BBSAG Bulletin 2

1972 April 10

35th List of Minima of Eclipsing Binaries

The following table lists 180 visual minima obtained by the subsequent observers:

PB	Peter Bachofner, Wetzikon, Switzerland
AB	Alexander Brown, Whitehaven, England
MC	Malcolm J. Currie, Worlingham, England
RD	Roger Diethelm, Winterthur, Switzerland
RG	Robert Germann, Wald, Switzerland
TG	Thomas T. Gough, Edinburgh, Scotland
JI	John E. Isles, London, England
WJ	Werner Jost, Rüti, Switzerland
KL	Kurt Locher, Grüt-Wetzikon, Switzerland
HP	Hermann Peter, Otelfingen, Switzerland
DP	D. A. Pickup, Edinburgh, Scotland

The O-C refer to the linear elements of the GCVS 1969. Reductions were made using the tracing paper method by R.Diethelm, R.Germann, J.Isles, and K.Locher .

current no.	star	minimum order	JD hel 244...	O-C	n	observer
3255	XZ And	I	1350.347	-0.004	11	HP
3256	AB And	II	1350.322	+0.015	8	HP
3257		II	1353.311	+0.017	9	RD
3258	S Ant	II	1401.332	+0.011	14	KL
3259	EE Aqr	I	1263.462	+0.004	12	TG
3260	BF Aur	I	1369.312	+0.005	10	RD
3261	IM Aur	II	1314.444	-0.001	5	JI
3262	AD Boo	I	1405.466	+0.019	7	KL
3263	SV Cam	I	1350.352	-0.007	12	HP
3264		I	1350.354	-0.005	9	RG
3265		I	1353.320	-0.004	7	RG
3266		I	1353.327	+0.003	7	RD
3267		I	1369.336	0.000	12	RD
3268		I	1372.307	+0.005	7	RG
3269		I	1372.315	+0.013	12	HP
3270		I	1385.343	-0.007	6	RD
3271	AL Cam	I	1396.456	+0.005	11	HP
3272	AY Cam	I	1353.302	-0.031	8	RD
3273	S Cnc	I	1395.358	+0.046	12	HP
3274	TX Cnc	II	1363.310	-0.006	10	RD
3275		I	1385.323	-0.008	7	RD
3276	WW Cnc	I	1353.287	-0.084	7	RD
3277		I	1392.313	-0.117	8	RD
3278	WY Cnc	I	1396.359	+0.005	12	RD
3279	RZ Cas	I	1272.381	+0.009	8	AB
3280		I	1352.451	-0.003	10	HP
3281		I	1395.484	+0.001	13	HP
3282		I	1407.434	-0.001	16	KL
3283	TV Cas	I	1247.351	+0.007	8	TG
3284		I	1314.392	-0.014	11	JI
3285	TW Cas	I	1271.367	-0.017	12	DP
3286	AB Cas	I	1324.360	+0.014	13	HP
3287		I	1335.294	+0.013	9	HP
3288		I	1350.326	+0.010	11	HP
3289		I	1380.398	+0.011	13	HP
3290		I	1391.332	+0.009	12	HP
3291		I	1395.433	+0.010	9	HP
3292	BM Cas	I	1366.78	+8.76	7	RD
3293	U Cep	I	1380.406	+0.026	9	KL
3294		I	1390.370	+0.018	10	KL
3295		I	1400.349	+0.025	10	KL
3296		I	1405.338	+0.028	11	KL
3297	VW Cep	I	1379.269	-0.077	11	KL
3298		II	1400.291	-0.069	7	KL
3299		II	1405.286	-0.084	10	KL
3300		I	1405.438	-0.071	11	KL
3301	ZZ Cep	I	1385.374	-0.006	11	HP
3302		I	1400.337	-0.036	10	HP
3303	EG Cep	I	1392.358	-0.034	8	RD
3304	GK Cep	II	1314.542	-0.040	10	JI
3305	TW Cet	I	1353.256	-0.023	5	KL
3306	XY Cet	I	1348.300	-0.017	9	KL
3307	BV 1481 Cet	II	1350.249	*)	6	KL
3308	RW Com	I	1390.477	-0.035	9	RD
3309		I	1391.420	-0.042	6	RD
3310		I	1392.370	-0.042	9	RD
3311	UX Com	I	1391.374	-0.051	13	RD
3312	CC Com	I	1392.429	+0.058	9	RD
3313		I	1396.400	+0.057	11	RD
3314		II	1401.588	+0.059	6	RD
3315	W Crv	II	1367.536	-0.013	11	KL
3316		I	1396.456	-0.006	8	HP
3317	Y Cyg	I	1271.349	-0.131	11	TG
3318		I	1271.361	-0.119	13	DP
3319		I	1274.343	-0.133	11	DP
3320		I	1274.354	-0.122	11	TG
3321	UZ Cyg	I	1351.78	-0.10	12	HP
3322	TW Dra	I	1273.315	-0.012	10	DP

*) not contained in the GCVS 1969: O-C = +0.085 referred to Bloomer's

current no.	star	minimum order	JD hel 244...	O-C	n	ob-ser-ver
3323	BS Dra	I	1392.452	+0.043	13	RD
3324	RU Eri	I	1369.297	-0.006	4	KL
3325	TZ Eri	I	1335.352	-0.026	13	HP
3326	WX Eri	I	1392.270	+0.010	11	KL
3327	YY Eri	I	1363.321	-0.007	7	RG
3328		I	1363.325	-0.003	6	WJ
3329		I	1363.328	0.000	8	RD
3330		I	1363.330	+0.001	6	PB
3331		II	1367.354	+0.007	6	KL
3332		II	1369.284	+0.008	5	KL
3333		I	1372.336	+0.006	7	RG
3334		II	1395.310	-0.007	7	KL
3335		II	1396.282	0.000	11	KL
3336	SX Gem	I	1363.304	-0.002	9	RD
3337	TX Gem	I	1369.316	-0.003	12	RD
3338	AF Gem	I	1369.312	-0.013	11	RD
3339		I	1390.447	-0.017	9	RD
3340		I	1390.455	-0.010	10	HP
3341		I	1395.429	-0.009	10	HP
3342	SZ Her	I	1354.629	+0.020	13	KL
3343		I	1395.535	+0.020	10	HP
3344	RX Hya	I	1396.497	-0.012	17	HP
3345	WY Hya	II	1390.448	+0.010	7	RD
3346		II	1393.315	+0.013	13	KL
3347	EU Hya	I	1396.350	-0.023	11	RD
3348		I	1396.359	-0.014	14	HP
3349		I	1396.366	-0.008	6	KL
3350	SW Lac	I	1352.334	-0.019	9	HP
3351		I	1353.284	-0.031	7	HP
3352		I	1353.292	-0.023	9	RD
3353	AR Lac	I	1268.461	+0.016	10	DP
3354		I	1270.435	+0.007	6	DP
3355		I	1274.417	+0.022	11	DP
3356	CM Lac	I	1274.376	+0.003	10	TG
3357		I	1335.351	0.000	11	HP
3358	UU Leo	I	1411.431	-0.017	12	RD
3359	UV Leo	I	1370.338	-0.007	8	KL
3360		II	1372.449	+0.004	8	KL
3361		I	1379.344	-0.002	9	KL
3362		I	1379.345	-0.001	12	HP
3363		I	1385.341	-0.006	9	RD
3364		I	1385.344	-0.003	6	KL
3365		II	1390.443	-0.005	8	RD
3366		II	1390.444	-0.003	10	HP
3367		I	1391.334	-0.014	11	RD
3368		I	1391.343	-0.005	9	RG
3369		II	1393.424	-0.025	12	HP
3370		I	1400.322	-0.027	8	RG
3371		II	1405.441	-0.009	9	KL
3372	UZ Leo	II	1363.342	-0.113	5	RD
3373	AM Leo	I	1392.336	-0.028	8	RD
3374		I	1396.365	-0.023	9	RD
3375		I	1411.353	-0.033	8	RD
3376	RS Lep	I	1363.355	-0.015	5	KL
3377		I	1385.270	-0.005	7	KL
3378	BO Mon	I	1391.423	+0.114	19	HP
3379		I	1391.426	+0.116	17	RD
3380	V508 Oph	II	1370.676	-0.002	7	KL
3381		II	1398.619	+0.013	12	KL
3382	V1010 Oph	I	1393.670	-0.020	9	KL
3383		I	1399.611	-0.031	11	KL
3384		I	1411.592	-0.035	8	RD
3385		I	1401.593	-0.034	14	KL
3386	ER Ori	I	1350.349	-0.025	8	RG
3387		I	1350.358	-0.017	10	HP
3388		I	1353.310	-0.028	7	RD
3389		I	1353.330	-0.008	7	RG
3390		I	1367.301	-0.009	6	KL
3391		I	1392.279	-0.012	10	KL
3392		II	1393.336	-0.013	7	RG
3393		II	1393.341	-0.009	11	KL
3394		II	1393.341	-0.009	10	HP
3395		II	1396.294	-0.019	6	KL
3396		I	1400.328	-0.009	6	RG
3397	FT Ori	I	1405.388	+0.008	11	KL
3398	ST Per	I	1324.280	+0.005	12	HP
3399	XZ Per	I	1395.382	+0.006	15	HP
3400	IZ Per	I	1273.444	+0.024	17	DP
3401		I	1273.456	+0.035	15	TG
3402	β Per	I	1366.355	-0.034	8	KL
3403	UZ Pup	II	1393.358	-0.029	11	KL
3404		I	1395.352	-0.023	12	KL
3405	V701 Sco	I	1396.658	-0.035	9	KL
3406	U Sct	I	1391.688	+0.007	12	KL
3407	AO Ser	I	1391.609	+0.004	13	KL
3408	CT Tau	I	1411.374	+0.012	10	RD
3409	GR Tau	II	1411.353	0.000	5	RD
3410	HU Tau	I	1244.476	+0.010	6	MC
3411		I	1314.398	+0.017	14	JI
3412	X Tri	I	1324.258	-0.022	12	HP
3413	W UMa	I	1392.414	-0.073	9	RD
3414	XZ UMa	I	1379.411	-0.059	10	HP
3415		I	1390.407	-0.064	11	HP
3416	ZZ UMa	I	1352.455	+0.009	12	HP
3417	UW Vir	I	1397.478	+0.187	8	KL
3418	AH Vir	I	1370.713	+0.006	6	KL
3419		I	1380.485	-0.004	5	KL
3420		I	1396.395	+0.013	8	KL
3421		I	1407.390	+0.005	13	KL
3422		I	1411.460	0.000	10	KL
3423		I	1416.375	+0.025	5	KL
3424	AZ Vir	I	1390.572	+0.035	8	KL
3425		II	1393.380	+0.016	10	KL
3426		I	1411.397	+0.034	10	KL
3427		II	1416.594	+0.026	6	KL
3428	BD Vir	I	1391.548	+0.019	13	KL
3429	BH Vir	I	1393.462	0.000	11	HP
3430		I	1401.637	+0.006	7	KL
3431		I	1407.356	+0.007	5	KL
3432		I	1411.434	0.000	13	HP
3433		I	1411.438	+0.004	7	KL
3434	BE Vul	I	1416.638	0.000	5	KL

An A.P.L. Computer Program for Predictions and Heliocentric Corrections of the Observable Minima of Eclipsing Binaries

After numerous trials the following form of program definition turned out to be the most useful one:

```
     ∇ BBSAG
[1]  CYCLE←INITIAL∆CYCLE
[2]  TIME←INITIAL∆TIME
[3]  PREDICTION←TIME+RESIDUAL
[4]  DARK←(¯0.3-0.35×10((02÷365.242)×PREDICTION-41031.7764))>10(02×PREDICTION-41000.7264)
[5]  HIGH←LIMITING∆HOURANGLE>(0.99726957|PREDICTION-CULMINATION)⌊0.99726957|CULMINATION-PREDICTION
[6]  HOUR←24|⌊13.5+24×1|PREDICTION
[7]  CORRECTION←MAXIMUM∆CORRECTION×10(02÷365.25636)×TIME-ZERO∆CORRECTION∆TIME
[8]  CORRECTIVE←0.0001×⌊0.5+10000×CORRECTION
[9]  →11-DARK×HIGH
[10] (HOUR;'  ';TIME;'  ';CORRECTIVE;'  ';CYCLE)
[11] CYCLE←CYCLE+STEP
[12] TIME←TIME+PERIOD
[13] →3-3×TIME>FINAL∆TIME
[14] ∇
```

HOUR: predicted minimum rounded to integer hours of central European time
TIME: C as usual
CORRECTIVE: heliocentric correction rounded to 4 decimals of a day
CYCLE: E as usual
(HOUR;' ';TIME;' ';CORRECTIVE;' ';CYCLE): one output line

description of the input variables (with numerical exemple for the star AZ Vir) :

INITIAL∆CYCLE←43990	the E value after which the output run starts by the first observable minimum
INITIAL∆TIME←41390.239833	the corresponding C value
RESIDUAL←0.03	the empirical recent O - C
LIMITING∆HOURANGLE←0.21	maximum either side hour angle at predicted minimum time for useful observation, in days
CULMINATION←40921.8601	any Julian date of a culmination of the star at longitude $-8^{o}30'$
MAXIMUM∆CORRECTION←0.0056	the yearly maximum of the heliocentric correction, expressed in fraction of a day
ZERO∆CORRECTION∆TIME←41329.6	any Julian date when the heliocentric correction passes zero ascendingly
STEP←0.5	=o.5 if secondary minima are of interest and not excentric, =1 otherwise
PERIOD←0.14874835	half or entire period, respectively
FINAL∆TIME←41900	the Julian date at which the output run is ordered to stop

description of the internal constants :

-0.3 , 0.35	empirical constants fitting the twilight function for latitude $+47^{o}$
365.242	the tropical year = period of the yearly term of the twilight function
41031.7764	spring equinox 1971 = zero point of the yearly term of the twilight function
41000.7264	$-1/4$ + a mean Julian noon for longitude $-8^{o}30'$ = zero point of the daily term of twilight function
0.99726957	the sidereal day
13.5	o.5 + 13 = rounding bias + zero point shift between Julian time and central European time
365.25636	the sidereal year = period of yearly variation of the heliocentric correction

K. Locher

Note on the Approximate O - C values FG Gem and TW UMa

During the night of JD 2441390 (1972 March 14) I was able to observe the ascending branches of the lightcurves of these neglected eclipsing binaries, which led me to the deduction of the following O - C values. These values should only be regarded as guidance to further observations of the entire eclipse lightcurves of these stars:

FG Gem: $-0^d.05$ TW UMa: $-0^d.08$

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New Elements for the Eclipsing Binary A Y Puppis

From 26 minima of AY Pup observed by K.Locher since 1967, I obtained the following elements using the common method of least square deviations:

Min hel JD = 2 426 371.430 + 0.4689607 x E

Each single minimum was given the same weight. Table 3 contains all observed minimum times, which have been published earlier, along with the O-C values from the above mentioned elements.

Table 3

O		O - C	O		O - C
2439554.388	I	+0.004	2440594.537	I	-0.002
834.589	II	0.000	629.479	II	+0.002
905.403	II	+0.001	650.345	I	-0.001
932.358	I	-0.009	655.280	II	+0.010
940.344	I	+0.005	658.310	I	-0.008
944.312	II	-0.013	913.667	II	0.000
2440180.669	II	-0.012	926.562	I	-0.002
181.630	II	+0.010	2441027.386	I	-0.004
221.485	II	+0.004	028.326	I	-0.002
252.441	II	+0.008	279.696	I	+0.005
256.423	I	+0.004	280.637	I	+0.008
299.324	II	-0.005	308.525	II	-0.007
536.630	II	+0.007	324.472	II	-0.005

R.Diethelm

probable Change of Period of B O Monocerotis

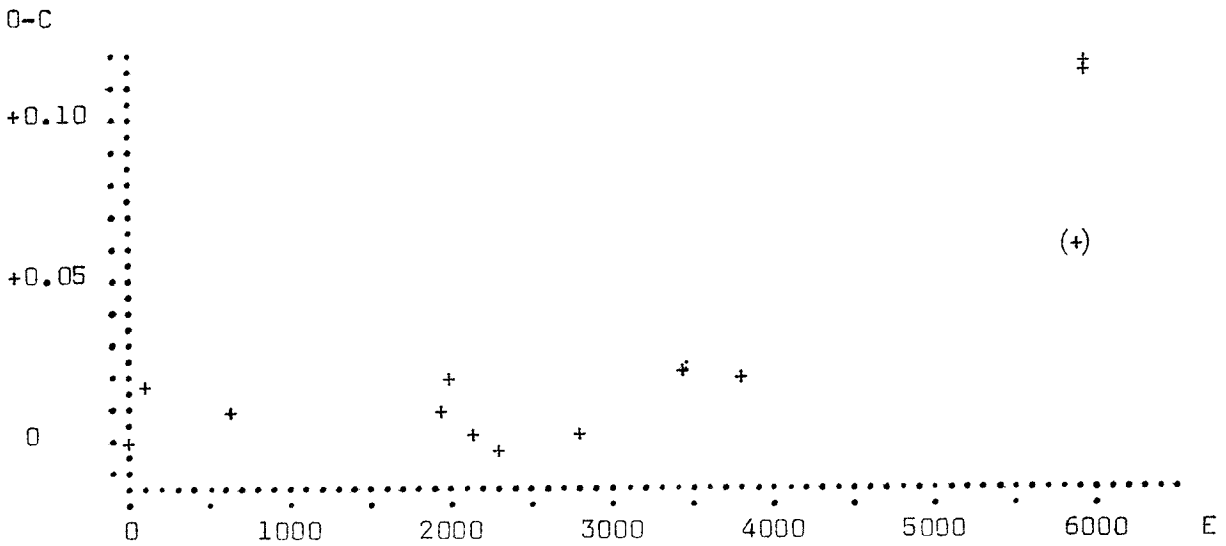
I would like to call your attention to this eclipsing binary. Observations obtained by BBSAG members in 1972 show large positive O - C values against the elements from the GCVS 1969. Table 4 contains these minima along with 9 timings of minimum from earlier years (A.Soloviev, II3 5, II3 8; R.Szafraniec, AAc 4, AAc 5, AAc 8, AAc 10), while figure 3 shows these O - C values plotted against time. Further observations seem to be very interesting and should lead to establishing the new period.

R.Diethelm

Table 4

O	E	O - C	observer	O	E	O - C	observer
2428394.076	82	+0.016	Soloviev	2434455.439	2806	+0.001	Szafraniec
2429655.745	649	+0.010	Soloviev	2435848.418	3432	+0.020	Szafraniec
2432539.571	1945	+0.009	Szafraniec	2436638.354	3787	+0.019	Szafraniec
617.448	1980	+0.017	Szafraniec	2441324.615:	5893	+0.059:	Locher
2433002.399	2153	+0.001	Szafraniec	391.423	5923	+0.114	Peter
358.422	2313	-0.004	Szafraniec	391.426	5923	+0.116	Diethelm

figure 3



P r e l i m i n a r y N o t e o n t h e P e r i o d o f C Y O p h i u c h i

According to the GCVS 1969 the period of this eclipsing binary is 49 / n days. From a rough survey started in 1971 I guess that n may be 2 and that in the next future minima would occur near the following dates:

1972 May 4
28
June 22
July 16 etc.

K.Locher

E r r a t a

ORION 90 , p. 130, 1965 :

O and O-C of the reported minimum of Y Leo are erroneous by exactly one hour and should therefore be increased by 0.042

BBSAG Bulletin 1 , p. 4 , 1972 :

The sign of the O-C of minima no. 3247 & 3248 (X Tri) must be changed to -

BBSAG Prediction Book 1972 :

U Cep : All minima are predicted 1/2 to 1 hour too early

BO Mon : The systematic correction announced in Errata of BBSAG Bulletin 1 is still considerably too small and should read +2 1/2 to +3 hours