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TIMES OF MINIMA OF ECLIPSING BINARIES

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We report times of minima of eclipsing binaries derived from photometric observations made at the High Altitude Maidanak Observatory in Uzbekistan in Johnson B,V filters, and at the University of Arkansas (unfiltered CCD observations; all but one of the Arkansas minima were observed by JLC). Heliocentric times of minima were estimated for each filter by using the method of Kwee and Van Woerden (1956) as adapted to a Macintosh computer. The adopted time of minimum was then the average over both filters for Maidanak data. In all cases the times of minima in different filters were concordant. Uncertainties in the times of minima were estimated from the values of standard error computed by the method and from the differences in times derived from the various filters used. In Table 1, primary eclipses are designated as type 1 eclipses, and secondary eclipses as type 2.

Table 1

Star	JD of Min −2400000	Type	Observatory
KP Aql	50670.6586 ± 0.0008	1	Arkansas
WW Cam	50319.3520 ± 0.0005	2	Maidanak
	50667.3343 ± 0.0004	2	Maidanak
	50675.3063 ± 0.0005	1	Maidanak
	50843.6054 ± 0.0002	1	Arkansas
	50852.7028 ± 0.0003	1	Arkansas
	50868.6209 ± 0.0004	1	Arkansas
AY Cam	50847.7598 ± 0.0004	1	Arkansas
IT Cas	50848.6032 ± 0.0009	1	Arkansas
PV Cas	50321.4771 ± 0.0006	2	Maidanak
V459 Cas	50307.3162 ± 0.0005	1	Maidanak
EK Cep	50311.3135 ± 0.0004	1	Maidanak

Table 1 (cont.)

Star	JD of Min −2400000	Type	Observatory
RT CrB	50640.3389 ± 0.0010	1	Maidanak
V442 Cyg	50725.7468 ± 0.0003	2	Arkansas
V541 Cyg	49935.3911 ± 0.0006	2	Maidanak
V909 Cyg	50284.3338 ± 0.0004	2	Maidanak
	50305.3752 ± 0.0003	1	Maidanak
	50312.3868 ± 0.0010	2	Maidanak
	50319.3520 ± 0.0005	2	Maidanak
	50622.3782 ± 0.0030	1	Maidanak
	50629.3962 ± 0.0020	2	Maidanak
	50653.2405 ± 0.0010	1	Maidanak
	50660.2535 ± 0.0010	2	Maidanak
	50689.7076 ± 0.0004	1	Arkansas
	50682.6993 ± 0.0007	2	Arkansas
V364 Lac	49947.4106 ± 0.0010	1	Maidanak
	50686.3545 ± 0.0009	2	Maidanak
RU Mon	50837.6714 ± 0.0004	1	Arkansas

For some of the binaries, JLC has collected from the literature all published dates of minima in order to improve the eclipse ephemerides. Based on a preliminary analysis of all data, visual dates of minima were assigned a standard error of 0.014 days, photographic dates were assigned a standard error of 0.018 days, relatively old photoelectric minima were assigned a standard error of 0.0037 days, and recent photoelectric minima were assigned a standard error of 0.0020 days unless the standard error was explicitly stated in the publication. A weighted least squares fit to the dates of minima resulted in the improved ephemerides listed in Table 2.

Table 2

Star	Period (days)	Zero Epoch (HJD)− 2400000
KP Aql	Min I 3.3674753 ± 0.0000005	50670.6586 ± 0.0003
	Min II 3.3674748 ± 0.0000008	49931.4981 ± 0.0017
WW Cam	Min I 2.2743614 ± 0.0000006	50843.6050 ± 0.0002
	Min II 2.2743634 ± 0.0000023	41781.3914 ± 0.0056
AY Cam	Min I 2.7349681 ± 0.0000004	50847.7597 ± 0.0003
	Min II 2.7349627 ± 0.0000014	49555.4675 ± 0.0042
IT Cas	Min I 3.8966431 ± 0.0000008	50848.6186 ± 0.0006
	Min II 3.8966489 ± 0.0000009	49962.3378 ± 0.0008
V442 Cyg	Min I 2.3859454 ± 0.0000011	44919.5609 ± 0.0037
	Min II 2.3859378 ± 0.0000009	50725.7472 ± 0.0003
V909 Cyg	Min I 2.8053850 ± 0.0000009	50689.7076 ± 0.0004
	Min II 2.8053881 ± 0.0000011	50682.6994 ± 0.0007

Differences between the periods for Min I and Min II are expected for the eccentric eclipsing binary IT Cas due to apsidal motion (Lacy et al. 1997). The period of RU Mon, however, is found to be quite variable, suddenly increasing or decreasing in value (the average period is 3.5846 days, with sudden variations at the level of 0.0001 days), and cannot be well represented by a single linear ephemeris. RU Mon is discussed by Martynov & Khaliullin (1986). This erratic behavior cannot be due to simple apsidal motion mechanisms, and is likely due to some kind of mass loss or transfer, or some unknown mechanism. We would like to acknowledge financial support of our work by the American Astronomical Society through the Edith J. Woodward Award and from the Margaret Cullinan Wray Charitable Lead Annuity Trust.

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