table 24 were also taken into account when determining the correct value of the period. The O-C residuals have been derived using the formula:

$$C = 2442836.853 + 6^{d}.207059 \times E$$

As shown by the O-C diagram (Fig. 35), the period has changed on one occasion:

before J.D. 2432500 $\qquad P = 6^{d}.207510$

after J.D. 2432500 $\qquad P = 6^{d}.207059$

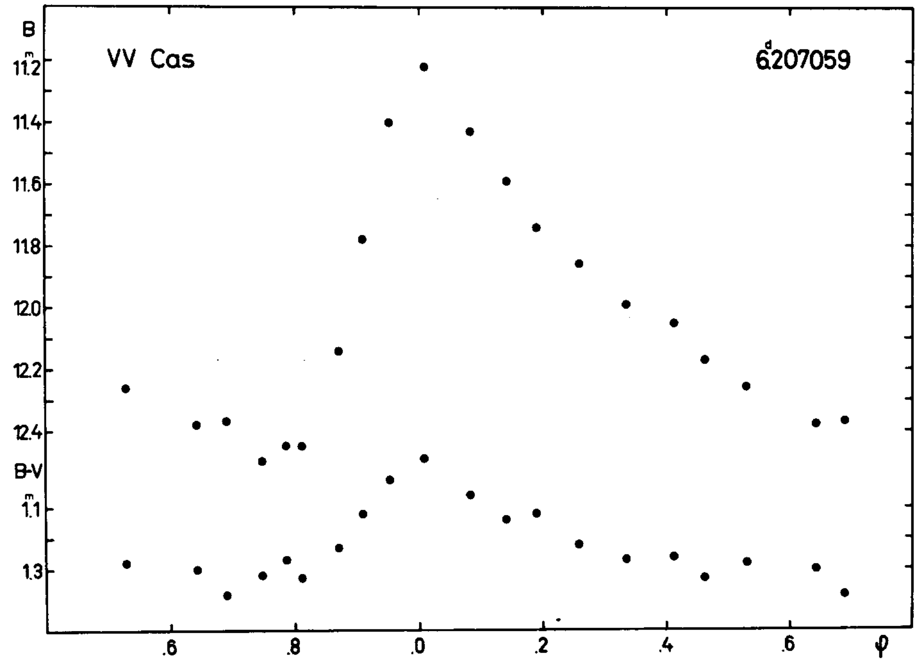

Figure 34 B and B-V curves of VV Cas

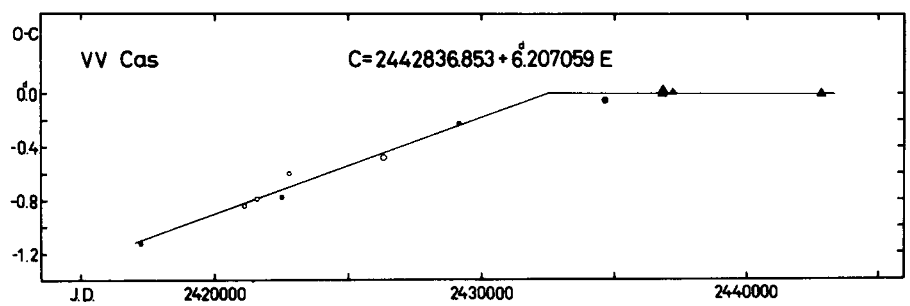

Figure 35 O-C diagram of VV Cas

Table 24 O-C residuals for VV Cas

Obs.Max.J.D.	E	O-C	Type	w	Reference
2417262.646	-4120	$-1^{d}.124$	pg	0.5	Merzlyakov (1957)
2421117.51	-3499	-0.84	vis	0.5	Hoffmeister (1923)
2421576.89	-3425	-0.79	vis	0.5	Hoffmeister (1923)
2422514.159	-3274	-0.783	pg	0.5	Robinson (1933)
2422806.1	-3227	-0.6	vis	0.5	Hoffmeister (1923)
2426319.389	-2661	-0.480	vis	1	Kukarkin (1940)
2428440.00	-2319	-2.68	pg	0	Fu De-Lian (1964)
2429156.266	-2204	-0.229	pg	0.5	Merzlyakov (1957)
2434655.901	-1318	-0.048	pg	1	Merzlyakov (1957)

Table 24 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2436816.001	-970	$-0^{d}.005$	pe	3	Oosterhoff (1960)
2436822.233	-969	+0.020	pe	3	Weaver et al. (1960)
2436853.252	-964	+0.004	pe	3	Bahner et al. (1962)
2437213.268	-906	+0.010	pe	2	Mitchell et al. (1964)
2442836.847	0	-0.006	pe	3	present paper

CR Cephei

The variable star CR Cep is a small amplitude Cepheid with a non-symmetrical light curve (see Fig. 36). The O-C residuals

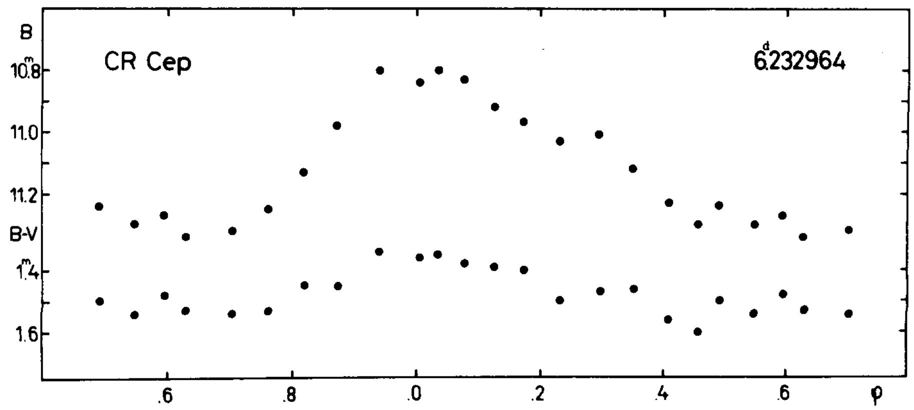

Figure 36 B and B-V curves of CR Cep

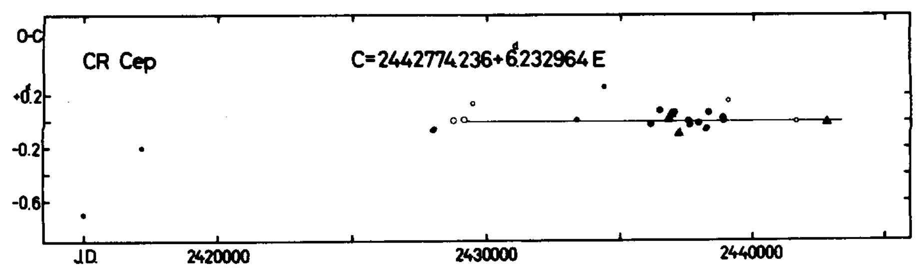

Figure 37 O-C diagram of CR Cep

have been computed with the formula:

$$C = 2442774.236 + 6^{d}.232964 \times E \quad .$$

The O-C diagram in Fig. 37 shows one period change. Neither the time of the change in the period nor the value of the former period can be determined for lack of sufficient number of points in the O-C diagram. The only certain fact is that the period change occurred before J.D. 2428000.

Table 25 O-C residuals for CR Cep

Obs.Max.J.D.	E	O-C	Type	w	Reference
2415005.7	-4455	$-0\overset{d}{.}7$	pg	0.5	Oosterhoff (1960)
2417200.2	-4103	-0.2	pg	0.5	Oosterhoff (1960)
2428045.680	-2363	-0.062	pg	1	Parenago (1938b)
2428750.076	-2250	+0.009	vis	1	Florya (1949)
2429142.758	-2187	+0.014	vis	1	Florya (1949)
2429479.460	-2133	+0.136	vis	0.5	Florya (1949)
2433362.470	-1510	+0.010	pg	0.5	Timofeyeva (1967)
2434366.226	-1349	+0.258	pg	0.5	Romano (1956)
2436123.644	-1067	-0.019	pg	1	Makarenko (1969)
2436479.027	-1010	+0.085	pg	1	Makarenko (1969)
2436809.309	-957	+0.020	pe	3	Oosterhoff (1960)
2436865.432	-948	+0.046	pe	3	Bahner et al. (1962)
2437021.276	-923	+0.066	pg	1	Makarenko (1969)
2437214.339	-892	-0.093	pe	3	Mitchell et al. (1964)
2437544.783	-839	+0.004	pg	1	Girnyak (1969)
2437569.684	-835	-0.027	pg	1	Makarenko (1969)
2437937.440	-776	-0.016	pg	1	Makarenko (1969)
2438267.747	-723	-0.056	pg	1	Girnyak (1969)
2438299.037	-718	+0.069	pg	1	Makarenko (1969)
2438847.501	-630	+0.032	pg	1	Girnyak (1969)
2438859.948	-628	+0.013	pg	1	Makarenko (1969)
2439047.078	-598	+0.154	vis	0.5	Berthold (1975)
2441602.436	-188	-0.003	vis	0.5	Berthold (1975)
2442774.223	0	-0.013	pe	3	present paper

RS Cassiopeiae

The light and colour curves of this variable are shown in

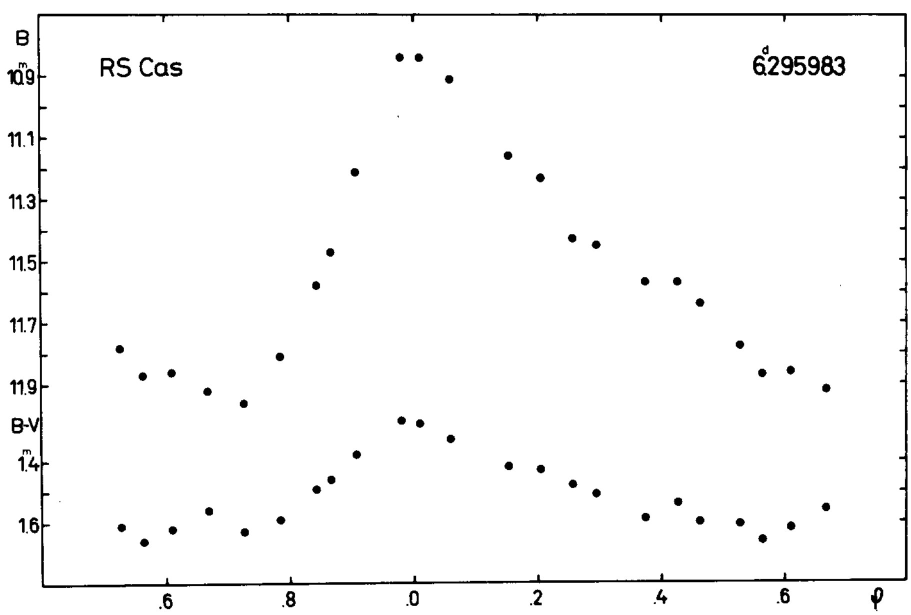

Figure 38 B and B-V curves of RS Cas

Fig. 38. The O-C residuals in Table 26 have been computed with the formula:

$$C = 2442773.487 + 6\overset{d}{.}295983 \times E \quad .$$

As is shown by the O-C diagram in Fig. 39, the period has changed on one occasion:

before J.D. 2434900 $\qquad P = 6\overset{d}{.}295623$,

after J.D. 2434900 $\qquad P = 6\overset{d}{.}295983$.

If the O-C diagram is approximated by a parabolic line (continuous period change), the equation of the best fitting parabola is:

$$C_{par} = 2442773.461 + 6.295993 \times E + 6.74 \times 10^{-8} \times E^2 \quad .$$

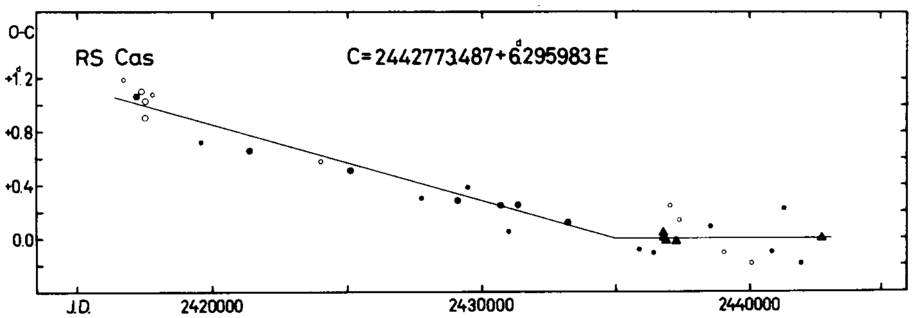

Figure 39 O-C diagram of RS Cas

Table 26 O-C residuals for RS Cas

Obs.Max.J.D.	E	O-C	Type	w	Reference
2416740.786	-4135	$+1\overset{d}{.}189$	vis	0.5	Kandiba et al.[1] (1935)
2417187.679	-4064	+1.067	pg	1	Kandiba et al. (1935)
2417357.706	-4037	+1.102	vis	1	Kandiba et al.[1] (1935)
2417515.036	-4012	+1.033	vis	1	Haynes (1907)
2417521.205	-4011	+0.906	vis	1	{Whitney (1907) Furness[2] (1913)
2417792.103	-3968	+1.077	vis	0.5	Zeipel (1908)
2419617.580	-3678	+0.718	pg	0.5	Robinson (1933)
2421367.807	-3400	+0.662	pg	1	Jordan (1929)
2424043.512	-2975	+0.574	vis	0.5	Kandiba et al.[1] (1935)
2425126.358	-2803	+0.511	pg	1	Schneller (1931)
2427751.571	-2386	+0.299	pg	0.5	Tolmár (1940a)
2429098.898	-2172	+0.286	pg	1	Tolmár (1940a)
2429470.457	-2113	+0.382	pg	0.5	Tolmár (1940a)
2430698.041	-1918	+0.249	pg	1	Solov'yov (1954)
2431012.634	-1868	+0.043	pg	0.5	Vasil'yanovskaya (1948)
2431359.126	-1813	+0.256	pg	1	Solov'yov (1954)
2433184.831	-1523	+0.126	pg	1	Solov'yov (1954)
2435873.005	-1096	-0.085	pg	0.5	Zonn, Semeniuk (1959)
2436401.84	-1012	-0.11	pg	0.5	Rubashevsky (1962)
2436767.158	-954	+0.039	pe	3	Weaver et al. (1960)
2436792.303	-950	0.000	pe	3	Oosterhoff (1960)

Table 26 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2436880.430	-936	$-0^{d}.017$	pe	3	Bahner et al. (1962)
2437025.500	-913	+0.245	vis	0.5	Häussler (1973)
2437220.404	-882	-0.026	pe	3	Mitchell et al. (1964)
2437365.373	-859	+0.135	vis	0.5	Häussler (1973)
2438542.68	-672	+0.09	pg	0.5	Ahnert (1966)
2439046.153	-592	-0.112	vis	0.5	Häussler (1973)
2439436.312	-530	-0.304	vis	0	Häussler (1973)
2440097.502	-425	-0.192	vis	0.5	Häussler (1973)
2440865.701	-303	-0.103	pg	0.5	Rümmler (1977)
2441300.450	-234	+0.223	pg	0.5	Rümmler (1977)
2441615.398	-184	+0.372	pg	0	Rümmler (1977)
2441967.408	-128	-0.193	pg	0.5	Rümmler (1977)
2442314.250	-73	+0.370	pg	0	Rümmler (1977)
2442678.758	-15	-0.289	pg	0	Rümmler (1977)
2442773.489	0	+0.002	pe	3	present paper

Remarks: [1] Observer: Blazhko; [2] Observer: Whitney

<u>X Vulpeculae</u>

The light and colour curves of this variable are shown in

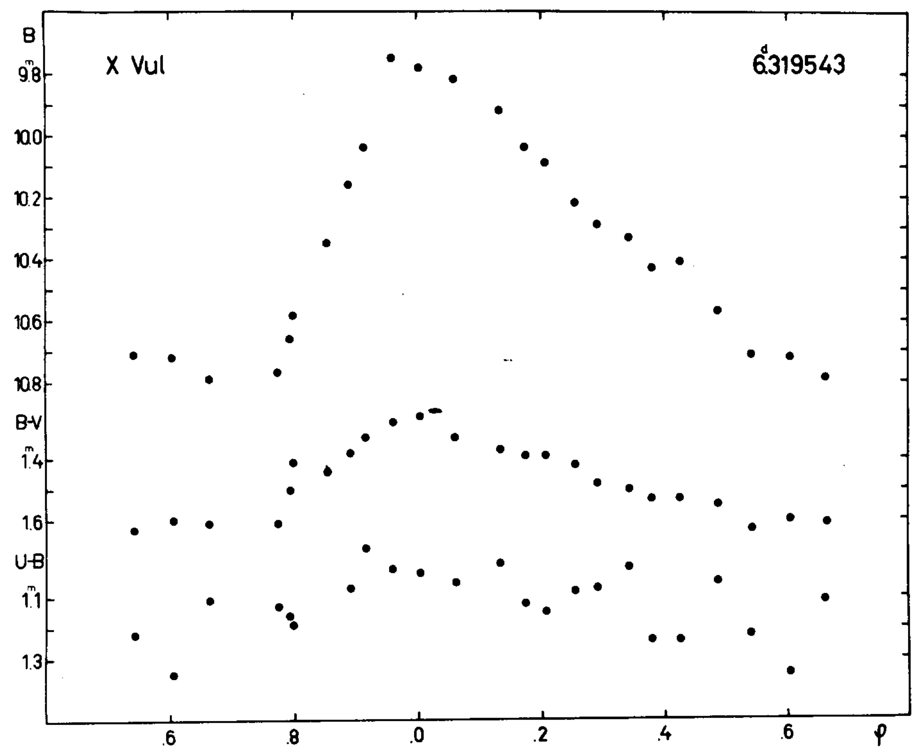

Figure 40 B, B-V and U-B curves of X Vul

Fig. 40. The present U-B amplitude is smaller than expected (*Schaltenbrand* and *Tammann* 1971). The O-C residuals have been calculated using the formula:

$$C = 2442665.932 + 6\overset{d}{.}319543 \times E \quad .$$

The O-C diagram in Fig. 41 shows one period change. Neither the time of the change in the period nor the value of the former period can be determined since the period change occurred before J.D. 2427000 when the reliability of the O-C diagram is not good.

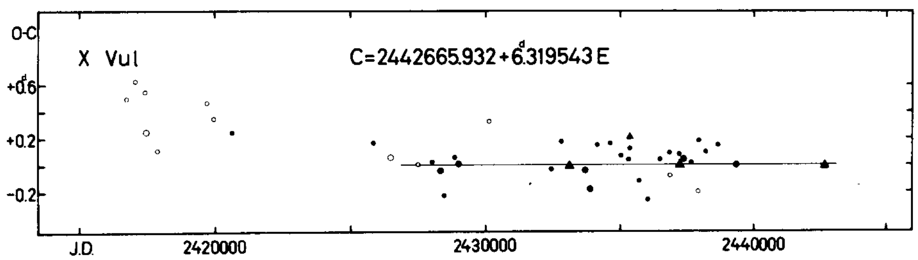

Figure 41 O-C diagram of X Vul

Table 27 O-C residuals for X Vul

Obs.Max.J.D.	E	O-C	Type	w	Reference
2416756.3	-4100	$+0\overset{d}{.}5$	vis	0.5	Dunér et al.[1] (1904)
2417066.09	-4051	+0.63	vis	0.5	Seares (1907a)
2417432.55	-3993	+0.55	vis	0.5	Seares (1907a)
2417470.166	-3987	+0.252	vis	1	Luizet (1907b)
2417893.435	-3920	+0.112	vis	0.5	Zeipel (1908)
2419701.18	-3634	+0.47	vis	0.5	Luizet (1914)
2419972.80	-3591	+0.35	vis	0.5	Luizet (1914)
2420636.248	-3486	+0.243	pg	0.5	Robinson (1933)
2425843.478	-2662	+0.169	pg	0.5	Nassau, Townson (1932)
2426481.643	-2561	+0.061	vis	1	Kukarkin (1940)
2427499.037	-2400	+0.008	vis	0.5	Nassau, Ashbrook (1943)
2428004.616	-2320	+0.024	pg	0.5	Nassau, Ashbrook (1943)
2428314.212	-2271	-0.038	pg	1	Azhusenis (1956)
2428453.05	-2249	-0.23	pg	0.5	Fu De-Lian (1964)
2428857.785	-2185	+0.054	pg	0.5	Nassau, Ashbrook (1943)
2428984.128	-2165	+0.007	pg	1	Azhusenis (1956)
2430128.29	-1984	+0.33	vis	0.5	Ashbrook (1943)
2432421.920	-1621	-0.033	pg	0.5	Davis (1949)
2432794.98	-1562	+0.17	pg	0.5	Wachmann (1964a)
2433117.093	-1511	-0.010	pe	3	Eggen (1951)
2433692.141	-1420	-0.040	pg	1	Chuprina (1954)
2433868.946	-1392	-0.182	pg	1	Chuprina[2] (1954)
2434122.06	-1352	+0.15	pg	0.5	Wachmann (1964a)
2434627.63	-1272	+0.16	pg	0.5	Wachmann (1964a)
2435006.72	-1212	+0.07	pg	0.5	Wachmann (1964a)
2435303.701	-1165	+0.037	pg	0.5	Chuprina (1957)
2435354.434	-1157	+0.213	pe	1	Walraven et al. (1958)
2435360.66	-1156	+0.12	pg	0.5	Wachmann (1964a)

Table 27 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2435695.36	-1103	$-0^{d}.12$	pg	0.5	Huth (1966)
2436023.83	-1051	-0.26	pg	0.5	Huth (1966)
2436485.46	-978	+0.04	pg	0.5	Huth (1966)
2436839.40	-922	+0.09	pg	0.5	Huth (1966)
2436858.191	-919	-0.081	vis	0.5	Busch (1963)
2437174.33	-869	+0.08	pg	0.5	Huth (1966)
2437205.847	-864	0.000	pe	3	Mitchell et al. (1964)
2437357.564	-840	+0.048	pg	1	Boyko (1970)
2437641.90	-795	+0.01	pg	0.5	Huth (1966)
2437919.746	-751	-0.209	vis	0.5	Busch (1963)
2437932.77	-749	+0.18	pg	0.5	Huth (1966)
2438172.84	-711	+0.10	pg	0.5	Huth (1966)
2438640.53	-637	+0.15	pg	0.5	Huth (1966)
2439291.295	-534	-0.001	pg	1	Boyko (1970)
2442665.923	0	-0.009	pe	3	present paper

Remarks: [1] Observer: Blazhko; [2] Observer: Tsessevich

RR Lacertae

The light and colour curves of RR Lac are plotted in Fig. 42.

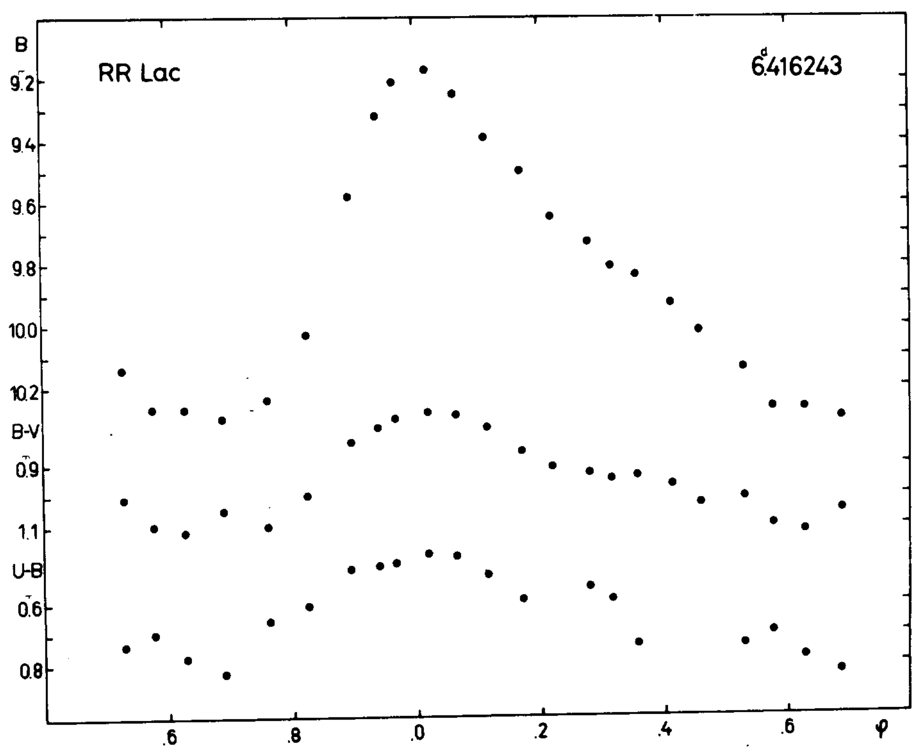

Figure 42 B, B-V and U-B curves of RR Lac

The O-C residuals have been computed with the formulae:

$$C_{max} = 2442776.686 + 6\overset{d}{.}416243 \times E \quad ,$$

$$C_{med} = 2442775.898 + 6\overset{d}{.}416243 \times E \quad .$$

One change in the period can be suspected (see Fig. 43):

before J.D. 2431600 $\quad P = 6\overset{d}{.}416146$,

after J.D. 2431600 $\quad P = 6\overset{d}{.}416243$.

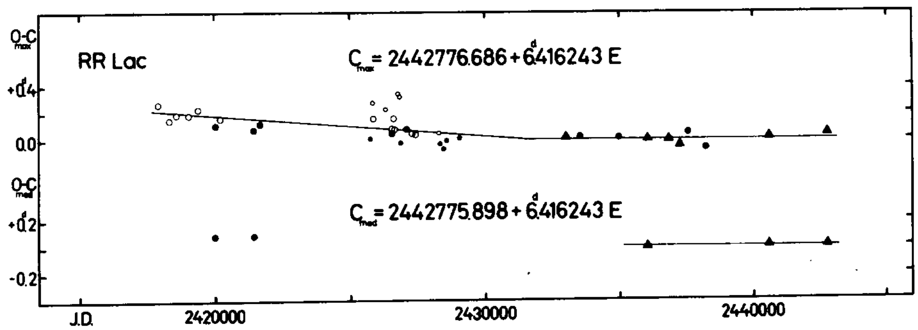

Figure 43 O-C diagram of RR Lac

Table 28 O-C residuals for RR Lac

(maximum brightness)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2417914.015	-3875	$+0\overset{d}{.}271$	vis	1	Enebo (1908)
2418330.952	-3810	+0.152	vis	1	Enebo (1909)
2418555.557	-3775	+0.188	vis	1	Bilt (1926b)
2419011.107	-3704	+0.185	vis	1	Enebo (1912)
2419376.875	-3647	+0.227	vis	1	Bilt (1926b)
2419434.331	-3638	-0.063	pg	0	Robinson (1933)
2420005.552	-3549	+0.112	pg	2	Hertzsprung (1922)
2420217.338	-3516	+0.162	vis	1	Bilt (1926b)
2421429.921	-3327	+0.075	pg	2	Hertzsprung (1922)
2421667.365	-3290	+0.118	pg	1	Jordan (1929)
2424856.5	-2793	+0.4	vis	0	Selivanov (1929)
2425747.99	-2654	+0.01	pg	0.5	Kiehl, Hopp (1977)
2425838.081	-2640	+0.277	vis	0.5	Parenago (1938a)
2425850.797	-2638	+0.160	vis	1	Beyer (1934b)
2426312.834	-2566	+0.228	vis	0.5	Terkán (1935)
2426530.843	-2532	+0.084	vis	1	Kukarkin (1940)
2426537.221	-2531	+0.046	pg	1	Zonn (1933)
2426607.914	-2520	+0.160	vis	1	Beyer (1934b)
2426633.496	-2516	+0.077	vis	1	Lassovszky (1934)
2426762.084	-2496	+0.341	vis	0.5	Dziewulski et al. (1946)
2426806.984	-2489	+0.327	vis	0.5	Dziewulski et al. (1946)
2426870.80	-2479	-0.02	pg	0.5	Kiehl, Hopp (1977)
2427095.468	-2444	+0.080	pg	1	Zonn (1933)
2427294.338	-2413	+0.046	vis	1	Florya et al. (1953)
2427403.406	-2396	+0.038	vis	1	Lassovszky (1934)
2428269.609	-2261	+0.048	vis	0.5	Dziewulski et al. (1946)
2428346.526	-2249	-0.029	pg	0.5	Dziewulski et al. (1946)
2428461.98	-2231	-0.07	pg	0.5	Fu De-Lian (1964)

Table 28 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2428558.287	-2216	$-0^{d}.005$	pg	0.5	Dziewulski et al. (1946)
2428751.422	-2186	+0.643	pg	0	Gur'yev (1938)
2429045.94	-2140	+0.01	pg	0.5	Katz (1946)
2432998.350	-1524	+0.018	pe	3	Eggen (1951)
2433537.316	-1440	+0.020	pg	1	Solov'yov (1952)
2434968.133	-1217	+0.015	pg	1	Azarnova (1957)
2436033.214	-1051	-0.001	pe	3	Bahner et al. (1971)
2436835.238	-926	-0.007	pe	3	Bahner et al. (1962)
2437213.761	-867	-0.042	pe	3	Mitchell et al. (1964)
2437579.580	-810	+0.051	pg	1	Girnyak (1964)
2438240.338	-707	-0.064	pg	1	Girnyak (1964)
2440582.350	-342	+0.019	pe	3	Asteriadis et al. (1977)
2442776.720	0	+0.034	pe	3	present paper

Table 29 O-C residuals for RR Lac

(median brightness)

Obs.Med.J.D.	E	O-C	Type	w	Reference
2420004.737	-3549	$+0^{d}.085$	pg	2	Hertzsprung (1922)
2421429.144	-3327	+0.086	pg	2	Hertzsprung (1922)
2436032.418	-1051	-0.009	pe	3	Bahner et al. (1971)
2440581.548	-342	+0.005	pe	3	Asteriadis et al. (1977)
2442775.905	0	+0.007	pe	3	present paper

AW Persei

The light and colour curves of this Cepheid are shown in Fig. 44. AW Per was reported to be a component of a spectroscopic binary system (*Miller* and *Preston* 1964). On the basis of the available radial velocity measurements *Lloyd Evans* (1968) determined the lowest value of the orbital period to be 1200 days. Using more recent radial velocity measurements *McNamara* and *Chapman* (1977) concluded that the orbital period was longer than 20 years. The presence of the B7 companion can also be pointed out using only photometric data (*Madore* 1977).

The O-C residuals have been calculated with the formula:

$$C = 2442709.059 + 6^{d}.463589 \times E \quad .$$

If the first point in the O-C diagram in Fig. 45 is real, a period change took place before J.D. 2426000. It is even more interesting that a simple eye inspection can reveal a sinusoidal wave in the O-C diagram which is a direct result of the orbital motion of AW Per around the centre of mass of the binary system. The phenomenon is similar to the case of FF Aql (Paper I, p. 94). A search for the period of this long term modulation gave $P_{orb}=$

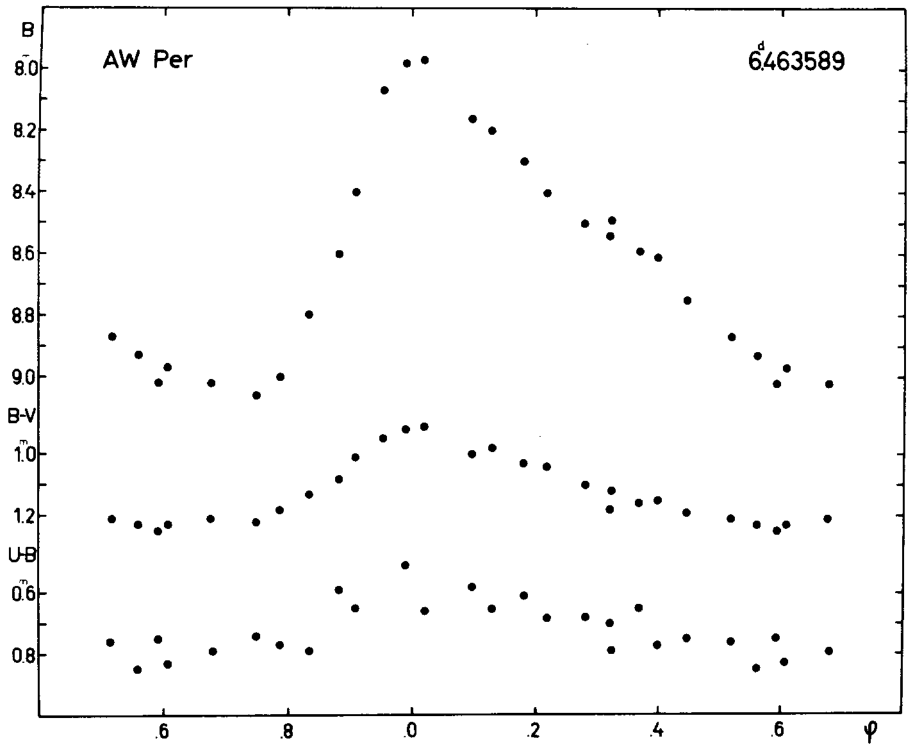

Figure 44 B, B-V and U-B curves of AW Per

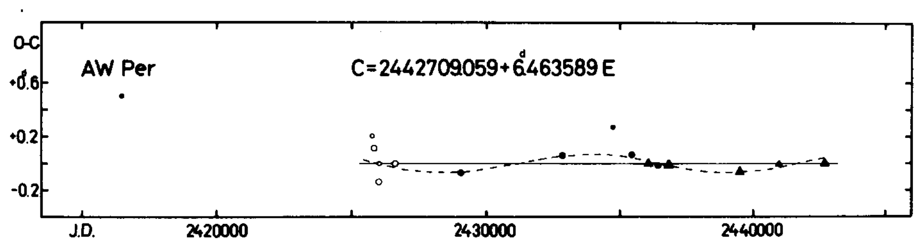

Figure 45 O-C diagram of AW Per

10300±800 days, as the best result. The resulting light-time diagram versus the orbital phase is plotted in Fig. 46. In constructing this diagram the O-C values based on visual observations were averaged into one point. The orbital phases have been computed with the formula:

$$\text{Epoch} + \text{phase} = (\text{J.D.} - 2400000)\times 10300^{-1} \quad .$$

The observed maxima, the corresponding O-C residuals and the orbital phases are listed in Table 31. The value of $a\times \sin i$ can be determined from the amplitude of the O-C variation curve. The result is: $a \times \sin i = 1.6 \times 10^9$ km.

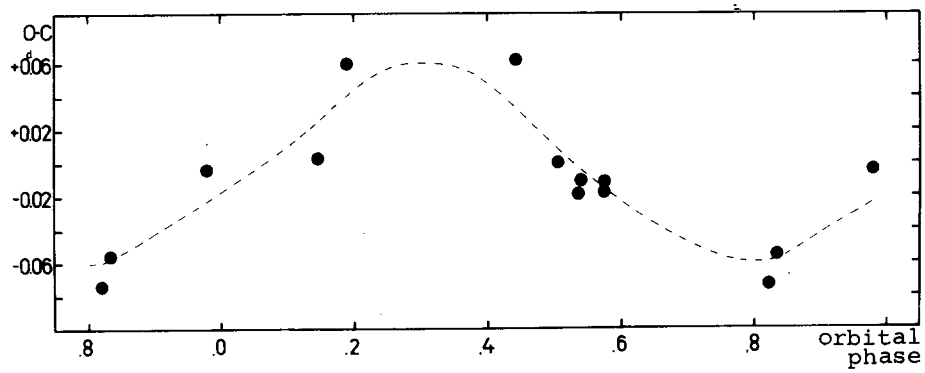

Figure 46 O-C variations due to the orbital motion

Table 30 O-C residuals for AW Per

Obs.Max.J.D.	E	O-C	Type	w	Reference
2416512.64	-4053	$+0^{d}.50$	pg	0.5	Kukarkin (1930)
2425832.8	-2611	+0.2	vis	0.5	Guthnick et al.[1] (1930)
2425845.669	-2609	+0.114	vis	1	Kukarkin (1940)
2426007.145	-2584	0.000	vis	0.5	Jacchia[2] (1930)
2426019.929	-2582	-0.143	vis	1	Jacchia (1930)
2426634.109	-2487	-0.004	vis	1	Kukarkin (1940)
2429070.812	-2110	-0.074	pg	1	Opolski (1948)
2432865.073	-1523	+0.060	pg	1	Erleksova (1961)
2434765.577	-1229	+0.269	pg	0.5	Erleksova (1961)
2435463.438	-1121	+0.062	pg	1	Erleksova (1961)
2436109.735	-1021	0.000	pe	3	Bahner et al. (1977)
2436426.431	-972	-0.019	pg	1	Erleksova (1961)
2436820.711	-911	-0.018	pe	3	Oosterhoff (1960)
2436827.181	-910	-0.012	pe	3	Weaver et al. (1960)
2439503.063	-496	-0.056	pe	3	Wamsteker (1972)
2440996.204	-265	-0.004	pe	2	Evans (1976)
2442709.062	0	+0.003	pe	3	present paper

Remarks: [1] Observer: Kanda; [2] Observer: Dallaporta

Table 31

Obs.Max.J.D.	O-C	phase	Obs.Max.J.D.	O-C	phase
2426168.714	$-0^{d}.011$	.541	2436820.711	$-0^{d}.018$	.575
2429070.812	-0.074	.822	2436827.181	-0.012	.575
2432865.073	+0.060	.191	2439503.063	-0.056	.835
2435463.438	+0.062	.443	2440996.204	-0.004	.980
2436109.735	0.000	.506	2442709.062	+0.003	.147
2436426.431	-0.019	.537			

CS Monocerotis

There is a faint companion NE of the variable. This may be the reason that the B and the B-V amplitudes of the variable (see Fig. 47) are smaller than given in the catalogue compiled by *Schaltenbrand* and *Tammann* (1971).

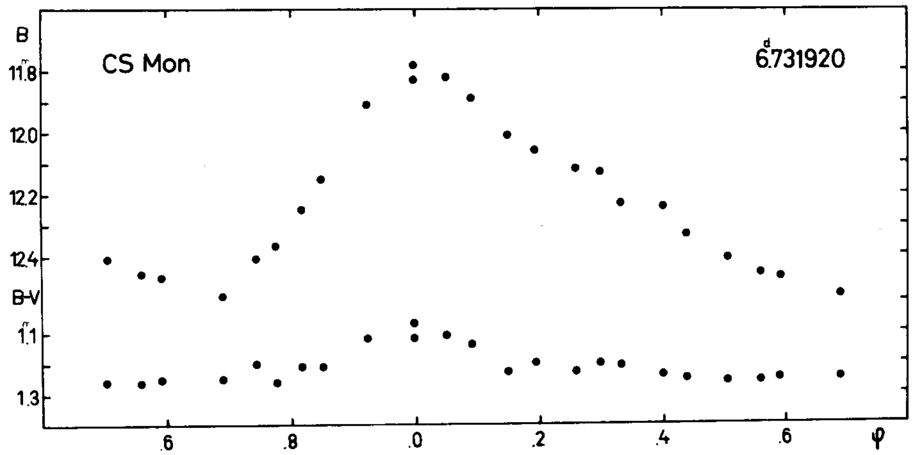

Figure 47 B and B-V curves of CS Mon

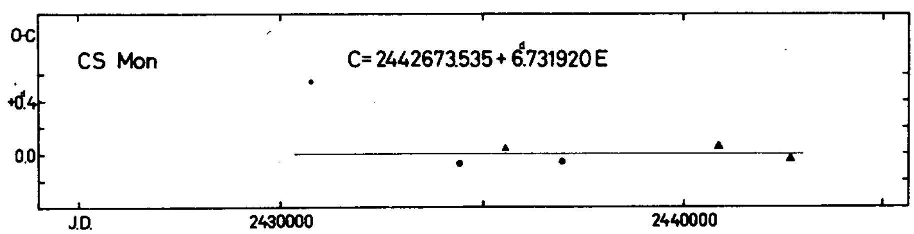

Figure 48 O-C diagram of CS Mon

Table 32 O-C residuals for CS Mon

Obs.Max.J.D.	E	O-C	Type	w	Reference
2430758.58	-1770	$+0^{d}.54$	pg	0.5	Ahnert (1947)
2434406.665	-1228	-0.072	pg	1	Bogdanov (1974)
2435544.469	-1059	+0.037	pe	1	Walraven et al. (1958)
2436964.811	-848	-0.056	pg	1	Bogdanov (1974)
2437914.158	-707	+0.090	pe	1	Eggen (1969)
2440855.969	-270	+0.052	pe	3	Pel (1976)
2442673.488	0	-0.047	pe	3	present paper

The O-C residuals have been derived using the formula:

$$C = 2442673.535 + 6^{d}.731920 \times E \quad .$$

The period has been constant since the discovery of the light variation of CS Mon.

AO Aurigae

The light curve plotted in Fig. 49 is the first reliable photoelectric light curve of this faint Cepheid. When determining the correct value of the period the normal maxima with a weight of 0.5 were also used. The O-C residuals have been computed with the formula:

$$C = 2442815.860 + 6^{d}.763006 \times E \quad .$$

The O-C diagram in Fig. 50 can be approximated by a straight line, i.e. the period is constant.

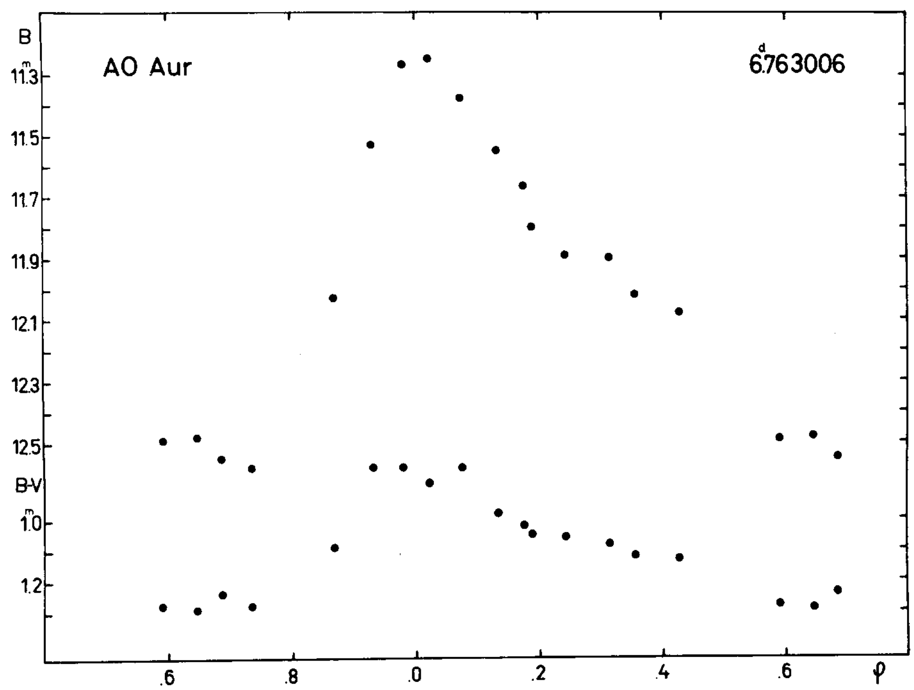

Figure 49 B and B-V curves of AO Aur

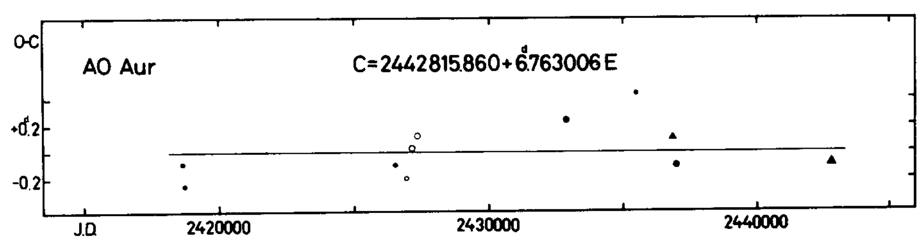

Figure 50 O-C diagram of AO Aur

Table 33 O-C residuals for AO Aur

Obs.Max.J.D.	E	O-C	Type	w	Reference
2418651.555	-3573	$-0^{d}.085$	pg	0.5	Reinmuth (1930)
2418739.308	-3560	-0.251	pg	0.5	Parenago (1934b)
2426523.68	-2409	-0.10	pg	0.5	Rügemer (1935)
2426942.9	-2347	-0.2	vis	0.5	Pedersen (1936)
2427132.476	-2319	+0.027	vis	1	Beyer (1934a)
2427335.463	-2289	+0.124	vis	1	Beyer (1934a)
2432867.714	-1471	+0.236	pg	1	Shakhovskaya (1964)
2435498.721	-1082	+0.433	pg	0.5	Shakhovskaya (1964)
2436850.986	-882	+0.097	pe	1	Weaver et al. (1960)
2436979.279	-863	-0.107	pg	1	Shakhovskaya (1964)
2442815.764	0	-0.096	pe	3	present paper

η Aquilae

The light and colour curves of this very bright Cepheid variable are shown in Fig. 51. The V amplitude derived from the

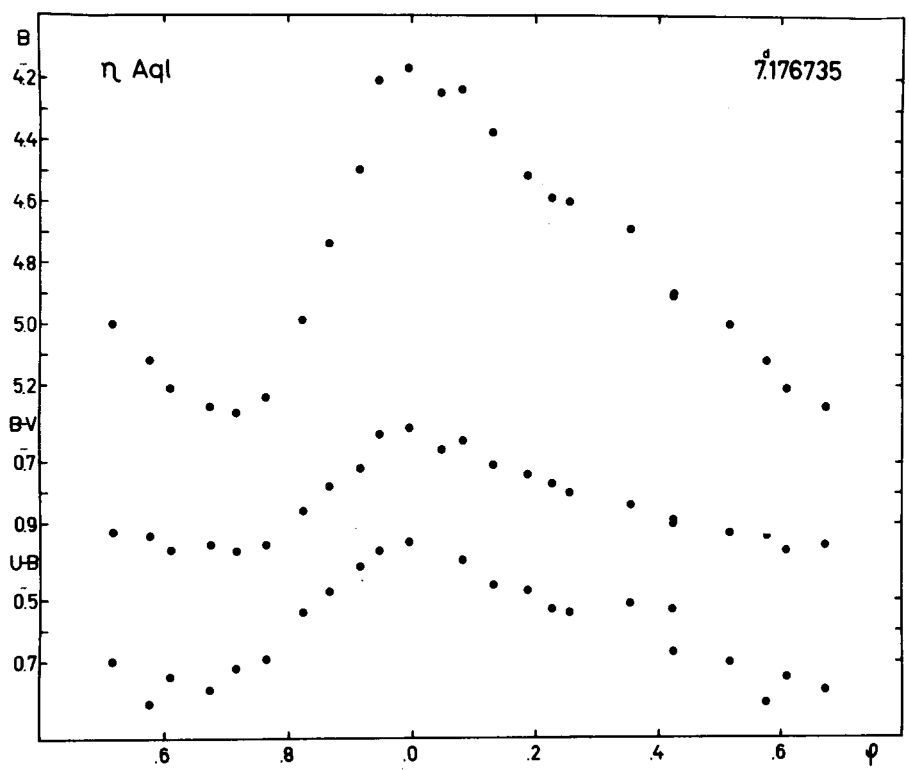

Figure 51 B, B-V and U-B curves of η Aql

present photometry is less whereas the U-B amplitude is greater than the corresponding values taken from the catalogue (*Schal-*

tenbrand and *Tammann* 1971).

The large number of photoelectric observational series has made it possible to construct the O-C diagram not only for the maximum brightness but also for the median brightness. The O-C residuals have been calculated with the formulae:

$$C_{max} = 2442794.773 + 7.^{d}176735 \times E \quad ,$$

$$C_{med} = 2442793.855 + 7.^{d}176735 \times E \quad .$$

The O-C diagram in Fig. 52 can well be approximated by a parabolic curve, i.e. the period has been changing continuously since the discovery of the light variation of η Aql. The equation of the parabolic curve for the maximum brightness is:

$$C_{par} = 2442794.773 + 7.176735 \times E + 2.18 \times 10^{-8} \times E^2 \quad .$$

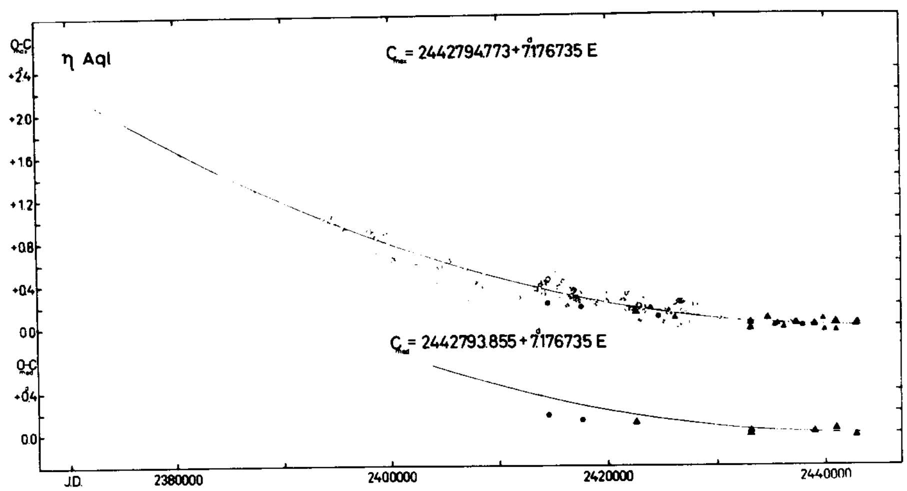

Figure 52 O-C diagram of η Aql

Table 34 O-C residuals for η Aql (maximum brightness)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2372974.375	-9729	$+2.^{d}057$	vis	1	Pigott (1785, 1786)
2373242.4	-9692	+4.5	vis	0	Dreyer[1] (1918)
2373627.64	-9638	+2.24	vis	0.5	Wurm (1811, 1813)
2374732.96	-9484	+2.34	vis	0.5	Wurm (1811, 1813)
2376161.03	-9285	+2.24	vis	0.5	Wurm (1811, 1813)
2377337.67	-9121	+1.90	vis	0.5	Wurm (1811, 1813)
2379490.69	-8821	+1.90	vis	0.5	Wurm (1811, 1813)
2380559.76	-8672	+1.63	vis	0.5	Wurm (1811, 1813)
2382741.50	-8368	+1.65	vis	0.5	Wurm (1811, 1813)
2385109.938	-8038	+1.761	vis	0.5	Westphal (1818)
2387463.409	-7710	+1.263	vis	1	Müller[2] (1925)
2388805.484	-7523	+1.288	vis	1	Müller[2] (1925)

Table 34 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2393376.905	-6886	+1^d.129	vis	1	Argelander (1869)
2393707.131	-6840	+1.225	vis	1	Argelander (1869)
2393821.756	-6824	+1.023	vis	1	Hagen[3] (1903)
2394051.380	-6792	+0.991	vis	1	Argelander (1869)
2394453.322	-6736	+1.036	vis	1	Argelander (1869)
2394611.136	-6714	+0.962	vis	1	Hagen[3] (1903)
2394769.094	-6692	+1.032	vis	1	Argelander (1869)
2395185.296	-6634	+0.983	vis	1	Argelander (1869)
2395200.224	-6632	+1.558	vis	0	Schmidt (1857a)
2395522.878	-6587	+1.258	vis	0.5	Schmidt (1857a)
2395551.255	-6583	+0.929	vis	1	Hagen[3] (1903)
2395551.391	-6583	+1.065	vis	1	Argelander (1869)
2395874.175	-6538	+0.895	vis	1	Argelander (1869)
2396261.541	-6484	+0.718	vis	1	Argelander (1869)
2396283.351	-6481	+0.998	vis	0.5	Schmidt (1857a)
2396396.19	-6465	-0.99	vis	0	Johnson (1856)
2396426.683	-6461	+0.795	vis	1	Hagen[3] (1903)
2396613.685	-6435	+1.202	vis	0.5	Schmidt (1857a)
2396993.874	-6382	+1.024	vis	0.5	Schmidt (1857a)
2397352.656	-6332	+0.969	vis	1	Argelander (1869)
2397395.573	-6326	+0.826	vis	1	Hagen[3] (1903)
2397711.653	-6282	+1.129	vis	0.5	Schmidt (1857a)
2397718.608	-6281	+0.908	vis	1	Argelander (1869)
2398084.609	-6230	+0.895	vis	1	Argelander (1869)
2398106.369	-6227	+1.125	vis	0.5	Schmidt (1857a)
2398414.885	-6184	+1.041	vis	0.5	Schmidt (1857a)
2398421.883	-6183	+0.863	vis	1	Hagen[3] (1903)
2398429.109	-6182	+0.912	vis	1	Argelander (1869)
2398680.075	-6147	+0.692	vis	0.5	Nielsen[4] (1931)
2398780.686	-6133	+0.829	vis	1	Argelander (1869)
2398802.079	-6130	+0.692	vis	0.5	Schmidt (1857a)
2398816.210	-6128	+0.469	vis	0.5	Schönfeld (1861)
2399175.853	-6078	+1.275	vis	0	Schmidt (1858b)
2399196.587	-6075	+0.479	vis	0.5	Schönfeld (1861)
2399196.852	-6075	+0.744	vis	1	Argelander (1869)
2399455.111	-6039	+0.641	vis	1	Hagen[3] (1903)
2399519.614	-6030	+0.553	vis	0.5	Schönfeld (1861)
2399541.797	-6027	+1.206	vis	0	Schmidt (1858b)
2399548.651	-6026	+0.883	vis	1	Argelander (1869)
2399570.167	-6023	+0.869	vis	1	Zinner, Wachmann[5] (1931)
2399900.206	-5977	+0.778	vis	1	Argelander (1869)
2399907.526	-5976	+0.921	vis	0.5	Schmidt (1859)
2399943.175	-5971	+0.687	vis	0.5	Auwers (1859)
2400237.465	-5930	+0.731	vis	1	Argelander (1869)
2400265.899	-5926	+0.458	vis	0.5	Schmidt (1860a)
2400345.043	-5915	+0.658	vis	0.5	Hagen[3] (1903)
2400352.169	-5914	+0.607	vis	1	Zinner, Wachmann[5] (1931)
2400646.369	-5873	+0.561	vis	0.5	Schmidt (1861)
2401026.824	-5820	+0.649	vis	0.5	Schmidt (1862)
2401385.376	-5770	+0.364	vis	0.5	Schmidt (1863)
2401407.30	-5767	+0.76	vis	0.5	Argelander (1869)
2401758.446	-5718	+0.244	vis	0.5	Schmidt (1864)
2402103.076	-5670	+0.390	vis	0.5	Schmidt (1865)
2402447.778	-5622	+0.609	vis	1	Valentiner[6] (1900)
2402476.448	-5618	+0.572	vis	0.5	Schmidt (1866)

Table 34 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2402828.175	-5569	+0^{d}.639	vis	1	Valentiner[6] (1900)
2402842.370	-5567	+0.481	vis	0.5	Schmidt (1867)
2403151.203	-5524	+0.714	vis	1	Valentiner[6] (1900)
2403201.246	-5517	+0.520	vis	0.5	Schmidt (1868)
2403495.761	-5476	+0.789	vis	1	Valentiner[6] (1900)
2403574.122	-5465	+0.206	vis	0.5	Schmidt (1869)
2403581.672	-5464	+0.579	vis	1	Zinner, Wachmann[5] (1931)
2403911.589	-5418	+0.366	vis	0.5	Schmidt (1870)
2403947.745	-5413	+0.639	vis	1	Valentiner[6] (1900)
2404284.954	-5366	+0.541	vis	1	Valentiner[6] (1900)
2404306.298	-5363	+0.355	vis	0.5	Schmidt (1871)
2404320.694	-5361	+0.397	vis	0.5	Hagen[3] (1903)
2404428.631	-5346	+0.683	vis	1	Zinner, Wachmann[5] (1931)
2404664.986	-5313	+0.206	vis	0.5	Schmidt (1872)
2404672.514	-5312	+0.557	vis	1	Valentiner[6] (1900)
2405031.145	-5262	+0.352	vis	0.5	Schmidt (1873)
2405031.354	-5262	+0.561	vis	1	Valentiner[6] (1900)
2405404.072	-5210	+0.088	vis	0	Schmidt (1874)
2405440.472	-5205	+0.605	vis	1	Valentiner[6] (1900)
2405741.913	-5163	+0.623	vis	1	Valentiner[6] (1900)
2405756.388	-5161	+0.744	vis	0.5	Schmidt (1875)
2406086.069	-5115	+0.296	vis	0.5	Chandler (1877)
2406143.432	-5107	+0.245	vis	0.5	Schmidt (1876)
2406143.561	-5107	+0.374	vis	0.5	Valentiner[6] (1900)
2406387.710	-5073	+0.514	vis	1	Belyavsky[7] (1910)
2406487.839	-5059	+0.168	vis	0.5	Schmidt (1877)
2406846.584	-5009	+0.077	vis	0	Schwab (1878)
2406861.175	-5007	+0.314	vis	0.5	Schmidt (1878)
2407019.283	-4985	+0.534	vis	1	Sawyer (1881)
2407212.600	-4958	+0.079	vis	0	Schwab (1879)
2407234.281	-4955	+0.230	vis	0.5	Schmidt (1879)
2407342.340	-4940	+0.638	vis	1	Schur (1895)
2407578.810	-4907	+0.276	vis	0.5	Schmidt (1880)
2407952.132	-4855	+0.407	vis	0.5	Schmidt (1881)
2408102.827	-4834	+0.391	vis	1	Schur (1895)
2408317.990	-4804	+0.252	vis	0.5	Schmidt (1882)
2408339.613	-4801	+0.345	vis	1	Sawyer (1882)
2408662.712	-4756	+0.491	vis	1	Sawyer (1883)
2408691.304	-4752	+0.376	vis	0.5	Schmidt (1883)
2409050.359	-4702	+0.594	vis	0.5	Schmidt (1884)
2409129.065	-4691	+0.356	vis	1	Schur (1895)
2410298.843	-4528	+0.326	vis	0.5	Hagen (1891)
2410873.405	-4448	+0.749	vis	0	Yendell (1889)
2411956.611	-4297	+0.268	vis	0.5	Nielsen[8] (1931)
2412315.431	-4247	+0.252	vis	0.5	Nielsen[9] (1931)
2413420.703	-4093	+0.306	vis	1	Stratonov (1904)
2413442.276	-4090	+0.349	vis	1	Plassmann (1900)
2413449.561	-4089	+0.457	vis	0.5	Sperra (1896)
2413686.167	-4056	+0.231	vis	1	Nijland (1923)
2413772.466	-4044	+0.409	vis	1	Plassmann (1900)
2413801.116	-4040	+0.352	vis	1	Stratonov (1904)
2413822.674	-4037	+0.380	vis	0.5	Sperra (1897b)
2414160.005	-3990	+0.405	vis	1	Stratonov (1904)
2414188.425	-3986	+0.118	vis	0.5	Sperra (1898)
2414188.597	-3986	+0.290	vis	1	Nijland (1923)

Table 34 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2414195.781	-3985	+0.297 (d)	vis	1	Pickering (1904)
2414195.874	-3985	+0.390	vis	1	Plassmann (1900)
2414511.75	-3941	+0.49	vis	0.5	Grouiller[10] (1920)
2414518.830	-3940	+0.393	vis	0.5	Luizet (1903)
2414540.180	-3937	+0.213	pg	2	Schwarzschild (1900)
2414540.396	-3937	+0.429	vis	1	Plassmann (1900)
2414633.699	-3924	+0.434	vis	1	Zinner[11] (1932)
2414877.540	-3890	+0.266	vis	0.5	Luizet (1903)
2414891.843	-3888	+0.216	vis	1	Plassmann (1900)
2415222.205	-3842	+0.448	vis	0.5	Luizet (1903)
2415265.31	-3836	+0.49	vis	0.5	Grouiller[12] (1920)
2415293.886	-3832	+0.362	vis	1	Plassmann (1901)
2415408.985	-3816	+0.633	vis	0.5	Tass (1908)
2415422.993	-3814	+0.287	vis	0.5	Tass[13] (1925)
2415595.527	-3790	+0.580	vis	0.5	Kopff (1902)
2415631.188	-3785	+0.357	vis	1	Plassmann (1905)
2415631.231	-3785	+0.400	vis	0.5	Luizet (1903)
2415638.26	-3784	+0.25	vis	0.5	Grouiller[12] (1920)
2415975.731	-3737	+0.417	vis	0.5	Luizet (1903)
2415982.944	-3736	+0.453	vis	1	Plassmann (1905)
2416018.547	-3731	+0.172	vis	1	Roy, de Roy (1905)
2416169.386	-3710	+0.300	vis	1	Bilt (1924a)
2416348.694	-3685	+0.189	vis	0.5	Plassmann (1905)
2416399.103	-3678	+0.361	vis	1	Götz (1906)
2416499.422	-3664	+0.206	vis	0.5	Nielsen[14] (1931)
2416542.542	-3658	+0.266	vis	0.5	Olivier (1952)
2416671.377	-3640	-0.081	vis	0	Terkán (1905)
2416722.04	-3633	+0.35	vis	0.5	Grouiller[12] (1920)
2416736.319	-3631	+0.271	vis	1	Plassmann (1905)
2416844.019	-3616	+0.320	vis	1	Zinner[11] (1932)
2416937.329	-3603	+0.332	vis	1	Tass[13] (1925)
2416951.604	-3601	+0.254	vis	1	Bilt (1924a)
2416994.742	-3595	+0.331	vis	0.5	Schiller (1906)
2417116.659	-3578	+0.244	vis	1	Plassmann (1905, 1906)
2417123.76	-3577	+0.17	vis	0.5	Grouiller[12] (1920)
2417131.041	-3576	+0.272	vis	0.5	Furness[15] (1913)
2417339.128	-3547	+0.234	vis	1	Lohnert (1909)
2417411.5	-3537	+0.8	vis	0	Gliese[16] (1942)
2417475.556	-3528	+0.304	vis	1	Plassmann (1908)
2417497.014	-3525	+0.232	vis	0.5	Olivier (1952)
2417662.026	-3502	+0.179	pg	2	Kohlschlütter (1910)
2417748.290	-3490	+0.322	vis	1	Bilt (1924a)
2417841.751	-3477	+0.486	vis	0.5	Plassmann (1908)
2418207.341	-3426	+0.062	vis	0.5	Favaro (1909)
2418300.805	-3413	+0.229	vis	1	Lau (1908)
2418387.07	-3401	+0.37	vis	0.5	Hornig (1915)
2418552.224	-3378	+0.462	vis	0.5	Olivier (1952)
2418573.567	-3375	+0.275	vis	1	Mündler (1911)
2418860.55	-3335	+0.19	vis	0.5	Grouiller[12] (1920)
2418896.391	-3330	+0.146	vis	0.5	Becker[9] (1925)
2419004.13	-3315	+0.23	vis	0.5	Grouiller[17] (1920)
2419083.04	-3304	+0.20	vis	0.5	Grouiller[18] (1920)
2419434.858	-3255	+0.357	vis	1	Zinner[11] (1932)
2419636.08	-3227	+0.63	vis	0	Hornig (1915)
2419649.812	-3225	+0.009	vis	0.5	Breson (1913)

Table 34 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2419678.821	-3221	+0^d.311	vis	1	Dziewulski (1930)
2419908.394	-3189	+0.229	vis	1	Hoffmeister (1915)
2420059.118	-3168	+0.241	vis	0.5	Olivier (1952)
2420188.362	-3150	+0.304	vis	1	Zinner[11] (1932)
2420683.572	-3081	+0.320	vis	1	Zinner[11] (1932)
2420726.441	-3075	+0.128	vis	0.5	Becker[9] (1925)
2421020.809	-3034	+0.250	vis	1	Luyten (1922)
2421429.935	-2977	+0.302	vis	1	Zinner[11] (1932)
2421444.228	-2975	+0.242	vis	0.5	Nielsen[19] (1931)
2421480.100	-2970	+0.230	vis	1	Lacchini (1921b)
2421487.176	-2969	+0.129	vis	1	Nijland (1923)
2421752.841	-2932	+0.255	vis	1	Luyten (1922)
2421788.8	-2927	+0.3	vis	0.5	Gliese[20] (1942)
2421824.507	-2922	+0.154	vis	1	Nijland (1923)
2422183.339	-2872	+0.149	vis	1	Nijland (1923)
2422233.583	-2865	+0.156	vis	0.5	Becker[9] (1925)
2422578.119	-2817	+0.209	vis	1	Nijland (1923)
2422585.217	-2816	+0.130	pe	3	Wylie (1922)
2422872.282	-2776	+0.125	vis	1	Zinner[11] (1932)
2422901.053	-2772	+0.189	vis	1	Nielsen[21] (1922)
2422908.345	-2771	+0.305	vis	1	Nijland (1923)
2422915.399	-2770	+0.182	vis	1	Zverev (1936)
2422922.433	-2769	+0.039	vis	0.5	Perepelkin (1925)
2422987.030	-2760	+0.046	vis	0.5	Nielsen[22] (1931)
2423267.112	-2721	+0.235	vis	1	Zverev (1936)
2423331.599	-2712	+0.131	vis	0.5	Becker[9] (1925)
2423331.637	-2712	+0.169	vis	1	Nielsen[21] (1929)
2423403.511	-2702	+0.276	vis	1	Parenago (1938a)
2423618.719	-2672	+0.182	vis	1	Grouiller et al.[17] (1932)
2423661.705	-2666	+0.108	vis	1	Hopmann (1924)
2423991.888	-2620	+0.161	pe	1	Pettit et al. (1933)
2424379.226	-2566	-0.045	vis	0.5	Parenago (1938a)
2424659.251	-2527	+0.087	pg	2	Tiercy (1930)
2424716.700	-2519	+0.122	vis	1	Kukarkin (1940)
2424731.082	-2517	+0.151	vis	1	Lipinski (1933)
2424989.329	-2481	+0.036	vis	1	Grouiller et al.[23] (1932)
2425154.388	-2458	+0.030	vis	0.5	Nielsen[9] (1931)
2425247.743	-2445	+0.087	vis	1	Collmann (1930)
2425448.768	-2417	+0.164	vis	1	Kukarkin (1940)
2425484.637	-2412	+0.149	vis	1	Parenago (1938a)
2425620.964	-2393	+0.118	vis	1	Zverev (1936)
2425663.952	-2387	+0.045	vis	1	Lipinski (1933)
2425750.158	-2375	+0.131	vis	1	McLaughlin (1934b)
2426087.426	-2328	+0.092	vis	1	Grouiller et al.[23] (1932)
2426144.825	-2320	+0.077	pe	2	Bernheimer (1931)
2426180.843	-2315	+0.212	vis	1	McLaughlin (1934b)
2426202.34	-2312	+0.18	vis	0.5	Gliese[9] (1942)
2426503.81	-2270	+0.23	vis	0.5	Gliese (1942)
2426510.767	-2269	+0.006	vis	1	Zverev (1936)
2426525.271	-2267	+0.156	vis	1	McLaughlin (1934b)
2426525.329	-2267	+0.214	vis	1	Kukarkin (1940)
2426596.873	-2257	-0.009	vis	1	Parenago (1938a)
2426747.812	-2236	+0.218	vis	1	Lipinski (1933)
2426912.889	-2213	+0.231	vis	1	McLaughlin (1934b)
2426919.965	-2212	+0.130	vis	1	Florya, Kukarkina (1953)

Table 34 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2426998.99	-2201	+0.21 d	vis	0.5	Gliese (1942)
2427293.050	-2160	+0.025	vis	1	Florya, Kukarkina (1953)
2427321.85	-2156	+0.12	vis	0.5	Horn (1934)
2427601.65	-2117	+0.03	vis	0.5	Gliese[9] (1942)
2427623.348	-2114	+0.193	vis	1	Krebs (1935)
2427723.742	-2100	+0.113	vis	1	Florya (1938)
2428010.893	-2060	+0.194	vis	1	Krebs (1937)
2428047.28	-2055	+0.70	vis	0	Sures (1937)
2428297.874	-2020	+0.106	vis	0.5	Nielsen (1940)
2428427.131	-2002	+0.181	vis	1	Krebs (1937)
2429001.21	-1922	+0.12	vis	0.5	Gliese (1942)
2429101.74	-1908	+0.18	vis	0.5	Gliese[9] (1942)
2430249.903	-1748	+0.063	vis	0.5	Kappert (1942)
2430501.072	-1713	+0.046	vis	1	Nielsen (1952)
2432065.59	-1495	+0.04	vis	0.5	Pohl[24] (1951)
2432072.857	-1494	+0.126	vis	0.5	Solov'yov (1949)
2432353.20	-1455	+0.58	vis	0	Pohl[24] (1951)
2432826.427	-1389	+0.139	vis	1	Lacchini (1949)
2432840.57	-1387	-0.07	vis	0.5	Pohl (1951)
2433041.561	-1359	-0.029	pe	3	Eggen (1951)
2433070.318	-1355	+0.021	pe	3	Stebbins et al. (1952)
2433170.95	-1341	+0.18	vis	0.5	Pohl[25] (1951)
2433931.93	-1235	+0.42	vis	0	Domke, Pohl (1952)
2434240.61	-1192	+0.51	vis	0	Pohl[26] (1955)
2434599.96	-1142	+1.02	vis	0	Marks[27] (1959)
2434613.353	-1140	+0.058	pe	3	present paper[28]
2434656.80	-1134	+0.44	vis	0	Pohl (1955)
2435022.70	-1083	+0.33	vis	0	Rudolph[29] (1959)
2435295.084	-1045	-0.001	pe	2	Irwin (1961)
2435574.994	-1006	+0.016	pe	2	Walraven et al. (1958)
2435725.92	-985	+0.23	vis	0.5	Rudolph[30] (1959)
2435976.91	-950	+0.04	vis	0.5	Rudolph (1959)
2436041.619	-941	+0.154	vis	1	Azarnova (1959)
2436084.514	-935	-0.012	vis	1	Vinnik (1958)
2436127.95	-929	+0.36	vis	0	Rudolph (1959)
2436141.921	-927	-0.019	pe	1	Oke (1961a)
2436809.40	-834	+0.02	vis	0.5	Braune et al.[29] (1962)
2436996.019	-808	+0.048	vis	1	Azarnova (1962)
2437153.956	-786	+0.097	vis	1	Mayall[31] (1964, 1966)
2437283.056	-768	+0.015	pe	3	Mitchell et al. (1964)
2437857.173	-688	-0.006	pe	1	Williams (1966)
2438287.635	-628	-0.148	vis	0.5	Romejko (1965)
2438926.521	-539	+0.008	pe	3	Wisniewski et al. (1968)
2439027.37	-525	+0.38	vis	0	Busch (1977b)
2439751.893	-424	+0.056	pe	2	Sudzius (1969)
2439888.148	-405	-0.047	pe	2	Schmidt (1971)
2440469.93	-324	+0.42	vis	0	Busch (1977b)
2440843.15	-272	+0.45	vis	0	Braune et al. (1972)
2440928.854	-260	+0.032	pe	3	Pel (1976)
2440957.482	-256	-0.047	pe	2	Evans (1976)
2441589.7	-168	+0.6	vis	0	Braune et al.[32] (1973)
2442794.781	0	+0.008	pe	3	present paper
2442945.512	+21	+0.028	pe	2	Dean (1977)

Remarks: (observers) [1] Herschel; [2] Schwerd; [3] Heis;

[4] Oudemans; [5] Winnecke; [6] Schönfeld; [7] Glasenapp; [8] Knopf; [9] Plassmann; [10] Guillaume; [11] Hartwig; [12] Markwick; [13] Terkán; [14] Balanowsky; [15] Whitney; [16] Stempell; [17] Moye; [18] Venturi; [19] Selivanov; [20] Jockisch; [21] Johansson; [22] Aurino; [23] Loreta; [24] Auzinger; [25] Menzel; [26] Born; [27] Szczepkowski; [28] Detre; [29] Pohl; [30] Masuch; [31] Evans, Lacchini, Nightingale, Orchiston, Staer, Vodrazka; [32] Pfeiffer

Table 35 O-C residuals for η Aql
(median brightness)

Obs.Med.J.D.	E	O-C	Type	w	Reference
2404284.071	-5366	$+0^{d}.576$	vis	1	Valentiner[1] (1900)
2413800.226	-4040	+0.380	vis	1	Stratonov (1904)
2414539.219	-3937	+0.170	pg	2	Schwarzschild (1900)
2417661.050	-3502	+0.121	pg	2	Kohlschlütter (1910)
2422584.269	-2816	+0.100	pe	3	Wylie (1922)
2428009.917	-2060	+0.136	vis	1	Krebs (1937)
2430500.103	-1713	-0.005	vis	1	Nielsen (1952)
2433040.657	-1359	-0.015	pe	3	Eggen (1951)
2433069.399	-1355	+0.020	pe	3	Stebbins et al. (1952)
2438925.610	-539	+0.015	pe	3	Wisniewski et al. (1968)
2440927.943	-260	+0.039	pe	3	Pel (1976)
2442793.834	0	-0.021	pe	3	present paper

Remark: [1] Observer: Schönfeld

V 600 Aquilae

The light and colour curves of V 600 Aql are plotted in Fig. 53. The O-C residuals have been computed with the formula:

$$C = 2442904.119 + 7^{d}.238748 \times E \quad .$$

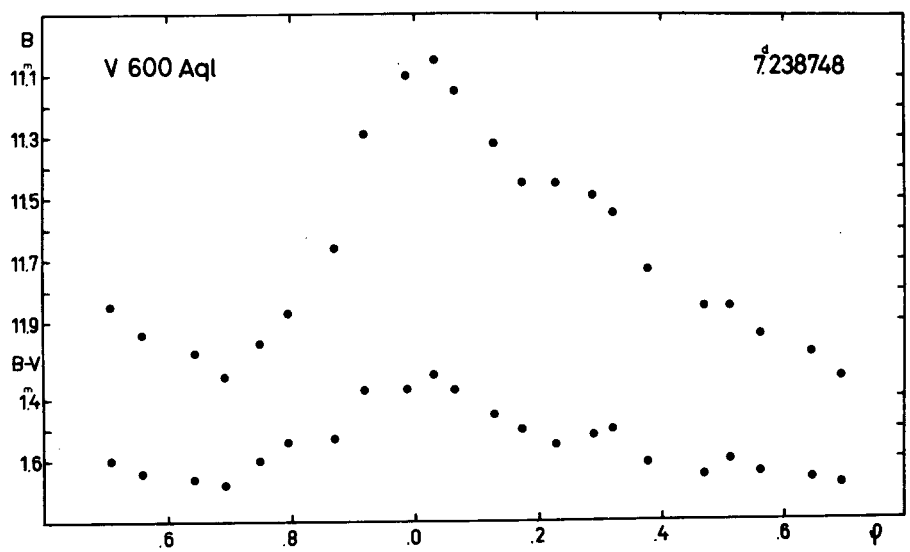

Figure 53 B and B-V curves of V 600 Aql

If the first two points in the O-C diagram (Table 36) are reliable, a period change must have occurred during an epoch before J.D. 2428000. Unfortunately, neither the epoch of the period change nor the former value of the period can be determined.

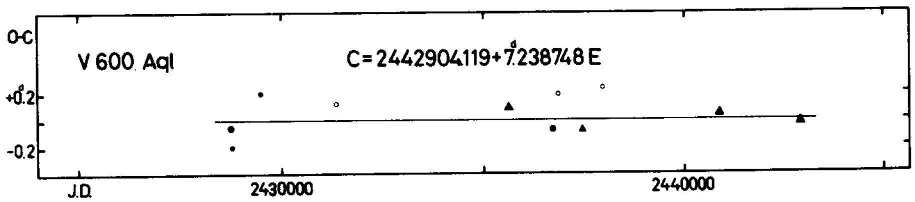

Figure 54 O-C diagram of V 600 Aql

Table 36 O-C residuals for V 600 Aql

Obs.Max.J.D.	E	O-C	Type	w	Reference
2415224.4	-3824	+1.^{d}3	pg	0.5	Tsessevich (1946)
2418924.2	-3313	+2.1	pg	0.5	Tsessevich (1946)
2428752.309	-1955	-0.058	pg	1	Kurochkin (1948)
2428773.9	-1952	-0.2	pg	0.5	Tsessevich (1946)
2429490.9	-1853	+0.2	pg	0.5	Tsessevich (1946)
2431336.72	-1598	+0.12	vis	0.5	Tsessevich (1946)
2431670.42	-1552	+0.84	vis	0	Tsessevich (1946)
2435622.024	-1006	+0.085	pe	3	Walraven et al. (1958)
2436707.675	-856	-0.076	pg	1	Chupilko (1961)
2436838.235	-838	+0.187	vis	0.5	Voigtländer (1964)
2437453.264	-753	-0.078	pe	2	Mitchell et al. (1964)
2437960.293	-683	+0.239	vis	0.5	Voigtländer (1964)
2440877.304	-280	+0.034	pe	3	Pel (1976)
2442904.092	0	-0.027	pe	3	present paper

<u>V 336 Aquilae</u>

The B-V amplitude of this Cepheid is smaller (see Fig. 55) than was determined by *Schaltenbrand* and *Tammann* (1971). This is likely to result from the one-sided deviation of the data points from the normal curve (due to the scatter) which tends to decrease the amplitude in this particular case.

Table 37 O-C residuals for V 336 Aql

Obs.Max.J.D.	E	O-C	Type	w	Reference
2414870.38	-3858	+0.^{d}90	pg	0	Kurochkin (1958)
2427600.31	-2115	0.00	vis	0.5	Selivanov (1935)
2427651.60	-2108	+0.17	pg	0.5	Harwood (1938)
2427826.901	-2084	+0.171	vis	1	Beyer (1936)
2429842.588	-1808	-0.039	pg	1	Solov'yov (1948)
2429908.428	-1799	+0.065	pg	1	Kapko (1963)
2430777.427	-1680	-0.109	pg	1	Kapko (1963)
2431266.830	-1613	-0.073	pg	1	Solov'yov (1948)
2433078.301	-1365	+0.012	pg	1	Filatov (1961)

Table 37 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2433187.854	-1350	+0^d.006	pg	1	Kurochkin (1958)
2433867.048	-1257	-0.070	pg	1	Filatov (1961)
2434400.317	-1184	+0.009	pg	1	Filatov (1961)
2434546.235	-1164	-0.153	pg	1	Kapko (1963)
2435364.444	-1052	+0.011	pe	2	Walraven et al. (1958)
2435525.042	-1030	-0.079	pg	1	Filatov (1961)
2435758.924	-998	+0.076	pe	3	Weaver et al. (1960)
2437285.337	-789	-0.042	pe	2	Mitchell et al. (1964)
2437577.17	-749	-0.37	pg	0	Jetschke (1969)
2437869.46	-709	-0.24	pg	0.5	Jetschke (1969)
2438322.12	-647	-0.42	pg	0	Jetschke (1969)
2438614.43	-607	-0.27	pg	0.5	Jetschke (1969)
2438936.50	-563	+0.42	pg	0	Jetschke (1969)
2439286.33	-515	-0.34	pg	0	Jetschke (1969)
2439593.01	-473	-0.43	pg	0	Jetschke (1969)
2440842.452	-302	+0.037	pe	3	Pel (1976)
2443048.212	0	-0.004	pe	3	present paper

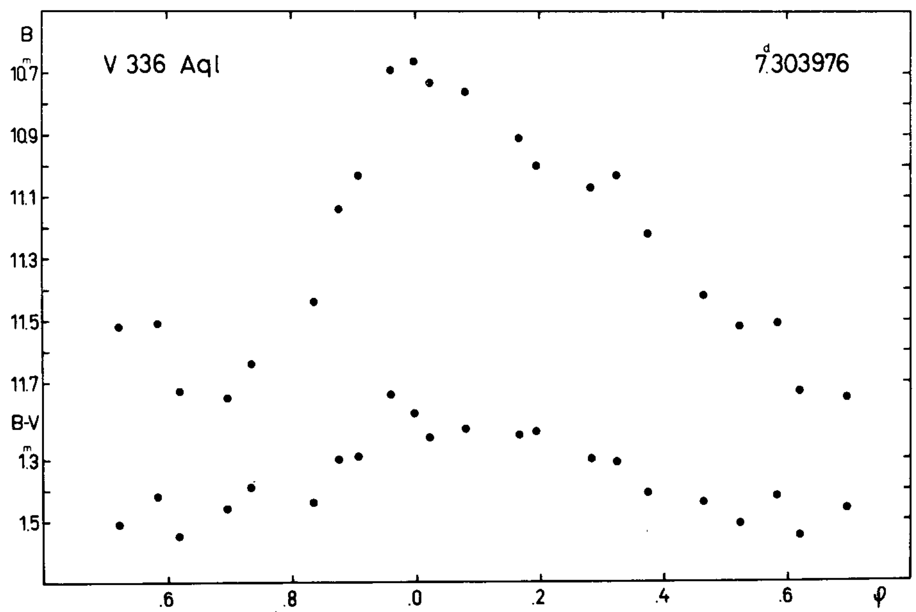

Figure 55 B and B-V curves of V 336 Aql

The O-C residuals have been derived using the formula:

$$C = 2443048.216 + 7^d.303976 \times E .$$

The O-C diagram in Fig. 56 shows a constant period thus the possible period variation reported in the G.C.V.S. (*Kukarkin* et al. 1969-1970) cannot be confirmed.

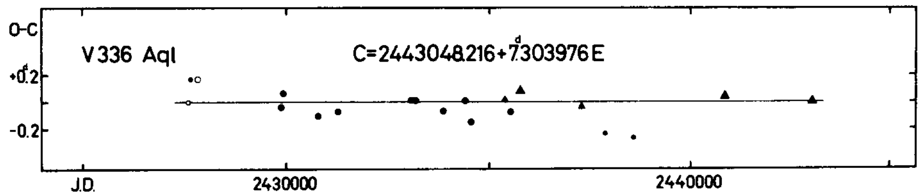

Figure 56 O-C diagram of V 336 Aql

BB Herculis

The classification of this variable is doubtful. The large radial velocity suggests its belonging to Population II (CW group) (2nd Suppl. to the G.C.V.S.; *Kukarkin* et al. 1974), but the light and colour curves (see Fig. 57) are common for a Population I or classical Cepheid. The variable has a faint companion within the edge of the diaphragm.

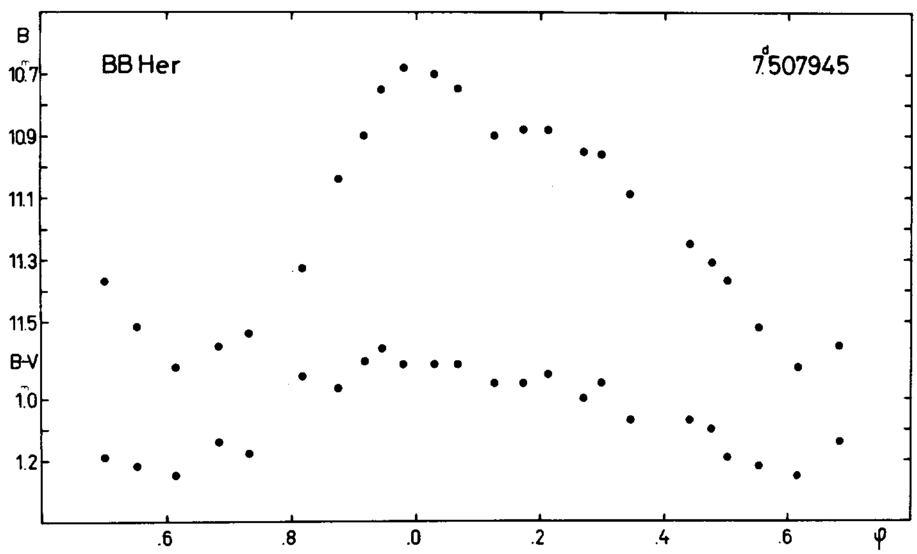

Figure 57 B and B-V curves of BB Her

The O-C residuals have been computed with the formula:

$$C = 2442679.289 + 7\overset{d}{.}507945 \times E \quad .$$

The O-C diagram in Fig. 58 shows one change in the period:

before J.D. 2430700 $P = 7\overset{d}{.}507696$,

after J.D. 2430700 $P = 7\overset{d}{.}507945$.

Table 38 O-C residuals for BB Her

Obs.Max.J.D.	E	O-C	Type	w	Reference
2418924.548	-3164	$+0^{d}.397$	pg	1	Parenago (1934a)
2424780.209	-2384	-0.139	pg	0.5	Albitzky (1928)
2425869.158	-2239	+0.158	vis	1	Kukarkin (1940)
2425884.218	-2237	+0.202	vis	1	Jacchia (1930)
2426034.278	-2217	+0.103	pg	1	Lassovszky (1931)
2426184.488	-2197	+0.154	vis	1	Jacchia (1930)
2429818.197	-1713	+0.018	pg	1	Mergentaler (1948)
2430546.475	-1616	+0.025	pg	1	Mergentaler (1948)
2433121.605	-1273	-0.070	pe	3	Eggen et al. (1957)
2433279.360	-1252	+0.018	pg	1	Solov'yov (1957)
2433542.091	-1217	-0.029	pg	1	Fridel' (1961)
2434037.752	-1151	+0.108	pg	1	Koval' (1957)
2434045.140	-1150	-0.012	pg	1	Solov'yov (1957)
2434600.745	-1076	+0.005	pg	1	Solov'yov (1957)
2434961.220	-1028	+0.098	pg	1	Solov'yov (1957)
2435344.023	-977	-0.004	pg	1	Solov'yov (1957)
2435449,141	-963	+0.003	pe	2	Walraven et al. (1958)
2435644.263	-937	-0.082	pg	1	Fridel' (1961)
2435696.87	-930	-0.03	pg	0.5	Vasil'yan. et al. (1970)
2436057.23	-882	-0.05	pg	0.5	Vasil'yan. et al. (1970)
2436417.58	-834	-0.08	pg	0.5	Vasil'yan. et al. (1970)
2436492.614	-824	-0.128	pg	1	Fridel' (1961)
2436793.03	-784	-0.03	pg	0.5	Vasil'yan. et al. (1970)
2437160.81	-735	-0.14	pg	0.5	Vasil'yan. et al. (1970)
2437296.203	-717	+0.111	pe	3	Mitchell et al. (1964)
2437551.38	-683	+0.02	pg	0.5	Vasil'yan. et al. (1970)
2437829.164	-646	+0.007	pe	3	Michal.-Smak et al.(1965)
2437866.66	-641	-0.04	pg	0.5	Vasil'yan. et al. (1970)
2438227.088	-593	+0.010	pe	3	Kwee, Braun (1967)
2438257.20	-589	+0.09	pg	0.5	Vasil'yan. et al. (1970)
2438594.95	-544	-0.02	pg	0.5	Vasil'yan. et al. (1970)
2442679.245	0	-0.044	pe	3	present paper

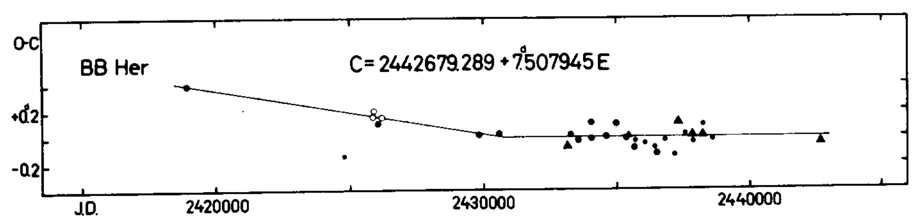

Figure 58 O-C diagram of BB Her

HR 690

This recently discovered Cepheid (*Henriksson* 1977) in constellation Perseus has extremely low amplitudes (see Fig. 59). It would be very important to know whether this variable is a physical member of the h and χ Persei but as far as the photoelectric V magnitudes allow one to draw a conclusion, HR 690 would be overluminous at the distance of the above-mentioned clusters, i.e. its belonging to either cluster is doubtful.

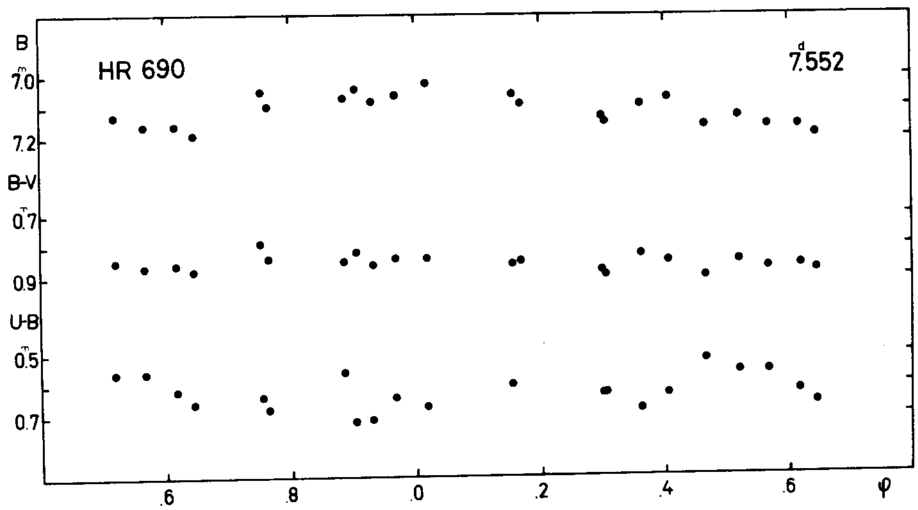

Figure 59 B, B-V and U-B curves of HR 690

The O-C diagram of HR 690 cannot be constructed because no other observations are available. Unfortunately, *Henriksson*'s (1977) observations – which might well be useful in refining the period – have remained unpublished. Using only the present photometric data, however, I determined a slightly shorter period: $7^{d}.552$ instead of the value $7^{d}.572$ given by *Henriksson*.

RS Orionis

The light and colour curves of this Cepheid are shown in Fig. 60. The variable has a B6 photometric companion (*Madore* 1977). The O-C residuals have been computed using the ephemeris:

$$C = 2442820.800 + 7^{d}.566881 \times E \quad .$$

Table 39 O-C residuals for RS Ori

Obs.Max.J.D.	E	O-C	Type	w	Reference
2416533.795	-3474	$+0^{d}.340$	pg	1	Kukarkina (1955)
2418274.055	-3244	+0.217	vis	1	Münch (1909)
2418381.4	-3230	+1.6	vis	0	Luizet (1913)
2419045.912	-3142	+0.252	pg	0.5	Robinson (1933)
2419098.7	-3135	+0.1	vis	0.5	Luizet (1913)
2419514.995	-3080	+0.188	pg	0.5	Hertzsprung (1928)
2419743.4	-3050	+1.6	vis	0	Zinner (1913)
2421936.353	-2760	+0.145	pg	1	Jordan (1929)
2424879.918	-2371	+0.193	vis	1	Rybka (1930)

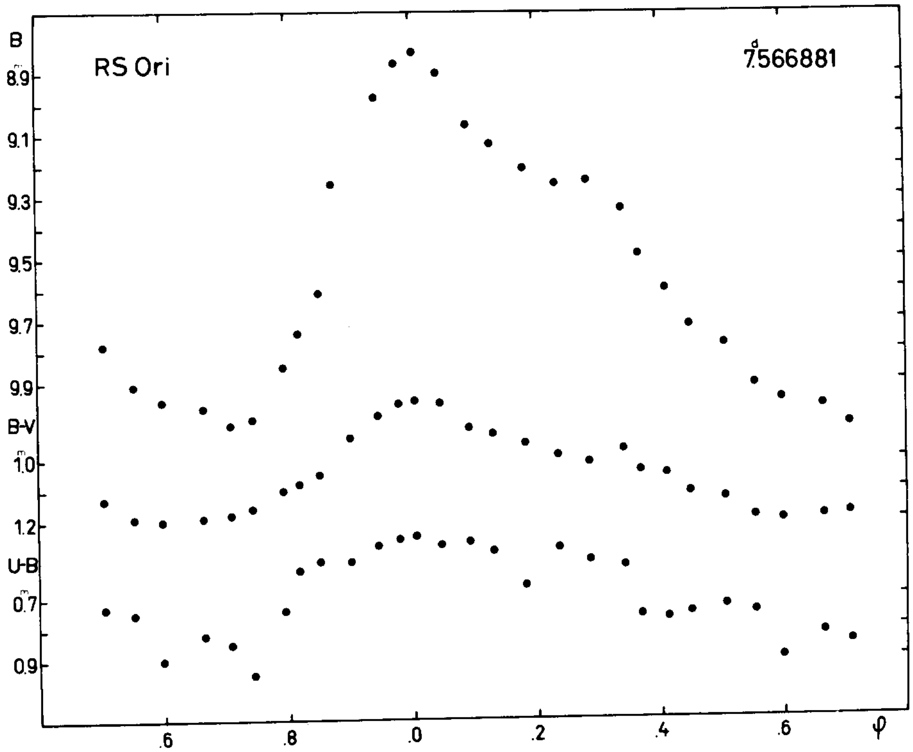

Figure 60 B, B-V and U-B curves of RS Ori

Table 39 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2425235.626	-2324	+0.257	vis	1	Rybka (1930)
2425326.322	-2312	+0.151	pg	1	Puchinskas (1962)
2425522.87	-2286	-0.04	pg	0.5	Martynov (1948)
2426393.242	-2171	+0.141	pg	1	Martynov (1951)
2427233.264	-2060	+0.239	pg	1	Martynov (1951)
2427581.209	-2014	+0.107	pg	1	Puchinskas (1962)
2427982.333	-1961	+0.187	pg	1	Martynov (1951)
2428565.060	-1884	+0.264	pg	1	Martynov (1951)
2429064.379	-1818	+0.169	pg	1	Martynov (1951)
2429306.578	-1786	+0.227	pg	1	Koshkina (1963)
2429798.322	-1721	+0.124	pg	1	Martynov (1951)
2430305.180	-1654	+0.001	vis	0.5	Kukarkina[1] (1955)
2430751.793	-1595	+0.168	pg	1	Martynov (1951)
2431039.385	-1557	+0.219	pg	1	Kukarkina (1955)
2433892.019	-1180	+0.139	pg	1	Koshkina (1963)
2433960.037	-1171	+0.055	pg	1	Solov'yov (1956)
2435178.286	-1010	+0.036	pe	2	Irwin (1961)
2435208.500	-1006	-0.018	pe	2	Walraven et al. (1958)
2436192.193	-876	-0.019	pe	3	Bahner et al. (1977)
2436282.987	-864	-0.028	pg	1	Puchinskas (1962)
2436608.377	-821	-0.014	pg	0.5	Huth (1963)

Table 39 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2436835.395	-791	$-0^d.002$	pe	3	Weaver et al. (1960)
2437047.280	-763	+0.010	pe	3	Mitchell et al. (1964)
2437599.63	-690	-0.02	pg	0.5	Ahnert (1964)
2438076.401	-627	+0.035	pg	1	Fridel' (1971)
2440777.748	-270	+0.006	pe	3	Pel (1976)
2442820.794	0	-0.006	pe	3	present paper

Remark: [1] Observer: Lasebnik

The O-C diagram in Fig. 61 can be approximated by two almost parallel lines showing the phenomenon of the rejumping period. Both the period jump and the subsequent rejump occurred between J.D. 2433000 and J.D. 2435000. The values of the period during the other intervals are as follows:

before J.D. 2433000 $P = 7^d.566836$,

after J.D. 2435000 $P = 7^d.566881$.

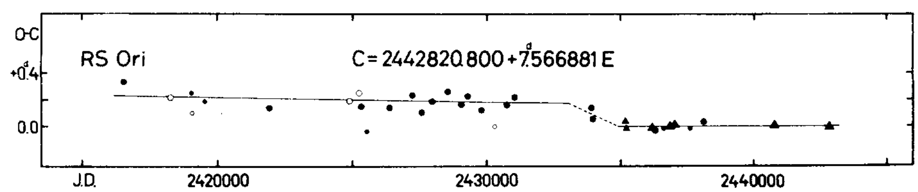

Figure 61 O-C diagram of RS Ori

GH Cygni

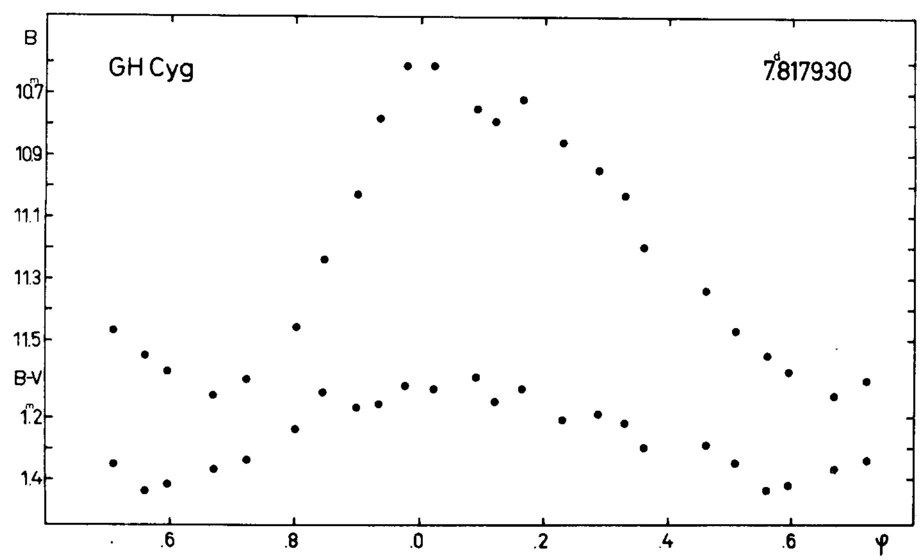

Figure 62 B and B-V curves of GH Cyg

The light and colour curves of this Cepheid variable are shown in Fig. 62. In order to obtain a precise value of the period I was obliged to take into account also the normal maxima with 0.5 weight when fitting a line to the points in the O-C diagram (Fig. 63). The O-C residuals have been computed with the formula:

$$C = 2442743.743 + 7^{d}.817930 \times E \quad .$$

The period has been constant since the discovery of GH Cyg's light variation.

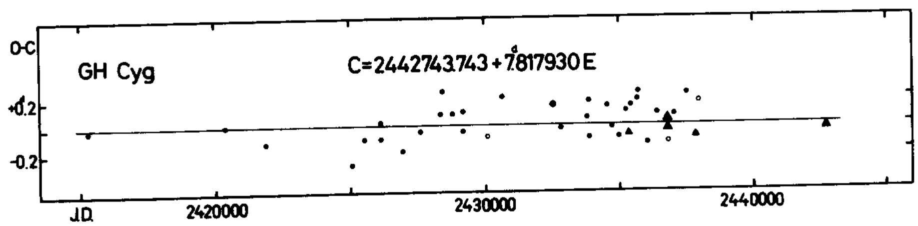

Figure 63 O-C diagram of GH Cyg

Table 40 O-C residuals for GH Cyg

Obs.Max.J.D.	E	O-C	Type	w	Reference
2415310.606	-3509	$-0^{d}.021$	pg	0.5	Parenago (1934b)
2420376.64	-2861	0.00	pg	0.5	Oosterhoff (1935)
2421877.56	-2669	-0.13	pg	0.5	Oosterhoff (1935)
2424755.18	-2301	+0.49	pg	0	Oosterhoff (1935)
2425074.93	-2260	-0.29	pg	0.5	Oosterhoff (1935)
2425528.56	-2202	-0.10	pg	0.5	Oosterhoff (1935)
2425778.30	-2170	-0.53	pg	0	Oosterhoff (1935)
2426130.66	-2125	+0.02	pg	0.5	Nassau, Ashbrook (1942)
2426138.4	-2124	-0.1	pg	0.5	Schneller (1930)
2426231.62	-2112	-0.65	pg	0	Oosterhoff (1935)
2426943.52	-2021	-0.19	pg	0.5	Oosterhoff (1935)
2427600.36	-1937	-0.05	pg	0.5	Nassau, Ashbrook (1942)
2428351.01	-1841	+0.08	pg	0.5	Nassau, Ashbrook (1942)
2428429.36	-1831	+0.25	pg	0.5	Wachmann (1963)
2428804.45	-1783	+0.08	pg	0.5	Wachmann (1963)
2429179.58	-1735	-0.05	pg	0.5	Parenago (1946)
2429195.37	-1733	+0.10	pg	0.5	Wachmann (1963)
2430094.24	-1618	-0.09	vis	0.5	Ashbrook (1943)
2430641.798	-1548	+0.211	pg	0.5	Solov'yov (1944)
2432525.850	-1307	+0.142	pg	1	Duncombe (1949)
2432838.40	-1267	-0.03	pg	0.5	Wachmann (1963)
2433456.435	-1188	+0.393	pg	0	Satyvaldiev (1966)
2433792.262	-1145	+0.049	pg	0.5	Chuprina (1953)
2433878.11	-1134	-0.10	pg	0.5	Wachmann (1963)
2433878.384	-1134	+0.174	pg	0.5	Shteiman (1958)
2434535.052	-1050	+0.136	pg	0.5	Satyvaldiev (1966)
2434714.71	-1027	-0.02	pg	0.5	Wachmann (1963)
2434972.629	-994	-0.092	pg	0.5	Satyvaldiev (1966)
2435222.991	-962	+0.097	pg	0.5	Shteiman (1958)

Table 40 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2435363.542	-944	$-0^d.075$	pe	2	Walraven et al. (1958)
2435426.30	-936	+0.14	pg	0.5	Wachmann (1963)
2435676.517	-904	+0.183	pg	0.5	Satyvaldiev (1966)
2435700.03	-901	+0.24	pg	0.5	Huth (1966)
2436051.45	-856	-0.14	pg	0.5	Huth (1966)
2436403.48	-811	+0.08	pg	0.5	Huth (1966)
2436607.157	-785	+0.489	pg	0	Satyvaldiev (1966)
2436802.097	-760	-0.019	pe	3	Oosterhoff (1960)
2436802.152	-760	+0.036	pe	3	Weaver et al. (1960)
2436810.64	-759	+0.71	pg	0	Huth (1966)
2436825.433	-757	-0.137	vis	0.5	Voigtländer (1964)
2437044.54	-729	+0.07	pg	0.5	Huth (1966)
2437513.78	-669	+0.23	pg	0.5	Huth (1966)
2437607.641	-657	+0.278	pg	0	Satyvaldiev (1966)
2437849.630	-626	-0.089	pe	1	Eggen (1969)
2437936.10	-615	+0.38	pg	0	Huth (1966)
2437959.340	-612	+0.170	vis	0.5	Voigtländer (1964)
2438170.72	-585	+0.47	pg	0	Huth (1966)
2438584.27	-532	-0.33	pg	0	Huth (1966)
2442743.705	0	-0.038	pe	3	present paper

VY Cygni

The amplitudes of both the light and the colour variations (see Fig. 64) are smaller than given by *Schaltenbrand* and *Tammann* (1971). Moreover, the descending branch of the light curve

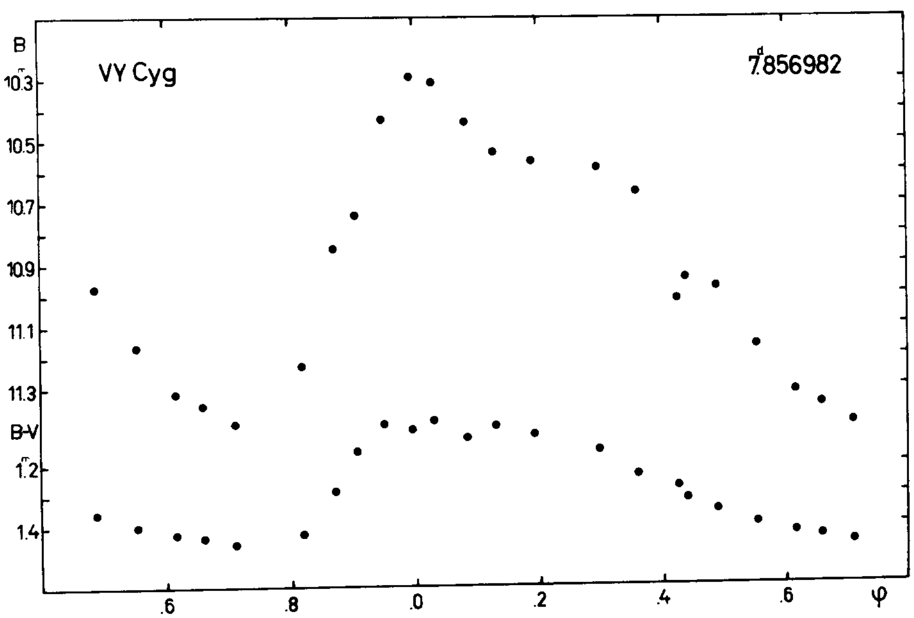

Figure 64 B and B-V curves of VY Cyg

differs from that given by *Nikolov* (1968). The variable has a B7 photometric companion (*Madore* 1977).

The O-C residuals listed in Tables 41 and 42 have been calculated using the formulae:

$$C_{max} = 2443045.282 + 7^{d}.856982 \times E \quad ,$$
$$C_{med} = 2443044.388 + 7^{d}.856982 \times E \quad ,$$

for the moments of the maximum and the median brightness, respectively. The O-C diagram in Fig. 65 shows the constancy of the period.

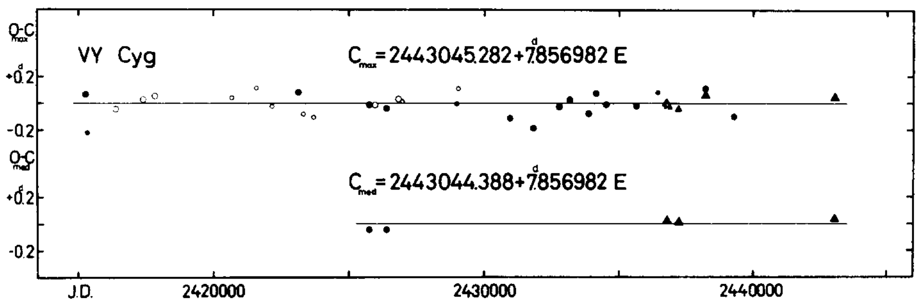

Figure 65 O-C diagram of VY Cyg

Table 41 O-C residuals for VY Cyg
(maximum brightness)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2415294.491	-3532	$+0^{d}.069$	pg	1	Kulikovsky (1932)
2415341.349	-3526	-0.214	pg	0.5	Williams (1904)
2416394.354	-3392	-0.045	vis	1	Williams (1904)
2417400.122	-3264	+0.029	vis	1	Luizet (1907c)
2417424.070	-3261	+0.406	vis	0	Seares (1907a)
2417832.286	-3209	+0.059	vis	1	Zeipel (1908)
2420660.780	-2849	+0.040	vis	0.5	Doberck (1920a)
2421572.265	-2733	+0.115	vis	0.5	Doberck (1920a)
2422169.260	-2657	-0.021	vis	0.5	Doberck (1920a)
2423120.061	-2536	+0.085	pg	1	Henroteau (1924)
2423308.463	-2512	-0.080	vis	0.5	Doberck (1924c)
2423701.287	-2462	-0.105	vis	0.5	Doberck (1924c)
2425759.910	-2200	-0.012	pg	2	Oosterhoff (1933)
2425964.191	-2174	-0.012	vis	1	Lassovszky (1933)
2426396.299	-2119	-0.038	pg	2	Oosterhoff (1933)
2426836.359	-2063	+0.031	vis	1	Lassovszky (1933)
2426946.34	-2049	+0.01	vis	0.5	Miczaika (1936)
2428973.422	-1791	-0.005	pg	0.5	Shnirelman (1940)
2429036.39	-1783	+0.11	vis	0.5	Krebs (1939)
2430953.276	-1539	-0.111	pg	1	Solov'yov (1957)
2431817.470	-1429	-0.185	pg	1	Solov'yov (1957)
2432791.897	-1305	-0.023	pg	1	Solov'yov (1957)
2433169.085	-1257	+0.029	pg	1	Solov'yov (1957)
2433883.966	-1166	-0.075	pg	1	Shteiman (1958)

Table 41 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2434143.395	-1133	+0.074	pg	1	Solov'yov (1957)
2434536.164	-1083	-0.006	pg	1	Shteiman (1958)
2435667.557	-939	-0.019	pg	1	Shteiman (1958)
2436092.883	-885	+1.030	pg	0	Korovkina (1958)
2436445.50	-840	+0.08	pg	0.5	Korovkina (1959)
2436775.410	-798	0.000	pe	3	Weaver et al. (1960)
2436806.815	-794	-0.023	pe	3	Oosterhoff (1960)
2437223.217	-741	-0.041	pe	2	Mitchell et al. (1964)
2438229.017	-613	+0.065	pe	3	Kwee, Braun (1967)
2438229.056	-613	+0.104	pg	1	Girnyak (1971)
2439297.405	-477	-0.097	pg	1	Girnyak (1971)
2443045.328	0	+0.046	pe	3	present paper

Table 42 O-C residuals for VY Cyg

(median brightness)

Obs.Med.J.D.	E	O-C	Type	w	Reference
2425758.983	-2200	-0.045	pg	2	Oosterhoff (1933)
2426395.396	-2119	-0.047	pg	2	Oosterhoff (1933)
2436805.966	-794	+0.022	pe	3	Oosterhoff (1960)
2438228.074	-613	+0.014	pe	3	Kwee, Braun (1967)
2443044.424	0	+0.036	pe	3	present paper

RX Camelopardalis

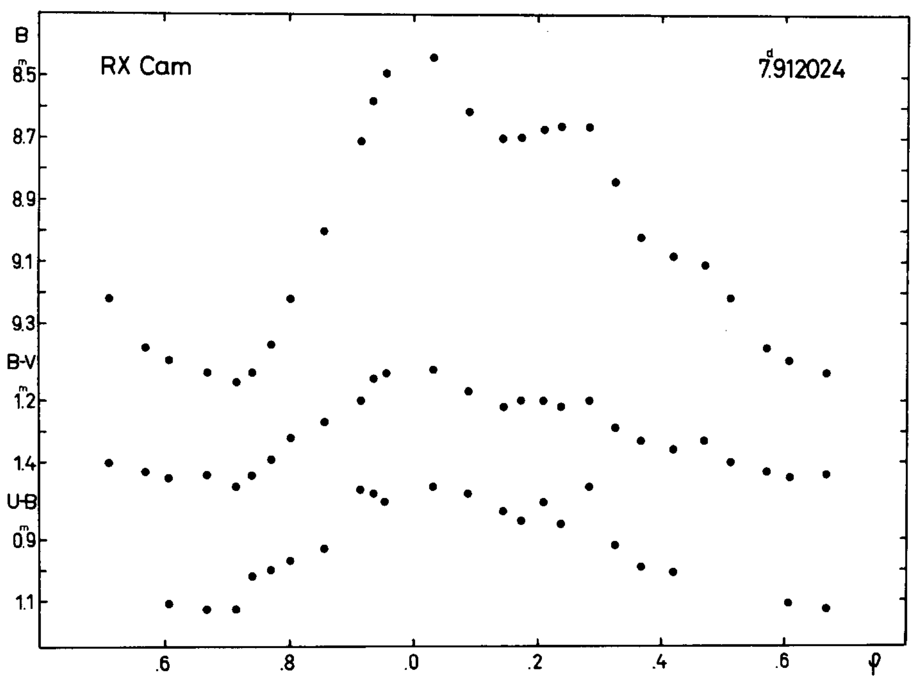

Figure 66 B, B-V and U-B curves of RX Cam

The amplitude of the light curve in the B band plotted in Fig. 66 as well as that of the V light curve is smaller than the corresponding value given by *Schaltenbrand* and *Tammann* (1971). The O-C diagrams could be constructed for both the maximum and the median brightnesses. The O-C residuals have been calculated by the formulae:

$$C_{max} = 2442766.583 + 7\overset{d}{.}912024 \times E \quad ,$$
$$C_{med} = 2442765.524 + 7\overset{d}{.}912024 \times E \quad .$$

The Cepheid RX Cam has a constant period (see Fig. 67) but a long term wave-like variation can be suspected as if RX Cam were a member of a binary system. In the absence of definite evidence (e.g. spectroscopic or photometric), it cannot be stated that this variable is really a component of a binary system.

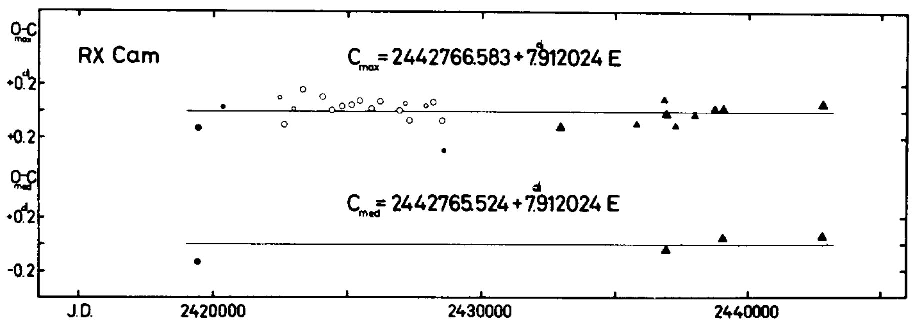

Figure 67 O-C diagram of RX Cam

Table 43 O-C residuals for RX Cam
(maximum brightness)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2419441.807	-2948	$-0\overset{d}{.}129$	pg	1	Hertzsprung (1928)
2420359.763	-2832	+0.032	pg	0.5	Robinson (1933)
2422456.523	-2567	+0.106	vis	0.5	Zakharov (1952)
2422638.293	-2544	-0.101	vis	1	Doberck (1924a)
2422970.715	-2502	+0.016	vis	0.5	Zakharov (1952)
2423311.080	-2459	+0.164	vis	1	Zakharov (1952)
2424054.759	-2365	+0.113	vis	1	Zakharov (1952)
2424394.871	-2322	+0.008	vis	1	Zakharov (1952)
2424774.677	-2274	+0.037	vis	1	Zakharov (1952)
2425138.644	-2228	+0.050	vis	1	Zakharov (1952)
2425431.419	-2191	+0.081	vis	1	Zakharov (1952)
2425874.434	-2135	+0.022	vis	1	Zakharov (1952)
2426198.881	-2094	+0.076	vis	1	Zakharov (1952)
2426926.719	-2002	+0.008	vis	1	Florya, Kukarkina (1953)
2427124.574	-1977	+0.062	vis	0.5	Dziewulski et al. (1946)
2427290.599	-1956	-0.065	vis	1	Florya, Kukarkina (1953)
2427899.933	-1879	+0.043	vis	0.5	Dziewulski (1947)

Table 43 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2428184.795	-1843	$+0^{d}.072$	vis	1	Krebs (1937)
2428524.867	-1800	-0.073	vis	1	Krebs (1937)
2428580.028	-1793	-0.296	pg	0.5	Dziewulski et al. (1946)
2432947.647	-1241	-0.114	pe	3	Eggen (1951)
2435795.998	-881	-0.092	pe	2	Prokof'yeva (1961)
2436824.745	-751	+0.092	pe	2	Weaver et al. (1960)
2436903.754	-741	-0.019	pe	3	Bahner et al. (1962)
2437251.794	-697	-0.108	pe	1	Mitchell et al. (1964)
2437963.959	-607	-0.025	pe	1	Williams (1966)
2438739.388	-509	+0.025	pe	1	Haug (1970)
2439040.043	-471	+0.023	pe	3	Wamsteker (1972)
2442766.639	0	+0.056	pe	3	present paper

Table 44 O-C residuals for RX Cam

(median brightness)

Obs.Med.J.D.	E	O-C	Type	w	Reference
2419440.747	-2948	$-0^{d}.130$	pg	1	Hertzsprung (1928)
2436902.670	-741	-0.044	pe	3	Bahner et al. (1962)
2439039.006	-471	+0.045	pe	3	Wamsteker (1972)
2442765.587	0	+0.063	pe	3	present paper

W Geminorum

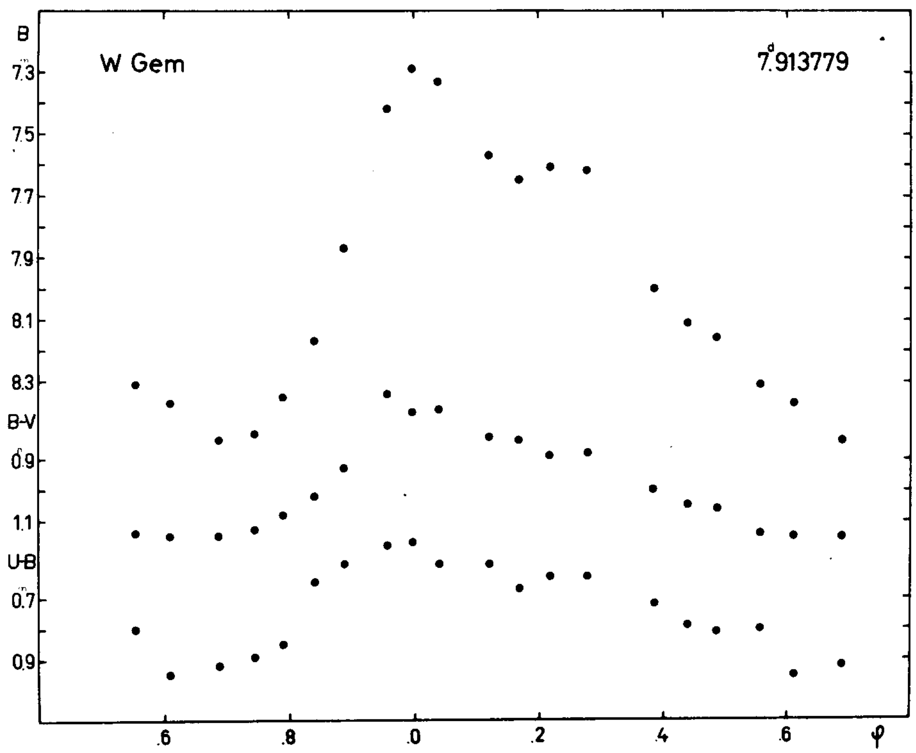

Figure 68 B, B-V and U-B curves of W Gem

The light and colour curves of this Cepheid are shown in Fig. 68. The O-C residuals have been computed with the formula:

$$C = 2442755.191 + 7\overset{d}{.}913779 \times E \quad .$$

The O-C diagram in Fig. 69 shows one change in the period:

before J.D. 2431700 $P = 7\overset{d}{.}914553$,

after J.D. 2431700 $P = 7\overset{d}{.}913779$.

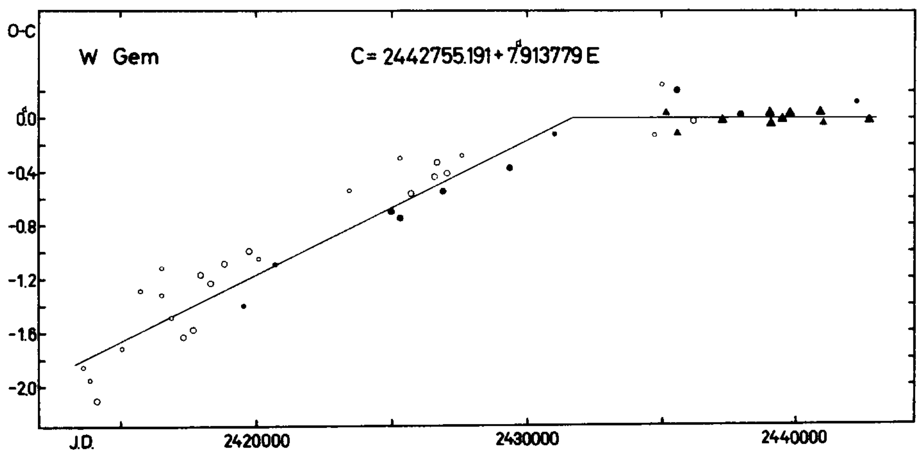

Figure 69 O-C diagram of W Gem

Table 45 O-C residuals for W Gem

Obs.Max.J.D.	E	O-C	Type	w	Reference
2413267.28	-3726	$-1\overset{d}{.}17$	vis	0	Sawyer (1897)
2413630.627	-3680	-1.857	vis	0.5	Luizet (1905b)
2413655.4	-3677	-0.8	vis	0	Yendell (1897a)
2413860.034	-3651	-1.950	vis	0.5	Sperra (1897a)
2414136.862	-3616	-2.104	vis	1	Pickering (1904)
2414738.835	-3540	-1.578	vis	0	Luizet (1905b)
2415047.336	-3501	-1.715	vis	0.5	Luizet (1905b)
2415736.261	-3414	-1.288	vis	0.5	Luizet (1905b)
2415776.092	-3409	-1.026	vis	0	Yendell (1902)
2416155.892	-3361	-1.088	vis	0	Luizet (1905b)
2416503.868	-3317	-1.318	vis	0.5	Luizet (1905b)
2416535.714	-3313	-1.127	vis	0.5	Lau (1906)
2416867.736	-3271	-1.484	vis	0.5	Luizet (1905b)
2417318.675	-3214	-1.630	vis	1	Wendell (1913)
2417659.022	-3171	-1.576	vis	1	Zeipel (1908)
2417944.327	-3135	-1.167	vis	1	Bilt (1926a)
2418324.126	-3087	-1.229	vis	1	Bilt (1926a)
2418807.014	-3026	-1.082	vis	1	Bilt (1926a)
2419518.936	-2936	-1.400	pg	0.5	Hertzsprung (1928)
2419748.851	-2907	-0.984	vis	1	Bilt (1926a)
2420073.25	-2866	-1.05	vis	0.5	Dziewulski (1924)
2420682.567	-2789	-1.094	pg	0.5	Robinson (1933)
2423421.284	-2443	-0.545	vis	0.5	Doberck (1924b)
2424980.146	-2246	-0.697	pg	1	Carrasco (1932)

Table 45 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2425296.648	-2206	$-0\overset{d}{.}747$	pg	2	Hellerich (1935)
2425297.250	-2206	-0.145	vis	0	Kukarkin (1940)
2425305.01	-2205	-0.30	vis	0.5	Lause (1937)
2425716.263	-2153	-0.562	vis	1	Zverev (1936)
2426421.135	-2064	-0.016	pg	0	Ahnert (1951)
2426578.991	-2044	-0.436	vis	1	Zverev (1936)
2426666.149	-2033	-0.329	vis	1	Kukarkin (1940)
2426895.429	-2004	-0.549	pg	1	Kox (1935)
2427030.096	-1987	-0.416	vis	1	Florya, Kukarkina (1953)
2427592.11	-1916	-0.28	vis	0.5	Krebs (1940)
2427885.162	-1879	-0.038	pg	0	Ahnert (1951)
2429364.701	-1692	-0.376	pg	1	Koshkina (1963)
2430022.041	-1609	+0.120	pg	0	Ahnert (1951)
2431026.850	-1482	-0.121	pg	0.5	Ahnert (1951)
2433749.628	-1138	+0.318	pg	0	Koshkina (1963)
2434746.32	-1012	-0.13	vis	0.5	Marks (1959)
2435023.68	-977	+0.25	vis	0.5	Marks[1] (1959)
2435165.909	-959	+0.032	pe	1	Irwin (1961)
2435561.781	-909	+0.215	pg	1	Nikulina (1959)
2435569.363	-908	-0.117	pe	2	Walraven et al. (1958)
2436186.729	-830	-0.025	vis	1	Latyshev (1969)
2437270.925	-693	-0.017	pe	3	Mitchell et al. (1964)
2437927.814	-610	+0.028	pg	1	Fridel' (1971)
2439043.666	-469	+0.037	pe	3	Wisniewski et al. (1968)
2439083.150	-464	-0.048	pe	3	Takase (1969)
2439502.615	-411	-0.013	pe	3	Wamsteker (1972)
2439787.563	-375	+0.039	pe	3	present paper[2]
2440927.150	-231	+0.042	pe	3	Pel (1976)
2441006.204	-221	-0.042	pe	2	Evans (1976)
2442296.312	-58	+0.120	pg	0.5	Berdnikov (1977)
2442755.172	0	-0.019	pe	3	present paper

Remarks: [1] Observer: Wroblewski; [2] Observer: Abaffy

U Vulpeculae

The light and colour curves of this variable are plotted in Fig. 70. The period of this Cepheid is very close to eight days, thus a reliable light curve can only be obtained during a time interval longer than one observing season. The lack of the complete light curve was the reason for the epoch of the minimum brightness being given in the G.C.V.S. (*Kukarkin* et al. 1969-1970) instead of that of the light maximum.

The O-C residuals have been derived using the formula:

$$C = 2442526.290 + 7\overset{d}{.}990629\times E \quad .$$

The period of this variable has been constant since the discovery of its light variation.

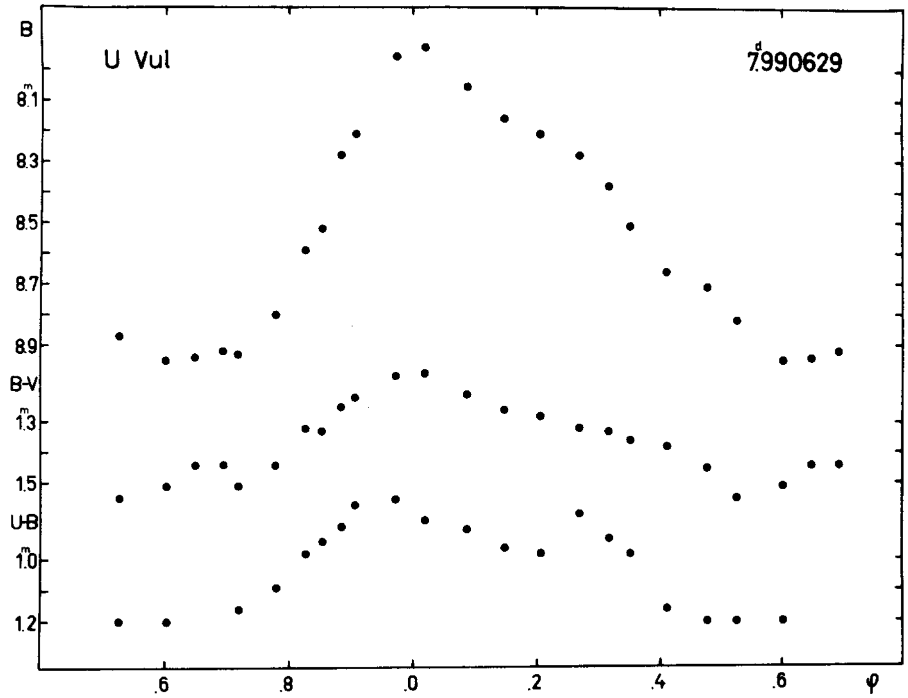

Figure 70 B, B-V and U-B curves of U Vul

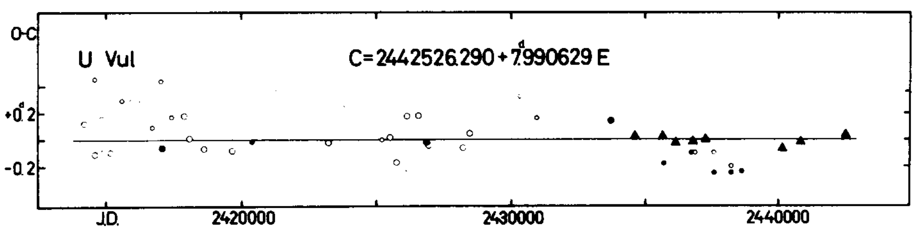

Figure 71 O-C diagram of U Vul

Table 46 O-C residuals for U Vul

Obs.Max.J.D.	E	O-C	Type	w	Reference
2414215.610	-3543	+0^d.119	vis	1	Müller, Kempf (1898)
2414582.950	-3497	-0.110	vis	1	Wendell (1909)
2414583.509	-3497	+0.449	vis	0.5	Luizet (1899)
2414854.90	-3463	+0.16	vis	0.5	Luizet (1907a)
2414894.60	-3458	-0.09	vis	0.5	Yendell (1901)
2415158.294	-3425	-0.092	vis	1	Zinner[1] (1932)
2415206.95	-3419	+0.62	vis	0	Luizet (1907a)
2415333.31	-3403	-0.87	vis	0	Yendell (1901)
2415574.19	-3373	+0.29	vis	0.5	Luizet (1907a)
2415911.703	-3331	+2.198	vis	0	Prittwitz (1907)
2415940.04	-3327	-1.43	vis	0	Yendell (1904)

Table 46 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2415949.75	-3326	+0.29 (d)	vis	0.5	Luizet (1907a)
2416317.32	-3280	+0.29	vis	0.5	Luizet (1907a)
2416716.65	-3230	+0.09	vis	0.5	Luizet (1907a)
2417036.62	-3190	+0.44	vis	0.5	Luizet (1907a)
2417060.091	-3187	-0.064	pg	1	Wilkens (1906)
2417411.91	-3143	+0.17	vis	0.5	Luizet (1907a)
2417436.36	-3140	+0.65	vis	0	Bemporad (1908)
2417483.1	-3134	-0.6	pg	0	Seares (1907a)
2417883.370	-3084	+0.180	vis	1	Zeipel (1908)
2418082.962	-3059	+0.006	vis	1	Bilt (1926c)
2418610.266	-2993	-0.071	vis	1	Bilt (1926c)
2418954.481	-2950	+0.547	vis	0	Jost (1913)
2419657.029	-2862	-0.081	vis	1	Bilt (1926c)
2420400.228	-2769	-0.010	pg	0.5	Robinson (1933)
2423212.920	-2417	-0.020	vis	1	Doberck (1925)
2425202.6	-2168	0.0	vis	0.5	Lause (1937)
2425498.277	-2131	+0.017	vis	1	Kukarkin (1940)
2425761.777	-2098	-0.173	vis	1	Parenago (1938a)
2426121.709	-2053	+0.180	vis	1	Zverev (1936)
2426553.206	-1999	+0.183	vis	1	Kukarkin (1940)
2426864.635	-1960	-0.022	pg	1	Kox (1935)
2426928.536	-1952	-0.046	vis	1	Florya, Kukarkina (1953)
2428215.011	-1791	-0.062	vis	1	Krebs (1937)
2428454.835	-1761	+0.043	vis	1	Kepinski (1937)
2430308.944	-1529	+0.326	vis	0.5	Model, Löchel (1964)
2430638.38	-1488	+2.15	vis	0	Stein (1944)
2430956.020	-1448	+0.161	vis	0.5	Model, Löchel (1964)
2433480.40	-1132	-0.50	vis	0	Domke, Pohl[2] (1952)
2433704.781	-1104	+0.145	pg	1	Chuprina (1952)
2434591.618	-993	+0.023	pe	3	present paper[3]
2435638.397	-862	+0.029	pe	3	Walraven et al. (1958)
2435694.12	-855	-0.18	pg	0.5	Huth (1966)
2436053.22	-810	-0.66	pg	0	Huth (1966)
2436125.772	-801	-0.024	pe	3	Bahner et al. (1971)
2436436.77	-762	-0.66	pg	0	Huth (1966)
2436724.99	-726	-0.10	pg	0.5	Huth (1966)
2436781.008	-719	-0.020	pe	3	Weaver et al. (1960)
2436812.9	-715	-0.1	vis	0.5	Häussler (1964a)
2437172.15	-670	-0.42	pg	0	Huth (1966)
2437244.483	-661	-0.001	pe	3	Mitchell et al. (1964)
2437579.84	-619	-0.25	pg	0.5	Huth (1966)
2437580.0	-619	-0.1	vis	0.5	Häussler (1964a)
2437827.47	-588	-0.33	pg	0	Huth (1966)
2438235.1	-537	-0.2	vis	0.5	Häussler (1964a)
2438243.06	-536	-0.25	pg	0.5	Huth (1966)
2438642.60	-486	-0.24	pg	0.5	Huth (1966)
2440121.046	-301	-0.065	pe	3	Asteriadis et al. (1977)
2440840.247	-211	-0.020	pe	3	Evans (1976)
2442526.328	0	+0.038	pe	3	present paper

Remarks: [1] Observer: Hartwig
[2] Obs.: Mielke
[3] Obs.: Detre

DL Cassiopeiae

The amplitude of the light and colour curves shown in Fig. 72 are smaller than would be expected from the catalogue compiled by *Schaltenbrand* and *Tammann* (1971). The Cepheid DL Cas is a member of the open cluster NGC 129 (*Arp* et al. 1959).

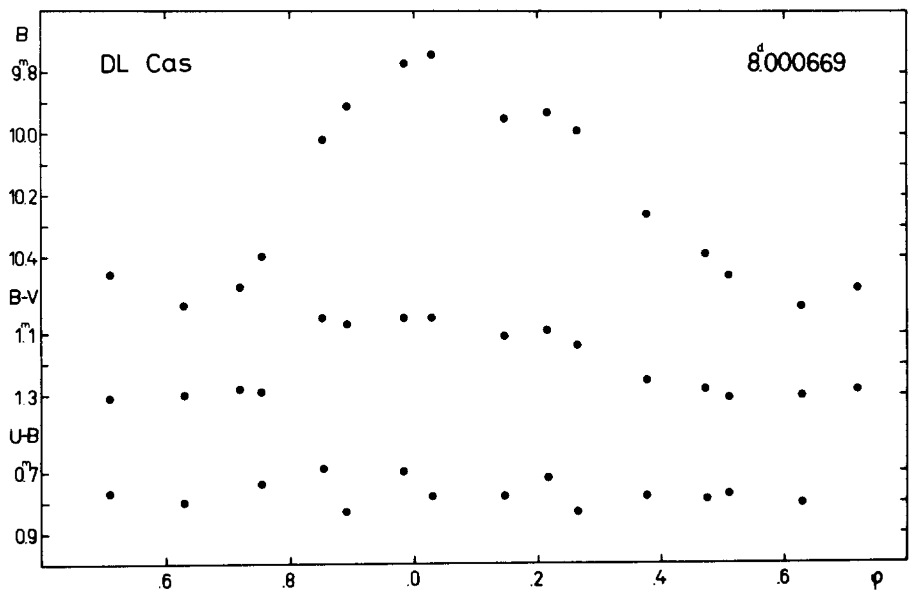

Figure 72 B, B-V and U-B curves of DL Cas

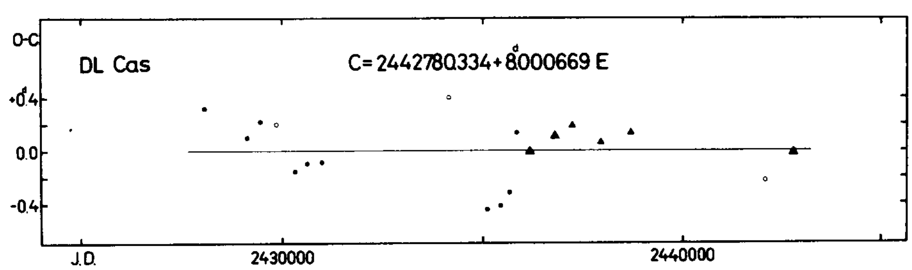

Figure 73 O-C diagram of DL Cas

The O-C residuals have been computed with the ephemeris:

$C = 2442780.334 + 8\overset{d}{.}000669 \times E$.

Although DL Cas was reported as having a changing period (*Hoffleit* 1971, *Briggs* 1978), the O-C diagram in Fig. 73 does not confirm the variability in the period.

Table 47 O-C residuals for DL Cas

Obs.Max.J.D.	E	O-C	Type	w	Reference
2426163.82	-2077	$+0\overset{d}{.}88$	pg	0	Kiehl, Hopp (1977)
2428059.42	-1840	+0.32	pg	0.5	Ahnert et al. (1943)
2428564.53	-1777	+1.39	pg	0	Ahnert et al. (1943)
2429131.3	-1706	+0.1	pg	0.5	Meshkova (1940)
2429467.44	-1664	+0.22	pg	0.5	Ahnert et al. (1943)
2429851.5	-1616	+0.2	vis	0.5	Loreta (1940)
2430307.13	-1559	-0.16	pg	0.5	Solov'yov (1943)
2430611.22	-1521	-0.10	pg	0.5	Solov'yov (1943)
2430979.26	-1475	-0.09	pg	0.5	Solov'yov (1943)
2434148.0	-1079	+0.4	vis	0.5	Günther (1954)
2435107.24	-959	-0.45	pg	0.5	Romano (1959)
2435435.29	-918	-0.42	pg	0.5	Romano (1959)
2435675.42	-888	-0.32	pg	0.5	Romano (1959)
2435835.880	-868	+0.13	pg	0.5	Zonn, Wroblewska (1964)
2436163.768	-827	-0.013	pe	3	Arp et al. (1959)
2436803.942	-747	+0.108	pe	3	Oosterhoff (1960)
2437220.052	-695	+0.183	pe	2	Mitchell et al. (1964)
2437947.988	-604	+0.058	pe	2	Williams (1966)
2438708.126	-509	+0.133	pe	2	Haug (1970)
2439043.481	-467	-0.541	vis	0	Häussler et al. (1973)
2439411.494	-421	-0.558	vis	0	Häussler et al. (1973)
2440483.510	-287	-0.632	vis	0	Häussler et al. (1973)
2442068.04	-89	-0.23	vis	0.5	Small (1974)
2442780.311	0	-0.023	pe	3	present paper

BK Aurigae

The light and colour curves of this variable are shown in Fig. 74. The O-C residuals have been calculated using the formula:

$$C = 2442825.384 + 8\overset{d}{.}002432 \times E \quad .$$

The period of BK Aur has been constant since the discovery of this star's light variation.

Table 48 O-C residuals for BK Aur

Obs.Max.J.D.	E	O-C	Type	w	Reference
2417249.593	-3196	$-0\overset{d}{.}018$	pg	1	Kukarkin (1949)
2419002.198	-2977	+0.054	pg	0.5	Ashbrook (1943)
2422699.065	-2515	-0.203	pg	0.5	Ashbrook (1943)
2425499.929	-2165	-0.190	pg	0.5	Ashbrook (1943)
2428396.826	-1803	-0.173	pg	0.5	Ashbrook (1943)
2428525.249	-1787	+0.211	vis	1	Kukarkin (1949)
2428564.95	-1782	-0.10	pg	0.5	Richter (1973)
2428621.20	-1775	+0.13	vis	0.5	Kukarkin[1] (1949)
2428629.154	-1774	+0.084	pg	1	Kukarkin (1949)
2431021.64	-1475	-0.16	pg	0.5	Richter (1973)
2432614.48	-1276	+0.20	pg	0.5	Richter (1973)
2432790.147	-1254	-0.187	pg	1	Shakhovskaya (1964)
2436199.34	-828	-0.03	pg	0.5	Richter (1973)

Table 48 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2436607.456	-777	$-0^{d}.038$	pg	1	Shakhovskaya (1964)
2436831.503	-749	-0.059	pe	2	Oosterhoff (1960)
2437191.72	-704	+0.05	pg	0.5	Richter (1973)
2437631.762	-649	-0.044	pe	3	Mitchell et al. (1964)
2438087.99	-592	+0.05	pg	0.5	Richter (1973)
2439072.166	-469	-0.077	pe	3	Takase (1969)
2439088.37	-467	+0.12	pg	0.5	Richter (1973)
2439208.368	-452	+0.083	pe	2	Wamsteker (1972)
2440616.78	-276	+0.07	pg	0.5	Richter (1973)
2442825.471	0	+0.087	pe	3	present paper

Remark: [1] Observer: Kanda

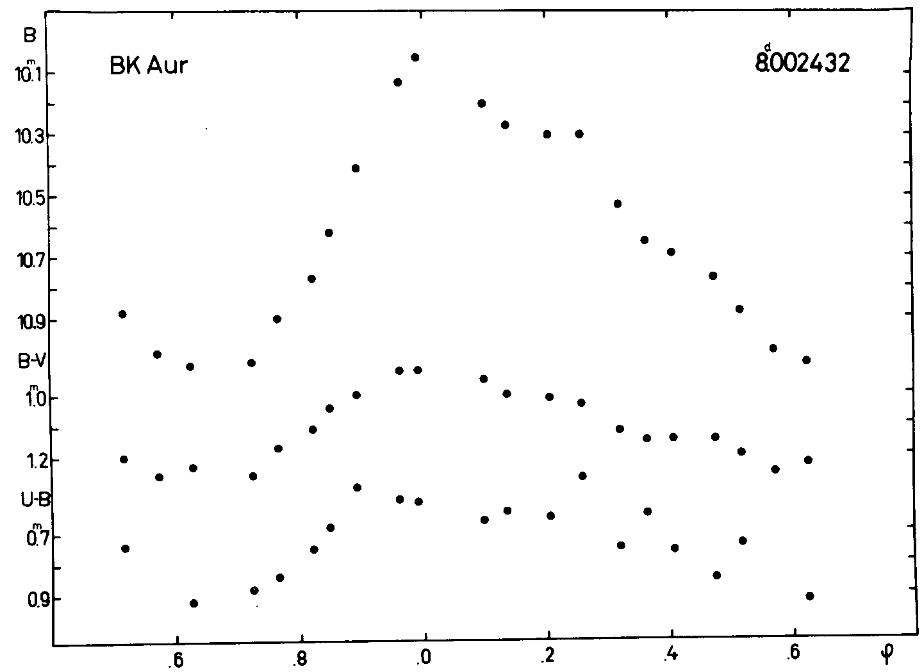

Figure 74 B, B-V and U-B curves of BK Aur

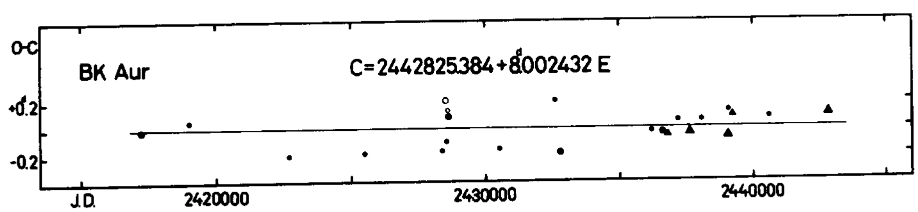

Figure 75 O-C diagram of BK Aur

S Sagittae

The light and colour curves of this Cepheid are plotted in Fig. 76. S Sge is a component of a binary system (*Herbig* and *Moore* 1952) with an orbital period of $676^{d}.2$.

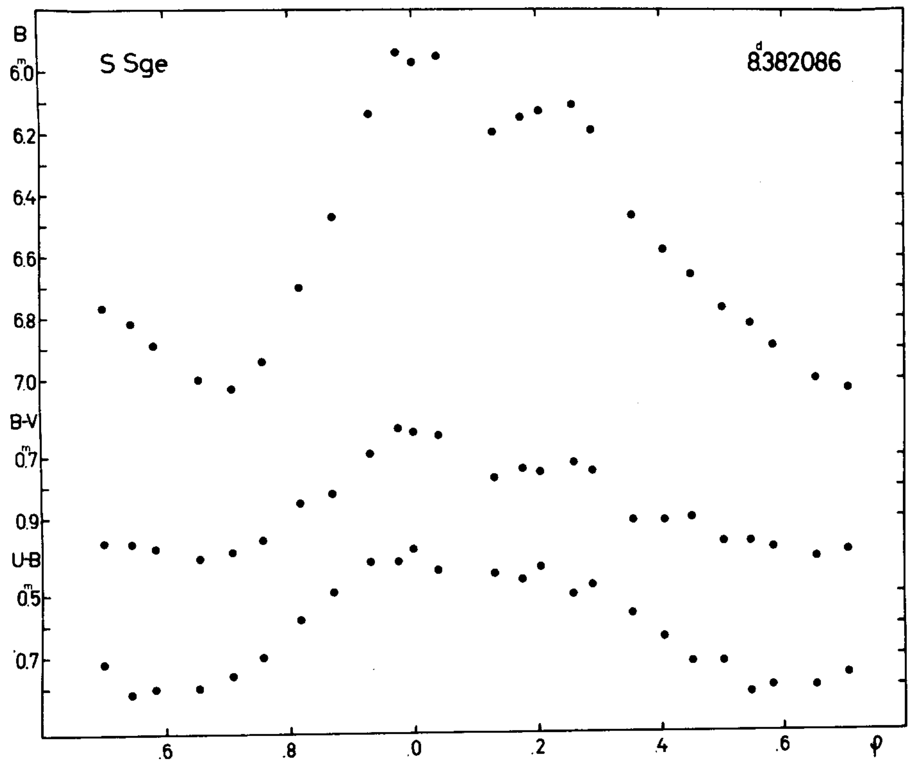

Figure 76 B, B-V and U-B curves of S Sge

The O-C residuals have been computed with the formula:

$$C = 2442678.792 + 8^{d}.382086 \times E \quad .$$

The O-C diagram in Fig. 77 shows one change in the period:

before J.D. 2418000 $P = 8^{d}.381968$,

after J.D. 2418000 $P = 8^{d}.382086$.

Unfortunately, the light-time effect caused by the orbital motion around the common centre of gravity cannot be seen in the O-C diagram. The possible causes of this imperfection are as follows:

- the light-time effect itself has to be small due to the comparatively short orbital period;

- the pulsation period is not short enough to reduce the uncertainty in determining the phase of the individual normal maxima;
- the individual observational series sometimes cover an interval longer than one year. This makes it difficult to point out an effect which has a periodicity with a value shorter than two years.

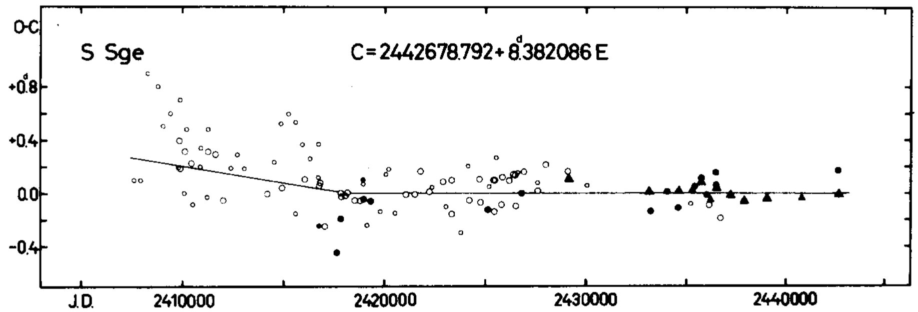

Figure 77 O-C diagram of S Sge

Table 49 O-C residuals for S Sge

Obs.Max.J.D.	E	O-C	Type	w	Reference
2406603.4	-4304	$+1^{d}.1$	vis	0	Chandler (1886)
2407633.4	-4181	+0.1	vis	0.5	Chandler (1886)
2407951.9	-4143	+0.1	vis	0.5	Chandler (1886)
2408313.1	-4100	+0.9	vis	0.5	Chandler (1886)
2408782.4	-4044	+0.8	vis	0.5	Chandler (1886)
2409050.4	-4012	+0.5	vis	0.5	Chandler (1886)
2409444.4	-3965	+0.6	vis	0.5	Chandler (1886)
2409770.925	-3926	+0.203	vis	0.5	Pickering et al. (1890)
2409829.793	-3919	+0.396	vis	1	Gore (1886)
2409888.258	-3912	+0.186	vis	1	Gore[1] (1886)
2409888.74	-3912	+0.7	vis	0.5	Chandler (1886)
2410114.4	-3885	0.0	vis	0.5	Espin (1886)
2410164.999	-3879	+0.319	vis	1	Gore (1887)
2410215.45	-3873	+0.48	vis	0.5	Sawyer (1888)
2410233.6	-3871	+1.8	vis	0	Reed (1888)
2410516.65	-3837	-0.08	vis	0.5	Sawyer (1895)
2410567.248	-3831	+0.227	vis	1	Gore (1888)
2410877.36	-3794	+0.20	vis	0.5	Sawyer (1895)
2410911.55	-3790	+0.86	vis	0	Yendell (1889, 1890a)
2410944.555	-3786	+0.341	vis	0.5	Gore (1889)
2411245.94	-3750	-0.03	vis	0.5	Sawyer (1895)
2411263.052	-3748	+0.318	vis	1	Gore (1890)
2411288.36	-3745	+0.48	vis	0.5	Yendell (1890b)
2411590.73	-3709	+1.10	vis	0	Yendell (1891)
2411615.078	-3706	+0.297	vis	1	Gore (1891)
2411975.160	-3663	-0.051	vis	1	Markwick (1892)
2411976.72	-3663	+1.51	vis	0	Yendell (1892)
2412336.76	-3620	+1.12	vis	0	Yendell (1893)
2412386.12	-3614	+0.19	vis	0.5	Sawyer (1895)

Table 49 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2412680.70	-3579	+1.^{d}39	vis	0	Yendell (1894)
2412713.12	-3575	+0.29	vis	0.5	Sawyer (1895)
2413005.63	-3540	-0.58	vis	0	Yendell (1895)
2413039.92	-3536	+0.18	vis	0.5	Sawyer (1896)
2413786.45	-3447	+0.71	vis	0	Yendell (1897b)
2414196.461	-3398	-0.003	vis	1	Pickering (1904)
2414548.747	-3356	+0.236	vis	0.5	Luizet (1905a)
2414867.554	-3318	+0.523	vis	0.5	Luizet (1905a)
2414868.58	-3318	+1.55	vis	0	Yendell (1900)
2414934.134	-3310	+0.047	vis	1	Prittwitz (1901)
2415228.055	-3275	+0.595	vis	0.5	Luizet (1905a)
2415596.116	-3231	-0.156	vis	0.5	Tass (1925)
2415596.803	-3231	+0.531	vis	0.5	Luizet (1905a)
2415948.687	-3189	+0.367	vis	0.5	Luizet (1905a)
2416082.542	-3173	+0.109	vis	1	Tass (1925)
2416325.776	-3144	+0.262	vis	0.5	Luizet (1905a)
2416711.205	-3098	+0.115	vis	0.5	Terkán (1905)
2416728.221	-3096	+0.367	vis	0.5	Luizet (1905a)
2416761.137	-3092	-0.245	pg	0.5	Lau (1907)
2416761.439	-3092	+0.057	vis	1	Lau (1907)
2416803.375	-3087	+0.082	vis	1	Tass[2] (1925)
2417062.887	-3056	-0.250	vis	1	Wilkens (1906)
2417632.674	-2988	-0.445	pg	1	Jordan (1919)
2417850.862	-2962	-0.191	pg	1	Hertzsprung (1909)
2417851.029	-2962	-0.024	vis	1	Nijland (1923)
2417851.054	-2962	+0.001	vis	1	Zeipel (1908)
2418035.437	-2940	-0.022	vis	1	Tass[3] (1925)
2418152.813	-2926	+0.005	vis	1	Nijland (1923)
2418304.62	-2908	+0.93	vis	0	Severny[4] (1933)
2418521.561	-2882	-0.059	vis	1	Nijland (1923)
2418806.555	-2848	-0.056	vis	1	Nijland (1923)
2418915.683	-2835	+0.105	pg	0.5	Robinson (1933)
2418924.031	-2834	+0.071	vis	0.5	Jost (1913)
2418957.443	-2830	-0.046	pg	2	Hertzsprung (1917)
2419225.47	-2798	-0.24	vis	0.5	Severny[4] (1933)
2419317.859	-2787	-0.059	pg	2	Hertzsprung (1917)
2419770.41	-2733	-0.14	vis	0.5	Severny[4] (1933)
2420064.066	-2698	+0.142	vis	0.5	Hoffmeister (1915)
2420198.22	-2682	+0.18	vis	0.5	Dziewulski (1930)
2420499.64	-2646	-0.15	vis	0.5	Severny[4] (1933)
2421061.385	-2579	-0.007	vis	1	Luyten (1922)
2421237.94	-2558	+0.52	vis	0	Severny[4] (1933)
2421488.867	-2528	-0.012	vis	1	Lacchini (1921a)
2421748.891	-2497	+0.168	vis	1	Luyten (1922)
2422192.987	-2444	+0.013	vis	1	Leiner (1926)
2422327.13	-2428	+0.04	vis	0.5	Severny[4] (1933)
2422897.156	-2360	+0.087	vis	1	{Eaton[5] (1920,1921,1922) Walker[5] (1921,1922)
2423056.23	-2341	-0.10	vis	0.5	Severny[4] (1933)
2423316.013	-2310	-0.160	vis	1	Nielsen (1927)
2423333.038	-2308	+0.100	vis	1	AFOEV (1922, 1923)
2423785.27	-2254	-0.300	vis	0.5	Severny[4] (1933)
2424154.59	-2210	+0.208	vis	0.5	Severny[6] (1933)

Table 49 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2424213.006	-2203	$-0^d.051$	vis	1	Parenago (1938a)
2424423.12	-2178	+0.51	vis	0	Dziewulski (1930)
2424690.941	-2146	+0.106	vis	1	Leiner (1938)
2424774.587	-2136	-0.069	vis	1	Kukarkin (1940)
2425134.962	-2093	-0.124	pg	1	Hellerich (1935)
2425202.19	-2085	+0.05	vis	0.5	Lause (1937)
2425386.645	-2063	+0.096	vis	1	Leiner (1938)
2425445.085	-2056	-0.138	vis	1	Zverev (1936)
2425453.702	-2055	+0.097	vis	1	Kukarkin (1940)
2425537.692	-2045	+0.266	vis	0.5	Parenago (1938a)
2425797.187	-2014	-0.084	vis	1	Zverev (1936)
2425847.689	-2008	+0.126	vis	1	Leiner (1938)
2426182.943	-1968	+0.096	vis	1	Leiner (1938)
2426384.157	-1944	+0.140	vis	1	Parenago (1938a)
2426451.214	-1936	+0.141	vis	1	Kukarkin (1940)
2426476.126	-1933	-0.094	vis	1	Zverev (1936)
2426585.34	-1920	+0.15	vis	0.5	Miczaika[7] (1937)
2426794.741	-1895	+0.002	pg	1	Kox (1935)
2426920.633	-1880	+0.163	vis	1	Florya, Kukarkina (1953)
2427591.056	-1800	+0.019	vis	1	Krebs (1935)
2427599.498	-1799	+0.079	vis	0.5	Dziewulski (1948)
2428001.975	-1751	+0.216	vis	1	Krebs (1936)
2428052.51	-1745	+0.46	vis	0	Sures (1937)
2429091.599	-1621	+0.168	vis	1	Leiner (1938)
2429141.833	-1615	+0.110	pe	3	Bennett (1939)
2430055.43	-1506	+0.06	vis	0.5	Conceicao-Silva (1948)
2433131.605	-1139	+0.009	pe	3	Eggen (1951)
2433198.520	-1131	-0.133	pg	1	Solov'yov (1959)
2434036.880	-1031	+0.019	pg	1	Solov'yov (1959)
2434598.351	-964	-0.110	pg	1	Solov'yov (1959)
2434615.241	-962	+0.016	pe	3	present paper[8]
2435218.65	-890	-0.08	vis	0.5	Marks (1959)
2435285.815	-882	+0.023	pe	2	Irwin (1961)
2435403.191	-868	+0.050	pg	1	Solov'yov (1959)
2435730.121	-829	+0.078	pe	3	Prokof'yeva (1961)
2435730.154	-829	+0.111	pg	1	Solov'yov (1959)
2436048.551	-791	-0.011	pg	1	Solov'yov (1959)
2436190.964	-774	-0.093	vis	1	Latyshev (1969)
2436207.768	-772	-0.054	pe	1	Svolopoulos (1960)
2436450.962	-743	+0.060	pg	1	Solov'yov (1959)
2436459.445	-742	+0.161	pg	1	Solov'yov (1959)
2436509.621	-736	+0.044	pe	3	Walraven et al. (1958)
2436718.940	-711	-0.189	vis	1	Azarnova (1960)
2437213.656	-652	-0.016	pe	3	Mitchell et al. (1964)
2437917.700	-568	-0.067	pe	3	Walraven et al. (1964)
2439040.928	-434	-0.039	pe	3	Wisniewski et al. (1968)
2440834.696	-220	-0.037	pe	2	Evans (1976)
2442595.144	-10	+0.173	pg	1	Berdnikov (1977)
2442678.783	0	-0.009	pe	3	present paper

Remarks: (observers) [1] Espin; [2] Terkán; [3] Czuczi; [4] Sharbe; [5] Mundt; [6] Vorontsov-Velyaminov; [7] Plassmann; [8] Detre

GQ Orionis

There is a bright NW companion near the variable. The light and colour curves of GQ Ori are plotted in Fig. 78. The value of

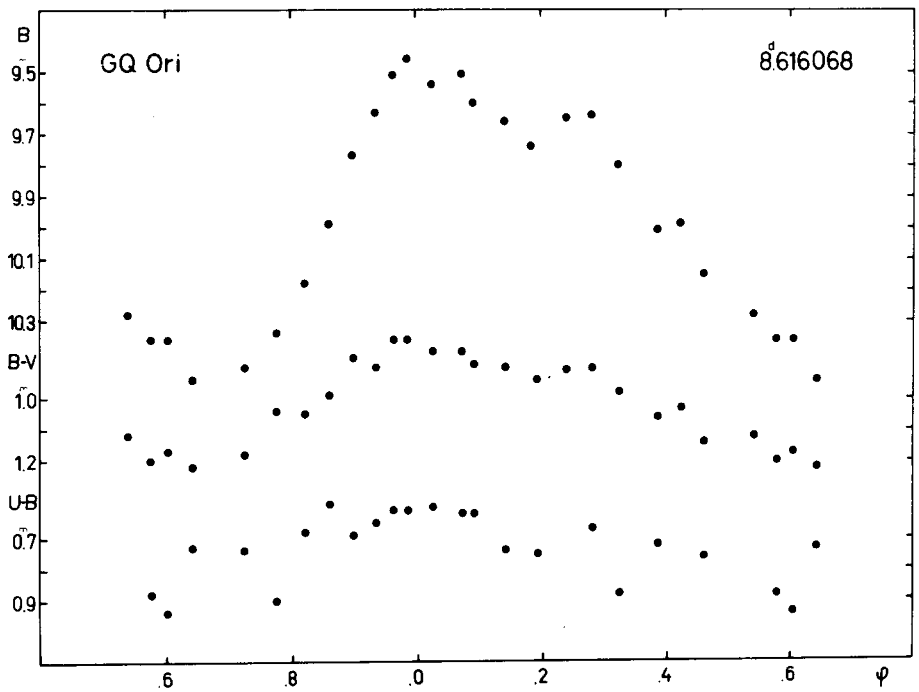

Figure 78 B, B-V and U-B curves of GQ Ori

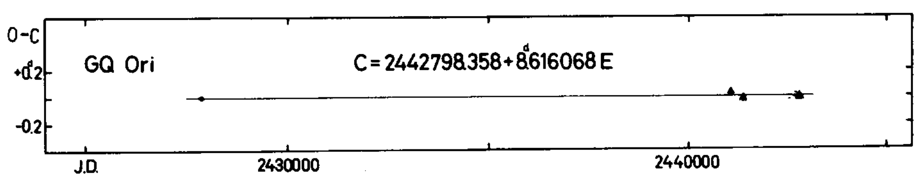

Figure 79 O-C diagram of GQ Ori

the period was determined by a least squares fitting procedure using all the normal maxima in Table 50, i.e. including the early uncertain point with a weight of 0.5 . The O-C residuals have been calculated using the ephemeris:

$$C = 2442798.358 + 8\overset{d}{.}616068 \times E \quad .$$

The O-C diagram in Fig. 79 can be approximated by a straight line.

Table 50 O-C residuals for GQ Ori

Obs.Max.J.D.	E	O-C	Type	w	Reference
2427866.7	-1733	$0^{d}.0$	pg	0.5	Kukarkin et al. (1947)
2441066.557	-201	+0.029	pe	2	Pel (1976)
2441368.070	-166	-0.021	pe	3	Wachmann (1976)
2442798.348	0	-0.010	pe	3	present paper

IX Cassiopeiae

According to the G.C.V.S. (*Kukarkin* et al. 1969-1970) this Cepheid belongs to Population II. The light and colour curves of IX Cas are shown in Fig. 80 . The actual value of the period ($P = 9^{d}.1582$) has been determined using the latest photographic

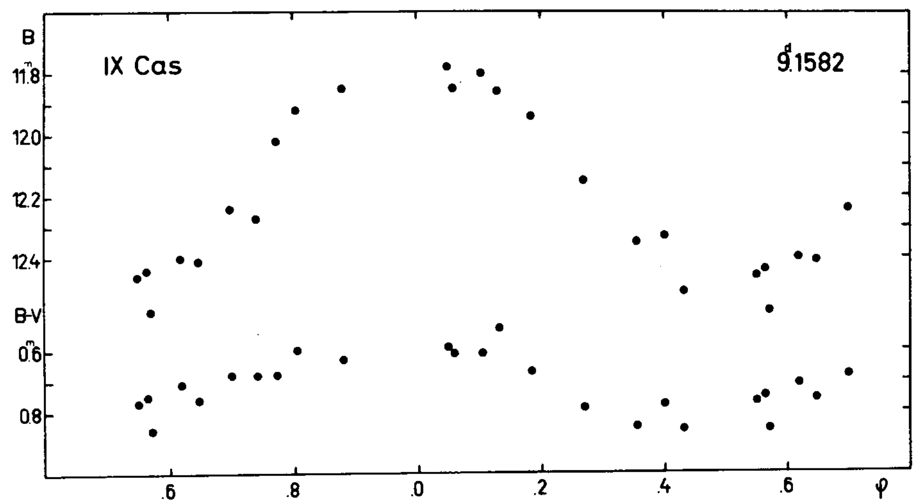

Figure 80 B and B-V curves of IX Cas

and the recent photoelectric observations (see Table 51), but this value is not sufficiently accurate for deriving the O-C residuals. For this reason the O-C residuals have been computed by the formula:

$$C = 2442779.743 + 9^{d}.153375 \times E \quad ,$$

where the value of the period is based only on the photoelectric observations. The O-C diagram in Fig. 81 shows continuous change in the period after J.D. 2428700. Before J.D. 2419000 the epochs of the normal maxima are uncertain because of the unknown trend of the O-C curve between J.D. 2419000 and J.D. 2428000, i.e. during the gap in the observations.

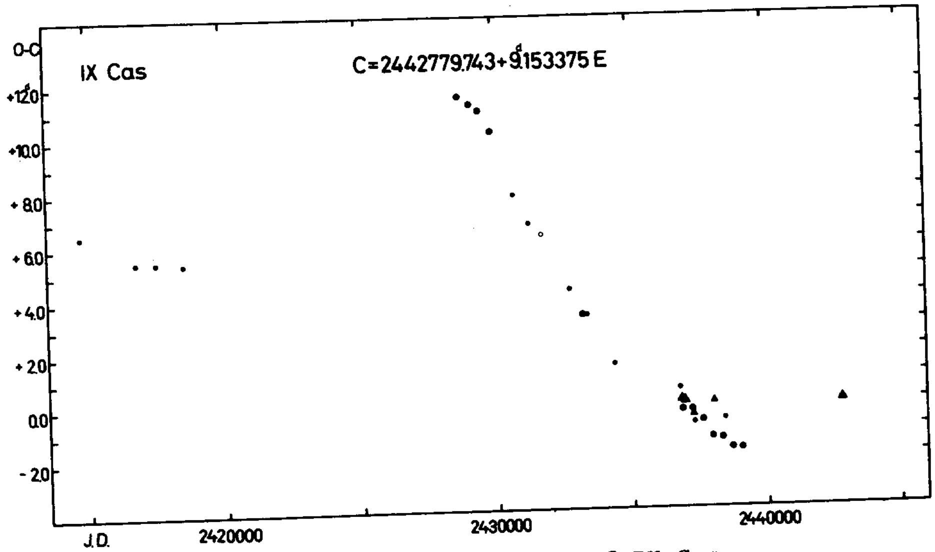

Figure 81 O-C diagram of IX Cas

Table 51 O-C residuals for IX Cas

Obs.Max.J.D.	E	O-C	Type	w	Reference
2414740.3	-3064	+6.5	pg	0.5	Eelsalu[1] (1956)
2416753.0	-2844	+5.5	pg	0.5	Eelsalu[1] (1956)
2417485.3	-2764	+5.5	pg	0.5	Eelsalu[1] (1956)
2418528.7	-2650	+5.4	pg	0.5	Eelsalu[1] (1956)
2428750.013	-1534	+11.547	pg	1	Florya (1949)
2429152.454	-1490	+11.240	pg	1	Florya (1949)
2429481.731	-1454	+10.995	pg	1	Florya (1949)
2429902.019	-1408	+10.228	pg	1	Eelsalu (1956)
2430677.66	-1323	+7.83	pg	0.5	Vasil'yan. et al. (1970)
2431262.38	-1259	+6.74	pg	0.5	Vasil'yan. et al. (1970)
2431701.332	-1211	+6.326	vis	0.5	Tsessevich (1952)
2432733.59	-1098	+4.25	pg	0.5	Vasil'yan. et al. (1970)
2433172.010	-1050	+3.311	pg	1	Eelsalu (1956)
2433355.055	-1030	+3.288	pg	0.5	Vasil'yan. et al. (1970)
2434323.493	-924	+1.469	pg	0.5	Eelsalu (1956)
2436757.32	-658	+0.50	pg	0.5	Vasil'yan. et al. (1970)
2436802.628	-653	+0.039	pe	3	Oosterhoff (1960)
2436838.881	-649	-0.322	pg	1	Makarenko (1969)
2436903.237	-642	-0.039	pe	3	Bahner et al. (1962)
2437195.867	-610	-0.317	pg	1	Makarenko (1969)
2437204.831	-609	-0.507	pe	1	Mitchell et al. (1964)
2437543.22	-572	-0.79	pg	0.5	Vasil'yan. et al. (1970)
2437589.059	-567	-0.720	pg	1	Makarenko (1969)
2437917.951	-531	-1.350	pg	1	Makarenko (1969)
2437974.225	-525	+0.004	pe	1	Williams (1966)
2438293.185	-490	-1.404	pg	1	Makarenko (1969)
2438403.77	-478	-0.66	pg	0.5	Vasil'yan. et al. (1970)
2438677.266	-449	-1.765	pg	1	Makarenko (1969)
2439025.048	-410	-1.811	pg	1	Makarenko (1969)
2442779.743	0	0.000	pe	3	present paper

Remark: [1] Observer: Florya

FN Aquilae

The V and B amplitudes of the light variation in this Cepheid are smaller than given by *Schaltenbrand* and *Tammann* (1971). The O-C residuals have been calculated using the formulae:

$$C_{max} = 2442796.744 + 9\overset{d}{.}481603 \times E \quad ,$$
$$C_{med} = 2442794.772 + 9\overset{d}{.}481603 \times E \quad .$$

The O-C diagram in Fig. 83 shows a constant period in contrast with the period variation reported by *Kukarkin* et al. (1974).

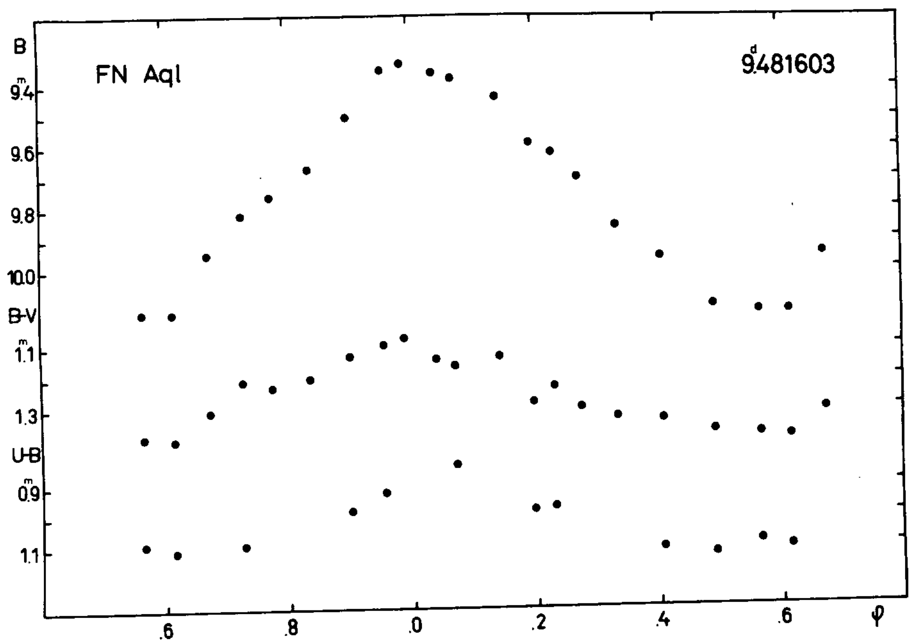

Figure 82 B, B-V and U-B curves of FN Aql

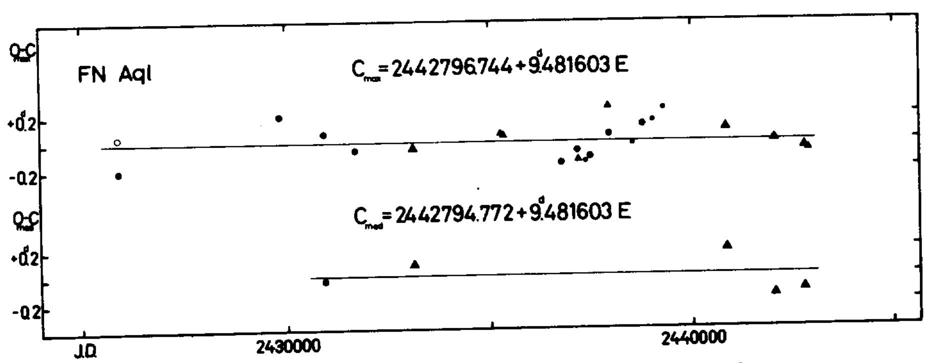

Figure 83 O-C diagram of FN Aql

Table 52 O-C residuals for FN Aql

(maximum brightness)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2425910.058	-1781	+0$^{d}_{.}$049	vis	1	Lause (1930)
2425938.250	-1778	-0.204	pg	1	Prager (1931)
2429845.079	-1366	+0.205	pg	1	Solov'yov (1946b)
2430944.810	-1250	+0.070	pg	1	Solov'yov (1946b)
2431712.692	-1169	-0.058	pg	1	Solov'yov (1946b)
2433115.978	-1021	-0.049	pe	3	Eggen (1951)
2435277.891	-793	+0.058	pe	2	Irwin (1961)
2435363.221	-784	+0.054	pe	2	Walraven et al. (1958)
2436794.727	-633	-0.162	pg	1	Makarenko (1969)
2437174.083	-593	-0.070	pg	1	Makarenko (1969)
2437211.945	-589	-0.135	pe	2	Mitchell et al. (1964)
2437354.15	-574	-0.15	pg	0.5	Jetschke (1969)
2437478.031	-561	+0.466	pg	0	Zoj Von Shor (1963)
2437505.895	-558	-0.115	pg	1	Makarenko (1969)
2437885.65	-518	+0.38	pg	0	Jetschke (1969)
2437951.901	-511	+0.256	pe	1	Williams (1966)
2437961.175	-510	+0.049	pg	1	Makarenko (1969)
2438369.20	-467	+0.37	pg	0	Jetschke (1969)
2438558.45	-447	-0.02	pg	0.5	Jetschke (1969)
2438805.113	-421	+0.124	pg	1	Makarenko (1969)
2439051.66	-395	+0.15	pg	0.5	Jetschke (1969)
2439317.24	-367	+0.24	pg	0.5	Jetschke (1969)
2439763.02	-320	+0.39	pg	0	Jetschke (1969)
2440862.589	-204	+0.092	pe	3	Pel (1976)
2442047.698	-79	+0.001	pe	3	Vasil'yanovskaya (1977)
2442796.691	0	-0.053	pe	3	present paper
2442900.967	+11	-0.075	pe	2	Dean (1977)

Table 53 O-C residuals for FN Aql

(median brightness)

Obs.Med.J.D.	E	O-C	Type	w	Reference
2430942.800	-1250	-0$^{d}_{.}$032	pg	1	Solov'yov (1946b)
2433114.138	-1021	+0.083	pe	3	Eggen (1951)
2440860.711	-204	+0.186	pe	3	Pel (1976)
2442045.564	-79	-0.161	pe	3	Vasil'yanovskaya (1977)
2442794.652	0	-0.120	pe	3	present paper

DD Cassiopeiae

The light and colour curves of this Cepheid are shown in Fig. 84. There is a B4 photometric companion (*Madore* 1977).

The O-C residuals have been computed using the formula:

$$C = 2442780.493 + 9^{d}_{.}812027 \times E \quad .$$

The O-C diagram in Fig. 85 shows one change in the period:

before J.D. 2418600 $\quad P = 9^{d}_{.}807272$,

after J.D. 2418600 $\quad P = 9^{d}_{.}812027$.

The O-C diagram also shows some sinusoidal variation which is

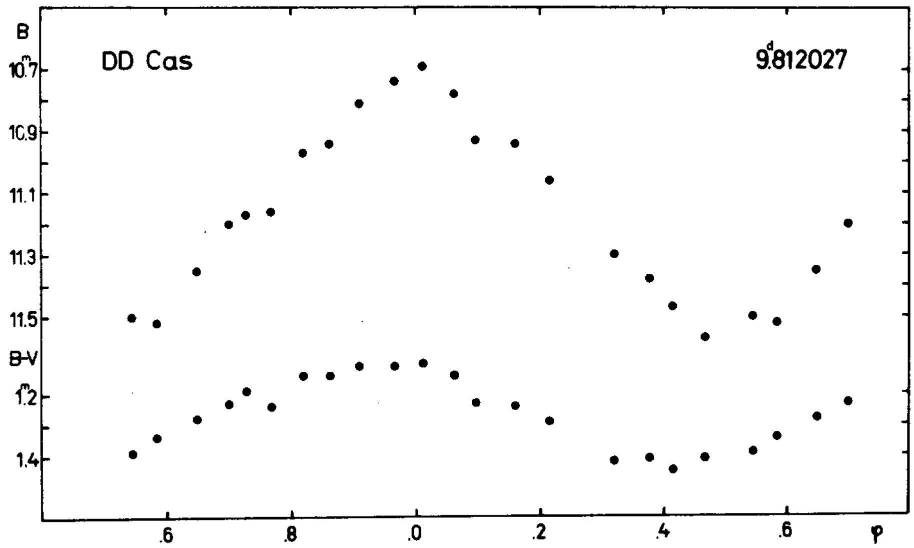

Figure 84 B and B-V curves of DD Cas

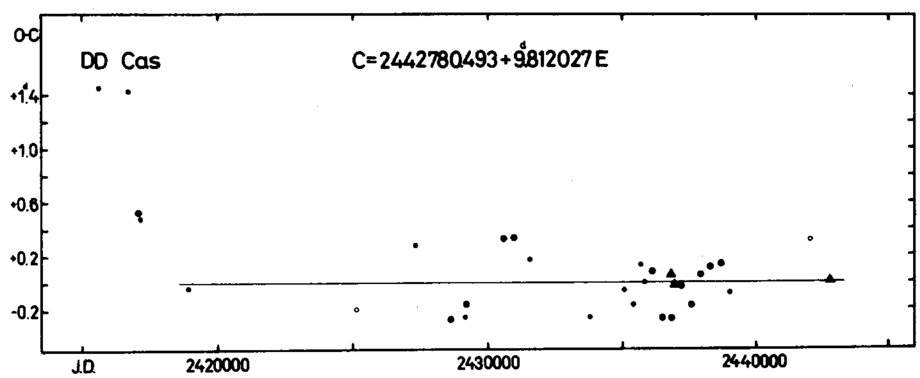

Figure 85 O-C diagram of DD Cas

the result of the light-time effect (orbital motion of DD Cas around the common centre of gravity of the binary system). A search for the orbital period gave the value: P_{orb} = 8500 ± 1000 days which seems to be a reasonable value for a pair consisting of a supergiant and an early type star. The O-C residuals used in determining the orbital period as well as the corresponding orbital phases are listed in Table 55. The arbitrary zero point of the phase calculation is J.D. 2400000. The plot of O-C variation vs. the orbital phase is seen in Fig. 86 . The value of a×*sini* can be determined from the amplitude of this curve:

a×*sini* = 6.5×10^9 km .

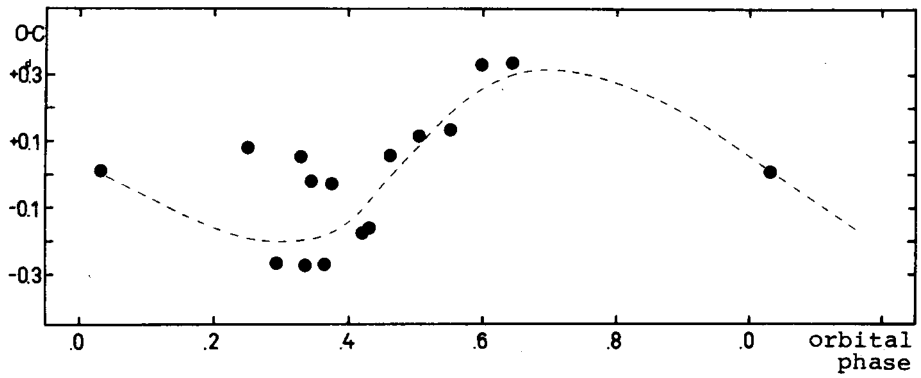

Figure 86 O-C variations due to the orbital motion

Table 54 O-C residuals for DD Cas

Obs.Max.J.D.	E	O-C	Type	w	Reference
2415612.45	-2769	+1^{d}.46	pg	0.5	Romano (1959)
2416711.37	-2657	+1.43	pg	0.5	Romano (1959)
2417063.699	-2621	+0.529	pg	1	Parenago (1940)
2417151.96	-2612	+0.48	pg	0.5	Romano (1959)
2418927.41	-2431	-0.04	pg	0.5	Romano (1959)
2425128.46	-1799	-0.20	vis	0.5	Stuker (1932)
2427297.39	-1578	+0.28	pg	0.5	Romano (1959)
2427779.22	-1529	+1.32	pg	0	Romano (1959)
2428062.95	-1500	+0.50	pg	0	Romano (1959)
2428583.21	-1447	+0.72	pg	0	Romano (1959)
2428601.841	-1445	-0.273	pg	1	Parenago (1940)
2428740.03	-1431	+0.55	pg	0	Romano (1959)
2429141.51	-1390	-0.26	pg	0.5	Romano (1959)
2429171.047	-1387	-0.165	pg	1	Parenago (1940)
2430584.472	-1243	+0.329	pg	1	Solov'yov (1958b)
2430976.962	-1203	+0.337	pg	1	Solov'yov (1958b)
2431555.704	-1144	+0.170	pg	0.5	Solov'yov (1958b)
2433861.097	-909	-0.263	pg	0.5	Solov'yov (1958b)
2435087.80	-784	-0.06	pg	0.5	Romano (1959)
2435421.30	-750	-0.17	pg	0.5	Romano (1959)
2435686.53	-723	+0.13	pg	0.5	Romano (1959)
2435833.58	-708	0.00	pg	0.5	Zonn, Semeniuk (1959)
2436137.833	-677	+0.080	pg	1	Makarenko (1969)
2436490.716	-641	-0.268	pg	1	Makarenko (1969)
2436805.022	-609	+0.053	pe	3	Oosterhoff (1960)
2436843.942	-605	-0.275	pg	1	Makarenko (1969)
2436932.506	-596	-0.019	pe	3	Bahner et al. (1962)
2437197.423	-569	-0.027	pg	1	Makarenko (1969)
2437579.945	-530	-0.174	pg	1	Makarenko (1969)
2437923.596	-495	+0.056	pg	1	Makarenko (1969)
2438296.512	-457	+0.115	pg	1	Makarenko (1969)
2438689.012	-417	+0.134	pg	1	Makarenko (1969)
2439022.410	-383	-0.077	pg	0.5	Makarenko (1969)
2442064.53	-73	+0.32	vis	0.5	Small (1974)
2442780.502	0	+0.009	pe	3	present paper

Table 55

Obs.Max.J.D.	O-C	phase	Obs.Max.J.D.	O-C	phase
2428601.841	$-0^d.273$	.365	2436932.506	$-0^d.019$	.345
2429171.047	−0.165	.432	2437197.423	−0.027	.376
2430584.472	+0.329	.598	2437579.945	−0.174	.421
2430976.962	+0.337	.644	2437923.596	+0.056	.462
2436137.833	+0.080	.252	2438296.512	+0.115	.505
2436490.716	−0.268	.293	2438689.012	+0.134	.552
2436805.022	+0.053	.330	2442780.502	+0.009	.038
2436843.942	−0.275	.335			

GENERAL REMARKS

Period changes

The investigation of period changes of Cepheids within the period interval 5 - 10 days is of great importance because a comprehensive study of their period changes has not been made so far. The most authentic paper in this field (*Parenago* 1956) contains only seven Cepheids within this period range; four of these seven are investigated in the present paper too. The stability of the period of the remaining more than thirty Cepheids in this sample has not, to all intents and purposes, previously been analysed.

From among the 42 Cepheids in this sample 19 stars showed variability in their period. Two of them (η Aql and δ Cep) have a parabolic O-C graph. This kind of period change may be attributed to the evolution of the stars across the instability strip. The period changes are sudden in most cases as was the case for the short period Cepheids too (Paper I).

The Cepheids showing "stepwise" O-C variations (i.e. rejumping period) can be included with this group. There are two variables in this sample showing this phenomenon, viz. CV Mon (see Fig. 9) and RS Ori (see Fig. 61). It is most interesting that both CV Mon and RS Ori were reported to have a photometric companion (*Madore* 1977). Moreover, three stars from Paper I which belong to the group of Cepheids with a rejumping period (SU Cyg, V 532 Cyg, SZ Tau) are also members of binaries according to *Madore*. The only Cepheid with a rejumping period that is not included in *Madore*'s list is DT Cyg. *Lloyd Evans* (1968), however, pointed out that a change of -3 km/s in normal radial velocity occurred in DT Cyg. Further spectroscopic observations would be highly desirable to reveal any periodic variation in the radial velocity of DT Cyg.

The above mentioned items of evidence make it possible to conclude that any Cepheid showing a rejumping period is a member of a binary system. If the orbital plane of a binary system is nearly parallel to the line of sight, the binary nature can be discovered on the basis of the periodic variation of the radial velocities. The binary motion, however, can also cause apparent period changes due to the simple light-time effect. The numerical treatment of this effect on period changes in RR Lyrae stars was published by *Coutts* (1971).

The apparent period changes in Cepheids caused by the binary motion were first studied in Paper I (FF Aql). The present sample of Cepheids contains two known spectroscopic binaries (AW Per and S Sge). Unfortunately, the apparent period changes in S Sge cannot be detected, partly because the value of the orbital period is too short (less than two years). The value of the orbital period of the system containing AW Per was not known earlier. The periodic O-C variations made it possible to determine the orbital period: P_{orb} = 10300 days (see Figs. 45 and 46). This method is, of course, less accurate than the usual method of determining the orbital period on the basis of radial velocity measurements. Nevertheless, the "O-C variation method" is very useful if there are not enough spectroscopic data as is the case for DD Cas. The binary nature of this Cepheid has not been detected spectroscopically but it can be realized photometrically (*Madore* 1977). The O-C diagram constructed on the basis of the available normal maxima shows a periodicity with P_{orb} = 8500 days (see Figs. 85 and 86). Some long period fluctuation can also be suspected in the O-C diagram of RX Cam (see Fig. 67), but there is no evidence as to its binary nature.

The apparent period change in a periodic variable which is a component of a binary system can only be detected if the inclination of the orbit differs significantly from 0°, otherwise the binary nature can only be discovered photometrically (if the companion has an early spectral type – *Madore* 1977). Since the Cepheids with a rejumping period are thought to be members of binary systems, it may be that one can detect both the apparent period changes due to the orbital motion and the stepwise period changes (rejumping period) in the same system. A check inspection of the O-C diagram for SU Cyg (Paper I, p. 77) was able to reveal a strict periodicity in the O-C variations after the rejump of the period. The orbital period for SU Cyg is $P_{orb} = 3250 \pm 100$ days. The normal maxima, the corresponding O-C residuals and orbital phases (with an arbitrary zero point) are collected in Table 56. The moments of maxima and the O-C values are taken from Table 27 in Paper I, supplemented with several more recent data (*Evans*, 1976; *Fernie*, 1979; *Szabados* unpublished). The value of $a \times sin i$ can be determined from the amplitude of the O-C variation (see Fig. 87): $a \times sin i = 1.5 \times 10^9$ km. Unfortunately, SU Cyg is exceptional. In other Cepheid-binaries we can only see either the rejumping period or the wave-like apparent period variation, and there are a lot of Cepheids listed by *Madore* (1977) as binaries but their O-C diagrams are incomplete and we are thus unable to prove the binary nature.

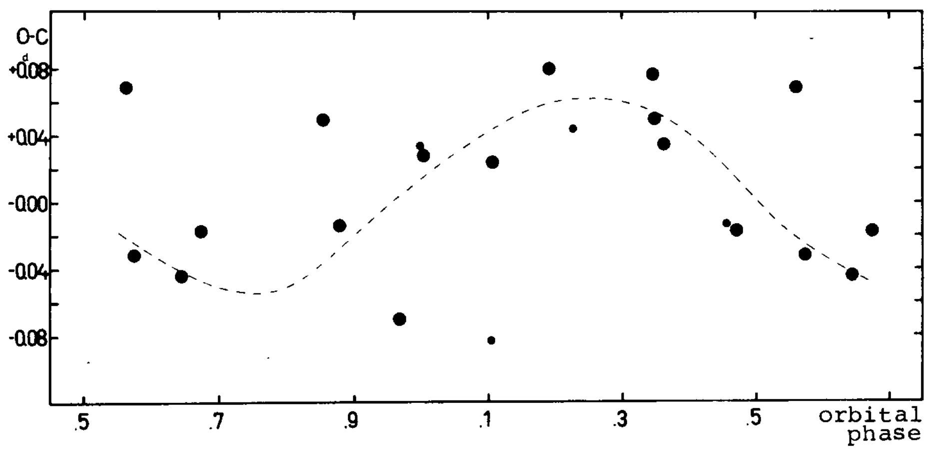

Figure 87 O-C variations of SU Cyg due to the orbital motion

In the light of the above mentioned results, one of the conclusions drawn in Paper I has to be changed. In Paper I the stepwise O-C diagram was declared to be observational evidence supporting the hypothesis on the evolution of Cepheids along the lines of constant period. The real state of affairs is that the period of Cepheids in binary systems tends to be constant, but a phase jump in the light variation of the Cepheid (i.e. a jump in the period and a subsequent rejump) may sometimes occur, which is certainly caused by the influence of the companion star.

Table 56

Obs.Max.J.D.	O-C	phase	Obs.Max.J.D.	O-C	phase
2433126.659	$+0^d.081$	.193	2438994.833	$+0^d.034$	.999
2433680.364	+0.035	.363	2439014.054	+0.028	.005
2434368.640	-0.032	.575	2439344.655	-0.083	.106
2434591.666	-0.044	.644	2439740.868	+0.044	.228
2435356.949	-0.014	.879	2440482.991	-0.013	.457
2435645.305	-0.070	.968	2440825.321	+0.069	.562
2436099.119	+0.024	.108	2441778.985	+0.050	.855
2437287.383	-0.017	.473	2443378.737	+0.077	.348
2437941.117	-0.017	.674	2443382.554	+0.050	.349

The instability of the period

The quantity $\Delta E \times |\Delta P|/P$, first suggested by *Parenago* (1956) as being a measure of the instability of the period, has also been computed as was done in Paper I (p. 109). Here ΔE is the number of epochs during which the period remained constant. Neither the sudden period jumps in CV Mon and RS Ori nor the apparent period changes due to the orbital motion of the binary Cepheids have been taken into consideration in these computations. Table 57 gives a short summary on the instability of the period for different groups of Cepheids. The successive columns contain the following data:

1. Name of the group
2. Average value of $\Delta E \times |\Delta P|/P$
3. Average value of ΔE
4. Average value of the period of Cepheids on which basis the preceding parameters are derived
5. Number of investigated Cepheids in this group
6. Abbreviation of the name of the group in Table 58

Table 57

Group	$\overline{\Delta E \times \|\Delta P\|/P}$	$\overline{\Delta E}$	$\overline{P}$	n	Abbrev.
classical Cepheids with large amplitude	0.12	4040	$6^d.90$	34	I
classical Cepheids with small amplitude	0.21	3500	5.86	4	Is
W Vir type variables	1.24*	2370	7.61*	3*	II

The asterisks in Table 57 denote that if the data concerning

Table 58 Summary

Name	Period	$\log P$	Norm.Max. Hel.J.D.2440000+	Norm.Med.	$\frac{\text{Max.-Med.}}{P}$	Type
FM Aql	6.d114230	0.7863	2678.229	2677.581	0.106	I
FN Aql	9.481603	0.9769	2796.691	2794.652	0.215	I
KL Aql	6.108015	0.7859	3338.696	3337.804	0.146	I?
V 336 Aql	7.303976	0.8636	3048.212	3047.270	0.129	I
V 600 Aql	7.238748	0.8597	2904.092	2903.187	0.125	I
V 733 Aql	6.178748	0.7909	2597.232	2596.225	0.163	Is*
η Aql	7.176735	0.8559	2794.781	2793.834	0.132	I
AO Aur	6.763006	0.8301	2815.764	2814.945	0.121	I
BK Aur	8.002432	0.9032	2825.471	2824.382	0.136	I
RX Cam	7.912024	0.8983	2766.639	2765.587	0.133	I
RS Cas	6.295983	0.7991	2773.489	2772.746	0.118	I
SW Cas	5.440950	0.7357	2989.509	2988.840	0.123	I
VV Cas	6.207059	0.7929	2836.847	2836.220	0.101	I
VW Cas	5.993859	0.7777	2778.699	2777.961	0.123	I
DD Cas	9.812027	0.9918	2780.502	2778.128	0.242	I
DL Cas	8.000669	0.9031	2780.311	2778.935	0.172	I
FM Cas	5.809284	0.7641	2817.752	2816.881	0.150	I
IX Cas	9.1582	0.9618	2779.743	2777.380	0.258	II
CR Cep	6.232964	0.7947	2774.223	2773.263	0.154	Is*
δ Cep	5.366270	0.7297	2756.458	2755.798	0.123	I
VY Cyg	7.856982	0.8953	3045.328	3044.424	0.115	I
GH Cyg	7.817930	0.8931	2743.705	2742.688	0.130	I
MW Cyg	5.954586	0.7749	2923.911	2923.078	0.140	I
V 386 Cyg	5.257606	0.7208	2777.160	2776.508	0.124	I
V 538 Cyg	6.118961	0.7867	2772.938	2771.965	0.159	I
V 924 Cyg	5.571472	0.7460	3066.098	3065.056	0.187	Is
TX Del	6.165907	0.7900	2947.033	2945.862	0.190	II
W Gem	7.913779	0.8984	2755.172	2754.293	0.111	I
RZ Gem	5.529286	0.7427	2714.927	2714.484	0.080	I
BB Her	7.507945	0.8755	2679.245	2678.104	0.152	II?
X Lac	5.444990	0.7360	2738.227	2737.296	0.171	Is*
RR Lac	6.416243	0.8073	2776.720	2775.905	0.127	I
BG Lac	5.331932	0.7269	2673.231	2672.490	0.139	I
CS Mon	6.731920	0.8281	2673.488	2672.445	0.155	I
CV Mon	5.378898	0.7307	2773.160	2772.520	0.119	I
RS Ori	7.566881	0.8789	2820.794	2819.879	0.121	I
GQ Ori	8.616068	0.9353	2798.348	2797.167	0.137	I
AW Per	6.463589	0.8104	2709.062	2708.363	0.108	I
HR 690(Per)	7.552	0.878	3483.394	3481.604	0.237	Is
S Sge	8.382086	0.9234	2678.783	2677.701	0.129	I
U Vul	7.990629	0.9026	2526.328	2525.281	0.131	I
X Vul	6.319543	0.8007	2665.923	2665.101	0.130	I

* Small amplitude, but non-sinusoidal light curve

of the observations

V_{max}	V_{min}	A_V	B_{max}	B_{min}	A_B	U_{max}	U_{min}	A_U	Name
$7^{m}.89$	$8^{m}.66$	$0^{m}.77$	$9^{m}.05$	$10^{m}.13$	$1^{m}.08$	$9^{m}.75$	$11^{m}.15$	$1^{m}.40$	FM Aql
8.22	8.75	0.53	9.34	10.15	0.81	10.23:	11.26	1.03:	FN
9.84	10.56	0.72	10.66	11.71	1.05				KL
9.50	10.27	0.77	10.67	11.74	1.07				V 336
9.73	10.40	0.67	11.08	12.04	0.96				V 600
9.73	10.16	0.43	10.53	11.23	0.70				V 733
3.57	4.30	0.73	4.17	5.29	1.12	4.49	6.05	1.56	η
10.38	11.30	0.92	11.24	12.57	1.33				AO Aur
9.12	9.83	0.71	10.04	11.07	1.03	10.66	11.96	1.30	BK
7.31	8.03	0.72	8.40	9.49	1.09	9.13	10.61	1.48	RX Cam
9.56	10.36	0.80	10.83	11.95	1.12				RS Cas
9.34	9.98	0.64	10.31	11.24	0.93				SW
10.28	11.18	0.90	11.21	12.49	1.28				VV
10.36	11.05	0.69	11.43	12.39	0.96				VW
9.59	10.16	0.57	10.69	11.56	0.87				DD
8.69	9.26	0.57	9.74	10.56	0.82	10.47	11.41:	0.94:	DL
8.85	9.47	0.62	9.71	10.61	0.90				FM
11.19	11.71	0.52	11.79	12.50	0.71				IX
9.45	9.81	0.36	10.79	11.35	0.56				CR Cep
3.50	4.33	0.83	3.95	5.18	1.23	4.30	5.85	1.55	δ
9.20	9.99	0.79	10.29	11.44	1.15				VY Cyg
9.50	10.33	0.80	10.61	11.68	1.07				GH
9.16	9.84	0.68	10.36	11.41	1.05				MW
9.27	9.94	0.67	10.67	11.67	1.00				V 386
10.22	10.73	0.51	11.39	12.17	0.78				V 538
10.57	10.85	0.28	11.36	11.75	0.39				V 924
8.88	9.51	0.63	9.42	10.46	1.04	9.91	11.35	1.44	TX Del
6.55	7.34	0.79	7.29	8.49	1.20	7.81	9.41	1.60	W Gem
9.49	10.46	0.97	10.38	11.67	1.29				RZ
9.80	10.43	0.63	10.69	11.63	0.94				BB Her
8.20	8.57	0.37	9.03	9.62	0.59	9.57	10.36	0.79	X Lac
8.43	9.23	0.80	9.16	10.30	1.14	9.59	11.09	1.50	RR
8.55	9.15	0.60	9.39	10.24	0.85	9.89	10.99	1.10	BG
10.71	11.28	0.57	11.80	12.53	0.73				CS Mon
9.95	10.57	0.62	11.13	11.99	0.86				CV
8.02	8.86	0.84	8.83	10.03	1.20	9.33	10.89	1.56	RS Ori
8.66	9.30	0.64	9.47	10.50	1.03	10.08	11.30	1.22	GQ
7.06	7.84	0.78	7.97	9.06	1.09	8.55	9.82	1.27	AW Per
6.19	6.30	0.11	7.04	7.17	0.13	7.66	7.80	0.14	HR 690
5.31	6.01	0.70	5.92	7.03	1.11	6.32	7.80	1.48	S Sge
6.79	7.50	0.71	7.92	8.95	1.03	8.76	10.17	1.41	U Vul
8.47	9.20	0.73	9.75	10.81	1.06	10.76	12.12	1.36	X

IX Cas are omitted from the statistics the corresponding data in the last line would be: $\overline{\Delta E \times |\Delta P|/P} = 0.19$, $\overline{P} = 6^{d}.84$. This difference shows that the data on W Vir type variables are not to be taken seriously since the number of Population II Cepheids in this sample is too small. The measure of the instability of the period for the small amplitude Cepheids is somewhat smaller than for their shorter period group in Paper I. This means that the instability of the period of the small amplitude Cepheids does not increase with the increase in the value of the period. This evidence supports the hypothesis that the small amplitude Cepheids must be separated from their counterparts with normal amplitude (see Paper I, p. 108). The increasing instability with the increase in the period can be seen in the case of the normal amplitude Cepheids when comparing the corresponding data from the present Table 57 and Table 44 in Paper I: at an average period of $4^{d}.1$ the measure of the instability is 0.03 , and for $\overline{P} = 6^{d}.9$ the instability is 0.12 . All these data, however, are affected by the rather uncertain value of $\overline{\Delta E}$. In most cases the value of ΔE is only a lower limit and its certainly larger real value can only be determined if more period changes are observed.

Summary of the observations

The fundamental parameters of the light variations of the observed Cepheids are summarized in Table 58. The successive columns contain the following data:

1. Name of the Cepheid
2. Period of light variation
3. Decimal logarithm of the period

4-5. The moments of the normal maximum and normal median brightnesses derived from the observations listed in Table 3

6. Fractional period between the moment of median brightness and that of the subsequent light maximum (a measure of the asymmetry of the light curve)

7-9. The maximum and minimum magnitudes and the amplitude in V

10-12. The corresponding quantities for B as under 7-9

13-15. The corresponding quantities for U as under 7-9

16. Type of Cepheid

17. Name of Cepheid

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Budapest-Szabadsághegy, April 20, 1980

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PHOTOELECTRIC UBV PHOTOMETRY OF NORTHERN CEPHEIDS, III

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PHOTOELECTRIC UBV PHOTOMETRY OF NORTHERN CEPHEIDS, III

ABSTRACT

New UBV photoelectric observational data on 25 northern Cepheids with periods longer than 10 days are presented. The period changes and the variations in the light curve of the observed Cepheids are investigated.

Almost half of the programme stars show continuous period change (parabolic O-C curve). Among the Cepheids in binary systems YZ Aur, SV Per and perhaps AN Aur show a period jump and a subsequent rejump to the earlier value of the period. The apparent period changes due to orbital motion around the common centre of gravity can be seen in RW Cam, X Cyg, SZ Cyg and T Mon. The orbital period of RW Cam is about 6600 days. The only new case of secular light curve variation is observed in AN Aur.

INTRODUCTION

This paper is the third and last part of a series dealing with the new UBV photometry of northern Cepheids performed at the Konkoly Observatory, and it contains the observational data and O-C diagrams of Cepheids with periods longer than 10 days. The previous parts of this survey covered Cepheids with periods shorter than this limit (Szabados, 1977 and 1980; hereinafter these papers are referred to as Paper I and Paper II, respectively).

The main purposes of this survey have been outlined in the introductions to Papers I and II. With the long period Cepheids the most important factor is the knowledge of the period changes because the long period Cepheids tend to exhibit strong period changes. The investigation of the period changes of Cepheids in binary systems is also very important because the O-C diagrams of these variables may show two kinds of peculiarities, viz. a rejumping period and an apparent period change due to the orbital motion (see pp. 112-114 of Paper II).

During the course of this last part of the work 25 Cepheids were observed. Of these variables, 13 were observed in three colours of the UBV system, the other 12 in B and V lights only.

THE OBSERVATIONS

The stars dealt with in this programme were selected from the General Catalogue of Variable Stars (Kukarkin et al., 1969-1970) with the restrictions that their declination should be north of 0^{o} and B magnitude (or m_{pg} for lack of photoelectric observations) at light minimum brighter than $12^{m}_{.}5$. This sample contains Cepheids of both populations with a period greater than 10 days. Only the variable star RU Cam was omitted because of its well known photometric and spectroscopic peculiarities which raise doubts as to its belonging to CW variables. Moreover, RU Cam has been regularly observed since 1967 at Konkoly Observatory by the members of the Variable Star Department. A detailed analysis on this star will appear in due course.

Table 1 The programme

Star	N	Col.	Page obs.	Page rem.	Star	N	Col.	Page obs.	Page rem.
SZ Aql	20	UBV	7	66	VX Cyg	22	BV	13	70
TT Aql	23	UBV	7	47	BZ Cyg	21	BV	14	20
RX Aur	17	UBV	7	41	CD Cyg	21	UBV	14	64
SY Aur	19	UBV	8	21	AA Gem	13	BV	15	40
YZ Aur	20	BV	8	68	ζ Gem	16	UBV	15	24
AN Aur	17	BV	9	29	AP Her	32	BV	16	31
RW Cam	20	UBV	9	62	Z Lac	20	UBV	16	35
RW Cas	21	BV	10	51	T Mon	12	UBV	17	72
RY Cas	20	BV	10	43	SV Mon	17	UBV	17	56
SZ Cas	18	BV	11	45	SV Per	19	BV	18	38
X Cyg	24	UBV	11	58	VX Per	16	UBV	18	37
SZ Cyg	19	BV	13	54	SV Vul	23	UBV	18	76
TX Cyg	23	BV	13	49					

The stars investigated are listed in Table 1. The number of observations on each star, the colours, serial numbers of the pages where the individual observations and the O-C diagram with additional remarks on the given star can be found are indicated in the successive columns. The total number of observations is close on 500. The observations were made between 1977 and 1980 except for Z Lac. This latter star was observed several years earlier among the stars in the second group of the programme stars, because of the similarity of its coordinates with the shorter period Cepheid RR Lac.

Table 2

Variable	Comp.	V	B-V	U-B	Check	V	B-V	U-B	Remark
SZ Aql	+ 0° 4090	$8^{m}.94$	$1^{m}.42$	$1^{m}.42$	+ 0° 4088	$6^{m}.76$	$1^{m}.51$	$1^{m}.75$	
TT Aql	+ 1° 3905	7.56	0.48	-0.02	+ 1° 3911	8.89	0.74	0.47	
RX Aur	+39° 1159	8.13	1.15	1.02	+39° 1157	8.39	0.15	-0.43	
SY Aur	+42° 1190	8.81	1.63	2.04	+42° 1192	9.17	0.33	0.07	
YZ Aur	+39° 1221	9.66	1.21		+40° 1214	9.24	1.33		
AN Aur	+40° 1126	11.11	0.45		+40° 1132	10.35	0.51		
RW Cam	+58° 670	9.13	1.22	1.00	+57° 755	9.19	0.96	0.77	
RW Cas	+56° 311	9.70	1.31		+57° 362	8.99	0.17		
RY Cas	+57° 2824	9.79	1.41		+57° 2823	9.58	0.29		
SZ Cas	+58° 466	9.94	1.34		+58° 461	9.74	0.46		
X Cyg	+35° 4219	7.42	0.65	0.12	+35° 4282	6.64	1.61	2.10	
SZ Cyg	+46° 2971	9.80	1.29		+46° 2976	9.46	1.13		
TX Cyg	+41° 3958	10.25	1.20		see Fig.1	10.68	0.88		
VX Cyg	+39° 4380	9.78	1.19		+40° 4365	9.63	0.45		1
BZ Cyg	+44° 3578	9.90	0.65		+44° 3572	9.64	0.47		2
CD Cyg	+33° 3734	8.92	1.07	0.84	+33° 3730	9.38	0.32	0.08	
AA Gem	+26° 1083	9.89	1.39		+26° 1080	10.51	0.14		
ζ Gem	+22° 1645	3.52	0.34	0.04	+16° 1443	3.57	0.10	0.10	
AP Her	+15° 3592	9.60	1.17		+15° 3586	9.33	0.98		
Z Lac	+55° 2791	8.79	1.05	0.83	+55° 2792	8.71	0.24	-0.06	
T Mon SV Mon	} +6° 1253	7.74	1.03	0.49	+ 6° 1254	7.37	1.57	1.52	
SV Per	+41° 975	9.61	1.14		+41° 973	9.84	1.03		
VX Per	+57° 479	9.01	0.68	0.06	+58° 375	8.87	0.73	0.11	
SV Vul	+27° 3523	6.93	0.66	0.06	+27° 3516	6.85	0.69	0.12	

Remarks: 1 The comparison star has a faint companion

2 The check star is double

A full description of the observational technique, and the telescope and filters used can be found in Paper I (p. 6). During the course of the present part the observations were performed using the 24" telescope only.

The V magnitudes and colour indices of the comparison and check stars are listed in Table 2. The tie-in observations were made with the aid of UBV standard stars taken from the catalogue of Blanco et al. (1968). All the comparison and check stars are BD stars except for the check star for TX Cyg. This latter check star can be identified using the chart in Fig. 1. The size of this chart is 45'x45', north is at the top; the letter *a* denotes the comparison star and the star marked *b* is the check one.

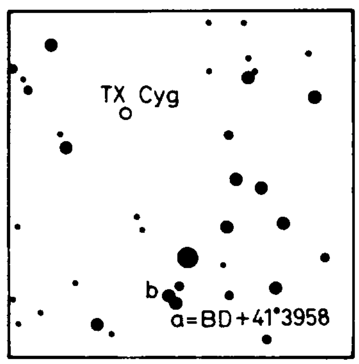

Figure 1 Identification chart for TX Cyg

Table 3 contains the observations in alphabetical order of the constellations. Some unpublished observations made by Prof. L. Detre in 1953 and by Dr. J. Abaffy in 1967 are also listed in Table 3. Unfortunately, since the comparison stars used by them are unknown in several cases these two sets of observations have not been transformed to the standard system, and only the magnitude differences are given in the instrumental system.

Table 3 The observations

SZ Aquilae

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
3647.526	9.22	1.82		3761.289	8.65	1.57	1.43
3679.478	9.14	1.79		3763.315	8.88	1.69	1.44:
3693.440	8.69	1.65	1.48	3798.223	8.96	1.72:	1.61:
3701.422	9.04	1.62	1.28	3803.213	9.17	1.66	1.42
3703.518	8.77	1.46	1.03	3809.239	8.31	1.32	0.94:
3705.406	8.20	1.20		4049.529	8.34	1.32	1.19
3714.383	9.15	1.83	1.67	4050.470	8.41	1.35	1.21
3743.400	8.58	1.51	1.39	4102.330	8.47	1.45	
3747.311	9.00	1.76	1.71	4113.313	8.95	1.53	1.23
3749.405	9.25	1.85:		4150.264	8.04	1.07	1.04

TT Aquilae

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
3647.546	6.77	1.13	0.82	3743.412	6.71	1.10	0.83
3679.456	7.28	1.47	1.33	3747.298	7.19	1.44	1.33
3690.414	6.93	1.28	1.07	3749.417	7.45	1.55	1.50
3701.407	6.65	0.98	0.76	3772.260	6.89	1.24	0.94
3703.506	6.85	1.24	1.06	3781.289	7.37	1.33	1.00
3705.394	7.10	1.39	1.18	3809.228	7.33	1.33	0.99
3707.443	7.32	1.47	1.36	4050.482	7.24	1.44	1.32
3714.371	6.67	1.00	0.63	4126.301	7.19	1.25	0.98
3722.411	7.52	1.60	1.52	4129.330	6.79	1.20	0.83
3724.437	7.56	1.50	1.60	4140.320	7.08	1.16	0.84
3737.322	7.55	1.65	1.61	4155.238	6.65	1.03	0.63
3739.405	7.40	1.42	1.08				

RX Aurigae

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
3438.607	7.76	1.12	0.74	3607.296	7.73	0.93	0.56:
3483.653	7.60	0.97	0.72	3777.536	7.98	1.15	0.84
3490.524	7.81	0.95	0.53	3789.619	8.02	1.14	0.88
3599.311	7.55	0.96	0.57	3791.574	7.95	1.03	0.67

Table 3 (cont.)

(RX Aur)

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
3830.399	7.37	0.83	0.54	4143.473	7.41	0.80	0.53
3911.445	7.35	0.78	0.56	4162.535	8.02	1.11	0.74
3926.434	7.73	1.06	0.74	4203.324	7.50	0.98	0.59
3957.302	7.43	0.80	0.47	4251.332	7.63	1.04	0.70
3966.312	7.86	1.04	0.59:				

SY Aurigae

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
3424.635	9.12	1.00	0.68	3878.315	9.36	1.21	
3425.639	8.91	0.91	0.66	3928.355	9.27	1.22	0.81
3438.628	8.93	1.03		3931.279	9.29	1.09	0.71
3460.493	9.12	1.11		3956.290	8.98	1.05	0.79
3483.620	9.36	1.21	0.89	3957.315	9.09	1.15	0.78:
3599.328	8.76	0.92	0.72:	4132.622	9.38	1.22	0.75
3789.485	9.27	1.01		4157.507	8.74	0.91	0.59:
3791.601	8.84	0.93	0.64	4166.471	8.89	0.95	0.72:
3803.393	8.86	0.93	0.77:	4203.346	9.37	1.24	0.87
3849.454	9.33	1.14	0.78				

YZ Aurigae

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
3420.620	10.25	1.43		3849.411	10.52	1.47	
3423.569	10.46	1.60		3928.385	10.14	1.33	
3424.584	10.52	1.67		3931.403	10.27	1.58	
3425.593	10.65	1.66		3956.275	10.75	1.56	
3483.602	10.76	1.47		4108.560	9.98	1.22	
3490.540	10.00	1.28		4132.604	10.41	1.53	
3598.349	9.93	1.20		4143.469	9.96	1.21	
3777.551	10.56	1.33		4167.460	10.28	1.56	
3791.586	10.72	1.68		4215.393	10.09	1.27	
3793.617	10.53	1.53		4251.315	10.27	1.25	

Table 3 (cont.)

AN Aurigae

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
3424.603	10.73	1.34		3803.408	10.81	1.40	
3425.616	10.49	1.23:		3926.386	10.76	1.43	
3438.590	10.21	1.14		3928.369	10.79	1.36	
3483.569	10.68	1.40		3931.394	10.30	1.21	
3490.470	10.24	1.09		3935.298	10.50	1.36	
3524.252	10.57	1.40		4157.487	10.30	1.18	
3777.514	10.25	1.21		4167.445	10.29	1.18	
3789.513	10.25	1.27		4251.351	10.19	1.17	
3793.578	10.79	1.44					

RW Camelopardalis

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
3438.520	8.88	1.47	0.91	3849.437	8.94	1.50	0.92:
3481.412	8.32	1.34	0.92	3878.332	8.58	1.42	0.98:
3483.674	8.52	1.44	1.02	3926.451	8.52	1.42	1.00
3560.320	8.47	1.24	0.82	3928.337	8.65	1.45	1.03
3777.441	8.39	1.35	1.03:	3935.328	8.84	1.41	0.83
3788.565	8.74	1.37	0.82	3956.303	8.20	1.27	0.91
3789.442	8.75	1.37	0.88	3966.325	9.00	1.46	0.96
3791.557	8.17	1.21	0.89:	4143.444	8.78	1.52	0.99
3803.376	8.92	1.44	0.90	4162.510	9.01	1.48	0.89:
3830.367	8.70	1.53	1.01	4167.413	8.55	1.34	0.85

Observations in 1967

J.D.hel. 2430000+	Δv	Δb	Δu	J.D.hel. 2430000+	Δv	Δb	Δu
9777.469	+0.203	1.070	1.929	9791.442	-0.021	0.832	1.634
9780.574	+0.392	1.234	1.755	9806.406	-0.112	0.684	1.265
9782.628	+0.180	1.003	1.410	9821.321	-0.240:	0.455:	0.810:
9786.528	-0.441	0.147	0.864	9833.334	+0.117:	0.820:	
9790.625	-0.072	0.754	1.575				

Table 3 (cont.)

RW Cassiopeiae

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
3420.524	9.10	1.35		3830.246	8.60	0.92	
3424.488	9.59	1.59		3837.421	9.44	1.52	
3437.400	9.34	1.48		3873.362	9.41	1.32	
3438.471	9.48	1.55		3928.249	9.70	1.56	
3489.314	9.23	1.19		3931.265	9.49	1.41:	
3490.333	8.58	0.91		4108.500	9.50	1.51	
3560.272	9.69	1.52		4113.377	8.81	1.21:	
3788.522	8.90	1.17		4157.391	8.79	1.08	
3789.456	9.01	1.28		4166.370	9.73	1.62	
3791.529	9.24	1.44		4167.302	9.62	1.46	
3800.288	8.98	1.14					

Observations in 1967

J.D.hel. 2430000+	Δv	Δb	Δu	J.D.hel. 2430000+	Δv	Δb	Δu
9759.590	-0.091	+0.919	2.11	9781.553	-0.343	+0.699	2.13
9762.589	-0.855	-0.153		9783.424	-0.127	+1.043	2.08:
9763.491	-0.751	+0.022	0.928	9786.507	+0.278	+1.458	
9769.530	+0.006	+1.152	2.61	9787.500	+0.261	+1.440	
9770.435	+0.120	+1.346	2.82	9790.490	-0.108	+0.844	2.03
9776.515	-0.776	-0.089	0.761	9791.501	-0.957	-0.351	0.450
9780.518	-0.492	+0.475	1.648				

RY Cassiopeiae

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
3420.505	10.31	1.62:		3777.572	9.48	1.13	
3424.469	9.71	1.22		3798.274	10.30	1.42:	
3438.456	9.38	1.13		3837.435	9.68	1.19	
3483.328	10.05	1.40		3878.242	9.82	1.45	
3489.295	9.77	1.33		3928.241	10.07	1.63	
3490.306	9.90	1.42		3931.254	10.35	1.57	
3524.261	9.55	1.22		4054.508	9.95	1.33	
3743.562	9.72	1.29		4066.470	10.05	1.42	

Table 3 (cont.)

(RY Cas)

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
4111.488	10.20	1.70:		4166.355	9.41	1.15	
4159.375	10.19	1.64		4251.267	9.39	1.17	

SZ Cassiopeiae

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
3420.557	9.81	1.44		3849.423	9.87	1.49	
3423.624	9.61	1.36		3935.248	10.03	1.53:	
3424.524	9.68	1.41		4066.528	9.78	1.50	
3483.394	9.97	1.57		4100.541	9.93:	1.51:	
3489.394	9.75	1.35		4101.520	9.85:	1.43:	
3743.575	9.99	1.59		4162.438	9.88:	1.42:	
3777.381	9.61	1.33		4166.439	10.02	1.59	
3789.567	9.68	1.34		4167.509	10.03	1.52	
3793.566	9.74	1.47		4215.373	9.78:	1.37:	

X Cygni

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
3679.429	6.64	1.21	1.00	3789.330	6.67	1.46	1.46
3693.487	6.88	1.47	1.40	3795.354	6.63	1.19	0.91
3704.367	6.35	1.30	1.15	3803.243	6.42	1.32	1.22
3705.462	6.43	1.36	1.27	3830.190	5.87	0.85	0.57
3714.514	6.10	0.99	0.67	4102.343	6.85	1.46	1.52:
3722.524	6.49	1.40	1.39	4108.358	5.91	0.88	0.54
3724.535	6.72	1.47	1.51	4113.535	6.29	1.25	1.08
3732.460	5.87	0.89	0.65	4126.325	5.96	0.92	0.70
3739.370	6.58	1.42	1.40	4129.356	6.24	1.22	1.12
3743.450	6.87	1.39	1.41	4143.361	6.01	1.00	0.77
3767.408	6.08	1.07	0.90	4155.281	6.60	1.19	0.94
3777.247	6.72	1.34	1.22	4160.371	6.07	1.07	0.89

Observations in 1953

J.D.hel. 2430000+	Δv	Δb	J.D.hel. 2430000+	Δv	Δb
4575.441	-0.567	-0.646	4576.421	-0.484	-0.450

Table 3 (cont.)

(X Cyg)

J.D.hel. 2430000+	Δv	Δb	J.D.hel. 2430000+	Δv	Δb
4577.415	-0.319	-0.127	4606.332	-0.691	-0.909
4579.432	-0.063	+0.252	4607.510	-0.552	-0.700
4580.410	+0.094	+0.453	4608.495	-0.479	-0.495
4581.427	+0.226	+0.535	4609.549	-0.331	-0.309
4583.448	+0.314	+0.620	4610.421	-0.259	-0.140
4584.551	+0.194	+0.458	4611.397	-0.178	+0.050
4585.375	+0.025	+0.102	4614.419	+0.180	+0.539
4587.527	-0.509	-0.686	4618.483	+0.012	+0.019
4588.377	-0.825	-1.105	4619.394	+0.040	+0.022
4589.360	-0.863	-1.114	4619.570	-0.002	-0.050
4590.425	-0.656	-0.836	4620.539	-0.579	-0.874
4591.419	-0.552	-0.590	4621.622	-0.839	-1.170
4592.454	-0.442	-0.427	4622.508	-0.693	-1.020
4595.376	-0.078	+0.120	4623.545	-0.542	-0.791
4596.398	+0.028	+0.234:	4624.546	-0.534	-0.542
4597.412	+0.149	+0.518	4625.473	-0.373	-0.376
4598.402	+0.256	+0.540	4627.548	-0.131	-0.014
4599.392	+0.241	+0.582	4628.538	-0.018	+0.284
4600.514	+0.252	+0.625	4629.546	+0.182	+0.389
4601.438	+0.080	+0.228	4636.583	-0.318:	-0.531:
4602.422	-0.008	+0.020	4649.387	+0.250	+0.561
4604.402	-0.703	-0.945	4652.372	-0.044	-0.025
4605.336	-0.788	-1.138	4652.545	-0.096	-0.119

Observations in 1967

J.D.hel. 2430000+	Δv	Δb	Δu	J.D.hel. 2430000+	Δv	Δb	Δu
9769.446	-0.395	0.626	2.07	9788.278	-0.145	1.075	
9770.397	-0.293	0.796	2.38	9791.390	+0.216	1.473	
9776.469	+0.319	1.651	3.53:	9795.247	+0.285	1.506	
9777.379	+0.368	1.713	3.37	9796.262	+0.123	1.286	
9782.481	-0.636	0.189	1.279	9799.281	-0.648	0.179	1.255
9783.402	-0.645	0.180	1.290	9814.271	-0.098	0.922	2.26:
9787.342	-0.253	0.904					

Table 3 (cont.)

SZ Cygni

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
3298.469	9.61	1.66		3772.407	9.54	1.52	
3337.481	8.93	1.30:		3777.279	9.06	1.36	
3437.263	9.83	1.79		3789.425	9.31	1.39	
3483.295	9.81	1.73		3791.364	8.97	1.31:	
3693.523	9.81	1.76		3795.367	9.36	1.59	
3714.501	9.02	1.26		3803.270	9.56	1.52	
3720.541	9.49	1.70:		4054.395	9.66	1.73	
3722.537	9.69	1.73		4066.408	9.26	1.59	
3743.518	9.55	1.37		4174.228	9.46:	1.68:	
3763.438	9.19	1.59					

TX Cygni

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
3437.281	10.01	2.11		3800.271	9.49	2.11	
3483.310	9.84	1.98		3803.330	9.90	2.15	
3705.540	9.62	1.93		3830.329	9.55	2.12	
3722.494	9.09	1.73		4049.446	9.39	1.98	
3724.519	9.33	1.91		4054.441	10.00	2.08	
3761.409	9.95	2.10		4100.437	9.86	2.03	
3763.464	9.72	1.99		4111.417	9.77	2.17	
3765.370	8.90	1.62		4147.322	9.44	1.73	
3772.364	9.68	2.13		4150.282	9.19	1.77	
3789.345	9.99	2.09		4162.362	9.06	1.60	
3791.350	9.92	2.03		4166.293	9.34	1.90	
3795.381	8.88:	1.71:					

VX Cygni

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
3693.470	10.41	1.94		3720.380	10.31	1.79	
3703.534	9.58	1.43		3722.482	9.68	1.49	
3705.521	9.73	1.59		3724.484	9.61	1.52	
3714.468	10.47	1.97		3761.398	10.25	1.77	

Table 3 (cont.)

(VX Cyg)

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
3765.380	9.69	1.55		3803.344	9.61	1.46	
3772.318	10.16	1.96:		3830.311	9.99	1.88	
3777.289	10.54	2.02		4049.430	9.84	1.68	
3788.487	9.90	1.74		4100.414	10.55	1.96	
3789.358	9.95	1.86		4101.465	10.36	1.85	
3791.336	10.09	1.92		4155.269	10.27	1.96	
3800.261	10.33	1.75:		4203.229	10.30	1.81	

BZ Cygni

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
3437.246	10.12	1.56		3777.411	10.33	1.80	
3647.502	10.53	1.67:		3788.472	10.50	1.72	
3679.517	10.28	1.68		3795.336	10.06	1.65	
3693.506	10.08	1.54		3803.254	10.09	1.56	
3714.449	10.11	1.61		3868.223	10.32	1.70	
3720.550	10.20	1.60:		4049.413	10.08	1.63	
3722.467	10.06	1.63:		4050.451	10.22	1.71	
3739.383	10.52	1.66		4100.460	10.15	1.70	
3743.529	10.05	1.51:		4102.354	10.40	1.74:	
3763.446	10.05	1.60		4113.345	10.49	1.76	
3772.393	10.06	1.52					

CD Cygni

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
3630.489	8.68	1.31	1.03	3772.419	9.36	1.60	1.55
3705.500	9.45	1.68	1.46	3798.238	8.48	1.04	0.81
3714.428	8.57	1.21	1.00	3803.283	8.97	1.46	1.28
3720.524	9.21	1.58	1.53	3809.253	9.51	1.62	1.39
3724.561	9.54	1.63		3830.295	9.14	1.34	1.06
3743.497	9.27	1.40		4049.401	9.44	1.62	
3761.300	9.23	1.46	1.18	4101.451	9.34	1.43	1.23
3763.423	8.41	0.99	0.65	4111.402	9.01	1.57	1.37:

Table 3 (cont.)

(CD Cyg)

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
4126.342	8.80	1.38	1.13	4155.253	8.58	1.07	0.79
4129.343	9.12	1.57	1.44	4159.330	8.67	1.32	1.07
4140.332	8.54	1.17					

AA Geminorum

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
3460.516	9.94	1.29		3789.580	9.97	1.24	
3481.439	9.77	1.14		3793.590	9.47	0.92	
3483.430	10.00	1.29		3928.405	9.69	1.02	
3489.411	9.40	0.95		3931.412	9.49	1.03	
3572.314	9.81	1.18		3957.343	9.89	1.26	
3598.318	9.86:	1.16:		3966.301	9.59	1.12:	
3599.352	9.76	1.09:					

ζ Geminorum

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
3481.505	3.65	0.71	0.51	3791.614	4.14	0.90	0.69
3483.492	3.87	0.84	0.68	3793.606	3.84	0.72	0.58
3489.463	3.80	0.73	0.51	3849.494	3.94	0.87	0.81
3572.329	3.67	0.68	0.49	3926.403	3.75	0.71	0.56
3598.336	4.16	0.90	0.87:	3928.420	3.68	0.67	0.56
3599.340	4.03	0.82	0.65	3935.345	3.85	0.77	0.55
3607.327	4.14	0.94	0.84	3957.331	3.70	0.69	0.57
3789.594	4.06	1.00	0.86	4203.461	3.76	0.82	0.75

Observations in 1967

J.D.hel. 2430000+	Δv	Δb	Δu	J.D.hel. 2430000+	Δv	Δb	Δu
9776.554	0.140:	0.416:	0.863:	9796.536	0.164	0.444	0.873
9777.550	0.232	0.592	1.063	9810.591	0.627	1.120	
9782.569	0.595	1.045	1.599	9814.631	0.376	0.745	1.197
9784.553	0.314	0.647	1.074	9825.138	0.314:	0.632:	1.104:
9786.551	0.169	0.444	0.875	9864.303	0.473	0.929	1.414
9791.583	0.676	1.184	1.919				

Table 3 (cont.)

AP Herculis

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
3298.450	10.74	0.80		3749.425	10.50	0.62	
3304.495	10.95	0.70		3753.289	10.94	0.84	
3337.439	10.50	0.60		3761.278	10.52	0.62	
3647.457	10.49	0.56		3772.269	10.62	0.69	
3690.395	10.75	0.79		3777.256	11.13	0.93	
3705.422	11.08	0.84		3789.294	10.95	0.71	
3714.413	11.12:	0.82:		3791.228	10.43	0.65	
3716.355	11.10	0.77:		3800.239	10.75	0.68	
3720.355	10.56	0.66		4049.364	10.38	0.67	
3722.436	11.01	0.80		4054.424	11.16:	0.81:	
3724.448	11.13	0.89		4108.343	11.17	0.90	
3730.319	10.54	0.64		4111.386	10.46	0.63	
3732.433	10.87	0.81		4113.324	10.55	0.67	
3739.325	10.46	0.59		4157.268	10.95	0.92	
3743.308	10.96	0.88		4159.250	11.08	0.99	
3747.320	11.03	0.78		4167.241	11.05	0.83	

Z Lacertae

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
2318.465	8.38	1.15	0.87	2728.302	8.24	1.00	
2642.405	7.92	0.90	0.55	2738.355	8.37	1.08	0.66
2645.490	8.45	1.25	1.02	2756.331	8.73	1.33	1.14
2646.388	8.58	1.31	1.08	2770.213	8.50	1.15	0.79
2672.546	8.48	1.09	0.69:	3481.329	8.13	1.01	0.70
2675.429	8.05	0.95	0.61	3489.262	8.42	1.06	0.75
2676.452	8.21	1.06	0.74	3705.479	8.71	1.23	0.97
2685.497	7.92	0.81	0.62	3798.285	8.32	1.06	0.74:
2714.359	8.82	1.25	1.06	3878.274	8.80	1.38	
2715.399	8.55	1.16	1.00:	3931.238	8.65	1.29	1.21

Observations in 1967

J.D.hel. 2430000+	Δv	Δb	Δu	J.D.hel. 2430000+	Δv	Δb	Δu
9732.477	+0.051	+0.761	1.496	9759.390	-0.331	+0.319	0.941

Table 3 (cont.)

(Z Lac)

J.D.hel. 2430000+	Δv	Δb	Δu	J.D.hel. 2430000+	Δv	Δb	Δu
9760.524	-0.152	+0.576	1.340	9769.513	-0.392	+0.175	0.755
9762.557	+0.192	+1.040	2.03	9789.356	-0.350	+0.111	0.687
9763.540	+0.295	+1.144	2.05	9790.469	-0.593	-0.114	0.355:
9766.562	-0.182:	+0.432:					

T Monocerotis

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
3481.462	6.54	1.43	1.01	3789.632	5.85	1.31	0.84
3483.452	6.37	1.26	0.68	3791.624	6.01	1.39	0.96
3489.429	5.73	1.07	0.60	3793.636	6.11	1.42	1.07
3490.454	5.77	1.19	0.70	3849.484	6.23	1.45	1.17
3560.360	6.59	1.46	1.05	3935.280	6.50	1.53	1.23
3777.607	6.52:	1.45:	0.96:	4203.483	6.41	1.49	1.20

Observations in 1967

J.D.hel. 2430000+	Δv	Δb	Δu	J.D.hel. 2430000+	Δv	Δb	Δu
9784.630	-0.992	-0.255	0.512:	9808.546	-0.107	+0.958	2.21
9786.592	-0.973	-0.176	0.671	9810.544	-0.794	+0.027	0.865
9787.572	-0.869	-0.027	0.929	9812.572	-1.018	-0.260	0.500
9790.589	-0.688	+0.307	1.461	9814.603	-0.904	-0.024	0.833
9791.571	-0.622	+0.403	1.680	9825.564	-0.166	+0.956:	
9796.522	-0.351	+0.837	2.50:				

SV Monocerotis

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
3481.486	8.41	1.36	0.98	3777.624	8.46	1.17	0.63
3483.473	8.67	1.40	1.12	3791.639	8.43	1.22	0.55
3489.444	7.66	0.81	0.37	3793.626	7.98	0.95	0.41
3490.436	7.70:	0.90:	0.32:	3928.280	8.61	1.21	0.58
3560.383	8.75	1.42	1.08	3935.267	8.04	1.14	0.69
3572.293	8.30	1.34	0.90	3957.274	8.78	1.42	1.06
3599.282	7.95	1.08	0.56	3966.282	8.14	1.16	0.67:

Table 3 (cont.)

(SV Mon)

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
4167.530	8.47	1.39	1.00	4251.370	7.69:	0.87:	0.23:
4203.511	8.41	1.14	0.51				

SV Persei

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
3438.569	8.49	0.91		3931.292	8.93	1.10	
3490.506	9.35	1.14		3935.313	9.35	1.18	
3560.338	8.85:	0.91:		3957.287	9.35	1.17	
3599.298	9.14	1.24		4132.588	9.02	1.18	
3607.281	8.76	1.08		4143.456	8.97	1.19	
3789.529	9.23	1.27		4162.416	8.59	0.94	
3791.542	9.22	1.14		4166.421	9.05	1.22	
3830.385	8.85	1.08		4167.430	9.20	1.18	
3837.477	9.03	1.05		4215.417	9.05	1.12	
3878.297	9.23	1.26					

VX Persei

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
3438.488	9.61	1.44	0.91	3789.549	9.08	1.09	0.76:
3483.371	9.38	1.23	0.83	3873.343	9.69	1.39	1.03:
3489.378	9.31	1.31	1.03	3878.261	9.03	1.16	0.82
3490.405	9.45	1.38	1.04	3928.260	9.62	1.45	1.02
3560.303	9.20	1.17	0.84	4101.501	9.65	1.35	1.11
3572.275	9.08	1.15	0.85	4108.514	9.11	1.19	0.88
3737.505	8.99	1.12	0.83	4132.571	9.42	1.36	0.98
3739.413	9.29	1.19	0.97	4166.404	9.59	1.42	1.11:

SV Vulpeculae

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
3298.489	7.75	1.72		3647.477	7.39	1.72	1.63
3304.462	7.64	1.61	1.48	3679.408	6.96	1.44	1.12
3337.457	7.51	1.71	1.64	3701.388	7.65	1.78	1.76

Table 3 (cont.)

(SV Vul)

J.D.hel. 2440000+	V	B-V	U-B	J.D.hel. 2440000+	V	B-V	U-B
3705.440	7.77	1.78	1.65	3772.293	7.07	1.54	1.31
3714.353	6.75	1.13	0.78	3781.299	7.33	1.73	1.62
3720.338	6.88	1.28	0.97	3789.318	7.58	1.78	1.63:
3722.452	6.92	1.37	1.06	3803.229	6.92	1.24	0.84
3732.449	7.22	1.64	1.55	4049.469	7.31	1.70	1.60
3739.354	7.40	1.77	1.65	4066.440	7.75	1.74	1.65
3753.280	7.68	1.75	1.58	4101.490	7.53	1.70	
3761.269	6.75	1.15	0.88	4150.327	7.63	1.78	1.68
3763.415	6.78	1.24	0.94				

THE LIGHT CURVES AND PERIOD CHANGES OF THE INDIVIDUAL VARIABLES

This section contains the light curves, the tables and the graphs of the O-C values representing the period variation. Some remarks on the observed Cepheids are also noted on the individual Cepheids. As in Papers I and II, it was not my intention to give the full history of the variables which would have increased considerably the volume of the paper. The variables were arranged according to the length of their period as in the previous papers.

A detailed description of the construction of the O-C diagrams can be found in Paper I (p. 32). The O-C values determined on the basis of visual, photographic and photoelectric observations are marked with open circles, filled circles and triangles, respectively. The size of these marks denotes the weight of the O-C values to be found in the figures of this section.

The columns in the tables of the O-C residuals for each variable contain the following data:

1. The moment of normal maximum (or that of median brightness)
2. The corresponding epoch
3. The O-C residual in days
4. The type of observation (vis for visual, pg for photographic and pe for photoelectric observations)
5. The weight of the O-C residual depending on the type, number

and quality of the observations.

6. The source of the observational data. When the name of the observer is not identical with the name (or one of the names) given in the reference the observer's name is indicated in the footnote to the table.

The determination of the O-C curves was by a weighted least squares fitting procedure. The O-C residuals with zero weight are not plotted in the diagrams, those with 0.5 weight are plotted but were always omitted in the curve fitting procedure.

The formula by which the O-C residuals have been calculated is indicated at each variable. These formulae usually refer to maximum light. If O-C diagrams for both maximum and median brightnesses are presented, the two different calculated ephemerides are marked with C_{max} and C_{med}, respectively.

<u>BZ Cygni</u>

The B light and the B-V colour curves of this small amplitude Cepheid are shown in Fig. 2. The O-C residuals have been computed by the formula:

$$C = 2443774.037 + 10^{d}.141932 \times E \quad .$$

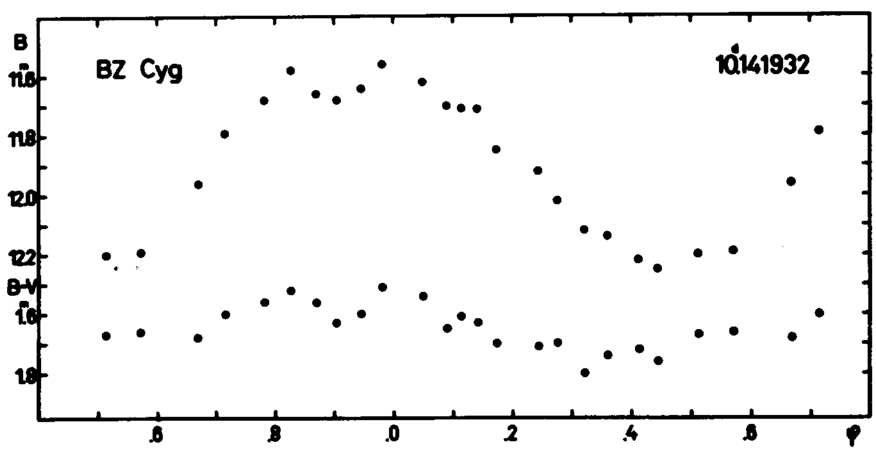

Figure 2 B and B-V curves of BZ Cyg

The period of this Cepheid has remained constant since the discovery of its light variation (see Fig. 3). The O-C value of the points with 0.5 weight is systematically smaller than that of

Table 4 O-C residuals for BZ Cyg

Obs.Max.J.D.	E	O-C	Type	w	Reference
2418571.266	-2485	$-0^d.070$	pg	1	Furuhjelm (1921)
2423631.4	-1986	-0.8	pg	0.5	Rügemer (1933)
2425943.45	-1758	-1.07	pg	0.5	Beyer[1] (1934a)
2426673.97	-1686	-0.77	pg	0.5	Beyer[1] (1934a)
2426674.10	-1686	-0.64	pg	0.5	Lur'ye (1946)
2426826.18	-1671	-0.69	pg	0.5	Rügemer (1933)
2427161.806	-1638	+0.254	vis	1	Beyer (1934a)
2428043.35	-1551	-0.55	pg	0.5	Perova (1956)
2430649.47	-1294	-0.91	pg	0.5	Solov'yov (1945)
2431349.85	-1225	-0.32	pg	0.5	Perova (1956)
2433073.92	-1055	-0.38	pg	0.5	Perova (1956)
2433306.66	-1032	-0.90	pg	0.5	Perova (1956)
2433560.64	-1007	-0.47	pg	0.5	Perova (1956)
2433976.20	-966	-0.73	pg	0.5	Perova (1956)
2434159.608	-948	+0.123	pg	1	Nikulina (1970)
2436085.580	-758	-0.873	pg	0.5	Korovkina (1958)
2436441.64	-723	+0.22	pg	0	Korovkina (1959)
2436786.104	-689	-0.142	pe	3	Weaver et al. (1960)
2436796.408	-688	+0.020	pe	3	Oosterhoff (1960)
2437191.22	-649	-0.70	vis	0.5	Häussler (1965)
2437273.217	-641	+0.158	pe	1	Mitchell et al. (1964)
2437922.037	-577	-0.105	pg	1	Girnyak (1971)
2438986.726	-472	-0.319	pg	1	Girnyak (1971)
2443774.144	0	+0.107	pe	3	present paper

Remark: [1] Observer: Plaut

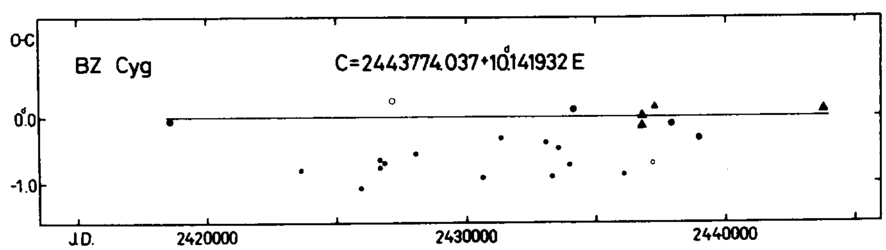

Figure 3 O-C diagram of BZ Cyg

the reliable points. This difference is caused by the fact that the phase of the normal maxima that are published without listing the original observational data is thought to be earlier than the phase of the true normal maximum determined from the photoelectric normal curve.

SY Aurigae

Its light and colour curves are plotted in Fig. 4. According to Janot Pacheco (1976) this variable has a faint blue compan-

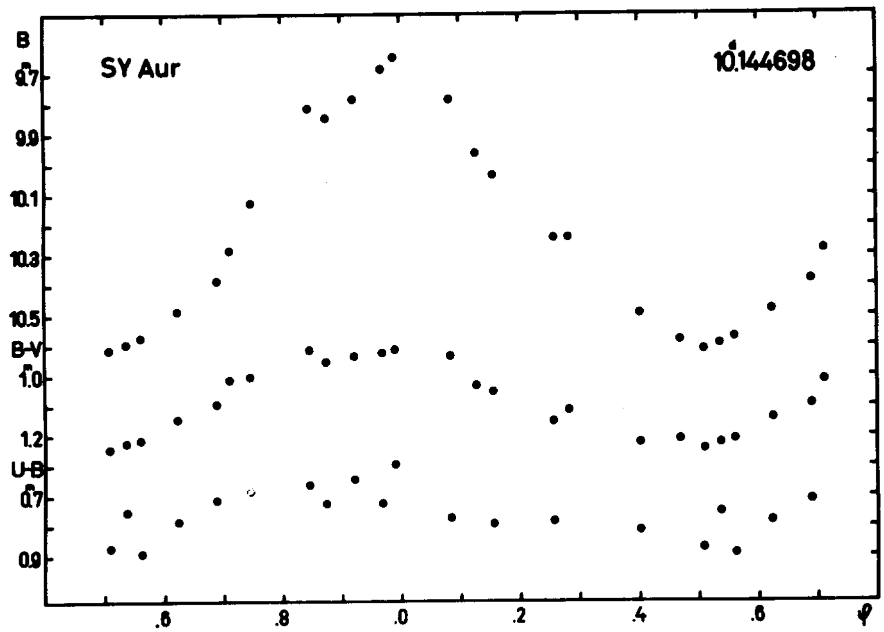

Figure 4 B, B-V and U-B curves of SY Aur

ion. The spectral classification of SY Aur (F5 III in the G.C.V.S. - Kukarkin et al., 1969-1970) may be in error since it suggests much lower luminosity than Cepheids with a period of 10 days usually have.

The O-C residuals for this star have been obtained with the formulae:

$$C_{max} = 2443832.919 + 10\overset{d}{.}144698 \times E$$
$$C_{med} = 2443830.379 + 10\overset{d}{.}144698 \times E$$

for the maximum and median brightnesses, respectively. As can be seen in Fig. 5, the O-C diagram can well be approximated by a parabola. The equation of the best fitting parabola is as follows:

$$(O-C)_{par} = 1.73 \times 10^{-7} \times E^2 \quad .$$

Table 5 O-C residuals for SY Aur (maximum brightness)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2416504.146	-2694	$+1\overset{d}{.}043$	pg	1	Florya, Kukarkin (1931)
2418036.203	-2543	+1.251	vis	1	Enebo (1909)
2418776.770	-2470	+1.255	vis	1	Enebo (1911)

Table 5 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2419172.122	-2431	+0.^{d}964	pg	0.5	Robinson (1933)
2419800.992	-2369	+0.863	vis	1	Enebo (1914)
2421961.887	-2156	+0.937	pg	1	Jordan (1929)
2424071.542	-1948	+0.495	vis	1	Nielsen[1] (1928)
2425674.508	-1790	+0.598	pg	1	Rybka (1930)
2426212.158	-1737	+0.579	vis	1	Zakharov (1951)
2426221.88	-1736	+0.16	pg	0.5	Kiehl, Hopp (1977)
2426252.969	-1733	+0.812	vis	1	Kukarkin (1940)
2426759.901	-1683	+0.509	pg	1	Mashnauskas (1961)
2427368.30	-1623	+0.23	pg	0.5	Kiehl, Hopp (1977)
2427916.205	-1569	+0.317	vis	0.5	Nielsen[2] (1937b)
2428129.02	-1548	+0.09	pg	0.5	Fu De-Lian (1964)
2428586.053	-1503	+0.615	pg	1	Sokolov (1969)
2429245.098	-1438	+0.255	vis	0.5	Nielsen[2] (1941a)
2429265.733	-1436	+0.600	pg	1	Sokolov (1969)
2430695.700	-1295	+0.165	vis	0.5	Nielsen[2] (1952)
2432298.488	-1137	+0.091	vis	0.5	Nielsen[2] (1955)
2436214.295	-751	+0.044	pe	3	Bahner et al. (1977)
2436538.771	-719	-0.110	pg	1	Makarenko (1969)
2436833.104	-690	+0.027	pe	2	Oosterhoff (1960)
2436833.140	-690	+0.063	pe	3	Weaver et al. (1960)
2438293.771	-546	-0.143	pg	1	Makarenko (1969)
2439075.158	-469	+0.102	pe	2	Takase (1969)
2439348.913	-442	-0.049	pe	2	Wamsteker (1972)
2443832.981	0	+0.062	pe	3	present paper

Remarks: [1] Observer: Thorrud; [2] Observer: Arthur Nielsen

Table 6 O-C residuals for SY Aur

(median brightness)

Obs.Med.J.D.	E	O-C	Type	w	Reference
2425671.922	-1790	+0.^{d}552	pg	1	Rybka (1930)
2436211.820	-751	+0.109	pe	3	Bahner et al. (1977)
2436830.664	-690	+0.127	pe	3	Weaver et al. (1960)
2443830.333	0	-0.046	pe	3	present paper

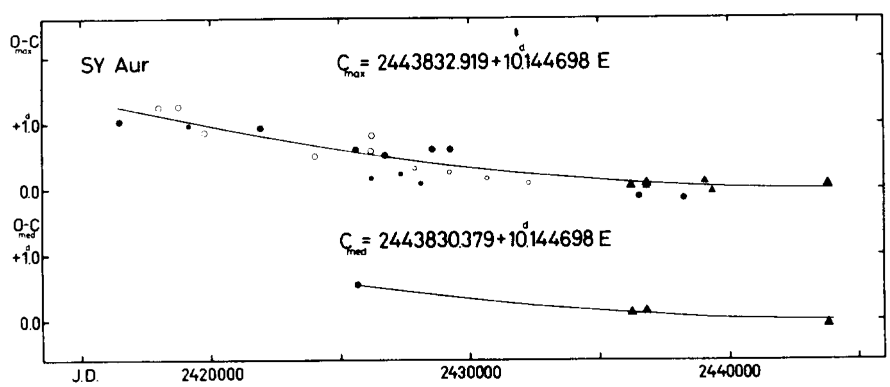

Figure 5 O-C diagram of SY Aur

ζ Geminorum

This star is one of the brightest Cepheids and is the prototype of the small amplitude Cepheids (see Fig. 6).

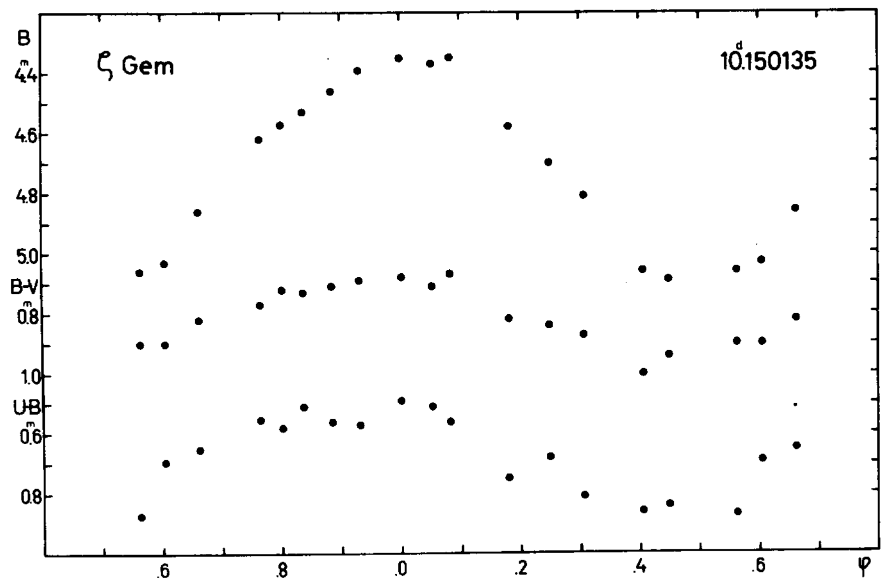

Figure 6 B, B-V and U-B curves of ζ Gem

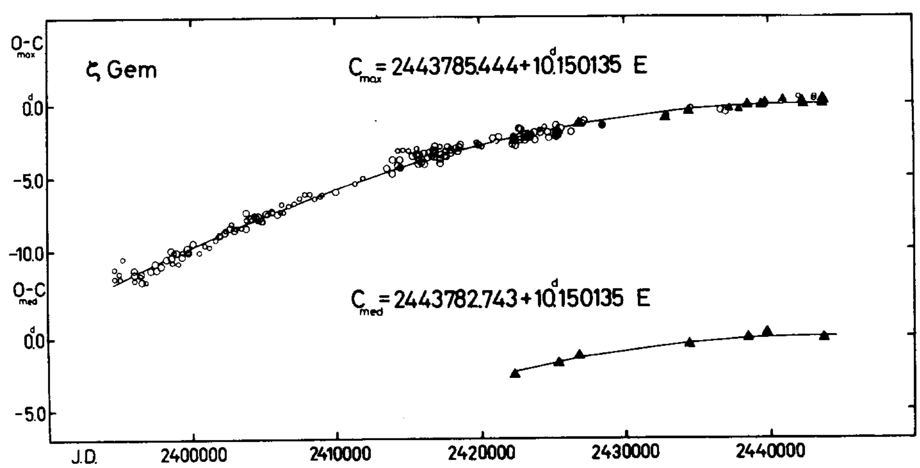

Figure 7 O-C diagram of ζ Gem

The O-C residuals have been computed with the formulae:

C_{max} = 2443785.444 + $10^{d}.150135 \times E$

C_{med} = 2443782.743 + $10^{d}.150135 \times E$

for the maximum and median brightnesses, respectively. The O-C diagram in Fig. 7 shows a continuous period decrease. The equation of the best fitting parabola is

$$(O-C)_{par} = -5\overset{d}{.}24\times10^{-7}\times E^2 \quad .$$

The deviations of the photoelectric and the reliable photographic O-C values from the above parabola (for maximum brightness) are plotted in Fig. 8. Some systematic trend in these deviations

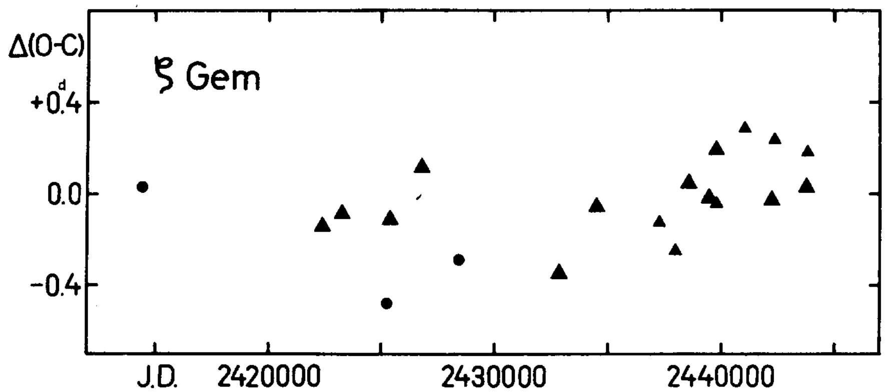

Figure 8 Deviations from the mean O-C curve

can be seen. If the parabolic O-C diagram is interpreted as a result of the stellar evolution, the small deviations from this parabola may be caused by the period noise. The explanation of the Δ(O-C) values in terms of the light-time effect is not satisfactory because the radial velocity measurements (Abt and Levy, 1974; Campbell, 1901; Evans, 1976; Hase, 1929; Henroteau, 1925; Jacobsen, 1926; Scarfe, 1976) do not show any variation in the average value of the radial velocity as would be expected in the case of the component in a binary system. The only deviating average radial velocity value is that of Rufus (1932).

According to Abt and Levy (1974) the rate of the period decrease of ζ Gem is four times greater than that predicted by the evolutionary calculations. Therefore they suggested that the period variation was due to a light-time effect in a long period binary ($P_{orb} > 225$ years) having a low mass secondary. Fernie and Turner (1978) remarked that the closest star to the Cepheid might be a physical companion to ζ Gem. In this case they must have an orbital period in excess of 10^6 years. In view of the above facts, there is no unambiguous answer as to the binary nature of ζ Gem.

Table 7 O-C residuals for ζ Gem

(maximum brightness)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2394667.81	-4838	$-11^{d}.28$	vis	0.5	Argelander (1848)
2394677.33	-4837	-11.91	vis	0.5	Schmidt (1857)
2394982.19	-4807	-11.55	vis	0.5	Argelander (1848)
2395002.05	-4805	-11.99	vis	0.5	Schmidt (1857)
2395267.43	-4779	-10.52	vis	0.5	Argelander (1848)
2396027.855	-4704	-11.354	vis	1	Hagen[1] (1903)
2396077.93	-4699	-12.03	vis	0.5	Schmidt (1857)
2396088.465	-4698	-11.645	vis	1	Argelander (1869)
2396423.37	-4665	-11.69	vis	0.5	Schmidt (1857)
2396474.176	-4660	-11.639	vis	1	Argelander (1869)
2396565.026	-4651	-12.140	vis	1	Hagen[1] (1903)
2396818.76	-4626	-12.159	vis	0.5	Schmidt (1857)
2397154.525	-4593	-11.349	vis	1	Argelander (1869)
2397459.537	-4563	-10.841	vis	1	Hagen[1] (1903)
2397519.975	-4557	-11.304	vis	1	Argelander (1869)
2397875.456	-4522	-11.077	vis	1	Argelander (1869)
2398241.363	-4486	-10.575	vis	1	Argelander (1869)
2398536.305	-4457	-9.987	vis	1	Hagen[1] (1903)
2398586.501	-4452	-10.542	vis	1	Argelander (1869)
2398657.28	-4445	-10.81	vis	0.5	Schmidt (1857)
2398769.61	-4434	-10.13	vis	0.5	Nielsen[2] (1930b)
2398982.738	-4413	-10.160	vis	1	Argelander (1869)
2399022.66	-4409	-10.84	vis	0.5	Schmidt (1858)
2399317.451	-4380	-10.402	vis	1	Argelander (1869)
2399358.34	-4376	-10.11	vis	0.5	Schmidt (1858)
2399632.685	-4349	-9.822	vis	1	Zinner, Wachmann[3] (1931)
2399723.768	-4340	-10.090	vis	1	Argelander (1869)
2399744.06	-4338	-10.10	vis	0.5	Schmidt (1859)
2400099.937	-4303	-9.476	vis	1	Argelander (1869)
2400525.58	-4261	-10.14	vis	0.5	Schmidt (1861)
2400901.66	-4224	-9.61	vis	0.5	Schmidt (1861)
2401226.35	-4192	-9.73	vis	0.5	Schmidt (1863)
2401632.05	-4152	-9.23	vis	0.5	Schmidt (1864)
2401927.501	-4123	-8.936	vis	1	Argelander (1869)
2401998.52	-4116	-8.97	vis	0.5	Schmidt (1865)
2402313.385	-4085	-8.758	vis	1	Valentiner[4] (1900)
2402384.62	-4078	-8.57	vis	0.5	Schmidt (1866)
2402648.656	-4052	-8.441	vis	1	Valentiner[4] (1900)
2402719.98	-4045	-8.17	vis	0.5	Schmidt (1867)
2402993.591	-4018	-8.611	vis	1	Valentiner[4] (1900)
2403095.22	-4008	-8.48	vis	0.5	Schmidt (1868)
2403470.82	-3971	-8.44	vis	0.5	Schmidt (1869)
2403785.426	-3940	-8.486	vis	1	Valentiner[4] (1900)
2403786.076	-3940	-7.836	vis	0.5	Schmidt (1870)
2403786.543	-3940	-7.369	vis	1	Zinner, Wachmann[3] (1931)
2404090.631	-3910	-7.785	vis	1	Valentiner[4] (1900)
2404192.05	-3900	-7.87	vis	0.5	Schmidt (1871)
2404344.61	-3885	-7.56	vis	0.5	Guthnick[5] (1920)
2404466.252	-3873	-7.719	vis	1	Valentiner[4] (1900)

Table 7 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2404567.59	-3863	-7.88 (d)	vis	0.5	Schmidt (1872)
2404608.424	-3859	-7.649	vis	1	Zinner, Wachmann[3] (1931)
2404831.417	-3837	-7.959	vis	1	Valentiner[4] (1900)
2404932.84	-3827	-8.04	vis	0.5	Schmidt (1873)
2405166.882	-3804	-7.448	vis	1	Valentiner[4] (1900)
2405288.64	-3792	-7.49	vis	0.5	Schmidt (1874)
2405552.714	-3766	-7.322	vis	1	Valentiner[4] (1900)
2405603.46	-3761	-7.33	vis	0.5	Schmidt (1875)
2405928.082	-3729	-7.509	vis	1	Valentiner[4] (1900)
2406121.08	-3710	-7.36	vis	0.5	Schmidt (1876)
2406263.759	-3696	-6.786	vis	0.5	Belyavsky[6] (1910)
2406395.10	-3683	-7.40	vis	0.5	Schmidt (1877)
2406750.83	-3648	-6.92	vis	0.5	Schmidt (1878)
2407157.01	-3608	-6.75	vis	0.5	Schmidt (1879)
2407492.32	-3575	-6.39	vis	0.5	Schmidt (1880)
2407857.98	-3539	-6.14	vis	0.5	Schmidt (1881)
2408233.54	-3502	-6.13	vis	0.5	Schmidt (1882)
2408578.36	-3468	-6.42	vis	0.5	Schmidt (1883)
2408913.44	-3435	-6.29	vis	0.5	Schmidt (1884)
2409015.04	-3425	-6.19	vis	0.5	Nielsen[7] (1930b)
2410009.990	-3327	-5.955	vis	1	Hagen (1891)
2410354.144	-3293	-6.905	vis	0	Reed (1888)
2411360.45	-3194	-5.46	vis	0.5	Nielsen[7] (1930b)
2411908.99	-3140	-5.03	vis	0.5	Nielsen[8] (1930b)
2412851.996	-3047	-5.987	vis	0	Markwick (1892, 1894)
2413564.137	-2977	-4.355	vis	1	Plassmann (1900)
2413950.417	-2939	-3.780	vis	1	Plassmann (1900)
2413979.885	-2936	-4.763	vis	1	Pickering (1904)
2414316.42	-2903	-3.18	vis	0.5	Luizet (1902b)
2414335.691	-2901	-4.211	vis	1	Pickering (1904)
2414478.219	-2887	-3.785	vis	1	Plassmann (1900)
2414487.821	-2886	-4.333	pg	1	Wirtz (1901)
2414712.31	-2864	-3.15	vis	0.5	Luizet (1902b)
2415087.80	-2827	-3.21	vis	0.5	Luizet (1902b)
2415320.879	-2804	-3.586	vis	1	Plassmann (1900,1901,1908)
2415605.224	-2776	-3.445	vis	1	Tass (1925)
2415666.56	-2770	-3.01	vis	0.5	Luizet (1902b)
2415777.453	-2759	-3.769	vis	0.5	Yendell (1902b)
2415787.268	-2758	-4.104	vis	1	Plassmann (1908)
2415787.949	-2758	-3.423	vis	1	Nijland (1923)
2415797.704	-2757	-3.818	vis	1	Kopff (1902)
2415858.58	-2751	-3.84	vis	0.5	McDermott (1902)
2415970.085	-2740	-3.989	vis	1	Bilt (1926a)
2416143.288	-2723	-3.338	vis	1	Plassmann (1908)
2416172.918	-2720	-4.159	vis	1	Lau (1904)
2416406.864	-2697	-3.666	vis	1	Götz (1906)
2416508.718	-2687	-3.313	vis	1	Plassmann (1908)
2416711.866	-2667	-3.168	vis	1	Olivier (1952)
2416721.611	-2666	-3.573	vis	1	Bilt (1926a)
2416874.025	-2651	-3.411	vis	1	Tass[9] (1925)
2416874.320	-2651	-3.116	vis	1	Tass[10] (1925)
2416883.963	-2650	-3.623	vis	1	Plassmann (1908)
2416894.896	-2649	-2.840	vis	1	Schiller (1906)
2417228.908	-2616	-3.783	vis	1	Bilt (1926a)

Table 7 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2417238.785	-2615	-4^{d}.056	vis	1	Plassmann (1908)
2417270.4	-2612	-2.9	vis	0.5	Furness[11] (1913b)
2417310.450	-2608	-3.442	vis	1	Lohnert (1909)
2417594.592	-2580	-3.504	vis	1	Olivier (1952)
2417604.986	-2579	-3.260	vis	1	Nijland (1923)
2417614.853	-2578	-3.543	vis	1	Bilt (1926a)
2417777.885	-2562	-2.913	vis	1	Plassmann (1908)
2417848.56	-2555	-3.29	vis	0.5	Nielsen[12] (1930b)
2417939.841	-2546	-3.359	vis	1	Nijland (1923)
2417950.165	-2545	-3.185	vis	1	Bilt (1926a)
2418315.716	-2509	-3.039	vis	1	Nijland (1923)
2418417.041	-2499	-3.216	vis	1	Mündler (1911a)
2418437.485	-2497	-3.072	vis	0.5	Scheller (1912)
2418559.427	-2485	-2.932	vis	1	Olivier (1952)
2418640.796	-2477	-2.764	vis	1	Nijland (1923)
2419250.821	-2417	-1.747	vis	0	Hornig (1915)
2419816.565	-2361	-4.410	vis	0	Breson (1913)
2419828.452	-2360	-2.673	vis	0.5	Hoffmeister (1916a)
2419899.406	-2353	-2.770	vis	1	Kaiser (1915)
2419939.979	-2349	-2.798	vis	0.5	Olivier (1952)
2420132.75	-2330	-2.879	vis	0.5	Nielsen[7] (1930b)
2420904.713	-2254	-2.327	vis	1	Luyten (1922)
2421127.79	-2232	-2.55	vis	0.5	Nielsen[13] (1930b)
2421320.897	-2213	-2.298	vis	1	Luyten (1922)
2422244.104	-2122	-2.754	vis	1	Rabe (1923)
2422315.70	-2115	-2.21	vis	0.5	Nielsen[7] (1930b)
2422366.187	-2110	-2.472	pe	3	Guthnick (1921)
2422375.973	-2109	-2.836	vis	1	Bellemin (1922)
2422721.639	-2075	-2.275	vis	1	Leiner (1922)
2422731.566	-2074	-2.498	vis	1	Rabe (1923)
2422732.368	-2074	-1.696	vis	1	Gallisot (1923)
2422803.383	-2067	-1.732	vis	1	Bellemin (1922)
2423056.382	-2042	-2.486	vis	1	Rabe (1923)
2423137.772	-2034	-2.297	vis	1	Nielsen[14] (1927a)
2423168.397	-2031	-2.123	vis	1	Zverev (1936)
2423269.793	-2021	-2.228	pe	3	Bottlinger (1928)
2423432.08	-2005	-2.34	vis	0.5	Nijland (1935)
2423442.428	-2004	-2.145	vis	1	Leiner (1928)
2423543.967	-1994	-2.108	vis	1	Parenago (1938)
2423736.995	-1975	-1.932	vis	1	Hopmann (1926)
2423797.392	-1969	-2.436	vis	1	Leiner (1928)
2424193.90	-1930	-1.78	vis	0.5	Nielsen[15] (1930b)
2424203.841	-1929	-1.993	vis	1	Leiner (1928)
2424529.05	-1897	-1.59	vis	0.5	Nijland (1935)
2424711.413	-1879	-1.927	vis	1	Leiner (1928)
2424761.751	-1874	-2.340	vis	1	Kukarkin (1940)
2425228.769	-1828	-2.228	pg	1	Hellerich (1935)
2425280.295	-1823	-1.453	vis	1	Leiner (1928)
2425310.362	-1820	-1.836	vis	1	Collmann (1930)
2425340.804	-1817	-1.845	pe	3	Güssow (1930)
2425411.71	-1810	-1.99	vis	0.5	Nijland (1935)
2425462.360	-1805	-2.090	vis	1	Kukarkin (1940)
2425625.169	-1789	-1.683	vis	1	Zverev (1936)
2426325.312	-1720	-1.900	vis	1	Zverev (1936)

Table 7 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2426802.918	-1673	$-1^{d}.350$	pe	3	Hall (1934)
2427056.638	-1648	-1.384	vis	1	Florya, Kukarkina (1953)
2427198.938	-1634	-1.185	vis	1	Nielsen[16] (1941b)
2428436.956	-1512	-1.484	pg	1	Günther (1939)
2432883.249	-1074	-0.950	pe	3	Eggen (1951)
2432884.25	-1074	+0.05	vis	0	Ahnert (1949)
2432954.5	-1067	-0.7	vis	0.5	Pohl[17] (1951)
2434416.368	-923	-0.501	pe	3	Harris (1953)
2434609.43	-904	-0.29	vis	0.5	Marks[18] (1959)
2434711.76	-894	+0.54	vis	0	Marks (1959)
2435948.00	-772	-1.54	vis	0	Rudolph[19] (1960)
2436639.347	-704	-0.402	vis	1	Azarnova (1960)
2437004.583	-668	-0.571	vis	1	Mayall[20] (1964)
2437258.567	-643	-0.340	pe	1	Mitchell et al. (1964)
2437979.154	-572	-0.413	pe	2	Williams (1966)
2438527.582	-518	-0.092	pe	3	Wisniewski, Johnson (1968)
2439420.773	-430	-0.113	pe	3	Takase (1969)
2439765.870	-396	-0.121	pe	2	Sudzius (1969)
2439796.556	-393	+0.115	pe	3	present paper[21]
2440984.10	-276	+0.09	vis	0.5	Braune et al.[22] (1972)
2441004.565	-274	+0.258	pe	2	Evans (1976)
2442111.17	-165	+0.50	vis	0.5	Busch[23] (1980)
2442354.51	-141	+0.235	pe	1	Scarfe[24] (1976)
2442465.897	-130	-0.029	pe	3	Depenchuk (1980)
2443217.388	-56	+0.352	vis	0.5	Busch[25] (1980)
2443258.14	-52	+0.50	vis	0.5	Braune et al.[26] (1978)
2443785.473	0	+0.029	pe	3	present paper
2443805.927	+2	+0.183	pe	2	Depenchuk (1980)

Remarks: (observers) [1] Heis; [2] Oudemans; [3] Winnecke; [4] Schönfeld; [5] Argelander; [6] Glasenapp; [7] Plassmann; [8] Knopf; [9] Terkán; [10] Fejes; [11] Whitney; [12] Luizet; [13] Vogelenzang; [14] Johansson; [15] Cecchini; [16] Loreta; [17] Händel; [18] Wroblewski; [19] Masuch; [20] Orchiston; [21] Abaffy; [22] Bischof; [23] Tietz; [24] Winzer; [25] Branzke; [26] Steinbach

Table 8 O-C residuals for ζ Gem

(median brightness)

Obs.Med.J.D.	E	O-C	Type	w	Reference
2422363.426	-2110	$-2^{d}.532$	pe	3	Guthnick (1921)
2425338.134	-1817	-1.814	pe	3	Güssow (1930)
2426800.309	-1673	-1.258	pe	3	Hall (1934)
2434413.637	-923	-0.531	pe	3	Harris (1953)
2438524.912	-518	-0.061	pe	3	Wisniewski, Johnson (1968)
2439793.968	-393	+0.228	pe	3	present paper[1]
2443782.611	0	-0.132	pe	3	present paper

Remark: [1] Observer: Abaffy

AN Aurigae

This variable has a faint companion within the edge of the diaphragm. The amplitude of the light variation is smaller than that given by Schaltenbrand and Tammann (1971); this is explainable by the effect of the visual companion (see Fig. 9). According to Madore (1977) AN Aur has a B5 photometric companion.

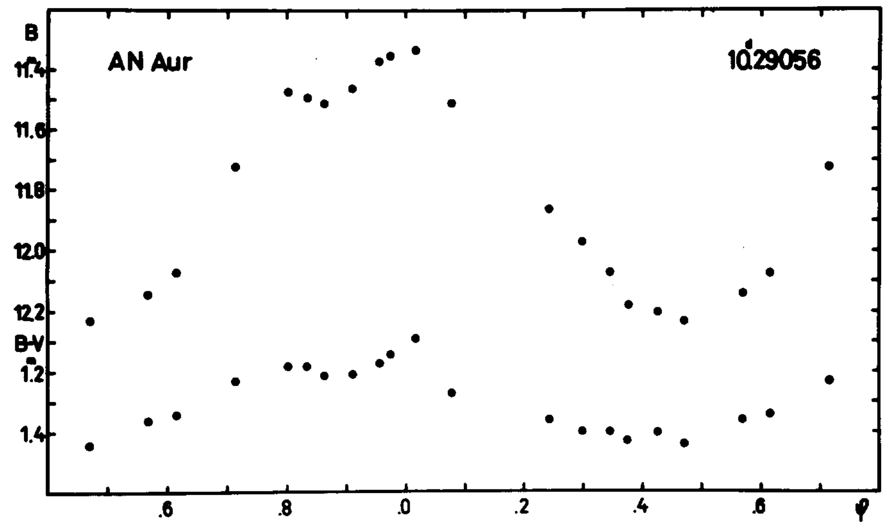

Figure 9 B and B-V curves of AN Aur

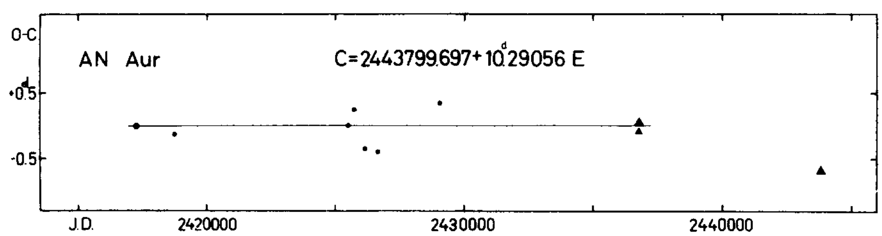

Figure 10 O-C diagram of AN Aur

The O-C residuals have been derived using the formula:

$$C = 2443799.697 + 10^{d}.29056 \times E \quad .$$

The O-C diagram in Fig. 10 shows a constant period before J.D. 2437000. After this epoch the behaviour of the period is not known. The existence of a jump in the period followed by a rejump cannot be excluded since the shape of the light curve has changed compared with the photoelectric light curve of Weaver et al. (1960) observed at about J.D. 2437000. Earlier evidence for such a change in the light curve was the case of SU Cyg published in Paper I (p. 77). With AN Aur the ascending branch of the light curve became considerably shorter, the difference between the maximum and median brightnesses being about 0^{d}.4 smaller at J.D. 2443800 than about 7000 days earlier. A new series of photoelectric observations is urgently needed to prove or reject the existence of the rejump in AN Aur's period.

Table 9 O-C residuals for AN Aur

Obs.Max.J.D.	E	O-C	Type	w	Reference
2417260.340	-2579	-0^{d}.003	pg	1	Parenago (1933)
2418742.05	-2435	-0.13	pg	0.5	Oosterhoff (1935)
2421262.44	-2190	-0.93	pg	0	Oosterhoff (1935)
2425513.34	-1777	-0.03	pg	0.5	Kukarkin (1932a)
2425524.18	-1776	+0.52	pg	0	Guthnick (1928)
2425729.72	-1756	+0.25	pg	0.5	Oosterhoff (1935)
2426181.91	-1712	-0.35	pg	0.5	Schneller (1932)
2426655.22	-1666	-0.40	pg	0.5	Oosterhoff (1935)
2429043.38	-1434	+0.35	pg	0.5	Frolov (1949)
2436832.907	-677	-0.081	pe	2	Oosterhoff (1960)
2436833.041	-677	+0.053	pe	3	Weaver et al. (1960)
2443799.026	0	-0.671	pe	3	present paper

<u>AP Herculis</u>

The light and colour curves of this Population II Cepheid are plotted in Fig. 11 (the observations made in 1977 are omit-

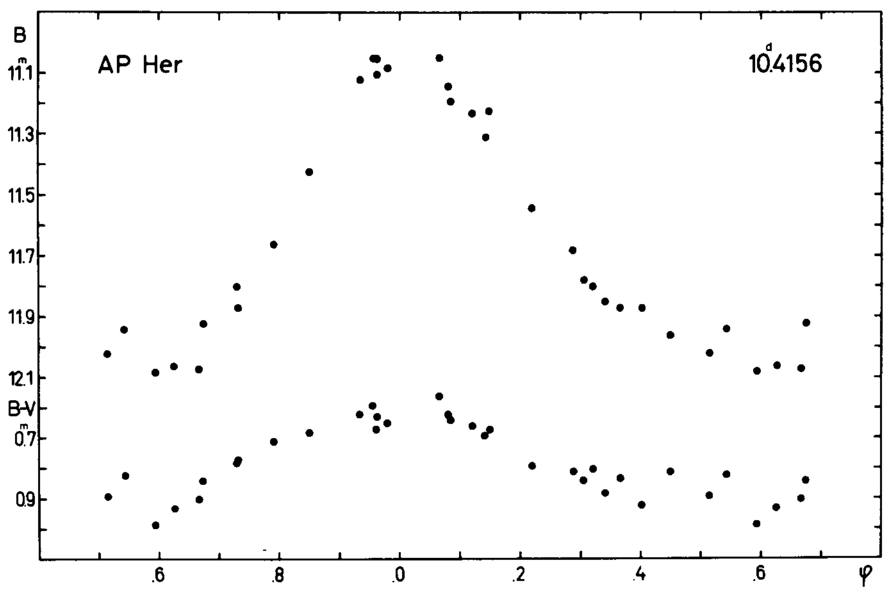

Figure 11 B and B-V curves of AP Her

ted because of their phase difference). The existence of a blue photometric companion cannot be excluded (Madore, 1977).

The O-C residuals have been computed with the formula:

$$C = 2443745.347 + 10\overset{d}{.}4156 \times E \quad .$$

This is the Population II Cepheid showing the strongest period variations (see Fig. 12), the difference between the longest and the shortest values of the period being about 6 per cent of the

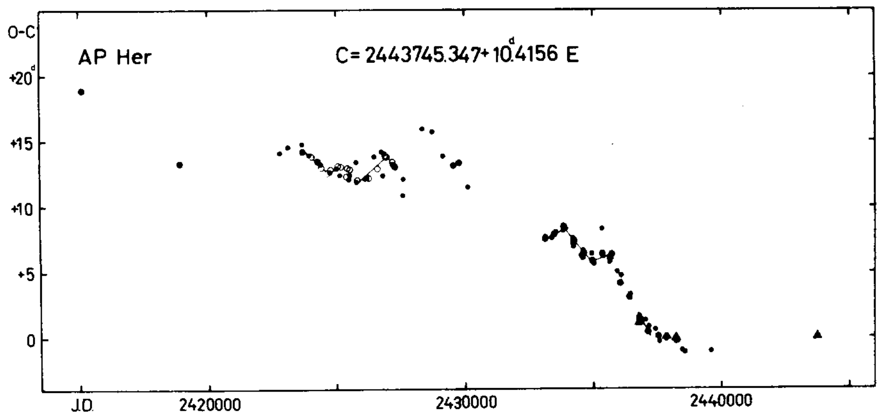

Figure 12 O-C diagram of AP Her

period. There are several intervals when the value of the period cannot be determined with any certainty. The reliable periods are as follows:

between J.D. 2415000 and J.D. 2419000 $P = 10\overset{d}{.}400$
between J.D. 2423700 and J.D. 2424700 $P = 10\overset{d}{.}3970$
between J.D. 2424700 and J.D. 2425300 $P = 10\overset{d}{.}4260$
between J.D. 2425800 and J.D. 2427000 $P = 10\overset{d}{.}4338$
between J.D. 2427000 and J.D. 2427400 $P = 10\overset{d}{.}3945$
between J.D. 2433000 and J.D. 2433850 $P = 10\overset{d}{.}4277$
between J.D. 2433850 and J.D. 2434850 $P = 10\overset{d}{.}3898$
between J.D. 2434850 and J.D. 2435600 $P = 10\overset{d}{.}4209$
between J.D. 2435600 and J.D. 2437200 $P = 10\overset{d}{.}3715$
between J.D. 2437200 and J.D. 2443800 $P = 10\overset{d}{.}4156$

but three observations made in 1977 show that the period in that year might have been smaller than reported here.

Bogdanov (1973) found the period variation to be periodic with $P = 8840^d$. Several pronounced cycles can be seen in Fig. 12

but the period variation is not periodic at all. Nevertheless, AP Her deserves to be subjected to regular photoelectric monitoring because of its extremely strong period changes.

Table 10 O-C residuals for AP Her

Obs.Max.J.D.	E	O-C	Type	w	Reference
2415163.011	-2746	+18.^{d}902	pg	1	Parenago[1] (1951)
2418959.142	-2381	+13.339	pg	1	Parenago[1] (1951)
2422855.43	-2007	+14.19	pg	0.5	Oosterhoff (1935)
2423168.32	-1977	+14.61	pg	0.5	Oosterhoff (1935)
2423720.50	-1924	+14.77	pg	0.5	Oosterhoff (1935)
2423730.408	-1923	+14.260	pg	1	Bohlin (1925)
2423959.22	-1901	+13.93	pg	0.5	Oosterhoff (1935)
2424084.156	-1889	+13.877	vis	1	Bohlin (1925)
2424104.992	-1887	+13.882	vis	0.5	Beyer (1926)
2424302.443	-1868	+13.437	vis	1	Beyer (1926)
2424333.70	-1865	+13.45	pg	0.5	Oosterhoff (1935)
2424349.164	-1864	+18.495	vis	0	Zakharov (1954b)
2424427.2	-1856	+13.2	pg	0.5	Tsessevich (1950)
2424447.842	-1854	+13.017	vis	1	Beyer (1926, 1928)
2424686.987	-1831	+12.604	vis	1	Beyer (1928)
2424780.73	-1822	+12.61	pg	0.5	Oosterhoff (1935)
2424801.735	-1820	+12.780	vis	1	Beyer (1928)
2425020.63	-1799	+12.95	pg	0.5	Oosterhoff (1935)
2425083.292	-1793	+13.116	vis	1	Beyer (1928)
2425155.52	-1786	+12.43	pg	0.5	Oosterhoff (1935)
2425197.832	-1782	+13.084	vis	1	Beyer (1928)
2425426.194	-1760	+12.303	vis	1	Beyer (1934b)
2425447.687	-1758	+12.965	vis	1	Zakharov (1954b)
2425509.3	-1752	+12.1	pg	0.5	Tsessevich (1950)
2425520.605	-1751	+12.974	vis	1	Beyer (1934b)
2425530.50	-1750	+12.45	pg	0.5	Oosterhoff (1935)
2425791.87	-1725	+13.43	pg	0.5	Huth (1965)
2425800.74	-1724	+11.89	pg	0.5	Oosterhoff (1935)
2425853.026	-1719	+12.095	vis	1	Beyer (1934b)
2426113.47	-1694	+12.15	pg	0.5	Huth (1965)
2426238.53	-1682	+12.22	pg	0.5	Oosterhoff (1935)
2426300.945	-1676	+12.144	vis	1	Beyer (1934b)
2426500.54	-1657	+13.84	pg	0.5	Huth (1965)
2426614.184	-1646	+12.915	vis	1	Beyer (1934b)
2426771.73	-1631	+14.23	pg	0.5	Huth (1965)
2426842.79	-1624	+12.38	pg	0.5	Oosterhoff (1935)
2426907.02	-1618	+14.11	pg	0.5	Tsessevich (1950)
2426927.611	-1616	+13.874	vis	1	Florya, Kukarkina (1953)
2426979.672	-1611	+13.857	vis	1	Beyer (1934b)
2427197.79	-1590	+13.25	pg	0.5	Oosterhoff (1935)
2427229.193	-1587	+13.403	vis	1	Beyer (1934b)
2427291.412	-1581	+13.129	vis	1	Florya, Kukarkina (1953)
2427312.11	-1579	+13.00	pg	0.5	Huth (1965)
2427353.818	-1575	+13.041	vis	1	Beyer (1934b)
2427601.60	-1551	+10.85	pg	0.5	Huth (1965)
2427634.15	-1548	+12.15	pg	0.5	Tsessevich (1950)
2427932.71	-1520	+19.08	pg	0	Huth (1965)
2428367.02	-1478	+15.93	pg	0.5	Huth (1965)
2428752.24	-1441	+15.77	pg	0.5	Huth (1965)

Table 10 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2429156.51	-1402	+13.83 d	pg	0.5	Huth (1965)
2429541.12	-1365	+13.07	pg	0.5	Huth (1965)
2429562.000	-1363	+13.116	pg	1	Parenago[1] (1951)
2429812.230	-1339	+13.371	pg	1	Kapko (1949)
2430133.254	-1308	+11.512	pg	0.5	Kapko (1949)
2433118.570	-1021	+7.551	pg	1	Kapko (1951)
2433149.97	-1018	+7.70	pg	0.5	Vasil'yan. et al.[2] (1970)
2433379.06	-996	+7.65	pg	0.5	Vasil'yan. et al.[2] (1970)
2433483.485	-986	+7.920	pg	1	Kapko (1951)
2433556.53	-979	+8.06	pg	0.5	Huth (1965)
2433827.49	-953	+8.21	pg	0.5	Huth (1965)
2433859.047	-950	+8.520	pvis	1	Koval' (1955)
2433869.18	-949	+8.24	pg	0.5	Vasil'yan. et al.[2] (1970)
2433879.676	-948	+8.318	pg	1	Kapko (1952)
2434201.85	-917	+7.61	pg	0.5	Vasil'yan. et al.[2] (1970)
2434211.63	-916	+6.97	pg	0.5	Huth (1965)
2434232.747	-914	+7.258	pg	1	Koval' (1955)
2434253.698	-912	+7.378	pg	1	Kapko (1964)
2434575.472	-881	+6.269	pg	1	Koval' (1955)
2434596.10	-879	+6.07	pg	0.5	Vasil'yan. et al.[2] (1970)
2434606.852	-878	+6.402	pg	1	Kapko (1964)
2434607.09	-878	+6.64	pg	0.5	Huth (1965)
2434950.62	-845	+6.46	pg	0.5	Vasil'yan. et al.[2] (1970)
2434970.851	-843	+5.855	pg	1	Kapko (1964)
2435012.30	-839	+5.64	pg	0.5	Huth (1965)
2435335.87	-808	+8.35	pg	0.5	Huth (1965)
2435356.852	-806	+6.479	pg	1	Kapko (1964)
2435387.84	-803	+6.22	pg	0.5	Vasil'yan. et al.[2] (1970)
2435626.97	-780	+5.79	pg	0.5	Huth (1965)
2435627.283	-780	+6.104	pe	2	Walraven et al. (1958)
2435690.023	-774	+6.350	pg	1	Kapko (1964)
2435700.43	-773	+6.34	pg	0.5	Vasil'yan. et al.[2] (1970)
2435938.70	-750	+5.05	pg	0.5	Huth (1965)
2436041.959	-740	+4.156	pg	1	Kapko (1964)
2436063.39	-738	+4.76	pg	0.5	Vasil'yan. et al.[2] (1970)
2436395.029	-706	+3.096	pg	1	Kapko (1964)
2436426.34	-703	+3.16	pg	0.5	Vasil'yan. et al.[2] (1970)
2436457.68	-700	+3.25	pg	0.5	Huth (1965)
2436778.772	-669	+1.461	pg	1	Kapko (1964)
2436789.29	-668	+1.56	pg	0.5	Vasil'yan. et al.[2] (1970)
2436799.287	-667	+1.145	pe	3	Weaver et al. (1960)
2436810.19	-666	+1.63	pg	0.5	Huth (1965)
2437028.62	-645	+1.34	pg	0.5	Huth (1965)
2437131.843	-635	+0.402	pg	1	Kapko (1964)
2437163.54	-632	+0.85	pg	0.5	Vasil'yan. et al.[2] (1970)
2437402.87	-609	+0.62	pg	0.5	Huth (1965)
2437527.274	-597	+0.040	pg	1	Kapko (1964)
2437578.98	-592	-0.33	pg	0.5	Vasil'yan. et al.[2] (1970)
2437818.73	-569	-0.14	pg	0.5	Huth (1965)
2437829.23	-568	-0.06	pg	0.5	Vasil'yan. et al.[2] (1970)
2437829.325	-568	+0.039	pe	2	Michalowska-Smak, Smak (1965)
2437860.538	-565	+0.005	pg	1	Kapko (1964)
2437871.009	-564	+0.060	pe	2	Williams (1966)

Table 10 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2438224.72	-530	$-0^d.36$	pg	0.5	Huth (1965)
2438225.026	-530	-0.053	pe	3	Kwee and Braun (1967)
2438245.76	-528	-0.15	pg	0.5	Vasil'yan. et al.[2] (1970)
2438287.402	-524	-0.171	pg	1	Kapko (1964)
2438463.64	-507	-1.00	pg	0.5	Huth (1965)
2438578.06	-496	-1.15	pg	0.5	Vasil'yan. et al. (1970)
2439598.85	-398	-1.09	pg	0.5	Vasil'yan. et al. (1970)
2443745.357	0	+0.010	pe	3	present paper

Remarks: [1] Observer: Fedorovich; [2] Obs.: Pahomova

Z Lacertae

The light and colour curves of Z Lac are shown in Fig. 13.

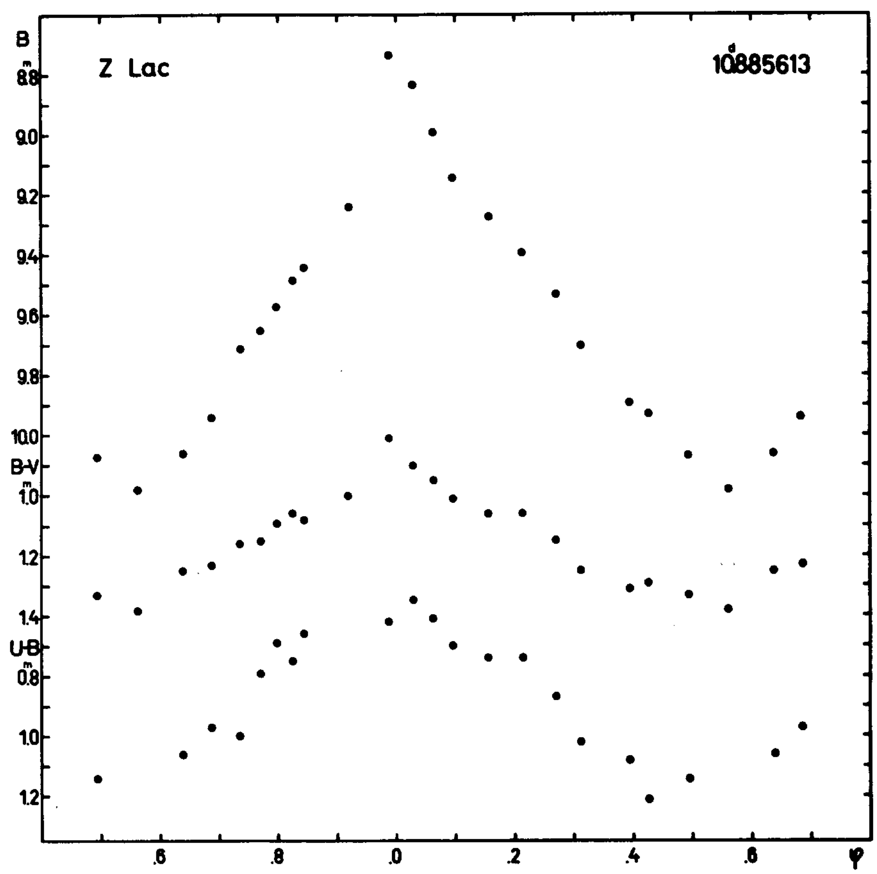

Figure 13 B, B-V and U-B curves of Z Lac

The O-C residuals have been computed using the ephemeris:

$$C = 2442827.123 + 10\overset{d}{.}885613 \times E \quad .$$

The O-C diagram in Fig. 14 shows a continuous decrease of the period. The equation of the fitted parabola is:

$$(O-C)_{par} = -3\overset{d}{.}4 \times 10^{-8} \times E^2 \quad .$$

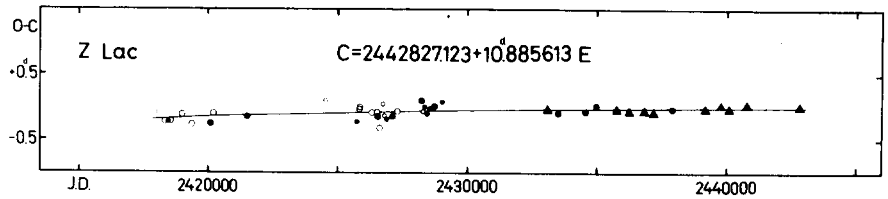

Figure 14 O-C diagram of Z Lac

Table 11 O-C residuals for Z Lac

Obs.Max.J.D.	E	O-C	Type	w	Reference
2417931.642	-2287	$-0\overset{d}{.}084$	vis	1	Enebo (1908)
2418334.276	-2250	-0.218	vis	1	Enebo (1909)
2418475.781	-2237	-0.226	pg	0.5	Robinson (1933)
2418541.107	-2231	-0.213	vis	1	Bilt (1926b)
2419009.285	-2188	-0.117	vis	1	Enebo (1912)
2419368.365	-2155	-0.262	vis	1	Bilt (1926b)
2420108.601	-2087	-0.248	pg	1	Hertzsprung (1922)
2420239.373	-2075	-0.103	vis	1	Bilt (1926b)
2421534.721	-1956	-0.143	pg	1	Hertzsprung (1922)
2424528.5	-1681	+0.1	vis	0.5	Selivanov (1929)
2425747.37	-1569	-0.23	pg	0.5	Kiehl, Hopp (1977)
2425834.646	-1561	-0.035	vis	1	Parenago (1938)
2425845.565	-1560	-0.002	vis	1	Beyer (1934b)
2426313.568	-1517	-0.080	vis	1	Terkán (1935)
2426542.105	-1496	-0.141	pg	1	Zonn (1933)
2426542.171	-1496	-0.075	vis	1	Kukarkin (1940)
2426618.132	-1489	-0.313	vis	1	Beyer (1934b)
2426760.019	-1476	+0.061	vis	0.5	Dziewulski et al. (1946)
2426803.371	-1472	-0.130	vis	0.5	Dziewulski et al. (1946)
2426879.52	-1465	-0.18	pg	0.5	Kiehl, Hopp (1977)
2427108.157	-1444	-0.141	pg	1	Zonn (1933)
2427293.293	-1427	-0.060	vis	1	Florya, Kukarkina (1953)
2428229.624	-1341	+0.108	pg	1	Gur'yev (1937)
2428283.881	-1336	-0.063	vis	0.5	Dziewulski (1947)
2428349.260	-1330	+0.002	pg	0.5	Dziewulski et al. (1946)
2428458.01	-1320	-0.10	pg	0.5	Fu De-Lian (1964)
2428556.071	-1311	-0.013	pg	0.5	Dziewulski et al. (1946)
2428741.160	-1294	+0.020	pg	1	Gur'yev (1938)
2429046.02	-1266	+0.08	pg	0.5	Katz (1946)
2433084.478	-895	-0.021	pe	3	Eggen (1951)
2433519.846	-855	-0.078	pg	1	Solov'yov (1952)
2434575.782	-758	-0.046	pg	1	Chuprina (1954)
2434967.738	-722	+0.028	pg	1	Chuprina (1956)
2435751.452	-650	-0.023	pe	3	Bahner et al. (1971)

Table 11 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2436230.385	-606	$-0^{d}.057$	pe	3	Bahner et al. (1971)
2436829.095	-551	-0.055	pe	3	Bahner et al. (1962)
2437199.191	-517	-0.070	pe	3	Mitchell et al. (1964)
2437928.575	-450	-0.022	pg	1	Girnyak (1964)
2439180.423	-335	-0.020	pe	3	Takase (1969)
2439768.312	-281	+0.046	pe	2	present paper[1]
2440083.936	-252	-0.013	pe	3	Asteriadis et al. (1977)
2440791.548	-187	+0.035	pe	3	Asteriadis et al. (1977)
2442827.154	0	+0.031	pe	3	present paper

Remark: [1] Observer: Abaffy

VX Persei

The light and colour curves of this neglected Cepheid variable are plotted in Fig. 15. VX Per is situated in the region of

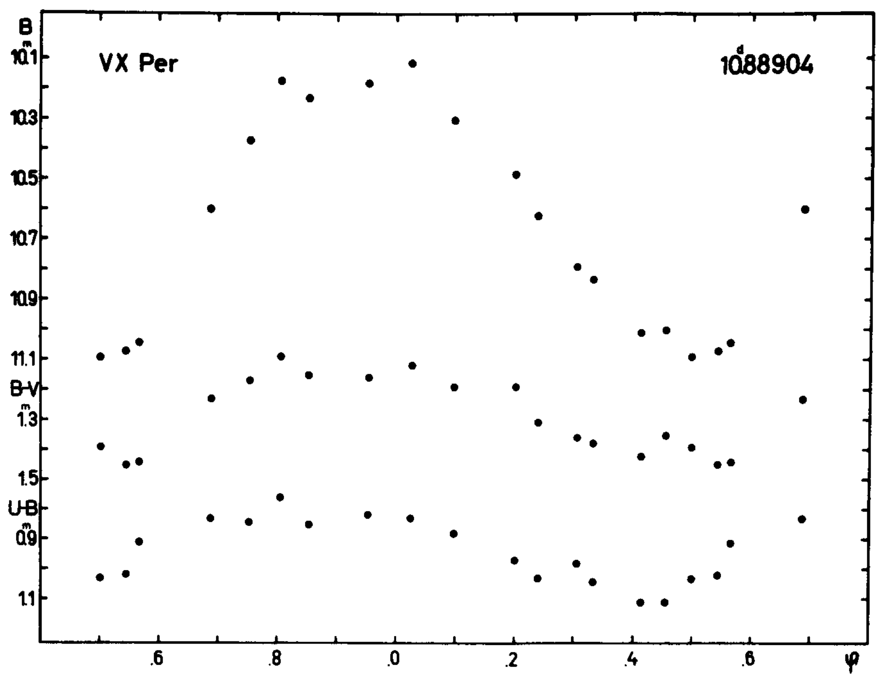

Figure 15 B, B-V and U-B curves of VX Per

the h and χ Per double cluster (Kukarkin et al., 1976). The O-C residuals have been calculated with the formula:

$$C = 2443758.994 + 10^{d}.88904 \times E \quad .$$

The O-C diagram in Fig. 16 shows one change in the period, but both the time of the change and the values of the period are uncertain.

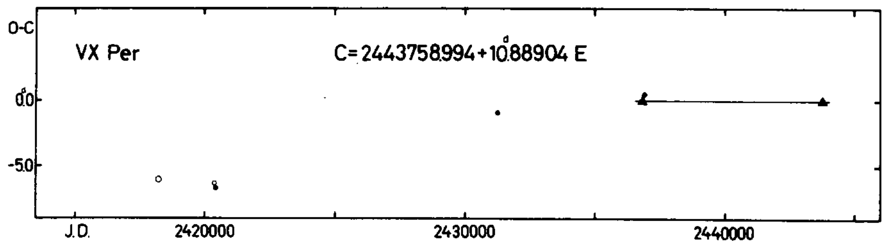

Figure 16 O-C diagram of VX Per

Table 12 O-C residuals for VX Per

Obs.Max.J.D.	E	O-C	Type	w	Reference
2418229.008	-2344	$-6^{d}.076$	vis	1	Pracka (1912)
2420363.01	-2148	-6.33	vis	0.5	Hoffmeister (1916b)
2420438.854	-2141	-6.705	pg	0.5	Robinson (1933)
2431279.215	-1146	-0.939	pg	0.5	Solov'yov (1955)
2436811.804	-638	+0.018	pe	3	Oosterhoff (1960)
2436822.654	-637	-0.022	pe	3	Weaver et al. (1960)
2436899.368	-630	+0.469	pg	0.5	Mauder (1960)
2443758.994	0	0.000	pe	3	present paper

SV Persei

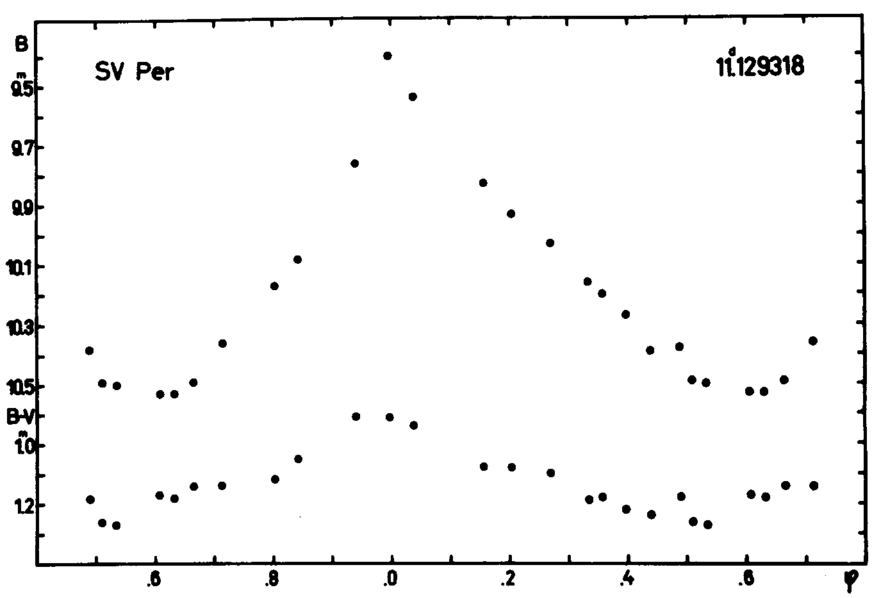

Figure 17 B and B-V curves of SV Per

The light and colour curves of SV Per are plotted in Fig. 17. According to Madore (1977) this Cepheid has a B2 photometric companion.

The O-C residuals have been calculated using the formula:

$$C = 2443839.296 + 11^{d}.129318 \times E \quad .$$

The O-C diagram in Fig. 18 shows a rejumping period, the sudden changes in the period (jump and rejump) occurred at about J.D. 2426300. The values of the period are as follows:

before J.D. 2426300 $P = 11^{d}.129289$

after J.D. 2426300 $P = 11^{d}.129318$.

Although the rejumping period seems to be the proper interpretation of the O-C diagram, another possibility cannot be excluded, viz. a sinusoidal wave caused by the light-time effect in the binary system. In this latter case the average period would be $P = 11^{d}.128986$ in the course of the last 70 years.

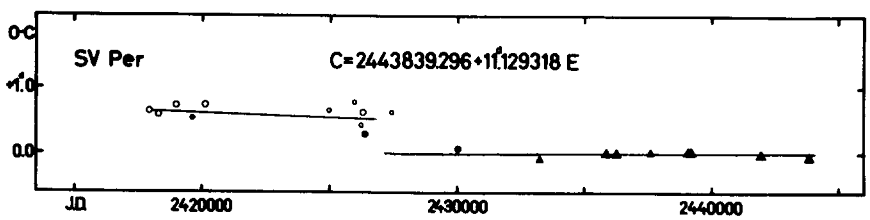

Figure 18 O-C diagram of SV Per

Table 13 O-C residuals for SV Per

Obs.Max.J.D.	E	O-C	Type	w	Reference
2417930.893	-2328	$+0^{d}.649$	vis	1	Enebo (1908)
2418298.108	-2295	+0.597	vis	1	Enebo (1909)
2418977.140	-2234	+0.740	vis	1	Enebo (1914)
2419611.313	-2177	+0.542	pg	0.5	Robinson (1933)
2420112.339	-2132	+0.749	vis	1	Enebo (1914)
2424953.506	-1697	+0.663	vis	0.5	Mergentaler[1] (1948)
2425955.263	-1607	+0.781	vis	0.5	Mergentaler[2] (1948)
2426210.883	-1584	+0.427	vis	0.5	Zakharov (1953)
2426288.996	-1577	+0.634	vis	1	Kukarkin (1940)
2426377.692	-1569	+0.296	pg	1	Rügemer (1932)
2426623.44	-1547	+1.20	vis	0	Mergentaler[3] (1948)
2427401.925	-1477	+0.632	vis	0.5	Mergentaler[4] (1948)
2430027.889	-1241	+0.077	pg	1	Mergentaler (1948)
2433232.980	-953	-0.076	pe	2	Eggen et al. (1957)
2434000.04	*-884*	*-0.94*	*pg*	*0*	*Fu De-Lian (1964)*
2435848.470	-718	+0.024	pe	3	Bahner et al (1977)
2436260.245	-681	+0.015	pe	3	Bahner et al. (1977)
2437595.773	-561	+0.024	pe	2	Mitchell et al. (1964)

Table 13 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2439075.985	-428	$+0^{d}.037$	pe	3	Takase (1969)
2439209.541	-416	+0.041	pe	3	Wamsteker (1972)
2441913.906	-173	-0.018	pe	3	Vasil'yanovskaya (1977)
2443839.246	0	-0.050	pe	3	present paper

Remarks: [1] Observer: Grouiller; [2] Obs.: Grouiller and Bloch; [3] Obs.: Rybka; [4] Obs.: Chang Yuin

AA Geminorum

This variable has two faint companions within the edge of the diaphragm. The light and colour curves in Fig. 19 are not complete since the weather conditions did not permit the coverage of the light curve at the other phases.

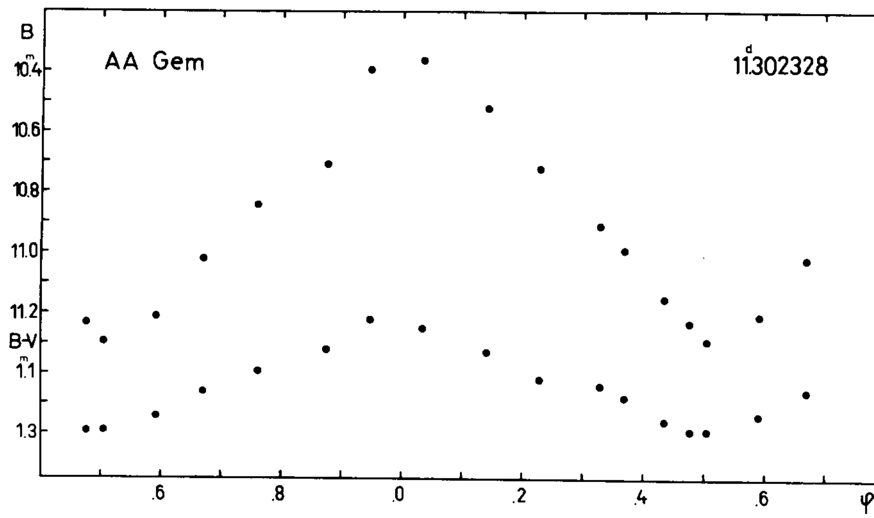

Figure 19 B and B-V curves of AA Gem

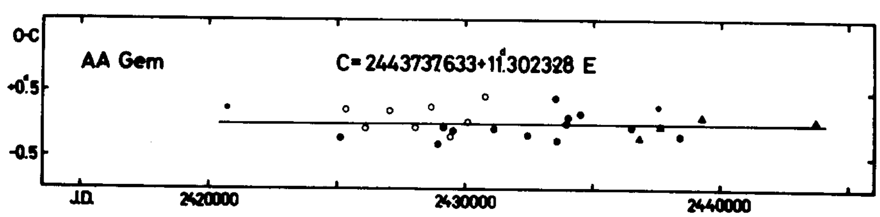

Figure 20 O-C diagram of AA Gem

The O-C residuals have been computed by the formula:

$$C = 2443737.633 + 11^{d}.302328 \times E \quad .$$

The period of the light variation has been constant since its discovery (see Fig. 20).

Table 14 O-C residuals for AA Gem

Obs.Max.J.D.	E	O-C	Type	w	Reference
2420726.34	-2036	$+0^d.25$	pg	0.5	Kukarkin (1930)
2425133.785	-1646	-0.216	pg	1	Prager (1929)
2425348.970	-1627	+0.225	vis	1	Kukarkin (1940)
2426015.515	-1568	-0.068	vis	1	Beyer (1934a)
2427055.602	-1476	+0.205	vis	1	Beyer (1934a)
2428061.251	-1387	-0.053	vis	1	Martynov (1951)
2428683.197	-1332	+0.265	vis	1	Martynov (1951)
2428953.877	-1308	-0.311	pg	1	Koshkina (1963)
2429157.579	-1290	-0.051	pg	1	Chudovicheva (1952)
2429439.991	-1265	-0.197	vis	1	Martynov (1951)
2429530.500	-1257	-0.107	pg	1	Koshkina (1963)
2430118.358	-1205	+0.030	vis	1	Martynov (1951)
2430785.592	-1146	+0.427	vis	1	Martynov (1951)
2431135.468	-1115	-0.069	pg	1	Chudovicheva (1952)
2432446.439	-999	-0.168	pg	1	Chudovicheva (1952)
2433543.332	-902	+0.399	pg	1	Chudovicheva (1952)
2433599.199	-897	-0.246	pg	1	Satyvaldiev (1970)
2433972.437	-864	+0.015	pg	1	Rosino, Nobili (1955)
2434029.050	-859	+0.117	pg	1	Koshkina (1963)
2434537.701	-814	+0.163	pg	1	Rosino, Nobili (1955)
2436504.096	-640	-0.047	pg	1	Satyvaldiev (1970)
2436831.705	-611	-0.206	pe	2	Weaver et al. (1960)
2437566.83	-546	+0.27	pg	0.5	Ahnert (1962)
2437634.342	-540	-0.034	pe	2	Mitchell et al. (1964)
2438436.673	-469	-0.168	pg	1	Satyvaldiev (1970)
2439250.725	-397	+0.116	pe	2	Takase (1969)
2443737.679	0	+0.046	pe	2	present paper

RX Aurigae

The light and colour curves of RX Aur are plotted in Fig. 21. According to the G.C.V.S. (Kukarkin et al., 1969-1970) the spectral type of this Cepheid is G0 III. Apart from the variation in

Table 15 O-C residuals for RX Aur

Obs.Max.J.D.	E	O-C	Type	w	Reference
2415816.313	-2410	$-0^d.867$	pg	1	Williams (1906)
2416222.77	-2375	-1.23	pg	0.5	Kukarkin[1] (1931)
2417338.90	-2279	-0.96	vis	0.5	Williams (1906, 1907)
2417478.47	-2267	-0.88	vis	0.5	Müller, Hartwig (1918-1920)
2417675.843	-2250	-1.103	vis	1	Zeipel (1908)
2419698.601	-2076	-0.840	pg	0.5	Robinson (1933)
2421883.742	-1888	-0.924	pg	1	Jordan (1929)
2425115.469	-1610	-0.540	vis	0.5	Dziewulski et al.[2] (1946)
2425243.007	-1599	-0.861	pg	1	Hellerich (1935)
2425592.584	-1569	+0.010	vis	0	Parenago (1938)
2425650.202	-1564	-0.490	vis	1	Kukarkin (1931)
2426219.80	-1515	-0.44	pg	0.5	Kiehl, Hopp (1977)

Table 15 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2426219.952	-1515	$-0^d.293$	vis	0.5	Zakharov (1951)
2426405.567	-1499	-0.655	vis	1	Terkán (1935)
2426452.003	-1495	-0.713	pg	1	Iwanowska et al. (1932)
2426498.823	-1491	-0.387	vis	1	Zverev (1936)
2426568.123	-1485	-0.829	vis	0.5	Iwanowska et al. (1932)
2426673.385	-1476	-0.178	vis	1	Kukarkin (1940)
2426905.458	-1456	-0.576	vis	0.5	Dziewulski et al. (1946)
2426997.79	-1448	-1.23	pg	0	Kiehl, Hopp (1977)
2427707.442	-1387	-0.616	vis	0.5	Dziewulski et al. (1946)
2428370.107	-1330	-0.493	pg	0.5	Dziewulski et al. (1946)
2428416.608	-1326	-0.486	pg	0.5	Dziewulski et al. (1946)
2428881.32	-1286	-0.71	pg	0.5	Karimova[3] (1949)
2430043.972	-1186	-0.417	pg	1	Mergentaler (1948)
2433287.54	-907	+0.18	vis	0.5	Pohl[4] (1951)
2433461.739	-892	+0.030	pe	2	Eggen et al. (1957)
2433982.06	-847	-2.71	pg	0	Fu De-Lian (1964)
2436228.158	-654	+0.047	pe	3	Bahner et al. (1977)
2436542.00	-627	+0.054	pg	0.5	Kiehl, Hopp (1977)
2437611.298	-535	-0.014	pe	3	Mitchell et al. (1964)
2437936.922	-507	+0.151	pe	1	Williams (1966)
2439064.203	-410	-0.051	pe	3	Takase (1969)
2439494.226	-373	-0.099	pe	3	Wamsteker (1972)
2441005.307	-243	-0.078	pe	2	Evans (1976)
2442365.266	-126	-0.072	vis	0.5	Berdnikov (1977)
2443515.872	-27	-0.197	vis	0.5	Busch[5] (1980)
2443829.995	0	+0.091	pe	3	present paper

Remarks: [1] Observer: Blazhko; [2] Obs.: Rybka; [3] Obs.: Ishchenko; [4] Obs.: Mielke; [5] Obs.: Branzke

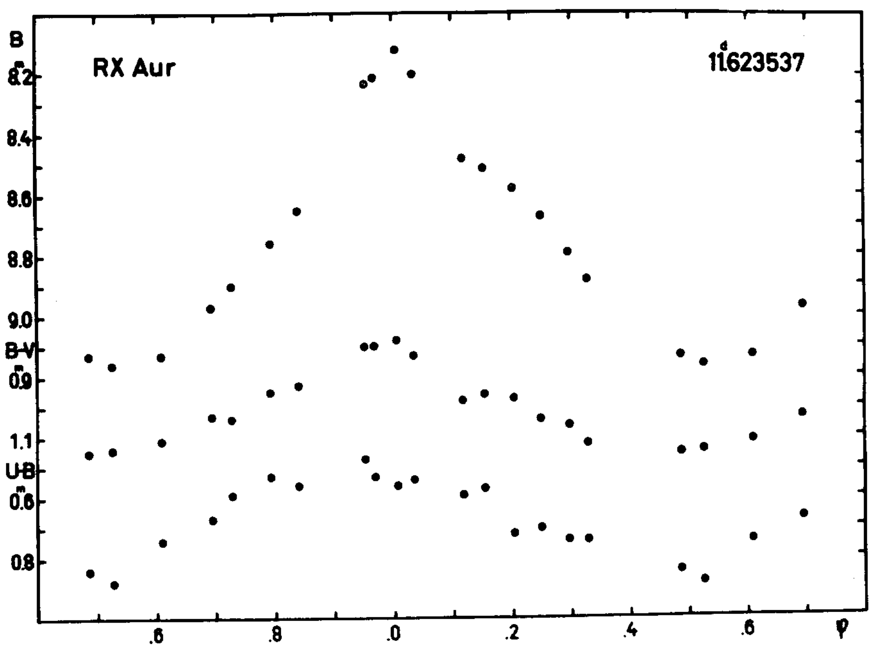

Figure 21 B, B-V and U-B curves of RX Aur

the spectral type during a pulsation cycle, the III luminosity class is not typical for a Cepheid variable.

The O-C residuals have been calculated with the formula:

$$C = 2443829.904 + 11\overset{d}{.}623537 \times E \quad .$$

The O-C diagram in Fig. 22 shows one change in the period:

before J.D. 2434900 $P = 11\overset{d}{.}624230$

after J.D. 2434900 $P = 11\overset{d}{.}623537$.

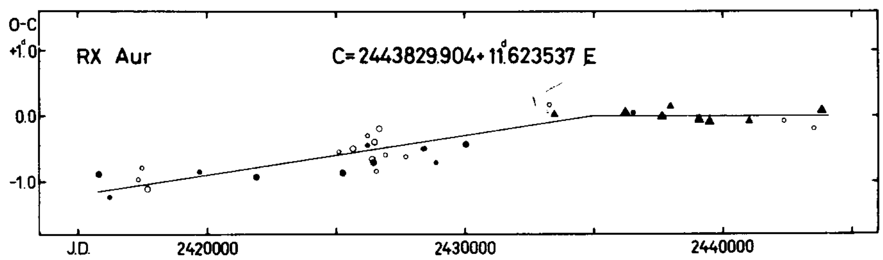

Figure 22 O-C diagram of RX Aur

RY Cassiopeiae

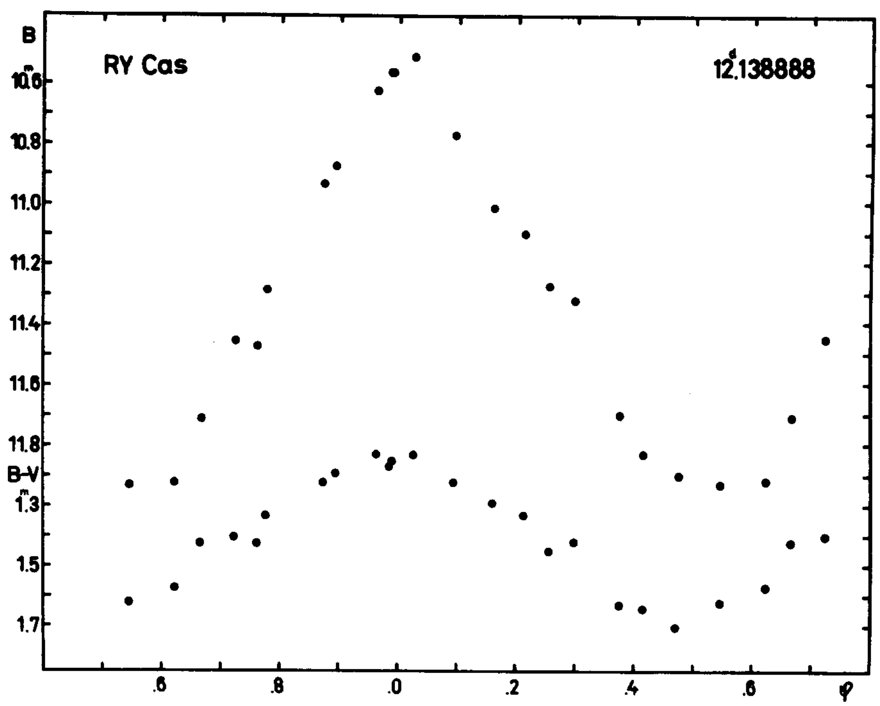

Figure 23 B and B-V curves of RY Cas

The light and colour curves in Fig. 23 show some minor changes in the shape of the light curve in comparison with the earlier photoelectric light curves.

The O-C residuals have been derived using the formula:

$$C = 2443826.530 + 12\overset{d}{.}138888 \times E \quad .$$

The period of RY Cas is continuously increasing (see Fig. 24), the approximate parabola being:

$$(O-C)_{par} = 5\overset{d}{.}31 \times 10^{-7} \times E^2 \quad .$$

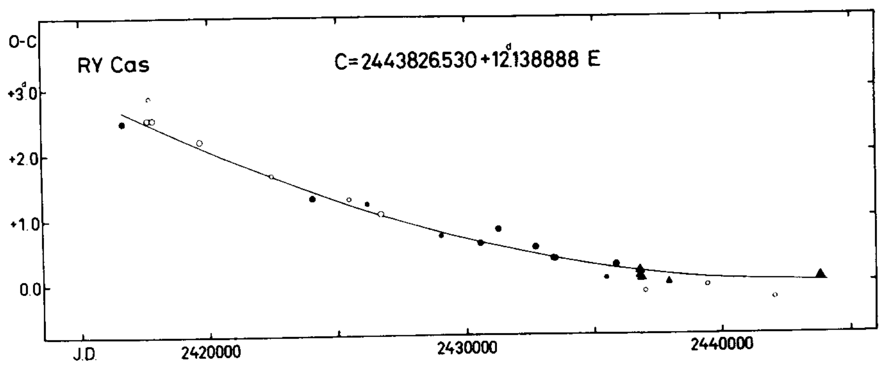

Figure 24 O-C diagram of RY Cas

Table 16 O-C residuals for RY Cas

Obs.Max.J.D.	E	O-C	Type	w	Reference
2416637.920	-2240	$+2\overset{d}{.}494$	pg	1	Kukarkin[1] (1940)
2417284.5	-2187	+5.7	vis	0	Dunér et al. (1906)
2417536.9	-2166	+3.2	vis	0	Ichinohe (1907)
2417633.346	-2158	+2.536	vis	1	Graff (1921b)
2417694.384	-2153	+2.880	vis	0.5	Pracka (1910)
2417839.703	-2141	+2.532	vis	1	Luizet (1908b)
2419672.345	-1990	+2.202	vis	1	Graff (1921b)
2422451.620	-1761	+1.672	vis	0.5	Graff (1921b)
2424041.467	-1630	+1.324	pg	1	Kukarkin (1940)
2425485.97	-1511	+1.30	vis	0.5	Nielsen[2] (1955)
2426165.68	-1455	+1.23	pg	0.5	Kiehl, Hopp (1977)
2426699.636	-1411	+1.077	vis	1	Kukarkin (1940)
2429017.82	-1220	+0.73	pg	0.5	Pevunova (1940)
2430547.208	-1094	+0.621	pg	1	Solov'yov (1954)
2431251.473	-1036	+0.831	pg	1	Solov'yov (1954)
2432732.134	-914	+0.548	pg	1	Solov'yov (1954)
2433423.88	-857	+0.38	vis	0.5	Nielsen[3] (1955)
2433472.434	-853	+0.375	pg	1	Solov'yov (1954)
2435291.32	-703	-1.57	pg	0	Parenago[4] (1956)
2435438.63	-691	+0.07	pg	0.5	Romano (1959)
2435875.84	-655	+0.28	pg	1	Zonn, Semeniuk (1959)
2436798.286	-579	+0.172	pe	3	Weaver et al. (1960)
2436810.350	-578	+0.097	pe	3	Oosterhoff (1960)
2436871.012	-573	+0.065	pe	3	Bahner et al. (1962)

Table 16 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2437016.475	-561	$-0^{d}.139$	vis	0.5	Sachse (1973)
2437939.164	-485	-0.005	pe	1	Williams (1966)
2439055.344	-393	-0.783	vis	0	Sachse (1973)
2439444.331	-361	-0.060	vis	0.5	Sachse (1973)
2442066.14	-145	-0.25	vis	0.5	Small (1974)
2443826.585	0	+0.055	pe	3	present paper

Remarks: [1] Observers: Blazhko and Parenago; [2] Obs.: Brun; [3] Obs.: Petersen; [4] Obs.: Zhdanova

SZ Cassiopeiae

The light and colour curves of this small amplitude Cepheid can be seen in Fig. 25. SZ Cas is situated in the corona of the double cluster h and χ Per (Efremov, 1964).

The O-C residuals have been computed with the ephemeris:

$$C = 2443818.142 + 13^{d}.637747 \times E \quad .$$

The period of SZ Cas is continuously increasing (see Fig. 26). The least squares fitting procedure has resulted in the parabola:

$$(O-C)_{par} = 1^{d}.01 \times 10^{-5} \times E^{2} \quad .$$

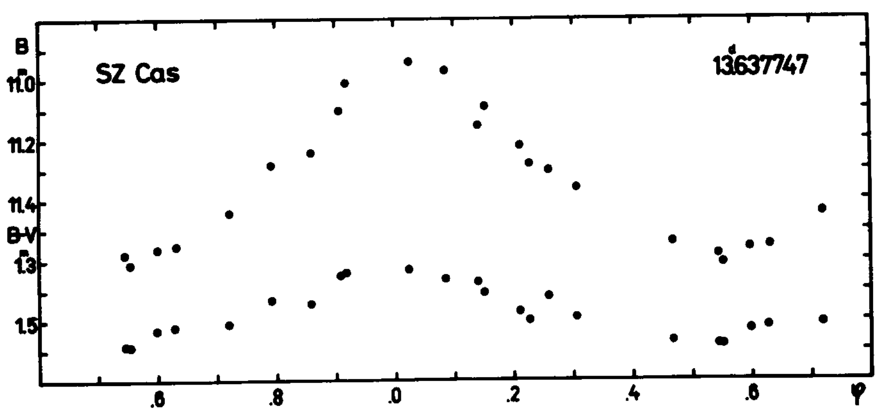

Figure 25 B and B-V curves of SZ Cas

Table 17 O-C residuals for SZ Cas

Obs.Max.J.D.	E	O-C	Type	w	Reference
2415753.8	-2061	$+43^{d}.1$	pg	0.5	Gerasimovic (1927b)
2416039.2	-2036	+42.1	pg	0.5	Gerasimovic (1927b)
2416338.4	-2016	+41.2	pg	0.5	Gerasimovic (1927b)
2416678.7	-1993	+40.6	pg	0.5	Gerasimovic (1927b)
2416738.046	-1989	+45.383	pg	0	Kukarkin (1932c)
2417085.8	-1963	+38.6	pg	0.5	Gerasimovic (1927b)
2417220.442	-1953	+36.820	vis	0.5	Pracka (1910)

Table 17 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2417480.8	-1934	+38.^{d}1	pg	0.5	Gerasimovic (1927b)
2417833.6	-1908	+36.3	pg	0.5	Gerasimovic (1927b)
2418542.5	-1856	+36.0	pg	0.5	Gerasimovic (1927b)
2419017.2	-1821	+33.4	pg	0.5	Gerasimovic (1927b)
2419030.229	-1820	+32.787	vis	0.5	Mündler (1911b, 1919)
2419805.7	-1763	+30.9	pg	0.5	Gerasimovic (1927b)
2420581.0	-1706	+28.9	pg	0.5	Gerasimovic (1927b)
2420718.996	-1696	+30.473	pg	0.5	Robinson (1933)
2420814.397	-1689	+30.410	vis	0.5	Zinner[1] (1932)
2420839.8	-1687	+28.5	pg	0.5	Gerasimovic (1927b)
2421084.6	-1669	+27.9	pg	0.5	Gerasimovic (1927b)
2421248.225	-1657	+27.830	vis	0.5	Zinner[1] (1932)
2421261.961	-1656	+27.928	vis	0.5	Luizet (1923)
2421479.3	-1640	+27.1	pg	0.5	Gerasimovic (1927b)
2421969.959	-1604	+26.763	vis	0.5	Zinner[1] (1932)
2422323.3	-1578	+25.5	pg	0.5	Gerasimovic (1927b)
2422582.0	-1559	+25.1	pg	0.5	Gerasimovic (1927b)
2422935.7	-1533	+24.2	pg	0.5	Gerasimovic (1927b)
2423439.4	-1496	+23.3	pg	0.5	Gerasimovic (1927b)
2423806.919	-1467	+22.627	vis	1	Beyer (1927)
2424105.6	-1447	+21.3	pg	0.5	Gerasimovic (1927b)
2424255.315	-1436	+20.978	vis	1	Beyer (1927)
2424390.7	-1426	+20.0	pg	0.5	Gerasimovic (1927b)
2424758.807	-1399	+19.873	vis	1	Beyer (1927)
2424880.4	-1390	+18.7	pg	0.5	Gerasimovic (1927b)
2425166.947	-1369	+18.881	vis	1	Beyer (1934a)
2425520.728	-1343	+18.080	vis	1	Beyer (1934a)
2426282.663	-1287	+16.301	vis	1	Kukarkin (1940)
2426623.239	-1262	+15.934	vis	1	Kukarkin (1932c)
2426691.049	-1257	+15.555	vis	1	Dunst (1933)
2428458.06	-1127	+9.66	pg	0	Fu De-Lian (1964)
2429604.696	-1043	+10.724	pg	1	Efremov (1958)
2430638.866	-967	+8.425	vis	0.5	Stein (1944)
2430653.134	-966	+9.056	pg	1	Filin (1958)
2431525.288	-902	+8.394	pg	1	Filin (1958)
2432805.023	-808	+6.181	pg	1	Filin (1958)
2433186.576	-780	+5.877	pg	1	Filin (1958)
2434249.160	-702	+4.716	pg	1	Efremov (1958)
2434893.313	-655	+7.895	pg	0	Filin (1958)
2436457.166	-540	+3.407	pg	1	Makarenko (1969)
2436484.05	-538	+3.02	pg	0.5	Smykov (1980)
2436606.84	-529	+3.07	pg	0.5	Vasil'yan. et al.[2] (1970)
2436824.793	-513	+2.815	pe	3	Oosterhoff (1960)
2436838.243	-512	+2.627	pe	3	Weaver et al. (1960)
2436892.930	-508	+2.763	pe	3	Bahner et al. (1962)
2437205.92	-485	+2.09	pg	0.5	Smykov (1980)
2437615.141	-455	+2.174	pg	1	Makarenko (1969)
2437968.44	-429	+0.89	pg	0	Smykov (1980)
2438201.44	-412	+2.05	pg	0.5	Vasil'yan. et al.[2] (1970)
2438295.77	-405	+0.92	pg	0	Smykov (1980)
2438664.78	-378	+1.71	pg	0.5	Vasil'yan. et al.[2] (1970)
2438665.010	-378	+1.936	pg	1	Makarenko (1969)
2439059.47	-349	+0.90	pg	0.5	Smykov (1980)
2441500.2	-170	+0.5	vis	0.5	Cragg (1976)

Table 17 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2442303.91	-111	$-0\overset{d}{.}44$	pg	0.5	Smykov (1980)
2442372.39	-106	-0.15	pg	0.5	Smykov (1980)
2442699.48	-82	-0.37	pg	0.5	Smykov (1980)
2443817.966	0	-0.176	pe	3	present paper

Remarks: [1] Observer: Hartwig; [2] Observer: Shakhovskaya

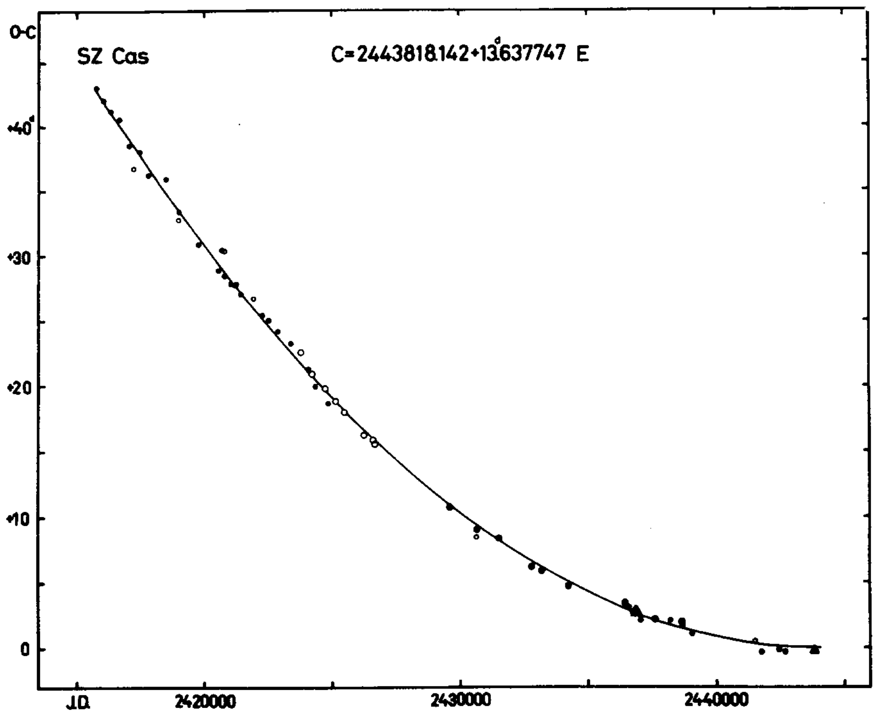

Figure 26 O-C diagram of SZ Cas

TT Aquilae

Its light and colour curves are plotted in Fig. 27. This variable has a faint companion within the edge of the diaphragm.

The O-C residuals have been calculated using the formula:

$$C = 2443810.823 + 13\overset{d}{.}754707 \times E \quad .$$

The period of TT Aql has been constant since J.D. 2425000. Before that date the period might have had another value but that part of the O-C diagram (see Fig. 28) is very uncertain.

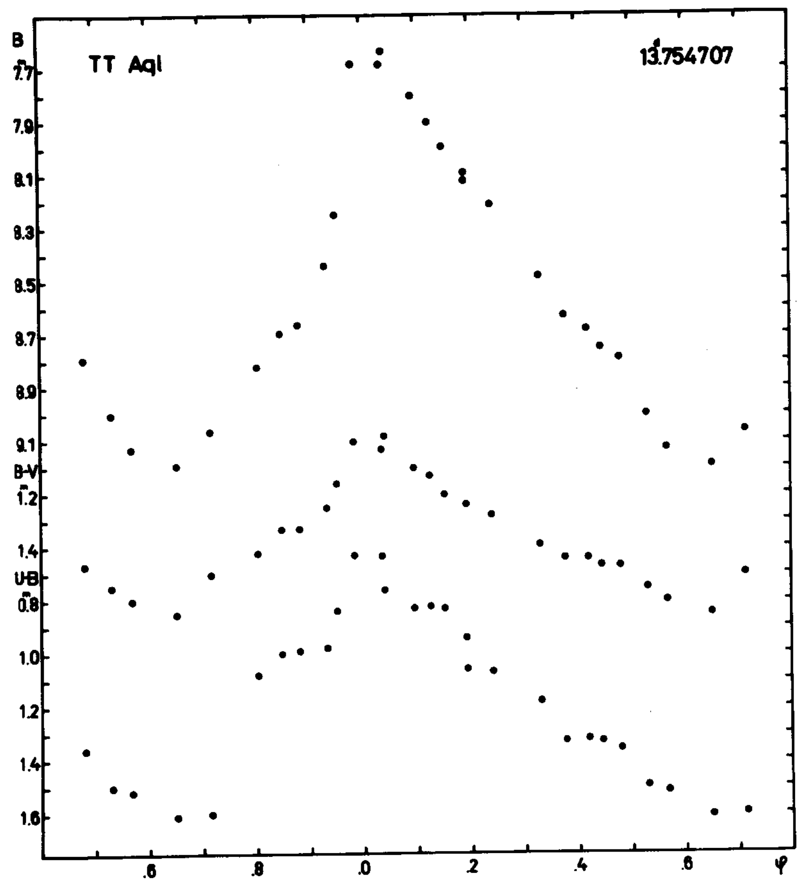

Figure 27 B, B-V and U-B curves of TT Aql

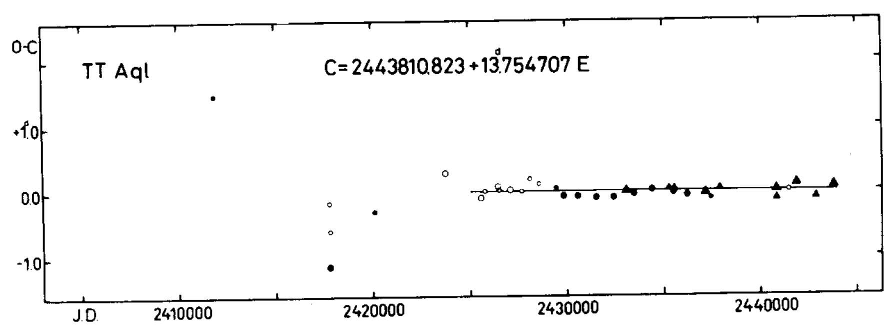

Figure 28 O-C diagram of TT Aql

Table 18 O-C residuals for TT Aql

Obs.Max.J.D.	E	O-C	Type	w	Reference
2411873.865	-2322	$+1^{d}.472$	pg	0.5	Pickering (1907)
2417744.514	-1895	-1.139	pg	1	Jordan (1919)
2417745.486	-1895	-0.167	vis	0.5	Ichinohe (1911)
2417800.1	-1891	-0.6	vis	0.5	Pickering (1908)
2420097.402	-1724	-0.306	pg	0.5	Robinson (1933)
2423742.991	-1459	+0.286	vis	1	Kukarkin[1] (1940)
2425613.245	-1323	-0.101	vis	1	Kukarkin (1940)
2425805.920	-1309	+0.008	vis	0.5	Parenago (1938)
2426466.209	-1261	+0.072	vis	1	Kukarkin (1940)
2426521.173	-1257	+0.017	vis	0.5	Zverev (1936)
2427085.125	-1216	+0.026	vis	1	Florya, Kukarkina (1953)
2427662.80	-1174	0.00	vis	0.5	Krebs[2] (1940)
2428089.378	-1143	+0.185	vis	0.5	Dziewulski et al. (1956)
2428584.5	-1107	+0.1	vis	0.5	Krebs (1939)
2429519.731	-1039	+0.049	pg	0.5	Solov'yov (1944)
2429835.963	-1016	-0.078	pg	1	Erleksova (1960)
2430564.956	-963	-0.084	pg	1	Erleksova (1960)
2431527.765	-893	-0.105	pg	1	Erleksova (1960)
2432449.337	-826	-0.098	pg	1	Erleksova (1960)
2433109.654	-778	-0.007	pe	3	Eggen (1951)
2433494.741	-750	-0.052	pg	1	Erleksova (1960)
2434416.368	-683	+0.010	pg	1	Erleksova (1960)
2435282.936	-620	+0.031	pe	2	Irwin (1961)
2435502.954	-604	-0.026	pg	1	Erleksova (1960)
2435558.014	-600	+0.015	pe	2	Walraven et al. (1958)
2436218.152	-552	-0.073	pg	1	Erleksova (1960)
2437208.525	-480	-0.039	pe	3	Mitchell et al. (1964)
2437469.787	-461	-0.116	pg	0.5	Zoj Von Shor (1963)
2437937.601	-427	+0.038	pe	1	Williams (1966)
2440867.193	-214	-0.123	pe	1	Evans (1976)
2440867.331	-214	+0.015	pe	3	Pel (1976)
2441500.0	-168	0.0	vis	0.5	Cragg (1976)
2441912.777	-138	+0.104	pe	3	Landis (1976)
2442916.670	-65	-0.097	pe	2	Dean (1977)
2443810.884	0	+0.061	pe	3	present paper

Remarks: [1] Observer: Kanda; [2] Observer: Loreta

TX Cygni

The light and colour curves of this Cepheid are shown in Fig. 29. The O-C residuals have been computed with the formula:

$$C = 2443794.231 + 14^{d}.708157 \times E \quad .$$

Although the G.C.V.S. (Kukarkin et al., 1969-1970) reported a variation in the period of TX Cyg, the period was constant until the sixties (see Fig. 30) with $P = 14^{d}.708157$. The period change can only be seen on the basis of the recent observations. Assuming that the change in the period occurred at about J.D. 2437000, the new period is $P = 14^{d}.7098$ which can be refined by future observations.

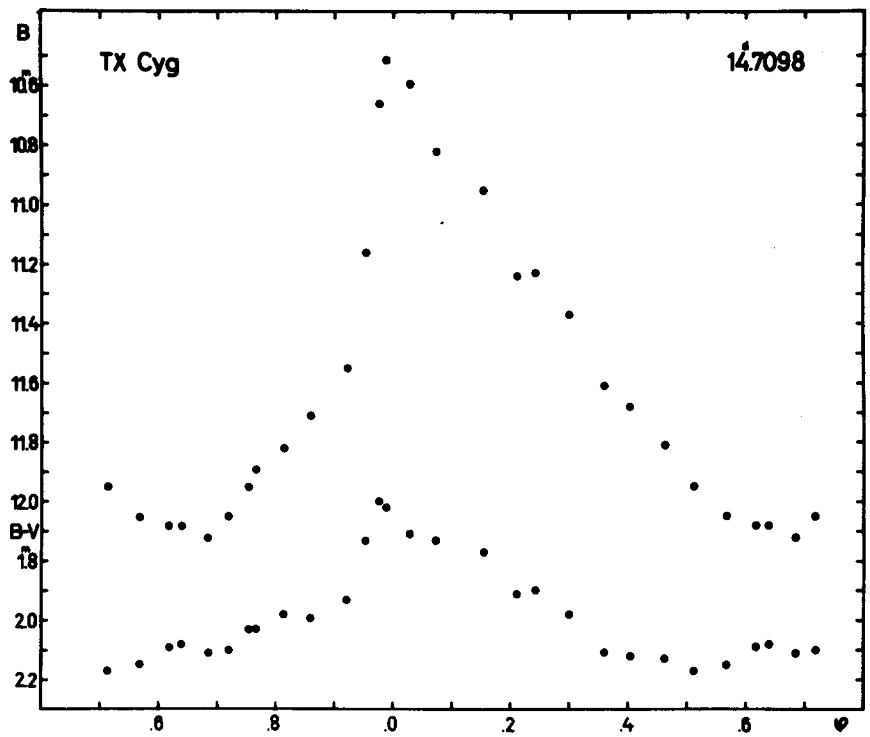

Figure 29 B and B-V curves of TX Cyg

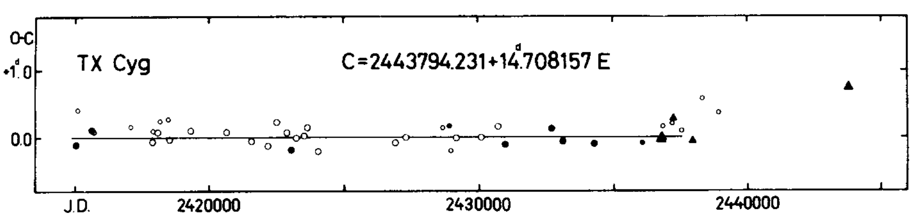

Figure 30 O-C diagram of TX Cyg

Table 19 O-C residuals for TX Cyg

Obs.Max.J.D.	E	O-C	Type	w	Reference
2415054.388	-1954	$-0^{d}.104$	pg	1	Williams (1900b)
2415099.03	-1951	+0.41	vis	0.5	Williams (1902)
2415613.522	-1916	+0.120	pg	1	Kulikovsky (1933)
2415614.51	-1916	+1.11	vis	0	Williams (1902)
2415731.144	-1908	+0.077	vis	0.5	Zinner[1] (1932)
2415938.65	-1894	+1.67	vis	0	Yendell (1904)
2416320.92	-1868	+1.53	vis	0	Yendell (1904)
2417084.377	-1816	+0.159	vis	0.5	Zinner[1] (1932)

Table 19 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2417511.71	-1787	$+0\overset{d}{.}96$	vis	0	Seares (1907)
2417893.095	-1761	-0.072	vis	1	Zeipel (1908)
2417908.0	-1760	+0.1	vis	0.5	Müller, Hartwig[2] (1918-1920)
2418099.158	-1747	+0.077	vis	1	Bilt (1925)
2418172.86	-1742	+0.24	vis	0.5	Müller, Hartwig[2] (1918-1920)
2418496.46	-1720	+0.26	vis	0.5	Müller, Hartwig[2] (1918-1920)
2418554.996	-1716	-0.038	vis	1	Bilt (1925)
2419319.957	-1664	+0.099	vis	1	Bilt (1925)
2420395.5	-1591	+1.9	vis	0	Yendell (1915)
2420643.670	-1574	+0.078	vis	1	Doberck (1920b)
2421570.143	-1511	-0.063	vis	1	Doberck (1920b)
2422187.816	-1469	-0.132	vis	1	Doberck (1920b)
2422511.750	-1447	+0.222	vis	1	Leiner (1925)
2422894.003	-1421	+0.063	vis	1	Leiner (1925)
2423040.836	-1411	-0.185	pg	1	Henroteau (1924)
2423246.928	-1397	-0.008	vis	1	Leiner (1925)
2423526.414	-1378	+0.023	vis	1	Doberck (1924b)
2423658.906	-1369	+0.142	vis	1	Leiner (1925)
2424040.967	-1343	-0.209	vis	1	Leiner (1925)
2426909.179	-1148	-0.088	vis	1	Florya, Kukarkina (1953)
2427291.667	-1122	-0.012	vis	1	Florya, Kukarkina (1953)
2428674.389	-1028	+0.143	vis	0.5	Dziewulski (1949)
2428909.736	-1012	+0.160	pg	0.5	Shteiman[3] (1958)
2428982.9	-1007	-0.2	vis	0.5	Krebs (1939)
2429174.308	-994	-0.015	vis	1	Conceicao-Silva (1949)
2430086.220	-932	-0.009	vis	1	Conceicao-Silva (1949)
2430704.128	-890	+0.157	vis	1	Conceicao-Silva (1949)
2430998.028	-870	-0.106	pg	1	Solov'yov (1950)
2432719.114	-753	+0.125	pg	1	Solov'yov (1950)
2433130.754	-725	-0.063	pg	1	Solov'yov (1950)
2434307.370	-645	-0.100	pg	1	Shteiman (1958)
2436087.069	-524	-0.088	pg	0.5	Korovkina (1958)
2436440.72	-500	+0.57	pg	0	Korovkina (1959)
2436778.400	-477	-0.040	pe	3	Weaver et al. (1960)
2436793.138	-476	-0.010	pe	3	Oosterhoff (1960)
2436837.432	-473	+0.159	vis	0.5	Busch, Häussler (1968)
2437190.466	-449	+0.197	vis	0.5	Busch, Häussler (1968)
2437219.971	-447	+0.286	pe	1	Mitchell et al. (1964)
2437543.356	-425	+0.092	vis	0.5	Busch, Häussler (1968)
2437955.031	-397	-0.062	pe	1	Williams (1966)
2438323.369	-372	+0.572	vis	0.5	Busch, Häussler (1968)
2438911.485	-332	+0.362	vis	0.5	Busch, Häussler (1968)
2443794.971	0	+0.740	pe	3	present paper

Remarks: [1] Observer: Hartwig; [2] Obs.: Belyavsky; [3] Obs.: Milstein Nikolayev

RW Cassiopeiae

The light and colour curves of RW Cas are plotted in Fig. 31. The O-C residuals have been calculated using the ephemerides:

$$C_{max} = 2443829.972 + 14\overset{d}{.}791548 \times E$$
$$C_{med} = 2443829.215 + 14\overset{d}{.}791548 \times E$$

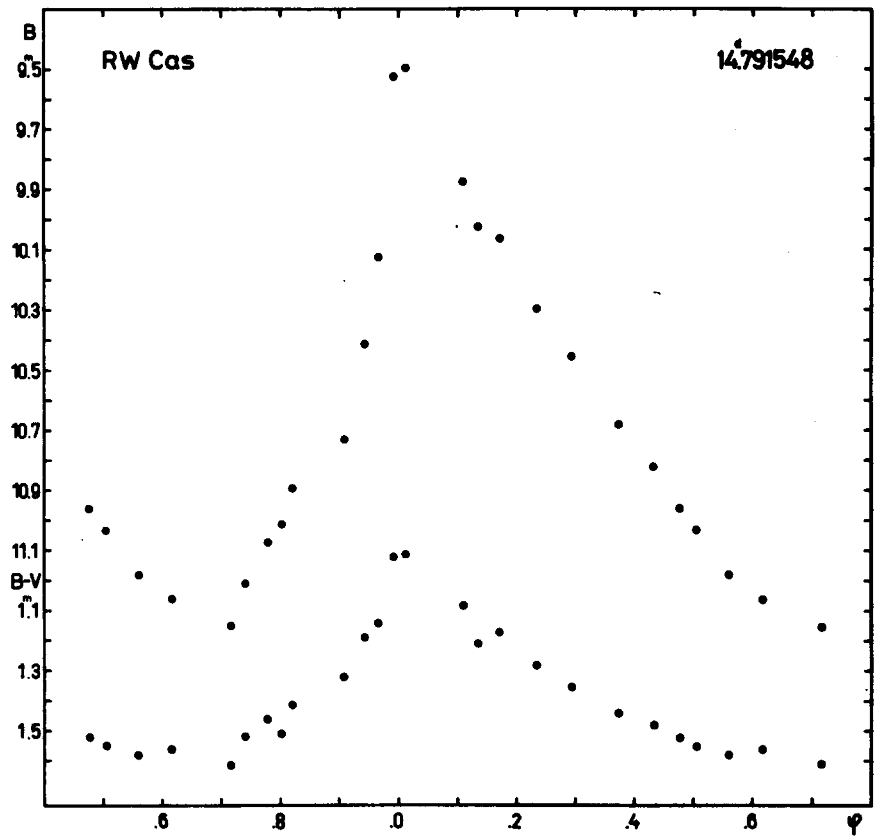

Figure 31 B and B-V curves of RW Cas

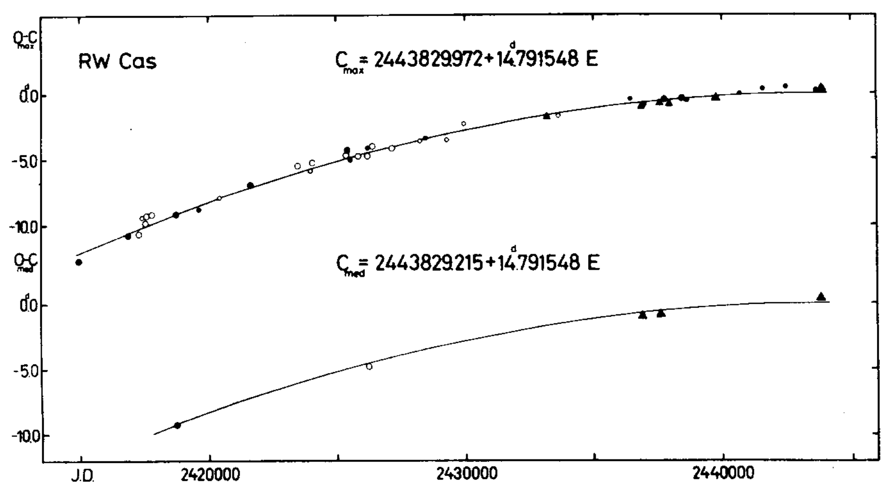

Figure 32 O-C diagram of RW Cas

for the maximum and median brightnesses, respectively. The period of RW Cas is continuously decreasing (see Fig. 32). The least squares fitting procedure has resulted in the formula:

$$(O-C)_{par} = -3^{d}.20\times10^{-6}\times E^{2}$$

for the fitted parabola.

Table 20 O-C residuals for RW Cas

(maximum brightness)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2414988.475	-1949	$-12^{d}.770$	pg	1	Ceraski (1905)
2416913.376	-1819	-10.770	pg	1	Kukarkin (1932b)
2417327.602	-1791	-10.708	vis	1	Kulikovsky[1] (1935)
2417461.95	-1782	-9.48	vis	0.5	Seares (1907)
2417565.095	-1775	-9.879	vis	1	Pracka (1909)
2417610.025	-1772	-9.324	vis	1	Hartwig (1910)
2417832.029	-1757	-9.193	vis	1	Graff (1921a)
2418763.907	-1694	-9.183	pg	1	Whittaker et al. (1911)
2419651.734	-1634	-8.849	pg	0.5	Robinson (1933)
2420466.157	-1579	-7.961	vis	0.5	Kukarkin[2] (1932b)
2421650.497	-1499	-6.945	pg	1	Kukarkin (1932b)
2422125.956	-1467	-4.815	vis	0	Graff (1921a)
2423500.864	-1374	-5.521	vis	1	Nielsen[3] (1927a)
2424018.179	-1339	-5.910	vis	0.5	Kukarkin[4] (1932b)
2424077.975	-1335	-5.280	vis	1	Kulikovsky[1] (1935)
2425394.993	-1246	-4.710	vis	1	{Kukarkin (1932b) Kulikovsky[5] (1935)
2425424.937	-1244	-4.349	pg	1	Kukarkin (1932b)
2425557.29	-1235	-5.12	pg	0.5	Kiehl, Hopp (1977)
2425868.248	-1214	-4.785	vis	1	Beyer (1934a)
2426208.442	-1191	-4.796	vis	1	Lassovszky (1932a)
2426223.87	-1190	-4.16	pg	0.5	Kiehl, Hopp (1977)
2426416.318	-1177	-4.002	vis	1	Beyer (1934a)
2427155.692	-1127	-4.205	vis	1	Beyer (1934a)
2428250.826	-1053	-3.646	vis	0.5	Dziewulska (1948)
2428458.06	-1039	-3.49	pg	0.5	Fu De-Lian (1964)
2429286.31	-983	-3.57	vis	0.5	Parenago[6] (1956)
2429953.14	-938	-2.36	vis	0.5	Conceicao-Silva (1948)
2433178.259	-720	-1.798	pe	2	Eggen (1951)
2433622.04	-690	-1.76	vis	0.5	Parenago[6] (1956)
2436478.11	-497	-0.46	pg	0.5	Smykov (1978)
2436891.747	-469	-0.989	pe	3	Bahner et al. (1962)
2436995.411	-462	-0.866	pg	1	Shinada et al. (1969)
2437587.153	-422	-0.786	pe	3	Mitchell et al. (1964)
2437587.24	-422	-0.70	pg	0.5	Smykov (1978)
2437779.760	-409	-0.469	pg	1	Shinada et al. (1969)
2437956.907	-397	-0.820	pe	1	Williams (1966)
2438475.018	-362	-0.414	pg	1	Shinada et al. (1969)
2438652.39	-350	-0.54	pg	0.5	Smykov (1978)
2439776.710	-274	-0.378	pe	3	present paper[7]
2440708.91	-211	-0.04	pg	0.5	Smykov (1978)
2441596.78	-151	+0.33	pg	0.5	Smykov (1978)
2442085.86	-118	+1.29	vis	0	Small (1974)
2442499.16	-90	+0.43	pg	0.5	Smykov (1978)
2443667.50	-11	+0.24	pg	0.5	Smykov (1978)
2443830.363	0	+0.391	pe	3	present paper

Table 20 (cont.)

Remarks: [1] Observer: Blazhko; [2] Obs.: Luizet; [3] Obs.: Aage Nielsen; [4] Obs.: Selivanov; [5] Obs.: Kukarkin; [6] Obs.: Latyshev; [7] Obs.: Abaffy

Table 21 O-C residuals for RW Cas
(median brightness)

Obs.Med.J.D.	E	O-C	Type	w	Reference
2418763.063	-1694	$-9^{d}.270$	pg	1	Whittaker et al. (1911)
2426207.657	-1191	-4.824	vis	1	Lassovszky (1932a)
2436891.022	-469	-0.957	pe	3	Bahner et al. (1962)
2437586.399	-422	-0.783	pe	3	Mitchell et al. (1964)
2443829.608	0	+0.393	pe	3	present paper

SZ Cygni

The light and colour curves of SZ Cyg are shown in Fig. 33. The variable has a B4 photometric companion (Madore, 1977).

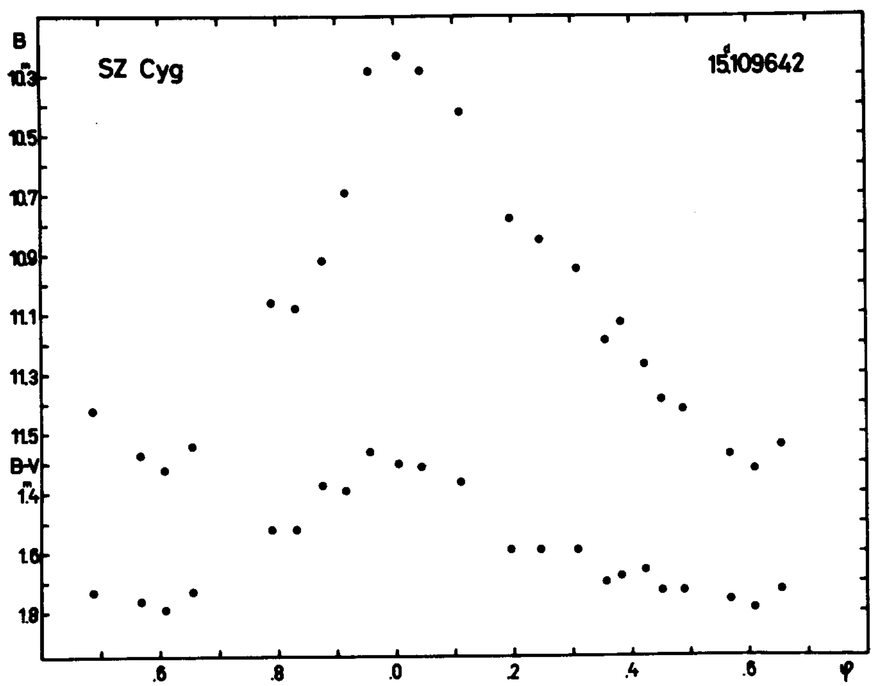

Figure 33 B and B-V curves of SZ Cyg

The O-C residuals have been computed with the formula:

$$C = 2443760.128 + 15^{d}.109642 \times E$$

The O-C diagram of SZ Cyg is plotted in Fig. 34 using the residuals listed in Table 22 except the first one (Deichmüller, 1900a). The O-C diagram has a sinusoidal structure as is to be expected for a member of a binary system with an inclination significantly different from zero, due to the light-time effect. The orbital period of the system is roughly 60-70 years. Spectroscopic observations of SZ Cyg are badly needed since the only radial velocity measurements are those of Joy (1937).

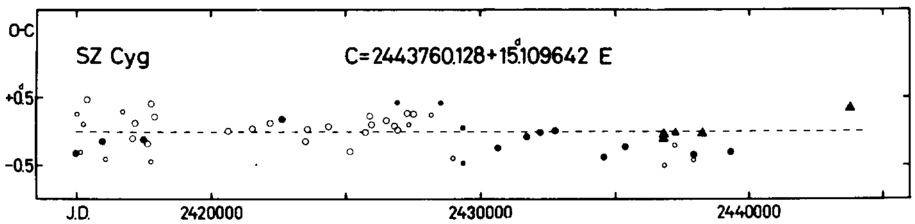

Figure 34 O-C diagram of SZ Cyg

Table 22 O-C residuals for SZ Cyg

Obs.Max.J.D.	E	O-C	Type	w	Reference
2406484.5	-2467	$-0^d.1$	vis	0.5	Deichmüller (1900a)
2414991.044	-1904	-0.326	pg	1	Williams (1900a)
2415021.853	-1902	+0.264	vis	0.5	Williams (1900a)
2415172.363	-1892	-0.322	vis	0.5	Esch (1936)
2415278.6	-1885	+0.1	vis	0.5	Deichmüller (1900b)
2415399.359	-1877	+0.468	vis	1	Zinner[1] (1932)
2415973.353	-1839	-0.143	pg	1	Florya, Parenago (1933)
2416078.85	-1832	-0.41	vis	0.5	Yendell (1904)
2416441.125	-1808	-0.770	vis	0	Furness[2] (1913b)
2416714.161	-1790	+0.292	vis	0.5	Lau (1907)
2417091.500	-1765	-0.110	vis	1	Nijland (1923)
2417182.386	-1759	+0.118	vis	1	Zinner[1] (1932)
2417499.452	-1738	-0.118	pg	1	Florya, Parenago (1933)
2417665.585	-1727	-0.191	vis	1	Nijland (1923)
2417771.959	-1720	+0.415	vis	1	Luizet (1908a)
2417786.208	-1719	-0.445	vis	0.5	Graff (1914)
2417907.751	-1711	+0.220	vis	1	Zeipel (1908)
2420657.495	-1529	+0.010	vis	1	Doberck (1920a)
2421548.993	-1470	+0.039	vis	1	Doberck (1920a)
2422198.794	-1427	+0.125	vis	1	Doberck (1920a)
2422667.246	-1396	+0.178	pg	1	Henroteau (1924)
2423028.962	-1372	-0.737	vis	0	{Eaton[3] (1920,1921,1922, 1923) and Walker[3] (1921)
2423513.067	-1340	-0.141	vis	1	Doberck (1924a)
2423573.673	-1336	+0.027	vis	1	Eaton[4] (1922,1923,1924)
2424374.528	-1283	+0.071	vis	1	Campbell[4] (1925, 1926)
2425174.974	-1230	-0.294	vis	1	Campbell[4] (1927, 1928)
2425749.422	-1192	-0.013	vis	1	Beyer (1934a)
2425900.762	-1182	+0.231	vis	1	Campbell[4] (1929, 1930)
2425976.176	-1177	+0.097	vis	1	Lassovszky (1932b)
2426520.192	-1141	+0.166	vis	1	Beyer (1934a)
2426626.566	-1134	+0.772	vis	0	Campbell[4] (1931, 1932)
2426822.299	-1121	+0.080	vis	1	Lassovszky (1932b)

Table 22 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2426912.898	-1115	$+0\overset{d}{.}021$	vis	1	Florya, Kukarkina (1953)
2426913.31	-1115	+0.43	pg	0.5	Sandig (1948)
2427275.777	-1091	+0.268	vis	1	Florya, Kukarkina (1953)
2427351.2	-1086	+0.1	vis	0.5	Miczaika (1934b)
2427517.521	-1075	+0.258	vis	1	Campbell[4] (1933,1934,1935)
2427576.71	-1071	-0.99	pg	0	Sandig (1948)
2427593.60	-1070	+0.79	vis	0	Solov'yov (1935)
2428197.437	-1030	+0.240	vis	0.5	Dziewulski (1948a)
2428530.03	-1008	+0.42	pg	0.5	Sandig (1948)
2428997.6	-977	-0.4	vis	0.5	Krebs (1939)
2429330.464	-955	+0.044	pg	0.5	Uranova (1950)
2429360.17	-953	-0.47	pg	0.5	Sandig (1948)
2430659.819	-867	-0.249	pg	1	Filin (1951)
2431702.567	-798	-0.067	pg	1	Filin (1951)
2432201.239	-765	-0.013	pg	1	Kulikov (1957)
2432820.760	-724	+0.013	pg	1	Filin (1951)
2434588.194	-607	-0.381	pg	1	Kulikov (1957)
2435389.154	-554	-0.232	pg	1	Kulikov (1957)
2436779.369	-462	-0.104	pe	3	Oosterhoff (1960)
2436794.540	-461	-0.043	pe	3	Weaver et al. (1960)
2436839.40	-458	-0.51	vis	0.5	Busch et al. (1964)
2437202.34	-434	-0.20	vis	0.5	Busch et al. (1964)
2437217.632	-433	-0.021	pe	2	Mitchell et al. (1964)
2437927.38	-386	-0.43	vis	0.5	Busch et al. (1964)
2437942.574	-385	-0.342	pg	1	Girnyak (1971)
2438229.979	-366	-0.020	pe	3	Kwee, Braun (1967)
2439302.479	-295	-0.305	pg	1	Girnyak (1971)
2443760.486	0	+0.358	pe	3	present paper

Remarks: [1] Observer: Hartwig; [2] Obs.: Whitney, [3] Obs.: McAteer; [4] Obs.: Peltier

SV Monocerotis

The light and colour curves of SV Mon are shown in Fig. 35. The O-C residuals have been calculated using the formula:

$$C = 2443794.338 + 15\overset{d}{.}232780 \times E \quad .$$

The period has been constant with the value used in the ephemeris since J.D. 2433000; earlier reliable values for the period cannot be determined (see Fig. 36).

Table 23 O-C residuals for SV Mon

Obs.Max.J.D.	E	O-C	Type	w	Reference
2419041.759	-1625	$+0\overset{d}{.}689$	pg	0.5	Robinson (1933)
2422621.464	-1390	+0.690	vis	1	Esch (1921)
2422728.089	-1383	+0.686	vis	1	Leiner (1921)
2423047.978	-1362	+0.686	vis	1	Leiner (1926b)
2423459.184	-1335	+0.607	vis	1	Leiner (1926b)
2423809.690	-1312	+0.759	vis	1	Leiner (1926b)
2424419.659	-1272	+1.417	vis	0.5	Leiner (1926b)
2427008.827	-1102	+1.013	vis	1	Florya, Kukarkina (1953)

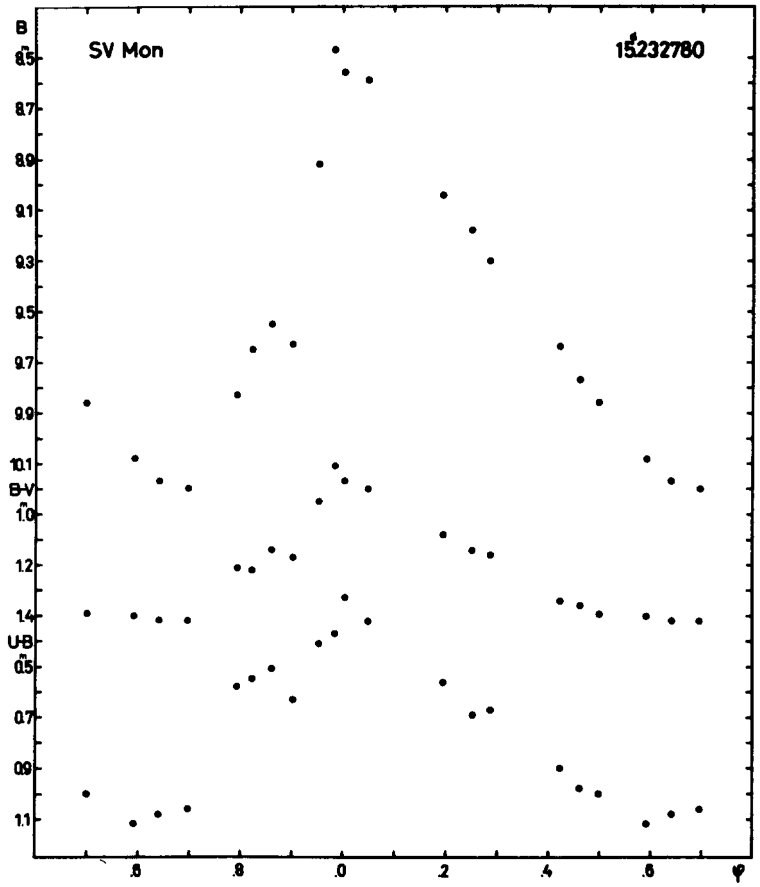

Figure 35 B, B-V and U-B curves of SV Mon

Table 23 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2429964.707	-908	+1.^{d}733	vis	0	Esch (1936)
2431608.67	-800	+0.56	vis	0.5	Nielsen[1] (1955)
2433192.420	-696	+0.097	pg	1	Satyvaldiev (1970)
2434045.326	-640	-0.033	pg	1	Satyvaldiev (1970)
2435477.219	-546	-0.021	pe	3	Walraven et al. (1958)
2435538.224	-542	+0.053	pg	1	Satyvaldiev (1970)
2436848.276	-456	+0.086	pg	1	Satyvaldiev (1970)
2437564.109	-409	-0.022	pe	3	Mitchell et al. (1964)
2437899.291	-387	+0.039	pe	2	Eggen (1969)
2438097.263	-374	-0.015	pg	1	Fridel' (1971)
2438386.627	-355	-0.074	pg	1	Satyvaldiev (1970)
2439209.191	-301	-0.080	pe	2	Wamsteker (1972)
2439346.203	-292	-0.163	pe	2	Takase (1969)
2440732.705	-201	+0.156	pe	3	Pel (1976)
2441493.5	-151	-0.7	vis	0	Cragg (1976)

Table 23 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2442865.108	-61	$-0^{d}.030$	pe	2	Dean (1977)
2443794.342	0	+0.004	pe	3	present paper

Remark: ¹ Observer: Arthur Nielsen

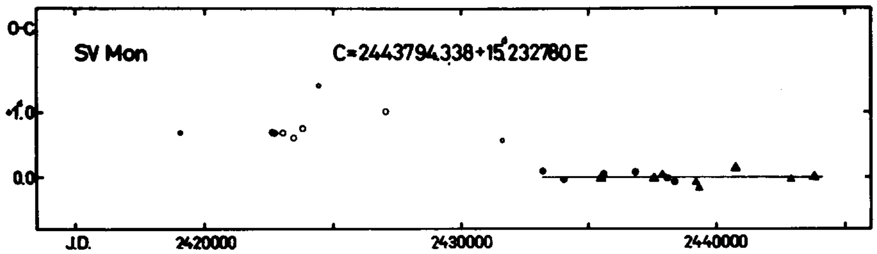

Figure 36 O-C diagram of SV Mon

X Cygni

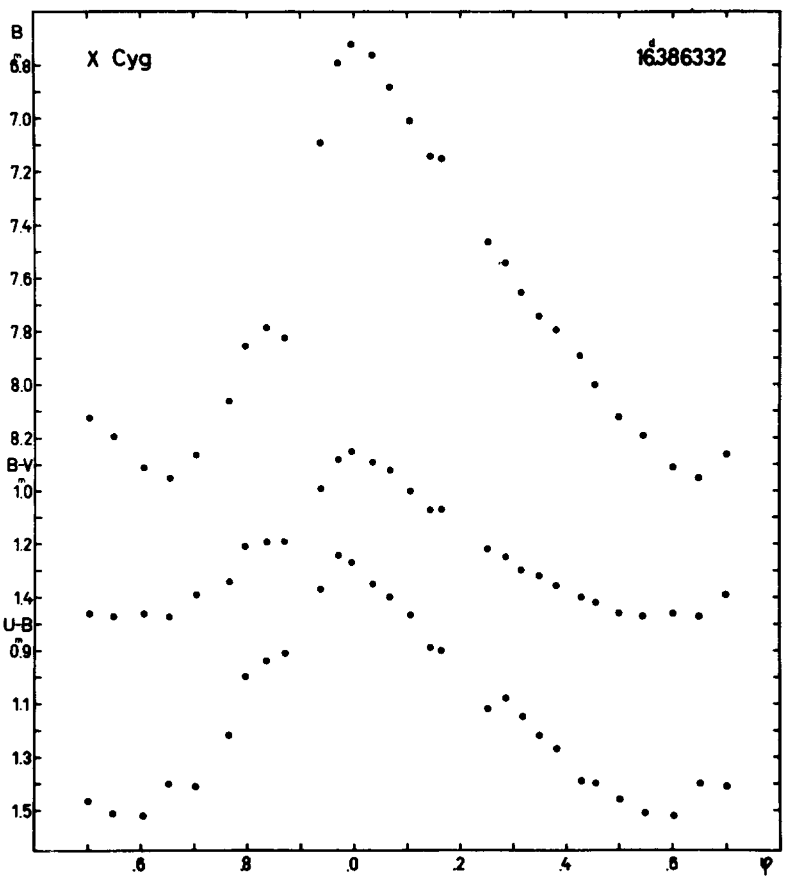

Figure 37 B, B-V and U-B curves of X Cyg

The light and colour curves of this bright Cepheid are shown in Fig. 37. According to Madore (1977) X Cyg has a B4 photometric companion.

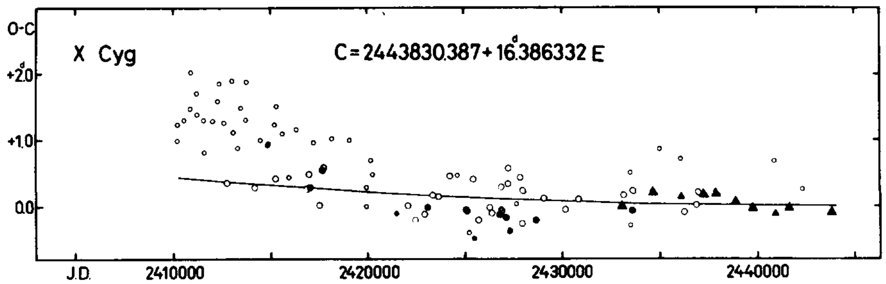

Figure 38 O-C diagram of X Cyg

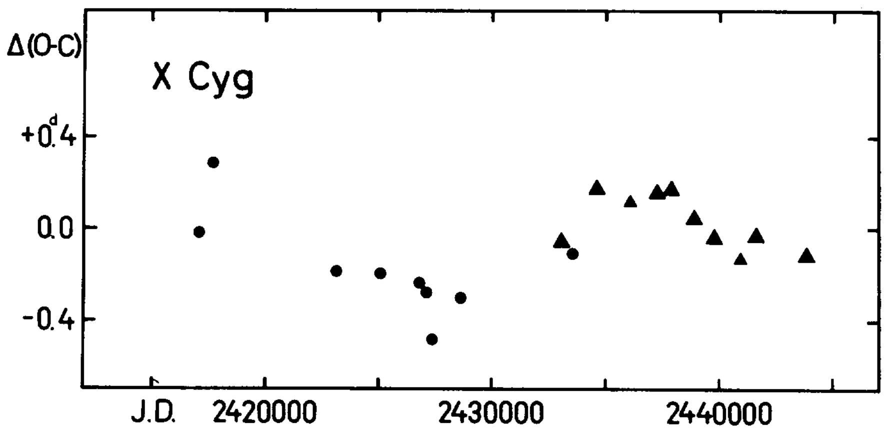

Figure 39 Deviations from the mean O-C curve

The O-C residuals have been computed using the formula:

$$C = 2443830.387 + 16\overset{d}{.}386332 \times E \quad .$$

The O-C diagram in Fig. 38 shows a slow period increase. The equation of the approximate parabola is as follows:

$$(O-C)_{par} = 1\overset{d}{.}01 \times 10^{-7} \times E^2 \quad .$$

The O-C residuals based on photoelectric and photographic observations show some systematic deviations from the above mentioned parabola. These Δ(O-C) deviations as a function of time are plotted in Fig. 39. Although a sinusoidal wave can be seen in this latter figure as if it were a result of the light-time effect, no variation can be found in the mean radial velocity of the star (Abt, 1978; Duncan, 1921; Evans, 1976). Only radial velocity observations made at different phases of the 55 year long cycle can resolve the problem.

Table 24 O-C residuals for X Cyg

Obs.Max.J.D.	E	O-C	Type	w	Reference
2410255.77	-2049	$+0^{d}.98$	vis	0.5	Chandler (1887)
2410256.02	-2049	+1.23	vis	0.5	Sawyer (1896)
2410551.04	-2031	+1.29	vis	0.5	Sawyer (1896)
2410568.28	-2030	+2.15	vis	0	Chandler (1887)
2410895.34	-2010	+1.48	vis	0.5	Sawyer (1896)
2410928.65	-2008	+2.02	vis	0.5	Yendell (1889a)
2411239.67	-1989	+1.70	vis	0.5	Yendell (1890a)
2411272.12	-1987	+1.38	vis	0.5	Sawyer (1896)
2411616.15	-1966	+1.29	vis	0.5	Yendell (1891a)
2411632.0	-1965	+0.8	vis	0.5	Gore (1892)
2411927.45	-1947	+1.25	vis	0.5	Dunér (1892)
2412009.41	-1942	+1.28	vis	0.5	Yendell (1892a)
2412321.05	-1923	+1.58	vis	0.5	Dunér (1893)
2412354.09	-1921	+1.85	vis	0.5	Yendell (1893a)
2412648.46	-1903	+1.26	vis	0.5	Corder (1894)
2412778.634	-1895	+0.346	vis	1	Moraes Pereira (1894)
2412829.563	-1892	+2.116	vis	0	Porro (1896)
2413025.97	-1880	+1.89	vis	0.5	Yendell (1895a)
2413107.12	-1875	+1.11	vis	0.5	Sawyer (1896)
2413336.29	-1861	+0.87	vis	0.5	Sperra (1895, 1896)
2413517.15	-1850	+1.48	vis	0.5	Hisgen (1896)
2413746.38	-1836	+1.30	vis	0.5	Sperra (1897b)
2413763.35	-1835	+1.88	vis	0.5	Yendell (1897)
2414204.170	-1808	+0.271	vis	1	Pickering (1904)
2414516.24	-1789	+1.00	vis	0.5	Luizet (1902a)
2414860.26	-1768	+0.91	vis	0.5	Luizet (1902a)
2414876.68	-1767	+0.94	vis	0.5	Yendell (1900)
2415204.68	-1747	+1.22	vis	0.5	Luizet (1902a)
2415269.413	-1743	+0.403	vis	1	Prittwitz (1907)
2415336.06	-1739	+1.50	vis	0.5	Yendell (1902a)
2415630.60	-1721	+1.09	vis	0.5	Luizet (1902a)
2415941.28	-1702	+0.43	vis	0.5	Yendell (1904)
2416351.66	-1677	+1.15	vis	0.5	Luizet (1912)
2416832.0	-1648	+6.8	vis	0	Furness[1] (1913a)
2416907.893	-1643	+0.249	vis	1	Prittwitz (1907)
2417039.215	-1635	+0.481	vis	1	Nijland (1923)
2417055.372	-1634	+0.251	pg	1	Wilkens (1906)
2417252.71	-1622	+0.95	vis	0.5	Luizet (1912)
2417530.338	-1605	+0.014	vis	1	Nijland (1923)
2417694.729	-1595	+0.542	pg	1	Jordan (1919)
2417743.921	-1592	+0.575	vis	1	Zeipel (1908)
2417810.20	-1588	+1.31	vis	0	Sperra (1909)
2418203.17	-1564	+1.01	vis	0.5	Luizet (1912)
2419104.41	-1509	+1.00	vis	0.5	Luizet (1912)
2419939.103	-1458	-0.012	vis	0.5	Kaiser (1915)
2419988.558	-1455	+0.284	vis	0.5	Kaiser (1915)
2420201.98	-1442	+0.68	vis	0.5	Dziewulski (1924a)
2420300.083	-1436	+0.469	vis	0.5	Hoffmeister (1916a)
2421512.089	-1362	-0.114	pg	0.5	Robinson (1933)
2422134.891	-1324	+0.008	vis	1	Leiner (1926b)
2422478.780	-1303	-0.216	vis	1	Leiner (1926b)

Table 24 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2422970.460	-1273	-0.126 d	vis	1	Hellerich (1922)
2423183.584	-1260	-0.025	pg	1	Henroteau (1924)
2423364.017	-1249	+0.159	vis	1	AFOEV[2] (1922, 1923)
2423675.346	-1230	+0.147	vis	1	Hellerich (1925)
2424314.718	-1191	+0.452	vis	1	Parenago (1938)
2424675.22	-1169	+0.46	vis	0.5	Azarnova[3] (1956)
2425117.137	-1142	-0.059	pg	1	Hellerich (1935)
2425133.508	-1141	-0.074	vis	1	Kukarkin (1940)
2425231.5	-1135	-0.4	vis	0.5	Lause (1937)
2425478.101	-1120	+0.406	vis	1	Parenago (1938)
2425559.129	-1115	-0.498	pg	0.5	Iwanowska et al. (1932)
2425690.504	-1107	-0.213	vis	1	Zverev (1936)
2426296.989	-1070	-0.023	vis	1	Kukarkin (1940)
2426428.000	-1062	-0.102	vis	1	Zverev (1936)
2426804.859	-1039	-0.129	pg	1	Kox (1935)
2426903.261	-1033	-0.045	vis	0.5	Dziewulski et al. (1948)
2426919.614	-1032	-0.078	vis	1	Florya, Kukarkina (1953)
2426919.975	-1032	+0.283	vis	1	Parenago (1938)
2427148.928	-1018	-0.173	pg	1	Dziewulski (1948b)
2427264.372	-1011	+0.567	vis	1	Jaschek (1938)
2427280.529	-1010	+0.337	vis	1	Florya, Kukarkina (1953)
2427328.968	-1007	-0.383	pg	1	Liau (1935)
2427624.336	-989	+0.031	vis	0.5	Dziewulski et al. (1948)
2427886.915	-973	+0.429	vis	1	Jaschek (1938)
2427951.757	-969	-0.274	vis	1	Miczaika (1937)
2428001.425	-966	+0.235	vis	1	Krebs (1936)
2428672.816	-925	-0.214	pg	1	Dziewulski (1948b)
2429050.036	-902	+0.120	vis	1	Conceicao-Silva (1949)
2430164.128	-834	-0.058	vis	1	Conceicao-Silva (1949)
2430819.740	-794	+0.101	vis	1	Conceicao-Silva (1949)
2433031.783	-659	-0.011	pe	3	Eggen (1951)
2433146.670	-652	+0.171	vis	1	Chadov (1953)
2433490.3	-631	-0.3	vis	0.5	Domke, Pohl[4] (1953)
2433491.1	-631	+0.5	vis	0.5	Domke, Pohl[5] (1953)
2433605.249	-624	-0.067	pg	1	Romano (1951)
2433638.317	-622	+0.229	vis	1	Chadov (1953)
2434605.093	-563	+0.211	pe	3	present paper[6]
2435015.398	-538	+0.858	vis	0.5	Azarnova (1956)
2435196.43	-527	+1.64	vis	0	Marks (1959)
2436096.180	-472	+0.142	pe	1	Svolopoulos (1960)
2436129.522	-470	+0.711	vis	0.5	Azarnova (1959)
2436259.812	-462	-0.090	vis	1	Latyshev (1969)
2436898.988	-423	+0.019	vis	1	Azarnova (1962)
2436964.715	-419	+0.201	vis	1	Mayall[7] (1964)
2437226.867	-403	+0.172	pe	3	Mitchell et al. (1964)
2437898.718	-362	+0.183	pe	3	Williams (1966)
2438881.767	-302	+0.052	pe	3	Wisniewski, Johnson (1968)
2439782.931	-247	-0.032	pe	3	present paper[8]
2440914.30	-178	+0.68	vis	0.5	Braune et al.[9] (1972)
2440929.879	-177	-0.127	pe	2	Evans (1976)
2441618.198	-135	-0.034	pe	3	Landis (1973)
2442372.254	-89	+0.251	vis	0.5	Berdnikov (1977)
2443830.274	0	-0.113	pe	3	present paper

Remarks: (Observers) [1] Whitney, [2] Ellsworth, Bernard, Houdard; [3] Vorontsoy-Veliaminov; [4] Mielke; [5] Sofronijewic; [6] Detre; [7] Oravec; [8] Abaffy; [9] Bauer

RW Camelopardalis

The light and colour curves of RW Cam are plotted in Fig. 40. The amplitude of the light variation is smaller than that given by Schaltenbrand and Tammann (1971). According to Madore (1977) this variable has a B2 photometric companion. The presence of an early type companion was also reported by Miller and Preston (1964).

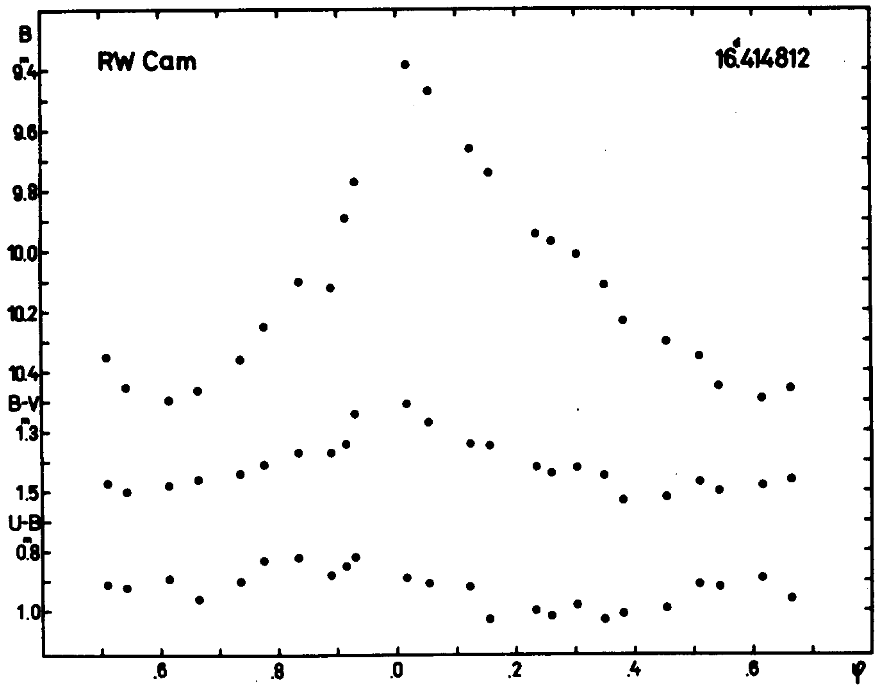

Figure 40 B, B-V and U-B curves of RW Cam

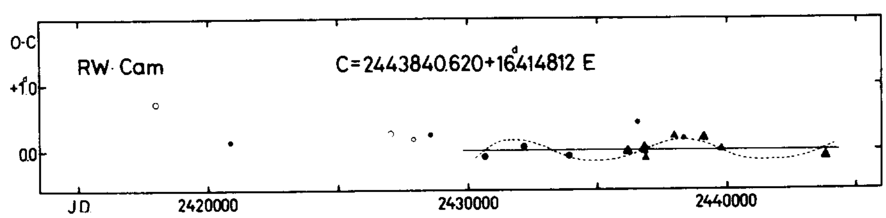

Figure 41 O-C diagram of RW Cam

The O-C residuals have been calculated with the ephemeris:

$$C = 2443840.620 + 16\overset{d}{.}414812 \times E \quad .$$

The O-C diagram in Fig. 41 also shows the presence of the com-

Table 25 O-C residuals for RW Cam

Obs.Max.J.D.	E	O-C	Type	w	Reference
2417955.185	-1577	$+0^d.724$	vis	1	Enebo (1908)
2420876.433	-1399	+0.135	pg	0.5	Robinson (1933)
2427015.703	-1025	+0.265	vis	1	Florya, Kukarkina (1953)
2427130.150	-1018	-0.191	vis	0	Dziewulski et al. (1946)
2427902.012	-971	+0.174	vis	0.5	Dziewulski (1947)
2428575.084	-930	+0.239	pg	0.5	Dziewulski et al. (1946)
2430643.017	-804	-0.094	pg	1	Filin (1958)
2432169.750	-711	+0.061	pg	1	Filin (1958)
2433909.575	-605	-0.084	pg	1	Filin (1958)
2436174.873	-467	-0.030	pe	3	Bahner et al. (1977)
2436552.861	-444	+0.418	pg	0.5	Nikulina (1970)
2436831.480	-427	-0.015	pe	3	Oosterhoff (1960)
2436831.546	-427	+0.051	pe	3	Weaver et al. (1960)
2436880.608	-424	-0.132	pe	3	Bahner et al. (1962)
2437964.318	-358	+0.201	pe	1	Williams (1966)
2438358.045	-334	-0.028	pg	0.5	Nikulina (1970)
2439113.340	-288	+0.186	pe	3	Wamsteker (1972)
2439786.182	-247	+0.021	pe	2	present paper[1]
2443840.515	0	-0.105	pe	3	present paper

Remark: [1] Observer: Abaffy

Table 26

Obs.Max.J.D.	O-C	Phase	Obs.Max.J.D.	O-C	Phase
2430643.017	$-0^d.094$	.097	2436880.608	$-0^d.132$	.043
2432169.750	+0.061	.329	2437964.318	+0.201	.207
2433909.575	-0.084	.592	2439113.340	+0.186	.381
2436174.873	-0.030	.936	2439786.182	+0.021	.483
2436831.480	-0.015	.035	2443840.515	-0.105	.097
2436831.546	+0.051	.035			

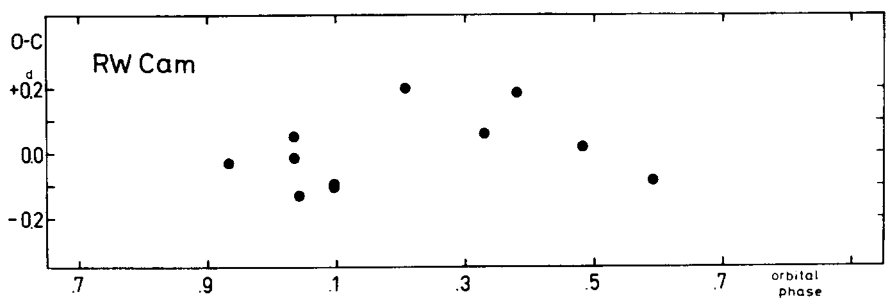

Figure 42 O-C variations due to orbital motion

panion. After J.D. 2430000 a wave-like structure can clearly be seen. The probable orbital period is $P_{orb}=6600^d \pm 300^d$ (see Table 26 and Fig. 42). Radial velocity measurements would be needed to check this value of the orbital period since the only series of radial velocity measurements is that of Joy (1937). Before J.D.

2430000 the period was shorter than that used in the ephemeris but the accurate value cannot be determined in lack of a satisfactory number of data points in the O-C diagram.

CD Cygni

The light and colour curves of this Cepheid are plotted in Fig. 43. The O-C residuals have been derived using the formula:

$$C = 2443831.167 + 17^{d}.073967 \times E \quad .$$

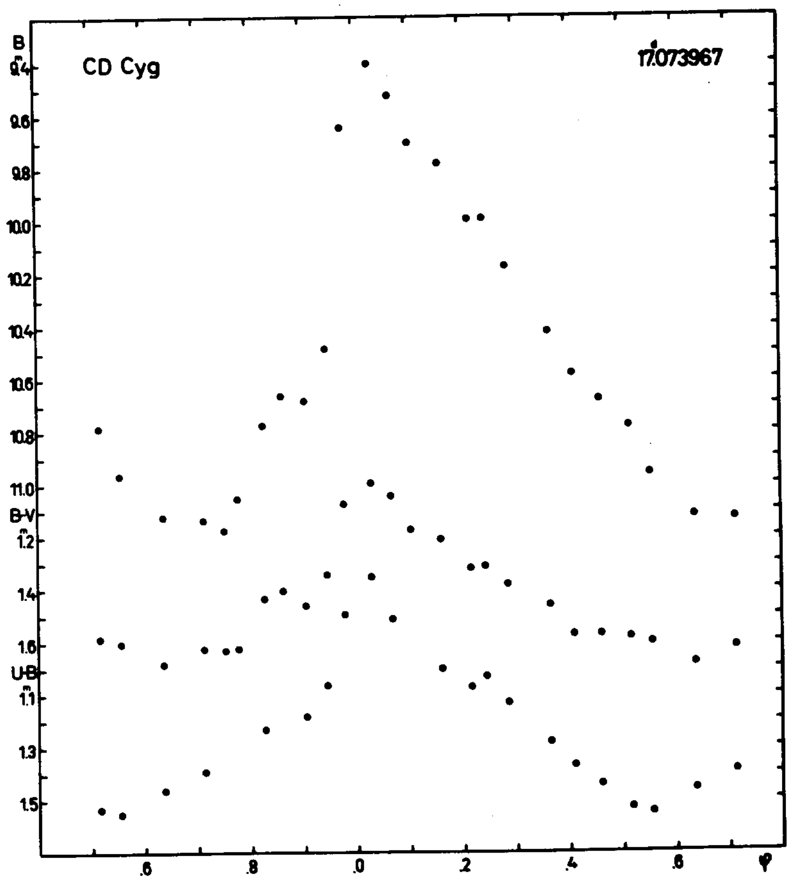

Figure 43 B, B-V and U-B curves of CD Cyg

The period of CD Cyg is continuously increasing. The positive parabola shown in Fig. 44 is a least squares fitted parabola to the O-C residuals. The equation of this parabola is

$$(O-C)_{par} = 1^{d}.54 \times 10^{-6} \times E^2 \quad .$$

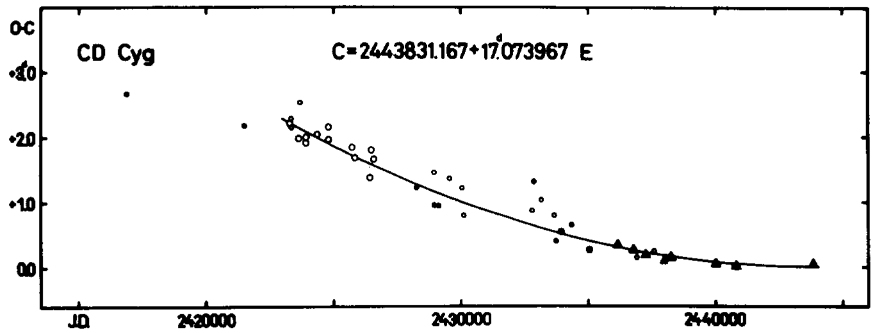

Figure 44 O-C diagram of CD Cyg

Table 27 O-C residuals for CD Cyg

Obs.Max.J.D.	E	O-C	Type	w	Reference
2416891.124	-1578	+2.677	pg	0.5	Kukarkin (1932d)
2421500.608	-1308	+2.190	pg	0.5	Robinson (1933)
2422972.7	-1222	+5.9	vis	0	Kristensen[1] (1923b)
2423276.338	-1204	+2.227	vis	1	Leiner (1924a)
2423327.6	-1201	+2.3	vis	0.5	Kristensen[2] (1923b)
2423344.570	-1200	+2.163	vis	0.5	Kristensen (1923b)
2423634.659	-1183	+1.995	vis	1	Leiner (1924a, 1926a)
2423686.431	-1180	+2.545	vis	0.5	Nielsen[1] (1933)
2423907.775	-1167	+1.927	vis	1	Nielsen[2] (1933)
2423924.936	-1166	+2.015	vis	1	Leiner (1926a)
2424368.905	-1140	+2.060	vis	1	Leiner (1926a)
2424795.868	-1115	+2.174	vis	1	Nielsen[2] (1933)
2424812.738	-1114	+1.970	vis	1	Nielsen[1] (1933)
2425734.623	-1060	+1.861	vis	1	Nielsen[2] (1933)
2425853.978	-1053	+1.698	vis	1	Nielsen[1] (1933)
2426434.190	-1019	+1.395	vis	1	Kukarkin (1932d)
2426468.767	-1017	+1.824	vis	1	Nielsen[1] (1933)
2426588.139	-1010	+1.679	vis	1	Nielsen[2] (1933)
2428193.727	-916	+2.314	vis	0	Dziewulski (1950)
2428260.945	-912	+1.236	pg	0.5	Wachmann (1966)
2428944.133	-872	+1.465	vis	0.5	Nielsen[2] (1952)
2428960.700	-871	+0.958	pg	0.5	Wachmann (1966)
2429148.50	-860	+0.95	pg	0.5	Smirnov (1946)
2429541.628	-837	+1.371	vis	0.5	Nielsen[1] (1952)
2430053.703	-807	+1.227	vis	0.5	Nielsen[3] (1952)
2430121.57	-803	+0.80	vis	0.5	Ashbrook (1943)
2432768.11	-648	+0.87	vis	0.5	Nielsen[4] (1955)
2432888.071	-641	+1.317	pg	0.5	Wachmann (1966)
2433160.98	-625	+1.04	vis	0.5	Nielsen[1] (1955)
2433672.96	-595	+0.80	vis	0.5	Nielsen[5] (1955)
2433740.850	-591	+0.398	pg	0.5	Jagott (1954)
2433928.810	-580	+0.544	pg	1	Shteiman (1958)
2434151.462	-567	+1.234	pg	0	Wachmann (1966)
2434355.773	-555	+0.658	pg	0.5	Jagott (1954)
2435055.408	-514	+0.260	pg	1	Shteiman (1958)
2435107.498	-511	+1.128	pg	0	Wachmann (1966)
2436165.306	-449	+0.350	pe	3	Bahner et al. (1971)

Table 27 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2436779.890	-413	$+0^{d}.271$	pe	3	Weaver et al. (1960)
2436796.966	-412	+0.273	pe	3	Oosterhoff (1960)
2436899.29	-406	+0.15	vis	0.5	Busch et al. (1964)
2437257.891	-385	+0.201	pe	3	Mitchell et al. (1964)
2437582.34	-366	+0.25	vis	0.5	Busch et al. (1964)
2437940.36	-345	-0.29	vis	0	Busch et al. (1964)
2437957.816	-344	+0.094	pe	1	Williams (1966)
2438231.052	-328	+0.146	pe	3	Kwee, Braun (1967)
2440006.657	-224	+0.059	pe	3	Asteriadis et al. (1977)
2440792.027	-178	+0.026	pe	3	Asteriadis et al. (1977)
2443831.224	0	+0.057	pe	3	present paper

Remarks: [1] Observer: Kierulff; [2] Obs.: Vaaben; [3] Obs.: Sjögren; [4] Obs.: Buhl; [5] Obs.: Darnell

SZ Aquilae

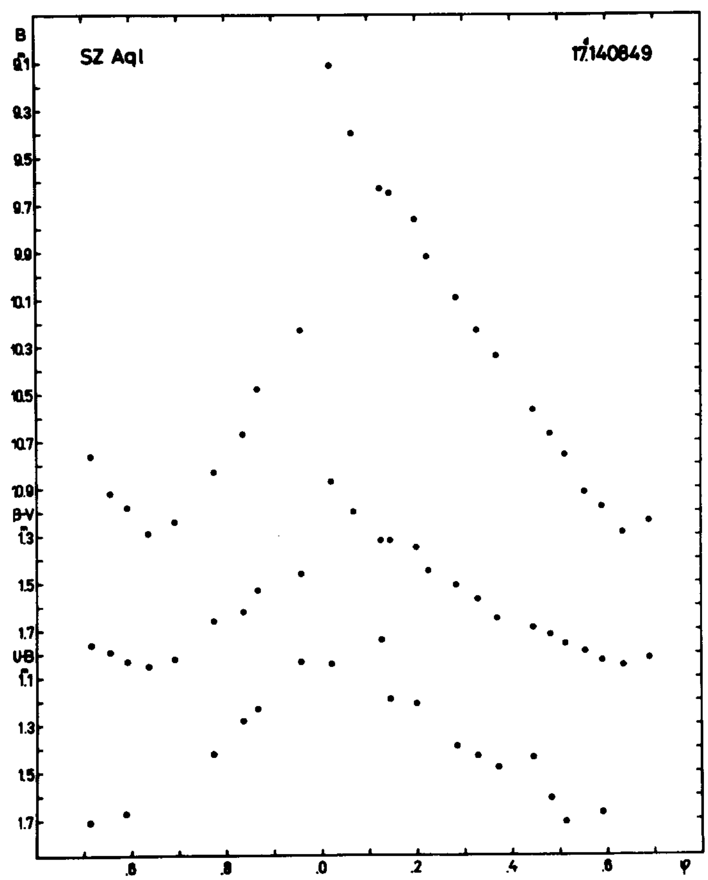

Figure 45 B, B-V and U-B curves of SZ Aql

Its light and colour curves are shown in Fig. 45. The O-C residuals have been calculated with the ephemerides:

$$C_{max} = 2443807.183 + 17\overset{d}{.}140849 \times E$$
$$C_{med} = 2443806.524 + 17\overset{d}{.}140849 \times E$$

for the maximum and median brightnesses, respectively. The period of SZ Aql is continuously increasing. The equation of the least squares fitted parabola shown in Fig. 46 is

$$(O-C)_{par} = 2\overset{d}{.}02 \times 10^{-6} \times E^2 \quad .$$

It is worth mentioning that the rate of the period increase is almost the same as in CD Cyg. This is important since the difference in the period of the two stars is less than 0.5 per cent.

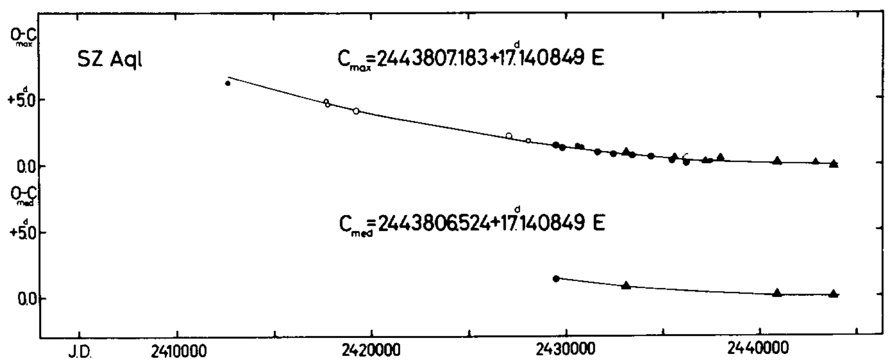

Figure 46 O-C diagram of SZ Aql

Table 28 O-C residuals for SZ Aql (maximum brightness)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2412685.63	-1816	$+6\overset{d}{.}23$	pg	0.5	Pickering (1907)
2417740.811	-1521	+4.859	vis	0.5	Ichinohe (1910)
2417809.1	-1517	+4.6	vis	0.5	Pickering (1908)
2419265.600	-1432	+4.113	vis	1	Biesbroeck et al. (1914)
2420258.765	-1374	+3.109	pg	0	Robinson (1933)
2423601.8	-1179	+3.7	vis	0	Hacar (1925)
2427097.073	-975	+2.218	vis	1	Florya, Kukarkina (1953)
2428125.097	-915	+1.791	vis	0.5	Dziewulski (1956b)
2429513.184	-834	+1.469	pg	1	Ahnert (1951)
2429547.473	-832	+1.476	pg	0.5	Solov'yov (1944)
2429838.681	-815	+1.290	pg	1	Erleksova (1960)
2430610.179	-770	+1.450	pg	0.5	Erleksova (1960)
2430832.873	-757	+1.313	pg	0.5	Filin (1948)
2431638.130	-710	+0.950	pg	1	Erleksova (1960)
2432460.734	-662	+0.793	pg	1	Erleksova (1960)
2433112.198	-624	+0.905	pe	3	Eggen (1951)
2433454.820	-604	+0.710	pg	1	Erleksova (1960)
2434414.613	-548	+0.615	pg	1	Erleksova (1960)

Table 28 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2435494.235	-485	$+0^{d}.364$	pg	1	Erleksova (1960)
2435580.096	-480	+0.521	pe	1	Walraven et al. (1958)
2436231.149	-442	+0.221	pg	1	Erleksova (1960)
2437156.786	-388	+0.252	pe	2	Mitchell et al. (1964)
2437465.336	-370	+0.267	pg	0.5	Zoj Von Shor (1963)
2437945.611	-342	+0.598	pe	1	Williams (1966)
2440910.526	-169	+0.146	pe	3	Pel (1976)
2441495.7	-135	+2.5	vis	0	Cragg (1976)
2442898.836	-53	+0.118	pe	2	Dean (1977)
2443807.095	0	-0.088	pe	3	present paper

Table 29 O-C residuals for SZ Aql

(median brightness)

Obs.Med.J.D.	E	O-C	Type	w	Reference
2429512.395	-834	$+1^{d}.339$	pg	1	Ahnert (1951)
2433111.359	-624	+0.725	pe	3	Eggen (1951)
2440909.789	-169	+0.068	pe	3	Pel (1976)
2443806.512	0	-0.012	pe	3	present paper

YZ Aurigae

YZ Aur has a faint companion within the edge of the diaphragm. This may be the reason that the amplitude of the light variation is less than that derived by Schaltenbrand and Tammann

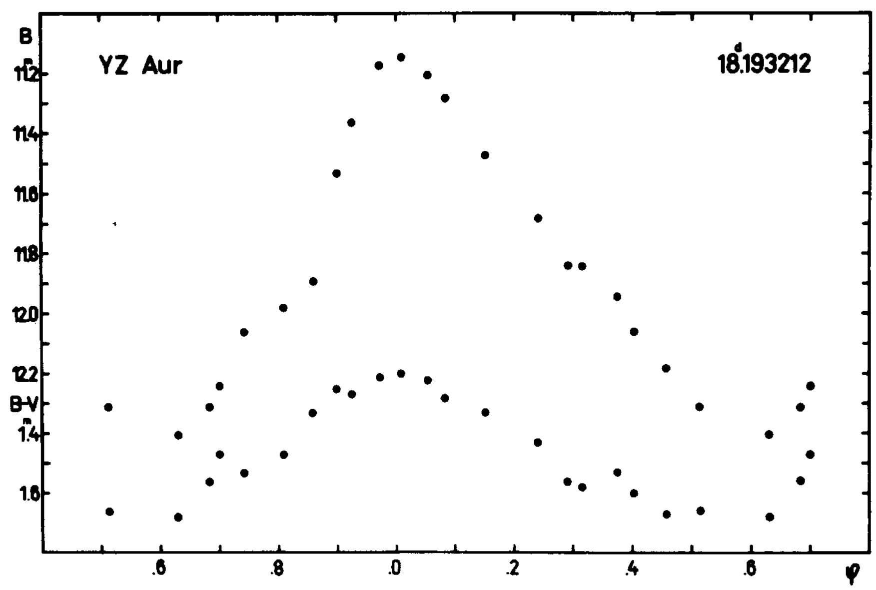

Figure 47 B and B-V curves of YZ Aur

(1971). The light curve in Fig. 47 shows the presence of a bump at the bottom of the ascending branch which is normal for a Cepheid with a period of 18 days but was unnoticed on the previous incomplete light curves. The Cepheid variable YZ Aur has a B3 photometric companion (Madore, 1977).

The O-C residuals have been computed with the formula:

$$C = 2443816.490 + 18\overset{d}{.}193212 \times E \quad .$$

The O-C diagram in Fig. 48 shows a rejumping period:

before J.D. 2428000 $P = 18\overset{d}{.}193121$

after J.D. 2429000 $P = 18\overset{d}{.}193212$.

The sudden period change and the rejump of the period took place between J.D. 2428000 and J.D. 2429000.

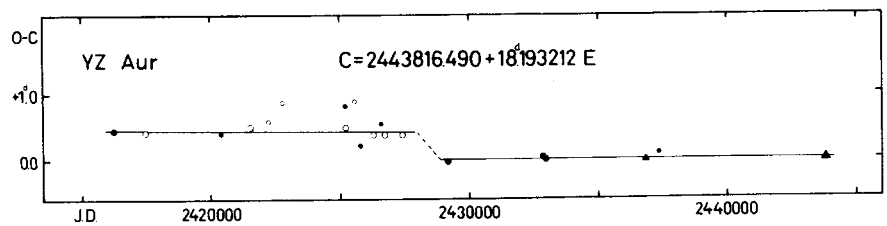

Figure 48 O-C diagram of YZ Aur

Table 30 O-C residuals for YZ Aur

Obs.Max.J.D.	E	O-C	Type	w	Reference
2416290.613	-1513	$+0\overset{d}{.}453$	pg	1	Yakimov (1962)
2417509.537	-1446	+0.432	vis	1	Williams (1918)
2420420.436	-1286	+0.417	pg	0.5	Robinson (1933)
2421548.525	-1224	+0.526	vis	1	Williams (1918)
2422239.93	-1186	+0.59	vis	0.5	Nijland (1935)
2422786.02	-1156	+0.88	vis	0.5	Nijland (1935)
2423386.79	-1123	+1.28	vis	0	Nijland (1935)
2425205.66	-1023	+0.83	pg	0.5	Oosterhoff (1935)
2425241.720	-1021	+0.499	vis	1	Beyer (1930)
2425587.785	-1002	+0.893	vis	0.5	Beyer (1930)
2425823.62	-989	+0.22	pg	0.5	Oosterhoff (1935)
2426315.010	-962	+0.390	vis	1	Kukarkin (1940)
2426606.26	-946	+0.55	pg	0.5	Oosterhoff (1935)
2426751.640	-938	+0.383	vis	1	Detre (1935)
2427424.795	-901	+0.389	vis	1	Detre (1935)
2428567.99	-838	-2.59	pg	0	Fu De-Lian (1964)
2429170.930	-805	-0.024	pg	1	Yakimov (1962)
2430245.058	-746	+0.704	vis	0	Lagrula (1941, 1942)
2432846.025	-603	+0.042	pg	1	Filatov (1958)
2432973.338	-596	+0.002	pg	1	Yakimov (1962)
2436830.288	-384	-0.009	pe	2	Weaver et al. (1960)
2437376.2	-354	+0.1	pg	0.5	Ahnert (1961)
2443816.489	0	-0.001	pe	3	present paper

VX Cygni

The light and colour curves of this variable are shown in Fig. 49. According to Madore (1977) VX Cyg has a B7 photometric companion.

The O-C residuals have been calculated using the formula:

$$C = 2443783.642 + 20^{d}.133407 \times E \quad .$$

The O-C diagram in Fig. 50 shows a continuous increase in period. The equation of the fitted parabola is:

$$(O-C)_{par} = 8^{d}.02 \times 10^{-7} \times E^{2} \quad .$$

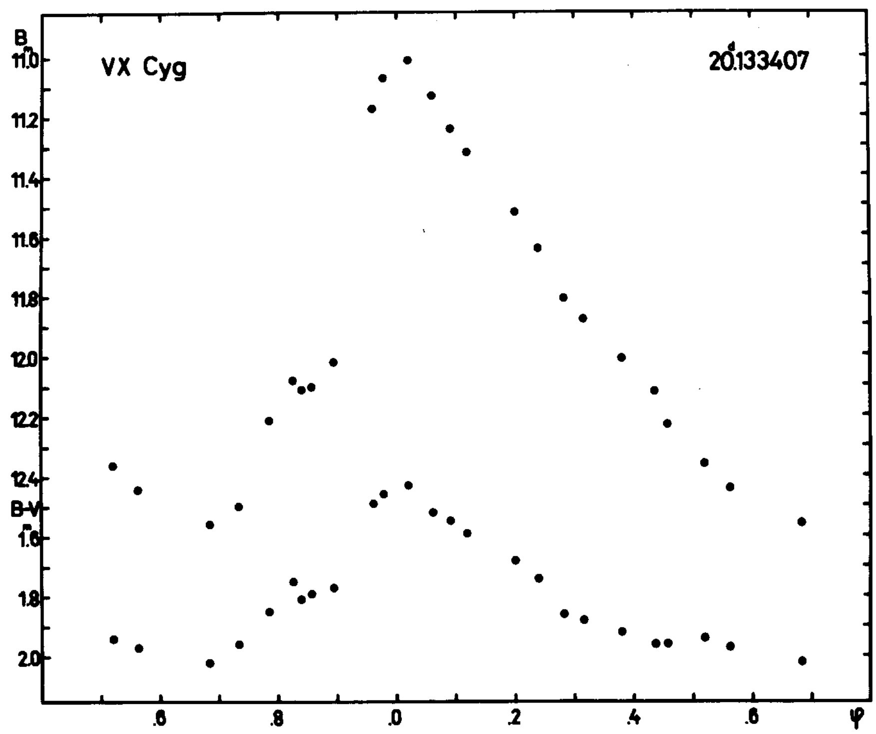

Figure 49 B and B-V curves of VX Cyg

Table 31 O-C residuals for VX Cyg

Obs.Max.J.D.	E	O-C	Type	w	Reference
2414976.2	-1431	$+3^{d}.5$	pg	0	Williams (1905)
2415337.4	-1413	+2.3	pg	0.5	Williams (1905)
2415477.663	-1406	+1.591	pg	1	Kulikovsky (1933)
2415681.0	-1396	+3.6	pg	0	Williams (1905)
2416423.86	-1359	+1.52	vis	0.5	Williams (1905)
2416424.0	-1359	+1.7	vis	0.5	Hartwig (1903)
2416726.78	-1344	+2.44	vis	0	Williams (1905)

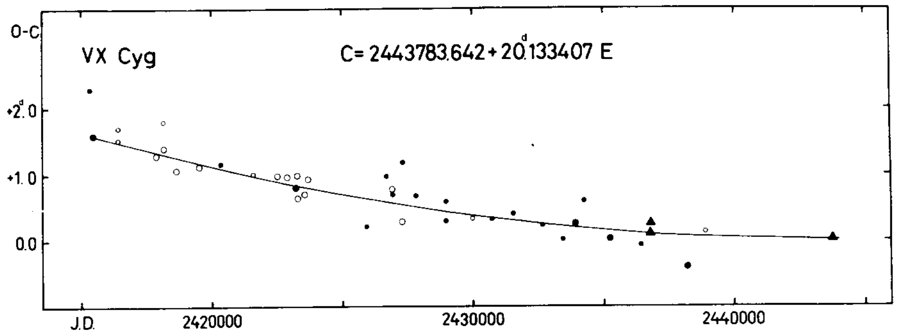

Figure 50 O-C diagram of VX Cyg

Table 31 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2417471.81	-1307	+2.53	vis	0	Seares (1907)
2417492.5	-1306	+3.1	vis	0	Müller, Hartwig (1918-1920)
2417873.230	-1287	+1.283	vis	1	Bilt (1925)
2417914.44	-1285	+2.23	vis	0	Müller, Hartwig[1] (1918-1920)
2418175.75	-1272	+1.80	vis	0.5	Müller, Hartwig[1] (1918-1920)
2418195.480	-1271	+1.398	vis	1	Bilt (1925)
2418658.210	-1248	+1.060	vis	1	Bilt (1925)
2419524.000	-1205	+1.113	vis	1	Bilt (1925)
2420369.659	-1163	+1.169	pg	0.5	Robinson (1933)
2421597.62	-1102	+0.99	vis	0.5	Parenago[2] (1949)
2422523.743	-1056	+0.979	vis	1	Leiner (1924b)
2422906.248	-1037	+0.949	vis	1	Leiner (1924b)
2423228.236	-1021	+0.803	pg	1	Henroteau (1924)
2423268.681	-1019	+0.981	vis	1	Leiner (1924b)
2423308.602	-1017	+0.635	vis	1	Doberck (1924c)
2423570.397	-1004	+0.696	vis	1	Leiner (1924b)
2423691.429	-998	+0.927	vis	1	Doberck (1924c)
2425925.52	-887	+0.21	pg	0.5	Oosterhoff (1935)
2426349.5	-866	+1.4	vis	0	Miczaika (1936)
2426711.48	-848	+0.97	pg	0.5	Oosterhoff (1935)
2426792.37	-844	+1.32	pg	0	Sandig (1948)
2426912.623	-838	+0.776	vis	1	Florya, Kukarkina (1953)
2426932.67	-837	+0.69	pg	0.5	Oosterhoff (1935)
2427294.665	-819	+0.283	vis	1	Florya, Kukarkina (1953)
2427315.68	-818	+1.17	pg	0.5	Oosterhoff (1935)
2427818.52	-793	+0.67	pg	0.5	Sandig (1948)
2428985.88	-735	+0.29	pg	0.5	Sandig (1948)
2429006.30	-734	+0.58	pg	0.5	Milstein (1946)
2429992.579	-685	+0.321	vis	0.5	Conceicao-Silva (1948)
2430717.381	-649	+0.320	pg	0.5	Nikulina (1970)
2431542.930	-608	+0.399	pg	0.5	Nikulina (1970)
2432670.232	-552	+0.231	pg	0.5	Nikulina (1970)
2433455.217	-513	+0.013	pg	0.5	Nikulina (1970)
2433918.520	-490	+0.247	pg	1	Shteiman (1958)
2434261.138	-473	+0.598	pg	0.5	Nikulina (1970)
2435226.968	-425	+0.024	pg	1	Shteiman (1958)

Table 31 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2436093.605	-382	+0ᵈ.924	pg	0	Korovkina (1958)
2436375.695	-368	+1.147	pg	0	Nikulina (1970)
2436434.88	-365	-0.07	pg	0.5	Korovkina (1959)
2436777.320	-348	+0.104	pe	3	Weaver et al. (1960)
2436797.613	-347	+0.263	pe	3	Oosterhoff (1960)
2436858.84	-344	+1.09	vis	0	Busch, Häussler (1968)
2437402.084	-317	+0.732	pg	0	Nikulina (1970)
2438206.277	-277	-0.411	pg	1	Dultsev (1967)
2438670.39	-254	+0.63	vis	0	Busch, Häussler (1968)
2438911.49	-242	+0.13	vis	0.5	Busch, Häussler (1968)
2443783.660	0	+0.018	pe	3	present paper

Remarks: [1] Observer: Belyavsky; [2] Observer: Doberck

T Monocerotis

The light and colour curves (Fig. 51) of this long period Cepheid are incomplete because the weather conditions during the

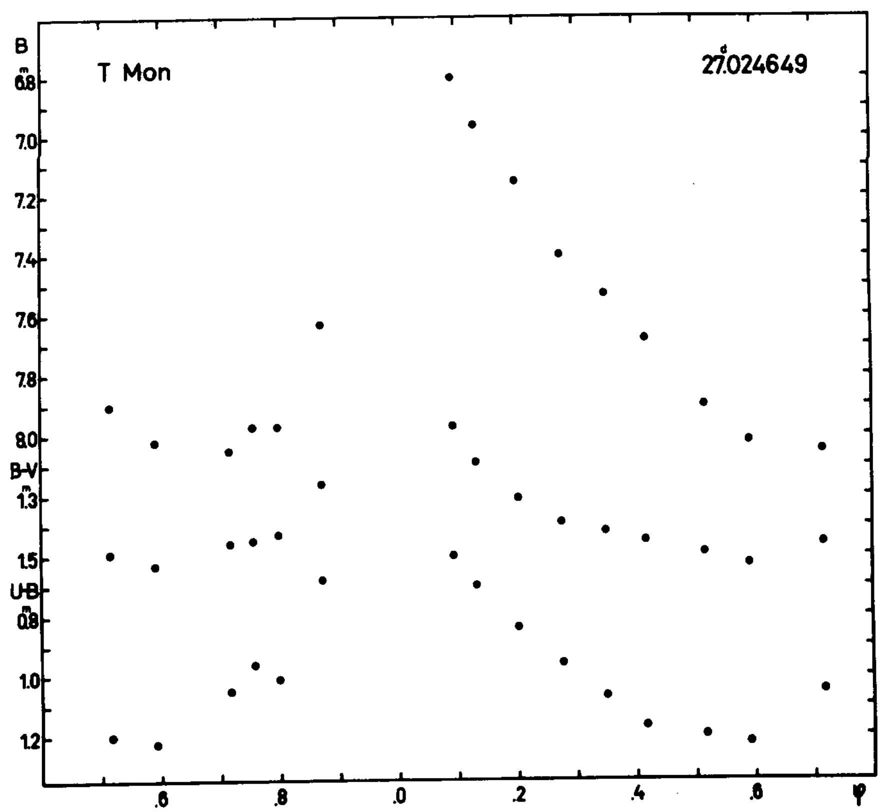

Figure 51 B, B-V and U-B curves of T Mon

observing runs did not permit observation of the star at the missing light curve phases. Based on IUE observations, Mariska et al. (1980) pointed out that T Mon has an A0 III companion.

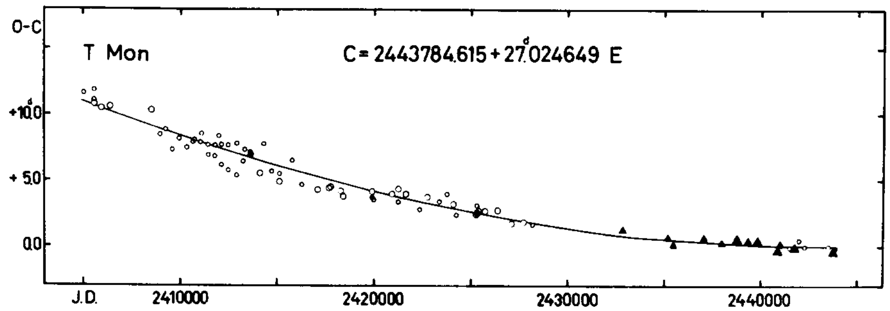

Figure 52 O-C diagram of T Mon

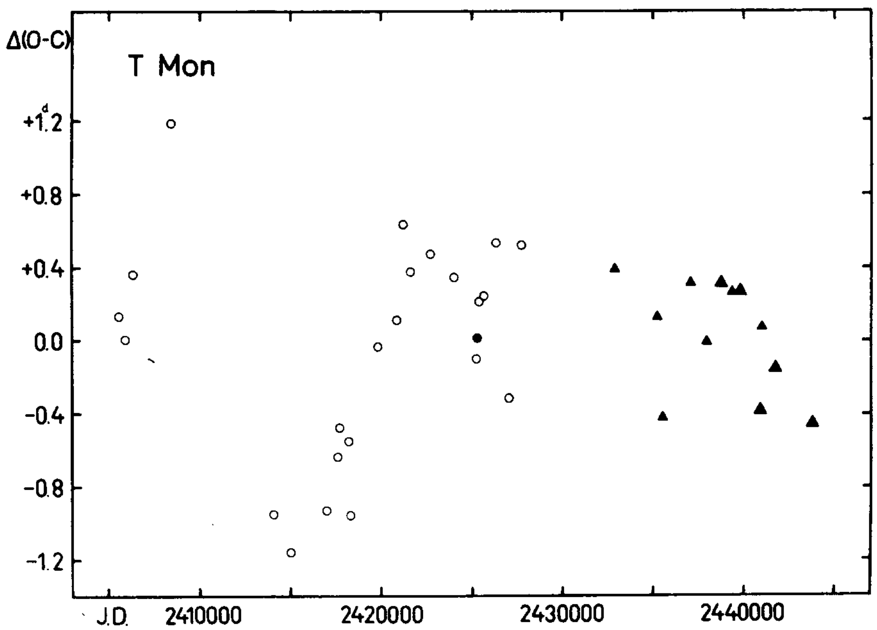

Figure 53 Deviations from the mean O-C curve

The O-C residuals have been computed with the formula:

$$C = 2443784.615 + 27\overset{d}{.}024649 \times E \quad .$$

The O-C diagram in Fig. 52 can well be approximated by the parabola:

$$(O-C)_{par} = 5\overset{d}{.}34 \times 10^{-6} \times E^2 \quad .$$

The deviation of each reliable O-C residual from this parabola is plotted in Fig. 53. These deviations have a wave-like trend. If this wave is attributed to the light-time effect, the orbital period would be about 100 years. Although the available radial velocity data are not very homogeneous (Evans, 1976; Sanford, 1927 and 1956, Wallerstein, 1972), the two series of Sanford's observations show a difference of about 2 km/sec in the average value of the radial velocity, thereby supporting the observability of the orbital motion.

Table 32 O-C residuals for T Mon

Obs.Max.J.D.	E	O-C	Type	w	Reference
2405015.8	-1435	$+11\overset{d}{.}6$	vis	0.5	Müller, Hartwig[1] (1918-1920)
2405555.8	-1415	+11.1	vis	0.5	Müller, Hartwig[1] (1918-1920)
2405556.62	-1415	+11.88	vis	0.5	Sanford[2] (1927)
2405582.574	-1414	+10.813	vis	1	Valentiner[3] (1900)
2405933.570	-1401	+10.488	vis	1	Valentiner[3] (1900)
2406366.087	-1385	+10.611	vis	1	Valentiner[3] (1900)
2408473.713	-1307	+10.314	vis	1	Sawyer (1883)
2408931.31	-1290	+8.49	vis	0.5	Sawyer (1885)
2409228.94	-1279	+8.85	vis	0.5	Sawyer (1885)
2409578.72	-1266	+7.31	vis	0.5	Sawyer (1887a)
2409930.90	-1253	+8.17	vis	0.5	Sawyer (1887b)
2410335.59	-1238	+7.49	vis	0.5	Sawyer (1888b)
2410660.29	-1226	+7.90	vis	0.5	Sawyer (1888a)
2410714.50	-1224	+8.06	vis	0.5	Yendell (1888)
2411038.63	-1212	+7.89	vis	0.5	Yendell (1889b)
2411066.28	-1211	+8.52	vis	0.5	Sawyer (1890a)
2411415.95	-1198	+6.87	vis	0.5	Sawyer (1890b)
2411416.76	-1198	+7.68	vis	0.5	Yendell (1890b)
2411767.19	-1185	+6.78	vis	0.5	Sawyer (1891)
2411768.05	-1185	+7.64	vis	0.5	Yendell (1891b)
2411957.926	-1178	+8.348	vis	0.5	Markwick (1892, 1894)
2412117.89	-1172	+6.16	vis	0.5	Sawyer (1896)
2412119.37	-1172	+7.64	vis	0.5	Yendell (1892b)
2412468.78	-1159	+5.73	vis	0.5	Sawyer (1896)
2412470.67	-1159	+7.62	vis	0.5	Yendell (1893b)
2412819.31	-1146	+4.94	vis	0	Sawyer (1896)
2412846.711	-1145	+5.319	vis	0.5	Porro (1896)
2412876.16	-1144	+7.74	vis	0.5	Yendell (1894)
2413226.16	-1131	+6.42	vis	0.5	Yendell (1895b)
2413308.11	-1128	+7.30	vis	0.5	Sperra (1895)
2413604.93	-1117	+6.85	vis	0.5	Hisgen (1897)
2413605.20	-1117	+7.1	vis	0.5	Yendell (1897)
2413606	-1117	+8	vis	0	Müller, Hartwig[4] (1918-1920)
2413659.0	-1115	+6.9	vis	0.5	Sperra (1897a)
2414090.032	-1099	+5.506	vis	1	Pickering (1904)
2414308.49	-1091	+7.77	vis	0.5	Yendell (1900)
2414711.75	-1076	+5.66	vis	0.5	Luizet (1902b)
2415089.305	-1062	+4.867	vis	1	Wendell (1909)
2415089.90	-1062	+5.46	vis	0.5	Luizet (1902b)
2415766.55	-1037	+6.50	vis	0.5	Yendell (1902b)
2416278.19	-1018	+4.67	vis	0.5	Nielsen[5] (1930a)

Table 32 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2417061.531	-989	$+4^{d}.294$	vis	1	Nijland (1923)
2417173.63	-985	+8.29	vis	0	Furness[6] (1913b)
2417656.144	-967	+4.365	vis	1	Zeipel (1908)
2417764.361	-963	+4.483	vis	1	Nijland (1923)
2418277.561	-944	+4.215	vis	1	Nijland (1923)
2418385.211	-940	+3.766	vis	1	Bemporad (1910)
2419844.940	-886	+4.164	vis	1	Kaiser (1915)
2419871.505	-885	+3.704	pg	0.5	Robinson (1933)
2419979.4	-881	+3.5	vis	0.5	Dziewulski (1924b)
2420925.705	-846	+3.943	vis	1	Luyten (1922)
2421249.41	-834	+3.35	vis	0.5	Nielsen[7] (1930a)
2421250.411	-834	+4.353	vis	1	Luyten (1922)
2421628.374	-820	+3.971	vis	1	Luyten (1922)
2422383.89	-792	+2.80	vis	0.5	Nielsen[8] (1930a)
2422736.133	-779	+3.720	vis	1	Gallisot (1923)
2423357.40	-756	+3.42	vis	0.5	Nielsen[9] (1930a)
2423790.35	-740	+3.98	vis	0.5	Sanford (1927)
2424086.834	-729	+3.188	vis	1	Eaton[10] (1924),Campbell[10] (1925)
2424221.16	-724	+2.39	vis	0.5	Nielsen[11] (1930a)
2425275.141	-685	+2.411	vis	1	Kukarkin (1940)
2425302.270	-684	+2.515	pg	1	Hellerich (1935)
2425302.9	-684	+3.1	vis	0.5	Lause (1937)
2425383.521	-681	+2.692	vis	1	Ahnert (1929)
2425680.746	-670	+2.646	vis	1	Zverev (1936)
2426356.475	-645	+2.759	vis	1	Zverev (1936)
2427085.110	-618	+1.728	vis	1	Florya, Kukarkina (1953)
2427734.385	-594	+2.412	vis	1	Krebs (1935)
2428193.05	-577	+1.66	vis	0.5	Nielsen (1941b)
2432840.908	-405	+1.276	pe	2	Eggen (1951)
2435191.449	-318	+0.672	pe	2	Irwin (1961)
2435488.134	-307	+0.086	pe	2	Walraven et al. (1958)
2435736.940	-298	+5.670	pg	0	Nikulina (1972)
2437056.133	-249	+0.656	pe	2	Mitchell et al. (1964)
2437974.560	-215	+0.245	pe	1	Williams (1966)
2438758.533	-186	+0.503	pe	3	Wisniewski, Johnson (1968)
2439352.984	-164	+0.411	pe	1	Takase (1969)
2439812.386	-147	+0.394	pe	3	present paper[12]
2440919.687	-106	-0.315	pe	3	Pel (1976)
2441001.207	-103	+0.131	pe	1	Evans (1976)
2441514.4	-84	-0.1	vis	0.5	Cragg (1976)
2441730.626	-76	-0.116	pe	3	Landis (1976)
2442001.5	-66	+0.5	vis	0.5	Böhme (1976)
2442298.250	-55	-0.009	vis	0.5	Berdnikov (1977)
2443214.40	-21	-2.70	vis	0	Busch[13] (1977)
2443541.383	-9	-0.010	vis	0.5	Busch[14] (1980)
2443784.184	0	-0.431	pe	3	present paper
2443838.47	+2	-0.19	vis	0.5	Busch[15] (1980)

Remarks: [1] from Uranometria Argentina; Observers: [2] Davis; [3] Schönfeld; [4] Prittwitz; [5] Worsell; [6] Whitney; [7] de Roy; [8] Bemporad; [9] Bernard; [10] Schuller; [11] Aurino; [12] Abaffy; [13] Rümmler; [14] Branzke; [15] Richter

SV Vulpeculae

The light and colour curves of the longest period programme star are shown in Fig. 54. The O-C residuals have been calculated with the formulae:

$$C_{max} = 2443715.321 + 44\overset{d}{.}994772 \times E$$
$$C_{med} = 2443711.336 + 44\overset{d}{.}994772 \times E$$

for the maximum and median brightnesses, respectively. The O-C diagram can well be approximated by a parabola after J.D. 2423000, indicating a continuous period shortening (see Fig. 55). The equation of the fitted parabola is

$$(O-C)_{par} = -2\overset{d}{.}063 \times 10^{-4} \times E^2 \quad .$$

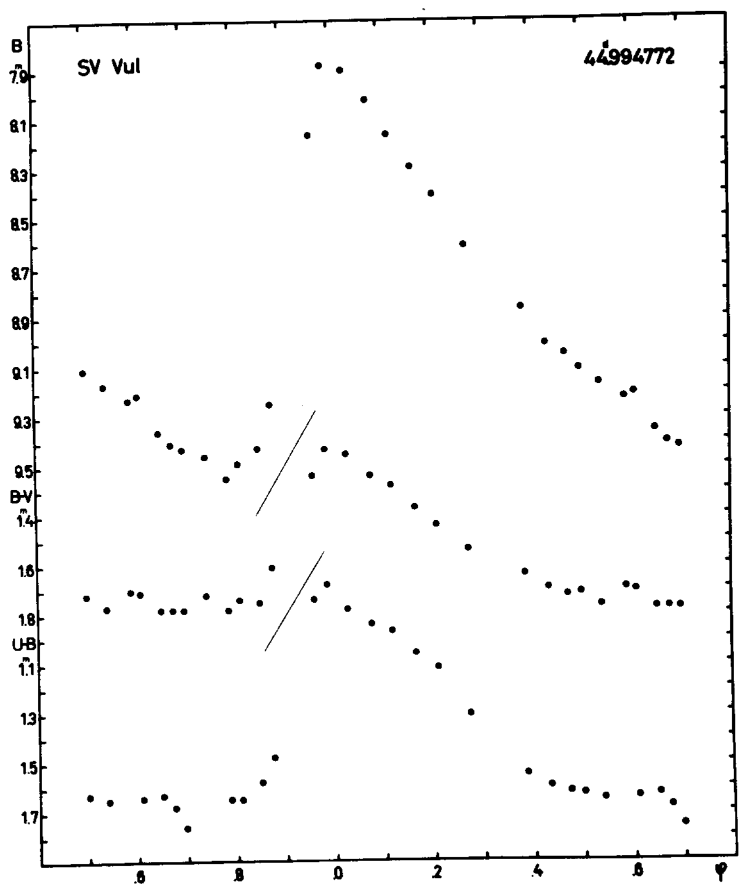

Figure 54 B, B-V and U-B curves of SV Vul

The deviations from this parabola are plotted in Fig. 56. Although there is a slight indication of a periodicity with P≈9000 days in this Δ(O-C) diagram, no other indication of the binary nature of SV Vul exists. The available radial velocity measurements (Fernie, 1979; Joy, 1937; Sanford, 1956) show the constancy of the average value of the radial velocity.

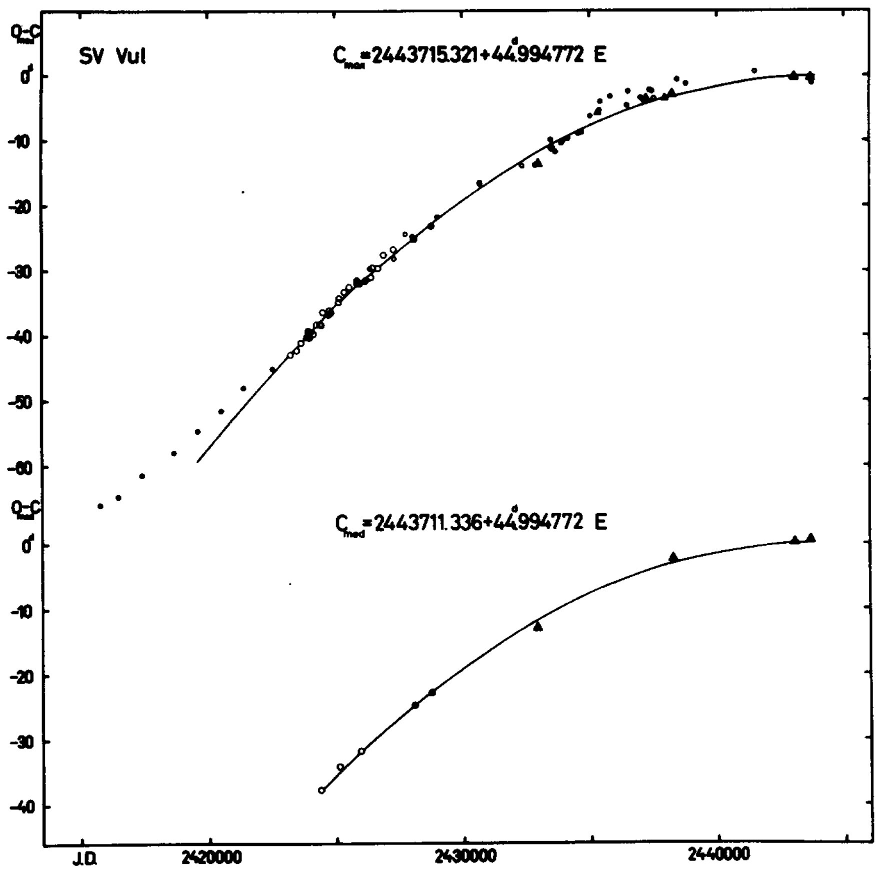

Figure 55 O-C diagram of SV Vul

Table 33 O-C residuals for SV Vul
(maximum brightness)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2415752.59	-620	-65^{d}.97	pg	0.5	Gerasimovic (1927a)
2416473.78	-604	-64.70	pg	0.5	Gerasimovic (1927a)
2417422.04	-583	-61.33	pg	0.5	Gerasimovic (1927a)
2418685.27	-555	-57.95	pg	0.5	Gerasimovic (1927a)
2419588.63	-535	-54.49	pg	0.5	Gerasimovic (1927a)
2420536.48	-514	-51.53	pg	0.5	Gerasimovic (1927a)

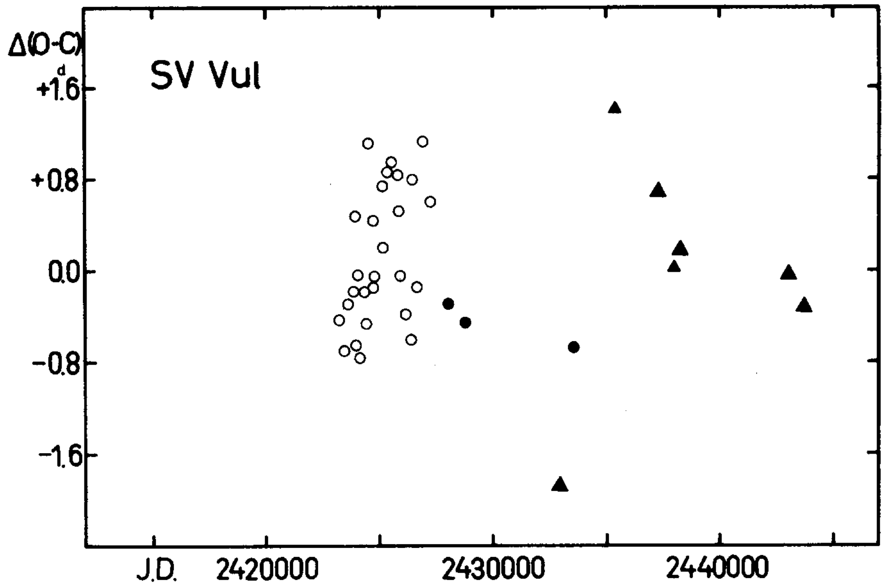

Figure 56 Deviations from the mean O-C curve

Table 33 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2421394.85	-495	-48.06 d	pg	0.5	Gerasimovic (1927a)
2422522.70	-470	-45.08	pg	0.5	Gerasimovic (1927a)
2423244.750	-454	-42.945	vis	1	Kristensen[1] (1923a, 1924)
2423470.375	-449	-42.293	vis	1	Leiner (1924c)
2423651.506	-445	-41.141	vis	1	Zakharov (1924a, 1924b)
2423877.492	-440	-40.129	vis	1	Kristensen[1] (1926)
2423923.337	-439	-39.279	vis	1	Beyer (1930)
2423967.382	-438	-40.229	vis	1	Ahnert (1931)
2424013.182	-437	-39.424	vis	1	Zakharov (1928)
2424147.972	-434	-39.618	vis	1	Leiner (1929)
2424329.238	-430	-38.331	vis	1	Zakharov (1928)
2424374.408	-429	-38.156	vis	1	Beyer (1930)
2424419.308	-428	-38.251	vis	1	Nielsen (1927b)
2424511.224	-426	-36.324	vis	1	Ahnert (1931)
2424735.814	-421	-36.708	vis	1	Leiner (1929)
2424736.399	-421	-36.123	vis	1	Beyer (1930)
2424781.074	-420	-36.443	vis	1	Zakharov (1928)
2425142.660	-412	-34.815	vis	1	Beyer (1930)
2425143.200	-412	-34.275	vis	1	Ahnert (1931)
2425369.141	-407	-33.308	vis	1	Leiner (1929)
2425549.866	-403	-32.562	vis	1	Beyer (1930)
2425865.562	-396	-31.829	vis	1	Ahnert (1931)
2425865.877	-396	-31.514	vis	1	Kukarkin (1940)
2425955.316	-394	-32.065	vis	1	Zakharov (1954a)
2426180.58	-389	-31.77	pg	0.5	Nassau, Townson (1932)
2426180.762	-389	-31.593	vis	1	Ahnert (1931)
2426362.56	-385	-29.77	vis	0.5	Nielsen (1937a)

Table 33 (cont.)

Obs.Max.J.D.	E	O-C	Type	w	Reference
2426406.297	-384	$-31^{d}.032$	vis	1	Zverev (1936)
2426452.863	-383	-29.460	vis	1	Terkán (1935)
2426677.678	-378	-29.619	vis	1	Kukarkin (1940)
2426904.699	-373	-27.572	vis	1	Florya, Kukarkina (1953)
2427265.340	-365	-26.889	vis	1	Florya, Kukarkina (1953)
2427309.0	-364	-28.2	vis	0.5	Miczaika (1934a)
2427762.809	-354	-24.363	vis	0.5	Dziewulski et al. (1947)
2428032.45	-348	-24.69	vis	0.5	Nielsen[2] (1952)
2428077.005	-347	-25.130	pg	1	Nassau, Ashbrook (1942)
2428422.03	-340	+4.93	pg	0	Fu De-Lian (1964)
2428753.872	-332	-23.185	pg	1	Dziewulski et al. (1946)
2429025.37	-326	-21.65	pg	0.5	Kholopov (1946)
2430695.04	-289	-16.79	vis	0.5	Nielsen[3] (1952)
2430695.11	-289	-16.72	vis	0.5	Kukarkin (1951)
2432362.68	-252	-13.96	vis	0.5	Nielsen[3] (1955)
2432857.74	-241	-13.84	pg	0.5	Wachmann (1966)
2432947.901	-239	-13.669	pe	3	Eggen (1951)
2433491.61	-227	-9.90	pg	0.5	Nikulina (1970)
2433535.293	-226	-11.210	pg	1	Chuprina (1953)
2433669.72	-223	-11.77	pg	0.5	Wachmann (1966)
2433896.09	-218	-10.37	vis	0.5	Nielsen[4] (1955)
2433941.34	-217	-10.12	vis	0.5	Dziewulski (1953)
2434166.73	-212	-9.70	pg	0.5	Wachmann (1966)
2434527.62	-204	-8.77	pg	0.5	Nikulina (1970)
2434617.73	-202	-8.65	pg	0.5	Dziewulski (1956a)
2434662.83	-201	-8.54	pg	0.5	Wachmann (1966)
2435025.01	-193	-6.32	pg	0.5	Wachmann (1966)
2435340.566	-186	-5.727	pe	1	Walraven et al. (1958)
2435387.87	-185	-5.37	pg	0.5	Wachmann (1966)
2435432.40	-184	-3.88	pg	0.5	Nikulina (1970)
2435838.11	-175	-3.13	pg	0.5	Huth (1966)
2436466.60	-161	-4.56	pg	0.5	Nikulina (1970)
2436513.77	-160	-2.39	pg	0.5	Huth (1966)
2437007.76	-149	-3.34	pg	0.5	Wachmann (1966)
2437232.486	-144	-3.588	pe	3	Mitchell et al. (1964)
2437368.90	-141	-2.16	pg	0.5	Huth (1966)
2437458.83	-139	-2.22	pg	0.5	Nikulina (1970)
2437547.5	-137	-3.5	vis	0.5	Lohsen (1964a)
2437952.641	-128	-3.349	pe	1	Williams (1966)
2438268.111	-121	-2.843	pe	3	Fernie et al. (1965)
2438450.46	-117	-0.47	pg	0.5	Huth (1966)
2438809.70	-109	-1.19	pg	0.5	Nikulina (1970)
2441511.4	-49	+0.8	vis	0.5	Cragg (1976)
2443085.325	-14	-0.069	pe	3	Fernie (1979)
2443715.004	0	-0.317	pe	3	present paper
2443759.32	+1	-1.00	vis	0.5	Busch[5] (1980)

Remarks: [1] Observer: Axel Nielsen; [2] Obs.: Moller Nicolaisen; [3] Obs.: Arthur Nielsen; [4] Obs.: Darsenius; [5] Obs.: Branzke

Table 34 O-C residuals for SV Vul (median brightness)

Obs.Med.J.D.	E	O-C	Type	w	Reference
2424370.940	-429	$-37^{d}.639$	vis	1	Beyer (1930)
2425139.462	-412	-34.028	vis	1	Beyer (1930)

Table 34 (cont.)

Obs.Med.J.D.	E	O-C	Type	w	Reference
2425951.669	-394	$-31^{d}.727$	vis	1	Zakharov (1954a)
2428073.392	-347	-24.758	pg	1	Nassau, Ashbrook (1942)
2428750.349	-332	-22.723	pg	1	Dziewulski et al. (1946)
2432944.568	-239	-13.017	pe	3	Eggen (1951)
2438264.733	-121	-2.236	pe	3	Fernie et al. (1965)
2443081.677	-14	+0.268	pe	3	Fernie (1979)
2443711.761	0	+0.425	pe	3	present paper

GENERAL REMARKS

Period changes, instability of the period

From the point of view of stellar evolution, it is even more important to study the period changes of the long period Cepheids than the short period ones. The tendency of the long period Cepheids to undergo a considerable amount of period change has been known for a long time (e.g. Parenago, 1956). Parenago, however, found that all the period changes were sudden. In this part of this series on Cepheids there are 17 stars for which Parenago also published O-C diagrams. On the basis of the newly constructed O-C diagrams for 11 stars out of the 17, the diagrams can be approximated by parabolas, thereby supporting the existence of Cepheids with continuously changing (increasing or decreasing) period.

The statistics of the observed period changes based on the whole programme (Papers I and II and the present paper) as well as the comparison of the theoretically calculated evolutionary period changes with the observed changes in the period will be published in a separate paper.

Cepheid binaries

The role of binaries in Cepheid research has seen an increase of late, since the frequency of Cepheids with companions is estimated to be at least as high as 20 per cent (Madore, 1977). Recent discoveries, viz. that AU Peg (Harris et al., 1979) and T Mon (Mariska et al., 1980) are also members in binary systems, indicate that the above mentioned frequency is really a lower limit of the true value.

Cepheids in binaries are important in several respects. They may serve as fundamental stars in deriving Cepheid masses and in a new calibration of the period - luminosity - colour relation. Moreover, their existence stresses the importance of some theoretical investigations to be made concerning the pulsational behaviour of a Cepheid in a binary system (non-radial pulsation) and their evolutionary status.

The membership of a Cepheid in a binary system causes two effects which can be observed in the O-C diagram:

1. Periodic quasi sinusoidal variation due to the light-time effect. The present sample contains at least four stars (RW Cam, X Cyg, SZ Cyg, T Mon) showing this kind of apparent period change. The duplicity of ζ Gem and SV Vul is rather doubtful. The value of the orbital period of RW Cam has been able to be determined using the O-C diagram (see p. 63): $P_{orb} = 6600 \pm 300$ days. In the other three cases less accurate (and considerably longer) values for the orbital period could be determined.

2. Rejumping period (or "stepwise" O-C diagram). YZ Aur is a very clear example showing this kind of period change (see Fig. 48). The O-C diagram of SV Per can be interpreted as showing either a rejumping period or a ligth-time effect (but based on the shape of the O-C diagram in Fig. 18, the former interpretation is preferred). In the case of AN Aur the occurrence of the rejump can only be suspected since the period change was accompanied by a change in the shape of the light curve – as in the case of SU Cyg (Paper I, p. 77).

If both the orbital period and the amount of the apparent O-C variation can be determined from the O-C diagram, some conclusions can be drawn as to the mass of the binary system without using any spectroscopic data. A detailed description of these results along with a summary of the other data on Cepheid binaries will be published in a separate paper.

Summary of the observations

The fundamental parameters of the light variations of the observed Cepheids are summarized in Table 35. The successive columns contain the following data:

1. Name of the Cepheid
2. Period of light variation
3. Decimal logarithm of the period
4-5. The moments of the normal maximum and normal median bright-

Table 35 Summary

Name	Period	$\log P$	Norm.Max. Hel.J.D.	Norm.Med. 2440000+	$\frac{\text{Max.-Med.}}{P}$	Type
SZ Aql	$17^{d}.140849$	1.2340	3807.095	3806.512	0.034	I
TT Aql	13.754707	1.1385	3810.884	3810.059	0.060	I
RX Aur	11.623537	1.0653	3829.995	3828.182	0.156	I
SY Aur	10.144698	1.0062	3832.981	3830.333	0.251	I
YZ Aur	18.193212	1.2599	3816.489	3814.233	0.124	I
AN Aur	10.29056	1.0124	3799.026	3795.918	0.302	I
RW Cam	16.414812	1.2152	3840.515	3839.070	0.088	I
RW Cas	14.791548	1.1700	3830.363	3829.608	0.051	I
RY Cas	12.138888	1.0842	3826.585	3824.218	0.195	I
SZ Cas	13.637747	1.1347	3817.966	3815.594	0.174	Is
X Cyg	16.386332	1.2145	3830.274	3828.783	0.091	I
SZ Cyg	15.109642	1.1793	3760.486	3758.688	0.119	I
TX Cyg	14.7098	1.1676	3794.971	3794.235	0.050	I
VX Cyg	20.133407	1.3039	3783.660	3782.050	0.080	I
BZ Cyg	10.141932	1.0061	3774.144	3770.970	0.313	Is
CD Cyg	17.073967	1.2323	3831.224	3830.490	0.043	I
AA Gem	11.302328	1.0532	3737.679	3735.147	0.224	I
ζ Gem	10.150135	1.0065	3785.473	3782.611	0.282	Is
AP Her	10.4156	1.0177	3745.357	3743.441	0.187	II
Z Lac	10.885613	1.0369	2827.154	2825.369	0.164	I
T Mon	27.024649	1.4318	3784.184	-	-	I
SV Mon	15.232780	1.1828	3794.342	3793.352	0.065	I
SV Per	11.129318	1.0465	3839.246	3838.322	0.083	I
VX Per	10.88904	1.0370	3758.994	3755.650	0.307	I
SV Vul	44.994772	1.6532	3715.004	3711.761	0.072	I

nesses derived from the observations listed in Table 3

6. Fractional period between the moment of median brightness and that of the subsequent light maximum (a measure of the asymmetry of the light curve)

7. Type of Cepheid

8-10. The maximum and minimum magnitudes and the amplitude in V

11-13. The corresponding quantities for B as under 8-10

14-16. The corresponding quantities for U as under 8-10

17. Name of Cepheid

of the observations

V_{max}	V_{min}	A_V	B_{max}	B_{min}	A_B	U_{max}	U_{min}	A_U	Name
$7^{m}.95$	$9^{m}.24$	$1^{m}.29$	$8^{m}.99$	$11^{m}.08$	$2^{m}.09$	$10^{m}.18$:	$12^{m}.76$:	$2^{m}.58$:	SZ Aql
6.56	7.58	1.02	7.52	9.19	1.67	8.20	10.81	2.61	TT Aql
7.34	8.03	0.69	8.12	9.17	1.05	8.67	10.05	1.38	RX Aur
8.73	9.37	0.64	9.64	10.60	0.96	10.33:	11.43:	1.10:	SY Aur
9.94	10.75	0.81	11.13	12.41	1.28				YZ Aur
10.20	10.80	0.60	11.33	12.24	0.91				AN Aur
8.16	9.00	0.84	9.37	10.48	1.11	10.24	11.44	1.20	RW Cam
8.55	9.75	1.20	9.45	11.36	1.91				RW Cas
9.38	10.35	0.97	10.52	11.94	1.42				RY Cas
9.61	10.03	0.42	10.94	11.59	0.65				SZ Cas
5.87	6.87	1.00	6.72	8.34	1.62	7.29	9.79	2.50	X Cyg
8.94	9.82	0.88	10.22	11.61	1.39				SZ Cyg
8.82	10.00	1.18	10.41	12.11	1.70				TX Cyg
9.57	10.54	0.97	10.98	12.54	1.56				VX Cyg
10.05	10.53	0.48	11.54	12.24	0.70				BZ Cyg
8.34	9.52	1.18	9.29	11.15	1.86	9.98	12.58	2.60	CD Cyg
9.40	10.00	0.60	10.35	11.30	0.95				AA Gem
3.66	4.17	0.51	4.35	5.10	0.75	4.87	5.94	1.07	ζ Gem
10.43	11.15	0.72	11.06	12.08	1.02				AP Her
7.89	8.82	0.93	8.73	10.18	1.45	9.33	11.23	1.90	Z Lac
5.61:	6.60	0.99:	6.49:	8.05	1.56:	7.08:	9.28	2.20:	T Mon
7.63	8.78	1.15	8.43	10.21	1.78	8.79	11.26	2.47	SV Mon
8.49	9.35	0.86	9.38	10.53	1.15				SV Per
8.98	9.68	0.70	10.08	11.09	1.01	10.85	12.12	1.27	VX Per
6.74	7.76	1.02	7.86	9.53	1.67	8.66	11.20	2.54	SV Vul

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AC ANDROMEDAE

ABSTRACT

More than five thousand photographic observations of AC Andromedae made at the Konkoly Observatory between 1935 and 1956, as well as 680 photoelectric ones (obtained in the period 1954 - 1956) are published. The values of the three periods are refined.

INTRODUCTION

The variable star AC And (BD +47°4104, $9^m.4$) was discovered by *Guthnick* and *Prager* (1927). The discoverers and the other observers, especially *Lause* (1932, 1933) were long at a loss for an explanation of its strong light curve variations. The light variation was sometimes definitely of RR Lyrae type, but in spite of the efforts made, no adequate period could be derived for the light changes. Ten years after the star's discovery, *Florja* (1937) made considerable progress in investigating its strange behaviour. He complemented the previously published observations with his own visual ones and on thoroughly investigating the light curves, he found that the course of the light variation could be described as the linear superposition of the light curves of two RR Lyrae type stars, one of which had a period of 0.525 day; the other having 0.711 day and a somewhat smaller amplitude. Subsequent observers also found that when the maxima of the 0.525 day and 0.711 day cycles coincided the observed maxima were high, otherwise they remained low or completely disappeared.

The strange behaviour of this star also aroused *L. Detre*'s interest and in 1935 he included AC And into the observing programme of Konkoly Observatory. In 1941, the present author also took up the observations. Up to 1954, observations had been carried out photographically; numerous photoelectric observations were obtained between 1954 and 1956. The photoelectric observations made from 1958 through 1962 were analysed by *Fitch* and *Szeidl* (1976).

It was realized that *Florja*'s periods could not explain the characteristics of the light curves in a satisfactory manner even though they could be used successfully to predict the times of the highest maxima. Relying upon these findings it was suspected that, in order to account the strongly variable light curves, further period or periods should have been supposed over and above the well-known two periods (cf. *Guman*, paper read at the Variable Star Conference, Budapest, 27 August 1956, Mitt. Sternw. ung. Akad. Wiss. No. 42. 1957, p.3; ***Kukarkin*** et al., 1969).

In their thorough analysis of the 1958-1962 observations *Fitch* and *Szeidl* (1976) showed that there was, indeed, a third period of 0.421 day in the pulsation of AC And. The complicated light variation can be adequately explained by the simultaneous, non-linearly coupled pulsations with these three periods.

Since AC And exhibits this unique phenomenon, every observation even if less accurate than photoelectric ones may be of importance, hence the presentation of my unpublished observations. The use of these data have enabled more accurate values of the periods to be determined.

THE OBSERVATIONS

The observations published here were carried out between 1935 and 1956 and include 5670 photographic observations in the years 1935-1954, and 680 photoelectric observations in the period 1954-1956.

The photographic observations were commenced by *Drs. Julia Balázs* and *L. Detre* who obtained 184 observations on five nights in 1935-1937. Between 1941 and 1954 the present author made 4138 observations during 133 nights; the remaining observations were collected by the staff with the 7 inch astrograph of Konkoly Observatory. First Eastman 40, later Guilleminot Superfulgur photographic plates were used. Usually 20-25 four-minute exposures were taken in succession on each plate. The measurements of all the plates and the reductions were carried out by the author. Most of the plates were measured by a Rosenberg-type electromicrophotometer, only a few by a Zeiss-type Schnell-photometer.

The photographic magnitudes of the comparison stars (Table I) have been determined by comparison with NPS utilizing two plates made in 1935 and 1949. The identification chart of the comparison stars is given in Figure 1. The heliocentric Julian Dates and the obtained photographic magnitudes of AC And are presented in Table II.

The photoelectric observations were made on Konkoly Observatory's 24 inch reflector without any filter; the photometer employed an uncooled RCA 1P21 photomultiplier (for detailed description see ***Balázs*** and *Detre,* 1954).

Table I

The comparison stars

Star	m_{pg}
p BD +47° 4103	10.06 .
c BD +48° 3989	10.33
r	10.63
t	10.97
d	11.20
s	11.44
q	11.92

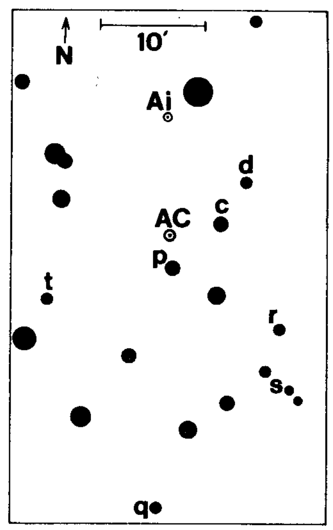

Figure 1

Identification chart of AC And

BD +48°3989 (=c of the photographic sequence) served as the comparison star. The photoelectric observations (in the sense variable minus comparison) can be found in Table III.

THE PERIODS

As has been already mentioned, according to *Fitch* and *Szeidl* (1976), AC And is a short period cepheid in which the fundamental, first and second overtone pulsation modes are simultaneously excited and non-linearly coupled. Since the photoelectric observations used in their work cover only a short time interval (1958-1962) they accepted the two known periods derived earlier by me (see Kukarkin et al., 1969) and could determine the third period only with less accuracy. Therefore it seemed desirable to use the photographic observations covering nearly 20 years for a more accurate determination of the periods. (The photoelectric observations are due to be discussed in a future paper.)

The photographic observational material given here is the most extensive ever published of this star; in particular, the observations between 1945 and 1953 provide a homogeneous continual series.

To facilitate the processing of the data and light curves it seemed reasonable to make more characteristic sets of brightness variation but a smaller number. Thus all the photographic observations were collected on a magnetic tape and then plotted thereby enabling the light curves to be used with sufficient certainty (neglecting the possible microstructure). Then, from the light curves obtained in such a way, the magnitudes could be read in by a digitizer to a magnetic tape at equidistant time intervals. (The length of the intervals depended on the character of the light curves: for low maxima the interval was chosen to be $0\overset{d}{.}02$ or $0\overset{d}{.}01$, for high maxima it was $0\overset{d}{.}005$.) All the manipulations were carried out by an HP 9810A computer. The homogeneous sets of 1688 magnitudes obtained by the above described procedure are given in Table IV. These data sets well represent the light variations of AC And.

It is intended that the shape of the light curves and its variations be discussed in a later paper. Here, it is mentioned that the height of maxima changes considerably depending on the phase relations of the three periods. The highest maxima reach the value of 10.20 magn., the lowest ones are at 11.30 magn. The amplitude belonging to the highest maxima exceeds 1.5 magn., the smallest amplitude is hardly more than 0.2 magn. (see Figure 2).

In order to obtain more accurate values of the periods the following procedure was used. If all the observations are plotted against phases of one of the three periods the mass of points near 0 phase shows all the maxima according to the period in question, from the lowest ones to the highest ones. About half a period later, because of the minima at given period, the points are under the highest maxima. The maximum of the envelope of the mass of points determines the 0 phase of the period in question very accurately.

The periods given in the paper of *Fitch* and *Szeidl* (1976) were used in

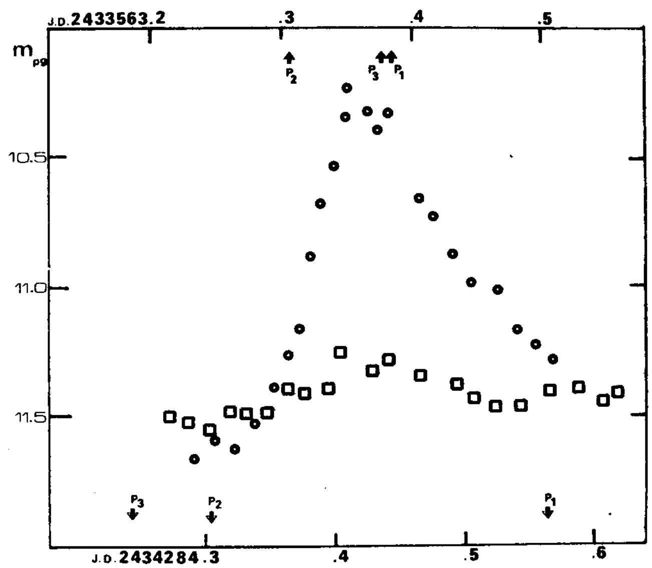

Figure 2

One of the brightest (J.D. 2433563 open circles) and one of the faintest (J.D. 2434284 squares) maxima of AC And. The arrows indicate the calculated zero phases for each of the three periods. Each point is a mean of three photographic observations on the ascending branch, otherwise of five observations.

the construction of the figures - supposing that at one of the highest maxima (on J.D. 2432467) the phase of each period was nearly 0. These initial elements were:

$$\text{J.D. } 2432467.373 + 0^{d}.71124243 \cdot E_1$$

$$\text{J.D. } 2432467.373 + 0^{d}.52512677 \cdot E_2$$

Guman (see *Kukarkin* et al., 1969)

$$\text{J.D. } 2432467.373 + 0^{d}.421069 \cdot E_3$$

Fitch and *Szeidl* (1976)

All the utilized observations of the phases of these periods showed considerable scattering. Even so, it is apparent from the figures that the envelope curves slowly shifted from year to year. Therefore the observations were divided into ten groups and then separately plotted against the phase of each of the three periods. In this way ten separate envelopes could be constructed for each period. The shift of each envelope determined an O-C value and, finally ten O-C residuals could be derived for each period. Using these data a least squares solution gave the following elements:

$$\text{J.D. } 2428009.429 \underset{\pm .005}{} + 0^{d}.71122470 \underset{\pm .00000074}{} \cdot E_1$$

$$\text{J.D. } 2428009.571 \underset{\pm .004}{} + 0^{d}.52512629 \underset{\pm .00000045}{} \cdot E_2$$

$$\text{J.D. } 2428009.496 \underset{\pm .004}{} + 0^{d}.42106751 \underset{\pm .00000037}{} \cdot E_3$$

With the phases deduced from these new elements all the observations were plotted for each period separately (Figure 3a, 3b and 3c). Most of the points of the different epochs coincided in a satisfactory manner. It is immediately evident that the $0^{d}.711$ and $0^{d}.525$ periods have a much greater influence on the light curve than the $0^{d}.421$ period. The amplitude of the envelopes belonging to the longer periods is about 1.0 magn; the faintest observations are about 0.3 magn. brighter at phase $\varphi = 0.2$ than at $\varphi = 0.6$. The envelope curve drawn according to the $0^{d}.421$ period has an amplitude of only 0.8 magn. with scattering of the observations greater in the direction of the phase axis, and finally the influence of the period cannot be seen at the faintest observations.

Knowing the three periods it is worth examining the length of cycles which repeat the same types of light curves. From the periods two different cycles can be derived which yield the repetition of the highest maxima. One of them is:

$$3P_1 = 2^{d}.134,\ 4P_2 = 2^{d}.101,\ 5P_3 = 2^{d}.105$$

which was already found by the very first observers. This $2^{d}.1$ repetition disappears very quickly, only two or three repetitions can be followed.

The other cycle is :

$$45P_1 = 32^{d}.005,\ 61P_2 = 32^{d}.033,\ 76P_3 = 32^{d}.001$$

which can be observed two or three times one after the other during an observational season. *Azarnova* (1956, 1957) considered this 32^{d} cycle as the period of the light curve changes, like the period of the *Blazhko* effect in RR Lyrae stars. But two features contradict this suggestion. First this period cannot be followed after two or three repetitions and, secondly, the height of maxima does not change continuously during such a cycle.

Besides these two cycles, no other coincidences of this kind between the periods could be found. Both of these cycles are nearly integral multiples of one day and, in consequence, if the star is observed only from one geographical location spurious secular variations of the light curve may be

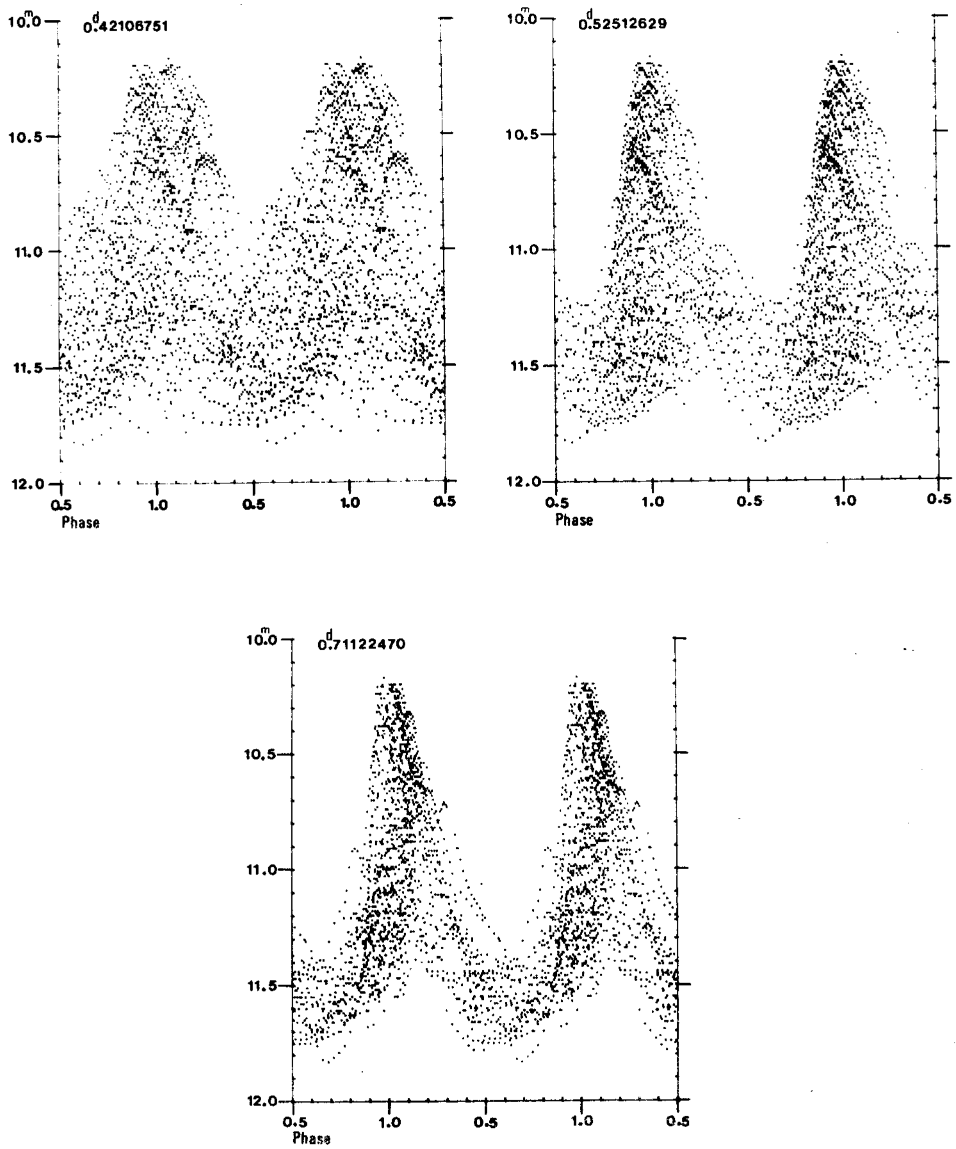

Figure 3a, b, c

Characteristic points of the light curves plotted against phases of each of the three periods deduced because there are observational seasons during which no very high maxima can be observed.

From the above data it is not possible to decide which of the two longer periods has the greater influence on the light curve though *Fitch* and *Szeidl*'s (1976) results suggest that it is the $0\overset{d}{.}711$ period.

The photographic material presented indicates that the considerable secondary and double maxima on the light curves calculated by *Florja* and his followers are not real, even the smaller waves required by *Fitch* and *Szeidl*'s calculated light curves (see the light curve on J.D. 2437562 in their Figure 1) cannot be seen on the observed light curves. Nevertheless smaller waves can really be found on the light curves, especially near the minimum and maximum. But these waves do not seem to be related to the known periods. These are rather like the phenomena observed on some light curves of RR Lyrae type stars (e.g. RR Lyrae itself). The observations indicate that one can observe three $0\overset{d}{.}7$ cycles during $2\overset{d}{.}1$ that are strongly deformed by the other periods, but no significant secondary maxima are recognizable. This would refer to the fact that the $0\overset{d}{.}711$ period is the fundamental one. This problem could be, however, investigated by international (literally intercontinental) cooperation given a some days' long continuous light curve.

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Budapest-Szabadsághegy, 31 August 1981

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Table II
Photographic observations of AC Andromedae

J.D.	m	J.D.	m	J.D.	m
2428009+		2428047+		2428047+	
0.551	10.60	0.488	11.26	0.594	11.34
0.556	10.56	0.490	11.36	0.596	11.41
		0.492	11.43	0.598	11.42
2428047+		0.494	11.36	0.600	11.39
0.391	11.05	0.496	11.34	0.602	11.40
0.393	11.17	0.498	11.33	0.604	11.32
0.395	11.23	0.500	11.32	0.606	11.46
0.397	11.19	0.502	11.31	0.608	11.42
0.399	11.20	0.504	11.29	0.610	11.43
0.401	11.19	0.506	11.22	0.613	11.42
0.404	11.05	0.508	11.22	0.615	11.43
0.406	11.21	0.510	11.28		
0.408	11.16	0.513	11.28	2428048+	
0.410	11.20	0.515	11.28	0.497	10.98
0.412	11.21	0.517	11.36	0.499	10.91
0.414	11.20	0.519	11.26	0.501	10.94
0.416	11.16	0.521	11.27	0.503	11.00
0.418	11.13	0.523	11.25	0.505	11.00
0.420	11.12	0.525	11.28	0.507	10.95
0.422	11.04	0.527	11.27	0.511	10.98
0.424	11.06	0.529	11.30	0.513	10.86
0.426	11.13	0.531	11.24	0.516	10.84
0.429	11.19	0.533	11.36	0.520	10.90
0.431	11.20	0.535	11.19	0.522	10.82
0.433	11.13	0.538	11.27	0.526	10.86
0.435	11.20	0.540	11.21	0.531	10.73
0.437	11.22	0.542	11.27	0.533	10.74
0.439	11.19	0.544	11.26	0.535	10.83
0.441	11.11	0.546	11.31	0.538	10.75
0.443	11.15	0.548	11.32	0.540	10.77
0.445	11.17	0.550	11.39	0.542	10.79
0.447	11.21	0.552	11.29	0.544	10.81
0.449	11.19	0.554	11.34	0.546	10.83
0.450	11.28	0.556	11.42	0.548	10.85
0.453	11.19	0.558	11.38	0.550	10.88
0.455	11.12	0.563	11.41	0.552	10.81
0.457	11.20	0.565	11.41	0.554	10.88
0.459	11.23	0.567	11.36	0.556	10.92
0.461	11.17	0.569	11.55	0.558	10.86
0.463	11.18	0.571	11.50	0.560	10.89
0.465	11.19	0.573	11.38	0.563	10.88
0.467	11.17	0.575	11.33	0.565	10.79
0.469	11.14	0.577	11.33	0.567	10.89
0.472	11.10	0.579	11.29		
0.474	11.22	0.588	11.35	2428489+	
0.476	11.18	0.590	11.39	0.537	10.50
0.478	11.16	0.592	11.27	0.539	10.43

Table II (cont.)

J.D	m
2428489+	
0.541	10.37
0.544	10.39
2428790+	
0.464	10.79
0.467	10.72
0.469	10.97
0.472	10.95
0.475	10.74
0.478	10.92
0.480	10.80
0.483	10.82
0.486	10.81
0.489	10.95
0.492	10.91
0.495	10.80
0.498	10.87
0.501	10.90
0.503	11.00
0.506	11.00
0.509	10.95
0.512	11.06
0.514	11.10
0.517	11.07
0.520	10.93
0.523	11.00
0.526	11.02
0.528	11.05
0.531	10.99
0.534	10.95
0.542	11.10
0.545	11.17
0.548	11.17
0.551	11.10
0.553	11.16
0.556	11.16
0.559	11.18
0.562	11.17
0.564	11.10
0.567	11.20
0.573	11.18
0.576	11.19
0.581	11.23
0.584	11.27
0.587	11.32
0.589	11.20
0.595	11.25

J.D.	m
2428790+	
0.598	11.36
0.601	11.32
0.603	11.40
0.606	11.40
2430258+	
0.276	11.00
0.279	10.89
0.281	11.02
0.284	11.00
0.287	11.08
0.290	11.04
0.293	11.07
0.295	11.00
0.298	11.12
0.301	11.14
0.304	11.00
0.306	11.10
0.309	11.08
0.312	11.08
0.459	11.37
0.462	11.44
0.465	11.36
0.468	11.52
0.470	11.38
0.473	11.41
0.476	11.30
0.479	11.40
0.481	11.49
0.484	11.40
0.487	11.50
0.490	11.44
0.493	11.55
0.495	11.49
0.498	11.42
0.501	11.41
0.504	11.54
0.506	11.57
0.509	11.40
0.512	11.58
0.515	11.36
0.518	11.46
0.520	11.35
0.523	11.51
0.526	11.45
0.529	11.52
0.531	11.39

J.D.	m
2430258+	
0.534	11.44
0.537	11.45
0.540	11.56
0.543	11.48
0.545	11.40
0.548	11.52
0.551	11.46
0.554	11.50
0.558	11.45
0.561	11.32
0.563	11.53
0.566	11.53
0.569	11.51
0.572	11.54
0.574	11.46
0.577	11.34
0.580	11.55
0.583	11.45
0.586	11.45
0.588	11.42
0.591	11.42
0.594	11.32
0.599	11.42
0.602	11.43
0.605	11.44
0.608	11.32
2430259+	
0.259	11.10
0.262	11.00
0.265	11.13
0.267	11.10
0.270	11.05
0.273	11.24
0.276	11.16
0.279	11.06
0.281	11.21
0.284	11.15
0.287	11.14
0.291	11.11
0.294	11.13
0.297	11.09
0.299	11.14
0.301	11.26
0.303	11.26
0.305	11.29
0.307	11.30

Table II (cont.)

J.D.	m	J.D.	m	J.D.	m
2430259+		2430259+		2430259+	
0.309	11.26	0.428	11.50	0.534	11.84
0.311	11.25	0.430	11.76	0.537	11.83
0.313	11.17	0.432	11.68	0.539	11.80
0.315	11.22	0.434	11.50	0.541	11.79
0.317	11.24	0.437	11.71	0.543	11.80
0.324	11.30	0.439	11.62	0.545	11.78
0.326	11.20	0.441	11.64	0.547	11.78
0.328	11.23	0.443	11.63	0.549	11.79
0.330	11.16	0.445	11.60	0.551	11.90
0.332	11.22	0.447	11.58	0.553	11.82
0.334	11.20	0.449	11.60	0.555	11.72
0.336	11.31	0.453	11.58	0.557	11.90
0.338	11.36	0.457	11.60	0.559	11.98
0.340	11.24	0.460	11.69	0.562	11.86
0.342	11.32	0.462	11.65	0.564	12.10
0.344	11.36	0.464	11.70	0.566	11.66
0.347	11.30	0.466	11.60	0.568	11.81
0.349	11.32	0.469	11.81	0.570	11.75
0.351	11.32	0.471	11.69	0.572	11.81
0.353	11.28	0.473	11.55	0.576	11.90
0.355	11.29	0.475	11.64	0.578	11.85
0.357	11.31	0.477	11.71	0.580	11.80
0.359	11.49	0.479	11.60	0.582	11.85
0.361	11.43	0.481	11.56	0.584	11.76
0.363	11.24	0.483	11.77	0.587	11.76
0.365	11.25	0.485	11.73	0.589	11.80
0.367	11.53	0.487	11.76	0.591	11.96
0.369	11.39	0.489	11.67	0.593	11.65
0.372	11.36	0.491	11.78	0.595	11.94
0.376	11.41	0.494	11.73	0.597	11.86
0.379	11.35	0.496	11.78	0.599	11.60
0.381	11.45	0.501	11.88	0.601	11.85
0.383	11.47	0.503	11.86	0.603	11.75
0.385	11.59	0.505	11.80	0.605	11.60
0.387	11.43	0.507	11.88	0.607	11.55
0.389	11.45	0.509	11.92	0.609	11.66
0.391	11.32	0.512	11.90	0.612	11.74
0.393	11.58	0.514	11.90	0.614	11.56
0.395	11.54	0.516	11.62	0.616	11.69
0.397	11.54	0.518	11.90	0.618	11.50
0.399	11.60	0.520	11.83	0.620	11.60
0.404	11.52	0.522	11.87	0.622	11.58
0.406	11.40	0.524	11.68	0.624	11.57
0.408	11.64	0.526	11.78	0.626	11.62
0.410	11.55	0.528	11.90	0.628	11.58
0.424	11.60	0.530	11.83	0.630	11.59
0.426	11.60	0.532	11.82	0.632	11.54

Table II (cont.)

J.D.	m	J.D.	m	J.D.	m
2430259+		2430260+		2430261+	
0.634	11.58	0.526	11.36	0.305	10.87
0.636	11.60	0.528	11.32	0.307	10.86
		0.530	11.25	0.309	10.80
2430260+		0.532	11.32	0.311	10.97
0.434	11.30	0.532	11.32	0.313	10.61
0.436	11.44	0.536	11.29	0.316	10.97
0.439	11.42	0.538	11.28	0.318	10.71
0.440	11.32	0.543	11.29	0.320	10.80
0.443	11.30	0.545	11.41	0.324	10.75
0.445	11.31	0.547	11.33	0.326	10.90
0.447	11.21	0.549	11.27	0.328	10.75
0.449	11.20	0.551	11.19	0.330	10.73
0.451	11.30	0.553	11.22	0.332	10.93
0.453	11.17	0.555	11.30	0.334	10.79
0.455	11.32	0.557	11.35	0.336	10.77
0.457	11.23	0.561	11.27	0.338	10.83
0.459	11.25	0.563	11.32	0.341	11.01
0.461	11.25	0.566	11.21	0.343	10.94
0.463	11.25	0.568	11.30	0.345	10.82
0.466	11.29	0.570	11.23	0.347	10.79
0.468	11.27	0.572	11.40	0.349	10.83
0.470	11.25	0.574	11.43	0.351	10.87
0.472	11.26	0.576	11.28	0.353	10.95
0.474	11.27	0.578	11.30	0.355	11.00
0.476	11.20	0.580	11.33	0.357	10.96
0.478	11.21	0.582	11.40	0.359	11.00
0.480	11.30	0.584	11.32	0.363	10.97
0.482	11.17	0.586	11.18	0.370	10.94
0.486	11.32	0.588	11.20	0.372	10.82
0.488	11.34	0.591	11.20	0.374	10.85
0.490	11.32	0.593	11.44	0.376	10.97
0.493	11.22	0.597	11.43	0.378	10.90
0.495	11.30	0.600	11.38	0.380	10.94
0.497	11.38	0.602	11.40	0.382	10.90
0.499	11.32	0.604	11.37	0.384	10.93
0.501	11.26	0.608	11.43	0.386	11.01
0.503	11.43	0.610	11.37	0.388	10.94
0.505	11.35	0.612	11.22	0.391	11.00
0.507	11.33	0.614	11.24	0.393	10.97
0.509	11.30	0.616	11.23	0.395	11.05
0.511	11.36	0.618	11.46	0.397	11.00
0.513	11.29	0.620	11.34	0.399	11.09
0.516	11.32	0.622	11.43	0.401	11.06
0.518	11.46	0.625	11.30	0.403	11.15
0.520	11.39	0.627	11.27	0.405	11.09
0.522	11.37			0.407	11.00
0.524	11.30	2430261+		0.409	11.16
		0.303	10.85		

Table II (cont.)

J.D.	m
2430261+	
0.411	11.18
0.413	11.10
0.416	11.09
0.418	11.10
0.420	11.18
0.422	11.19
0.424	11.11
0.426	11.24
0.428	11.16
0.430	11.20
0.441	11.37
0.445	11.33
0.447	11.37
0.449	11.39
0.453	11.33
0.455	11.25
0.457	11.41
0.459	11.33
0.461	11.32
0.468	11.26
0.470	11.25
0.472	11.43
0.474	11.23
0.476	11.37
0.478	11.40
0.480	11.37
0.482	11.54
0.484	11.51
0.486	11.36
0.488	11.26
0.491	11.45
0.493	11.35
0.495	11.53
0.497	11.39
0.499	11.34
0.501	11.54
0.505	11.49
0.507	11.45
0.509	11.37
0.511	11.38
2430262+	
0.357	11.45
0.359	11.46
0.362	11.36
0.364	11.44
0.366	11.41

J.D.	m
2430262+	
0.368	11.37
0.370	11.37
0.372	11.53
0.374	11.48
0.376	11.35
0.382	11.47
0.385	11.38
0.387	11.56
0.389	11.35
0.391	11.33
0.393	11.48
0.395	11.51
0.397	11.32
0.403	11.45
0.405	11.55
0.412	11.45
0.414	11.41
0.416	11.45
0.418	11.45
0.520	11.48
0.522	11.38
0.524	11.43
0.526	11.27
0.528	11.25
0.530	11.30
0.532	11.25
0.535	11.30
0.537	11.23
0.543	11.15
0.545	11.30
0.547	11.48
0.549	11.40
0.551	11.18
0.555	11.48
0.557	11.29
0.560	11.32
0.562	11.39
0.564	11.27
0.571	11.30
0.573	11.20
0.575	11.20
0.578	11.35
0.585	11.17
0.587	11.30
0.589	11.39
0.591	11.37
0.593	11.32

J.D.	m
2430262+	
0.595	11.32
0.597	11.12
0.599	11.16
0.601	11.16
0.605	11.35
0.609	11.36
0.611	11.16
2430266+	
0.442	11.78
0.444	11.57
0.446	11.66
0.448	11.75
0.451	11.59
0.455	11.69
0.457	11.73
0.459	11.58
0.461	11.57
0.463	11.60
0.465	11.68
0.467	11.57
0.469	11.72
0.471	11.62
0.473	11.57
0.476	11.64
0.478	11.63
0.480	11.65
0.482	11.50
0.484	11.60
0.486	11.54
0.488	11.54
0.490	11.52
0.492	11.54
0.494	11.52
0.496	11.52
0.498	11.51
0.501	11.45
0.503	11.66
0.507	11.48
0.509	11.60
0.511	11.60
0.513	11.55
0.515	11.55
0.517	11.62
0.519	11.68
0.521	11.68
0.523	11.59

Table II (cont.)

J.D.	m
2430266+	
0.526	11.52
0.528	11.58
0.530	11.64
0.532	11.58
0.534	11.38
0.536	11.48
0.538	11.62
0.540	11.56
0.542	11.53
0.546	11.49
0.551	11.49
0.553	11.60
0.555	11.70
0.557	11.70
0.559	11.58
0.561	11.52
0.563	11.62
0.565	11.60
0.567	11.56
0.569	11.43
0.571	11.67
0.576	11.58
0.578	11.59
0.580	11.76
0.582	11.71
0.584	11.55
0.586	11.70
0.588	11.63
0.590	11.70
0.594	11.54
0.596	11.62
0.598	11.62
0.601	11.79
0.603	11.57
0.605	11.49
0.607	11.74
0.609	11.54
0.611	11.78
0.613	11.65
0.615	11.62
0.617	11.78
0.619	11.64
0.621	11.68
0.623	11.56
0.626	11.57
0.628	11.78
0.632	11.62

J.D.	m
2430266+	
0.634	11.60
0.636	11.46
0.638	11.53
2430267+	
0.452	11.72
0.455	11.57
0.457	11.66
0.459	11.59
0.461	11.63
0.463	11.61
0.465	11.70
0.467	11.61
0.469	11.51
0.471	11.52
0.473	11.65
0.475	11.45
0.477	11.42
0.480	11.66
0.482	11.58
0.484	11.63
0.486	11.47
0.488	11.58
0.490	11.59
0.492	11.62
0.494	11.63
0.496	11.51
2430285+	
0.406	10.56
0.408	10.63
0.410	10.60
0.412	10.50
0.414	10.50
0.417	10.43
0.419	10.36
0.421	10.32
0.423	10.31
0.425	10.31
0.427	10.30
0.429	10.32
0.431	10.38
0.433	10.30
0.435	10.35
0.437	10.38
0.439	10.37
0.442	10.36

J.D.	m
2430285+	
0.444	10.39
0.446	10.40
0.448	10.32
0.452	10.41
0.454	10.35
2431684+	
0.367	10.63
0.369	10.82
0.371	10.71
0.373	10.74
0.375	10.97
0.377	10.80
0.379	10.73
0.381	10.89
0.384	10.96
0.386	10.90
0.388	10.93
0.392	10.94
0.396	10.80
0.404	10.98
0.407	11.10
0.409	10.94
0.411	10.90
0.418	11.10
2431695+	
0.311	11.58
0.313	11.45
0.316	11.42
0.318	11.67
0.320	11.65
0.322	11.56
0.324	11.58
0.328	11.43
0.330	11.65
0.334	11.46
0.336	11.54
0.342	11.53
0.345	11.75
0.349	11.66
0.357	11.60
0.359	11.52
0.361	11.50
0.363	11.54
0.366	11.38
0.368	11.67

Table II (cont.)

J.D.	m	J.D.	m	J.D.	m
2431695+		2431703+		2431704+	
0.372	11.70	0.504	11.40	0.343	10.59
0.374	11.60	0.506	11.16	0.354	10.57
0.376	11.53	0.508	11.14	0.357	10.63
0.378	11.64	0.510	11.37	0.368	10.61
0.382	11.52	0.512	11.12	0.371	10.63
0.384	11.51	0.514	11.27	0.375	10.66
0.386	11.55	0.516	11.07	0.378	10.67
0.393	11.66	0.520	11.41	0.385	10.71
0.395	11.64	0.522	11.40	0.389	10.75
0.403	11.40	0.524	11.30	0.392	10.87
0.405	11.47	0.529	11.43	0.395	10.80
0.407	11.70	0.531	11.30	0.400	10.82
0.409	11.78	0.535	11.39	0.406	10.91
0.411	11.60	0.537	11.34	0.409	10.92
0.426	11.64	0.539	11.39	0.413	10.83
0.435	11.45	0.541	11.11	0.416	10.76
0.437	11.64	0.543	11.33	0.420	10.91
0.439	11.48	0.545	11.24	0.423	10.89
0.448	11.63	0.549	11.26	0.427	11.00
0.450	11.70	0.551	11.14	0.430	11.09
0.452	11.50	0.554	11.18	0.434	11.17
0.463	11.72	0.556	11.43	0.437	11.06
0.465	11.72	0.558	11.43	0.468	11.18
0.479	11.50	0.560	11.30	0.472	11.16
0.481	11.54	0.562	11.08	0.475	11.21
0.485	11.54	0.564	11.20	0.479	11.10
0.489	11.46	0.566	11.20	0.482	11.23
0.491	11.50	0.568	11.33	0.486	11.40
		0.570	11.41	0.489	11.29
2431703+		0.572	11.29	0.493	11.41
0.466	11.16	0.574	11.29	0.496	11.33
0.468	11.22	0.576	11.43	0.500	11.43
0.470	11.07	0.579	11.29	0.503	11.50
0.472	11.13			0.507	11.29
0.474	11.20	2431704+		0.510	11.41
0.476	11.34	0.302	11.22	0.513	11.40
0.481	11.25	0.305	11.00	0.517	11.56
0.483	11.33	0.307	10.88	0.520	11.43
0.485	11.38	0.309	10.96	0.524	11.45
0.487	11.25	0.312	10.84	0.527	11.47
0.489	11.23	0.316	10.74	0.531	11.46
0.491	11.26	0.319	10.63	0.534	11.57
0.493	11.31	0.326	10.54	0.536	11.70
0.495	11.17	0.330	10.52	0.538	11.50
0.497	11.39	0.333	10.53	0.541	11.50
0.499	11.46	0.336	10.57	0.543	11.38
0.501	11.07	0.340	10.60	0.545	11.52

Table II (cont.)

J.D.	m
2431704+	
0.547	11.53
0.549	11.53
0.551	11.51
0.553	11.56
0.555	11.56
0.557	11.53
0.559	11.57
0.561	11.63
0.563	11.77
0.566	11.65
0.568	11.55
0.570	11.70
0.572	11.72
0.574	11.66
0.576	11.80
2431707+	
0.333	11.43
0.335	11.57
0.338	11.70
0.340	11.48
0.342	11.58
0.344	11.51
0.346	11.44
0.348	11.50
0.350	11.53
0.352	11.56
0.356	11.42
0.359	11.60
0.363	11.49
0.366	11.41
0.369	11.55
0.373	11.47
0.376	11.40
0.380	11.41
0.383	11.51
0.387	11.43
0.394	11.57
0.397	11.43
0.404	11.33
0.408	11.43
0.411	11.25
0.415	11.47
0.418	11.49
0.422	11.48
0.425	11.48
0.429	11.43

J.D.	m
2431707+	
0.432	11.42
0.453	11.58
0.455	11.60
0.457	11.50
0.459	11.62
0.462	11.70
0.464	11.56
0.466	11.43
0.468	11.43
0.470	11.65
0.472	11.56
0.474	11.49
0.476	11.47
0.478	11.49
0.480	11.62
0.482	11.50
0.484	11.66
0.487	11.49
0.489	11.51
0.491	11.60
0.493	11.63
0.495	11.60
0.497	11.60
0.499	11.58
0.501	11.69
0.503	11.60
0.505	11.54
0.507	11.78
0.509	11.76
0.512	11.55
0.514	11.52
0.516	11.49
0.518	11.43
0.520	11.60
0.522	11.56
0.524	11.40
0.526	11.40
0.528	11.60
0.530	11.40
0.532	11.52
0.534	11.73
2432092+	
0.416	11.63
0.418	11.38
0.421	11.45
0.424	11.49

J.D.	m
2432092+	
0.427	11.41
0.429	11.53
0.432	11.46
0.435	11.65
0.441	11.42
0.475	11.40
0.477	11.33
0.480	11.40
0.483	11.29
0.486	11.27
0.488	11.11
0.491	11.27
0.494	11.20
0.500	11.31
0.533	10.97
0.538	10.97
0.541	11.06
2432094+	
0.461	11.59
0.464	11.64
0.466	11.63
0.469	11.55
0.472	11.61
0.475	11.62
0.483	11.55
0.486	11.67
0.489	11.55
0.491	11.54
0.494	11.51
0.497	11.62
0.500	11.67
0.502	11.55
0.505	11.67
0.510	11.62
0.514	11.76
0.516	11.50
2432095+	
0.397	11.32
0.400	11.21
0.403	11.39
0.405	11.28
0.408	11.50
0.411	11.30
0.414	11.31
0.416	11.44

Table II (cont.)

J.D.	m
2432095+	
0.419	11.36
0.422	11.42
0.459	11.38
2432097+	
0.391	11.58
0.394	11.72
0.398	11.60
0.401	11.51
0.405	11.70
0.408	11.69
0.412	11.63
0.415	11.64
0.419	11.59
0.422	11.74
0.470	11.67
0.473	11.59
0.476	11.51
0.479	11.71
0.482	11.63
0.487	11.76
0.493	11.75
0.496	11.83
0.526	11.40
0.531	11.43
0.534	11.62
0.537	11.75
0.540	11.80
2432421+	
0.395	11.45
0.398	11.45
0.401	11.33
0.404	11.60
0.430	11.45
0.433	11.60
0.436	11.66
0.439	11.65
0.454	11.69
0.459	11.65
0.462	11.80
0.504	11.80
0.507	11.75
2432441+	
0.394	11.49
0.399	11.60

J.D.	m
2432441+	
0.402	11.50
0.405	11.55
0.408	11.66
0.411	11.45
0.413	11.45
0.416	11.50
0.419	11.60
0.422	11.54
0.424	11.62
0.427	11.65
0.430	11.45
0.433	11.58
0.436	11.67
0.438	11.70
0.488	11.57
0.491	11.67
0.494	11.80
0.536	11.53
0.538	11.65
0.543	11.61
0.581	11.74
0.584	11.38
0.587	11.63
0.590	11.46
0.602	11.45
0.605	11.48
0.608	11.40
2432444+	
0.335	11.45
0.338	11.46
0.341	11.35
0.344	11.40
0.346	11.38
0.349	11.45
0.352	11.35
0.355	11.42
0.357	11.49
0.363	11.45
0.366	11.48
0.369	11.46
0.513	11.60
0.516	11.33
0.525	11.64
0.528	11.70
0.536	11.40
0.539	11.40

J.D.	m
2432444+	
0.546	11.54
0.549	11.47
0.557	11.55
0.559	11.55
0.571	11.60
0.573	11.49
0.585	11.62
0.588	11.58
0.591	11.50
2432466+	
0.276	11.48
0.279	11.56
0.282	11.60
0.285	11.42
0.287	11.38
0.308	11.60
0.311	11.50
0.317	11.36
0.319	11.46
0.360	11.52
0.362	11.60
0.365	11.58
0.368	11.50
0.404	11.70
2432467+	
0.248	11.70
0.251	11.56
0.254	11.70
0.257	11.66
0.259	11.60
0.290	11.49
0.294	11.45
0.297	11.55
0.326	11.43
0.329	11.26
0.332	10.92
0.334	11.11
0.337	11.05
0.347	10.63
0.350	10.30
0.352	10.33
0.355	10.40
0.358	10.32
0.361	10.26
0.364	10.24

Table II (cont.)

J.D.	m
2432467+	
0.366	10.21
0.422	10.40
0.425	10.49
0.427	10.29
0.430	10.52
0.433	10.60
0.439	10.62
0.441	10.60
0.444	10.60
0.447	10.60
0.450	10.74
0.452	10.60
0.455	10.60
0.458	10.60
0.461	10.80
2432469+	
0.435	11.33
0.438	11.13
0.441	11.20
0.444	10.99
0.447	11.08
0.449	10.91
0.452	10.93
0.455	10.61
0.458	10.75
0.460	10.66
0.463	10.47
0.466	10.49
0.469	10.23
0.472	10.50
0.474	10.22
0.477	10.18
0.480	10.21
0.484	10.25
0.487	10.22
0.490	10.20
0.492	10.22
0.495	10.20
0.498	10.18
0.501	10.20
0.504	10.25
0.506	10.30
0.509	10.33
0.512	10.28
0.515	10.36
0.517	10.43
2432469+	
0.520	10.38
0.523	10.39
0.526	10.41
0.529	10.46
0.531	10.53
0.534	10.47
0.537	10.50
0.540	10.51
0.542	10.56
0.545	10.62
2432472+	
0.287	11.29
0.290	11.26
0.293	11.13
0.295	11.32
0.298	11.27
0.304	11.33
0.306	11.23
0.309	11.26
0.312	11.24
0.315	11.34
0.318	11.29
0.320	11.20
0.324	11.32
0.329	11.25
0.331	11.28
2432474+	
0.418	11.39
0.420	11.39
0.423	11.39
0.426	11.44
0.429	11.30
0.431	11.45
0.434	11.40
0.437	11.38
0.443	11.37
0.445	11.30
0.448	11.35
0.451	11.30
0.454	11.42
0.456	11.34
0.459	11.32
0.462	11.34
0.465	11.26
0.467	11.30
2432474+	
0.470	11.40
0.473	11.19
0.476	11.32
0.481	11.20
0.484	11.35
0.493	11.20
0.495	11.20
0.498	11.23
0.501	11.20
0.504	11.20
0.506	11.25
0.509	11.20
0.512	11.20
0.515	11.33
0.517	11.38
0.520	11.27
0.523	11.20
0.526	11.28
0.529	11.28
0.531	11.21
0.534	11.20
0.537	11.22
2432479+	
0.388	11.38
0.391	11.48
0.394	11.33
0.397	11.28
0.399	11.40
0.402	11.38
0.405	11.36
0.408	11.38
0.410	11.33
0.413	11.21
0.416	11.26
0.419	11.20
0.422	11.24
0.424	11.23
0.427	11.24
0.430	11.20
0.433	11.20
0.435	11.15
0.438	11.18
0.442	11.14
0.445	11.12
0.448	10.81
0.451	10.95

Table II (cont.)

J.D.	m
2432479+	
0.454	10.91
0.456	10.95
0.459	10.73
0.462	10.75
0.465	10.67
0.467	10.50
0.470	10.60
0.473	10.66
0.476	10.60
0.479	10.50
0.481	10.48
0.484	10.57
0.487	10.49
0.490	10.50
2432482+	
0.258	11.16
0.261	11.08
0.264	11.12
0.266	11.15
0.269	11.12
0.272	11.30
0.275	11.30
0.278	11.30
0.280	11.32
0.283	11.31
0.286	11.15
0.289	11.16
2432761+	
0.400	11.50
0.402	1.32
0.406	11.54
0.409	11.38
0.412	11.32
0.415	11.51
0.418	11.55
0.420	11.38
0.423	11.45
0.426	11.45
2432764+	
0.420	11.80
0.423	11.67
0.429	11.53
0.434	11.45
0.440	11.57

J.D.	m
2432764+	
0.442	11.52
0.451	11.71
0.474	11.52
0.477	11.50
0.479	11.58
0.482	11.52
0.485	11.51
0.488	11.51
2432772+	
0.367	11.51
0.370	11.63
0.375	11.43
0.378	11.41
0.381	11.41
0.383	11.57
0.386	11.46
0.389	11.40
0.392	11.44
0.395	11.45
0.397	11.53
0.400	11.36
0.403	11.45
0.406	11.50
0.408	11.61
0.411	11.46
0.414	11.43
0.417	11.52
0.420	11.39
0.422	11.39
0.425	11.38
0.428	11.37
0.431	11.32
0.436	11.22
0.439	11.23
0.442	11.34
0.445	11.36
0.447	11.20
0.450	11.21
0.453	11.35
0.456	11.23
0.461	11.27
2432823+	
0.321	11.70
0.324	11.68
0.327	11.64

J.D.	m
2432823+	
0.330	11.58
0.335	11.48
0.340	11.58
0.346	11.66
0.349	11.56
0.352	11.61
0.357	11.66
0.360	11.78
0.363	11.71
0.366	11.57
2432824+	
0.362	11.45
0.364	11.50
0.367	11.34
0.370	11.38
0.373	11.40
0.375	11.30
0.378	11.08
0.381	11.13
0.384	11.29
0.387	11.27
0.389	11.11
0.404	10.77
0.407	10.55
0.409	10.60
0.412	10.30
0.415	10.32
0.418	10.22
0.421	10.23
0.423	10.20
0.426	10.20
0.429	10.20
0.434	10.12
0.437	10.26
0.440	10.21
0.446	10.28
0.451	10.29
0.454	10.27
0.457	10.29
0.459	10.29
0.462	10.31
0.465	10.34
0.468	10.35
0.471	10.39
0.473	10.41

Table II (cont.)

J.D.	m
2432826+	
0.406	11.38
0.409	11.33
0.421	11.47
0.453	11.71
0.456	11.68
0.459	11.55
0.464	11.55
0.467	11.67
0.470	11.43
0.473	11.43
0.475	11.40
0.479	11.45
0.481	11.60
2432829+	
0.247	11.30
0.250	11.24
0.253	11.25
0.256	11.24
0.258	11.20
0.261	11.15
0.264	11.09
0.267	11.20
0.269	11.15
0.272	11.25
0.275	11.06
0.278	11.09
0.280	11.16
0.283	11.15
0.286	11.21
0.289	11.21
0.291	11.33
0.294	11.35
0.299	11.29
0.302	11.23
0.305	11.11
0.307	11.29
0.310	11.25
0.313	11.37
0.316	11.27
0.319	11.20
0.321	11.37
0.324	11.27
0.327	11.23
0.330	11.01
0.332	11.11
0.335	11.09

J.D.	m
2432829+	
0.338	11.13
0.346	11.22
0.348	11.08
0.351	11.11
0.354	11.27
0.357	11.08
0.360	11.18
0.365	11.33
0.368	11.23
0.371	11.20
0.373	11.35
2433075+	
0.420	10.97
0.423	10.83
0.425	10.88
0.428	10.75
0.431	10.74
0.434	10.53
0.441	10.30
0.443	10.39
0.446	10.47
0.449	10.34
0.452	10.24
0.455	10.25
0.461	10.35
0.464	10.33
0.467	10.47
0.470	10.40
0.473	10.42
0.475	10.42
2433085+	
0.419	10.53
0.422	10.49
0.425	10.54
0.428	10.41
0.430	10.35
0.433	10.25
0.436	10.25
0.439	10.23
0.441	10.18
0.444	10.27
0.447	10.18
0.450	10.24
0.453	10.17
0.455	10.18

J.D.	m
2433085+	
0.458	10.23
0.461	10.25
0.466	10.23
0.469	10.29
0.472	10.30
0.475	10.27
0.478	10.33
0.480	10.28
0.483	10.35
0.486	10.38
0.489	10.43
0.493	10.43
0.497	10.42
2433094+	
0.388	11.45
0.391	11.45
0.393	11.52
0.396	11.42
0.399	11.50
0.402	11.40
0.404	11.50
0.407	11.45
0.410	11.45
0.416	11.45
0.418	11.42
0.421	11.54
2433095+	
0.365	11.27
0.368	11.23
0.370	11.42
0.373	11.10
0.376	11.34
0.379	11.20
0.382	11.29
0.385	11.20
0.388	11.20
0.390	11.05
0.393	11.10
0.396	11.01
0.399	11.03
0.401	10.95
0.404	11.02
0.407	10.87
0.410	11.03
0.417	10.80

Table II (cont.)

J.D.	m
2433095+	
0.420	10.87
0.423	10.65
0.448	10.68
0.451	10.64
0.454	10.69
0.456	10.60
0.459	10.65
0.462	10.71
0.464	10.77
0.467	10.65
0.473	10.75
0.476	10.80
0.479	10.69
0.481	10.75
0.484	10.80
0.487	10.85
0.490	10.75
0.492	10.85
0.495	10.88
2433097+	
0.460	11.25
0.463	11.17
0.466	11.27
0.469	11.10
0.472	11.23
0.474	11.33
0.477	11.13
0.480	11.20
0.483	11.00
0.486	11.15
0.488	11.05
0.491	11.07
0.497	11.25
0.499	11.13
0.502	11.15
0.505	11.16
0.507	11.17
0.510	11.11
0.518	10.91
0.523	10.98
0.526	10.93
0.529	10.97
0.531	10.80
2433112+	
0.349	11.20

J.D.	m
2433112+	
0.352	11.18
0.355	11.26
0.357	11.20
0.360	11.18
0.363	11.05
0.366	11.27
0.369	11.20
0.371	11.20
0.374	11.23
0.377	11.33
0.380	11.15
0.382	11.11
0.385	11.06
0.391	11.03
0.394	11.13
0.399	11.19
0.413	11.20
0.418	11.33
0.421	11.25
0.424	11.29
0.427	11.10
0.429	11.30
0.432	11.28
0.435	11.14
0.438	11.09
0.441	11.35
0.444	11.25
0.446	11.30
0.456	11.20
0.459	11.30
0.465	11.24
0.471	11.23
0.475	11.20
2433124+	
0.342	11.38
0.345	11.41
0.350	11.37
0.353	11.33
0.356	11.42
0.358	11.29
0.361	11.39
0.364	11.31
0.367	11.45
0.370	11.37
0.372	11.27
0.375	11.27

J.D.	m
2433124+	
0.378	11.37
0.381	11.51
0.386	11.48
0.389	11.33
0.392	11.23
0.395	11.36
0.397	11.34
0.400	11.33
0.406	11.33
0.408	11.32
0.411	11.39
0.417	11.24
0.420	11.29
0.422	11.23
0.425	11.14
0.428	11.38
0.431	11.15
0.433	11.20
0.436	11.34
0.439	11.25
0.445	11.27
0.449	11.25
0.453	11.23
0.456	11.25
0.458	11.18
0.461	11.25
0.464	11.18
0.467	11.35
0.470	11.29
0.492	11.47
0.495	11.33
0.515	11.38
0.519	11.35
2433126+	
0.411	11.53
0.414	11.41
0.417	11.61
0.419	11.21
0.425	11.45
0.428	11.45
0.431	11.43
0.433	11.45
0.436	11.64
0.442	11.58
0.444	11.65
0.447	11.36

Table II (cont.)

J.D.	m
2433126+	
0.450	11.58
0.458	11.35
0.477	11.15
0.480	11.30
0.483	11.25
0.485	11.07
0.488	11.20
0.491	11.22
0.494	11.10
0.498	11.18
0.502	11.20
0.505	11.20
0.508	11.19
0.511	11.17
0.513	11.13
0.516	11.25
0.519	11.22
0.522	11.04
0.524	11.17
0.530	11.02
2433134+	
0.348	11.32
0.350	11.18
0.353	11.20
0.356	11.12
0.359	11.10
0.362	11.10
0.364	11.00
0.367	11.11
0.370	11.15
0.373	11.14
0.375	10.80
0.378	10.90
0.399	10.93
0.402	11.00
0.405	10.90
0.407	10.93
0.410	10.86
0.413	10.87
0.416	11.09
0.419	11.18
0.421	11.05
0.424	11.10
0.427	11.06
0.430	11.03
0.443	10.87

J.D.	m
2433134+	
0.446	10.94
0.448	11.12
0.451	11.00
0.459	10.97
0.462	11.06
0.465	11.11
0.468	11.16
0.471	11.19
0.473	11.19
0.476	11.10
0.479	11.11
0.482	11.18
0.489	11.24
0.492	11.24
0.494	11.35
0.497	11.29
0.500	11.22
0.503	11.35
0.506	11.14
0.508	11.30
0.519	11.48
0.524	11.24
0.528	11.28
0.540	11.36
0.543	11.22
0.554	11.40
0.557	11.29
2433149+	
0.379	11.52
0.383	11.56
0.387	11.58
0.390	11.49
0.393	11.46
0.395	11.60
0.398	11.53
0.401	11.60
0.404	11.52
0.406	11.55
0.409	11.35
0.412	11.48
0.415	11.36
0.419	11.46
0.423	11.43
0.426	11.40
0.434	11.30
0.437	11.26

J.D.	m
2433149+	
0.440	11.27
0.443	11.12
0.445	10.86
0.448	10.83
0.451	10.87
0.454	10.65
0.456	10.60
0.459	10.56
0.462	10.39
0.465	10.29
0.468	10.37
0.470	10.27
0.473	10.21
0.476	10.23
0.479	10.26
0.481	10.25
0.493	10.18
0.496	10.28
0.499	10.22
0.502	10.22
0.504	10.25
0.507	10.31
0.510	10.27
0.513	10.28
0.515	10.40
0.518	10.34
0.521	10.44
0.524	10.52
0.527	10.34
0.529	10.59
0.532	10.43
0.535	10.51
0.538	10.57
0.540	10.66
0.543	10.57
0.546	10.65
0.549	10.59
0.552	10.73
0.554	10.67
0.557	10.73
2433161+	
0.477	11.50
0.479	11.49
0.482	11.49
0.485	11.55
0.488	11.45

Table II (cont.)

J.D.	m
2433161+	
0.491	11.49
0.493	11.32
0.499	11.57
0.502	11.48
0.504	11.51
0.507	11.45
0.510	11.45
0.513	11.50
0.516	11.31
0.532	11.17
0.535	11.24
0.539	11.21
0.543	11.09
0.546	11.16
0.550	11.13
0.554	11.09
0.560	11.10
0.563	11.00
0.566	10.83
0.568	11.04
0.571	10.73
0.574	10.57
0.577	10.80
0.579	10.57
0.582	10.52
0.585	10.61
0.588	10.50
0.591	10.40
0.593	10.49
0.596	10.53
0.599	10.45
0.602	10.48
0.604	10.54
0.609	10.46
2433179+	
0.283	11.50
0.286	11.51
2433183+	
0.529	11.53
0.532	11.50
0.534	11.56
0.537	11.51
0.540	11.48
0.543	11.53
0.545	11.42

J.D.	m
2433183+	
0.548	11.41
0.551	11.32
0.554	11.42
0.556	11.36
0.559	11.41
0.562	11.32
0.565	11.32
0.569	10.98
0.573	10.92
0.576	10.85
0.579	10.62
0.581	10.52
0.584	10.54
0.587	10.36
0.590	10.32
0.594	10.32
0.598	10.24
0.601	10.21
0.604	10.20
0.606	10.21
0.609	10.19
0.612	10.16
0.615	10.23
0.618	10.22
2433184+	
0.253	10.93
0.258	10.91
0.261	10.88
0.264	10.92
0.267	10.91
0.270	10.95
0.272	11.04
0.275	10.92
0.278	11.03
0.281	10.86
0.283	10.80
0.290	11.03
0.293	11.00
0.298	11.08
0.301	10.94
0.304	11.03
0.309	11.03
0.315	11.20
0.318	11.09
0.320	11.20
0.323	11.13

J.D.	m
2433184+	
0.331	11.13
0.334	11.17
0.337	11.20
0.340	11.22
0.343	11.24
0.345	11.30
0.348	11.20
0.351	11.29
0.354	11.20
2433189+	
0.255	11.30
0.258	11.46
0.261	11.46
0.263	11.24
0.266	11.33
0.269	11.33
0.272	11.46
0.283	11.42
0.286	11.40
0.291	11.45
0.294	11.41
0.297	11.40
0.300	11.48
0.302	11.36
0.305	11.45
0.308	11.43
0.311	11.25
0.313	11.41
0.316	11.38
0.319	11.35
0.325	11.24
0.327	11.07
0.330	11.23
0.333	11.17
0.336	11.02
0.338	11.13
0.341	11.20
0.344	11.17
0.347	11.01
0.350	11.09
0.352	11.10
0.355	11.16
0.358	11.01
0.361	10.94
0.366	10.91
0.369	11.03

Table II (cont.)

J.D.	m
2433189+	
0.374	10.87
2433201+	
0.311	11.40
0.313	11.45
0.316	11.07
0.319	11.23
0.322	11.37
0.325	11.11
0.327	11.18
0.330	11.22
2433211+	
0.290	11.64
0.293	11.47
0.295	11.48
0.298	11.36
0.301	11.50
0.304	11.54
0.306	11.59
0.309	11.40
0.315	11.51
0.318	11.58
0.320	11.68
0.323	11.61
0.326	11.59
0.338	11.22
0.341	11.28
0.344	11.35
0.347	11.27
0.349	11.30
0.355	11.25
0.358	11.20
0.361	11.20
0.363	11.17
0.366	11.13
0.369	10.97
0.372	10.97
0.376	10.90
0.383	10.83
0.386	10.73
0.388	10.74
0.391	10.65
0.394	10.62
0.397	10.55
0.399	10.60
0.402	10.66

J.D.	m
2433211+	
0.405	10.50
0.408	10.56
0.411	10.46
0.413	10.63
0.416	10.53
2433213+	
0.422	11.53
0.425	11.56
0.428	11.52
0.431	11.46
0.433	11.53
0.436	11.49
0.443	11.43
0.447	11.53
0.450	11.50
0.454	11.33
0.458	11.36
0.463	11.20
0.467	11.20
0.469	11.18
0.478	11.11
0.481	10.93
0.483	10.74
0.486	10.78
0.489	10.85
0.492	10.77
0.494	10.77
0.497	10.60
0.500	10.50
0.503	10.57
0.506	10.43
0.508	10.45
0.511	10.45
0.514	10.37
0.517	10.50
0.519	10.47
0.522	10.42
0.525	10.33
0.528	10.34
0.531	10.38
0.533	10.40
0.536	10.44
0.539	10.49
0.542	10.49
0.544	10.54

J.D.	m
2433248+	
0.244	11.29
0.248	11.25
0.253	11.19
0.255	10.99
0.258	11.04
0.261	11.07
0.264	11.09
0.266	11.11
0.272	11.02
0.275	10.89
0.278	10.84
0.280	10.85
0.283	10.88
0.286	10.80
0.289	10.80
0.291	10.75
2433452+	
0.429	11.14
0.432	11.10
0.435	11.13
0.438	11.10
0.440	11.11
0.443	11.01
0.446	11.13
0.449	11.24
0.451	11.12
0.454	11.08
0.457	11.20
0.459	11.16
0.463	11.03
0.465	11.01
0.468	11.02
0.471	11.08
0.474	10.98
0.476	11.07
0.479	10.91
0.482	10.97
0.488	10.84
0.491	10.89
0.494	10.91
0.497	10.85
0.499	10.90
0.502	10.90
0.505	10.74
0.508	10.86
0.510	10.87

Table II (cont.)

J.D.	m
2433452+	
0.516	10.79
0.519	10.69
0.522	10.80
0.524	10.73
0.527	10.88
0.530	10.88
0.533	10.84
2433482+	
0.340	11.28
0.343	11.14
0.346	11.23
0.349	11.20
0.351	11.17
0.354	11.21
0.360	11.17
0.363	11.22
0.365	11.19
0.370	11.20
2433484+	
0.353	11.39
0.355	11.51
0.358	11.42
0.361	11.43
0.365	11.41
0.365	11.41
0.372	11.51
0.375	11.39
0.380	11.55
0.383	11.55
0.386	11.33
0.388	11.40
0.391	11.35
0.394	11.43
0.397	11.26
0.399	11.38
0.403	11.37
0.408	11.23
0.411	11.36
0.413	11.38
0.416	11.42
0.422	11.40
0.424	11.48
0.427	11.40
0.430	11.31
0.433	11.48

J.D.	m
2433484+	
0.436	11.56
0.438	11.36
0.441	11.31
0.444	11.42
0.447	11.47
0.449	11.47
0.452	11.50
0.455	11.41
0.458	11.36
0.461	11.29
0.463	11.32
0.468	11.33
0.473	11.28
0.477	11.27
0.480	11.10
0.483	11.03
0.486	11.10
0.488	11.00
0.491	11.01
0.495	11.15
0.498	11.00
0.501	11.04
0.504	11.06
0.506	10.98
0.509	11.02
0.512	10.91
0.515	10.87
0.518	10.95
0.520	10.93
0.523	10.93
0.526	10.80
0.529	10.66
0.531	10.79
0.534	10.85
0.540	10.80
0.543	10.81
0.545	10.64
0.548	10.60
0.551	10.75
0.554	10.75
2433485+	
0.355	11.60
0.358	11.43
0.361	11.65
0.363	11.57
0.366	11.73

J.D.	m
2433485+	
0.369	11.72
0.372	11.73
0.375	11.59
0.377	11.69
0.383	11.69
0.388	11.74
0.391	11.70
0.397	11.67
0.400	11.69
0.402	11.68
0.405	11.79
0.411	11.61
0.413	11.66
0.419	11.68
0.422	11.80
0.425	11.61
0.441	11.72
0.444	11.73
0.447	11.80
0.450	11.73
0.452	11.80
0.455	11.75
0.459	11.75
0.481	11.76
0.502	11.77
0.504	11.65
0.507	11.82
0.510	11.62
0.513	11.62
0.516	11.65
0.520	11.43
0.523	11.63
0.526	11.52
0.529	11.43
0.532	11.53
0.534	11.38
0.537	11.39
0.540	11.35
0.543	11.26
0.545	11.44
0.548	11.35
0.551	11.30
0.557	11.37
0.559	11.46
2433504+	
0.393	11.15

Table II (cont.)

J.D.	m
2433504+	
0.395	11.32
0.398	11.04
0.401	11.06
0.404	11.05
0.409	10.87
0.412	10.90
0.415	10.88
0.418	10.74
0.421	10.77
0.423	10.72
0.426	10.61
0.429	10.67
0.432	10.50
0.434	10.51
0.437	10.60
0.440	10.62
0.443	10.63
0.445	10.62
0.448	10.52
0.451	10.50
0.454	10.63
2433505+	
0.345	11.71
0.347	11.57
0.350	11.63
0.353	11.73
0.356	11.75
0.359	11.65
0.361	11.78
0.364	11.77
0.367	11.78
0.371	11.76
0.375	11.80
0.378	11.67
0.381	11.78
0.384	11.74
0.386	11.71
0.389	11.77
0.392	11.63
0.395	11.75
0.397	11.77
0.400	11.72
0.406	11.59
0.415	11.62
0.418	11.73
0.420	11.71
2433505+	
0.423	11.88
0.426	11.67
0.429	11.77
0.432	11.73
0.434	11.74
0.437	11.76
0.440	11.73
0.443	11.61
0.445	11.70
0.448	11.80
0.454	11.72
0.457	11.73
0.459	11.70
0.462	11.79
0.465	11.60
0.468	11.70
0.470	11.60
0.473	11.62
0.476	11.66
0.479	11.73
0.482	11.75
0.484	11.72
0.487	11.80
0.490	11.55
0.525	11.75
0.530	11.62
0.533	11.62
0.536	11.56
0.538	11.53
0.541	11.60
0.552	11.65
0.557	11.77
0.559	11.77
0.562	11.65
0.565	11.70
0.568	11.62
0.570	11.57
0.573	11.54
0.576	11.62
0.579	11.50
0.582	11.62
0.584	11.67
0.587	11.60
0.590	11.50
2433506+	
0.434	11.48
2433506+	
0.437	11.62
0.440	11.53
0.443	11.51
0.518	10.76
0.520	10.71
0.523	10.67
0.526	10.53
0.529	10.72
0.532	10.60
0.534	10.54
0.537	10.55
0.540	10.40
0.543	10.26
0.545	10.33
0.548	10.39
0.551	10.40
0.554	10.36
0.558	10.32
0.562	10.38
0.565	10.40
0.568	10.42
0.570	10.49
0.573	10.40
0.576	10.50
0.579	10.41
0.582	10.58
0.584	10.63
0.587	10.50
2433507+	
0.354	11.26
0.357	11.23
0.359	11.23
0.362	11.43
0.365	11.23
0.368	11.30
0.370	11.32
0.373	11.50
0.376	11.33
0.379	11.45
0.382	11.58
0.387	11.42
0.391	11.35
0.395	11.54
0.398	11.41
0.401	11.44
0.404	11.40

Table II (cont.)

J.D.	m	J.D.	m	J.D.	m
2433507+		2433507+		2433511+	
0.407	11.25	0.579	11.68	0.504	11.10
0.409	11.42	0.585	11.52	0.507	11.03
0.412	11.47	0.588	11.65		
0.415	10.92	0.591	11.77	2433514+	
0.420	11.40			0.340	11.34
0.434	11.36	2433511+		0.343	11.22
0.437	11.55	0.373	11.20	0.346	11.23
0.440	11.68	0.379	11.20	0.348	11.40
0.443	11.51	0.382	11.00	0.351	11.34
0.445	11.53	0.384	11.15	0.354	11.13
0.448	11.52	0.387	11.18	0.357	11.22
0.451	11.56	0.390	11.04	0.359	11.30
0.454	11.66	0.393	11.17	0.362	11.23
0.458	11.59	0.395	11.13	0.365	11.16
0.462	11.70	0.398	11.09	0.368	11.18
0.465	11.57	0.401	11.15	0.371	11.26
0.468	11.62	0.404	11.09	0.373	11.18
0.473	11.60	0.407	11.01	0.376	11.34
0.476	11.64	0.409	11.13	0.379	11.20
0.479	11.65	0.412	11.07	0.382	11.24
0.482	11.63	0.415	11.20	0.384	11.20
0.484	11.49	0.418	11.10	0.389	11.18
0.487	11.69	0.421	11.12	0.393	11.20
0.490	11.65	0.423	11.12	0.396	11.09
0.493	11.60	0.426	11.13	0.398	11.05
0.495	11.67	0.429	11.13	0.401	11.11
0.498	11.62	0.437	11.07	0.404	11.12
0.501	11.62	0.440	11.04	0.407	11.01
0.504	11.61	0.443	11.11	0.423	11.12
0.524	11.64	0.446	11.01	0.426	11.06
0.527	11.64	0.448	11.06	0.429	11.08
0.529	11.73	0.451	11.00	0.432	10.99
0.535	11.60	0.454	11.13	0.434	10.97
0.538	11.58	0.460	11.09	0.437	10.87
0.541	11.46	0.465	11.08	0.440	10.92
0.543	11.63	0.468	11.16	0.443	10.89
0.546	11.67	0.470	11.10	0.446	10.96
0.549	11.52	0.473	11.02	0.448	10.90
0.552	11.68	0.476	11.18	0.451	10.85
0.554	11.70	0.479	11.13	0.454	10.84
0.557	11.60	0.482	11.21	0.457	10.90
0.563	11.73	0.484	11.06	0.459	10.97
0.566	11.66	0.489	11.11	0.462	10.95
0.568	11.62	0.493	11.10	0.465	10.88
0.571	11.76	0.495	11.17	0.468	11.03
0.574	11.55	0.498	11.09	0.471	11.02
0.577	11.60	0.501	11.15	0.473	11.00

Table II (cont.)

J.D.	m
2433514+	
0.476	11.01
0.479	11.00
0.482	11.00
0.484	10.99
0.487	11.00
0.490	11.03
0.493	10.98
0.496	11.00
0.498	11.08
2433516+	
0.464	11.25
0.466	11.37
0.469	11.30
0.472	11.33
0.475	11.35
0.478	11.30
0.483	11.40
0.486	11.35
0.489	11.27
0.491	11.30
0.494	11.27
0.497	11.20
0.503	11.23
0.505	11.18
0.508	11.21
0.511	11.24
0.514	11.16
0.516	11.12
0.519	11.09
0.522	11.09
0.525	11.06
0.537	10.98
0.543	11.04
0.546	10.97
0.548	10.82
0.551	10.83
0.557	10.88
0.560	10.78
0.568	10.98
0.571	10.80
0.573	10.97
2433536+	
0.321	11.62
0.324	11.48
0.327	11.48

J.D.	m
2433536+	
0.330	11.45
0.332	11.43
0.335	11.50
0.338	11.54
0.344	11.43
0.346	11.51
0.349	11.50
0.352	11.56
0.355	11.43
0.357	11.52
0.360	11.52
0.363	11.35
0.366	11.43
0.369	11.48
0.380	11.22
0.382	11.32
0.385	11.34
0.388	11.27
0.391	11.34
0.394	11.14
0.396	11.22
0.399	11.25
0.402	11.12
0.405	11.02
0.407	11.19
0.410	11.14
0.416	10.90
0.421	10.97
0.424	11.04
0.432	10.92
0.435	10.87
0.438	10.90
0.441	10.90
0.444	10.84
0.446	10.62
0.449	10.80
0.452	10.71
0.455	10.87
0.458	10.74
0.461	10.80
0.463	10.68
0.466	10.65
0.469	10.68
0.471	10.69
0.482	10.63
0.486	10.74
0.491	10.80

J.D.	m
2433536+	
0.494	10.83
0.496	10.91
0.499	10.85
0.502	10.82
0.505	10.78
0.507	10.83
0.510	10.74
0.513	10.92
0.516	10.90
0.519	10.86
0.521	10.97
0.524	11.07
0.527	11.02
0.530	10.88
0.532	10.90
2433537+	
0.414	11.77
0.417	11.80
0.423	11.71
0.426	11.78
0.428	11.75
0.431	11.74
0.434	11.77
0.437	11.84
0.438	11.79
0.441	11.78
0.444	11.72
0.446	11.68
0.449	11.72
0.452	11.72
0.455	11.75
0.464	11.74
0.467	11.71
0.470	11.79
0.473	11.79
0.476	11.79
0.478	11.83
0.481	11.79
0.484	11.79
0.487	11.72
0.489	11.73
0.492	11.82
0.495	11.68
0.498	11.60
0.501	11.60
0.503	11.69

Table II (cont.)

J.D.	m
2433537+	
0.506	11.74
0.509	11.70
0.512	11.71
0.519	11.73
0.521	11.76
0.524	11.78
0.527	11.71
0.530	11.61
0.532	11.71
0.535	11.64
0.538	11.75
0.541	11.75
0.544	11.67
0.546	11.65
0.549	11.64
0.552	11.62
0.555	11.65
0.557	11.59
0.560	11.67
0.563	11.73
0.579	11.58
0.582	11.64
0.585	11.64
0.588	11.57
0.591	11.55
0.594	11.47
0.596	11.51
0.599	11.50
0.602	11.52
0.605	11.46
0.607	11.62
0.610	11.50
0.613	11.46
0.616	11.38
0.619	11.55
0.621	11.41
0.624	11.25
0.627	11.33
0.630	11.38
2433538+	
0.501	11.34
0.504	11.28
0.507	11.28
0.509	11.09
0.512	11.20
0.515	11.17

J.D.	m
2433538+	
0.517	11.15
0.520	11.20
0.523	11.12
0.526	11.02
0.529	11.05
0.531	10.91
0.534	10.90
0.537	10.70
0.540	10.85
0.542	10.72
0.545	10.70
0.548	10.63
0.554	10.46
0.556	10.45
0.559	10.46
0.562	10.43
0.565	10.55
0.567	10.58
0.574	10.62
0.577	10.56
0.580	10.59
0.583	10.40
0.585	10.50
0.588	10.54
0.594	10.40
0.597	10.60
0.599	10.56
0.602	10.52
0.605	10.52
0.608	10.53
0.610	10.61
0.613	10.68
0.616	10.76
0.619	10.78
0.622	10.71
0.624	10.71
0.627	10.79
0.630	10.66
2433545+	
0.327	11.73
0.329	11.70
0.332	11.77
0.336	11.68
0.340	11.75
0.346	11.69
0.349	11.68

J.D.	m
2433545+	
0.352	11.70
2433562+	
0.227	11.27
0.230	11.38
0.233	11.37
0.236	11.24
0.238	11.29
0.241	11.42
0.244	11.22
0.247	11.26
0.250	11.36
0.252	11.40
0.255	11.39
0.258	11.41
0.261	11.63
0.263	11.43
0.266	11.30
0.269	11.26
0.272	11.28
0.275	11.49
0.277	11.46
0.280	11.43
2433563+	
0.227	11.66
0.230	11.51
0.233	11.66
0.236	11.80
0.238	11.65
0.241	11.76
0.244	11.60
0.250	11.60
0.252	11.50
0.255	11.51
0.258	11.69
0.261	11.65
0.263	11.51
0.266	11.55
0.269	11.70
0.272	11.60
0.275	11.66
0.277	11.57
0.283	11.42
0.286	11.40
0.288	11.50
0.291	11.40

Table II (cont.)

J.D.	m	J.D.	m	J.D.	m
2433563+		2433563+		2433564+	
0.294	11.38	0.438	10.89	0.308	11.20
0.297	11.30	0.441	10.94	0.311	11.13
0.300	11.38	0.444	10.95	0.313	11.11
0.302	11.33	0.447	10.92	0.316	11.32
0.305	11.25	0.450	11.01	0.319	11.12
0.308	11.23	0.452	11.11	0.322	11.20
0.311	11.32	0.461	10.96	0.325	11.33
0.313	11.12	0.463	11.01	0.327	11.27
0.316	11.05	0.466	10.97	0.330	11.28
0.319	10.90	0.469	11.09	0.333	11.37
0.322	11.00	0.472	10.97	0.336	11.37
0.325	10.73	0.475	11.07	0.338	11.22
0.327	10.72	0.477	11.20	0.341	11.22
0.330	10.60	0.480	11.18	0.347	11.29
0.333	10.70	0.483	11.23	0.350	11.15
0.338	10.60	0.486	11.15	0.352	11.22
0.341	10.63	0.488	11.28	0.363	11.42
0.344	10.40	0.490	11.16	0.366	11.37
0.347	10.36	0.494	11.16	0.369	11.43
0.350	10.42	0.497	11.27	0.372	11.27
0.352	10.26	0.500	11.23	0.375	11.53
0.355	10.28	0.502	11.27	0.377	11.41
0.358	10.20	0.505	11.25	0.380	11.30
0.361	10.30	0.508	11.32	0.383	11.46
0.363	10.37	0.511	11.26	0.386	11.50
0.366	10.33	0.513	11.30	0.388	11.33
0.369	10.42			0.391	11.50
0.372	10.48	2433564+		0.427	11.52
0.375	10.32	0.241	11.36	0.430	11.41
0.377	10.42	0.244	11.38	0.433	11.48
0.380	10.32	0.247	11.33	0.436	11.50
0.383	10.25	0.250	11.28	0.438	11.46
0.386	10.38	0.252	11.36	0.441	11.41
0.400	10.60	0.255	11.33	0.444	11.34
0.402	10.63	0.258	11.50	0.449	11.51
0.406	10.66	0.261	11.36	0.452	11.52
0.408	10.68	0.275	11.22	0.455	11.50
0.411	10.72	0.277	11.28	0.458	11.38
0.413	10.63	0.280	11.30	0.461	11.48
0.416	10.55	0.283	11.22	0.463	11.62
0.419	10.78	0.286	11.26	0.466	11.51
0.422	10.83	0.288	11.28	0.469	11.62
0.425	10.86	0.291	11.26	0.472	11.54
0.427	10.92	0.294	11.29	0.475	11.58
0.430	10.86	0.297	11.25	0.477	11.62
0.433	10.84	0.302	11.26	0.480	11.39
0.436	10.90	0.305	11.18	0.483	11.52

Table II (cont.)

J.D.	m	J.D.	m	J.D.	m
2433564+		2433566+		2433567+	
0.486	11.43	0.472	11.22	0.425	11.71
0.488	11.49	0.475	11.20	0.427	11.66
0.491	11.52	0.477	11.20	0.430	11.72
0.494	11.47	0.480	11.22	0.436	11.62
0.497	11.57	0.483	11.31	0.438	11.76
0.500	11.54	0.486	11.10	0.441	11.72
0.502	11.51	0.488	11.22	0.444	11.65
		0.491	11.32	0.447	11.70
2433566+		0.494	11.30	0.450	11.70
0.350	11.22	0.497	11.47	0.452	11.63
0.352	11.21	0.500	11.27	0.455	11.58
0.355	11.22	0.502	11.30	0.458	11.70
0.361	11.20	0.505	11.39	0.461	11.67
0.363	11.25	0.510	11.38	0.463	11.67
0.366	11.26	0.514	11.45	0.466	11.65
0.369	11.12			0.469	11.78
0.372	11.15	2433567+		0.472	11.68
0.375	11.12	0.325	11.66	0.475	11.77
0.377	11.15	0.327	11.72	0.477	11.62
0.380	11.19	0.330	11.68	0.480	11.63
0.383	11.03	0.333	11.60	0.483	11.56
0.387	11.06	0.336	11.72	0.486	11.64
0.391	11.06	0.340	11.69	0.491	11.62
0.394	11.12	0.344	11.73	0.494	11.70
0.397	11.13	0.349	11.74	0.497	11.67
0.400	11.10	0.352	11.72	0.500	11.74
0.405	11.08	0.355	11.72	0.502	11.64
0.408	11.22	0.358	11.80	0.505	11.68
0.411	11.10	0.362	11.71	0.508	11.67
0.413	11.24	0.366	11.71	0.511	11.52
0.416	11.08	0.369	11.80	0.513	11.65
0.419	11.11	0.372	11.68	0.516	11.55
0.422	11.10	0.380	11.60	0.519	11.49
0.426	11.05	0.383	11.65	0.522	11.47
0.433	11.11	0.386	11.76	0.525	11.47
0.436	11.06	0.388	11.76	0.527	11.40
0.438	11.20	0.391	11.70	0.530	11.48
0.441	11.16	0.397	11.71	0.533	11.36
0.444	10.99	0.400	11.80	0.536	11.33
0.447	11.16	0.402	11.80	0.538	11.47
0.450	11.06	0.405	11.79	0.541	11.33
0.455	11.18	0.408	11.72	0.544	11.35
0.458	11.17	0.411	11.67	0.547	11.16
0.461	10.64	0.413	11.70		
0.463	11.34	0.416	11.68	2433568+	
0.466	11.20	0.419	11.74	0.227	11.48
0.469	11.25	0.422	11.71	0.230	11.43

Table II (cont.)

J.D.	m	J.D.	m	J.D.	m
2433568+		2433568+		2433569+	
0.233	11.51	0.480	11.02	0.230	11.20
0.236	11.62	0.483	11.03	0.233	11.20
0.241	11.43	0.486	10.95	0.236	11.20
0.244	11.42	0.488	10.95	0.238	11.18
0.247	11.42	0.491	10.97	0.241	11.24
0.250	11.49	0.494	11.00	0.244	11.20
0.252	11.49	0.497	10.97	0.247	11.20
0.255	11.46	0.500	10.97	0.250	11.27
0.258	11.53	0.502	10.93	0.252	11.34
0.263	11.49	0.508	10.90	0.255	11.36
0.266	11.37	0.511	10.92	0.258	11.39
0.269	11.39	0.513	10.92	0.261	11.31
0.272	11.55	0.516	10.92	0.263	11.27
0.275	11.57	0.519	10.77	0.266	11.25
0.277	11.53	0.522	10.97	0.269	11.10
0.280	11.60	0.525	10.84	0.475	11.77
0.283	11.62	0.527	11.05	0.477	11.74
0.394	11.50	0.530	10.92	0.480	11.74
0.397	11.37	0.533	10.93	0.483	11.69
0.400	11.44	0.536	11.00	0.486	11.70
0.402	11.46	0.538	10.93	0.488	11.62
0.405	11.45	0.541	10.94	0.491	11.75
0.408	11.26	0.544	10.93	0.494	11.67
0.411	11.46	0.547	11.00	0.497	11.64
0.413	11.29	0.550	10.97	0.500	11.79
0.416	11.28	0.552	11.06	0.502	11.59
0.419	11.26	0.555	11.09	0.505	11.58
0.422	11.37	0.561	11.20	0.508	11.68
0.425	11.20	0.563	11.05	0.511	11.82
0.427	11.31	0.566	11.13	0.513	11.82
0.430	11.31	0.569	11.05	0.516	11.74
0.433	11.20	0.572	11.05	0.519	11.76
0.436	11.17	0.575	11.05	0.522	11.76
0.438	11.25	0.577	11.18	0.525	11.79
0.441	11.18	0.580	11.07	0.527	11.73
0.444	11.17	0.583	11.07	0.536	11.69
0.450	11.07	0.586	11.09	0.538	11.65
0.452	11.17	0.588	11.23	0.541	11.62
0.455	11.05	0.591	11.20	0.544	11.30
0.458	10.99	0.594	11.20	0.547	11.26
0.461	11.08	0.597	11.24	0.550	11.52
0.463	11.00	0.600	11.23	0.552	11.60
0.466	10.94	0.602	11.29	0.555	11.73
0.469	11.06	0.605	11.30	0.558	11.69
0.472	10.94			0.561	11.68
0.475	11.03	2433569+		0.563	11.62
0.477	10.98	0.227	11.32	0.566	11.64

Table II (cont.)

J.D.	m
2433569+	
0.569	11.55
0.572	11.69
0.575	11.68
0.577	11.68
0.580	11.65
0.583	11.71
0.588	11.55
0.591	11.60
0.594	11.62
0.597	11.56
0.600	11.72
0.602	11.57
0.605	11.62
0.608	11.65
0.611	11.56
0.613	11.70
0.616	11.65
0.619	11.52
0.623	11.48
0.629	11.58
0.634	11.44
0.638	11.42
0.642	11.49
2433583+	
0.205	11.30
0.208	11.35
0.210	11.31
0.213	11.29
0.216	11.18
0.219	11.10
0.222	11.13
0.224	10.96
0.227	10.99
0.230	10.95
0.233	11.03
0.238	10.50
0.240	10.52
0.244	10.62
2433613+	
0.186	10.52
0.188	10.49
0.191	10.32
0.194	10.23
2433826+	
0.370	11.64

J.D.	m
2433826+	
0.375	11.76
2433838+	
0.437	11.64
0.440	11.50
0.442	11.59
0.445	11.57
0.448	11.58
0.454	11.55
0.456	11.50
0.459	11.62
0.462	11.51
0.465	11.47
0.467	11.45
0.470	11.55
0.473	11.48
0.476	11.50
0.479	11.48
0.481	11.20
0.484	11.43
0.487	11.29
0.490	11.42
0.492	11.35
0.495	11.40
0.498	11.14
0.501	11.26
0.504	11.16
0.506	11.25
0.509	11.29
0.512	11.20
0.515	11.32
0.517	11.31
0.520	11.26
0.524	11.23
0.529	11.18
0.534	11.20
0.537	11.20
0.540	11.24
0.543	11.26
2433887+	
0.291	11.47
0.293	11.35
0.296	11.33
0.299	11.20
0.302	11.39
0.305	11.36

J.D.	m
2433887+	
0.307	11.38
0.310	11.41
0.313	11.40
0.316	11.32
0.318	11.38
0.321	11.50
0.324	11.32
0.327	11.28
0.330	11.38
0.332	11.33
0.335	11.38
0.338	11.36
0.341	11.44
0.343	11.30
0.346	11.44
0.349	11.51
0.352	11.39
2433888+	
0.310	11.44
0.313	11.46
0.319	11.43
0.324	11.44
0.327	11.44
0.330	11.37
0.332	11.33
0.335	11.26
0.338	11.20
0.341	11.32
0.344	11.18
0.347	11.44
0.349	11.40
0.352	11.26
0.355	11.34
0.358	11.32
0.360	10.94
0.363	11.06
0.366	10.89
0.369	10.80
0.371	10.88
0.374	10.68
0.377	10.59
0.380	10.57
0.383	10.57
0.385	10.44
0.388	10.37
0.391	10.46

Table II (cont.)

J.D.	m
2433888+	
0.394	10.40
0.396	10.40
0.402	10.40
0.405	10.36
0.408	10.42
0.410	10.43
0.413	10.36
0.416	10.38
0.419	10.35
0.421	10.56
0.424	10.54
0.427	10.51
0.430	10.32
0.435	10.40
0.438	10.40
0.441	10.53
0.446	10.60
0.449	10.45
0.452	10.61
0.455	10.70
0.458	10.52
0.460	10.56
0.463	10.60
0.466	10.84
0.469	10.73
0.471	10.73
0.474	10.74
0.477	10.65
0.480	10.68
2433889+	
0.305	11.40
0.308	11.40
0.310	11.32
0.313	11.35
0.316	11.27
0.319	11.37
0.322	11.23
0.324	11.34
0.327	11.26
0.330	11.33
0.333	11.32
0.336	11.39
0.338	11.15
0.341	11.39
0.344	11.27
0.347	11.28
0.349	11.15
0.358	11.30
0.360	11.20
0.363	11.27
0.366	11.39
0.369	11.24
0.372	11.15
0.374	11.29
0.377	11.15
0.408	11.20
0.410	11.20
0.413	11.40
0.416	11.35
0.419	11.25
0.433	11.40
0.435	11.41
0.438	11.48
0.443	11.32
0.447	11.38
0.449	11.40
0.452	11.27
0.455	11.29
0.458	11.55
0.460	11.30
0.465	11.36
0.472	11.45
0.474	11.52
0.477	11.39
0.480	11.54
0.483	11.48
0.485	11.50
0.488	11.45
0.491	11.44
0.494	11.45
0.497	11.42
0.505	11.39
0.508	11.69
0.510	11.49
0.513	11.48
0.516	11.53
2433890+	
0.363	11.57
0.366	11.53
0.369	11.53
0.372	11.56
0.374	11.67
0.377	11.62
0.380	11.63
0.383	11.71
0.407	11.46
0.411	11.64
0.413	11.55
0.438	11.48
0.441	11.55
0.444	11.44
0.446	11.59
0.450	11.59
0.455	11.44
0.458	11.51
2433891+	
0.311	11.44
0.314	11.55
0.316	11.49
0.319	11.40
0.322	11.59
0.325	11.46
0.328	11.35
0.330	11.48
0.333	11.56
0.336	11.41
0.339	11.39
0.341	11.50
0.344	11.37
0.347	11.50
0.350	11.30
0.353	11.51
0.355	11.52
0.358	11.47
0.361	11.34
0.364	11.42
0.366	11.34
0.369	11.28
0.372	11.44
0.375	11.25
0.378	11.25
0.380	11.22
0.383	11.40
0.386	11.41
0.389	11.28
0.391	11.20
0.394	11.25
0.397	11.29

Table II (cont.)

J.D.	m	J.D.	m	J.D.	m
2433891+		2433891+		2433898+	
0.400	11.25	0.564	11.37	0.373	10.82
0.402	11.28	0.566	11.43	0.376	10.80
0.408	11.25	0.569	11.44	0.379	10.80
0.411	11.24	0.572	11.38	0.382	10.80
0.414	11.17	0.575	11.44	0.387	10.94
0.416	11.11	0.577	11.39	0.390	10.93
0.419	11.30	0.580	11.43	0.393	10.82
0.422	11.30	0.589	11.44	0.395	10.77
0.425	11.20	0.593	11.41	0.401	10.96
0.427	11.24	0.597	11.42	0.404	10.88
0.430	11.29	0.600	11.50	0.407	10.79
0.433	11.19	0.602	11.34	0.409	10.82
0.436	11.16	0.605	11.40	0.412	10.72
0.439	11.05	0.608	11.40	0.415	10.77
0.441	11.15	0.611	11.44	0.418	10.84
0.444	11.20	0.614	11.46	0.420	10.97
0.447	11.10	0.616	11.51	0.423	10.93
0.453	11.16	0.619	11.48	0.426	10.90
0.461	11.23			0.429	10.95
0.464	11.23	2433898+		0.432	10.84
0.476	11.23	0.295	11.19	0.434	11.04
0.481	11.20	0.298	11.28	0.437	11.01
0.486	11.39	0.301	11.38	0.440	10.93
0.489	11.32	0.304	11.32	0.443	10.92
0.491	11.31	0.307	11.31	0.446	11.05
0.497	11.30	0.309	11.20	0.448	10.97
0.500	11.38	0.315	11.22	0.451	10.97
0.502	11.37	0.318	11.25	0.453	11.09
0.505	11.43	0.320	11.12	0.457	11.10
0.508	11.30	0.323	11.34	0.459	11.13
0.511	11.27	0.326	11.26		
0.514	11.25	0.329	11.12	2433900+	
0.516	11.23	0.332	11.19	0.437	11.28
0.519	11.20	0.334	11.20	0.440	11.24
0.522	11.24	0.337	11.12	0.443	11.30
0.525	11.40	0.340	11.12	0.446	11.29
0.527	11.32	0.343	11.16	0.449	11.08
0.530	11.20	0.345	11.22	0.451	11.03
0.533	11.31	0.348	11.00	0.454	11.03
0.536	11.35	0.351	11.02	0.457	11.03
0.541	11.37	0.354	10.98	0.460	10.97
0.544	11.30	0.357	11.08	0.462	11.04
0.547	11.25	0.359	10.97	0.465	11.00
0.550	11.30	0.362	10.92	0.468	11.10
0.552	11.24	0.365	10.73	0.475	10.98
0.555	11.25	0.368	10.88	0.481	10.85
0.558	11.24	0.371	10.82	0.485	10.95

Table II (cont.)

J.D.	m	J.D.	m	J.D.	m
2433900+		2433924+		2433924+	
0.487	10.92	0.383	11.70	0.558	11.42
0.490	10.97	0.386	11.62	0.561	11.48
0.493	10.80	0.389	11.70	0.564	11.57
0.496	10.84	0.391	11.60	0.566	11.56
0.499	10.78	0.394	11.68	0.569	11.64
0.501	10.95	0.397	11.69	0.572	11.58
0.504	10.98	0.400	11.72	0.575	11.51
0.507	10.91	0.403	11.71	0.578	11.41
0.510	10.90	0.405	11.68	0.581	11.42
0.512	10.89	0.408	11.70	0.584	11.46
0.515	10.99	0.414	11.76	0.589	11.44
0.518	10.85	0.416	11.65	0.591	11.44
0.521	10.87	0.422	11.76	0.594	11.34
0.524	10.89	0.441	11.84	0.597	11.40
0.529	10.95	0.444	11.75	0.600	11.36
0.532	10.84	0.447	11.66	0.603	11.28
0.535	10.80	0.449	11.59	0.605	11.18
0.546	10.97	0.452	11.60	0.608	11.14
0.549	10.82	0.455	11.74	0.611	11.09
0.551	10.92	0.458	11.72	0.614	10.95
0.554	10.97	0.469	11.68	0.616	10.92
0.557	10.92	0.475	11.62	0.619	10.97
0.560	10.97	0.478	11.53	0.622	10.82
0.562	10.97	0.480	11.62	0.625	10.95
0.565	10.93	0.483	11.50	0.628	10.52
0.568	11.17	0.489	11.60	0.630	10.56
0.571	10.90	0.491	11.57	0.633	10.68
0.574	11.22	0.494	11.56	0.636	10.59
0.576	11.10	0.505	11.62	0.639	10.40
0.579	11.17	0.508	11.67	0.642	10.38
0.582	11.03	0.511	11.57	0.644	10.44
0.593	11.06	0.514	11.68	0.647	10.41
0.596	11.10	0.516	11.72	0.650	10.42
0.599	11.14	0.519	11.67		
0.601	11.30	0.522	11.64	2433950+	
0.607	11.22	0.525	11.70	0.287	10.84
		0.528	11.70	0.289	10.92
2433920+		0.530	11.62	0.292	10.68
0.333	11.62	0.533	11.64	0.295	10.60
0.336	11.63	0.536	11.71	0.298	10.54
0.338	11.59	0.539	11.75	0.301	10.43
0.341	11.44	0.541	11.54	0.303	10.48
0.344	11.39	0.544	11.49	0.306	10.39
0.347	11.41	0.547	11.55	0.309	10.33
0.350	11.40	0.550	11.53	0.312	10.30
0.352	11.22	0.553	11.67	0.315	10.24
0.355	11.32	0.555	11.66	0.320	10.32

Table II (cont.)

J.D.	m
2433950+	
0.323	10.26
0.326	10.28
0.328	10.24
0.338	10.26
0.341	10.29
0.344	10.43
0.346	10.33
0.349	10.38
0.352	10.48
0.355	10.53
0.358	10.37
0.360	10.39
0.363	10.56
0.366	10.43
0.369	10.49
2433970+	
0.193	11.02
0.196	10.88
0.199	10.94
0.202	10.82
0.204	10.90
0.207	10.79
0.210	10.82
0.213	10.76
0.215	10.65
0.218	10.61
0.221	10.54
0.224	10.56
2433980+	
0.182	11.16
0.184	10.99
0.187	10.86
0.190	10.95
0.193	10.80
0.196	10.62
0.198	10.56
0.201	10.58
0.204	10.45
0.207	10.53
0.209	10.38
0.212	10.32
0.215	10.50
0.218	10.31
0.221	10.35
0.223	10.34

J.D.	m
2433980+	
0.226	10.25
0.229	10.30
0.232	10.29
0.235	10.32
0.237	10.38
2433982+	
0.263	11.27
0.266	11.38
0.268	11.29
0.271	11.34
0.274	11.31
0.280	11.11
0.282	11.34
0.285	11.20
0.288	11.08
0.291	11.04
0.294	10.99
0.296	11.00
0.299	11.02
0.302	10.89
0.305	10.68
0.307	10.66
0.310	10.38
0.313	10.32
0.316	10.38
0.318	10.36
0.321	10.33
0.324	10.24
0.327	10.38
0.330	10.20
0.355	10.32
0.358	10.32
0.360	10.33
2434192+	
0.385	11.40
0.388	11.53
0.396	11.40
0.402	11.44
0.405	11.46
0.407	11.48
0.410	11.40
0.413	11.47
0.416	11.46
0.418	11.42
0.421	11.52

J.D.	m
2434192+	
0.424	11.53
0.427	11.43
0.430	11.55
0.432	11.37
0.435	11.44
0.438	11.48
0.441	11.53
0.444	11.63
0.449	11.43
0.452	11.49
0.455	11.48
0.457	11.44
0.460	11.44
0.463	11.53
0.466	11.43
0.469	11.41
0.472	11.40
0.474	11.58
0.477	11.42
0.480	11.40
0.482	11.41
0.485	11.44
0.488	11.44
0.491	11.44
0.495	11.45
0.499	11.42
0.502	11.42
0.505	11.36
0.507	11.45
0.510	11.39
0.513	11.37
0.516	11.49
0.518	11.44
0.521	11.43
2434214+	
0.383	11.38
0.386	11.31
0.389	11.48
0.392	11.37
0.394	11.10
0.397	11.20
0.400	11.17
0.403	11.38
0.406	11.32
0.408	11.27
0.411	11.40

Table II (cont.)

J.D.	m	J.D.	m	J.D.	m
2434214+		2434215+		2434236+	
0.414	11.24	0.485	11.57	0.390	11.44
0.417	11.33	0.488	11.34	0.393	11.44
0.419	11.53	0.494	11.44	0.395	11.44
0.422	11.36	0.496	11.56	0.398	11.44
0.425	11.27	0.499	11.50	0.401	11.64
0.428	11.39	0.502	11.51	0.404	11.52
0.431	11.32	0.507	11.25	0.406	11.53
0.433	11.37	0.510	11.30	0.409	11.54
0.436	11.34	0.512	11.22	0.412	11.42
0.439	11.49	0.515	11.29	0.415	11.41
0.442	11.47	0.518	11.17	0.420	11.47
0.445	11.23	0.521	11.19	0.426	11.58
0.448	11.44	0.524	11.08	0.429	11.59
0.456	11.36	0.526	10.97	0.434	11.56
0.458	11.50	0.529	10.93	0.437	11.68
0.461	11.25	0.532	10.84	0.440	11.55
0.464	11.30	0.535	10.69	0.443	11.48
0.467	11.50	0.537	10.62	0.445	11.68
0.469	11.34	0.540	10.59	0.448	11.52
0.472	11.30	0.543	10.52	0.451	11.61
0.475	11.36	0.546	10.68	0.454	11.66
0.478	11.40			0.456	11.68
0.481	11.35	2434233+		0.458	11.50
0.483	11.44	0.333	10.38	0.462	11.42
0.489	11.53	0.337	10.33	0.465	11.56
0.494	11.60	0.351	10.27	0.468	11.37
0.497	11.50	0.353	10.29	0.473	11.54
0.500	11.41	0.366	10.31	0.479	11.50
0.503	11.37	0.369	10.40	0.481	11.58
0.506	11.67	0.382	10.48	0.484	11.50
0.508	11.64			0.488	11.56
0.511	11.48	2434236+		0.493	11.59
0.514	11.51	0.338	11.39	0.495	11.47
0.517	11.44	0.340	11.30	0.498	11.43
0.519	11.35	0.343	11.28	0.501	11.56
0.522	11.49	0.347	11.34	0.504	11.52
		0.351	11.44	0.512	11.58
2434215+		0.354	11.40	0.515	11.41
0.458	11.64	0.357	11.31	0.524	11.74
0.460	11.60	0.360	11.30	0.530	11.64
0.463	11.62	0.363	11.43	0.533	11.60
0.466	11.70	0.367	11.41	0.535	11.64
0.469	11.41	0.372	11.44	0.541	11.64
0.471	11.42	0.376	11.52	0.544	11.53
0.474	11.48	0.379	11.50	0.547	11.73
0.477	11.40	0.382	11.36	0.549	11.62
0.482	11.48	0.385	11.52	0.552	11.59

Table II (cont.)

J.D.	m
2434236+	
0.555	11.66
0.558	11.59
0.560	11.52
0.563	11.60
0.569	11.57
0.574	11.77
0.580	11.58
0.582	11.77
0.584	11.59
0.588	11.56
2434237+	
0.505	11.52
0.512	11.60
0.514	11.46
0.517	11.44
0.520	11.51
0.523	11.59
0.526	11.40
0.528	11.53
0.531	11.44
0.534	11.42
0.537	11.23
0.539	11.15
0.545	11.15
0.554	10.62
0.556	10.64
0.559	10.51
0.562	10.46
0.564	10.58
0.567	10.52
0.570	10.50
0.573	10.48
0.576	10.40
0.578	10.37
0.581	10.40
0.584	10.54
0.587	10.34
0.589	10.46
0.592	10.53
2434240+	
0.316	11.27
0.319	11.55
0.322	11.36
0.324	11.49
0.327	11.43

J.D.	m
2434240+	
0.330	11.47
0.333	11.30
0.336	11.49
0.339	11.39
0.341	11.42
0.344	11.50
0.347	11.49
0.350	11.41
0.352	11.58
0.358	11.42
0.361	11.35
0.363	11.50
0.366	11.41
0.369	11.45
0.372	11.16
0.374	11.20
0.377	11.34
0.380	11.32
0.386	11.40
0.388	11.44
0.391	11.32
0.394	11.48
0.397	11.39
0.399	11.36
0.402	11.38
0.405	11.48
0.408	11.35
0.410	11.52
0.413	11.25
0.416	11.49
0.419	11.26
0.422	11.38
0.424	11.27
0.427	11.34
0.430	11.42
0.433	11.40
0.436	11.41
0.438	11.44
0.441	11.44
0.444	11.33
0.449	11.21
0.452	11.24
0.455	11.20
0.458	11.34
0.460	11.35
0.463	11.22
0.466	11.36

J.D.	m
2434240+	
0.469	11.34
0.472	11.34
0.474	11.29
0.480	11.40
0.483	11.22
0.486	11.28
0.491	11.16
0.494	11.30
0.497	11.24
0.499	11.30
0.502	11.41
0.513	11.28
0.519	11.30
0.522	11.22
0.524	11.44
0.527	11.36
0.530	11.16
0.533	11.20
0.536	11.12
0.538	11.16
0.541	11.26
0.544	11.34
0.547	11.28
0.549	11.26
0.552	11.19
0.555	11.15
0.558	11.20
0.569	11.25
0.574	11.25
0.577	11.28
0.580	11.34
0.586	11.31
0.588	11.42
0.591	11.44
0.594	11.41
0.597	11.31
2434243+	
0.318	10.86
0.320	10.84
0.323	10.62
0.326	10.61
0.329	10.60
0.331	10.51
0.334	10.42
0.337	10.37
0.340	10.38

Table II (cont.)

J.D.	m
2434243+	
0.343	10.36
0.345	10.28
0.348	10.32
0.351	10.32
0.354	10.32
0.356	10.22
0.359	10.39
0.362	10.39
0.365	10.39
0.368	10.33
0.370	10.49
0.373	10.31
0.376	10.46
0.379	10.46
0.384	10.46
0.387	10.64
0.390	10.61
0.393	10.47
0.395	10.54
0.398	10.48
0.401	10.49
0.406	10.70
0.409	10.74
0.412	10.77
0.415	10.72
0.418	10.85
0.420	10.72
0.423	10.80
0.426	10.78
0.430	10.88
0.434	10.74
0.437	10.85
0.442	10.90
2434253+	
0.297	11.07
0.302	11.03
0.304	10.92
0.307	10.94
0.310	10.95
0.314	10.91
0.318	10.78
0.321	10.92
0.325	11.83
0.329	10.86
0.332	10.71
0.335	10.77

J.D.	m
2434253+	
0.340	10.87
0.343	10.90
0.346	10.81
0.349	10.87
0.352	10.99
0.354	10.97
0.357	10.99
0.360	10.86
0.363	10.83
0.365	10.86
0.368	10.90
0.371	10.85
0.374	10.85
0.377	10.97
2434254+	
0.290	11.53
0.293	11.49
0.295	11.64
0.298	11.56
0.302	11.58
0.306	11.55
0.309	11.59
0.312	11.70
0.315	11.54
0.318	11.54
0.320	11.61
0.323	11.60
0.331	11.44
0.333	11.46
0.336	11.57
0.339	11.44
0.342	11.62
0.345	11.42
0.350	11.46
0.353	11.55
0.356	11.53
0.358	11.44
0.361	11.56
0.364	11.37
0.367	11.57
0.370	11.52
0.372	11.40
0.375	11.60
0.378	11.39
0.381	11.48
0.385	11.39

J.D.	m
2434254+	
0.389	11.42
0.392	11.38
0.398	11.31
0.401	11.47
0.405	10.39
0.411	10.33
0.415	11.32
0.418	11.28
0.420	11.41
0.423	11.43
0.426	11.39
0.431	11.42
0.434	11.46
0.437	11.48
0.440	11.28
0.443	11.28
0.445	11.48
0.448	11.38
0.451	11.22
0.454	11.36
0.456	11.39
0.459	11.44
0.462	11.42
2434255+	
0.328	11.56
0.331	11.39
0.333	11.50
0.336	11.40
0.339	11.46
0.342	11.50
0.345	11.41
0.353	11.34
0.356	11.52
0.358	11.36
0.361	11.37
0.364	11.36
0.367	11.38
0.372	11.32
0.374	11.28
0.377	11.31
0.380	11.02
0.383	11.27
0.386	11.06
0.388	11.11
0.391	11.18
0.394	11.20

Table II (cont.)

J.D.	m
2434255+	
0.397	10.76
0.399	11.10
0.402	11.06
0.405	10.92
2434277+	
0.380	11.40
0.383	11.42
0.386	11.54
0.390	11.54
0.394	11.56
0.397	11.49
0.400	11.58
0.402	11.61
0.405	11.47
0.411	11.44
0.413	11.50
0.416	11.51
0.419	11.50
0.422	11.40
0.425	11.12
0.430	11.07
0.433	11.18
0.436	11.23
0.450	10.76
0.452	10.60
0.455	10.79
0.458	10.59
0.461	10.51
0.463	10.42
0.466	10.33
0.469	10.31
0.472	10.28
0.475	10.36
0.477	10.26
0.480	10.39
0.483	10.36
0.486	10.21
0.488	10.24
0.491	10.33
0.494	10.20
0.497	10.21
0.500	10.30
0.502	10.37
0.505	10.40
0.508	10.40
0.511	10.36

J.D.	m
2434277+	
0.513	10.45
0.516	10.42
0.519	10.50
0.522	10.56
2434282+	
0.493	11.55
0.495	11.46
0.498	11.44
0.501	11.33
0.504	11.47
0.507	11.44
0.509	11.42
0.512	11.31
0.515	11.46
0.518	11.36
0.520	11.44
0.523	11.42
0.526	11.35
0.529	11.29
0.532	11.37
0.534	11.47
0.537	11.50
0.540	11.39
0.543	11.52
0.545	11.28
0.548	11.60
0.551	11.43
0.554	11.44
0.559	11.32
0.562	11.32
0.565	11.39
0.568	11.32
0.570	11.41
0.573	11.24
0.576	11.31
0.579	11.40
0.582	11.32
0.584	11.51
0.587	11.35
0.590	11.32
0.593	11.30
0.595	11.32
0.601	11.22
0.607	11.40
0.612	11.48
0.615	11.44

J.D.	m
2434282+	
0.619	11.38
0.623	11.44
0.626	11.31
0.629	11.40
0.633	11.45
2434284+	
0.266	11.58
0.272	11.54
0.275	11.46
0.277	11.40
0.280	11.50
0.283	11.37
0.286	11.59
0.288	11.60
0.291	11.53
0.294	11.53
0.297	11.63
0.300	11.60
0.302	11.52
0.305	11.59
0.311	11.43
0.314	11.52
0.316	11.47
0.319	11.52
0.322	11.43
0.325	11.46
0.327	11.38
0.330	11.53
0.333	11.60
0.336	11.47
0.339	11.42
0.341	11.52
0.344	11.54
0.347	11.44
0.352	11.44
0.355	11.45
0.358	11.37
0.361	11.39
0.364	11.50
0.366	11.38
0.369	11.32
0.372	11.44
0.375	11.44
0.377	11.28
0.380	11.54
0.383	11.37

Table II (cont.)

J.D.	m	J.D.	m	J.D.	m
2434284+		2434284+		2434304+	
0.386	11.36	0.566	11.40	0.255	11.73
0.388	11.39	0.569	11.42	0.258	11.66
0.391	11.42	0.577	11.48	0.260	11.58
0.394	11.36	0.580	11.40	0.265	11.63
0.407	11.40	0.589	11.54	0.269	11.59
0.409	11.30	0.591	11.40	0.274	11.72
0.412	11.30	0.594	11.34	0.277	11.63
0.415	11.26	0.597	11.26	0.280	11.61
0.418	11.14	0.600	11.52	0.283	11.55
0.420	11.25	0.602	11.52	0.285	11.67
0.422	11.36	0.605	11.42	0.288	11.51
0.426	11.24	0.608	11.35	0.291	11.55
0.429	11.32	0.611	11.39	0.294	11.58
0.432	11.41	0.613	11.28	0.296	11.54
0.434	11.25	0.616	11.49	0.335	11.57
0.437	11.23	0.619	11.48	0.338	11.55
0.440	11.16	0.622	11.39	0.341	11.55
0.443	11.39			0.344	11.36
0.445	11.24	2434295+		0.347	11.47
0.448	11.40	0.255	10.73	0.349	11.45
0.451	11.28	0.258	10.58	0.352	11.53
0.454	11.30	0.261	10.48	0.356	11.46
0.480	11.32	0.264	10.42	0.360	11.56
0.483	11.48	0.267	10.54	0.391	11.28
0.486	11.31	0.269	10.51	0.394	11.35
0.489	11.37	0.272	10.50	0.397	11.37
0.491	11.25	0.275	10.50	0.399	11.16
0.494	11.35	0.278	10.48	0.402	11.15
0.497	11.48	0.282	10.57	0.405	11.14
0.500	11.44	0.286	10.55	0.408	11.18
0.502	11.47	0.289	10.59	0.410	11.35
0.505	11.36	0.292	10.57	0.413	11.21
0.508	11.41	0.294	10.64	0.416	11.07
0.511	11.50	0.303	10.68	0.419	11.20
0.513	11.43	0.305	10.70	0.422	11.08
0.516	11.60	0.308	10.90	0.424	11.12
0.519	11.37	0.311	10.82	0.427	11.20
0.522	11.44	0.314	10.78	0.433	11.00
0.527	11.58	0.318	10.86	0.436	10.94
0.530	11.32	0.322	11.04	0.438	11.01
0.533	11.35	0.325	10.87	0.444	10.98
0.536	11.53	0.328	10.92	0.449	10.95
0.539	11.41			0.452	10.97
0.550	11.48	2434304+		0.455	10.88
0.553	11.54	0.246	11.62	0.458	10.98
0.555	11.36	0.249	11.71	0.461	11.07
0.563	11.33	0.252	11.78	0.463	10.93

Table II (cont.)

J.D.	m	J.D.	m	J.D.	m
2434304+		2434304+		2434305+	
0.466	11.12	0.619	11.56	0.347	10.78
0.469	10.97	0.622	11.39	0.350	10.80
0.472	11.04	0.625	11.57	0.357	10.92
0.474	10.89	0.627	11.41	0.359	10.82
0.479	11.03	0.630	11.46	0.362	10.88
0.483	11.08	0.633	11.26	0.365	11.04
0.486	11.03	0.635	11.37	0.368	11.08
0.488	10.98			0.370	11.09
0.491	11.04	2434305+		0.373	10.92
0.494	11.12	0.233	11.14	0.377	10.97
0.497	11.18	0.236	11.16	0.380	10.99
0.499	10.98	0.238	11.11		
0.505	11.18	0.241	11.00	2434567+	
0.508	11.13	0.244	11.15	0.369	11.46
0.511	11.32	0.247	10.89	0.374	11.54
0.513	11.31	0.250	10.81	0.378	11.58
0.519	11.00	0.252	10.76	0.381	11.56
0.524	11.20	0.255	10.64	0.383	11.46
0.527	11.20	0.258	10.65	0.386	11.60
0.531	11.15	0.261	10.40	0.389	11.62
0.536	11.24	0.263	10.50	0.392	11.58
0.538	11.27	0.266	10.50	0.405	11.50
0.545	11.27	0.270	10.41	0.408	11.64
0.547	11.22	0.275	10.43	0.410	11.54
0.549	11.32	0.280	10.48	0.416	11.62
0.552	11.09	0.283	10.41	0.419	11.56
0.555	11.27	0.286	10.42	0.424	11.46
0.558	11.19	0.288	10.51	0.427	11.58
0.561	11.29	0.291	10.48	0.430	11.56
0.563	11.16	0.297	10.57	0.433	11.60
0.566	11.26	0.300	10.58	0.436	11.45
0.569	11.42	0.302	10.63	0.439	11.60
0.575	11.30	0.305	10.48	0.442	11.56
0.577	11.41	0.308	10.53	0.448	11.48
0.580	11.40	0.311	10.69	0.451	11.52
0.583	11.46	0.313	10.50	0.454	11.54
0.586	11.45	0.316	10.50	0.459	11.60
0.588	11.30	0.319	10.60	0.462	11.47
0.595	11.28	0.322	10.67	0.465	11.60
0.597	11.18	0.324	10.64	0.467	11.57
0.600	11.18	0.327	10.64	0.470	11.56
0.602	11.39	0.330	10.80	0.473	11.50
0.605	11.36	0.333	10.60	0.476	11.53
0.608	11.28	0.336	10.59	0.479	11.50
0.611	11.47	0.338	10.67	0.481	11.33
0.613	11.50	0.341	10.80	0.484	11.42
0.616	11.48	0.344	10.82	0.487	11.44

Table II (cont.)

J.D.	m
2434567+	
0.490	11.46
0.492	11.44
0.495	11.51
0.498	11.50
0.504	11.25
0.506	11.28
0.509	11.28
0.512	11.30
0.515	11.20
0.517	11.20
0.520	11.23
0.523	11.31
0.526	11.33
0.529	11.27
0.531	11.27
0.534	11.29
0.537	11.40
0.540	11.38
2434569+	
0.469	11.48
0.472	11.37
0.475	11.44
0.478	11.51
0.481	11.40
0.483	11.40
0.486	11.50
0.489	11.28
0.492	11.40
2434598+	
0.326	10.54
0.329	10.50
0.332	10.52
0.335	10.53
0.338	10.57
0.342	10.55
0.346	10.57
0.349	10.53
0.351	10.56
0.354	10.70
0.357	10.60
0.360	10.80
0.362	10.80
0.365	10.73
0.371	10.74
2434600+	
0.346	11.33
0.349	11.32
0.352	11.46
0.355	11.37
0.358	11.21
0.360	11.27
0.363	11.25
0.366	11.24
0.369	11.08
0.371	10.99
0.374	10.97
0.377	11.05
0.380	11.00
0.383	10.84
0.385	10.72
0.388	10.46
0.391	10.60
0.394	10.48
0.396	10.36
0.399	10.40
0.406	10.45
0.408	10.46
0.410	10.45
0.413	10.34
0.416	10.34
0.419	10.30
0.424	10.24
0.427	10.34
0.430	10.33
0.433	10.38
0.435	10.30
0.438	10.27
0.441	10.33
0.444	10.27
0.446	10.36
0.449	10.40
0.452	10.36
2434601+	
0.342	11.52
0.345	11.62
0.348	11.59
0.351	11.58
0.353	11.54
0.356	11.57
0.359	11.50
0.362	11.46
2434601+	
0.364	11.55
0.367	11.48
0.370	11.44
0.374	11.46
0.378	11.48
0.381	11.47
0.384	11.44
0.387	11.45
0.389	11.51
0.392	11.52
0.395	11.53
0.398	11.53
0.401	11.48
0.403	11.50
0.406	11.60
0.412	11.54
0.414	11.46
0.417	11.42
0.420	11.53
0.423	11.56
0.426	11.57
0.428	11.44
0.431	11.45
0.434	11.44
0.437	11.43
0.439	11.45
0.442	11.46
0.445	11.45
0.448	11.44
0.451	11.51
0.453	11.44
0.456	11.44
0.459	11.40
0.462	11.44
0.464	11.26
0.467	11.29
0.470	11.41
0.473	11.48
0.476	11.55
0.481	11.48
0.484	11.56
0.487	11.51
0.489	11.60
0.492	11.60
0.495	11.59
0.498	11.45
0.500	11.42

Table II (cont.)

J.D.	m
2434601+	
0.503	11.44
0.506	11.49
0.509	11.44
0.512	11.48
0.514	11.48
0.517	11.53
0.520	11.43
0.523	11.46
0.525	11.48
0.528	11.46
0.531	11.46
0.534	11.44
0.537	11.48
0.539	11.59
0.542	11.49
0.545	11.50
0.548	11.49
2434602+	
0.483	11.08
0.486	11.15
0.489	10.90
0.492	10.90
0.494	10.92
0.497	10.94
0.500	10.66
0.503	10.64
0.506	10.60
0.508	10.34
0.511	10.42
0.514	10.28
0.517	10.26
0.519	10.26
0.522	10.15
0.525	10.15
0.528	10.14
0.531	10.17
0.533	10.30
0.540	10.28
0.543	10.27
0.546	10.24
0.549	10.26
0.551	10.32
0.554	10.33
0.557	10.40
0.560	10.34
0.562	10.43

J.D.	m
2434602+	
0.565	10.38
0.568	10.40
0.571	10.47
0.574	10.42
0.576	10.47
0.579	10.50
0.582	10.41
0.585	10.55
0.588	10.56
2434620+	
0.333	10.75
0.337	10.72
0.340	10.70
0.343	10.69
0.346	10.61
0.348	10.62
0.353	10.68
0.357	10.63
0.359	10.60
0.362	10.62
0.365	10.61
0.368	10.67
0.371	10.60
0.382	10.64
0.384	10.65
0.389	10.63
0.392	10.75
0.395	10.82
0.398	10.94
0.400	10.95
0.403	10.78
0.406	10.81
0.409	11.13
0.412	10.97
0.414	10.84
0.417	10.98
0.420	10.98
0.423	11.14
2434622+	
0.435	10.33
0.438	10.33
0.440	10.49
0.443	10.47
0.446	10.35
0.449	10.42

J.D.	m
2434622+	
0.452	10.44
0.454	10.39
0.457	10.39
0.460	10.30
0.462	10.31
0.465	10.59
0.468	10.51
0.471	10.41
0.474	10.56
0.476	10.47
0.479	10.57
0.482	10.45
0.485	10.40
0.488	10.37
0.493	10.52
0.503	10.84
0.506	10.73
0.509	10.69
0.511	10.84
0.514	10.80
0.517	10.79
0.519	10.91
0.522	10.87
0.525	10.97
0.528	10.88
0.531	10.87
0.533	10.88
0.536	11.00
0.539	11.04
0.542	11.09
0.544	11.08
0.547	10.97
0.550	11.08
0.553	11.12
0.556	11.05
0.558	11.18
0.561	11.07
0.564	11.13
0.567	11.25
2434624+	
0.469	11.10
0.471	11.02
0.474	10.98
0.477	11.10
0.480	11.02
0.482	11.12

Table II (cont.)

J.D.	m	J.D.	m	J.D.	m
2434624+		2434624+		2434629+	
0.485	10.99	0.621	10.81	0.433	11.02
0.488	11.08	0.624	10.80	0.435	11.24
0.491	11.04			0.438	11.09
0.493	11.00	2434629+		0.441	11.20
0.496	11.02	0.308	11.66	0.467	11.11
0.499	11.04	0.310	11.45	0.471	11.14
0.502	11.05	0.313	11.61	0.474	11.08
0.505	10.99	0.316	11.56	0.477	11.00
0.507	11.02	0.319	11.45	0.480	11.08
0.510	11.04	0.321	11.49	0.483	11.07
0.513	10.97	0.324	11.56	0.485	11.12
0.516	10.85	0.327	11.55	0.488	11.16
0.518	10.67	0.330	11.31	0.491	11.12
0.521	10.65	0.332	11.50	0.494	11.08
0.524	10.62	0.335	11.46	0.496	11.02
0.527	10.63	0.341	11.58	0.499	11.17
0.532	10.53	0.344	11.36	0.502	11.10
0.535	10.60	0.346	11.48	0.505	11.14
0.538	10.54	0.349	11.32	0.510	11.00
0.541	10.46	0.352	11.50	0.513	11.09
0.544	10.43	0.355	11.36	0.516	11.23
0.546	10.63	0.357	11.48	0.519	11.13
0.549	10.42	0.360	11.50	0.524	11.20
0.552	10.53	0.363	11.39	0.526	11.20
0.555	10.40	0.366	11.50	0.591	11.01
0.557	10.31	0.369	11.46	0.594	11.08
0.560	10.24	0.371	11.40	0.596	11.19
0.563	10.36	0.374	11.54	0.599	11.20
0.566	10.40	0.380	11.28	0.602	11.16
0.568	10.37	0.383	11.28	0.605	11.25
0.571	10.33	0.385	11.26	0.607	11.20
0.574	10.37	0.388	11.24	0.610	11.23
0.577	10.30	0.391	11.28	0.613	11.25
0.580	10.31	0.394	11.10	0.616	11.29
0.582	10.40	0.396	11.30	0.619	11.33
0.585	10.44	0.399	11.27	0.621	11.30
0.588	10.22	0.402	11.36	0.624	11.33
0.591	10.40	0.405	11.26	0.627	11.23
0.596	10.67	0.408	11.23	0.630	11.24
0.599	10.66	0.410	11.20		
0.602	10.68	0.413	11.20	2434630+	
0.605	10.88	0.416	11.25	0.276	11.20
0.607	10.94	0.419	11.32	0.279	11.14
0.610	10.71	0.421	11.25	0.281	11.08
0.613	10.83	0.424	11.21	0.284	11.06
0.616	10.61	0.427	11.20	0.287	11.05
0.619	10.84	0.430	11.23	0.290	11.00

Table II (cont.)

J.D.	m
2434630+	
0.292	10.92
0.295	11.00
0.298	10.84
0.301	10.83
0.304	10.71
0.306	10.74
0.309	10.80
0.312	10.64
0.315	10.64
0.317	10.63
0.320	10.58
0.323	10.73
0.325	10.65
0.328	10.60
0.331	10.60
0.334	10.62
0.337	10.63
0.341	10.64
0.344	10.64
0.347	10.66
0.349	10.62
0.352	10.65
0.355	10.70
0.358	10.65
0.360	10.73
0.380	10.75
0.383	10.80
0.385	10.71
0.388	10.63
0.391	10.78
0.394	10.81
0.397	10.70
0.399	10.75
0.402	10.72
0.405	10.81
0.408	10.80
0.410	10.83
0.413	10.92
0.416	10.81

J.D.	m
2434649+	
0.290	11.60
0.292	11.42
0.295	11.40
0.298	11.42
0.301	11.40
0.304	11.20

J.D.	m
2434649+	
0.306	11.25
0.309	11.24
0.312	10.99
0.315	11.10
0.324	11.08
0.327	10.92
0.330	10.97
0.333	10.97
0.335	10.96
0.338	10.97
0.341	10.81
0.344	10.78
0.347	10.65
0.349	10.80
0.352	10.88
0.355	10.80
0.365	10.40
0.367	10.40
0.370	10.46
0.373	10.46
0.376	10.57
0.379	10.58
0.394	10.62
0.397	10.60
0.399	10.69
0.402	10.61
0.405	10.70
0.408	10.66
0.412	10.71
0.416	10.67
0.419	10.69
0.422	10.80

J.D.	m
2434652+	
0.255	11.36
0.258	11.40
0.260	11.23
0.263	11.18
0.266	11.19
0.269	11.10
0.271	11.16
0.274	11.26
0.277	11.14
0.280	11.08
0.283	11.12
0.285	11.20
0.288	11.14

J.D.	m
2434652+	
0.291	11.14
0.305	11.06
0.308	10.90
0.310	11.00
0.313	10.82
0.316	10.98
0.319	10.80
0.321	10.72
0.324	10.78
0.327	10.66
0.330	10.73
0.344	11.03
0.346	11.01
0.349	10.88
0.352	11.00
0.355	11.00
0.357	11.18
0.360	11.18
0.363	11.20
0.366	11.07
0.369	11.02
0.371	11.08
0.374	10.98
0.377	11.09
0.380	11.04
0.383	11.20
0.385	11.10
0.388	11.20
0.391	11.32
0.394	11.20
0.396	11.20
0.399	11.26
0.402	11.13
0.405	11.24
0.407	11.30
0.410	11.20

J.D.	m
2434654+	
0.397	11.04
0.399	11.30
0.402	11.08
0.405	11.08
0.408	11.12
0.410	11.00
0.413	11.20
0.416	11.08
0.419	10.97

Table II (cont.)

J.D.	m
2434654+	
0.422	11.00
0.424	11.05
0.427	10.81
0.430	10.88
0.433	10.86
0.435	10.90
0.438	10.80
0.441	10.81
0.444	10.83
0.447	10.78
0.449	10.90
0.452	10.80
0.455	10.87
0.458	10.73
0.463	10.60
0.466	10.60
0.469	10.58
0.472	10.50
0.474	10.62
0.477	10.63
0.480	10.64
0.483	10.58
0.485	10.70
0.488	10.59
0.490	10.61
0.494	10.59
0.497	10.68
0.499	10.69
0.502	10.68
0.505	10.70
0.508	10.74
0.510	10.69
0.513	10.73
0.516	10.74
0.519	10.72
0.522	10.78
2434656+	
0.519	11.10
0.522	11.18
0.524	10.98
0.527	11.00
0.530	11.03
0.533	11.10
0.536	10.90
0.538	10.80
0.541	10.97

J.D.	m
2434656+	
0.544	10.79
0.547	10.61
0.549	10.70
0.552	10.50
0.555	10.63
0.561	10.65
0.563	10.64
0.569	10.66
0.572	10.53
0.574	10.64
0.577	10.64
0.580	10.61
0.583	10.52
0.588	10.71
0.591	10.64
0.594	10.63
0.597	10.62
0.599	10.64
0.602	10.53
0.605	10.66
0.608	10.64
0.611	10.67
0.613	10.60
0.616	10.64
0.619	10.77
0.622	10.64
0.624	10.67
0.627	10.64
0.630	10.80
0.633	10.69
0.636	10.76
0.638	10.80
0.641	10.78
0.644	10.77
0.647	10.85
0.649	10.76
0.652	10.86
2434661+	
0.332	11.60
0.334	11.61
0.337	11.78
0.340	11.65
0.343	11.56
0.345	11.55
0.348	11.58
0.351	11.42

J.D.	m
2434661+	
0.353	11.42
0.357	11.43
0.359	11.56
0.362	11.48
0.365	11.54
0.368	11.50
0.370	11.50
0.373	11.53
0.376	11.54
0.379	11.35
0.382	11.44
0.384	11.23
0.387	11.48
0.390	11.46
0.422	11.00
0.427	10.92
0.430	10.97
0.433	11.08
0.436	10.97
0.438	11.03
0.441	10.88
0.444	10.80
0.447	10.80
0.450	10.83
0.452	10.88
0.455	10.78
0.458	10.75
0.461	10.87
0.463	10.68
0.466	10.78
0.469	10.76
0.472	10.66
0.475	10.60
0.477	10.67
0.480	10.62
0.483	10.67
0.486	10.42
2434662+	
0.302	11.02
0.305	11.14
0.308	10.98
0.311	11.00
0.313	10.98
0.316	10.97
0.319	10.97
0.322	10.90

Table II (cont.)

J.D.	m	J.D.	m	J.D.	m
2434662+		2434664+		2434920+	
0.325	10.77	0.388	11.49	0.434	11.15
0.327	10.77	0.391	11.40	0.437	11.08
0.330	10.87	0.394	11.44	0.441	11.09
0.333	10.86	0.397	11.22	0.445	11.16
0.336	10.74	0.400	11.27	0.448	11.04
0.338	10.80	0.402	11.12	0.451	11.20
0.341	10.73	0.405	11.20	0.454	11.10
0.344	10.77	0.408	11.20	0.457	10.98
0.348	10.70	0.411	11.32		
0.353	10.71	0.413	11.13	2434924+	
0.358	10.70	0.416	11.02	0.409	11.50
0.361	10.67	0.419	10.97	0.412	11.60
0.369	10.75	0.422	10.94	0.415	11.52
0.372	10.66	0.425	10.86	0.420	11.57
0.374	10.65	0.427	10.74	0.478	11.49
0.377	10.64	0.430	10.69	0.484	11.50
0.380	10.65	0.433	10.80	0.487	11.50
0.383	10.68	0.436	10.64	0.492	11.49
0.386	10.71	0.438	10.61	0.500	11.62
0.391	10.61	0.441	10.54	0.507	11.53
0.394	10.86	0.444	10.68	0.513	11.51
0.397	10.69	0.447	10.62	0.517	11.46
0.400	10.76	0.450	10.61	0.520	11.46
0.402	10.86	0.458	10.49	0.525	11.50
0.405	10.90	0.461	10.47		
0.408	10.75	0.463	10.51	2434987+	
0.411	10.80	0.466	10.63	0.342	11.12
0.413	10.84	0.469	10.58	0.345	11.10
0.416	10.88	0.472	10.48	0.348	11.20
0.422	10.97	0.475	10.55	0.351	11.10
0.425	10.77	0.477	10.64	0.353	11.23
0.427	10.84	0.480	10.52	0.356	11.17
0.430	10.93	0.483	10.57	0.358	11.20
0.433	10.97	0.486	10.70	0.361	11.16
0.436	10.98	0.488	10.72	0.364	11.20
0.439	10.90	0.491	10.57	0.367	11.15
0.441	10.81			0.370	10.90
0.444	10.91	2434920+		0.373	11.20
0.447	10.91	0.398	10.97	0.376	11.20
0.450	11.04	0.402	10.96	0.378	10.98
0.452	11.05	0.407	10.96	0.382	10.99
0.455	10.98	0.412	11.02	0.385	10.91
0.458	11.04	0.416	11.01	0.388	10.90
0.461	11.03	0.420	10.88	0.391	11.03
0.463	11.02	0.423	10.97	0.394	10.83
0.466	11.03	0.426	11.04	0.396	10.99
		0.430	11.10	0.399	10.88

Table II (cont.)

J.D.	m
2434987+	
0.405	11.00
0.410	11.02
0.413	10.90
0.416	10.97
0.419	10.92
0.421	10.89
0.424	10.78
0.427	10.75
0.430	10.76
0.432	10.83
0.435	10.92
0.438	10.72
0.441	10.76
0.444	10.70
0.446	10.84
0.449	10.62
0.452	10.73
0.455	10.63
0.457	10.70
0.463	10.69
0.469	10.68
0.488	10.93
0.491	10.92
0.494	11.02
0.499	10.86
0.502	10.97
0.505	11.06
0.507	10.89
0.510	10.98
0.513	10.98
0.516	11.07
0.519	11.00
0.521	11.13
0.524	11.09
0.527	11.01
0.530	11.02
0.532	10.98
0.535	11.07
0.538	11.20
0.541	11.18
0.543	11.06
0.546	11.10
0.552	11.12
0.555	10.99
0.557	11.15
0.560	11.15
0.563	11.16
0.566	11.10
0.569	11.24
0.571	11.09
0.574	11.12

J.D.	m
2434987+	
0.577	11.13
0.580	11.01
0.582	11.04
0.585	11.15
0.588	11.04
0.591	11.23
0.594	11.18
0.596	11.20
0.599	11.30
0.602	11.24
0.605	11.23
0.607	11.12
0.610	11.32
2434989+	
0.405	11.63
0.408	11.70
0.411	11.55
0.414	11.56
0.416	11.56
0.419	11.44
0.425	11.46
0.430	11.55
0.433	11.56
0.436	11.49
0.439	11.59
0.441	11.56
0.447	11.50
0.450	11.48
0.458	10.98
0.461	11.12
0.464	10.93
0.466	10.76
0.469	10.95
0.472	10.84
0.475	10.90
0.478	10.76
0.480	10.76
0.504	10.50
0.509	10.70
0.512	10.58
0.517	10.49
0.521	10.50
0.526	10.50
0.529	10.54
0.532	10.50
0.536	10.55
0.540	10.64
0.543	10.63
0.546	10.76
0.548	10.73
0.551	10.70

J.D.	m
2434989+	
0.554	10.84
0.557	10.70
0.565	10.78
0.574	10.80
0.577	10.80
2434990+	
0.360	11.57
0.366	11.48
0.369	11.48
0.371	11.66
0.374	11.62
0.377	11.50
0.380	11.67
0.382	11.60
0.385	11.70
0.388	11.46
0.391	11.57
0.394	11.62
0.396	11.66
0.399	11.50
0.402	11.70
0.405	11.58
0.407	11.61
0.410	11.60
0.413	11.61
0.416	11.70
0.419	11.57
0.421	11.59
0.474	11.68
0.483	11.65
0.488	11.60
0.491	11.70
0.494	11.70
0.496	11.74
0.499	11.73
0.502	11.68
0.505	11.64
0.507	11.48
0.510	11.52
0.516	11.45
0.519	11.67
0.521	11.70
2435009+	
0.352	11.37
0.355	11.45
0.357	11.40
0.360	11.42
0.363	11.46
0.366	11.26
0.372	11.40

Table III

Photoelectric observations of AC Andromedae

J.D.	$m-m_o$	J.D.	$m-m_o$	J.D.	$m-m_o$
2435016+		2435019+		2435019+	
0.3985	0.379	0.3492	1.016	0.4311	0.725
0.3999	0.403	0.3502	1.067	0.4321	0.720
0.4013	0.410	0.3576	1.016	0.4332	0.744
0.4027	0.379	0.3586	1.025	0.4343	0.710
0.4041	0.392	0.3596	1.002	0.4353	0.729
0.4055	0.381	0.3606	1.013	0.4363	0.716
0.4068	0.392	0.3634	1.028	0.4373	0.708
0.4082	0.410	0.3655	0.950	0.4384	0.719
0.4096	0.424	0.3683	0.990	0.4394	0.711
0.4110	0.478	0.3693	0.959	0.4406	0.717
		0.3708	0.963	0.4443	0.707
2435019+		0.3718	0.945	0.4453	0.723
0.2961	1.207	0.3728	0.939	0.4464	0.693
0.2981	1.181	0.3738	0.927	0.4475	0.716
0.3023	1.248	0.3748	0.943	0.4485	0.709
0.3041	1.272	0.3760	0.879	0.4495	0.721
0.3051	1.251	0.3843	0.853	0.4516	0.699
0.3061	1.296	0.3850	0.860	0.4526	0.724
0.3072	1.283	0.3863	0.843	0.4537	0.711
0.3086	1.288	0.3874	0.845	0.4547	0.721
0.3166	1.079	0.3884	0.841	0.4557	0.730
0.3176	1.111	0.3894	0.840	0.4568	0.729
0.3186	1.102	0.3905	0.847	0.4579	0.721
0.3197	1.096	0.3915	0.847	0.4589	0.729
0.3207	1.098	0.3926	0.836	0.4600	0.719
0.3218	1.073	0.3936	0.835	0.4610	0.730
0.3228	1.051	0.3947	0.790	0.4620	0.693
0.3238	1.115	0.3957	0.799		
0.3249	1.100	0.3968	0.774	2435043+	
0.3259	1.122	0.3977	0.787	0.4554	0.864
0.3270	1.101	0.4033	0.745	0.4563	0.823
0.3280	1.121	0.4043	0.766	0.4573	0.810
0.3290	1.102	0.4054	0.775	0.4583	0.786
0.3301	1.086	0.4065	0.738	0.4593	0.821
0.3312	1.082	0.4075	0.739	0.4604	0.879
0.3322	1.095	0.4086	0.721	0.4614	0.856
0.3336	1.083	0.4096	0.708	0.4624	0.792
0.3374	1.056	0.4106	0.737	0.4634	0.779
0.3384	1.063	0.4117	0.714	0.4688	0.676
0.3395	1.049	0.4127	0.738	0.4705	0.803
0.3405	1.051	0.4137	0.748	0.4715	0.764
0.3415	1.046	0.4148	0.724	0.4725	0.744
0.3426	1.055	0.4158	0.706	0.4736	0.708
0.3436	1.052	0.4169	0.695	0.4746	0.651
0.3447	1.080	0.4179	0.745	0.4757	0.816
0.3468	1.052	0.4189	0.686	0.4767	0.785
0.3481	1.029	0.4301	0.703	0.4826	0.767

Table III (cont.)

J.D.	$m-m_o$
2435043+	
0.4836	0.790
0.4847	0.740
0.4857	0.675
0.4868	0.711
0.4878	0.750
0.4888	0.706
0.4900	0.665
0.5032	0.735
0.5042	0.706
0.5052	0.664
0.5063	0.685
0.5073	0.604
0.5083	0.638
0.5093	0.617
0.5105	0.651
2435046+	
0.2503	0.902
0.2514	0.799
0.2524	0.830
0.2535	0.744
0.2545	0.785
0.2556	0.736
0.2566	0.767
0.2576	0.739
0.2622	0.736
0.2632	0.775
0.2642	0.753
0.2653	0.728
0.2663	0.715
0.2673	0.681
0.2683	0.712
0.2750	0.677
0.2760	0.570
0.2771	0.582
0.2781	0.598
0.2792	0.525
0.2802	0.521
0.2812	0.485
0.2826	0.429
0.2840	0.345
0.2854	0.342
0.3007	0.103
0.3017	0.137
0.3056	0.173
0.3076	0.115
0.3090	0.135

J.D.	$m-m_o$
2435046+	
0.3153	0.197
0.3163	0.224
0.3174	0.255
0.3184	0.260
0.3194	0.221
0.3205	0.224
0.3215	0.237
0.3225	0.237
0.3236	0.260
0.3246	0.273
0.3257	0.292
0.3267	0.281
0.3333	0.205
0.3343	0.224
0.3354	0.335
0.3368	0.347
0.3382	0.436
2435061+	
0.3886	0.884
0.3964	1.010
0.3914	1.071
0.3926	0.924
0.3940	1.009
0.3987	0.957
0.3997	0.984
0.4008	1.011
0.4032	0.951
0.4042	0.924
0.4053	0.987
0.4081	0.945
0.4091	0.828
0.4101	0.917
0.4112	0.993
0.4122	0.965
0.4240	0.860
0.4258	0.899
0.4294	0.910
0.4308	0.840
0.4351	0.859
0.4374	0.853
0.4402	0.928
0.4431	0.861
0.4511	0.910
0.4532	0.781
0.4560	0.770
0.4581	0.916

J.D.	$m-m_o$
2435061+	
0.4605	0.886
0.4654	0.779
0.4726	0.836
0.4737	0.877
0.4749	0.808
0.4763	0.740
2435393+	
0.2595	1.029
0.2606	1.009
0.2616	1.040
0.2627	1.014
0.2637	1.021
0.2679	1.045
0.2689	1.093
0.2700	1.056
0.2710	1.055
0.2720	1.030
0.2731	1.090
0.2741	1.083
0.2818	1.020
0.2828	1.044
0.2839	0.981
0.2849	1.017
0.2859	0.992
0.2870	0.953
0.2880	1.013
0.2936	0.961
0.2946	1.002
0.2957	0.943
0.2967	0.954
0.2977	0.949
0.2988	0.962
0.2998	0.907
0.3009	0.951
0.3019	0.891
0.3123	0.802
0.3134	0.866
0.3144	0.844
0.3155	0.820
0.3165	0.822
0.3175	0.661
0.3186	0.757
0.3196	0.736
0.3306	0.451
0.3320	0.561
0.3332	0.548

Table III (cont.)

J.D.	$m-m_o$	J.D.	$m-m_o$	J.D.	$m-m_o$
2435393+		2435393+		2435393+	
0.3342	0.502	0.4276	0.384	0.5205	0.822
0.3352	0.336	0.4286	0.310	0.5297	0.791
0.3365	0.438	0.4297	0.394	0.5307	0.858
0.3450	0.201	0.4307	0.391	0.5318	0.893
0.3460	0.196	0.4318	0.389	0.5328	0.854
0.3477	0.177	0.4328	0.363	0.5339	0.831
0.3481	0.155	0.4339	0.420	0.5349	0.811
0.3491	0.159	0.4436	0.448	0.5359	0.839
0.3502	0.102	0.4457	0.504	0.5370	0.905
0.3512	0.108	0.4467	0.440	0.5380	0.865
0.3523	0.062	0.4477	0.532	0.5436	0.880
0.3533	0.104	0.4503	0.441	0.5446	0.867
0.3542	0.090	0.4519	0.516	0.5459	0.875
0.3575	0.045	0.4530	0.584	0.5470	0.841
0.3585	0.073	0.4542	0.505	0.5482	0.887
0.3595	0.075	0.4602	0.549	0.5495	0.836
0.3606	0.072	0.4613	0.565	0.5508	0.813
0.3616	0.039	0.4623	0.577	0.5519	0.868
0.3627	0.039	0.4634	0.602	0.5533	0.866
0.3637	0.037	0.4644	0.578	0.5543	0.858
0.3648	0.062	0.4655	0.598	0.5554	0.889
0.3658	0.008	0.4665	0.594	0.5700	0.892
0.3668	0.002	0.4679	0.600	0.5710	0.960
0.3679	0.061	0.4688	0.598	0.5720	0.934
0.3720	0.034	0.4727	0.643	0.5731	0.943
0.3731	0.040	0.4738	0.625	0.5741	0.953
0.3741	0.040	0.4748	0.646	0.5752	0.975
0.3752	0.034	0.4759	0.692	0.5762	0.877
0.3762	0.032	0.4769	0.619	0.5776	0.903
0.3773	0.034	0.4780	0.636	0.5792	0.889
0.3783	0.049	0.4790	0.599	0.5804	0.916
0.3793	0.063	0.4957	0.753	0.5814	0.901
0.3804	0.044	0.4970	0.906	0.5825	1.004
0.3814	0.049	0.4988	0.853	0.5833	0.985
0.3823	0.051	0.5009	0.720	0.5901	1.017
0.4068	0.218	0.5030	0.780	0.5911	0.928
0.4084	0.172	0.5043	0.766	0.5924	0.988
0.4095	0.197	0.5054	0.806	0.5936	0.969
0.4107	0.232	0.5064	0.796	0.5946	1.026
0.4120	0.247	0.5075	0.794	0.5957	0.923
0.4130	0.225	0.5128	0.794		
0.4182	0.249	0.5141	0.787	2435395+	
0.4193	0.294	0.5151	0.814	0.2723	1.352
0.4203	0.348	0.5161	0.826	0.2739	1.406
0.4214	0.355	0.5172	0.799	0.2756	1.351
0.4224	0.355	0.5182	0.821	0.2770	1.356
0.4234	0.333	0.5193	0.819	0.2826	1.338

Table III (cont.)

J.D.	$m-m_o$	J.D.	$m-m_o$	J.D.	$m-m_o$
2435395+		2435396+		2435696+	
0.2843	1.390	0.5162	1.158	0.4278	0.260
0.2864	1.349	0.5197	1.302	0.4299	0.386
0.2881	1.353	0.5231	1.095	0.4320	0.263
0.2900	1.369	0.5266	1.036	0.4341	0.296
0.2986	1.282	0.5301	1.086	0.4514	0.420
0.3666	1.147	0.5391	1.071	0.4535	0.394
		0.5409	0.974	0.4556	0.540
2435396+		0.5429	1.053	0.4580	0.405
0.2635	1.013			0.4639	0.309
0.2658	0.961	2435696+		0.4664	0.374
0.2678	0.999	0.3362	0.813	0.4691	0.309
0.2699	0.992	0.3372	0.941		
0.2806	0.866	0.3382	0.871	2435720+	
0.2831	0.939	0.3424	0.850	0.4627	0.918
0.2860	0.922	0.3433	0.753	0.4645	0.907
0.2933	0.943	0.3441	0.776	0.4665	0.865
0.2962	1.025	0.3452	0.848	0.4687	0.847
0.2976	1.006	0.3462	0.760	0.4711	0.814
0.2995	0.988	0.3473	0.765	0.4763	0.845
0.3014	0.930	0.3483	0.728	0.4788	0.786
0.3362	0.965	0.3497	0.675	0.4815	0.799
0.3394	0.987	0.3509	0.640		
0.3446	0.969	0.3594	0.543	2435728+	
0.3559	1.006	0.3605	0.512	0.3584	0.894
0.3731	1.039	0.3615	0.507	0.3604	0.903
0.3898	1.025	0.3626	0.567	0.3629	0.854
0.3941	1.043	0.3636	0.557	0.3653	0.812
0.3981	0.987	0.3646	0.526	0.3674	0.848
0.4075	1.028	0.3657	0.501	0.3729	0.859
0.4096	1.080	0.3669	0.495	0.3750	0.844
0.4120	1.124	0.3683	0.493	0.3771	0.760
0.4162	1.055	0.3723	0.461	0.3792	0.723
0.4193	0.998	0.3738	0.369	0.3812	0.688
0.4304	1.068	0.3757	0.366	0.3896	0.540
0.4339	1.129	0.3778	0.327	0.3924	0.468
0.4377	1.188	0.3813	0.408	0.3955	0.526
0.4405	1.180	0.3841	0.188	0.3983	0.423
0.4498	1.060	0.3862	0.198	0.4035	0.381
0.4521	1.064	0.3886	0.203	0.4059	0.432
0.4579	1.142	0.4056	0.135	0.4087	0.438
0.4610	1.193	0.4077	0.103	0.4167	0.176
0.4711	1.116	0.4098	0.166	0.4191	0.206
0.4731	1.118	0.4119	0.115	0.4389	0.083
0.4760	1.019	0.4139	0.156	0.4410	0.078
0.4843	1.080	0.4164	0.160	0.4431	0.113
0.4881	1.111	0.4237	0.307	0.4507	0.065
0.5131	1.187	0.4257	0.289	0.4524	0.110

Table III (cont.)

J.D.	$m-m_o$
2435728+	
0.4538	0.102
2435745+	
0.2777	1.025
0.2798	0.931
0.2819	0.980
0.2840	0.913
0.2860	1.009
0.2881	0.987
0.2937	0.942
0.2958	0.927
0.2979	0.933
0.2999	0.909
0.3020	0.969
0.3090	0.934
0.3110	0.930
0.3131	0.618
0.3159	0.779
0.3347	0.594
0.3367	0.598
0.3388	0.584
0.3409	0.604
0.3433	0.577
0.3517	0.671
0.3659	0.565
0.3756	0.565
0.4135	0.625
0.4124	0.640
0.4144	0.685
0.4169	0.691
0.4197	0.656
0.4374	0.676
0.4406	0.820
0.4541	0.753
0.4561	0.765
0.4583	0.796
0.4600	0.764
0.4621	0.805
2435747+	
0.2820	1.024
0.2841	1.066
0.2862	1.088
0.2883	0.995
0.2907	0.972
0.2966	0.982
0.2987	1.088
0.3008	1.080
0.3029	1.133
0.3050	1.034
0.3105	0.979
0.3125	1.052
2435747+	
0.3147	1.062
0.3169	1.054
0.3185	1.041
0.3251	0.901
0.3272	0.902
0.3293	1.000
0.3313	1.005
0.3327	1.055
0.3383	0.968
0.3404	1.038
0.3425	1.016
0.3444	1.051
0.3466	1.002
0.3529	0.972
0.3550	0.964
0.3570	1.082
0.3591	0.865
0.3609	1.057
0.3806	1.005
0.3825	1.015
0.3848	0.964
0.3860	0.950
0.3886	0.976
0.4098	0.779
0.4119	0.686
0.4140	0.662
0.4161	0.761
0.4192	0.847
0.4251	0.720
0.4272	0.825
0.4296	0.734
2435748+	
0.3014	0.256
0.3035	0.233
0.3056	0.220
0.3077	0.183
0.3098	0.150
0.3160	0.136
0.3181	0.128
0.3202	0.121
0.3223	0.121
0.3244	0.123
0.3265	0.122
0.3320	0.107
0.3341	0.101
0.3362	0.093
0.3383	0.107
0.3403	0.111
0.3424	0.112
0.3480	0.113
0.3501	0.148
2435748+	
0.3521	0.141
0.3542	0.170
0.3563	0.175
0.3584	0.192
0.3640	0.214
0.3660	0.215
0.3681	0.231
0.3702	0.242
0.3723	0.230
2435749+	
0.2817	0.993
0.2838	0.979
0.2859	0.977
0.2876	0.979
0.2928	1.014
0.2949	1.024
0.2970	1.071
0.2990	1.020
0.3018	1.057
0.3039	1.067
0.3085	1.051
0.3115	1.058
0.3136	1.075
0.3156	1.102
0.3178	1.166
0.3199	1.158
0.3254	1.094
0.3275	1.027
0.3296	1.065
0.3317	1.081
0.3338	1.075
0.3477	1.054
0.3497	1.105
0.4426	1.007
0.4449	1.019
0.4470	1.022
0.4490	1.006
0.4511	0.987
0.4568	1.020
0.4588	1.010
0.4605	1.000
0.4629	1.017
0.4650	0.988
0.4671	0.982
0.4725	0.966
0.4747	0.963
0.4789	0.827
0.4810	0.814
0.4831	0.887

Table IV

Photographic normal points

J.D.	m
2428009+	
0.553	10.58
2428047+	
0.390	11.10
0.410	11.13
0.430	11.16
0.450	11.20
0.470	11.22
0.490	11.25
0.510	11.28
0.530	11.31
0.550	11.35
0.570	11.40
0.590	11.42
0.610	11.44
2428048+	
0.500	10.98
0.520	10.88
0.540	10.84
0.560	10.87
2428489+	
0.540	10.43
2428790+	
0.470	10.79
0.490	10.88
0.510	10.97
0.530	11.04
0.550	11.12
0.570	11.20
0.590	11.28
2430258+	
0.280	11.02
0.310	11.09
0.450	11.43
0.480	11.44
0.500	11.46
0.520	11.47
0.540	11.48
0.560	11.48
0.580	11.47
0.600	11.46
2430259+	
0.260	11.07
0.280	11.14
0.300	11.20

J.D.	m
2430259+	
0.320	11.26
0.340	11.30
0.360	11.37
0.380	11.44
0.400	11.52
0.420	11.58
0.440	11.64
0.460	11.70
0.480	11.76
0.500	11.82
0.520	11.83
0.540	11.81
0.560	11.79
0.580	11.76
0.600	11.70
0.620	11.63
0.640	11.53
2430260+	
0.440	11.30
0.470	11.29
0.500	11.31
0.530	11.31
0.560	11.31
0.590	11.32
0.620	11.33
2430261+	
0.310	10.80
0.330	10.83
0.350	10.88
0.370	10.93
0.410	11.11
0.430	11.22
0.450	11.30
0.470	11.36
0.490	11.41
0.510	11.45
2430262+	
0.360	11.48
0.380	11.47
0.400	11.46
0.420	11.46
0.520	11.36
0.539	11.33
0.560	11.30
0.580	11.29

J.D.	m
2430262+	
0.600	11.28
2430266+	
0.450	11.66
0.470	11.60
0.490	11.56
0.510	11.55
0.530	11.55
0.550	11.55
0.570	11.55
0.590	11.57
0.610	11.60
0.630	11.63
2430267+	
0.460	11.62
0.490	11.61
2430285+	
0.410	10.59
0.415	10.48
0.420	10.37
0.425	10.32
0.430	10.33
0.435	10.35
0.440	10.37
0.445	10.39
0.450	10.41
2431684+	
0.370	10.71
0.390	10.88
0.410	11.04
2431695+	
0.310	11.55
0.340	11.55
0.370	11.55
0.400	11.55
0.430	11.55
0.460	11.54
0.490	11.54
2431703+	
0.470	11.26
0.500	11.27
0.530	11.27
0.560	11.28
0.580	11.30

Table IV (cont.)

J.D.	m
2431704+	
0.300	11.28
0.305	11.03
0.310	10.88
0.315	10.76
0.320	10.65
0.325	10.57
0.330	10.54
0.335	10.58
0.340	10.60
0.345	10.60
0.350	10.60
0.355	10.60
0.360	10.60
0.365	10.62
0.370	10.64
0.375	10.67
0.380	10.70
0.385	10.72
0.390	10.76
0.395	10.80
0.400	10.82
0.420	10.92
0.430	10.98
0.440	11.04
0.470	11.19
0.480	11.24
0.490	11.29
0.500	11.34
0.510	11.39
0.520	11.44
0.530	11.48
0.540	11.52
0.550	11.56
0.560	11.61
0.570	11.66
2431707+	
0.335	11.56
0.355	11.50
0.375	11.47
0.395	11.45
0.415	11.45
0.435	11.48
0.455	11.52
0.475	11.55
0.495	11.57
0.515	11.58
0.535	11.58

J.D.	m
2432092+	
0.415	11.54
0.435	11.47
0.475	11.32
0.495	11.23
0.535	11.03
2432094+	
0.460	11.61
0.480	11.62
0.500	11.62
0.515	11.61
2432095+	
0.400	11.34
0.420	11.34
0.460	11.38
2432097+	
0.380	11.56
0.390	11.58
0.405	11.62
0.420	11.64
0.470	11.68
0.490	11.67
0.530	11.61
2432421+	
0.395	11.45
0.405	11.49
0.430	11.58
0.445	11.64
0.460	11.69
0.505	11.78
2432441+	
0.395	11.50
0.415	11.56
0.435	11.61
0.490	11.68
0.540	11.64
0.585	11.50
0.605	11.43
2432444+	
0.335	11.41
0.350	11.42
0.365	11.43

J.D.	m
2432444+	
0.515	11.52
0.535	11.53
0.555	11.55
0.575	11.56
0.590	11.57
2432466+	
0.275	11.49
0.290	11.50
0.310	11.52
0.360	11.58
0.370	11.60
0.405	11.67
2432467+	
0.250	11.63
0.260	11.62
0.290	11.53
0.325	11.22
0.330	11.14
0.335	11.00
0.345	10.69
0.350	10.53
0.355	10.38
0.360	10.26
0.365	10.20
0.370	10.17
0.420	10.34
0.425	10.40
0.430	10.46
0.435	10.53
0.440	10.59
0.445	10.64
0.450	10.70
0.455	10.76
2432469+	
0.435	11.33
0.440	11.21
0.445	11.08
0.450	10.96
0.455	10.81
0.460	10.66
0.465	10.53
0.470	10.39
0.475	10.24
0.480	10.21

Table IV (cont.)

J.D.	m
2432469+	
0.485	10.24
0.490	10.24
0.495	10.21
0.500	10.21
0.505	10.26
0.510	10.30
0.515	10.35
0.520	10.38
0.525	10.42
0.530	10.47
0.535	10.51
0.540	10.56
0.545	10.61
2432472+	
0.290	11.28
0.310	11.28
0.330	11.28
2432474+	
0.420	11.45
0.440	11.38
0.460	11.31
0.480	11.27
0.500	11.24
0.520	11.23
0.540	11.24
2432479+	
0.390	11.42
0.400	11.39
0.410	11.32
0.420	11.26
0.430	11.19
0.435	11.14
0.440	11.08
0.445	11.02
0.450	10.95
0.455	10.87
0.460	10.78
0.465	10.70
0.470	10.63
0.475	10.58
0.480	10.53
0.485	10.49
0.490	10.48

J.D.	m
2432482+	
0.265	11.13
0.285	11.28
2432761+	
0.400	11.46
0.420	11.45
2432764+	
0.420	11.65
0.440	11.60
0.460	11.57
0.480	11.53
2432772+	
0.370	11.50
0.380	11.49
0.390	11.49
0.400	11.47
0.410	11.44
0.420	11.40
0.430	11.36
0.440	11.31
0.450	11.26
0.460	11.20
2432823+	
0.320	11.63
0.340	11.62
0.360	11.61
2432824+	
0.365	11.46
0.370	11.39
0.375	11.31
0.380	11.22
0.385	11.12
0.390	11.01
0.395	10.89
0.400	10.78
0.405	10.65
0.410	10.48
0.415	10.30
0.420	10.24
0.425	10.22
0.430	10.22
0.435	10.22

J.D.	m
2432824+	
0.440	10.23
0.445	10.25
0.450	10.26
0.455	10.29
0.460	10.31
0.465	10.35
0.470	10.39
0.475	10.43
2432826+	
0.410	11.40
0.460	11.58
2432829+	
0.250	11.27
0.260	11.21
0.270	11.19
0.280	11.19
0.290	11.22
0.300	11.25
0.310	11.26
0.320	11.25
0.330	11.20
0.340	11.16
0.350	11.16
0.360	11.23
0.370	11.30
2433075+	
0.410	10.98
0.415	10.85
0.420	10.70
0.425	10.58
0.430	10.47
0.435	10.38
0.440	10.32
0.445	10.29
0.450	10.30
0.455	10.33
0.460	10.38
0.465	10.43
0.470	10.47
2433085+	
0.420	10.57
0.425	10.47

Table IV (cont.)

J.D.	m
2433085+	
0.430	10.38
0.435	10.29
0.440	10.24
0.445	10.20
0.450	10.20
0.455	10.21
0.460	10.23
0.465	10.25
0.470	10.28
0.475	10.30
0.480	10.33
0.485	10.36
0.490	10.40
0.495	10.44
2433094+	
0.390	11.47
0.410	11.47
2433095+	
0.370	11.38
0.375	11.31
0.380	11.25
0.385	11.19
0.390	11.13
0.395	11.07
0.400	11.00
0.405	10.95
0.410	10.89
0.415	10.83
0.420	10.78
0.425	10.74
0.450	10.65
0.455	10.67
0.460	10.69
0.465	10.70
0.470	10.73
0.475	10.76
0.480	10.79
0.485	10.82
0.490	10.85
0.495	10.88
2433097+	
0.460	11.29
0.480	11.18
0.500	11.10
2433097+	
0.525	10.99
2433112+	
0.350	11.21
0.370	11.20
0.390	11.20
0.410	11.20
0.430	11.20
0.450	11.21
0.470	11.21
2433124+	
0.340	11.42
0.360	11.38
0.380	11.34
0.400	11.32
0.420	11.28
0.440	11.25
0.460	11.27
0.480	11.30
0.500	11.34
0.520	11.39
2433126+	
0.410	11.59
0.430	11.48
0.450	11.39
0.470	11.31
0.490	11.23
0.510	11.18
0.530	11.14
2433134+	
0.350	11.21
0.360	11.09
0.370	10.99
0.380	10.92
0.390	10.91
0.400	10.92
0.410	10.95
0.420	10.98
0.440	11.04
0.460	11.11
0.480	11.19
0.500	11.26
0.520	11.31
0.540	11.35
2433134+	
0.560	11.37
2433149+	
0.380	11.54
0.390	11.54
0.400	11.52
0.410	11.49
0.420	11.43
0.425	11.39
0.430	11.33
0.435	11.26
0.440	11.17
0.445	11.02
0.450	10.84
0.455	10.66
0.460	10.52
0.465	10.37
0.470	10.29
0.475	10.26
0.480	10.23
0.485	10.23
0.490	10.23
0.495	10.24
0.500	10.26
0.505	10.28
0.510	10.30
0.515	10.34
0.520	10.38
0.525	10.43
0.530	10.48
0.535	10.52
0.540	10.58
0.545	10.63
0.550	10.69
0.555	10.75
2433161+	
0.480	11.50
0.490	11.48
0.500	11.45
0.510	11.41
0.520	11.35
0.530	11.29
0.540	11.21
0.550	11.12
0.555	11.07
0.560	11.00

Table IV (cont.)

J.D.	m
2433161+	
0.565	10.91
0.570	10.81
0.575	10.67
0.580	10.56
0.585	10.52
0.590	10.49
0.595	10.49
0.600	10.49
0.605	10.49
0.610	10.50
2433179+	
0.285	11.52
2433183+	
0.530	11.53
0.540	11.49
0.550	11.42
0.555	11.37
0.560	11.27
0.565	11.15
0.570	11.00
0.575	10.81
0.580	10.62
0.585	10.48
0.590	10.34
0.595	10.28
0.600	10.23
0.605	10.21
0.610	10.20
0.615	10.20
0.620	10.22
2433184+	
0.255	10.89
0.275	10.94
0.295	11.00
0.315	11.08
0.335	11.19
0.355	11.29
2433189+	
0.260	11.41
0.280	11.42
0.300	11.42
0.310	11.39
0.320	11.34

J.D.	m
2433189+	
0.330	11.26
0.340	11.17
0.350	11.09
0.360	11.01
0.370	10.93
2433201+	
0.321	11.24
2433211+	
0.290	11.53
0.310	11.52
0.320	11.50
0.330	11.46
0.340	11.40
0.345	11.34
0.350	11.29
0.355	11.24
0.360	11.17
0.365	11.12
0.370	11.06
0.375	10.97
0.380	10.88
0.385	10.79
0.390	10.70
0.395	10.63
0.400	10.58
0.405	10.55
0.410	10.54
0.415	10.52
2433213+	
0.420	11.54
0.430	11.53
0.440	11.47
0.450	11.37
0.455	11.30
0.460	11.23
0.465	11.16
0.470	11.08
0.475	10.99
0.480	10.90
0.485	10.82
0.490	10.74
0.495	10.65
0.500	10.56
0.505	10.47

J.D.	m
2433213+	
0.510	10.42
0.515	10.38
0.520	10.37
0.525	10.38
0.530	10.39
0.535	10.44
0.540	10.49
0.545	10.55
2433248+	
0.245	11.31
0.250	11.24
0.255	11.16
0.260	11.10
0.265	11.04
0.270	10.99
0.275	10.93
0.280	10.88
0.285	10.82
0.290	10.77
2433452+	
0.430	11.15
0.450	11.10
0.460	11.06
0.470	11.00
0.480	10.95
0.490	10.89
0.500	10.85
0.510	10.80
0.520	10.77
0.530	10.78
2433482+	
0.345	11.20
0.365	11.19
2433484+	
0.360	11.43
0.380	11.42
0.400	11.41
0.420	11.40
0.440	11.41
0.450	11.41
0.460	11.34
0.470	11.27

Table IV (cont.)

J.D	m
2433484+	
0.480	11.18
0.490	11.10
0.500	11.03
0.510	10.96
0.520	10.88
0.530	10.80
0.540	10.71
0.550	10.63
2433485+	
0.360	11.61
0.380	11.67
0.400	11.70
0.420	11.73
0.440	11.76
0.460	11.78
0.500	11.72
0.510	11.65
0.520	11.57
0.530	11.47
0.540	11.39
0.550	11.30
2433504+	
0.390	11.27
0.395	11.15
0.400	11.06
0.405	10.96
0.410	10.88
0.415	10.81
0.420	10.74
0.425	10.66
0.430	10.61
0.435	10.57
0.440	10.55
0.445	10.55
0.450	10.55
0.455	10.56
2433505+	
0.350	11.72
0.370	11.74
0.390	11.74
0.410	11.74
0.430	11.73
0.450	11.73
0.470	11.73

J.D.	m
2433505+	
0.490	11.72
0.520	11.68
0.540	11.65
0.560	11.63
0.580	11.61
2433506+	
0.440	11.52
0.520	10.70
0.525	10.63
0.530	10.57
0.535	10.50
0.540	18.04
0.545	10.40
0.550	10.38
0.555	10.38
0.560	10.38
0.565	10.41
0.570	10.44
0.575	10.48
0.580	10.53
0.585	10.58
2433507+	
0.350	11.24
0.370	11.32
0.390	11.39
0.410	11.45
0.430	11.51
0.450	11.56
0.470	11.61
0.490	11.65
0.510	11.66
0.530	11.66
0.550	11.67
0.570	11.66
0.590	11.66
2433511+	
0.370	11.17
0.380	11.15
0.390	11.12
0.410	11.10
0.430	11.09

J.D.	m
2433511+	
0.450	11.09
0.470	11.10
0.490	11.10
0.510	11.13
2433514+	
0.340	11.30
0.360	11.26
0.380	11.20
0.400	11.13
0.420	11.05
0.440	10.96
0.450	10.94
0.460	10.94
0.480	11.00
0.500	11.06
2433516+	
0.460	11.38
0.480	11.32
0.490	11.27
0.500	11.22
0.510	11.16
0.520	11.09
0.530	11.03
0.540	10.97
0.550	10.92
0.560	10.88
0.570	10.86
2433536+	
0.320	11.55
0.340	11.51
0.360	11.45
0.370	11.40
0.380	11.33
0.390	11.25
0.400	11.16
0.410	11.08
0.420	11.00
0.430	10.93
0.440	10.85
0.450	10.78
0.460	10.74
0.470	10.72
0.480	10.75
0.490	10.79

Table IV (cont.)

J.D.	m
2433536+	
0.500	10.83
0.510	10.88
0.520	10.94
0.530	11.01
2433537+	
0.410	11.75
0.430	11.75
0.450	11.75
0.470	11.75
0.490	11.75
0.510	11.74
0.530	11.72
0.550	11.70
0.570	11.66
0.590	11.57
0.610	11.47
0.630	11.33
2433538+	
0.500	11.36
0.505	11.31
0.510	11.25
0.515	11.18
0.520	11.11
0.525	11.05
0.530	10.98
0.535	10.90
0.540	10.79
0.545	10.68
0.550	10.59
0.554	10.51
0.560	10.46
0.565	10.49
0.570	10.56
0.575	10.58
0.580	10.56
0.585	10.53
0.590	10.52
0.595	10.54
0.600	10.57
0.605	10.60
0.610	10.64
0.615	10.67
0.620	10.71
0.625	10.75
0.630	10.78

J.D.	m
2433545+	
0.330	11.71
0.350	11.70
2433562+	
0.230	11.30
0.245	11.35
0.260	11.41
0.275	11.45
2433563+	
0.230	11.65
0.240	11.64
0.250	11.63
0.260	11.61
0.270	11.57
0.280	11.51
0.285	11.46
0.290	11.41
0.295	11.36
0.300	11.30
0.305	11.25
0.310	11.16
0.315	11.05
0.320	10.94
0.325	10.81
0.330	10.70
0.335	10.60
0.340	10.50
0.345	10.41
0.350	10.32
0.355	10.24
0.360	10.29
0.365	10.35
0.370	10.37
0.375	10.36
0.380	10.32
0.385	10.38
0.390	10.46
0.400	10.61
0.405	10.66
0.410	10.72
0.420	10.78
0.430	10.85
0.440	10.92
0.450	10.96
0.460	11.03
0.470	11.09

J.D.	m
2433563+	
0.480	11.15
0.490	11.20
0.500	11.26
0.510	11.29
2433564+	
0.240	11.40
0.260	11.34
0.280	11.29
0.300	11.24
0.320	11.21
0.340	11.22
0.350	11.26
0.360	11.31
0.370	11.36
0.380	11.41
0.390	11.44
0.425	11.50
0.445	11.51
0.465	11.52
0.485	11.53
0.505	11.51
2433566+	
0.350	11.29
0.360	11.23
0.370	11.19
0.380	11.15
0.390	11.12
0.400	11.11
0.410	11.11
0.420	11.11
0.430	11.11
0.440	11.12
0.450	11.15
0.460	11.18
0.470	11.21
0.480	11.25
0.490	11.28
0.500	11.32
0.510	11.37
2433567+	
0.325	11.70
0.345	11.71
0.365	11.72
0.385	11.73

Table IV (cont.)

J.D.	m
2433567+	
0.405	11.73
0.425	11.72
0.445	11.71
0.465	11.70
0.485	11.67
0.505	11.62
0.515	11.55
0.525	11.45
0.535	11.37
0.545	11.28
2433568+	
0.225	11.45
0.245	11.50
0.265	11.53
0.285	11.57
0.400	11.47
0.410	11.40
0.420	11.32
0.430	11.24
0.440	11.16
0.450	11.10
0.460	11.05
0.470	11.00
0.480	10.98
0.490	10.95
0.500	10.93
0.510	10.92
0.520	10.92
0.530	10.92
0.540	10.94
0.550	10.97
0.560	11.01
0.570	11.06
0.580	11.12
0.590	11.18
0.600	11.26
2433569+	
0.230	11.20
0.250	11.26
0.270	11.30
0.480	11.67
0.500	11.69
0.520	11.69
0.540	11.69
0.560	11.68
2433569+	
0.580	11.66
0.600	11.62
0.620	11.57
0.640	11.49
2433583+	
0.210	11.31
0.215	11.23
0.220	11.13
0.225	11.01
0.230	10.90
0.240	10.64
0.245	10.51
2433613+	
0.186	10.50
0.192	10.29
2433826+	
0.375	11.63
2433838+	
0.440	11.59
0.450	11.56
0.460	11.53
0.470	11.49
0.480	11.44
0.490	11.38
0.500	11.32
0.510	11.26
0.520	11.21
0.530	11.20
0.540	11.22
2433887+	
0.290	11.38
0.310	11.38
0.330	11.37
0.350	11.37
2433888+	
0.310	11.45
0.320	11.42
0.330	11.38
0.340	11.31
0.345	11.27
0.350	11.20
2433888+	
0.355	11.12
0.360	11.04
0.365	10.94
0.370	10.82
0.375	10.68
0.380	10.58
0.385	10.49
0.390	10.42
0.395	10.40
0.400	10.38
0.405	10.38
0.410	10.38
0.415	10.39
0.420	10.40
0.425	10.41
0.430	10.43
0.435	10.45
0.440	10.48
0.445	10.51
0.450	10.55
0.455	10.58
0.460	10.62
0.465	10.66
0.470	10.70
0.475	10.74
0.480	10.78
2433889+	
0.310	11.38
0.320	11.34
0.330	11.30
0.340	11.28
0.350	11.26
0.360	11.25
0.370	11.24
0.380	11.25
0.410	11.28
0.430	11.31
0.450	11.35
0.470	11.40
0.490	11.44
0.510	11.48
2433890+	
0.370	11.61
0.410	11.55
0.440	11.51

Table IV (cont.)

J.D.	m
2433890+	
0.460	11.48
2433891+	
0.310	11.54
0.330	11.46
0.350	11.39
0.370	11.33
0.390	11.28
0.410	11.24
0.430	11.22
0.450	11.22
0.470	11.24
0.490	11.25
0.510	11.27
0.530	11.30
0.550	11.33
0.570	11.38
0.590	11.41
0.610	11.45
2433898+	
0.300	11.30
0.310	11.27
0.320	11.23
0.330	11.18
0.340	11.12
0.350	11.02
0.360	10.93
0.370	10.84
0.380	10.81
0.390	10.81
0.400	10.83
0.410	10.86
0.420	10.90
0.430	10.95
0.440	11.00
0.450	11.06
0.460	11.13
2433900+	
0.440	11.26
0.450	11.16
0.460	11.09
0.470	11.03
0.480	10.98
0.490	10.94
0.500	10.92

J.D.	m
2433900+	
0.510	10.91
0.520	10.91
0.530	10.91
0.540	10.92
0.550	10.94
0.560	10.97
0.570	11.01
0.580	11.07
0.590	11.14
0.600	11.22
2433920+	
0.335	11.61
0.345	11.43
0.355	11.24
2433924+	
0.380	11.67
0.400	11.69
0.420	11.70
0.440	11.70
0.460	11.64
0.470	11.61
0.480	11.58
0.490	11.58
0.500	11.61
0.510	11.65
0.520	11.66
0.530	11.65
0.540	11.63
0.550	11.60
0.560	11.56
0.570	11.51
0.580	11.46
0.585	11.43
0.590	11.39
0.595	11.34
0.600	11.27
0.605	11.18
0.610	11.10
0.615	10.99
0.620	10.88
0.625	10.77
0.630	10.67
0.635	10.58
0.640	10.49
0.645	10.40
0.650	10.38

J.D.	m
2433950+	
0.285	10.91
0.290	10.76
0.295	10.62
0.300	10.51
0.305	10.43
0.310	10.36
0.315	10.30
0.320	10.28
0.325	10.28
0.330	10.29
0.335	10.30
0.340	10.33
0.345	10.37
0.350	10.40
0.355	10.44
0.360	10.47
0.365	10.52
0.370	10.56
2433970+	
0.190	11.03
0.200	10.91
0.205	10.84
0.210	10.77
0.215	10.69
0.220	10.61
0.225	10.54
2433980+	
0.180	11.24
0.185	11.02
0.190	10.85
0.195	10.70
0.200	10.57
0.205	10.48
0.210	10.43
0.215	10.37
0.220	10.34
0.225	10.33
0.230	10.33
0.235	10.34
0.240	10.36
2433982+	
0.265	11.41
0.270	11.35
0.275	11.30
0.280	11.25

Table IV (cont.)

J.D.	m
2433982+	
0.285	11.18
0.290	11.11
0.295	11.03
0.300	10.95
0.305	10.87
0.310	10.57
0.315	10.44
0.320	10.35
0.325	10.28
0.330	10.25
0.355	10.33
2434192+	
0.385	11.45
0.405	11.46
0.425	11.46
0.445	11.46
0.465	11.45
0.485	11.44
0.505	11.42
0.525	11.41
2434214+	
0.390	11.30
0.410	11.32
0.430	11.36
0.450	11.40
0.470	11.44
0.490	11.47
0.509	11.49
0.530	11.51
2434215+	
0.460	11.57
0.470	11.55
0.480	11.50
0.490	11.46
0.495	11.41
0.500	11.37
0.505	11.31
0.510	11.25
0.515	11.18
0.520	11.11
0.525	11.01
0.530	10.88
0.535	10.73

J.D.	m
2434215+	
0.540	10.59
2434233+	
0.335	10.38
0.340	10.34
0.350	10.31
0.355	10.31
0.365	10.35
0.370	10.39
0.380	10.48
2434236+	
0.340	11.36
0.360	11.40
0.380	11.44
0.400	11.48
0.420	11.51
0.440	11.54
0.460	11.56
0.480	11.57
0.500	11.59
0.520	11.59
0.540	11.59
0.560	11.60
0.580	11.60
2434237+	
0.510	11.51
0.520	11.48
0.525	11.45
0.530	11.39
0.535	11.31
0.540	11.17
0.545	11.00
0.555	10.65
0.560	10.56
0.565	10.51
0.570	10.47
0.575	10.45
0.580	10.44
0.585	10.42
0.590	10.42
2434240+	
0.320	11.47
0.350	11.42
0.380	11.37

J.D.	m
2434240+	
0.410	11.33
0.440	11.30
0.470	11.27
0.500	11.25
0.530	11.24
0.560	11.27
0.590	11.31
2434243+	
0.320	10.81
0.325	10.65
0.330	10.53
0.335	10.43
0.340	10.37
0.345	10.32
0.350	10.30
0.355	10.30
0.360	10.31
0.365	10.33
0.370	10.37
0.375	10.41
0.380	10.46
0.390	10.54
0.400	10.61
0.410	10.68
0.420	10.77
0.430	10.85
0.440	10.94
2434253+	
0.300	11.06
0.310	10.95
0.320	10.87
0.330	10.81
0.340	10.82
0.350	10.85
0.360	10.88
0.370	10.91
2434254+	
0.290	11.64
0.320	11.55
0.350	11.47
0.380	11.40
0.410	11.38
0.440	11.39
0.460	11.42

Table IV (cont.)

J.D.	m
2434255+	
0.330	11.48
0.340	11.46
0.350	11.42
0.360	11.38
0.370	11.33
0.375	11.29
0.380	11.24
0.385	11.18
0.390	11.11
0.395	11.00
0.400	10.88
2434277+	
0.380	11.50
0.390	11.51
0.400	11.50
0.410	11.49
0.420	11.40
0.425	11.30
0.430	11.20
0.435	11.08
0.450	10.74
0.455	10.62
0.460	10.50
0.465	10.39
0.470	10.33
0.475	10.29
0.480	10.26
0.485	10.25
0.490	10.26
0.495	10.28
0.500	10.32
0.505	10.36
0.510	10.41
0.515	10.47
0.520	10.52
2434282+	
0.490	11.50
0.500	11.46
0.510	11.43
0.530	11.39
0.550	11.35
0.570	11.33
0.590	11.34
0.610	11.38

J.D.	m
2434282+	
0.630	11.44
2434284+	
0.270	11.53
0.300	11.51
0.330	11.48
0.360	11.43
0.390	11.36
0.420	11.31
0.450	11.30
0.480	11.32
0.510	11.35
0.540	11.39
0.570	11.41
0.600	11.43
0.620	11.45
2434295+	
0.255	1o.62
0.260	10.56
0.265	10.53
0.270	10.51
0.275	10.50
0.280	10.51
0.285	10.54
0.290	10.58
0.295	10.63
0.300	10.67
0.305	10.72
0.310	10.76
0.315	10.82
0.320	10.88
0.325	10.94
0.330	11.00
2434304+	
0.250	11.66
0.270	11.64
0.290	11.62
0.335	11.56
0.355	11.49
0.390	11.32
0.400	11.25
0.410	11.19
0.420	11.13
0.430	11.06
0.440	11.01
0.450	10.99

J.D.	m
2434304+	
0.460	10.99
0.470	11.01
0.480	11.03
0.490	11.06
0.500	11.10
0.510	11.13
0.520	11.17
0.530	11.20
0.540	11.22
0.550	11.25
0.560	11.27
0.580	11.33
0.600	11.40
0.620	11.44
0.635	11.46
2434305+	
0.235	11.19
0.240	11.05
0.245	10.93
0.250	10.82
0.255	10.71
0.260	10.61
0.265	10.53
0.270	10.46
0.275	10.43
0.280	10.42
0.285	10.43
0.290	10.45
0.295	10.47
0.300	10.49
0.305	10.52
0.310	10.56
0.320	10.61
0.330	10.68
0.340	10.75
0.350	10.82
0.360	10.89
0.370	10.97
0.380	11.05
2434567+	
0.370	11.59
0.390	11.58
0.410	11.57
0.430	11.57
0.450	11.57

Table IV (cont.)

J.D.	m
2434567+	
0.470	11.54
0.495	11.38
0.505	11.32
0.515	11.29
0.525	11.29
0.535	11.31
0.545	11.34
2434569+	
0.470	11.43
0.490	11.43
2434598+	
0.330	10.52
0.340	10.59
0.350	10.65
0.360	10.72
0.369	10.78
2434600+	
0.345	11.47
0.350	11.41
0.355	11.34
0.360	11.26
0.365	11.19
0.370	11.09
0.375	10.99
0.380	10.87
0.385	10.74
0.390	10.65
0.395	10.53
0.400	10.46
0.405	10.40
0.410	10.36
0.415	10.35
0.420	10.33
0.425	10.32
0.430	10.32
0.435	10.33
0.440	10.34
0.445	10.36
0.450	10.39
2434601+	
0.340	11.57
0.360	11.53
0.380	11.51

J.D.	m
2434601+	
0.400	11.48
0.420	11.47
0.440	11.45
0.455	11.45
0.470	11.45
0.485	11.46
0.500	11.46
0.520	11.48
0.540	11.49
2434602+	
0.485	11.16
0.490	11.00
0.495	10.85
0.500	10.70
0.505	10.57
0.510	10.44
0.515	10.33
0.520	10.25
0.525	10.20
0.530	10.20
0.535	10.22
0.540	10.25
0.545	10.28
0.550	10.32
0.560	10.38
0.570	10.44
0.580	10.51
0.590	10.58
2434620+	
0.330	10.80
0.335	10.75
0.340	10.70
0.345	10.66
0.350	10.65
0.355	10.63
0.360	10.63
0.365	10.62
0.370	10.63
0.375	10.64
0.380	10.65
0.385	10.67
0.390	10.71
0.395	10.77
0.400	10.82
0.405	10.88

J.D.	m
2434620+	
0.410	10.94
0.415	11.02
0.420	11.10
2434622+	
0.440	10.39
0.450	10.39
0.460	10.42
0.470	10.45
0.480	10.51
0.490	10.59
0.500	10.67
0.510	10.76
0.520	10.83
0.530	10.91
0.540	10.99
0.550	11.07
0.560	11.16
0.570	11.25
2434624+	
0.475	11.11
0.490	11.05
0.500	10.99
0.510	10.89
0.520	10.74
0.525	10.67
0.530	10.61
0.535	10.54
0.540	10.48
0.545	10.44
0.550	10.40
0.555	10.37
0.560	10.35
0.565	10.34
0.570	10.35
0.575	10.36
0.580	10.38
0.585	10.42
0.590	10.46
0.600	10.61
0.610	10.76
0.620	10.92
2434629+	
0.310	11.55
0.330	11.47

Table IV (cont.)

J.D.	m
2434629+	
0.350	11.40
0.370	11.33
0.390	11.27
0.410	11.22
0.430	11.18
0.450	11.14
0.470	11.11
0.490	11.10
0.510	11.10
0.525	11.11
0.590	11.13
0.610	11.21
0.625	11.29
2434630+	
0.275	11.19
0.280	11.12
0.285	11.04
0.290	10.96
0.295	10.88
0.300	10.81
0.305	10.75
0.310	10.70
0.315	10.66
0.320	10.64
0.325	10.62
0.330	10.62
0.335	10.63
0.340	10.63
0.345	10.64
0.350	10.65
0.355	10.66
0.360	10.68
0.380	10.74
0.390	10.76
0.400	10.79
0.410	10.82
2434649+	
0.290	11.50
0.295	11.42
0.300	11.34
0.305	11.27
0.310	11.21
0.315	11.15
0.320	11.08
0.325	11.01

J.D.	m
2434649+	
0.330	10.95
0.335	10.89
0.340	10.82
0.345	10.75
0.350	10.68
0.355	10.61
0.360	10.55
0.365	10.51
0.370	10.49
0.375	10.49
0.380	10.50
0.385	10.52
0.390	10.55
0.400	10.63
0.410	10.70
0.420	10.78
2434652+	
0.255	11.37
0.265	11.28
0.275	11.18
0.285	11.09
0.295	10.99
0.305	10.90
0.315	10.82
0.320	10.79
0.325	10.78
0.330	10.78
0.335	10.80
0.345	10.86
0.355	10.94
0.365	11.01
0.375	11.08
0.385	11.14
0.395	11.21
0.405	11.28
2434654+	
0.400	11.19
0.410	11.09
0.420	11.00
0.430	10.91
0.440	10.82
0.450	10.73
0.460	10.64
0.465	10.60
0.470	10.59

J.D.	m
2434654+	
0.475	10.58
0.480	10.59
0.485	10.60
0.490	10.61
0.494	10.63
0.499	10.66
0.504	10.68
0.509	10.71
0.514	10.73
0.520	10.76
2434656+	
0.525	11.10
0.530	11.00
0.535	10.92
0.540	10.83
0.545	10.76
0.550	10.71
0.555	10.65
0.560	10.62
0.565	10.61
0.570	10.60
0.575	10.60
0.580	10.61
0.585	10.61
0.590	10.62
0.595	10.62
0.600	10.63
0.610	10.65
0.620	10.68
0.630	10.72
0.639	10.77
0.650	10.84
2434661+	
0.335	11.70
0.345	11.62
0.355	11.54
0.365	11.47
0.375	11.40
0.385	11.32
0.425	11.03
0.435	10.96
0.445	10.88
0.455	10.81
0.465	10.74
0.475	10.67

Table IV (cont.)

J.D.	m
2434662+	
0.305	11.02
0.315	10.94
0.325	10.86
0.335	10.79
0.345	10.73
0.355	10.69
0.360	10.67
0.365	10.66
0.370	10.65
0.375	10.66
0.380	10.67
0.385	10.68
0.390	10.70
0.400	10.75
0.410	10.79
0.420	10.83
0.430	10.87
0.440	10.92
0.450	10.97
0.460	11.02
2434664+	
0.390	11.47
0.395	11.39
0.400	11.30
0.405	11.22
0.410	11.14
0.415	11.05
0.420	10.97
0.425	10.87
0.430	10.79
0.435	10.71
0.440	10.65
0.445	10.60
0.450	10.56
0.455	10.52
0.460	10.51
0.465	10.50
0.470	10.52

J.D.	m
2434664+	
0.475	10.55
0.480	10.59
0.490	10.67
2434920+	
0.410	10.99
0.440	11.09
2434924+	
0.415	11.56
0.480	11.50
0.500	11.50
0.520	11.49
2434987+	
0.345	11.19
0.355	11.17
0.365	11.13
0.375	11.07
0.385	11.01
0.395	10.96
0.405	10.91
0.415	10.87
0.425	10.82
0.435	10.79
0.445	10.75
0.450	10.74
0.455	10.72
0.460	10.71
0.465	10.72
0.470	10.73
0.500	10.85
0.510	10.91
0.520	10.96
0.530	11.01
0.540	11.05
0.550	11.08
0.560	11.11
0.570	11.13

J.D.	m
2434987+	
0.580	11.15
0.590	11.17
0.600	11.20
0.610	11.21
2434989+	
0.410	11.55
0.420	11.55
0.430	11.52
0.440	11.49
0.450	11.36
0.460	11.07
0.465	10.98
0.470	10.88
0.475	10.79
0.480	10.71
0.490	10.62
0.500	10.57
0.510	10.54
0.520	10.54
0.530	10.56
0.540	10.61
0.550	10.66
0.560	10.72
0.570	10.80
2434990+	
0.360	11.62
0.380	11.61
0.400	11.60
0.415	11.60
0.480	11.63
0.500	11.65
0.520	11.67
2435009+	
0.350	11.40
0.370	11.40

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SPACE DISTRIBUTION OF STARS IN A REGION OF CEPHEUS AROUND NGC 7160

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SPACE DISTRIBUTION OF STARS IN A REGION OF CEPHEUS AROUND NGC 7160

ABSTRACT

Objective prism spectral types and photographic U, B, V magnitudes have been determined for 1810 stars in a region of 19.5 square degrees of Cepheus centred on the galactic cluster NGC 7160. A catalogue of data together with identification charts is given. The magnitude limit is approximately V=12.5. The field contains a part of the supposed older subsystem of the association Cepheus OB2. The interstellar absorption in the region is smooth. The visual absorption is $1\overset{m}{.}0$ at the distance of the association for the northern part of the field, and is about $1\overset{m}{.}4$ for the southern part. Space densities of the stars have been computed as a function of spectral type and distance from the sun. Concentrations of B and early A type stars are found at 800 pc from the sun. General luminosity functions were derived at 200, 400, 600, 800, 1000 and 1200 pc, and an attempt was made to derive the shape of the luminosity function of the association subgroup.

INTRODUCTION

This paper is the second part of a study of stellar distributions in the association Cepheus OB2. It was shown by *Blaauw* (1964) that most OB associations consist of several subgroups of different ages. *Simonson* and *van Someren Greve* (1976) suggest that Cep OB2 consists of two subgroups: Cep OB2a is the older and more dispersed one; it is situated between $l=100^{\circ}-105^{\circ}$ and $b=+2^{\circ}-+8^{\circ}$. The younger subgroup, Cep OB2b, is the open cluster Tr 37 embedded in the HII region IC 1396 at $l=99\overset{\circ}{.}7$ and $b=+3\overset{\circ}{.}7$. In a previous paper (*Kun,* 1979, hereinafter Paper I) the distribution of main sequence stars and the absorbing matter in the region of IC 1396 was described. It was shown that this group contains a great number of B3-B7 and B8-A1 stars in addition to the earliest type stars defining the group. In the present paper a similar study is made for the supposed older subgroup.

The field chosen for this study is centred on the galactic cluster NGC 7160. The coordinates of the plate centre are: $\alpha(1950)=21^{h}52^{m}$, $\delta(1950)=+62^{\circ}20'$ ($l=104\overset{\circ}{.}6$, $b=+6\overset{\circ}{.}4$). The total area is 19.5 square degrees. The field contains a part of Cep OB2a, the older subgroup of Cep OB2. Since no significant obscuration in this region can be observed, this field should be suitable for the statistical study of the space distribution of the stars.

Figure 1 shows the surface distribution of the early type and supergiant members of the association, according to *Simonson* (1968) and *Humphreys* (1978).

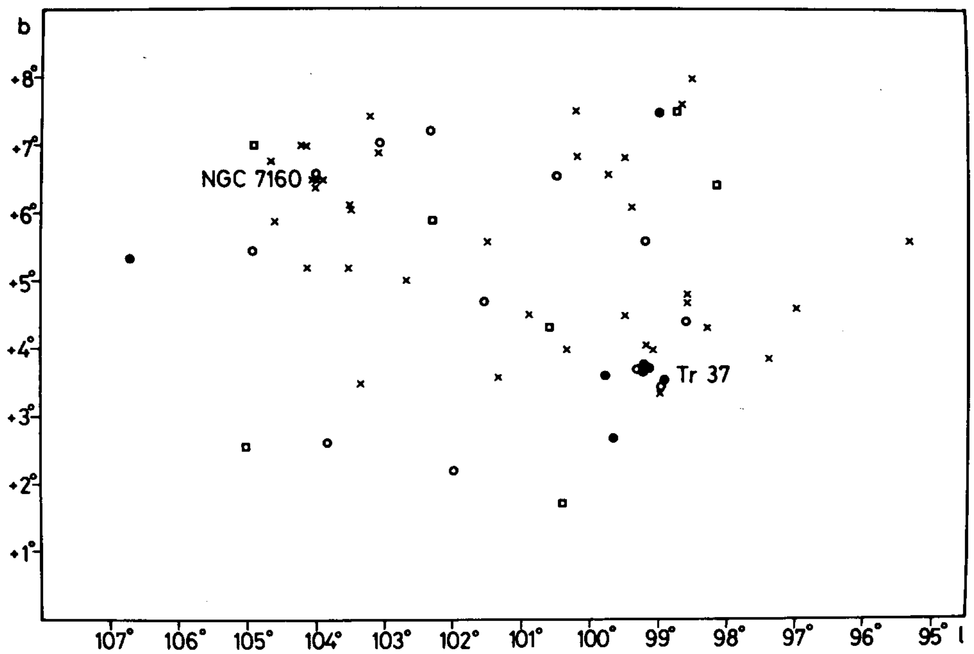


Figure 1: Surface distribution of the members of Cep OB2. Open circles denote blue supergiants and main sequence O stars; squares indicate red supergiants, dots BOV stars, and crosses B1V-B3V stars.

OBSERVATIONAL DATA

a) Spectral classification

Spectra were classified from Kodak IIa-O plates taken with the 5° ultraviolet transmitting objective prism attached to the 60/90/180 cm Schmidt telescope of Konkoly Observatory. It provides a dispersion of 580 A/mm at Hγ. Spectra were widened to 18" on each plate. Exposure times were 30^{s}, 6^{m} and 24^{m}. Criteria described by *Seitter* (1975) were used in classifying the spectra. In the case of stars later than F8 luminosity classes were also determined. Each star was classified on at least two plates. The number of classified stars is 1810.

Figure 2 shows a comparison between the adopted spectral types and those of the *Henry Draper Catalogue.* This comparison involves 51 stars. There is a tendency in this work to classify the late B and early A stars slightly earlier than the corresponding classification in the HD Catalogue. *Lindoff* and *Lynga* (1966) found the same differences between the HD and MK types.

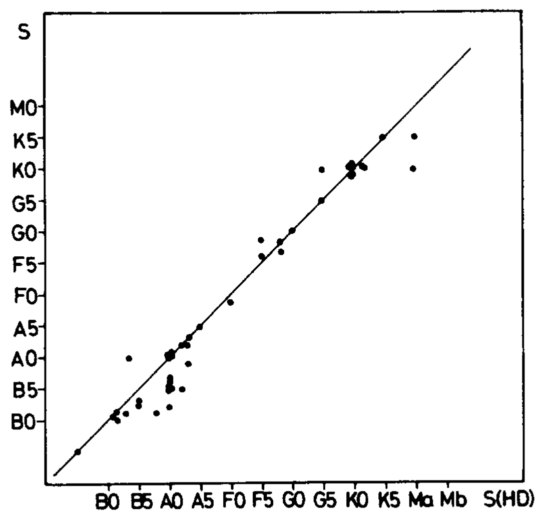


Figure 2

MK classification of some early type stars of this field (*Simonson,* 1968) shows a good agreement with the present classification (Table 1).

TABLE 1

HD number	Sp.	Sp(Simonson)	S(HD)
207 198	B0	O9.5II	B2
207 951	B1	B2V	B8
208 185	B3	B1V	A0
208 266	B1	B3V	B5
208 761	B2	B3V	B5

In accordance with the sharpness of the classification criteria and so that the space densities can be calculated the stars have been grouped into broad spectral ranges. These spectral ranges and the number of stars included in them are given in Table 2.

TABLE 2

Spectral range	number of stars
earlier than B3	36
B3-B7	90
B8-A1	572
A2-A6	270
A7-F1	104
F2-F8	356
gG-gK	207
dG-dK	158
M	17

b) Photographic photometry

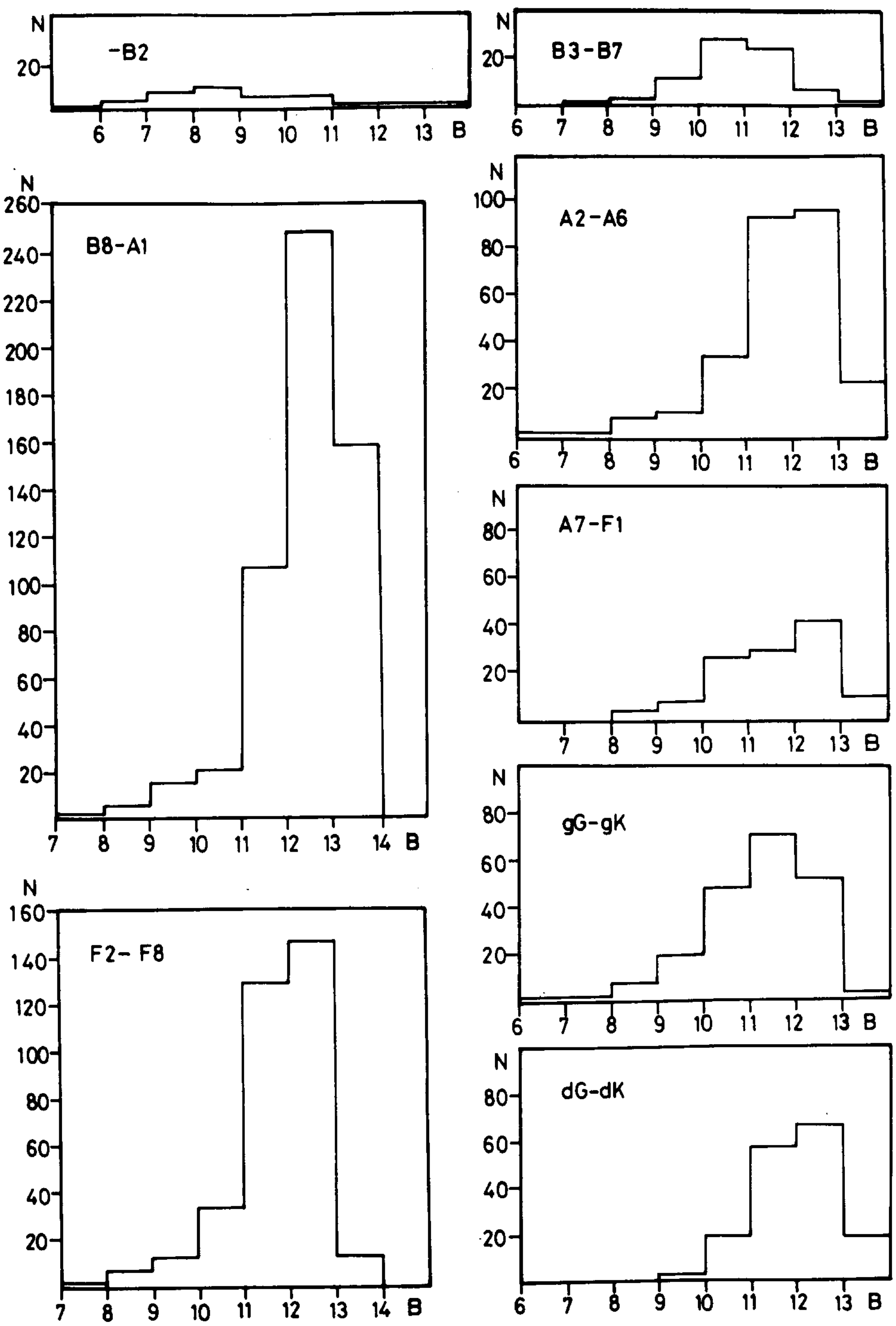
U, B, V photographic magnitudes were obtained for all the stars that have been classified. Five plates were taken in each colour. The plate-filter combinations and exposure times are those described in Paper I. The plates were measured with the Cuffey irisphotometer of Konkoly Observatory. The photoelectric sequence for the photographic measures was taken from *Hoag* et al. (1961), *Argue* (1966) and *Simonson* (1968). The mean internal errors of the photometry are ±0.06 for both V and B, and ±0.08 for U. In addition to these random errors the ultraviolet filter had a field error in a restricted area. The estimated probable errors of U magnitudes of the stars affected by this field error are about $\pm 0\overset{m}{.}2$.

The limiting magnitude of the spectral classification is about $B=13\overset{m}{.}0$. Figure 3 shows the distribution of the stars of different spectral ranges as a function of apparent B magnitude. The limiting magnitude in V depends on the colour of the stars; on the average, the limiting V is about $12\overset{m}{.}5$, but for the K stars it is about a magnitude lower.

The Q colour differences have been determined for all stars earlier than A2 in order to have an independent spectral classification. For the stars showing a discrepancy between the classified spectra and the Q value taken from *Johnson* (1958), the average of the two subclasses was adopted for the spectral type.

c) Completeness of spectral data

Because the region investigated is situated close to the galactic plane, the surface density of stars is high, thus there


N
20
-B2
6
7
8
9
10
11
12
13
B
N
20
B3-B7
6
7
8
9
10
11
12
13
B
N
260
240
220
200
180
160
140
120
100
80
60
40
20
B8-A1
7
8
9
10
11
12
13
14
B
N
100
80
60
40
20
A2-A6
6
7
8
9
10
11
12
13
B
N
80
60
40
20
A7-F1
7
8
9
10
11
12
13
B
N
160
140
120
100
80
60
40
20
F2- F8
7
8
9
10
11
12
13
14
B
N
80
60
40
20
gG-gK
6
7
8
9
10
11
12
13
B
N
80
60
40
20
dG-dK
6
7
8
9
10
11
12
13
B
Figure 3

are a great number of overlapped spectra. It is hard to estimate how the unclassifiable overlapped spectra affect the completeness of our data. Figure 4 gives $\lg N(m_B)$ values, where $N(m_B)$ is the total number of stars per square degree brighter than m_B, as a function of B magnitude. *McCuskey's* study of LF4 (1951) and *Kubinec's* (1973) work for an adjacent Cepheus region provide values of lgN(m) for comparison with present data; they are also plotted in Fig. 4. Though these surveys are made at slightly lower galactic latitudes, they do allow us to make an estimate of the completeness of the present survey: it is estimated that the survey is complete to $B=13\overset{m}{.}0$.

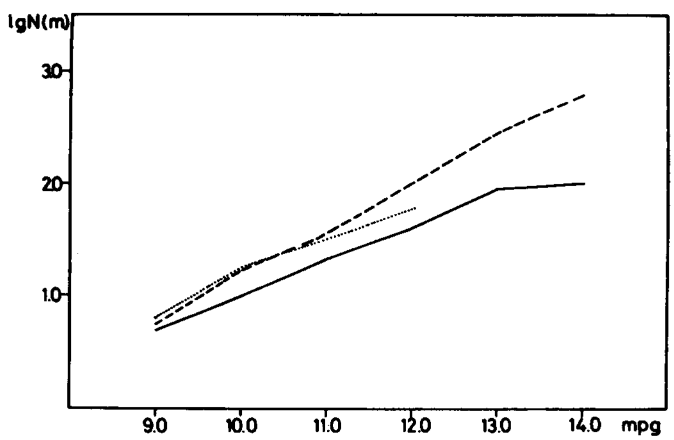


Figure 4: logN(m) versus m. Dashed line refers to McCuskey's LF survey, dotted line Kubinec's (1973) result. The solid line shows the present survey.

INTERSTELLAR ABSORPTION

By examining *Khavtassi's Atlas of Galactic Dark Nebulae* it can be seen that the interstellar absorption pattern is relatively smooth in this region. There are two dark nebulae of moderate obscuration in the southern part of the field: Khavtassi 170 and 173. We can distinguish two regions with slightly different reddenings: Figs. 5a and 5b show the E_{B-V} colour excesses against the uncorrected distance modulus. The higher reddening affects about five hundred stars in the southern part of the field.

The solid lines in Figs. 5a and 5b represent the adopted relation between colour excess and distance modulus. The relations between the total visual absorption, a_V and the distance, r are given in Figs. 6a and 6b for the two regions. These were determined from Figure 5 with R=3.0.

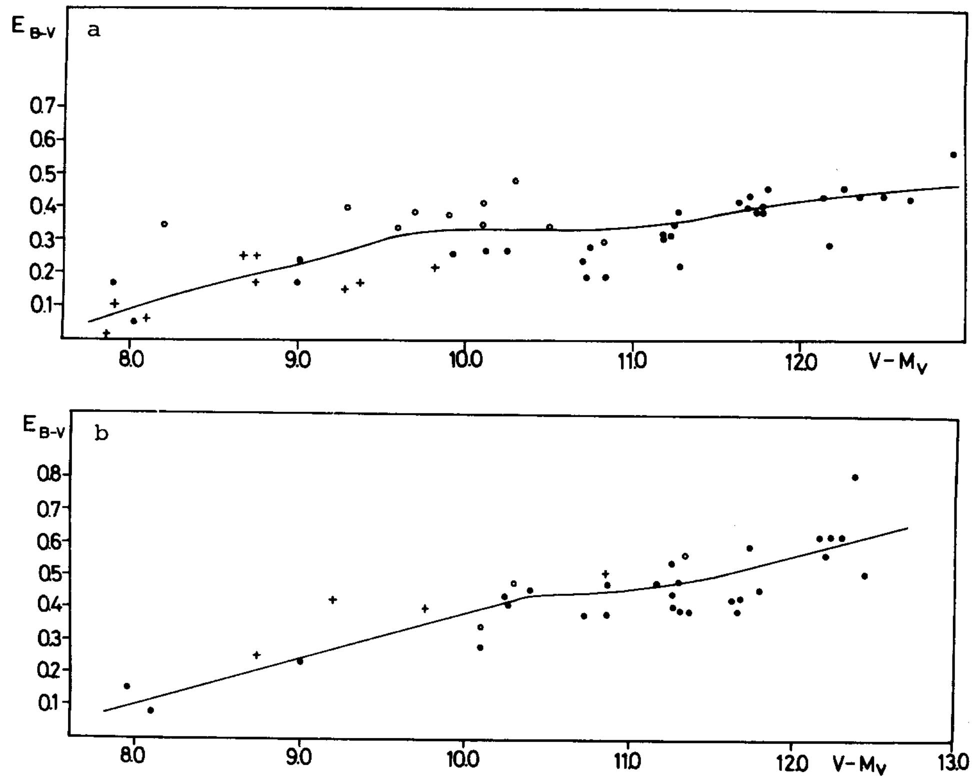


Figure 5: E_{B-V} versus distance modulus a) for the region of low reddening; b) for the region of high reddening. Dots indicate A0 type stars, crosses F type stars, and open circles photoelectric measurements taken from Hoag et al. (1961), and Simonson (1968).

Stars of the association Cep OB2 are situated between distances of 600 and 1100 pc (*Simonson*, 1968). It can be seen from Fig. 6 that there is no obscuring matter in this region in the northern part of the field, but in the region covered by the dark nebulae an absorption begins about 850 pc.

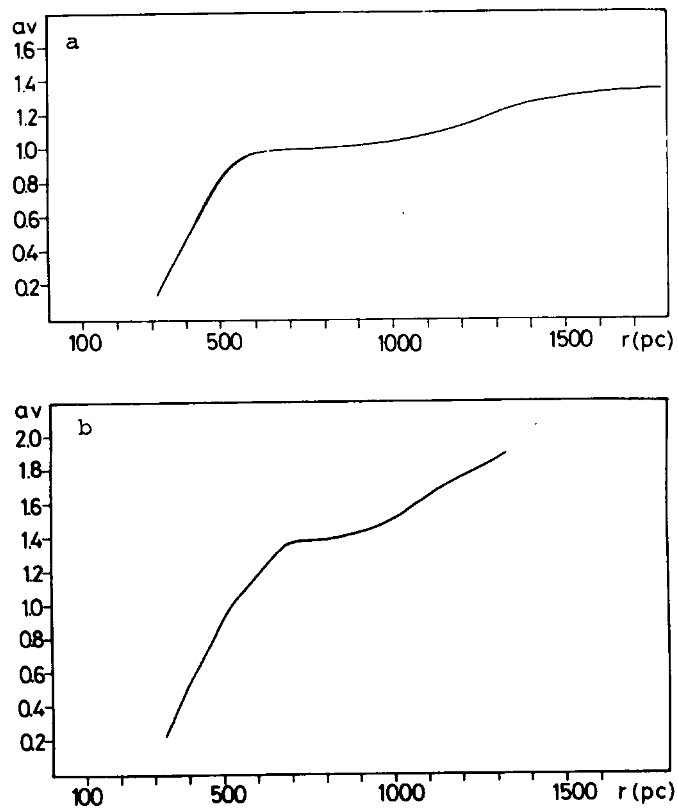


Figure 6

SPACE DENSITIES

The stellar space densities can be determined after having corrected the apparent magnitudes of stars for the interstellar absorption. For this purpose *Dolan*'s (1974) matrix method was used. The adopted mean absolute magnitudes and dispersions for the spectral ranges are taken from *Allen* (1973).

The resulting space densities as functions of the distance from the sun are given in Figs. 7-10. The general characteristics of spatial distributions of stars can be summarized as follows:

B0-B2 stars: (Figure 7a) The density curve has a sharp maximum at 700 pc, and a "shoulder" between 900-1100 pc. Beyond 1100 pc there is a sudden decrease. As the region is $6\overset{\circ}{.}5$ above the ga-

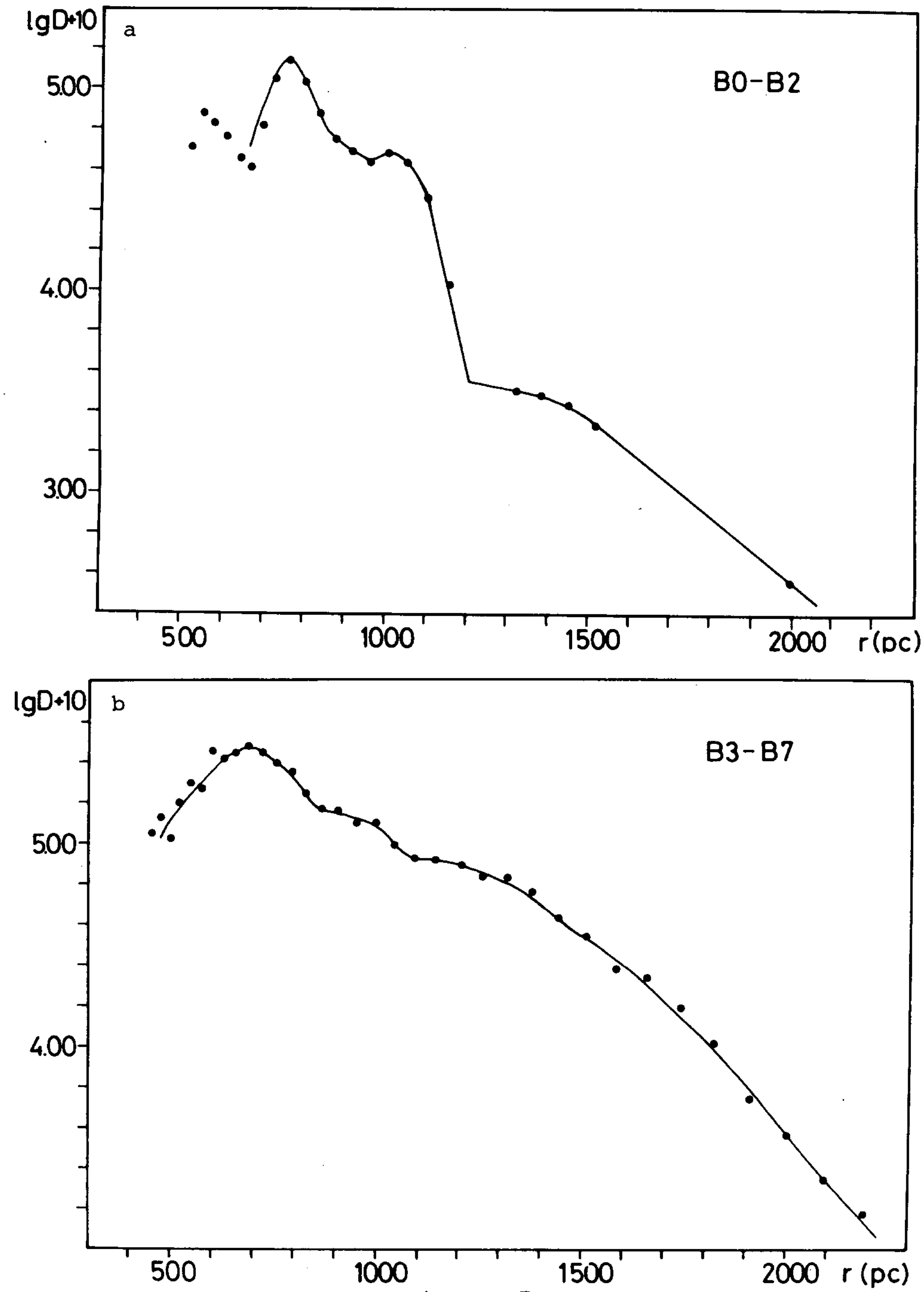

lgD+10
a
B0-B2
5.00
4.00
3.00
500
1000
1500
2000
r(pc)
lgD+10
b
B3-B7
5.00
4.00
500
1000
1500
2000
r (pc)

Figure 7

lactic plane, and at 1200 pc it corresponds to z=130 pc, not many background stars of this type can be expected.

B3-B7 stars: (Fig. 7b) The structure of this curve is similar to the previous one. The maximum is broader than in the case of the earlier group. The shoulder can also be seen. The density of the background slowly decreases between 1100 and 1400 pc, and a faster decrease begins beyond 1400 pc.

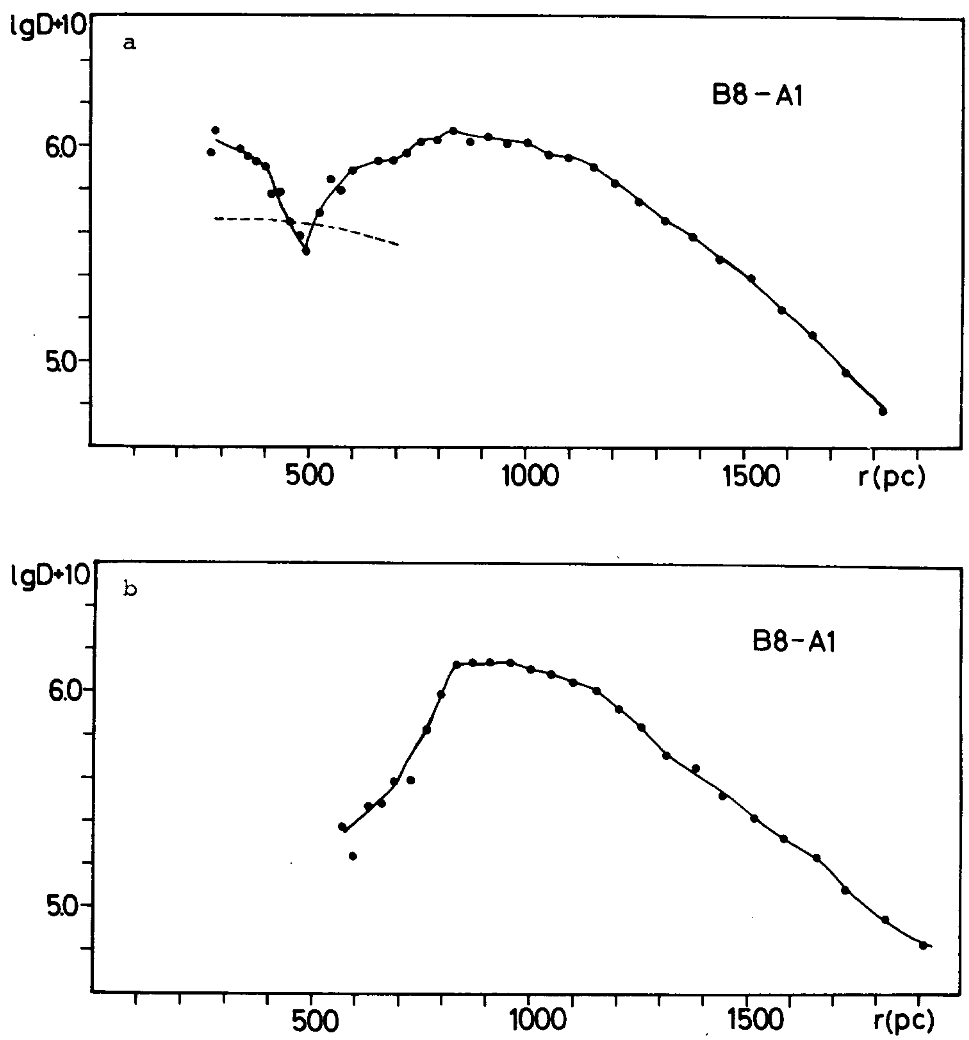


Figure 8

B8-A1 stars: (Fig. 8a) The density continuously decreases to 600 pc and it has a broad maximum at 800 pc. For comparison, *van Rhijn*'s (1955) density data obtained at $l=100^{o}$, $b=+7^{o}$ are also indicated in Fig. 8a (dashed line). The curve suggests that the place of its maximum indicates the same stellar group as the early type stars. The density maximum at the distance of the association is more pronounced when we consider the distribution of B8-A1 stars in a smaller region around the cluster. Fig. 8b shows this arrangement for a circle of radius of one degree centred on NGC 7160. This region contains 107 B8-A1 stars. Here the density sharply increases to 830 pc, it is nearly constant between 830-1000 pc, and then it decreases similarly to the previous curve.

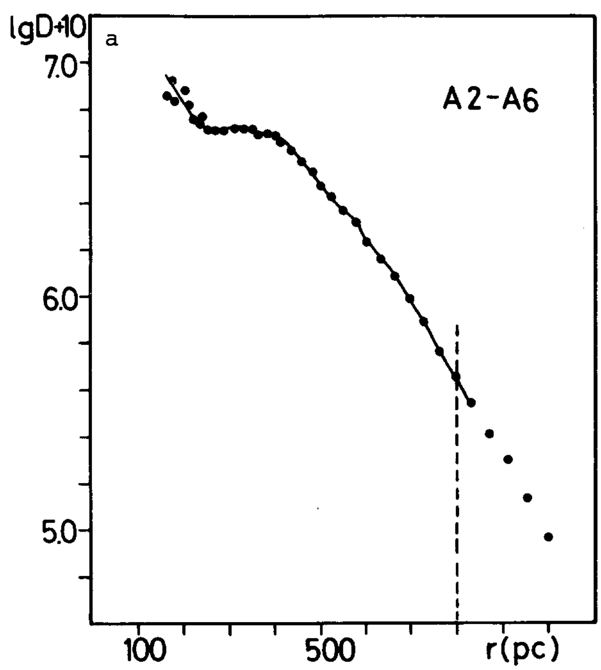


Figure 9a

A2-A6 stars: (Fig. 9a) The density is constant between 250 and 400 pc, and has a large negative gradient beyond 400 pc. The dashed line indicates the plate limit.

A7-F1 stars: (Fig. 9b) The density continuously decreases beyond 300 pc. It stops decreasing at about 650 pc. Unfortunately it is near the plate limit.

F2-F8 stars: (Fig. 9c) The curve has a maximum at 250 pc and sharply decreases beyond it.

G0-K3 giants: (Fig. 10) The curve is also characterized by the large negative gradient.

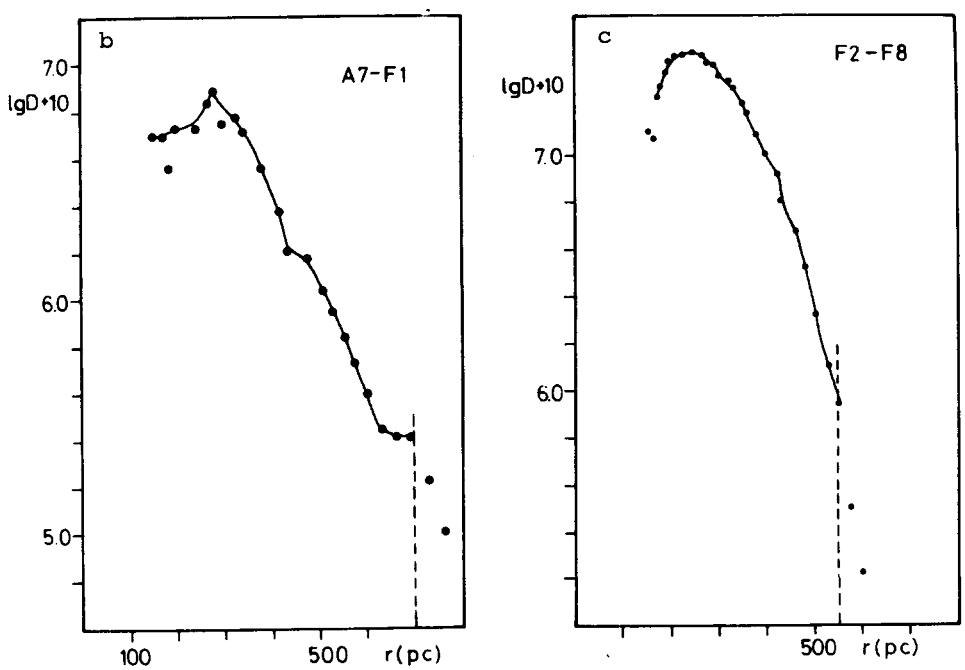


Figure 9b-c

The density of G-K dwarfs has not been calculated; they are very faint, thus the plate limit is about 200 pc.

The most significant features of the space density distributions are the presence of the association in the distribution of stars earlier than A2, and the large negative gradients for the later types, and even for the early types at greater distances. In the case of B and early A stars this gradient can be explained by the increasing distance from the galactic plane. In the case of A2-F8 stars, however, there must be a true concentration of stars near the sun. The same phenomenon was found by *Kubinec* (1973) for an adjacent region, lying exactly in the galactic plane.

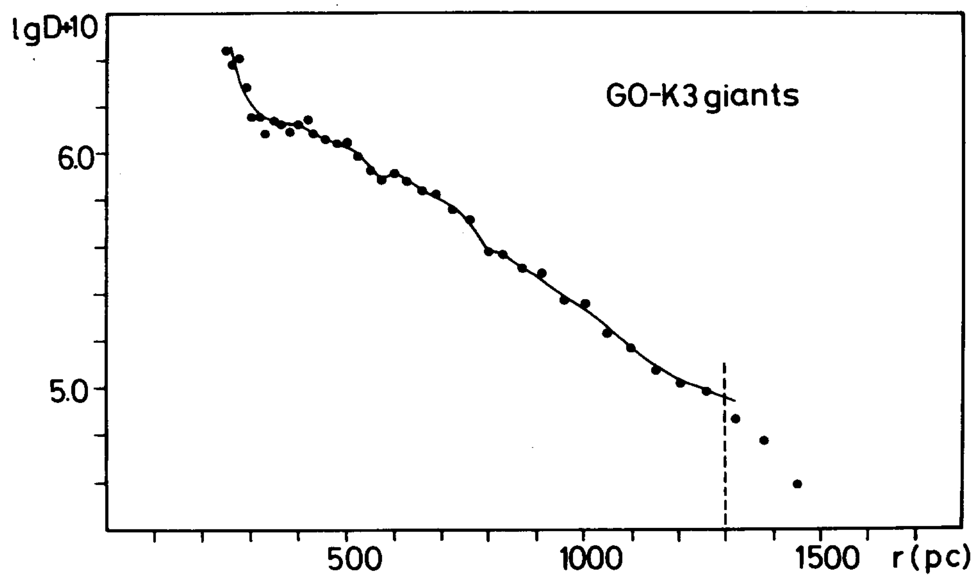


Figure 10

The ratio of B8-A1 main sequence stars to the G8-K3 giants has been calculated as a function of apparent V magnitude. Because the absolute visual magnitude of these two groups are nearly the same ($+0\overset{m}{.}5$), equal apparent magnitudes correspond to equal distance moduli. It was shown by *Sandage* (1957) that this ratio has evolutionary implications: N(A)/N(K) is large for the relatively young regions of the Galaxy. Figure 11 gives the ratio N(A)/N(K) as a function of V for both subgroups of Cep OB2. The data for the region of IC 1396 are taken from Paper I. In this region there is an excess of bright K giants; and in both regions the ratio shows a steep increase at V=10. Unfortunately it is not possible to follow this ratio to the fainter stars because the K giants having a V magnitude larger than 11.0 are near the plate limit. The high value of N(A)/N(K) between V=10 and 11 (the corresponding corrected distance moduli are 8.5-9.5 for IC 1396 and 9.0-10.0 for NGC 7160) also indicates an excess of main sequence A stars in the volume of the association.

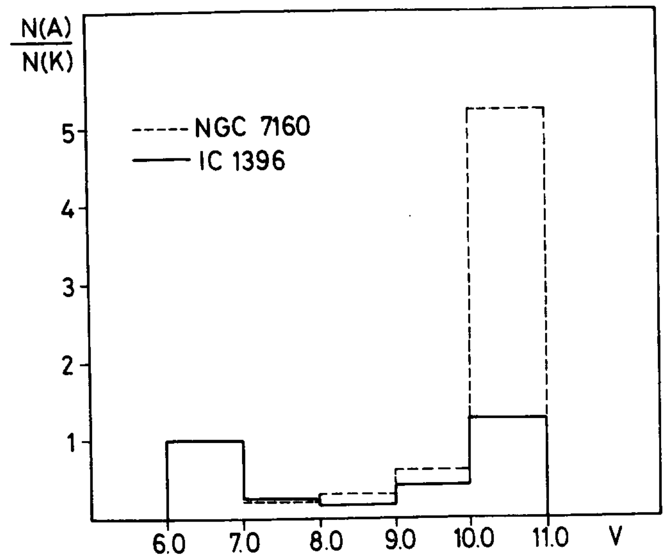


Figure 11

LUMINOSITY FUNCTIONS

The stellar luminosity function is defined as the number of stars per cubic parsec with absolute magnitudes in the range M-1/2, M+1/2, at distance r. It can be calculated from the space densities by the formula:

$$\Phi(M,r) = \sum_{s} (2\pi\sigma_s^2)^{-1/2} \exp-\left(\frac{M-M_s}{\sigma_s\sqrt{2}}\right)^2 D_s(r)$$

The luminosity function has been determined for this field at distances of 200, 400, 600, 800, 1000 and 1200 pc, between the absolute magnitudes -5^m and $+1^m$ and for the lower distances to $+2^m$. The results are shown in Fig. 12. The dashed lines indicate *McCuskey*'s (1966) luminosity function for the solar neighbourhood. At 200 pc our luminosity function agrees well with this function, and at 1200 pc (at z=130 pc) they are nearly parallel with each other. Between these limits there is an excess of bright stars, showing the presence of the association.

Using the resulting space densities we made an attempt to determine the luminosity function of the association subgroups.

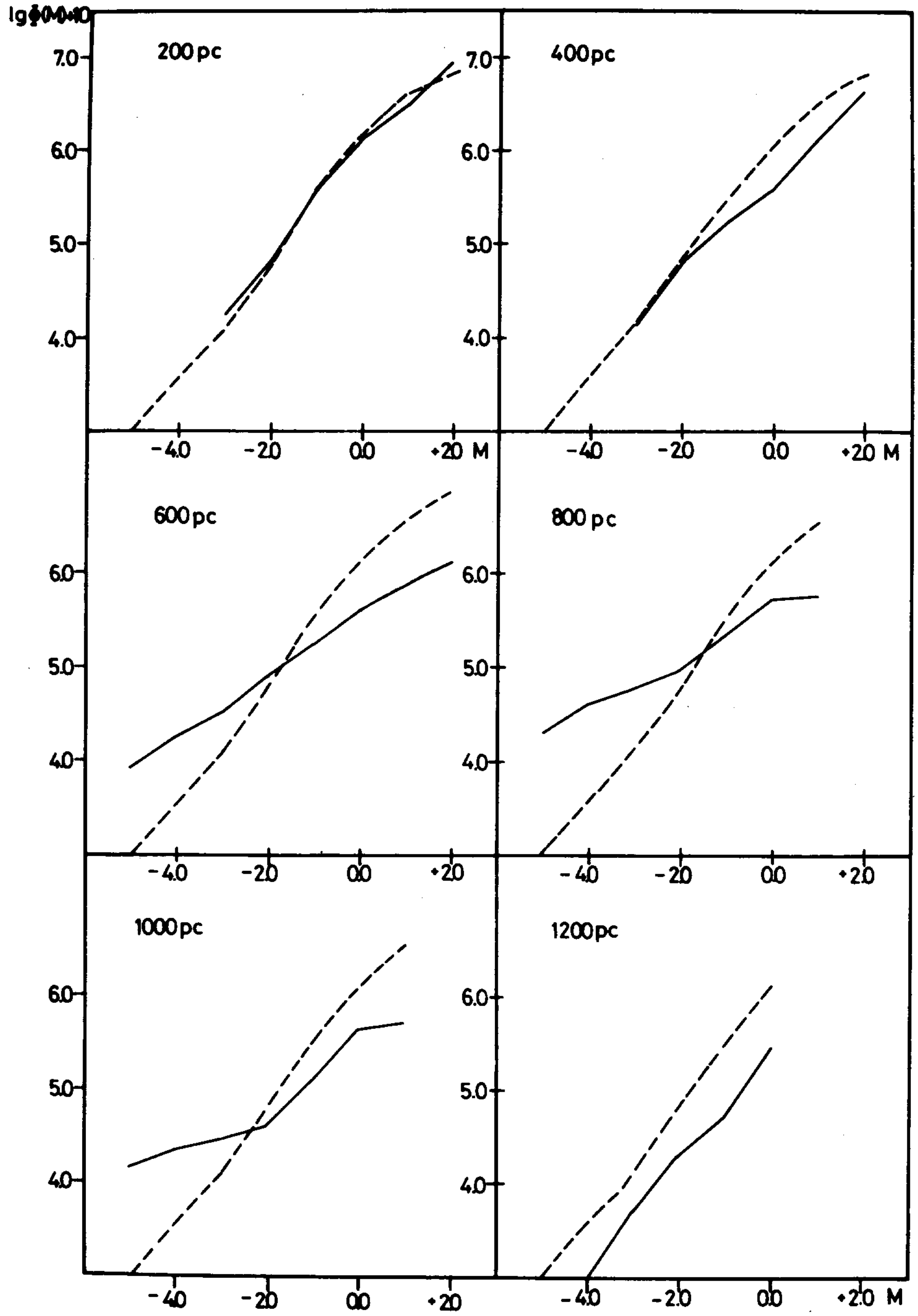


Figure 12

From the shape of the density curves of B0-B2 and B3-B7 stars an estimate can be made for the density of the field stars at the distance of the association by extrapolating the density values beyond 1100 pc to the smaller distances. Thus the space densities of the true association members can be estimated. A somewhat less reliable estimation can be made for the density of the B8-A1 members using *van Rhijn*'s data for the density of the field. His survey was made near the assumed border of Cep OB2.

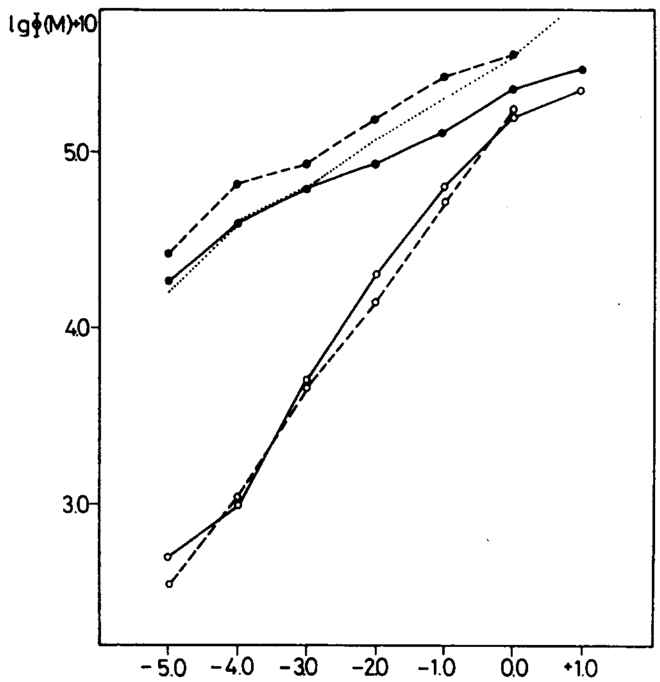


Figure 13: Luminosity functions of the two subgroups or Cep OB2 and those of the underlying field, derived from the stellar densities. Open circles denote the field and dots the association. Dashed line: Cep OB2a, solid line: Cep OB2b. Dotted line: Limber's (1960) initial luminosity function.

On the basis of these extrapolated densities the luminosity functions of the two subgroups have been calculated. For the region of IC 1396 the density curves given in Paper I were used. The resulting luminosity functions are shown in Fig. 13 together with the so obtained field star luminosity functions. It can be seen that the gradients of the luminosity functions of the two subgroups do not differ significantly from each other nor from the standard initial luminosity function published by *Limber* (1960). The smaller values obtained for Cep OB2a may indicate the more dispersed nature of this group. The relative proportions of stars of different absolute magnitudes, however, are remarkably similar in the two subgroups. The supergiants are not included in these luminosity functions, but according to *Humphreys* (1979) the number of supergiants is nearly the same for the two subgroups. This close similarity of the two subgroups indicates that they were produced under similar physical conditions.

ACKNOWLEDGEMENT

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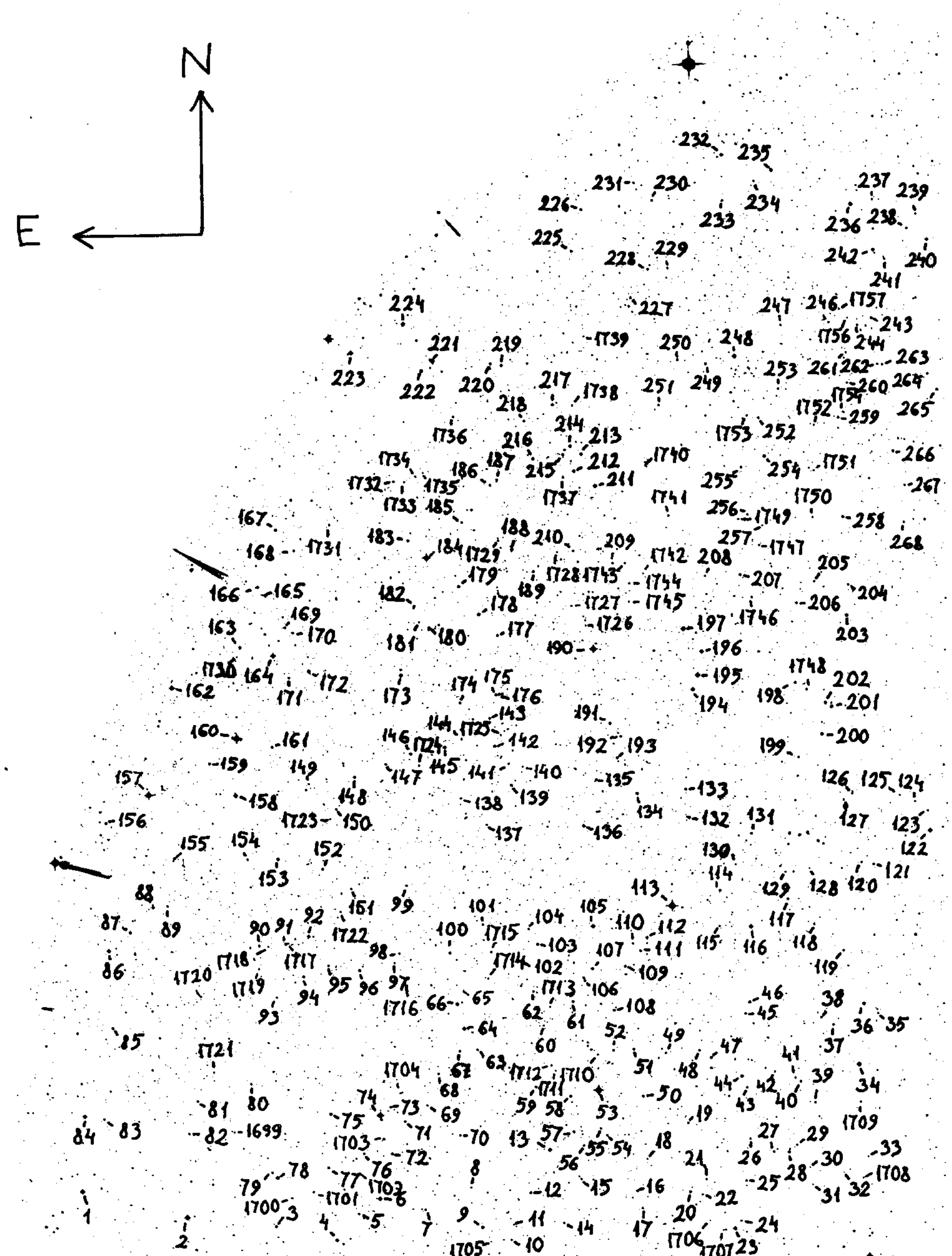
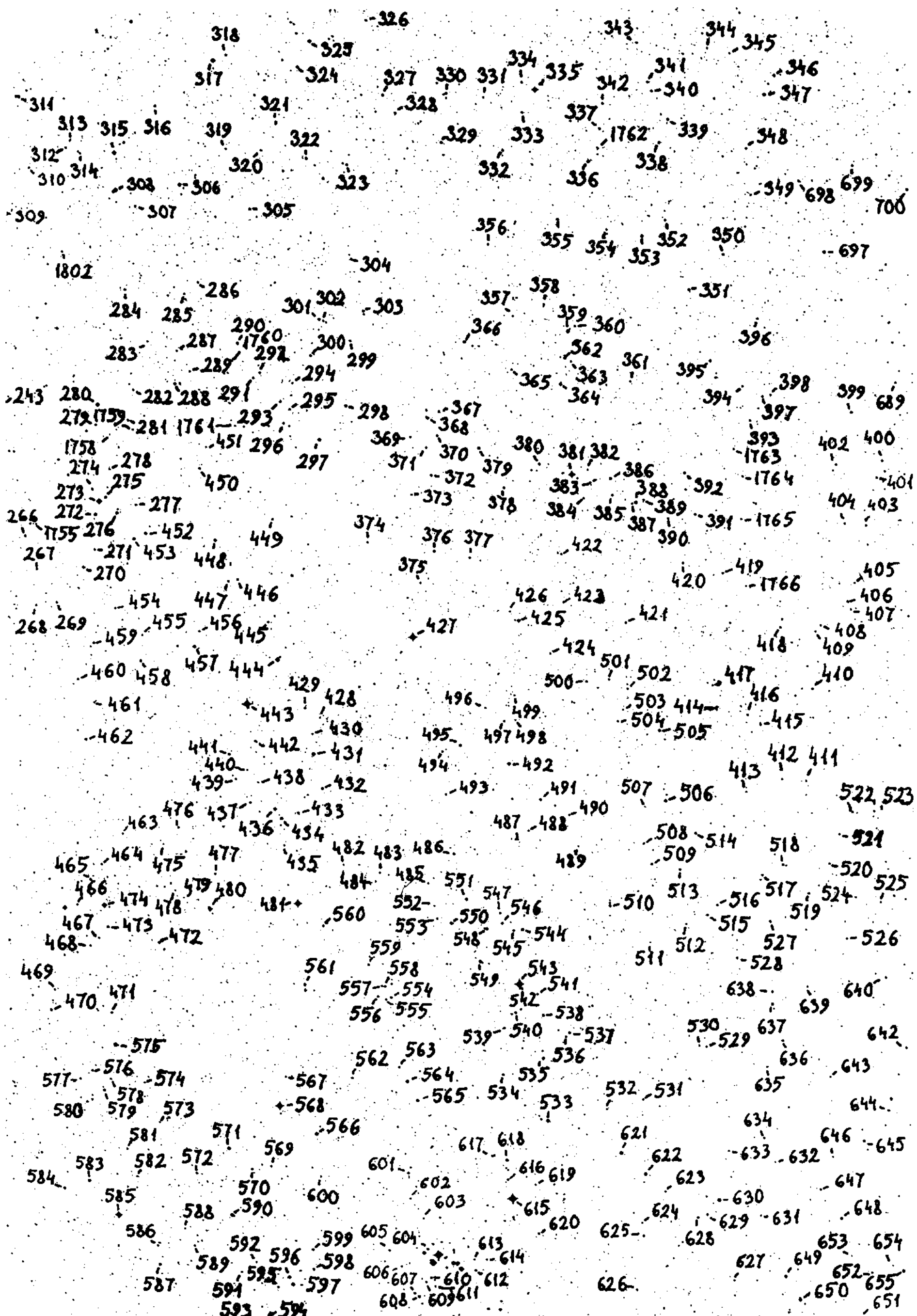
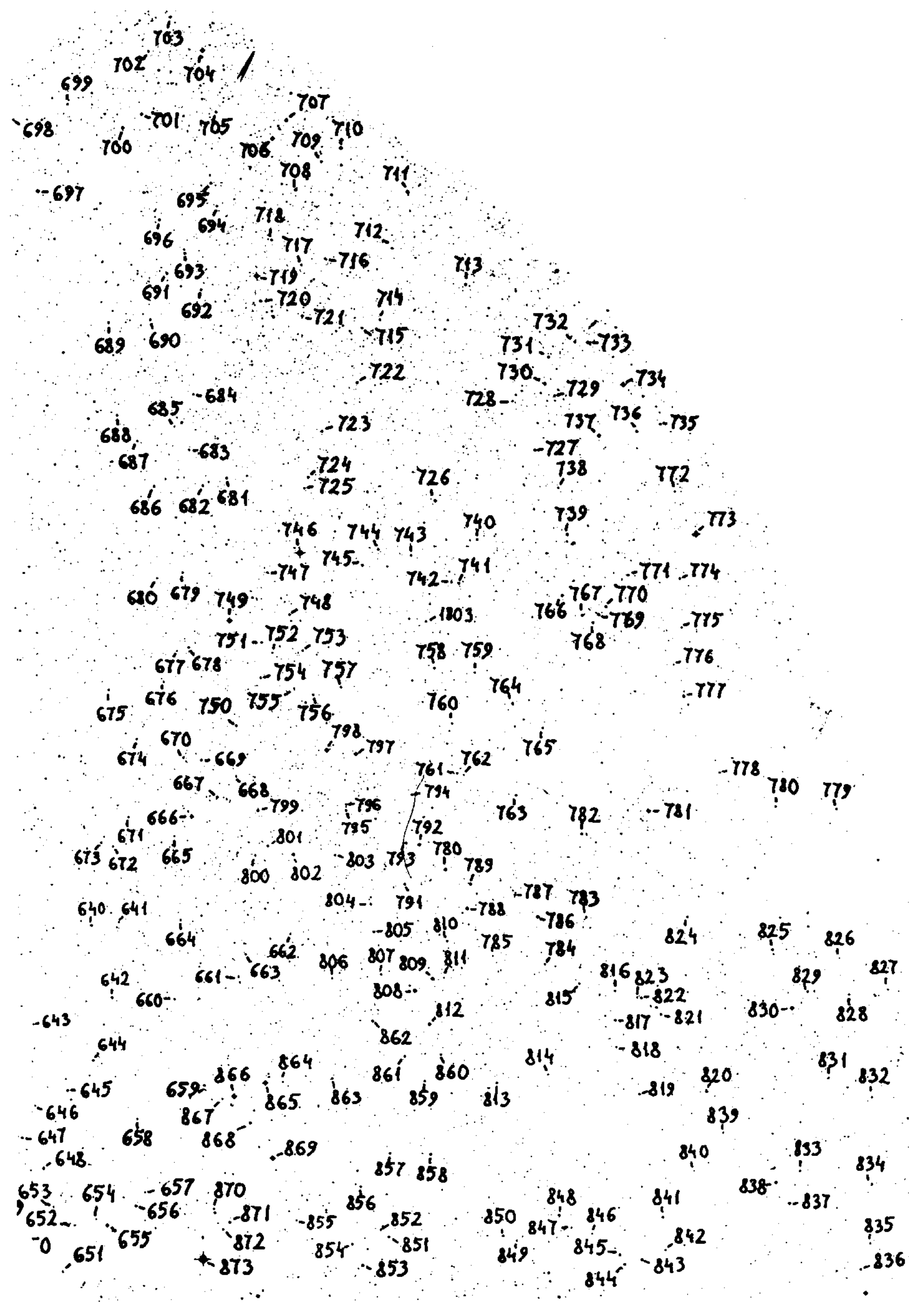


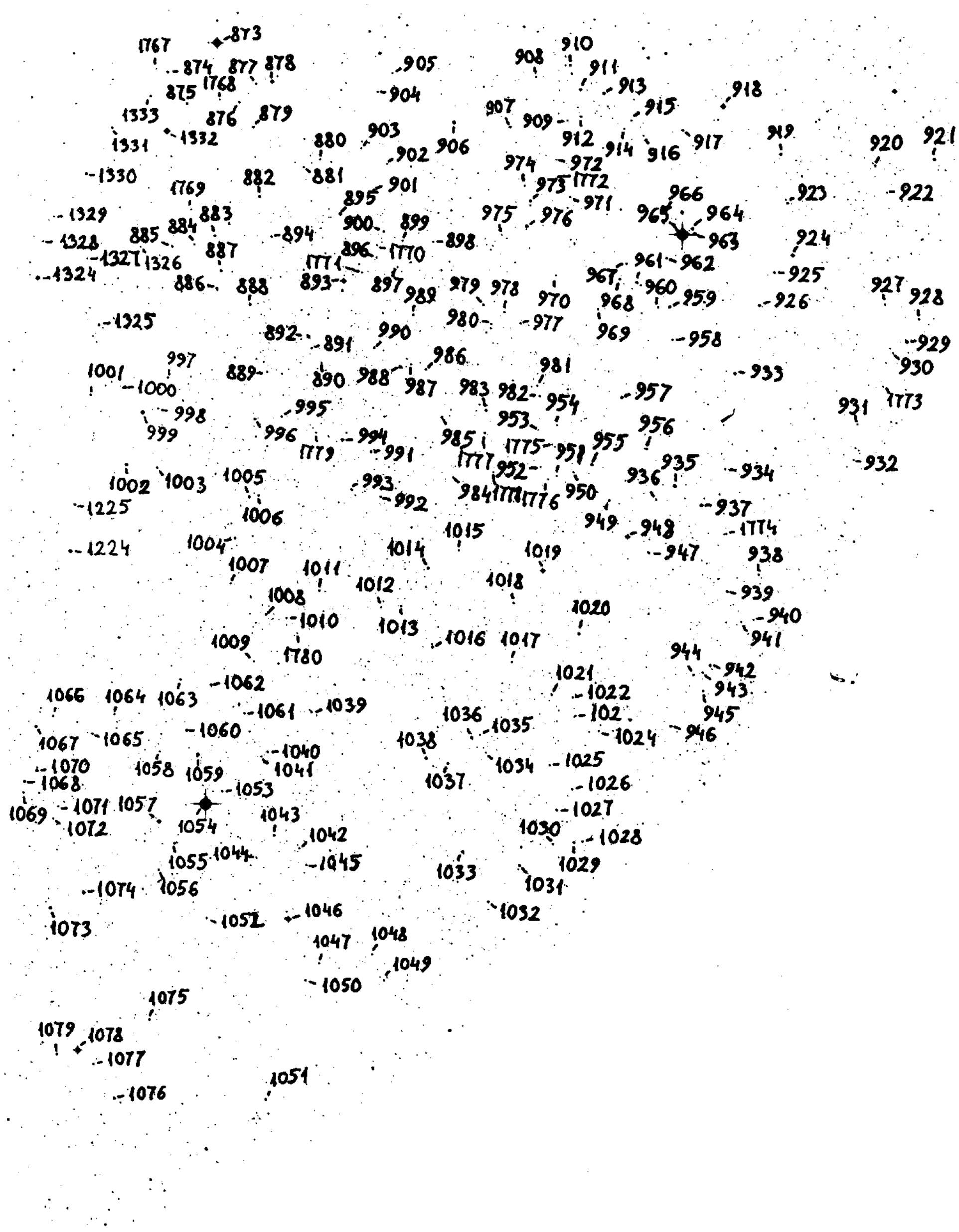
Finding chart of the survey stars I.
North-eastern part of the field



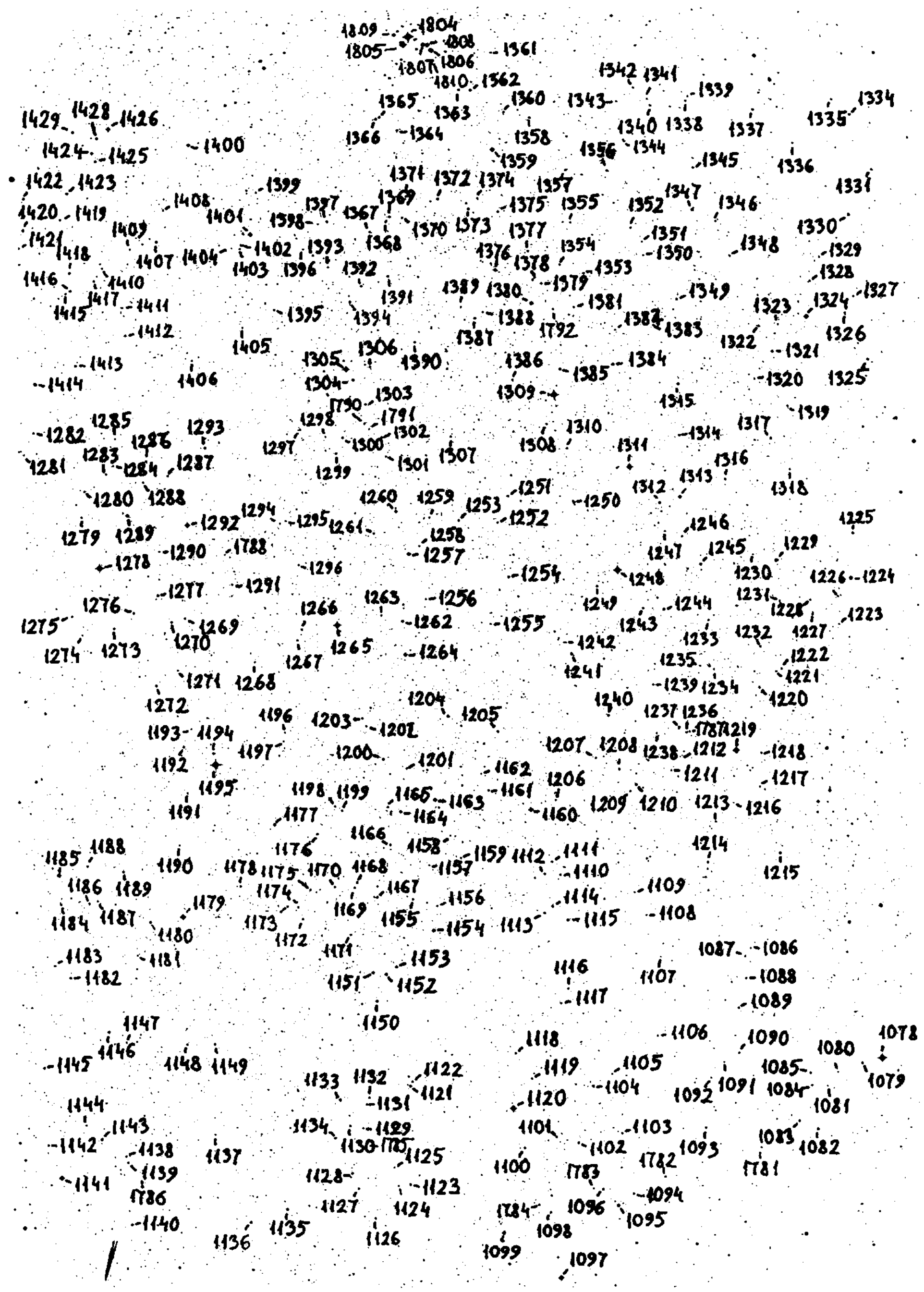
Finding chart of the survey stars II.
Northern part of the field



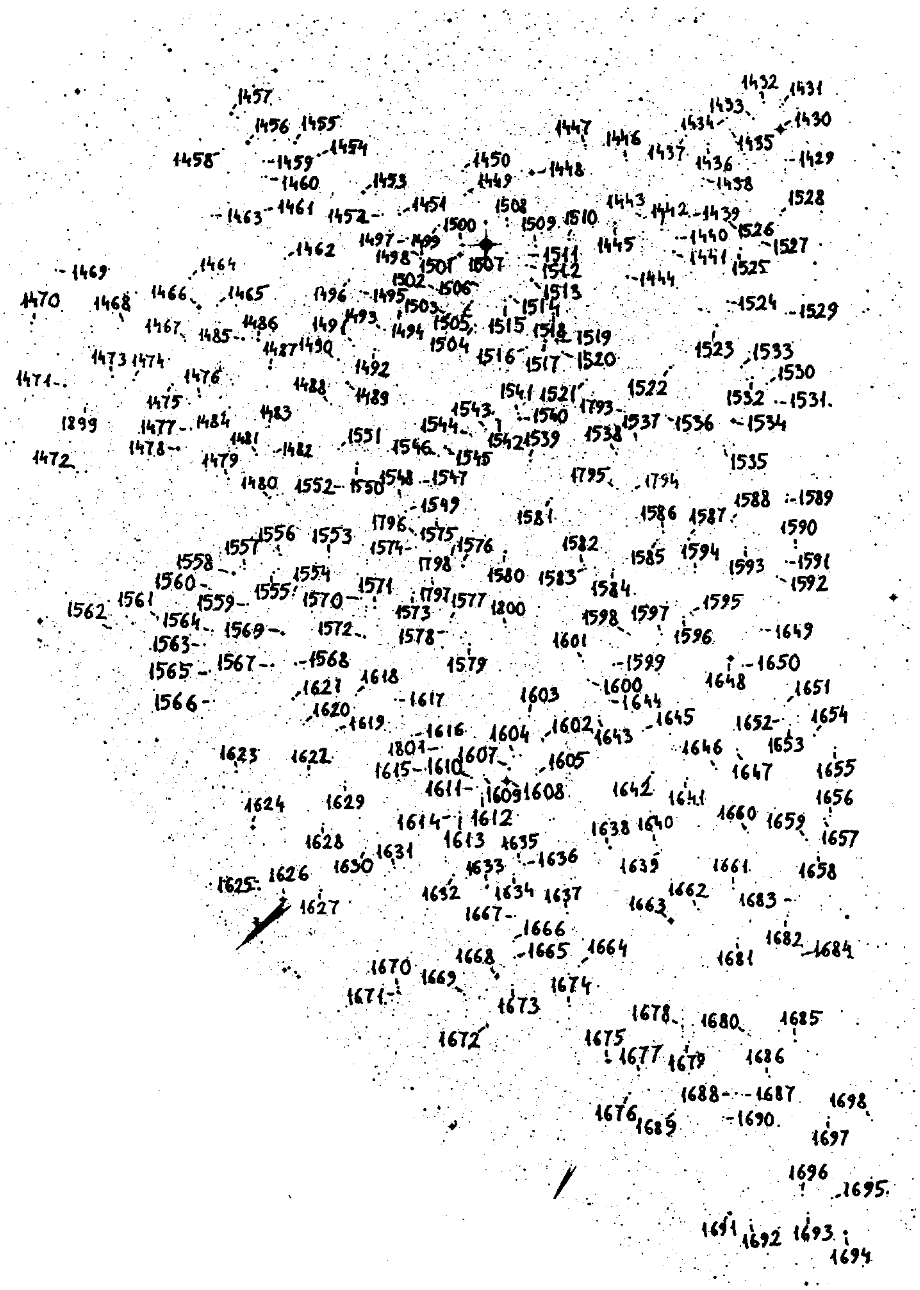
Finding chart of the survey stars III.
North-western part of the field



Finding chart of the survey stars IV.
South-western part of the field



Finding chart of the survey stars V.
Southern part of the field



Finding chart of the survey stars VI.
South-eastern part of the field

CATALOGUE

Spectra and UBV data of the survey stars

No.	Sp.	V	B-V	U-B	remarks
1	A0	8.59	0.13	-0.24	BD+61°2266
2	A0	8.46	0.07	-0.10	BD+61°2265
3	B7	10.65	0.10	-0.31	
4	gK	8.63	1.01	1.29	BD+61°2259
5	A2	11.44	0.14	0.28	
6	G0	9.26	0.50	0.19	BD+61°2256
7	A2	11.92	0.24	0.38	
8	gK	10.39	1.90	2.60	
9	A2	10.32	0.15	-0.04	
10	A0	12.37	0.54	0.48	
11	K0	12.67	1.06	0.69	
12	A0	11.22	0.14	0.11	
13	G8III	8.48	0.85	0.64	BD+61°2249
14	F8	11.67	0.47	0.03	
15	A0	12.08	0.33	0.15	
16	A2	11.60	0.18	0.27	
17	A2	13.02	0.44	0.31	
18	A0	12.60	0.30	0.17	
19	A2	11.80	0.59	0.18	
20	G0	10.24	0.49	0.07	BD+61°2238, blend
21	A0	12.08	0.38	0.27	
22	G5III	11.00	1.29	0.96	
23	B6	9.63	0.23	-0.06	BD+61°2237
24	A0	11.78	0.74	0.35	
25	K0III	10.71	0.97	0.94:	blend
26	A0	11.63	0.25	0.28	
27	A2	11.68	0.11	0.13	
28	B5	10.23	0.11	-0.51	
29	K0III	11.05	1.11	1.08	
30	A0	12.80	0.62	0.15	
31	A0	13.04	0.35	0.10	
32	A0	13.03	0.48	0.16	
33	A0	12.26	0.81	0.19	
34	F8	8.39	0.40	-0.13	BD+62°2016
35	K2III	10.72	1.29	1.22	
36	B6	9.68	0.08	-0.04	BD+62°2015
37	A5	11.56	0.22	0.26	
38	A0	11.68	0.67	0.04	
39	F5	11.17	0.71	0.22	
40	F5	10.55	0.40	-0.07	
41	G2	11.28	0.62	0.13	
42	A2	11.91	0.27	0.07	
43	G5	11.64	0.50	0.09	
44	A6	10.12	0.21	0.01	
45	G5IV	11.06	0.66	0.26	
46	A2	10.78	0.12	-0.11	
47	G8III	9.64	1.39	0.72	
48	F8	11.32	0.55	0.01	
49	A0	11.68	0.26	0.24	
50	F4	10.75	0.42	0.11	
51	G2	10.19	1.17	0.95	

CATALOGUE

/Continued/

Nó.	Sp.	V	B-V	U-B	remarks
52	AO	11.44	0.09	0.18	
53	K5	5.05	1.50	1.85	BD+62°2029
54	A2	10.95	0.97	0.58	
55	AO	12.52	0.30	-0.05	
56	F8	11.80	0.53	-0.03	
57	M2III	9.05	1.68	1.98	BD+62°2031
58	B6	10.85	0.14	-0.42	
59	B6	11.33	0.13	-0.29	
60	AO	12.43	0.18	0.16	
61	B8	11.42	0.09	0.05	
62	FO	11.68	0.39	0.12	
63	FO	11.98	0.34	0.28	
64	A2	9.88	0.16	0.11	BD+62°2035
65	F2	12.60	0.42	0.18	
66	F2	9.68	0.39	0.06	BD+62°2036
67	KOIII	10.03	1.08	1.21	
68	GO	11.36	0.57	0.26	
69	AO	12.38	0.21	0.08	
70	F8	11.71	0.42	-0.02	
71	G5	10.89	0.99	1.16	
72	A2	10.73	0.16	0.26	BD+62°2254
73	GO	11.81	0.39	0.12	
74	AO	7.91	0.03	0.07	BD+62°2039
75	B4	10.60	0.07	-0.49	
76	A5	11.59	0.37	0.16	
77	G8	10.20	1.03	1.08	
78	B5	9.90	0.04	-0.48	BD+61°2263
79	K5V	9.45	1.77	2.43	
80	F2	11.26	0.58	0.06	
81	F2	11.42	0.35	0.09	
82	KOII	10.26	1.42	1.65	
83	F8	11.24	0.55	0.07	
84	B2	9.28	0.45	-0.01	BD+62°2051
85	AO	10.70	0.34	-0.07	
86	F8	9.07	0.51	0.01	BD+62°2049
87	G8	9.87	0.68	0.12	
88	AO	10.50	0.31	0.16	
89	AO	11.44	0.40	0.21	
90	AO	10.94	0.36	0.29	
91	AO	11.09	0.18	0.13	
92	KOIII	9.25	1.34	1.43	BD+62°2041
93	FO	12.37	0.39	0.37	
94	F8	11.28	0.52	0.09	
95	A2	11.79	0.23	0.21	
96	KOIII	9.61	0.97	1.16	
97	A2	12.34	0.06	0.22	
98	A7	11.86	0.20	0.33	
99	KOIII	10.95	0.95	0.96	
100	F8	10.60	0.85	0.34	
101	A2	11.89	0.29	0.17	
102	G5IV	10.98	0.28	0.44	

CATALOGUE
/Continued/

No.	Sp.	V	B-V	U-B	remarks
103	GOV	11.66	0.52	0.17	
104	G2V	11.05	0.69	0.15	
105	A2	8.38	1.07	0.15	BD+62°2030
106	A4	11.74	0.18	0.19	
107	AO	10.75	0.11	-0.36	
108	GO	11.53	0.16	-0.09	
109	KOIII	10.91	0.62	0.48	
110	G8III	11.03	1.08	0.74	
111	dM	10.37	1.55	1.96	
112	B3	11.32	0.22	-0.39	
113	KO	5.10	1.55	1.79	BD+62°2028
114	AO	11.45	0.37	0.19	blend
115	AO	12.57	0.35	-0.14	
116	B1	9.61	-0.02	-0.63	BD+62°2020
117	G5	10.90	0.43	-0.03	
118	F6	11.40	0.59	0.14	
119	A2	11.58	0.61	0.24	
120	A2	12.02	0.30	0.16	
121	AO	11.55	0.15	0.07	
122	G5III	8.44	0.63	0.27	BD+62°2014
123	F8	11.81	0.77	0.09	
124	AO	12.02	0.32	0.09	
125	KOIII	11.18	1.56	1.19	
126	F2	11.53	0.43	0.14	
127	A2	11.64	0.16	-0.01	
128	AO	13.48	0.83	0.04	
129	AO	12.22	0.89	0.38	
130	AO	12.79	0.40	0.05	
131	F8	10.78	0.47	-0.03	
132	A7	9.72	0.36	0.27	BD+62°2024
133	KOV	10.50	0.96	0.61	BD+62°2026
134	G5V	9.79	0.90	0.69	BD+62°2028
135	F8	11.34	0.52	0.11	
136	AO	10.22	0.21	-0.03	
137	A2	12.01	0.38	0.19	
138	GO	11.88	0.45	0.18	
139	A2	10.72	0.30	0.21	
140	Me	12.13	1.41	1.19	
141	A4	12.05	0.49	0.32	
142	F8	10.51	0.53	-0.01	
143	AO	11.82	0.29	0.12	blend
144	F8	12.00	0.41	0.04	
145	A5	10.14	0.24	0.33	
146	GO	10.34	0.47	0.12	
147	A4	11.82	0.31	0.15	
148	AO	10.54	0.18	-0.04	blend
149	F2	12.59	0.52	0.24	
150	AO	11.27	0.14	0.32	
151	AO	12.00	0.07	0.06	
152	GO	11.18	0.43	0.15	
153	B7	10.50	0.11	-0.35	
154	FO	11.47	0.28	0.12	

CATALOGUE
/Continued/

No.	Sp.	V	B-V	U-B	remarks
155	B3e	10.64	0.28	-0.40	
156	G8III	9.30	1.30	0.89	BD+62°2050
157	M	5.57	1.67	1.99	BD+62°2048
158	FO	8.66	0.36	0.13	BD+62°2044
159	AO	10.83	0.40	0.31	
160	B2	7.37	0.06	-0.52	BD+62°2045
161	AO	10.55	0.25	0.20	
162	KOIII	7.59	0.97	1.01	BD+62°2047
163	A2	10.38	0.29	0.25	
164	B6	8.79	0.14	-0.48	BD+62°2042
165	B3	9.95	0.25	-0.41	BD+62°2043
166	Ap	10.88	0.34	0.15	
167	M	9.06	1.55	2.05	BD+63°1817
168	AO	11.53	0.46	0.09	
169	AO	11.59	0.03	0.19	
170	A5	11.07	0.59	0.35	
171	K2III	10.58	1.48	1.48	
172	B6	10.35	0.17	-0.33	
173	B7	9.93	0.18	-0.22	BD+62°2035
174	K2III	10.18	1.25	1.34	
175	FO	11.00	0.31	0.09	
176	A7	11.36	0.31	0.21	
177	A7	10.80	0.34	0.09	BD+62°2033
178	A4	10.08	0.26	-0.02	BD+62°2034
179	K2III	8.99	1.43	1.74	BD+62°2037
180	A2	10.58	0.54	0.09	
181	F2	12.86	0.76	0.02	
182	A5	11.96	0.36	0.21	
183	AO	11.17	0.19	0.01	
184	B1	7.99	0.29	-0.61	BD+63°1807
185	GOV	11.57	0.65	0.15	
186	AO	11.74	0.26	0.01	
187	F2	12.06	0.60	0.00	
188	dK	9.29	1.06	0.73	BD+63°1806, blend
189	K3V	9.93	1.83	1.93	
190	gG5	6.81	0.87	0.53	BD+62°2032
191	A4	10.92	0.29	0.09	
192	A2	11.47	0.22	0.08	
193	AO	11.33	0.20	-0.23	
194	B6	9.63	0.00	-0.55	BD+62°2025
195	B6	9.02	-0.05	-0.48	BD+62°2023
196	A7	9.45	0.21	-0.12	BD+62°2022
197	AO	9.23	0.03	.0.01	BD+62°2027
198	FO	10.63	0.33	0.09	
199	A2	11.49	0.22	0.27	
200	KOIII	9.06	1.07	0.81	BD+62°2019
201	A2	9.98	0.16	-0.14	
202	K5III	8.39	1.76	2.19	BD+62°2018
203	FO	9.79	0.24	0.06	BD+62°2017
204	FO	11.54	0.32	0.06	
205	AO	11.92	0.37	0.16	
206	A2	10.89	0.36	-0.01	

CATALOGUE
/Continued/

No.	Sp.	V	B-V	U-B	remarks
207	GOIII	10.72	0.60	0.06	
208	A7	11.73	0.34	0.07	
209	A2	12.04	0.48	0.02	
210	AO	12.36	0.00	0.08	
211	F2	9.49	0.31	-0.04	BD+63°1803
212	F4	10.32	0.45	-0.31	
213	GOIII	10.38	0.62	-0.18	BD+63°1805
214	B8	10.80	0.28	-0.01	
215	G8V	11.68	0.55	0.28	
216	BO	11.06	0.18	-0.86	
217	AO	11.41	0.26	0.11	
218	AO	11.45	0.17	-0.03	
219	AO	10.78	0.32	-0.34	
220	AO	11.58	0.12	-0.32	
221	A5	9.09	0.18	-0.14	BD+63°1809
222	A2	9.74	0.29	-0.10	BD+63°1810
223	A3	8.57	0.29	-0.64	BD+63°1814, blend
224	KOIII	8.13	1.03	0.88	BD+63°1812
225	F2	11.61	0.60	0.14	
226	G8III	10.79	0.66	0.03	BD+63°1804
227	A2	11.52	0.26	0.17	
228	G8	11.64	0.97	0.23	
229	G5	11.86	0.51	-0.12	
230	dG	11.73	0.59	0.16	
231	F2	12.04	0.92	0.34	blend
232	A4	10.21	0.33	0.09	BD+63°1801
233	AO	12.64	0.38	0.18	
234	FO	12.34	0.70	-0.02	
235	F5	10.10	0.40	-0.08	BD+63°1799
236	AO	9.46	0.13	0.01	BD+63°1797
237	F8	12.10	0.47	-0.21	
238	A2	12.25	0.47	0.17	
239	AO	12.85	0.45	-0.06	
240	GO	10.65	0.58	0.14	
241	F8	11.7	0.63	0.04	
242	FO	9.91	0.60	0.26	BD+63°1796
243	KOIII	10.18	1.24	0.85	
244	AO	12.17	0.52	0.08	
245	GO	11.51	1.14	0.08	
246	A5	12.40	0.69	0.-9	
247	AO	12.01	0.36	-0.17	
248	KOIII	8.11	0.95	0.75	BD+63°1800
249	FO	11.30	0.41	-0.13	
250	F5	11.20	0.55	-0.28	
251	A2	11.76	0.35	0.05	
252	KOIII	10.77	1.26	1.15	
253	AO	11.90	0.28	-0.10	
254	B6	10.11	0.34	-0.49	
255	FO	11.24	0.73	0.03	
256	AO	11.93	0.42	-0.07	
257	AO	12.84	0.53	0.09	
258	KOIII	10.12	0.98	0.52	

CATALOGUE
/Continued/

No.	Sp.	V	B-V	U-B	remarks
259	A7	11.14	0.56	0.11	
260	A5	12.10	0.52	-0.22	
261	K0V	11.63	1.13	0.62	
262	F8	11.94	0.56	0.13	
263	A0	11.81	0.17	0.23	
264	F5	11.25	0.56	-0.19	
265	G8III	10.06	1.12	0.68	
266	B8	11.03	0.11	-0.38	
267	G8III	10.92	0.99	0.66	
268	F5	11.68	0.44	0.01	
269	K0III	10.66	1.12	0.95	
270	B8	10.75	0.36	0.22	
271	B8	10.99	0.96	0.62	
272	B6	10.26	-0.02	-0.57	BD+63°1795
273	B5	8.49	0.19	-0.54	BD+63°1794
274	K0III	10.05	1.16	0.83	
275	B6	10.80	0.18	-0.7	
276	F8	10.53	0.49	-0.22	blend
277	B7	11.75	0.80	0.19	
278	A0	12.33	0.46	-0.07	
279	M	10.51	1.65	2.24	
280	B5	9.57	0.23	-0.57	
281	dG	11.77	0.78	0.17	
282	F8	11.46	0.64	-0.19	
283	A0	12.13	0.62	0.03	
284	F8	11.80	0.57	-0.16	
285	A2	11.98	0.52	-0.05	
286	K5I-II	11.48	1.15	0.99	
287	A0	12.30	0.31	-0.01	
288	B7	10.81	0.29	-0.43	
289	K2	10.96	1.44	0.98	
290	K0	9.00	1.55	1.41	BD+63°1789
291	A0	12.08	0.30	0.00	
292	A2	11.74	0.29	-0.34	
293	A0	11.02	0.38	-0.12	
294	A7	12.07	0.46	-0.03	
295	B8	11.70	0.25	-0.31	
296	F8	11.51	0.46	-0.02	
297	G0III	9.35	0.74	0.18	BD+63°1786
298	G0V	9.23	1.10	0.73	BD+63°1785
299	G8V	11.68	0.58	0.19	
300	K0III	10.77	1.20	0.76	
301	K0III-IV	9.50	1.50	1.63	BD+63°1787
302	A0	12.36	0.46	0.23	
303	F5	10.97	1.28	1.12	
304	G0	11.65	0.48	0.11	
305	A0	11.50	0.12	-0.25	
306	G2III	9.30	0.87	0.39	BD+63°1791
307	F8	11.06	0.57	-0.12	
308	K0III	8.63	0.58	-0.20	BD+63°1792
309	G0V	11.57	0.56	-0.08	
310	F8	11.97	0.48	-0.23	

CATALOGUE
/Continued/

No.	Sp.	V	B-V	U-B	remarks
311	AO	11.12	0.04	-0.11	
312	AO	12.19	0.34	-0.25	
313	AO	12.47	0.48	-0.08	
314	AO	12.77	0.43	0.03	
315	A2	9.54	0.08	-0.38	BD+63°1793
316	F8	12.34	0.38	-0.25	
317	A2	9.21	0.20	-0.14	BD+63°1610
318	G8V	10.75	0.90	0.39	
319	A6	12.34	0.62	0.14	
320	AO	12.36	0.36	0.02	
321	G3V	11.15	1.26	0.29	
322	F8	10.92	0.47	-0.15	
323	G5III	10.85	1.07	0.54	
324	F8	10.73	0.28	-0.05	
325	A7	10.30	0.03	-0.02	BD+63°1605
326	A2	11.62	0.21	-0.04	
327	KOIII	10.21	0.95	0.70	
328	AO	11.96	0.22	0.21	
329	AO	11.57	0.32	0.05	
330	A5	11.41	0.49	0.14	
331	AO	12.57	0.32	0.07	
332	AO	11.73	0.20	-0.26	
333	F6	11.88	0.51	-0.26	
334	F8	11.36	1.01	0.80	
335	G8III	7.57	0.82	0.60	BD+64°1599
336	KOIII	9.41	1.17	1.02	BD+63°1778
337	F8	11.05	0.32	-0.26	
338	AO	11.17	0.20	0.32	
339	KOIII	10.21	1.00	0.67	BD+63°1776
340	F8	11.57	0.46	-0.01	
341	F4	11.60	0.62	-0.08	
342	G5V	11.37	0.66	0.10	
343	F4	11.31	0.75	-0.17	
344	AO	12.14	0.51	-0.01	
345	A5	12.50	0.72	-0.16	
346	KOIII	9.79	1.13	0.85	
347	G2	10.02	0.41	-0.19	
348	AO	11.86	0.24	-0.03	
349	F8	11.70	0.63	-0.07	
350	KOIV	10.26	1.46	1.39	
351	B8	11.02	0.16	-0.20	
352	KOIII	10.98	1.07	0.57	
353	GO	10.34	0.55	-0.13	
354	F8	12.06	0.67	-0.19	
355	B8	11.03	0.25	-0.33	
356	KOIII	11.46	1.16	0.78	
357	AO	12.82	0.79	0.09	
358	A2	11.37	0.38	0.00	
359	K2III	8.35	1.62	1.67	BD+63°1780
360	F2	11.97	0.55	-0.26	
361	GO	11.93	0.58	-0.12	
362	G	10.55	0.77	0.06	blend

CATALOGUE
/Continued/

No.	Sp.	V	B-V	U-B	remarks
363	KOV	11.09	1.09	1.03	
364	FO	10.42	0.50	-0.02	BD+63°1781
365	AO	11.86	0.64	0.09	
366	B6	10.45	0.40	-0.13	
367	F8	10.86	0.55	-0.13	
368	F6	11.21	0.23	0.00	
369	A2	11.78	0.47	0.15	
370	F2	11.72	0.49	0.07	
371	F8	11.41	0.64	-0.01	
372	F2	11.41	0.47	-0.16	
373	A2	12.37	0.28	-0.01	
374	AO	11.98	0.24	0.09	
375	G8III	11.22	1.33	0.49	
376	AO	11.15	0.49	0.17	
377	KOIII	11.22	0.93	0.72	
378	KOII	10.00	1.24	1.15	
379	FO	10.38	0.43	-0.03	BD+63°1786
380	F4	10.50	0.59	-0.16	
381	B2	8.19	0.10	-0.66	BD+63°1779
382	F8	12.25	0.77	-0.25	
383	F8	11.78	0.88	0.08	blend
384	AO	11.73	0.73	0.25	
385	AO	11.61	0.39	0.11	
386	AO	10.47	0.52	0.09	
387	F5	12.55	0.46	-0.14	
388	AO	9.64	0.40	0.03	BD+63°1777
389	AO	11.95	0.27	0.14	
390	G2III	11.42	0.71	0.13	
391	K2III	10.53	1.25	1.12	
392	KOIII	9.44	1.43	1.34	BD+63°1775
393	AO	11.46	0.32	-0.01	
394	AO	12.21	0.59	0.10	
395	KOIII	10.02	1.03	0.76	BD+63°1774
396	AO	12.03	0.19	0.12	
397	G5V	11.72	0.59	-0.04	
398	AO	12.09	0.55	0.09	
399	F6	10.54	0.49	-0.17	
400	A5	11.18	0.30	0.06	
401	G8III	10.85	0.88	0.78	
402	F8	11.39	0.62	0.04	
403	F8	11.29	0.65	-0.05	
404	KOIII	10.40	1.39	1.30	
405	AO	12.45	0.22	0.25	
406	AO	11.56	0.43	-0.06	
407	A2	12.37	0.38	-0.10	
408	K2III	10.66	1.52	1.29	
409	AO	12.04	0.33	0.02	
410	AO	11.48	0.30	0.16	
411	F8	11.85	0.75	0.12	
412	A2	12.08	0.25	0.18	
413	A6	12.39	0.31	0.27	
414	AO	12.32	0.77	0.15	

CATALOGUE
/Continued/

No.	Sp.	V	B-V	U-B	remarks
415	G8V	11.36	0.70	0.18	
416	A4	11.18	0.49	0.02	
417	FO	12.31	0.50	0.03	
418	F6	11.23	0.46	-0.21	
419	F6	11.39	0.48	-0.13	
420	A2	11.49	0.37	-0.21	
421	G5III	10.44	1.44	1.25	
422	KOV	11.38	0.95	0.69	
424	AO	12.27	0.73	0.05	
425	F5	10.14	0.60	-0.25	BD+63^{O}1782
426	AO	12.11	0.53	0.12	
427	B7	7.73	-0.03	-0.31	BD+63^{O}1784
428	AO	12.39	0.38	0.07	
429	F5	11.25	0.44	-0.26	
430	AO	11.78	0.34	0.00	
431	A2	9.57	0.12	-0.20	
432	A4	10.62	0.41	0.04	
433	G8	10.06	1.16	0.77	
434	KOV	11.12	1.19	0.99	
435	B7	10.29	0.25	-0.30	BD+62^{O}2005
436	B7	9.80	0.23	-0.30	
437	G2	11.22	0.24	0.36	
438	AO	12.40	0.44	0.03	
439	A2	11.96	0.65	0.30	
440	AO	12.03	0.68	0.07	
441	A7	10.95	0.68	0.13	
442	AO	11.55	0.24	0.17	blend
443*	M2IB+B8Ve	4.78	1.96	0.30	BD+62^{O}2007
444	AO	9.10	0.11	-0.71	BD+63^{O}1788
445	KOIII	10.62	1.29	1.09	
446	KOIII	10.50	1.13	0.58	
447	F8	11.64	0.70	-0.07	
448	K5III	8.78	1.55	1.44	BD+63^{O}1790
449	KOIII	10.78	1.33	1.17	
450	A2	11.65	0.18	-0.23	
451	G8V	12.15	0.71	0.00	
452	G2III	9.93	0.75	0.27	
453	F8	10.23	0.50	-0.16	
454	AO	12.58	0.37	0.07	
455	AO	12.11	0.29	-0.27	
456	F2	12.75	0.50	0.21	
457	B6	10.22	0.15	-0.67	
458	AO	10.63	0.55	-0.21	
459	B8	11.34	0.21	-0.52	
460	AO	12.03	0.35	-0.10	
461	AO	12.23	0.41	0.11	
462	F8	10.52	0.46	-0.28	
463	G8V	11.85	0.83	0.39	
464	AO	11.66	0.34	0.12	
465	AO	11.12	0.03	-0.38	
466	K5III	10.71	1.44	1.68	
467	AO	12.29	0.31	0.13	

CATALOGUE
/Continued/

No.	Sp.	V	B-V	U-B	remarks
468	KOIII	10.53	1.21	0.85	
469	dM	10.01	1.85	2.21	
470	FO	10.45	0.33	-0.01	
471	AO	11.40	0.57	0.15	
472	F8	10.35	0.90	-0.07	
473	F5	10.49	0.40	-0.09	
474	A2	8.71	0.06	-0.20	BD+62°2012
475	AO	13.20	0.32	0.19	
476	F8	11.23	0.66	-0.09	
477	F8	11.77	0.48	-0.09	
478	AO	13.07	0.49	-0.03	
479	AO	13.06	0.63	0.12	
480	B7	9.21	0.11	-0.36	BD+62°2009, blend
481	F2	7.19	0.63	0.07	BD+62°2004
482	AO	13.07	0.52	0.18	
483	FO	11.77	0.45	0.00	
484	AO	12.94	0.29	0.05	
485	AO	12.23	0.38	0.01	
486	K2V	9.40	1.70	2.02	BD+62°2000
487	F6	11.34	0.43	-0.22	
488	F6	11.55	0.71	0.14	
489	A6	12.49	0.41	-0.12	
490	A4	12.60	0.34	0.06	
491	A2	10.99	0.35	0.09:	
492	B5	10.05	0.15	-0.90:	
493	AO	11.88	0.47	-0.28	
494	FO	11.90	0.58	-0.18	
495	KOI-II	9.21	1.47	1.22	
496	AO	12.69	0.58	0.22	
497	FO	11.47	0.57	-0.16	
498	AO	12.91	0.72	0.15	
499	AO	12.59	0.67	0.19	
500	G5IV	10.38	1.13	0.57	
501	F2	11.90	0.51	-0.26	
502	AO	11.83	0.12	-0.13	
503	AO	12.84	0.31	-0.15	
504	F5	12.21	0.73	0.28	
505	F2	10.68	0.61	-0.28	
506	KOIII	9.04	1.05	0.55	BD+62°1983
507	FO	12.85	0.44	0.13	
508	A2	11.81	0.43	0.15	
509	F2	10.92	0.40	-0.27:	BD+62°1984
510	G5III	10.06	1.64	1.69	BD+62°1987
511	AO	12.93	0.38	0.19:	
512	AO	12.31	0.56	0.02:	
513	A2	11.46	0.40	0.15:	
514	A2	10.54	0.76	0.17:	BD+62°1982
515	F8	10.84	0.36	-0.18:	
516	AO	11.60	0.45	0.29:	
517	A2	11.35	0.18:	-0.44:	
518	KOIII	10.15	1.36	0.71	BD+62°1980
519	AO	11.52	0.27	-0.17	

CATALOGUE
/Continued/

No.	Sp.	V	B-V	U-B	remarks
520	AO	11.64	0.13	-0.08	
521	F6	11.56	0.44	-0.19	
522	A6	11.09	0.27	0.13	
523	AO	11.89	0.28	0.03	
524	A2	11.73	0.38	0.14	
525	A4	12.09	0.69	0.08	
526	FO	11.90	0.52	0.02	
527	AO	11.06	0.42	0.07:	
528	AO	11.69	0.08	-0.15:	
529	AO	12.40	0.24	-0.03	
530	AO	12.40	0.59	0.20	
531	A7	11.98	0.58	0.20	blend
532	dK	10.88	1-71	2.10	
533	F8	9.58	0.61	-0.13	BD+62°1981
534	A2	12.07	0.26	0.00	
535	GO	10.17	0.07	-0.11:	
536	AO	12.64	0.19	-0.07	
537	AO	11.15	0.09	-0.22:	
538	FO	10.83	0.42	0.11	BD+62°1990
539	AO	11.82	0.21	0.11	
540	F8	11.08	0.61	0.11	BD+62°1991
541	FO	12.11	0.49	0.19:	
542	A2	11.56	0.09	0.11	
543	B3	7.42	0.09	-0.78	BD+62°1992
544	F8	10.26	0.45	-0.17	BD+62°1991
545	AO	11.25	0.38	0.05	
546	F5	10.61	0.40	-0.20	BD+62°1996
547	A2	11.68	0.23	0.06	
548	KOIII	9.55	1.09	0.76	BD+62°1997
549	KOIII	9.43	1.05	0.73	BD+62°1998
550	A7	10.34	0.30	-0.13	BD+62°2001
551	K2III	8.17	1.85	1.98	BD+62°1999
552	F8	12.43	0.74	0.32	
553	AO	11.81	0.67	0.27	
554	F8	11.23	0.56	0.01	
555	A5	12.22	0.22	0.09	
556	F8	11.39	0.55	-0.02	
557	FO	12.26	0.29	0.00	
558	AO	11.60	0.36	0.03	
559	KOIII	10.25	1.36	1.57	
560	F8	11.43	0.61	-0.19	
561	FO	10.37	0.26	0.17	BD+62°2003
562	A7	11.88	0.25	0.31	
563	GO	11.81	0.49	0.04	
564	AO	10.70	0.11	-0.28	
565	B7	10.75	0.12	0.06	
566	B3	9.85	0.03	-0.53	BD+62°2002
567	dM	10.88	1.79	1.77	
568	BO	7.77	-0.16	-0.73	BD+62°2006
569	F8	11.59	0.60	0.03	
570	FO	10.92	0.36	0.09	
571	A7	9.86	0.17	-0.02	

CATALOGUE
/Continued/

No.	Sp.	V	B-V	U-B	remarks
572	A2	11.50	0.37	0.17	
573	B8	12.09	0.75	-0.15:	edge of plates
574	FO	12.53	0.35	0.24	
575	F4	13.40	0.92	0.27	
576	A7	11.64	0.44	0.22	
577	AO	12.20	0.29	0.00	
578	AO	12.74	0.60	0.14	
579	G2III	9.69	1.29	1.34	BD+62°2011
580	F4	11.19	0.97	0.39	
581	AO	12.12	0.58	0.01	
582	G2V	11.63	1.34	1.16	
583	KOIII	9.08	0.81	1.06:	BD+62°2013
584	KOIII	9.99	1.11	0.85	
585	M	5.76	1.74	1.90	BD+62°2010
586	F8	11.40	0.57	-0.05	
587	FO	10.83	0.34	0.13	
588	AO	12.41	0.59	0.16	
589	F8	11.82	0.57	0.06	
590	AO	9.73	0.19	-0.03	BD+62°2008
591	F8	12.07	0.77	0.23	
592	AO	12.80	0.42	0.26	
593	B8	11.19	0.16	0.07	BD+61°2223
594	A2	11.34	0.35	0.34	
595	A4	11.88	0.42	0.29	
596	A2	10.17	0.29	0.49	
597	AO	9.76	0.17	-0.11	BD+61°2222
598	F8	11.01	0.75	0.22	
599	A4	11.38	0.55	0.28	
600	AO	12.36	0.63	0.30	
601	B7	11.44	0.19	0.00	
602	AO	12.57	0.61	0.28	
603	AO	12.65	0.41	0.40	
604•	AO	11.52	0.36	0.23	
605	KOIII	11.22	1.43	1.29	
606•	AO	12.14	0.34	0.42	
607•	AO	11.62	0.46	0.53	
608	AO	10.97	0.11	-0.18	
609•	AO	12.24	0.39	0.28	
610•	B7	12.07	0.34	0.28	
611	A2	13.02	0.41	0.31	
612	F2	11.39	0.54	0.06	
613•	AO	12.39	0.46	0.39	
614•	AO	12.53	0.46	0.38	
615•	B1	6.69	0.24	-0.57	BD+62°1994
616	F8	11.73	0.20	0.00	
617	G5III	10.85	1.04	0.99	
618	A7	10.50	0.26	0.28	
619	F8	12.03	0.63	0.36	
620	A2	11.49	0.48	0.36	
621	F5	9.53	0.32	-0.06	BD+62°1986
622	F8	9.51	0.50	0.17	BD+62°1985
623	KOIII	11.25	1.44	1.22	

CATALOGUE
/Continued/

No.	Sp.	V	B-V	U-B	remarks
624	AO	12.29	0.20	-0.09	
625	F6	10.91	0.40	-0.04	
626	AO	12.05	0.50	0.18	
627	AO	11.91	0.37	0.36	
628	F8	11.43	0.59	-0.04	
629	AO	11.32	0.39	0.09	
630	F8	9.10	0.41	-0.19	BD+61°2203
631	F2	12.21	0.75	-0.12	
632	B7	12.84	0.52	-0.23	
633	G8V	11.62	0.76	0.60	
634	M2III	10.33	1.76	2.41	
635	A7	11.96	0.42	0.25	
636	F5	11.93	0.68	0.26	blend
637	A5	10.52	0.19	0.00	
638	B8	10.40	1.14	1.21	
639	K2III	10.57	1.44	2.23	
640	A2	11.23	0.32	0.17	
641	F8	11.83	0.63	0.23	
642	F2	11.07	0.71	0.35:	blend
643	AO	12.53	0.43	0.24	
644	F8	10.86	0.57	-0.13:	blend
645	F5	10.68	0.32	-0.09	
646	M2V	11.32	1.43	1.22	
647	F2	10.82	0.55	0.29	
648	B7	10.59	0.28	-0.20	
649	AO	9.74	0.14	-0.05	BD+61°2201
650	FO	9.29	0.32	0.11	BD+61°2206, blend
651	A2	11.58	0.48	0.23	
652	FO	11.37	0.72	0.29	
653	dM	12.15	1.80	0.64	
654	A2	12.40	0.88	0.08	
655	B8	9.73	0.07	-0.03	BD+61°2197
656	F6	10.53	0.42	-0.07	
657	A4	11.89	0.78	0.34	
658	F8	11.76	0.76	0.07	
659	K2V	8.91	2.50	2.03	BD+62°1977
660	F8	12.15	0.38	0.45	
661	AO	12.60	0.36	0.18	
662	F8	12.13	0.56	0.12	
663	A2	12.18	0.28	0.15	
664	A2	12.06	0.26	0.24	
665	AO	12.64	0.40	0.00	
666	F2	9.27	0.26	-0.06	BD+62°1978
667	F2	11.07	0.54	0.14	
668	AO	12.16	0.30	-0.20	
669	F6	11.00	0.46	-0.02	
670	AO	12.01	0.18	0.06	
671	F8	11.72	0.75	0.07	
672	F6	12.15	0.68	0.00	
673	F5	11.54	0.39	-0.02	
674	F8	11.13	0.84	0.41	
675	G2V	10.81	1.06	0.37	

CATALOGUE
/Continued/

No.	Sp.	V	B-V	U-B	remarks
676	AO	12.49	0.50	-0.10	
677	AO	13.28	0.42	0.26	
678	AO	12.16	0.34	0.23	
679	A2	11.80	0.60	0.28	
680	AO	12.81	0.45	0.22	
681	B8	11.89	0.12	0.07	
682	A4	11.51	0.23	-0.29	
683	F8	11.78	0.75	0.24	
684	KOV	11.17	1.29	1.26	
685	dG	13.04	0.60	0.19	
686	F5	11.33	0.45	-0.10	
687	F8	12.08	0.44	-0.13	
688	F4	11.98	0.52	0.02	
689	F8	11.19	0.91	0.28	
690	dM	10.19	1.81	1.95	
691	FO	11.86	0.43	-0.01	
692	G8III	11.23	1.18	0.77	
693	KOV	10.44	1.14	1.21	
694	AO	12.32	0.26	0.07	
695	F2	11.38	0.65	0.20	
696	GO	11.03	0.34	0.03	
697	F8	9.82	0.34	-0.20	BD+63°1773
698	G8III	11.31	0.97	0.77	
699	F8	11.50	0.48	-0.07	
700	F8	10.66	0.38	-0.18	
701	A2	11.32	0.28	0.04	
702	F5	11.51	0.92	0.14	
703	AO	12.14	0.34	0.17	
704	A2	9.16	0.20	0.14	BD+63°1769
705	A4	12.04	0.32	0.01	
706	A2	9.77	0.10	-0.24	BD+63°1765
707	K2III	8.91	1.36	1.50	BD+63°1763
708	A7	10.33	0.31	0.17	BD+63°1762
709	FO	11.63	0.49	-0.13	
710	KOIII	8.54	1.50	1.44	BD+63°1761
711	A7	10.41	0.22	0.24	BD+63°1760, blend
712	AO	11.76	0.50	0.17	
713	F5	10.94	0.70	0.07	
714	KOIII	11.11	1.15	1.08	
715	F5	11.74	0.39	-0.06	
716	FO	12.31	0.49	-0.34	
717	F6	11.90	0.40	-0.13	
718	KOV	11.25	0.83	0.65	
719	F2	8.31	0.21	-0.11	BD+63°1768
720	K2III	9.85	1.08	1.01	BD+63°1767
721	FO	11.05	0.56	-0.07	
722	AO	11.37	0.05	-0.39	
723	K2III	9.97	1.36	1.24	
724	FO	11.37	0.50	-0.05	
725	AO	12.21	0.43	0.11	
726	AO	11.05	0.20	0.14	
727	F6	11.08	0.37	-0.01	

CATALOGUE
/Continued/

No.	Sp.	V	B-V	U-B	remarks
728	dK	11.89	1.39	0.92	
729	GO	11.91	0.68	0.08	
730	G2	10.18	0.58	0.07	
731	F8	11.41	0.56	0.09	
732	K2	10.31	1.43	1.92	
733	B5	10.61	0.16	0.04	
734	A4	9.19	0.13	0.04	BD+63°1755
735	KOIII	11.22	1.12	1.49	
736	A5	10.78	0.29	0.15	
737	AO	10.02	0.11	-0.61	BD+63°1757
738	B3	12.40	0.73	0.05	
739	F6	10.85	0.03	-0.47	
740	F6	11.77	0.46	-0.04	
741	G8V	11.77	0.61	-0.06	
742	F8	11.56	0.44	-0.13	
743	KOIII	10.81	1.46	1.22	
744	KOIII	11.10	1.03	0.80	
745	A2	11.51	0.41	0.35	
746	F5	6.95	0.45	-0.23	BD+63°1764
747	A2	12.12	0.52	0.00	
748	A2	11.87	0.30	0.19	
749	F5	8.16	0.30	-0.02	BD+62°1975
750	B8	11.55	0.23	-0.17	
751	G5	11.26	1.19	0.87	
752	A2	12.20	0.52	0.20	
753	F5	11.-3	0.61	0.25	
754	F8	11.47	0.54	0.07	
755	A5	12.65	0.68	0.25	
756	F5	11.46	0.61	0.29	
757	G5V	11.10	0.72	0.30	
758	AO	11.58	0.33	0.24	
759	F2	11.99	0.56	0.27	
760	GOV	11.15	0.76	0.02	
761	gK	11.11	1.34	1.43	
762	AO	12.83	0.71	0.31	
763	F8	11.68	0.56	0.00	
764	G2	10.56	0.72	0.42:	
765	K5III	10.23	1.76	1.93	
766	F8	10.46	0.60	0.04	
767	AO	11.43	0.24	0.18	
768	KOIII	9.94	1.18	1.09	BD+62°1960
769	B7	11.21	0.17	-0.03	
770	GO	10.76	0.82	0.24	
771	K2V	10.63	1.45	1.25	
772	AO	12.70	0.17	0.28	
773	B2	8.09	0.06	0.01	BD+63°1753
774	AO	12.02	0.68	0.29	
775	AO	12.75	0.56	0.43	
776	AO	13.23	0.49	0.32	
777	G8III	10.54	0.62	-0.08	
778	FO	12.12	0.77	0.38	
779	K2III	10.32	1.65	1.68	

CATALOGUE
/Continued/

No.	Sp.	V	B-V	U-B	remarks
780	A2	12.00	0.44	0.18	
781	F6	9.14	0.31	0.09	BD+62°1959
782	F5	11.07	0.60	-0.04	
783	F2	11.24	0.65	0.26	
784	A0	12.71	0.38	0.23	
785	dK	12.59	0.89	0.27	
786	K2III	8.57	1.82	2.49	
787	A0	11.96	0.44	-0.28	
788	G0	9.81	0.52	0.13	BD+62°1962
789	F8	10.78	0.60	0.22	
790	K2	8.95	0.95	0.79	BD+62°1963
791	A0	11.25	0.30	-0.17	
792	G0	10.33	0.68	0.10	
793	A2	11.03	0.43	0.20	
794	G0	11.29	0.65	-0.03	
795	G8	10.73	1.18	1.07	
796	G	12.31	0.63	0.10	
797	A4	9.91	0.14	-0.42	BD+62°1968
798	F6	8.96	0.34	-0.07	BD+62°1969
799	K5III	9.59	1.84	2.04	BD+62°1972
800	G8III	11.39	0.81	0.39	
801	K2III	10.63	1.37	1.18	
802	K0	9.46	0.90	0.93	BD+62°1971
803	A0	12.12	0.31	0.06	
804	F8	11.58	0.60	0.20	
805	F4	11.35	0.40	-0.13	
806	K2III	11.29	1.32	0.86	
807	A2	12.42	0.35	0.22	
808	B6	9.36	0.04	-0.20	BD+62°1967, blend
809	A2	9.62	0.36	0.21	BD+62°1964
810	A2	12.01	0.27	0.06	
811	A0	12.55	0.50	0.24	
812	F0	10.15	0.28	-0.09	BD+62°1966
813	F8	11.22	0.52	0.07	
814	F0	12.30	0.58	0.12	
815	A0	12.43	0.30	0.09	
816	A0	12.30	0.37	0.31	
817	A0	11.66	0.18	-0.31	
818	G0	11.77	0.70	0.23	
819	gK	10.20	1.82	2.15	
820	A0	10.82	0.21	-0.21	
821	F5	11.11	0.57	0.08	
822	F6	11.03	0.54	0.01	
823	A0	12.98	0.44	0.14	
824	A0	11.97	0.39	0.18	
825	F2	10.78	0.73	0.34	
826	A2	11.07	0.50	0.53	
827	A5	12.57	0.86	0.53	
828	F0	12.15	0.61	0.42	
829	A2	11.61	0.46	0.02	
830	F0	9.27	0.35	0.03:	BD+62°1957
831	A0	12.09	0.57	0.57	

CATALOGUE
/Continued/

No.	Sp.	V	B-V	U-B	remarks
832	AO	12.37	0.14	0.21	
833	G5V	11.13	0.62	0.35	
834	K2III	8.88	1.56	1.95	BD+61^{o}2157
835	AO	12.10	0.37	0.43	
836	AO	11.45	0.48	0.42	
837	B5	10.42	0.09	-0.46	BD+61^{o}2161
838	F5	9.86	0.51	0.07	BD+61^{o}2162
839	A2	12.45	0.42	0.42	
840	F8	13.43	0.86	0.31	
841	F6	10.65	0.51	0.04	
842	F6	12.00	0.55	-0.04	
843	B5	10.50	0.24	-0.46	BD+61^{o}2170
844	F8	10.64	0.37	0.12	BD+61^{o}2173
845	K2III	9.96	1.07	1.19	BD+61^{o}2174
846	AO	13.09	0.33	0.31	
847	AO	12.60	0.30	0.18	
848	A2	11.12	0.32	-0.15	
849	F8	11.83	0.78	0.12	
850	F4	11.17	0.43	-0.05	
851	F2	11.43	0.74	0.30	
852	dM	10.33	1.60	0.93	
853	B8	10.19	0.26	-0.25	
854	A2	11.48	0.51	0.26	
855	AO	12.55	0.85	0.15	
856	F6	11.46	0.60	0.09	
857	A2	11.62	0.28	0.13	
858	FO	10.48	0.38	0.04	
859	G8V	11.78	0.59	0.22	
860	K2III	10.97	1.31	1.28	
861	B5	10.97	0.48	-0.03	
862	A2	10.97	0.23	-0.12	
863	G2	11.62	0.66	0.04	
864	AO	12.24	0.46	-0.02	
865	B5	8.76	0.10	-0.70	BD+62^{o}1973
866	FO	8.41	0.14	-0.06	BD+62^{o}1976
867	GO	12.14	0.82	0.06	
868	A5	10.43	0.47	-0.04	
869	F5	8.32	0.34	-0.26	BD+61^{o}2188
870	B8	11.79	0.14	-0.02	
871	K2III	8.94	1.77	2.15	BD+61^{o}2120
872	A5	11.39	0.55	0.10	
873	B2	5.87	0.32	-0.60	BD+61^{o}2193, blend
874	gK	11.84	1.53	0.99	
875	F8	12.00	0.58	-0.12	
876	F5	11.11	0.75	0.51	
877	F4	11.86	0.73	0.18	
878	F6	9.20	0.45	0.00	
879	F6	10.86	0.49	-0.10	
880	AO	12.26	0.57	0.25	
881	F8	11.76	0.29	0.09	
882	KOIII-IV	9.89	1.00	0.60	BD+61^{o}2189
883	F2	11.03	0.43	0.02	

CATALOGUE
/Continued/

No.	Sp.	V	B-V	U-B	remarks
884	A2	12.03	0.55	0.08	
885	G8	10.58	1.19	0.95	
886	A2	11.27	0.14	0.09:	
887	A2	10.87	0.29	0.12	
888	K2III	9.84	1.21	1.21	BD+61°2191
889	AO	12.45	0.39	0.21	
890	FO	12.17	0.64	0.22	
891	A2	12.08	0.48	0.26	
892	F6	9.56	0.40	-0.02	BD+61°2187
893	A2	8.35	0.02	0.00	BD+61°2185
894	AO	11.79	0.39	0.00	
895	K2II-III	8.45	1.45	1.41:	BD+61°2186
896	A2	12.56	0.50	0.10	
897	AO	12.72	0.56	0.28	
898	AO	12.53	0.40	0.19	
899	A2	12.46	0.45	0.16	
900	AO	11.63	0.42	0.22	
901	AO	12.02	0.48	0.23	
902	gK	11.80	1.71	1.46	
903	AO	11.86	0.78	0.38	
904	AO	12.20	0.40	0.32	
905	AO	12.44	0.62	0.33	
906	AO	9.66	0.10	-0.05	BD+61°2182
907	KOV	11.72	0.65	0.45	
908	A2	12.42	0.38	0.16	
909	AO	12.25	0.50	0.23	
910	F5	10.76	0.67	0.19	
911	AO	10.60	0.20	-0.36	
912	AO	11.92	0.20	-0.04	
913	B5	10.59	0.18	-0.55	BD+61°2178
914	FO	12.94	0.42	0.17	
915	F8	12.30	0.67	0.23	
916	AO	12.47	0.62	0.51:	
917	F5	11.27	0.68	0.31	
918	G2III	7.11	0.91	0.71	BD+61°2166
919	AO	13.52	0.39	0.49	
920	dK	10.43	1.39	1.48	
921	A2	10.07	0.33	0.24	
922	AO	12.75	0.56	0.52	
923	AO	11.39	0.37	0.27	
924	A7	9.33	0.51	-0.36	BD+61°2163
925	G2	11.54	0.34	-0.04	
926	F8	10.53	0.46	0.08	BD+61°2164
927	AO	12.56	0.55	0.65	
928	AO	12.18	0.84	0.38	
929	F5	10.08	0.32	0.05	
930	AO	12.52	0.60	0.39	
931	AO	12.82	0.63	0.13	
932	AO	12.44	0.38	0.14	
933	FO	9.92	0.19	0.16	BD+61°2165
934	A2	12.20	0.10	0.08	
935	F5	8.98	0.30	0.03	BD+61°2274

CATALOGUE
/Continued/

No.	Sp.	V	B-V	U-B	remarks
936	F5	11.72	0.52	-0.16	
937	AO	9.87	0.12	0.00	BD+60°2273
938	G8III	11.32	0.92	0.57	
939	B7	11.38	0.27	0.10	
940	AO	12.43	0.87	0.06	
941	AO	12.49	0.52	0.02	
942	F8	10.64	0.48	-0.34	
943	AO	12.05	0.16	-0.21	
944	AO	11.81	0.36	0.16	
945	AO	11.33	0.44	-0.05	
946	FO	10.53	0.37	-0.30	
947	AO	11.45	0.53	-0.01	
948	A7	8.81	0.05	-0.57	BD+60°2276
949	F8	10.95	0.59	-0.34	
950	AO	12.40	0.45	-0.01	
951	AO	12.81	0.43	0.18	
952	gK	11.49	1.93	2.08	
953	AO	13.45	0.69	0.05:	
954	AO	12.60	0.73	0.48	
955	KOIII	9.25	1.15	0.94	BD+61°2177
956	F8	11.11	0.60	0.07	
957	K2II	8.83	1.28	1.56	BD+61°2175
958	A2	11.98	0.35	0.23	
959	B8	10.14	0.32	-0.16:	
960	F2	11.76	0.51	0.11	
961	F2	11.73	1.01	0.26:	blend
962	A4	11.50	0.41	0.25	
963	F6	9.84	0.41	0.06	BD+61°2167
964	B6	10.53	0.12	-0.45	BD+61°2168
965	O9II	5.96	0.31	-0.64	BD+61°2172
966	A7	11.11	0.37	0.31	
967	F2	11.52	0.56	0.13	
968	F8	11.31	0.46	0.05	
969	AO	12.35	0.62	0.43	
970	AO	12.34	0.61	0.42	
971	F2	11.68	0.49	0.00	
972	dK	11.29	2.26	2.19	
973	A2	10.69	0.20	0.10	BD+61°2179
974	G2V	11.51	1.02	0.69	
975	AO	13.10	0.48	0.26	
976	B5	9.79	0.25	-0.32	BD+61°2180
977	AO	12.24	0.44	0.44	
978	AO	12.26	0.62	0.23	
979	F8	10.92	0.72	0.21	
980	FO	11.73	0.75	0.18	
981	AO	12.36	0.35	0.17	
982	A2	11.91	0.26	0.02	
983	G8III	9.71	1.12	0.77	BD+61°2181
984	F8	11.59	0.60	0.28	
985	A5	11.26	0.52	0.40	
986	A7	11.32	0.70	0.42	
987	FO	12.05	0.73	0.45	

CATALOGUE
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No.	Sp.	V	B-V	U-B	remarks
988	GOV	10.84	0.42	0.48	
989	A2	10.29	0.07	0.19	BD+61°2183
990	F5	11.30	0.61	0.16	
991	KOIII	10.31	1.30	1.08	
992	F2	11.71	0.59	0.24	
993	G5V	11.86	0.87	0.16	
994	A2	10.07	0.16	0.14	BD+61°2184
995	G8III	10.96	1.01	0.61	
996	F8	11.43	0.45	-0.02	
997	AO	11.51	0.46	0.38	
998	F8	11.17	0.63	0.09	
999	GO	8.65	0.48	-0.07	BD+61°2195
1000	B8	9.17	0.73	0.29	BD+61°2198
1001	B8	11.33	0.29	-0.17	
1002	AO	10.07	0.21	-0.31:	BD+61°2196
1003	F5	11.48	0.50	-0.07	
1004	K3III	9.23	1.67	2.09	BD+60°2287
1005	A2	10.19	0.39	0.26	BD+60°2286
1006	A5	11.03	0.56	0.33	
1007	AO	12.50	0.58	0.17	
1008	A2	11.75	0.54	0.40	
1009	G5V	11.98	0.74	0.11	
1010	AO	12.03	0.56	0.29	
1011	A2	12.11	0.45	0.15	
1012	A7	12.53	0.39	0.50	
1013	FO	11.94	0.63	0.37	
1014	F2	10.33	0.67	0.43	blend
1015	FO	12.14	0.61	0.26	
1016	A2	10.83	0.40	0.13:	
1017	K2III	11.06	1.61	1.44	
1018	F8	11.77	0.58	0.25	
1019	A5	8.71	0.22	0.18	BD+60°2278
1020	A2	10.70	0.34	0.28	
1021	A2	11.49	0.49	0.25	
1022	A2	12.44	0.59	0.38	
1023	AO	12.60	0.56	0.25	
1024	AO	12.80	0.47	0.41	
1025	A5	11.92	0.75	0.63	
1026	A2	11.90	0.40	0.51	
1027	A2	10.97	0.52	0.21	
1028	AO	11.32	0.57	0.07	
1029	GO	11.12	0.59	0.29	
1030	AO	11.67	0.60	0.25	
1031	A2	10.48	0.49	-0.01	BD+60°2280
1032	GO	10.92	0.75	0.43	
1033	A7	10.36	0.45	0.08	BD+60°2282
1034	AO	12.77	0.70	0.59	
1035	AO	12.84	0.73	-0.05	
1036	GOV	10.22	0.69	-0.05	BD+60°2281
1037	A2	10.79	0.46	0.52	
1038	F8	10.17	0.47	0.13	BD+60°2284
1039	F8	11.15	0.75	0.27	

CATALOGUE
/Continued/

No.	Sp.	V	B-V	U-B	remarks
1040	F5	11.37	0.52	0.27	
1041	AO	12.13	0.62	0.43	
1042	A2	12.09	0.60	0.14	
1043	F5	10.84	0.54	0.30	
1044	A2	12.41	0.81	0.40	
1045	AO	12.20	0.49	0.29	
1046	GOIII	7.31	0.76	0.34	BD+60^{O}2285
1047	A7	11.56	0.76	0.69	
1048	KOV	11.92	0.82	0.27	
1049	F8	12.11	0.74	0.21	
1050	AO	11.44	0.64	0.32	
1051	A2	10.94	0.73	0.72	
1052	AO	11.92	0.49	0.12	
1053	AO	11.63	0.54	0.45	
1054•	A2Ia	4.29	0.52	0.14	BD+60^{O}2288
1055	AO	11.63	0.45	-0.01	
1056	AO	12.02	0.49	0.36	
1057	GO	8.59	0.41	0.14	BD+60^{O}2290
1058	AO	12.29	0.46	0.30	
1059	B7	9.57	0.53	-0.22	BD+60^{O}2289
1060	A7	10.29	0.32	0.18	
1061	F6	11.65	0.51	0.06	
1062	F5	11.12	0.40	-0.01:	
1063	F6	10.93	0.49	0.13:	
1064	AO	12.29	0.59	0.24	
1065	AO	11.97	0.25	0.20	
1066	F6	11.13	0.56	0.13	
1067	K2III	9.09	1.18	1.38	BD+60^{O}2296
1068	F8	10.14	0.63	0.15	
1069	A5	11.54	0.53	0.41	
1070	F4	9.31	1.00	0.85	BD+60^{O}2297
1071	BOn	11.90	0.37	-0.53	
1072	A5	11.75	0.41	0.37	
1073	KOIII	9.04	1.09	0.90	BD+60^{O}2295
1074	FO	9.03	0.33	0.11	BD+60^{O}2291
1075	A2	11.14	0.45	0.30	
1076	GO	10.17	0.69	0.30	
1077	F5	11.59	0.57	0.13	
1078	M	5.31	1.61	2.06	BD+60^{O}2294
1079	G8V	11.09	0.56	0.24	
1080	AO	12.90	0.68	0.39	
1081	AO	13.53	0.64	0.34	
1082	K5III	9.10	2.03	2.31	BD+60^{O}2302
1083	A2	11.20	0.58	0.62	
1084	K2III	10.37	1.79	1.36	
1085	AO	11.69	0.71	0.15	
1086	AO	12.47	0.65	0.38	
1087	AO	11.87	0.80	0.22	
1088	AO	11.94	0.62	0.55	
1089	A5	11.42	0.84	0.73	
1090	AO	11.90	0.52	0.35	
1091	AO	13.22	0.47	0.43	

CATALOGUE
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No.	Sp.	V	B-V	U-B	remarks
1092	AO	12.66	0.88	0.27	
1093	F8	11.18	0.63	0.32	
1094	KOII	10.24	1.46	1.60	
1095	KOIII	9.01	1.11	1.13	BD+59^{o}2425
1096	F8	11.59	0.77	0.69:	
1097	G5III	7.59	0.60	1.44	BD+59^{o}2428
1098	FO	12.01	0.62	0.47	
1099	A2	9.51	0.07	0.42:	BD+59^{o}2431, blend
1100	F6	10.90	0.92	0.26	
1101	KOV	10,90	0.93	0.97	
1102	A7	11.15	0.45	0.16	
1103	AO	12.36	0.31	0.49	
1104	G8III	9.77	1.35	1.78	BD+59^{o}2426
1105	AO	12.84	0.68	0.39	
1106	AO	12.18	0.62	0.41	
1107	AO	13.76	0.75	0.68	
1108	AO	12.66	0.73	0.40	
1109	A2	12.22	0.92	0.31	
1110	F8	11.66	0.55	0.06	
1111	AO	11.83	0.70	0.46	
1112	FO	11.06	0.95	0.67	
1113	G5III	10.67	0.88	0.93	
1114	GOIII	10.19	0.85	0.85	
1115	F8	10.42	0.63	0.21	BD+60^{o}2305
1116	GOV	11.56	0.61	0.29	
1117	KOIII	10.97	1.15	1.46	
1118	F8	11.64	0.49	0.13	
1119	F8	11.74	0.68	0.27	
1120	B1	8.07	0.36	-0.57	BD+59^{o}2430
1121	A5	10.76	0.26	0.33	
1122	AO	11.69	0.61	0.50	
1123	B7	11.02	0.34	-0.01	
1124	AO	12.47	0.68	0.54	
1125	AO	12.18	0.81	0.88	
1126	AO	11.83	0.29	0.34	
1127	FO	11.56	0.55	0.15	
1128	AO	11.57	0.45	0.02	
1129	AO	12.60	0.56	0.42	
1130	K2III	9.56	1.77	2.37	BD+59^{o}2433
1131	FO	12.08	1.05	0.39	
1132	AO	11.46	0.73	0.49	
1133	A7	10.18	0.52	0.39	
1134	AO	12.02	0.51	0.26	blend
1135	B6	10.73	0.33	-0.05	
1136	B8	10.80	0.33	0.23	
1137	A2	12.41	0.63	0.51	
1138	dK	10.97	1.27	1.30	
1139	F8	11.43	0.62	0.10	
1140	A7	10.65	0.54	0.95	
1141	A4	8.45	0.15	0.35	
1142	K2II-III	10.28	1.41	1.56	
1143	A2	10.20	0.32	-0.06	

CATALOGUE
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No.	Sp.	V	B-V	U-B	remarks
1144	A0	12.49	0.22	0.17	
1145	B5	11.23	0.33	-0.39	
1146	A0	10.24	0.27	-0.06	
1147	A0	12.66	0.34	0.05	
1148	F2	11.85	0.62	0.25	
1149	A2	11.57	0.46	0.36	
1150	G0	10.42	0.56	0.38	BD+60°2317
1151	F4	10.23	0.48	0.24	BD+60°2316
1152	F8	9.56	0.64	0.15	BD+60°2315
1153	A2	10.81	0.42	0.33	
1154	B5	9.99	0.38	-0.28	
1155	A4	11.89	0.38	0.29	
1156	F8	11.88	0.55	0.12	
1157	A0	13.04	0.47	0.57	
1158	A0	12.86	0.53	0.30	
1159	A0	12.68	0.37	0.36	
1160	A0	9.09	0.12	0.03	BD+60°2306
1161	A0	12.01	0.28	0.17	
1162	A0	13.05	0.39	0.32	
1163	F0	9.52	0.39	0.23	BD+60°2308
1164	K5III	8.78	1.75	2.35	BD+60°2313
1165	A2	11.62	0.35	0.32	
1166	A2	11.64	0.37	0.34	
1167	A0	11.60	0.25	0.36	
1168	K2III	9.81	1.54	1.80	
1169	A0	11.86	0.34	0.34	
1170	G5V	11.32	0.70	0.41	
1171	A0	12.13	0.19	0.18	
1172	F8	11.50	0.61	0.22	
1173	A5	11.79	0.53	0.41	
1174	K0III	10.95	1.26	1.26	
1175	A0	11.99	0.76	0.59	
1176	A0	11.82	0.23	0.07	
1177	F5	10.48	0.36	0.12:	BD+60°2319
1178	A0	11.58	0.36	0.00	
1179	F8	7.72	1.02	0.27:	BD+60°2321
1180	F6	11.01	0.67	0.19	
1181	A2	11.86	0.58	0.21	
1182	F8	10.83	0.50	-0.13	
1183	F8	11.48	0.72	0.17	
1184	G0III:	10.88	0.75	0.65	
1185	A0	8.97	0.17	0.28	BD+60°2324
1186	F8	11.68	0.67	0.16	
1187	G0V	11.94	0.67	-0.12	
1188	G8III	10.75	1.14	0.89	
1189	A0	11.75	0.52	-0.17	
1190	dK	10.67	1.89	2.53	
1191	A0	12.76	0.48	0.14	
1192	F2	11.12	0.45	-0.02	
1193	A0	12.89	0.38	0.19	
1194	A0	10.89	0.38	-0.05	
1195	A0	7.03	0.07	-0.31	BD+60°2320

CATALOGUE
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No.	Sp.	V	B-V	U-B	remarks
1196	AO	12.69	0.26	0.31	
1197	F8	12.62	0.37	0.22	
1198	G8V	11.40	0.78	0.50	
1199	GO	11.79	0.73	0.31	
1200	F8	10.56	0.57	0.09	
1201	A2	12.19	0.59	0.41	
1202	F8	12.00	0.66	-0.10	
1203	F2	11.82	0.67	0.33	
1204	GOIII	9.85	0.70	0.39	BD+60°2307
1205	K5III	9.77	1.69	1.99	
1206	AO	12.29	0.44	0.36	
1207	AO	12.22	0.82	0.45	
1208	A2	11.38	0.21	0.20	
1209	AO	10.17	2.03	2.45	
1210	F8	10.84	0.52	0.00	
1211	F8	12.21	0.59	0.40	
1212	AO	13.05	1.21	1.13	
1213	AO	12.17	0.54	0.59	
1214	A2	11.39	1.03	0.37	
1215	KOV	10.32	0.53	0.18	BD+60°2299
1216	A2	13.35	1.61	0.46	
1217	dG	12.35	0.75	0.22	
1218	AO	12.80	0.33	0.44	
1219	M	5.93	1.97	2.18	BD+60°2300
1220	F8	11.30	0.64	0.24	
1221	AO	12.52	0.72	0.45	
1222	AO	12.34	0.18	0.23	
1223	A2	12.65	0.46	-0.05	
1224	KOIII-IV	8.37	1.02	0.79:	BD+60°2293
1225	KOIV	9.10	1.56	1.46:	BD+60°2292
1226	F5	12.25	0.61	0.02:	
1227	AO	12.28	0.26	0.09:	blend
1228	AO	12.56	0.30	-0.06:	
1229	F5	9.03	1.03	0.46:	BD+60°2298, blend
1230	AO	12.94	0.51	0.12	
1231	A2	12.78	0.53	0.30	
1232	A2	12.10	0.38	0.17	
1233	G5V	11.42	0.88	0.17	
1234	F8	11.84	0.76	1.81	
1235	F8	11.74	0.94	0.41	
1236	AO	12.61	0.48	0.09:	
1237	A2	11.28	0.35	0.08:	
1238	AO	12.72	0.60	0.07:	
1239	AO	12.27	0.31	-0.17:	
1240	A2	11.11	0.46	0.17:	
1241	F5	10.60	0.56	-0.21:	BD+60°2304
1242	AO	12.40	0.39	0.02:	
1243	B6	11.38	0.28	-0.29:	
1244	B8	10.71	0.26	-0.07:	
1245	A2	10.67	0.33	0.04:	
1246	AO	12.24	0.31	-0.09:	
1247	AO	13.08	0.65	0.09:	

CATALOGUE
/Continued/

No.	Sp.	V	B-V	U-B	remarks
1248	B5	7.21	0.24	0.05:	BD+60°2303
1249	AO	11.80	0.29	0.01:	
1250	B6	11.06	0.25	-0.23:	
1251	AO	11.64	0.38	-0.15	
1252	F8	11.83	0.66	-0.08	
1253	F8	11.55	0.58	-0.12	
1254	A5	10.88	0.52	0.28:	
1255	KOIII	11.18	1.36	1.09	
1256	A2	12.70	0.31	0.07	
1257	B7	9.75	0.23	-0.44	BD+60°2310
1258	AO	12.89	0.71	-0.21:	
1259	AO	12.42	0.32	-0.17	
1260	A4	10.44	0.20	-0.40:	
1261	A2	12.19	0.38	-0.09	
1262	KOIII	9.74	1.22	1.02:	BD+60°2312
1263	AO	12.09	0.34	-0.22	
1264	KOIII	8.49	0.95	0.57:	BD+60°2311
1265·	G8Ib	6.13	1.60	1.60	BD+60°2318
1266	A7	11.27	0.58	0.25	
1267	AO	12.09	0.44	0.14	
1268	AO	12.57	0.44	-0.11	
1269	A2	11.46	0.42	0.23	
1270	A2	11.27	0.89	0.26	
1271	F2	12.00	0.59	0.10	
1272	A2	11.21	0.42	0.36	
1273	KOIV	9.90	1.43	1.59	
1274	KO	12.76	0.51	0.02	
1275	AO	11.82	0.48	0.03	
1276	F2	10.83	0.57	0.31	
1277	A4	10.42	0.30	-0.34	BD+60°2322
1278	A5	7.12	0.30	-0.20	BD+60°2323
1279	AO	11.79	0.60	0.15	
1280	AO	12.12	0.44	0.16	
1281	AO	12.43	0.42	0.05	
1282	A7	11.38	0.46	0.23	
1283	F5	12.02	0.91	-0.22	
1284	A4	12.23	0.53	0.11	
1285	A2	12.04	0.51	-0.17	
1286	A2	12.04	0.51	0.12	
1287	F5	11.56	0.67	-0.01	
1288	B7	11.74	0.34	-0.40	
1289	A2	9.68	0.34	-0.23	BD+61°2225
1290	A2	11.85	0.39	-0.05	
1291	dM	11.10	1.56	1.54:	
1292	F6	8.37	0.46	-0.26:	BD+61°2224
1293	F8	10.66	0.48	-0.22	
1294	AO	12.69	0.66	0.09	
1295	F2	12.08	0.78	0.03	
1296	AO	12.31	0.22	-0.12	
1297	KOIII	10.22	1.35	1.36	
1298	FO	12.65	0.51	0.13	
1299	A4	11.92	0.63	0.05	

CATALOGUE
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No.	Sp.	V	B-V	U-B	remarks
1300	B7	11.43	0.22	-0.55	
1301	AO	12.59	0.32	-0.01	
1302	B8	11.40	0.24	-0.20:	
1303	K2III	10.38	1.27	0.81	
1304	G8III-IV	9.69	0.95	0.28	BD+61°2221
1305	G8III	7.10	1.01	0.53:	
1306	AO	11.78	0.41	0.11	
1307	AO	11.97	0.50	0.22	
1308	F8	11.77	0.88	0.20	
1309˙	B3V	7.56	0.13	-0.52	BD+61°2209
1310	G8III	10.89	1.22	0.81	
1311˙	B2V	8.18	0.14	-0.57	BD+61°2208
1312	F2	10.66	0.40	-0.05:	
1313	K3II	8.16	1.49	1.65:	BD+61°2207
1314	K2III	9.80	1.73	1.90:	BD+61°2205
1315	G5III	9.96	0.79	0.30:	BD+61°2206
1316	F8	11.25	0.57	-0.18:	
1317	F5	10.78	0.51	0.02:	
1318	AO	12.13	0.65	0.00:	
1319	K3I-II	10.63	1.49	1.32	
1320	FO	12.20	0.49	0.21:	
1321	A7	10.74	0.58	0.34	
1322	G5III	10.76	1.34	0.74	
1323	AO	12.36	0.60	0.15	
1324	A3	8.36	0.30	0.14:	BD+61°2199
1325	F6	10.42	0.58	0.02	
1326	AO	13.54	0.49	0.09	
1327	F2	11.59	0.75	0.05	
1328	AO	12.26	0.58	0.24	
1329	AO	12.19	0.41	0.10	
1330	F5	10.15	1.00	0.21:	blend
1331	B6	11.08	0.31	-0.49	
1332	BO	7.53	0.31	-0.85	BD+61°2194
1333	FO	10.65	0.64	0.27	
1334	dK	11.77	1.56	0.90	
1335	A2	11.51	0.53	0.15	
1336	AO	12.58	0.40	0.07	
1337	FO	10.39	0.57	0.21	BD+61°2202
1338	A2	11.44	0.91	0.04	
1339	F8	12.48	0.38	0.04	
1340	FO	11.69	0.73	0.26:	blend
1341	AO	12.20	0.62	0.15	
1342	AO	12.09	0.50	-0.02	
1343	A6	11.69	0.63	0.11	
1344	F8	11.43	0.93	0.19	
1345	A2	11.45	0.61	-0.05	
1346	AO	12.18	0.62	0.74	
1347	K2IV	9.63	0.87	0.24	BD+61°2204
1348	gK	11.21	1.42	1.24	
1349	A2	10.93	0.41	0.01	
1350	AO	12.53	0.55	0.09	
1351	AO	12.67	0.74	0.04	

CATALOGUE
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No.	Sp.	V	B-V	U-B	remarks
1352	AO	12.03	0.30	0.12	
1353	AO	11.78	0.78	0.06	
1354	AO	12.79	0.38	0.03	
1355	AO	12.23	0.77	0.14	
1356	AO	11.46	0.46	0.17	
1357	AO	11.75	0.44	0.06	
1358	AO	11.60	0.22	0.14	
1359	B5	9.16	0.15	-0.41	BD+61°2211
1360	F8	11.59	0.59	0.09	
1361	gK	10.51	1.96	2.33	
1362˙	F4	10.50	0.44	0.02	
1363˙	AO	11.13	0.30	0.13	
1364	AO	11.92	0.45	0.06	
1365	AO	11.62	0.41	0.06	
1366	B7	10.88	0.42	-0.20	
1367	AO	12.95	0.47	0.21	
1368	AO	11.90	0.25	-0.02	
1369	AO	11.75	0.42	0.01	
1370	AO	11.93	0.51	0.12	
1371	AO	12.56	0.38	0.09	
1372	A4	10.87	0.43	0.18	
1373	B8	11.30	0.33	-0.30	
1374	F8	12.01	0.65	0.17	
1375	G8III	10.79	1.15	0.89	
1376	FO	10.23	0.43	-0.17	BD+61°2212
1377	G8II	10.79	1.25	1.01	
1378	AO	11.21	0.29	-0.09	
1379	AO	11.35	0.46	0.01	
1380	F8	8.92	0.51	-0.13	BD+61°2210, blend
1381	F2	12.06	0.85	-0.05	
1382	AO	12.80	0.49	0.10	
1383	F2	12.09	1.33	1.27	
1384	F8	10.36	0.38	-0.11:	
1385	F8	10.87	0.51	-0.29:	
1386	AO	12.49	0.23	-0.05	
1387	F8	11.35	0.58	-0.12	
1388	AO	12.54	0.45	0.38	
1389	FO	12.29	0.55	0.14	
1390	F8	11.29	0.45	0.06	
1391	KOIII	10.03	1.59	1.66	
1392	KOIII	10.52	1.15	1.25	BD+61°2219
1393	F8	11.79	0.75	-0.01	
1394	B8	11.28	0.26	-0.21	
1395	F2	11.97	0.38	0.25	
1396	AO	12.82	0.56	0.20	
1397	KOV	10.66	0.88	0.44	
1398	AO	13.04	0.38	0.30	
1399	AO	12.54	0.23	0.43	
1400	B6	10.15	0.22	-0.31	
1401	F8	8.89	0.47	-0.01:	BD+61°2223
1402	KOIII	10.50	1.06	1.18:	
1403	AO	12.35	0.42	0.23:	

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No.	Sp.	V	B-V	U-B	remarks
1404	A7	13.32	0.86	0.48:	
1405	K2III	11.15	1.48	1.49:	
1406	AO	12.36	0.59	0.14	
1407	A2	11.02	0.31	-0.21:	
1408	F6	12.62	0.63	0.24	
1409	AO	12.64	0.25	0.40	
1410	F8	12.17	0.49	0.31	
1411	gK	11.33	1.36	1.37	
1412	B8	11.54	0.28	0.12:	
1413	A2	11.18	0.29	-0.19	
1414	F8	10.15	0.20	0.28	BD+61°2228, blend
1415	AO	12.07	0.40	0.36	
1416	F8	11.16	0.53	0.09	
1417	G5	11.57	0.92	0.51:	
1418	F8	10.10	0.86	0.75	
1419	FO	11.65	0.55	0.14	
1420	A4	10.54	0.40	0.32	BD+61°2230
1421	A2	9.91	0.10	0.08	BD+61°2231
1422	KOIII	9.64	1.28	1.20	BD+61°2229
1423	F5	10.55	0.68	0.05	
1424	KOIII	9.55	0.97	0.92	
1425	FO	10.74	0.34	-0.04	
1426	F5	8.79	0.43	-0.05	BD+61°2226
1427	F5	10.44	0.39	-0.10	
1428	KOV	10.01	1.00	0.77	BD+61°2227
1429	F8	10.95	0.78	0.45	
1430	B1	6.68	0.09	-0.76	BD+61°2233
1431	K2III	11.64	0.58	0.04	
1432	A2	11.37	0.27	-0.29	
1433	FO	11.08	0.51	-0.03	
1434	GO	11.90	0.65	-0.16	
1435	G	12.41	0.93	0.12	
1436	KO	9.94	1.58	1.09	BD+61°2239
1437	F2	11.31	0.77	0.06	
1438	AO	12.82	0.53	0.30	
1439	AO	12.39	0.29	0.07	
1440	A2	10.90	0.17	-0.04	
1441	AO	10.52	0.29	-0.01	
1442	AO	11.89	0.64	0.28	
1443	G5	12.68	0.90	0.26	
1444	gK	9.58	1.64	1.38:	
1445	B6	10.65	0.21	-0.51	
1446	FO	11.44	0.49	0.20	
1447	KOIII	9.83	1.23	0.93	
1448	AO	8.42	0.14	-0.03	BD+61°2243
1449	B7	11.05	0.10	-0.27	
1450	A3	10.87	1.14	0.74	BD+61°2248
1451	A2	10.86	0.08	-0.15	
1452	AO	12.49	0.42	0.37	
1453	GO	8.92	0.50	0.11	BD+61°2250
1454	FO	10.06	0.40	0.29	BD+61°2252
1455	G5IV	9.35	0.85	0.51	BD+61°2253

CATALOGUE
/Continued/

No.	Sp.	V	B-V	U-B	remarks
1456	F8	8.63	0.36	0.05	BD+61°2258
1457	K2III	8.61	1.03	1.27	BD+61°2259
1458	AO	12.08	0.57	-0.01	
1459	AO	11.79	0.42	0.14	
1460	F8	11.66	0.51	0.05	
1461	A2	11.82	0.13	0.10	
1462	K2II-III	10.51	1.36	1.55	
1463	FO	11.07	0.52	0.13	
1464	K2I-II	9.96	1.37	1.51	
1465	F2	11.48	0.73	0.23	
1466	AO	8.73	0.04	0.01	BD+61°2260
1467	AO	12.19	0.43	0.19	
1468	AO	11.79	0.56	0.13	
1469	F6	11.26	0.70	-0.13	
1470	F2	10.34	0.72	0.08	
1471	KOIII	9.26	1.14	0.80	BD+61°2264
1472	A2	11.26	0.37	0.13	
1473	KOIII	9.49	1.58	1.75	BD+61°2265
1474	A2	11.55	0.48	0.36	
1475	F8	11.01	0.56	-0.14	
1476	F8	10.90	0.56	0.07	
1477	GO	11.21	0.59	0.23	
1478	AO	9.02	0.01	0.05	
1479	AO	11.96	0.21	-0.14	
1480	A2	11.23	0.50	0.38	
1481	KOIII	9.44	1.49	1.46	
1482	F8	11.83	0.68	0.09	
1483	AO	11.76	0.39	-0.03	
1484	G5	11.78	0.51	0.01	
1485	K3II	8.77	1.05	1.11	BD+61°2257
1486	F6	9.82	0.41	-0.18	
1487	K3II	8.82	1.02	0.93	BD+61°2255
1488	F2	12.00	0.54	0.20	
1489	K2II	8.51	1.07	1.02	BD+61°2251
1490	KOIII	9.82	1.07	0.89	
1491	F6	10.95	0.74	0.08	
1492	A2	11.07	0.32	-0.10	
1493	AO	11.67	0.30	-0.09	
1494	AO	11.67	0.31	-0.03	
1495	K3III	11.05	1.08	0.99	
1496	A2	11.45	0.47	0.08	
1497	AO	11.84	0.51	0.09	
1498	AO	12.10	0.34	-0.24	
1499	K2III	11.19	1.35	0.85	
1500	B7	10.31	0.10	-0.40	BD+61°2247
1501	O5e	8.86	-0.03	-0.73	BD+61°2248
1502	AO	12.33	0.65	0.06:	
1503	A2	10.58	0.25	0.48	
1504	AO	11.91	0.55	0.18	
1505	A2	10.68	0.44	0.07	
1506	A2	11.41	0.42	0.18	
1507*	O9.5Ib	5.10	0.09	-0.84	BD+61°2246

CATALOGUE
/Continued/

No.	Sp.	V	B-V	U-B	remarks
1508	AO	10.95	0.28	0.15	
1509	B7	10.71	0.33	-0.31	
1510	AO	11.39	0.39	0.16	
1511	FO	11.24	0.64	0.28	
1512	AO	11.67	0.35	-0.09	
1513	AO	9.91	0.19	-0.38	BD+61^{O}2242
1514	B3e	10.92	0.19	-0.43	
1515	AO	11.45	0.49	0.03	
1516	KOV	10.07	1.07	0.56	BD+61^{O}2244
1517	AO	9.95	0.35	-0.26	BD+61^{O}2241
1518	AO	11.52	0.41	0.05	
1519	A5	9.39	0.28	0.13	BD+61^{O}2240
1520	AO	11.59	0.44	0.15	
1521	F5	11.26	0.57	0.03	
1522	G5III	9.31	1.04	0.61	
1523	KOIII	8.90	1.22	1.21	BD+61^{O}2336
1524	M	8.98	1.85	2.26	BD+61^{O}2227
1525	AO	10.78	0.62	0.30	
1526	F6	11.37	0.67	0.04	
1527	F6	12.66	0.35	0.22	blend
1528	F6	11.16	0.72	0.11	
1529	A7	11.61	0.58	0.34	
1530	F5	11.65	0.65	-0.02	
1531	KO	9.34	1.54	1.57	
1532	A3	10.51	0.36	0.22	
1533	A2	10.59	0.24	0.13	
1534	KOIII	6.95	1.17	1.18	BD+61^{O}2334
1535	FO	11.76	0.98	0.04	
1536	AO	12.95	0.56	0.21	
1537	AO	12.13	0.84	0.24	
1538	K2	11.34	1.15	0.-5	blend
1539	F8	10.86	0.79	0.22	
1540	AO	9.18	0.21	-0.04	BD+61^{O}2245
1541	AO	11.82	0.50	0.16	
1542	KOV	10.60	0.98	0.55	
1543	A2	11.70	0.53	-0.04	
1544	AO	11.96	0.43	0.19	
1545	A4	10.94	0.59	-0.46	
1546	G8	12.01	0.72	0.29	
1547	F8	12.00	0.69	0.15	
1548	B8	12.83	0.86	0.43	
1549	AO	11.45	0.28	-0.01	
1550	A2	11.00	0.26	-0.04	
1551	KOIII	11.13	1.60	1.09	
1552	KOV	11.76	1.02	0.62:	
1553	F8	11.76	0.49	0.15	
1554	A2	12.00	0.37	0.30	
1555	K2II-III	9.69	1.30	1.61	
1556	F8	11.39	0.47	0.23	
1557	G2	11.29	0.65	0.09	
1558	B6	9.27	0.14	-0.30	BD+60^{O}2359
1559	B8	11.58	0.12	-0.07	

CATALOGUE
/Continued/

No.	Sp.	V	B-V	U-B	remarks
1560	A2	11.76	0.41	0.31	
1561	AO	11.14	0.32	0.18	
1562	GO	10.79	0.59	0.46	
1563	AO	11.40	0.25	-0.18	
1564	F8	11.55	0.95	0.38	
1565	AO	11.62	0.21	0.25	
1566	AO	12.35	0.33	0.18	
1567	B2III	10.19	0.06	-0.25	BD+60°2355
1568	F8	10.18	0.47	0.06	
1569	KOIII	8.18	0.99	0.94	BD+60°2353
1570	A4	12.00	0.34	0.28	
1571	B7	11.12	0.15	-0.16	
1572	B8	10.86	0.19	0.16	
1573	AO	12.27	0.57	0.29	
1574	AO	12.33	0.37	0.04	
1575	AO	12.70	0.35	-0.47	
1576	A2	10.04	0.29	0.23	
1577	F4	11.81	0.62	-0.04	
1578	AO	12.91	0.39	0.11	
1579	F2	10.71	0.52	0.13	
1580	A2	10.00	0.18	-0.20	
1581	A2	11.48	0.57	0.16	
1582	AO	12.46	0.32	0.08	
1583	A4	11.93	0.37	0.18	
1584	F8	11.94	0.70	0.19	
1585	GO	10.50	1.16	0.69	
1586	F6	11.24	0.75	0.05	
1587	B8	10.56	0.29	-0.09	
1588	AO	11.92	0.38	-0.35	
1589	B5	10.80	0.31	-0.01	BD+61°2232
1590	A5	10.79	0.53	0.13	
1591	F8	10.76	0.68	-0.07	
1592	A2	11.35	0.31	0.02	
1593	AO	11.51	0.33	0.19	
1594	B6	11.47	0.38	-0.37	
1595	AO	11.54	0.21	0.17	
1596	F8	11.63	0.48	-0.11	
1597	AO	12.50	0.19	0.15	
1598	A2	11.93	0.51	0.19	
1599	A5	10.90	0.22	-0.02	
1600	A7	11.17	0.61	0.24	
1601	KOIII	11.12	1.28	0.91	
1602	A2	10.74	0.42	0.02	
1603	F8	12.04	0.62	0.05	
1604	G5III	10.87	1.29	0.97	
1605	GO	11.99	0.68	0.17	
1607	KOIII	8.36	1.74	2.30	BD+60°2333
1608	A2	7.29	0.08	0.06:	BD+60°2334
1609	AO	11.60	1.35	1.30	
1610	AO	11.35	0.26	-0.11	
1611	AO	12.90	0.36	0.19	
1612	AO	12.87	0.69	0.28	

CATALOGUE
/Continued/

No.	Sp.	V	B-V	U-B	remarks
1613	AO	11.71	0.44	0.14	
1614	AO	12.77	0.38	0.03	
1615	KOV	11.76	0.67	0.11	
1616	AO	12.50	0.46	0.22	
1617	A2	11.52	0.35	0.19	
1618	F8	11.52	0.48	0.05	
1619	A2	11.77	0.33	0.21	
1620	AO	12.03	0.32	0.12	
1621	FO	9.96	0.42	0.27	
1622	AO	12.32	0.04	0.22	
1623	G	10.46	0.57	0.47	
1624	K	7.68	0.93	1.28	BD+60^{o}2357
1625	AO	10.21	0.11	-0.42	BD+60^{o}2356
1626	B2	8.15	0.03	-0.65	BD+60^{o}2352
1627	AO	10.81	0.18	-0.19	
1628	AO	11.81	0.14	0.08	
1629	AO	11.76	0.39	0.11	
1630	AO	13.06	0.36	0.25	
1631	AO	11.68	0.67	0.27	
1632	AO	11.25	0.36	0.13	
1633	A7	10.27	0.32	-0.04	BD+60^{o}2336
1634	AO	12.54	0.72	0.27	
1635	dG	12.18	0.69	0.24	
1636	GO	11.40	0.59	0.12	
1637	F8	11.43	0.50	-0.02	
1638	A2	9.10	0.61	0.58	BD+60^{o}2332
1639	AO	12.34	0.58	0.30	
1640	K	11.79	1.47	1.08	
1641	F8	11.04	0.91	0.24	
1642	B8	10.30	0.43	-0.02	
1643	F5	11.61	0.61	0.19	
1644	AO	12.72	0.54	0.06	
1645	F8	12.04	0.67	0.14	
1646	A2	11.75	0.45	0.28	
1647	GO	11.23	0.70	0.33	
1648	B2	7.88	0.18	-0.70	BD+60^{o}2329
1649	K2III	9.67	1.79	1.93	
1650	B6	11.94	0.36	-0.18	
1651	AO	12.85	0.48	0.46:	
1652	AO	11.73	0.53	0.45	
1653	gK	11.08	1.51	1.41	
1654	G2	10.56	0.60	0.00	
1655	A2	11.13	0.33	-0.05	
1656	F8	11.51	0.88	0.42	
1657	K2III	8.99	2.04	2.48	BD+60^{o}2325
1658	gK	11.52	1.27	1.04	
1659	F8	10.62	0.55	0.06	
1660	AO	12.44	0.53	0.30	
1661	F8	11.50	0.61	0.02	
1662	F5	11.56	0.55	0.11	
1663	AO	7.97	0.01	-0.12	BD+60^{o}2330

CATALOGUE
/Continued/

No.	Sp.	V	B-V	U-B	remarks
1664	AO	11.88	0.32	0.05	
1665	AO	11.92	0.33	0.19	
1666	AO	12.35	0.81	0.72	
1667	AO	12.43	0.41	0.39	
1668	F6	8.15	0.66	0.43	BD+60°2335
1669	B6	11.11	0.29	0.13	
1670	F8	11.27	0.29	0.24	
1671	A4	10.00	0.49	0.57	BD+60°2339
1672	B6	10.96	0.35	-0.07	
1673	AO	11.57	1.10	0.86	
1674	F8	11.00	0.63	0.26	
1675	KO	7.30	1.60	0.77:	BD+60°2331
1676	A2	11.09	0.26	-0.08	
1677	A2	12.61	0.34	0.27	
1678	K	10.28	1.42	1.14	
1679	A5	11.10	1.24	0.77	
1680	AO	12.47	0.36	0.36	
1681	F8	12.28	0.23	0.14	
1682	AO	12.26	0.24	0.43	
1683	AO	12.45	0.85	0.35	
1684	K3III	9.13	1.67	2.21	BD+60°2326
1685	F8	10.17	0.64	-0.03	
1686	A2	10.83	0.85	0.64	
1687	F6	11.43	0.78	0.13	
1688	B6	11.46	0.33	-0.28	
1689	AO	12.80	0.26	0.15	
1690	AO	12.58	0.37	0.03	
1691	AO	10.05	0.67	0.26	
1692	F8	11.70	0.82	0.33	
1693	F5	11.10	0.57	0.15	
1694	A5	8.39	0.27	0.35	
1695	AO	10.29	1.46	1.53	
1696	K2III	9.53	1.42	1.44	
1697	B5	11.20	0.28	-0.27	
1698	B5	11.31	0.27	-0.36	
1699	F5	11.46	0.71	0.12	
1700	KOIII	10.75	1.21	0.89	
1701	AO	11.96	0.31	0.19	
1702	AO	12.72	0.58	0.08	
1703	B6	11.90	0.18	-0.19	
1704	AO	12.66	0.49	0.39	
1705	AO	14.08	0.75	0.65	
1706	B8	12.68	0.46	0.02	
1707	AO	13.00	0.67	0.47	
1708	AO	12.74	0.48	0.20	
1709	AO	11.88	0.54	0.08	
1710	AO	12.18	0.87	0.36	
1711	AO	13.24	0.20	0.80	
1712	AO	12.57	0.18	0.18	
1713	AO	13.15	0.50	0.20	
1714	AO	12.46	0.57	0.07	
1715	AO	11.91	0.35	0.18	

CATALOGUE
/Continued/

No.	Sp.	V	B-V	U-B	remarks
1716	AO	12.57	0.43	0.08	
1717	AO	12.37	0.38	0.04	
1718	AO	12.73	0.54	0.18	
1719	FO	11.63	0.71	-0.17	
1720	AO	12.25	1.23	0.17	
1721	AO	12.44	0.69	0.00	
1722	AO	12.36	0.91	0.11	
1723	AO	12.59	0.46	0.72	
1724	F2	12.15	0.61	0.00	
1725	AO	12.48	1.32	0.33	
1726	AO	13.09	0.93	0.19	
1727	AO	12.44	0.61	0.29	
1728	AO	12.97	0.79	0.40	
1729	AO	12.67	0.56	0.07	
1730	AO	13.67	1.03	0.72	
1731	AO	12.00	0.83	0.07	
1732	F8	11.30	1.46	0.91	
1733	GO	12.55	0.55	0.08	
1734	AO	12.06	0.98	0.22	
1735	A7	13.67	0.93	0.25	
1736	B8	10.73	1.64	1.41	
1737	FO	11.82	0.52	0.01	
1738	F2	12.57	0.49	0.14	
1739	A5	12.95	1.02	0.20	
1740	F8	12.24	0.84	0.28	
1741	KO	11.25	1.16	0.51	
1742	AO	13.09	1.08	0.16	
1743	AO	12.88	0.70	0.09	
1744	AO	12.14	0.71	0.15	
1745	AO	12.50	0.51	0.10	
1746	AO	12.24	0.49	0.19	
1747	AO	12.57	0.67	0.34	
1748	AO	11.21	0.52	0.09	
1749	AO	13.00	0.61	0.22	
1750	AO	12.56	0.63	0.20	
1751	AO	12.35	0.64	0.23	
1752	AO	12.70	0.60	0.17	
1753	AO	12.19	0.98	0.41	
1754	A5	12.98	0.95	0.15	
1755	AO	12.75	0.75	0.20	
1756	AO	13.12	0.89	0.26	
1757	AO	12.59	0.68	0.16	
1758	AO	13.02	1.76	-	
1759	AO	13.00	0.75	0.11	
1760	AO	12.79	0.62	0.06	
1761	AO	12.88	0.69	0.04	
1762	KOIII	11.23	1.26	0.86	
1763	FO	11.88	0.69	0.13	
1764	AO	12.68	1.05	0.01	
1765	FO	13.09	0.51	--	
1766	A2	12.25	0.49	0.05	
1767	AO	12.68	0.65	0.22	
1768	A2	12.72	0.75	1.11	

TABLE
/Continued/

No.	Sp.	V	B-V	U-B	remarks
1769	F2	12.27	0.72	0.33	
1770	A0	12.05	1.68	1.60	
1771	A0	12.96	0.81	0.28	
1772	A2	12.73	0.89	0.19	
1773	A0	12.93	0.87	0.20	
1774	K2III	10.92	1.61	1.25	
1775	A0	12.95	0.92	0.28	
1776	A0	12.88	0.65	0.37	
1777	A0	12.81	0.80	0.41	
1778	F5	11.73	0.59	0.11	
1779	A0	12.76	0.63	0.06	
1780	A0	13.09	0.92	0.14	
1781	A0	11.95	1.13	0.27	
1782	A4	12.04	1.03	0.23	
1783	A0	12.65	0.90	0.58	
1784	K2III	10.16	1.71	2.03	
1785	A0	12.75	0.81	0.52	
1786	A5	12.58	1.18	0.56	
1787	A0	12.81	0.76	0.04	
1788	A2	12.95	0.75	0.27	
1789	A0	12.83	0.75	0.15	
1790	gK	10.86	1.70	1.53	
1791	A2	12.75	0.76	0.06	
1792	A0	12.66	0.44	0.08	
1793	A0	12.90	0.69	0.04	
1794	A0	13.31	0.78	0.26	
1795	A0	12.86	0.74	0.18	
1796	A0	13.01	0.71	0.23	
1797	A0	13.28	0.61	0.09	
1798	A0	13.16	0.68	0.23	
1799	A0	12.73	0.38	0.09	
1800	A0	13.18	0.19	0.81	
1801	A5	13.22	0.75	0.24	
1802	Me	11.34	2.20	2.00	
1803	Me	10.98	2.24	2.43	
1804·	B1	6.69	0.24	-0.57	BD+61°2216
1805·	B1	7.02	0.26	-0.56	BD+61°2217
1806·	B1	7.90	0.08	-0.73	BD+62°2006
1807·	B3	8.92	0.17	-0.46	BD+61°2215
1808·	B3	9.34	0.18	-0.40	BD+61°2214
1809·	B3	9.83	0.23	-0.33	BD+61°2213
1810·	B3	10.01	0.15	-0.49	

NOTES TO THE CATALOGUE

A point at the right upper side of the running number denotes photoelectrically measured magnitudes.

Blend is remarked if the photographic image of the measured star is distorted by a neighbouring star.

A colon beside the U-B colour denotes that the ultraviolet magnitude of the star is uncertain because of the field error of the ultraviolet filter.

Star No. 1501: The HD type of this star is A3. On our plates it shows an O-type spectrum, with HeII 468.6 in emission.

Star No. 1514: HeI 4026 can be seen in emission.