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MINIMA OF BINARY STARS

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Observatory and telescope:
Prince George Astronomical Observatory (PGAO): 61 cm f/12 Cassegrain; Backyard Observatory (BYO): 33 cm f/4.5 Newtonian on Paramount GT-1100s mount

Detector:	PGAO: SBIG ST6 with telecompressor (to f/7), $1\farcs1 \times 1\farcs3$ pixels, $5' \times 7'$FOV, cooled to -40 °C BYO: SBIG ST9e with tele-extender (to f/8.9), $1\farcs4$ pixels, $11\farcm9 \times 11\farcm9$ FOV, cooled to -10 °C

Method of data reduction:
Aperture photometry using MIRA, by Axiom Research

Method of minimum determination:
Digital tracing paper method, bisection of chords, curve fitting, and Kwee and van Woerden (1956)

Observed star(s):

Star name	GCVS	Coordinates (J2000)		Comp. star	Ephemeris		Source
	type	RA	Dec		E 2400000+	P [day]	
CX Aqr	EA/SD	22.3544	−0.4126	G 5233:1831	52136.8117	0.555986	1.
HP Aur	EA	5.10216	35.4748	[not GSC]	51936.3787	1.422819	1.
TY Boo	EW/KW	15.0047	35.0752	G 2568:0991	51957.8764	0.317150	1.
CV Boo	na	15.26192	36.5915	G 2570:0423	51955.9444	0.846994	1.
AE Cas	EA/SD	1.26573	70.0733	G 4301:1549	51947.3320	0.759121	1.
PV Cas	EA/DM	23.10025	59.1206	G 4010:1111	52135.8214	1.750454	1.
V387 Cas	EA/DM	1.00355	58.4157	G 3680:1741	52133.8565	1.608211	1.
XX Cep	EA/SD	23.38199	64.2	G 4288:0150	52136.9064	2.337306	1.
XY Cep	EA/SD	23.535637	68.5823	G 4479:0423	51931.7501	2.774517	1.
GW Cep	EW/KW	1.45591	80.0456	G 4502:0724	51957.9425	0.318844	1.
XZ CMi	EA	7.54065	3.3854	G 0185:1509	51936.8652	0.578807	1.
AK CMi	EA/SD	4.37064	1.4023	G 0187:1081	51913.8210	2.043367	1.
EK Com	EW	12.5121	27.1347	G 1995:2289	51961.0457	0.266686	1.
V859 Cyg	EW/KW	19.27124	28.565	G 2137:0260	49580.3946	0.405004	1.

Observed star(s):							
Star name	GCVS	Coordinates (J2000)		Comp. star	Ephemeris		Source
	type	RA	Dec		E 2400000+	P [day]	
AF Gem	EA/SD	6.50343	21.2233	G 1343:2551	51922.8889	1.243499	1.
V728 Her	EW/KW	17.1805	41.5041	G 3081:1028	51676.8628	0.471286	1.
WY Hya	EW/KE	8.14112	0.302	G 0195:1434	51964.8064	0.716008	1.
AV Hya	EB/KE	9.35025	5.1911	G 0241:2130	51961.7943	0.683400	1.
DF Hya	EW/KW	8.5223	6.1736	G 0225:0943	51934.9513	0.330597	1.
CN Lac	EB/DW	0.20305	40.1335	G 3605-2646	51812.8787	0.462790	1.
DU Leo	na	9.4411	25.2115	G 2568:0991	52013.6090	0.687093	1.
NS Mon	EW/DW	6.3326	7.5418	G 0733:2002	51933.7458	1.777619	1.
BB Peg	EW/KW	22.22556	16.1959	G 1682:1530	52132.0233	0.361502	1.
BX Peg	EW/KW	21.38532	26.4223	G 2197:1485	51761.9154	0.280417	1.
DV Peg	EW/KE	21.2452	21.1	G 1675:0092	52112.8601	0.949625	1.
DK Peg	EA/DM	23.41335	10.1257	G 1173:1705	52132.8317	1.631827	1.
KL Per	EA/SD	2.41167	48.5618	G 3304:0460	51166.3595	2.223015	1.
Y Psc	EA/SD	23.34253	7.5529	G 1169:0263	52134.9441	3.765759	1.
AU Ser	EW/KW	15.56492	22.154	G 1502:1573	52028.8138	0.386494	1.
AC Tau	EA/SD	4.37064	1.4023	G 0082:0234	51913.8210	2.043367	1.
RV Tri	EA/SD	2.1318	37.0101	G 2321:0244	52116.8846	0.753666	1.
AX Vir	EB/KE	13.2745	3.5228	G 0303:0193	51964.9697	0.702526	1.
G1534:0753	na	17.025047	21.3959	G 1534:1027	52015.0936	0.511158	1.
G1991:1390	na	12.32049	26.2248	G 1991:1447	51992.8346	0.286362	1.
G1991:1390	na	12.32049	26.2248	G 1991:1447	51992.8346	0.286362	1.
G2035:0175	na	16.0154	24.5216	G 2035:0109	51750.7083	0.268730	1.
G2035:0175	na	16.0154	24.5216	G 2035:0109	51750.7083	0.268730	1.
G2038:0674	na	16.1005	25.3655	G 2038:0040	51989.9672	0.530831	1.
G2530:2276	na	12.3201	35.29597	G 2530:2154	51991.9728	0.305967	1.
G2532:0514	na	13.00117	30.231	G 2532:0946	52010.7820	0.301988	1.
G2532:0514	na	13.00117	30.231	G 2532:0946	52010.7820	0.301988	1.
G2533:1519	na	12.4033	34.2256	G 2533:1553	51998.7445	0.491419	1.
G2533:1563	na	12.4441	35.5756	G 2533:0959	51956.0078	0.329068	1.
G3021:2642	na	12.4337	38.4415	G 3021:2615	51955.7666	0.326894	1.
G3021:2642	na	12.4337	38.4415	G 3021:2613	51955.7666	0.326894	1.
G3026:1046	na	13.3726	37.3458	G 3026:0922	52001.9066	0.349189	1.
G3092:1291	na	17.4411	40.1655	G 3092:1157	52024.9883	0.346925	1.
G3103:0919	na	18.1521	39.0545	G 3103:0849	52064.8900	1.238813	1.
G3112:0179	na	18.2138	42.1008	G 3112:1051	52054.8478	0.995959	1.

Notes: RA values are in the format HH.MMSS, Dec in DD.MMSS. G stands for GSC.

Source(s) of the ephemeris:
1. This paper (see remarks).

Explanation of the remarks in the table:
* Note: The comparison for HP Aur is located approximately 1° north of the variable.

Times of minima:						
Star name	Time of min. HJD 2400000+	Error	Type	Filter	$O-C$ [day]	Rem.
CX Aqr	52136.8123	0.0002	I	none		BYO
HP Aur *	51935.6673	0.0001	II	none		PGAO
TY Boo	51957.8764	0.0001	I	none		PGAO
CV Boo	51955.9444	0.0001	I	none		PGAO
AE Cas	51913.9283	0.0001	I	none		PGAO
AE Cas	51946.9520	0.001	II	none		PGAO
PV Cas	52135.8214	0.0001	I	none		BYO
V387 Cas	52133.8565	0.0004	I	none		BYO
XX Cep	52136.9064	0.0004	I	none		BYO
XY Cep	51931.7501	0.0005	I	none		PGAO
GW Cep	51935.7847	0.0001	II	none		PGAO
GW Cep	51957.7830	0.0001	II	none		PGAO
XZ CMi	51936.8652	0.0002	I	none		PGAO
AK CMi	51934.7501	0.0003	I	none		PGAO
EK Com	51960.9124	0.0002	II	none		PGAO
V859 Cyg	52134.7548	0.0001	I	none		BYO
AF Gem	51922.8889	0.0002	I	none		PGAO
V728 Her	51983.9129	0.0002	II	none		BYO
WY Hya	51916.8334	0.0001	I	none		PGAO
WY Hya	51964.8064	0.0002	I	none		PGAO
AV Hya	51961.7943	0.0002	I	none		PGAO
DF Hya	51934.9513	0.0001	II	none		PGAO
CN Lac	52093.8300	0.001	I	none		BYO
DU Leo	51957.9543	0.0002	II	none		PGAO
NS Mon	51933.7458	0.0002	I	none		PGAO
BB Peg	52131.8425	0.0002	II	none		BYO
BX Peg	52015.9750	0.0001	I	none		BYO
DV Peg	52112.8601	0.0002	II	none		BYO
DK Peg	52132.8317	0.0001	I	none		BYO
KL Per	52137.8501	0.0007	I	none		BYO
Y Psc	52134.9441	0.0002	I	none		BYO
AU Ser	52028.8139	0.0001	I	none		BYO
AC Tau	51913.8210	0.0001	I	none		PGAO
RV Tri	52116.8845	0.0001	I	none		BYO
AX Vir	51964.9697	0.0002	I	none		PGAO
G1534:0753	52014.8379	0.0001	II	none		BYO
G1991:1390	51992.8346	0.0001	I	none		PGAO
G1991:1390	51962.9098	0.0001	II	none		PGAO
G2035:0175	52019.8715	0.0001	I	none		BYO
G2035:0175	52038.8169	0.0001	II	none		BYO
G2038:0674	51989.8345	0.0001	II?	none		BYO
G2530:2276	51991.8204	0.0002	II	none		BYO
G2532:0514	52010.7820	0.0002	I	none		BYO
G2532:0514	52000.8160	0.0001	I	none		BYO
G2533:1519	51998.7440	0.0002	I	none		BYO
G2533:1563	51955.8433	0.0003	II?	none		PGAO

Times of minima:						
Star name	Time of min. HJD 2400000+	Error	Type	Filter	$O-C$ [day]	Rem.
G3021:2642	51955.7666	0.0002	II	none		PGAO
G3021:2642	52014.7711	0.0002	I	none		BYO
G3026:1046	52001.7327	0.0002	I	none		BYO
G3092:1291	52024.8148	0.0001	I	none		BYO
G3103:0919	52064.8900	0.01	I	none		BYO
G3112:0179	52054.8499	0.0007	I	none		BYO

Remarks:

A problem emerged for the BYO data during the routine photometry of the check stars, performed some time after the original data were taken and reduced. It was discovered that nightly drifts of a few hundreds of a magnitude occurred for the check stars in some (but not all) data sets. The causes of this drift are presently unknown (flatfielding was scrupulously done in all cases) but are thought to arise from possible misalignments of the tele-extender lens axis with that of the main optical axis, focussing errors, possibly inadequate tube baffling, stray lights, etc. Clearly this situation is unacceptable and will be dealt with before more data are taken. However, to correct the existing BYO data, linear fits by least-squares were made of the check star magnitudes versus time and linear corrections (extrapolated to the location of the variable where possible) were applied to the variable star magnitudes versus time. The times of minima were then redetermined and the differences from the uncorrected ToMs noted. These differences, or corrections, ranged from 0.00008 to 0.01 days; the median was 0.0004 days. Rather than discard some of the obviously less accurate times of minima, since many are for ROTSE stars (Akerlof, C., et al., 2000) which have not been previously observed, it was decided to report all the values with estimated errors equal to the internally estimated errors or the corrections themselves, whichever was larger. These are given in Table 2. Information on period behaviour for most of the stars listed in Table 1 is available in a website, the URL for which is given in the references. The ephemerides were calculated with the help of O−C charts using all available published times of minima.

Acknowledgements:

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References:

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