New Minimum Times of Eclipsing Binaries

I observe visually with a Newton telescope on an azimuthal mount and occasionally with a field glass in Fürnheim, Germany (φ +49°). Eclipses of all selected 15 binaries last longer than 8 hours and cannot be observed completely in one night.

The 16 minimum times in table 1 are in Greenwich mean astronomical time. A preceding "HJD" designates that, before deriving a minimum time, I reduced every single observation to the sun (others: "JD"). In most cases I determined minimum times with a digitized tracing paper method, seldom with a quadratic fit. In the column "O-C" I report only values far outside the range of 3 standard deviations σ. Where nothing is noted, I regard the O-C-value as insignificant.

Before deriving a new minimum time I plotted an O-C-diagram and chose the ephemeris, which best represented reported data. I used this ephemeris to reduce my new data set into a normal epoch and to calculate O-C-values. I give the chosen elements in table 2 together with reasons in the column "remarks".

Table 1 - Observed Minimum Times:

Star	Observed Minimum Time & mean error	Nr. of single observations	covered Gregorian Time Interval (Δ Epoch count)	O–C
LY Aur (prim.)	HJD 24 53406.403 ± 5	205	2004JAN18...2006MAR20 (198)	
LY Aur (sec.)	HJD 24 53408.413 ± 6			
S Cnc	HJD 24 53431.146 ± 3	59	2004JAN18...2006FEB25 (81)	–0,010d (3σ: ±0,006d)
GU Cas	HJD 24 53638.236 ± 5	96	2005JUL27...2006FEB01 (62)	
KR Cas	HJD 24 53654.380 ± 7	101	2005JUL09...2006JAN31 (42)	
LR Cas	HJD 24 53660.115 ± 8	115	2005JUL27...2006FEB27 (48)	
XZ Cep	HJD 24 53635.032 ± 9	97	2005JUN26...2006JAN16 (40)	
GT Cep	HJD 24 53632.829 ± 8	90	2005JUN02...2006JAN19 (47)	
UX Mon	HJD 24 53475.023 ± 7	70	2004DEZ09...2006MAR23 (79)	–0,036d (3σ: ±0,020d)
VV Mon	HJD 24 53398.160 ± 8	85	2003NOV30...2006MAR20 (139)	
AR Mon	JD 24 53073.96 ± 4	88	2003FEB18...2006MAR02 (52)	
Z Ori	HJD 24 53715.10 ± 2	49	2004NOV14...2006MAR13 (93)	
CP Ori	HJD 24 53751.84 ± 3	68	2005JAN13...2006MAR05 (78)	
Z Per	HJD 24 53752.148 ± 2	64	2005OKT10...2006JAN31 (37)	
RW Tau	HJD 24 53755.149 ± 2	54	2005NOV08...2006FEB24 (39)	
RW UMa	HJD 24 53429.992 ± 5	95	2003DEZ23...2006MAR24 (112)	

Table 2 – The Elements:

Star	Initial Epoch	Period (days)	Reference	Remarks
LY Aur	JD 24 39061.463	4.002496	GCVS 1974	secondaries at phase 0.5
S Cnc	JD 24 42410.1733	9.4844946	Olson & Etzel Astron.J.106, 1162 (1993)	The O-C-diagram with observations since 1848 shows a slight, but definite continuous period decrease.
GU Cas	JD 24 52982.454 ± 5	3.093316 ± 2	author of the pres.paper, unpublished	Reported ephemerides do not meet several recent, precise CCD minimum times.
KR Cas	JD 24 29579.413	4.904246	Saikin, Perem. Zvezdy 9, 3 (1953)	
LR Cas	JD 24 41959.276	4.4557746	GCVS 2001	
XZ Cep	JD 24 26033.421	5.0972531	Kreiner ea, Bull.Astron. Inst.Czech. 41, 51 (1989)	
GT Cep	JD 24 52503.821	4.908762	Kreiner, Acta Astron. 54, 207 (2004)	
UX Mon	JD 24 33329.00	5.9044721	Olson & Etzel Astron.J.110, 2385 (1995)	Data points since 1910 show a continuous period decrease. The given linear ephemeris can be regarded as the tangent to a parabola and represents present observations best. The initial epoch is misleading, as reported minima around 1950 actually came earlier by 0.15 days.
VV Mon	JD 24 52502.7184	6.0504270	Kreiner, loc. cit. (2004)	Data points since ca. 1927 show a marked, continuous period decrease. The reported linear ephemeris can be regarded as the tangent to a parabola and describes present observations best.
AR Mon	JD 24 52522.53	21.20784	Kreiner, loc. cit. (2004)	
Z Ori	JD 24 52502.75	5.203288	Kreiner, loc. cit. (2004)	
CP Ori	JD 24 49644.47 ± 4	5.32047 ± 3	author of the pres.paper, unpublished	Grossly scattering O-C-diagram; 3 visual & 1 CCD-observation from 1957OKT until 2003DEZ; the ephemeris is provisional.
Z Per	JD 24 52502.153	3.056221	Kreiner, loc. cit. (2004)	
RW Tau	JD 24 52500.9032	2.768757	Kreiner, loc. cit. (2004)	
RW UMa	JD 24 17976.113 ± 6	7.328209 ± 4	author of the pres.paper, unpublished	Most reported ephemerides assign weight to a set of minimum times in the 1980ies reported by one visual observer. These times are unplausible and biased probably by an inadequate observing method. I took these minima out of calculation. All other observations follow a straight line described by the given elements.

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