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TIMES OF MINIMA OF ECLIPSING VARIABLES

This bulletin lists times of minima determined at this observatory in 1973, 1974, 1975 and 1976. The equipment was the same as used for the minima listed by us in IBVS 844, 1973. However, in 1974 the d.c. output of the photometer was replaced by a photon counter designed and built by J.R. Stilborn, and all subsequent observations have been obtained with this new system. The computer programme for reduction by the method of Kwee and van Woerden (BAN 12, 327, 1956) was modified by one of us (D.J. B.) to use the digital output data directly and to calculate and print out magnitude differences in the process of determining the times of minima.

The ephemerides used to calculate O-C were the same as those used in IBVS 844 for the stars 44i Boo, VW Cep, MR Cyg, AI Dra, Z Her, RX Her, U Oph, and U Sge. Ephemerides for the other stars are given in Table 2. Some remarks on individual systems follow the tables.

Table 1. Observed Times of Minima.

Star	H.J.D. (2,440,000+)	E	O-C (days)	Observer
OO Aql	2986.8086±0.0003	4200	±0.0130	S
44i Boo	1900.7444±0.0005	12648	±0.0131	B
	2196.8176±0.0004	13753.5	±0.0176	S
	2218.7782±0.0005	13835.5	±0.0175	B
	2228.8212±0.0003	13873	±0.0174	B
	2635.7667±0.0006	15392.5	±0.0191	B
	2947.7702±0.0008	16557.5	±0.0189	R

Table 1. Observed Times of Minima, (Cont.)

Star	H.J.D. (2,440,000+)	E	O-C (days)	Observer
ZZ Boo	2551.8384±0.0004	798.5	+0.0116	S
RZ Cas	2266.8220±0.0001	10367	+0.0030	B
	3001.8946±0.0002	10982	-0.0014	B
	3019.8240±0.0004	10997	-0.0008	B
TV Cas	1919.8125±0.0004	5016	-0.0049	S
VW Cep	1895.8309±0.0004	9095	+0.0098	B
	2198.7773±0.0007	10183.5	+0.0116	S
	2256.8019±0.0002	10392	+0.0078	S
	2268.7702±0.0002	10435	+0.0086	S
	2269.7467±0.0006	10438.5	+0.0110	B
	2290.7587±0.0006	10514	+0.0103	B
	2290.8973±0.0005	10514.5	+0.0098	B
	2557.8039±0.0003	11473.5	+0.0135	B
	2563.7854±0.0003	11495	+0.0113	B
	2977.7824±0.0003	12982.5	+0.0166:	R
XX Cep	1894.7619±0.0016	152	-0.0003	S
	2289.7776±0.0007	321	+0.0107	S
MR Cyg	2252.8221±0.0005	5281	+0.0007	B
	2273.7832±0.0013	5293.5	-0.0012	B
AI Dra	1881.8234±0.0002	3618	+0.0005	B
	1890.8109±0.0010	3625.5	-0.0031	B
	2255.8543±0.0007	3930	+0.0011	S
	2270.8314±0.0012	3942.5	-0.0070:	B
Z Her	2217.8226±0.0005	7296	-0.0030	B
RX Her	2259.7932±0.0006	5554.5	+0.0005	S
	2267.7942±0.0004	5559	-0.0020:	B
	2564.8175±0.0004	5726	-0.0003	S
	3031.6935±0.0004	5988.5	+0.0006	B
TX Her	2226.7781±0.0003	5778	+0.0002	B
	2262.8256±0.0005	5795.5	+0.0011	S
	2570.7668±0.0004	5945	+0.0008	A
	2985.8213±0.0007	6146.5	+0.0038	R
AK Her	2596.8128±0.0003	9644.5	+0.0016	S
AR Lac	2287.8275±0.0003	1468	-0.0014	B
	2288.8215±0.0007	1468.5	+0.0010	B
CM Lac	1893.7814±0.0003	9265	-0.0003	B
	1905.8139±0.0006	9272.5	-0.0030	B
	2636.7537±0.0002	9728	-0.0001	B
	2989.7850±0.0004	9948	-0.0009	R
U Oph	2942.8337±0.0003	20665.5	-0.0029	B
V566 Oph	2215.8078±0.0002	927.5	-0.0003	B
	2216.8320±0.0003	930	-0.0002	B1
	2241.8201±0.0003	991	-0.0005	S
	2248.7844±0.0002	1008	-0.0002	S
	2265.7848±0.0003	1049.5	-0.0001	S
	2572.8131±0.0004	1799	-0.0012	A
	2581.8262±0.0002	1821	-0.0003	B
	2614.8044±0.0012	1901.5	+0.0011	B
	2938.8340±0.0003	2692.5	+0.0013	S
	2987.7861±0.0003	2712	+0.0009	R

Table 1. Observed Times of Minima, (Cont.)

Star	H.J.D. (2440,000+)	E	O-C (days)	Observer
U Sge	2207.8447±0.0001	7418	+0.0023	B
	2633.8033±0.0002	7544	+0.0030	B
Observers:	A= S.B. Alers R= J. Regan	B= D.J. Barlow S= C.D. Scarfe		Bl= B.W. Baldwin

Table 2. Ephemerides

Star	H.J.D. (2,400,000+)	Period	References
OO Aql	40858.291	0.5067868	Herczeg IBVS 699, 1972
ZZ Boo	38565.9192	4.991744	McNamara et al. PASP 83, 192, 1971
RZ Cas	29875.6902	1.1952473	Herczeg & Frieboes-Conde, A. & Ap. 30, 259, 1974
TV Cas	32827.7665	1.81260983	Frieboes-Conde & Herczeg, A. & Ap. Supp. 12, 1, 1973
XX Cep	41539.4917	2.3373059	Battistini et al., IBVS 1325, 1977
TX Her	30326.2006	2.05980915	Vetesnik & Papousek, BAC 24, 57, 1973
AK Her	38531.4318	0.42152309	Kurutac & Ibanoglu, IBVS 369, 1969
AR Lac	37376.4979 ±5	1.9831955 ±10	present work
CM Lac	27026.3159	1.6046914	Alexander, A.J. 63, 108, 1958
V566 Oph	41835.8617 ±3	0.40964569 ±25	present work

Notes on individual systems:

1. OO Aql The trend of recent is to later times than predicted by the ephemeris of Herczeg.
2. ZZ Boo An increase of the period since the observations of McNamara et al. is indicated.
3. RZ Cas Our data and those of Surkova (IBVS 1335, 1977), and Pohl and Kizilirmak (IBVS 1358, 1977) indicate a new change in the period since the observations of Chambliss (PASP 88, 22, 1976).
4. TV Cas Recent minima, including those of Tremko and Bakos (BAC 28, 41, 1977), Grauer et al. (A.J. 82, 740, 1977) and Pohl and Kizilirmak (IBVS 1163, 1976, and IBVS 1358, 1977) leave undecided the question of the nature of the period changes, ie. abrupt as proposed by Grauer et al., sinusoidal as suggested by Frieboes-Conde and Herczeg (A. & Ap. Supp. 12, 1, 1973), or possibly

steady.

5. XX Cep Our data and those of Pohl and Kizilirmak (IBVS 1358, 1977), support the suggestion of Battistini et al. (IBVS 1325, 1977), that an increase in the period may have occurred a few years ago.
6. AR Lac A new ephemeris has been calculated by least-squares from the present minima and those listed in IBVS 201, 456, 817, 873 and 937 and in A.A. 27, 93, 1977.
7. U Oph Three additional minima are listed by Batten and Scarfe (Revista Mexicana de A. y Ap. 1978, in press).
8. V566 Oph A new ephemeris has been calculated by least-squares using the present minima and those since 1972 given in IBVS 844, 937, and 1053 by Bookmyer (PASP 88, 473, 1976) and by Dawson and Narayanaswamy (PASP 89, 47, 1977). The ephemerides given in both of these latter papers give substantial O-C's for the most recent minima. The present ephemeris fits the 1972-76 data nearly as well as that of Bookmyer (A.J. 74, 1197, 1969) fitted the pre-1969 data. The minima in the interval 1969-71 while the period was changing show a very large scatter.

C.D. SCARFE and D.J. BARLOW  
University of Victoria Observatory  
Victoria, B.C. Canada