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**NEW ELEMENTS FOR 80 ECLIPSING BINARIES**

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The public availability of the ASAS-3 database (Pojmanski, 2002) has given the opportunity of searching for variability in a large number of southern stars that lie between magnitudes 8 and 13, extending the range to 7-14 if proper care in analysing the data is taken. This study presents new elements for eclipsing binaries determined using ASAS-3 and Hipparcos (Perryman et al., 1997) databases. TASS data (Droege, 2003) were also used for some selected stars in equatorial zones. Some new eclipsing binaries are also presented. Two catalogues have been used to detect the candidates for this study: the Hipparcos Catalogue and the New Catalogue of Suspected Variable Stars (NSV) (Kukarkin and Kholopov, 1982) and its supplement (NSVS) (Kazarovetz et al., 1998). All stars showing mean  $H_p$  magnitudes close to the maximum  $H_p$  values in the Hipparcos Variability Annex were identified and their ASAS-3 data subsequently obtained. Some turned out to be constant, but most of them were bona-fide eclipsing binaries. This approach excludes the detection of EW-type binaries. Stars classified as possible eclipsing systems (of all types) in the NSV catalogues were also checked using the ASAS-3 database. Most of them turned out to be true eclipsing binaries and some were pulsating stars, mostly of the SR and RR-types. Also checked were stars with a spectral type between O and G that had no given classification within the NSV catalogues, often with positive results. The current paper features the first set of results of this study. The method of bisected chords was used to determine times of minima. The accuracy depends on the quantity and quality of the observations. Elements were found with AVE (Barberá, 1999) and a Microsoft Excel period search utility kindly provided by Patrick Wils (Wils, 2003). Suspect observations (saturated data in ASAS-3 and flagged observations in the Hipparcos Epoch photometry) were discarded before any analysis was undertaken. Hipparcos observations have been transformed to V using a table by the author (Otero, 2001). Table 1 shows the list of variables. The first column gives the variable star designation by alphabetical order according to the GCVS (blank for newly discovered variables). The following columns give another identifier; the brightness range of the variable, with the magnitude of secondary eclipse between brackets; the epoch of minimum light derived from the complete dataset; the period; the variability class and the spectral type with a note to the spectral type source.

**Table 1.** New elements for 80 eclipsing binary stars.

Variable	Star Name Other ID	Magnitude range (V)	Epoch (HJD2440000+)	Period (days)	Type	Spectral type
AK For	HIP 016247	9.12–9.57 (9.33)	12655.671	3.98100	EA	K4V (4)
DK Tuc *	HIP 110842	6.85–7.06 (6.92)	8323.542	5.337933	EA	A1mA5-F0 (1)
DN Cru *	HIP 060786	8.76–9.05(9.04:)	12654.849	9.88134	EA	B8V (1)
DN Tuc *	HIP 114175	8.51–8.70 (8.68)	12068.780	5.85488	EA	F3V (1)
FM Leo	HIP 054766	8.44–8.94(8.93:)	8202.940	6.72863	EA	F7V (5)
	GSC 7915 0741	9.78–10.01 (9.99)	12470.531	0.841185	EW:	
	HD 101131	7.13–7.24 (7.17)	7964.840	9.64645	EA	O6.5 V((f))+O8.5 V (6)
	HD 174110	9.15–9.24 (9.22)	12104.641	29.717	EA	B8III (1)
IQ Lup	HIP 070840	10.31–10.66(10.43)	8682.838	3.54005	EA	G0 (12)
KT CMa *	HIP 032758	9.40–9.76 (9.6:)	8700.185	5.19010	EA	B7II/III (5)
MP TrA *	HIP 078526	7.79–7.92 (7.85)	8077.897	2.069719	EA	B7Ib/II (1)
NSV 00969	HD 017886	9.28–9.90 (9.32)	12564.723	2.59226	EA	A2/A3V (3)
NSV 03376	HD 053649	9.02–9.16 (9.13)	12785.566	3.5230	EB	B0.5III (8)
NSV 03526	GSC 7638 2163	12.39–13.56(12.52)	12183.820	2.15233	EA	
NSV 03589	HD 058872	7.82–8.23 (8.08)	12784.540	7.0508	EA	F2V (2)
NSV 03608	GSC 7116 1545	11.87–12.47(12.43)	12877.892	0.92015	EW	
NSV 03646	HD 060476	7.86–8.13(7.94:)	12763.433	2.6713	EA	B8II/III (4)
NSV 03688	HD 061961	7.98–8.33 (8.12)	12643.764	0.780408	EB	A3III (4)
NSV 03887	HD 066671	9.11–9.32 (9.25)	11928.652	7.2845	EA	A3V (4)
NSV 03934	HD 068296	8.72–9.09 (8.97)	11964.603	2.02218	EA/KE	B8V (3)
NSV 04120	GSC 7135 1108	11.11–11.59(11.37)	11965.577	1.49296	EB	
NSV 04419	GSC 5470 0539	10.48–11.11(10.58)	12732.719	3.15077	EA	A3 (14)
NSV 04542	GSC 8953 1247	10.87–11.50(11.45)	12615.737	0.80110	EW	
NSV 04561	HD 309731	10.38–11.18(11.06)	11948.606	3.16583	EA/KE	A5 (9)
NSV 04950	GSC 9219 1118	10.81–11.38(11.32)	11880.770	3.51151	EA	
NSV 05643	GSC 7242 0828	11.80–12.65(12.57)	11905.805	0.323464	EW	
NSV 05704	GSC 7246 1161	11.20–12.2(12.18:)	12454.529	0.3483075	EW	
NSV 07337	GSC 6191 1122	11.14–13.1 (11.22)	12845.597	1.238751	EA	
NSV 07597*	HIP 080022	8.67–8.86 (8.85)	8022.005	5.66215	EA	F6V (1)
NSV 07976*	HD 151475	8.00–8.22 (8.21)	12102.557	0.770478	EW/KE	B2V (13)
NSV 08117*	GSC 7372 0122	10.59–10.78(10.64)	12929.460	2.08355	EB:	A0 (11)
NSV 08266	GSC 6812 0691	11.55–12.7 (12.57:)	12726.1	53.05	EB	
NSV 08766	GSC 6235 2570	12.7–14.0:(14.0:)	12756.766	3.40949	EA	
NSV 09510	GSC 8343 1979	10.14–10.63(10.57)	12764.755	2.41887	EA	F8 (15)
NSV 09870	HD 163233	9.17–9.72 (9.70)	12441.669	4.24319	EA	A0IV (11)
NSV 10497	GSC 6265 0740	11.56–12.7 (11.86)	12442.697	4.11315	EB	
NSV 11243	HD 172666	10.05–10.52(10.27)	12104.601	6.4478	EA	A9IV (11)
NSV 12416	GSC 7451 0595	12.86–13.74:(13.6:)	12180.497	2.6954	EA	
NSV 13346	GSC 7968 1243	11.75–12.46(12.14)	12025.820	1.62873	EA	
NSV 13389	GSC 7968 0581	12.82–13.47:(13.45:)	12465.696	2.018848	EA	
NSV 13515	HD 200670	7.65–8.05 (8.00)	12623.549	0.410687	EW	F6/F7V (3)
NSV 13551	GSC 5779 0162	12.4–12.95:(12.85:)	12540.611	0.429583	EW	
NSV 13712	HD 204179	7.73–8.12 (8.04)	12437.798	0.753572	EW	F3IV/V (3)
NSV 13737	HD 204370	7.50–8.18(8.14:)	12854.862	5.9532	EA	A9V (2)
NSV 15107	HIP 002486	9.70–9.92 (9.75)	8635.666	2.277687	EA	F3V (3)
NSV 15203	HIP 004332	8.67–9.16 (8.90)	12227.588	11.03574	EA	G5V (3)
NSV 15212*	HIP 004505	9.99–10.18(10.04)	11881.544	1.577216	EA:	F2V (3)
NSV 17376*	HIP 034775	9.26–9.42 (9.39)	8496.256	1.60498	EB	F8 (11)
NSV 18844	HIP 057032	8.41–8.57:(8.53:)	8009.675	3.115733	EA	A2V+F6V (1)
NSV 20064*	HIP 069617	9.55–9.71(9.64:)	12738.708	2.20957	EA:	B2V (16)
NSV 20311*	HIP 075994	7.87–7.98 (7.90)	8574.241	1.086152	EB:	F3V (1)
NSV 20329	HIP 076254	8.57–8.76 (8.73)	8127.076	4.73065	EA	A4V (1)
NSV 20495*	HIP 078808	10.07–10.36(10.34:)	8657.588	3.97413	EA	F5 (15)
NSV 20579*	HIP 079970	8.86–9.04 (9.01)	7963.349	4.00305	EA	B9IV (2)
NSV 20831	HD 326440	10.09–10.52(10.35)	12481.518	3.92070	EA	B0.5V (8)
NSV 21910	HIP 085377	8.90–9.08 (8.96)	7921.793	1.859839	EB	B4III (2)

**Table 1.** New elements for 80 eclipsing binary stars.

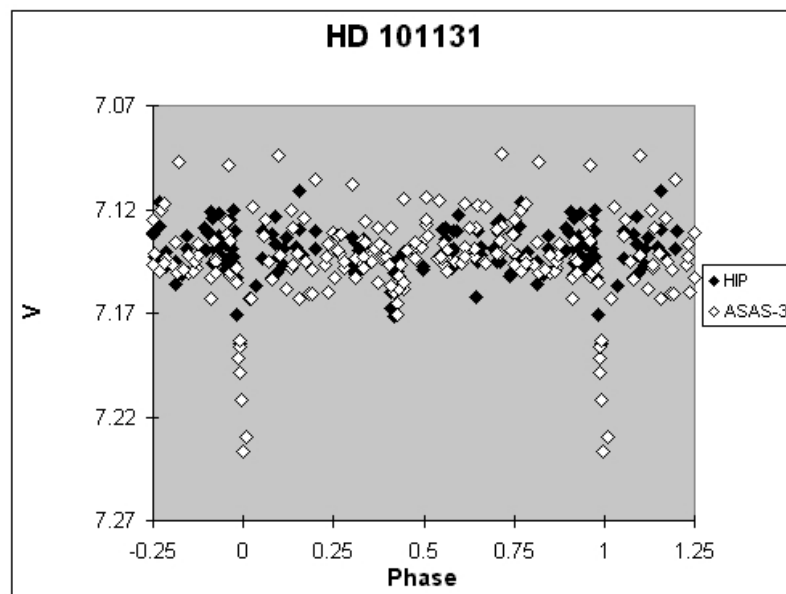
Variable	Star Name Other ID	Magnitude range (V)	Epoch (HJD2440000+)	Period (days)	Type	Spectral type
NSV 24609	HIP 092372	9.30–9.57 (9.35)	12760.834	2.59849	EB	A0V: (17)
NSV 24630*	HIP 092943	8.09–8.40 (8.26)	12810.870	3.88181	EA	B9V (18)
NSV 24714	HIP 094482	8.91–9.01 (8.98)	12070.764	6.07195	EB	B6III (5)
NSV 24931*	HIP 098034	8.53–8.62 (8.61)	8404.165	2.69466	EB	F5/F6V (2)
NSV 24968	HD 189676	8.27–8.64 (8.43)	12527.618	3.40078	EA	B9 (11)
NSV 25330	HIP 102842	9.21–9.48 (9.34)	12845.852	2.47867	EA/RS:	G2/G3V (1)
NSV 25363*	HIP 102935	7.59–7.69 (7.64)	7985.661	0.806982	EB	F0V (4)
NSV 25590*	HIP 105915	9.18–9.33 (9.23)	11905.532	1.155466	EB	F5V (1)
NX Vel	HIP 042433	7.19–7.29 (7.26)	8256.485	2.91990	EA	O8V: (19)
RZ Cae *	HIP 021213	7.62–7.90 (7.78)	8092.281	2.486955	EA	A4V (3)
SW Pyx *	GSC 6569 3789	10.76–13.6: (10.88)	12056.450	2.98328	EA	
V340 Vel *	HIP 050463	7.83–7.96 (7.93)	11928.774	3.55953	EA	A3mA6-A7 (2)
V349 Vel *	HIP 051355	9.53–9.68 (9.67)	8710.806	3.02447	EA	F3(IVp Sr) (2)
V362 Pav	HIP 092330	7.39–7.62 (7.44)	8223.088	2.748435	EA	A2mA5-A9 (1)
V373 Nor *	HIP 080545	8.46–8.76 (8.64)	8997.670	4.94787	EA	B9V (1)
V414 Pup *	HIP 039229	8.79–9.12 (8.94)	12167.867	4.74922	EA+ACV	Ap Si (4)
V438 Pup *	HIP 041250	5.95–6.19 (6.17)	7976.370	4.9350	EA	B3V (2)
V963 Cen *	HIP 064941	8.60–8.98 (8.77)	11950.730	15.2693	EA+RS:	G2V (1)
V1046 Sco*	HIP 078919	9.25–9.66 (9.63)	8528.387	11.11641	EA	A1mA7-F0 (3)
V1082 Sco*	HIP 086163	10.0–10.48(10.34)	12096.300	23.446	EA	B0.5Ib (8)
V2365 Oph	HIP 083891	8.86–9.14 (8.94)	7909.540	4.86562	EA	A2 (11)
V2383 Oph*	HIP 086509	10.23–11.09(10.48)	12083.640	0.5022043	EA+BY	K7V (20)
VV Crt	HIP 056139	9.39–9.62 (9.6:)	8624.332	2.295599	EA/RS:	G2V (4)
WZ Pic *	HIP 026772	9.20–9.60 (9.27)	8836.287	1.21672	EA	A2mA7-A9 (1)

Sources of spectral type: (1) Houk and Cowley, 1975. (2) Houk, 1978. (3) Houk, 1982. (4) Houk and Smith-Moore, 1988. (5) Houk and Swift, 1999. (6) Gies et al., 2002. (7) Schalen, 1935. (8) Kennedy, 1983. (9) Nesterov et al., 1995. (10) Garrison et al., 1977. (11) Wright et al., 2003. (12) Perryman et al., 1997. (13) Whiteoak, 1963. (14) Kholopov et al., 2003. (15) Spencer and Jackson, 1939. (16) Feast et al., 1957. (17) Buscombe, 1998. (18) Buscombe, 1999. (19) Morgan et al., 1955. (20) Uppgren et al., 1972.

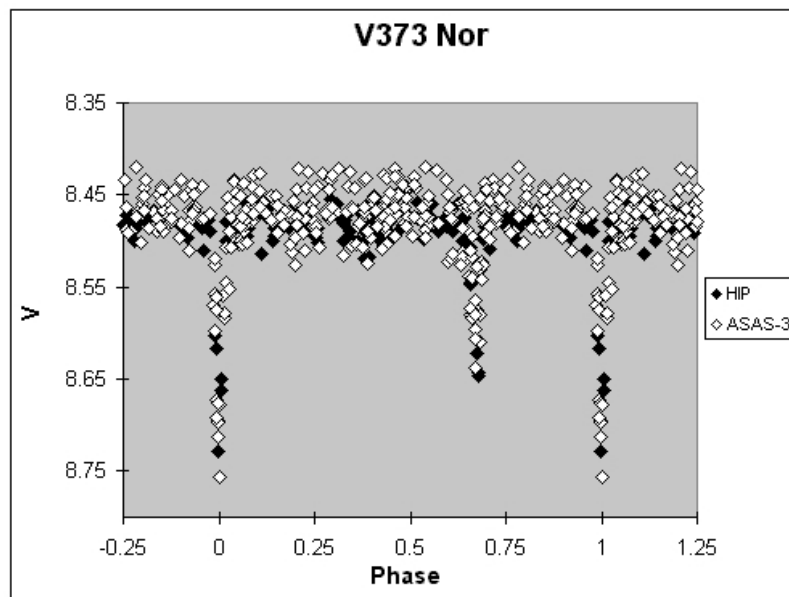
Notes on individual stars:

DK Tuc = Visual binary. A= 6.9; B= 10.2. Sep. 2''1 (Perryman et al., 1997)  
 DN Cru = Secondary eclipse might be the primary. Eccentric system.  
 DN Tuc = Period might be half the value given. Very short eclipses.  
 GSC 7915 0741 = CPD -38 7598. Might be an RRc-type star with half the period.  
 HD 101131 = HIP 56726 in the open cluster IC 2944. Eccentric. Slight apsidal motion. Period for primary eclipse given. Studied as a non-eclipsing system by Gies et al. (2002).  
 HD 174110 = BD-10 4817.  
 KT CMa = Wrong period suggested in the HIP catalogue. (9.480 d.)  
 MP TrA = Eccentric system. Visual binary. A= 8.5; B= 8.6 Hp. Sep. 0''1 (Perryman et al., 1997).  
 NSV 07597 = Visual binary. A= 9.2; B= 10.0 Hp. Sep. 0''6 (Perryman et al., 1997)  
 NSV 07976 = V magnitudes calibrated with GCPD data (Mermilliod et al., 1997). ASAS-3 data contaminated by companion.  
 NSV 08117 = Might be EA-type.  
 NSV 15212 = Might be EB-type.  
 NSV 17376 = Koen and Eyer (2002) give per= 0.8025 d.  
 NSV 20064 = Might be EB-type.

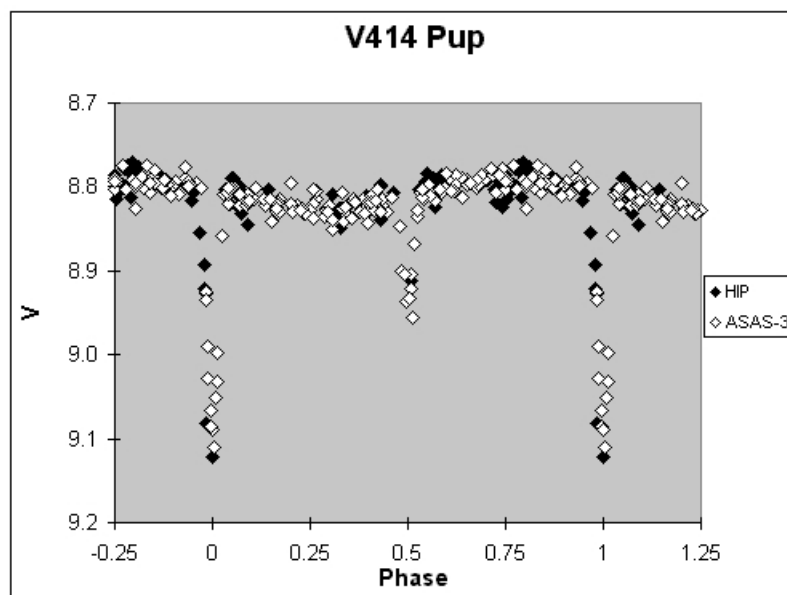
NSV 20311 = Might be EA-type. Koen and Eyer (2002) give per= 0.5431 d.  
 NSV 20495 = Visual triple. AB= 6''8; AC= 10''5 (Worley and Douglass, 1997).  
 NSV 20579 = Eccentric binary.  
 NSV 24630 = Eccentric. Slight apsidal motion. Period for primary eclipse given.  
 NSV 24931 = Koen and Eyer (2002) give per= 1.34736 d.  
 NSV 25363 = Handler (1999) wrongly classified it as a DSCT? with a 0.526 d. period.  
 NSV 25590 = Koen and Eyer (2002) give per= 0.57773 d.  
 RZ Cae = Visual binary. A= 7.8; B= 9.6. Sep. 3''1 (Perryman et al., 1997).  
 SW Pyx = No period in the literature.  
 V340 Vel = Visual binary. A= 8.3; B= 9.2 Hp. Sep. 0''3 (Perryman et al., 1997).  
 V349 Vel = Also an intrinsic variable? (ACV: or DSCT:). Binariness may have caused problems with HIP photometry. Visual binary. A= 10.0; B= 11.2 Hp. Sep. 1''1.  
 V373 Nor = Eccentric system.  
 V414 Pup = Synchronous rotation. ACV and EA period are the same. ACV var. = 0.05 mag.  
 V438 Pup = Very eccentric. Multiple system. A= 6.9; a= 8.0; B= 7.0 (Tokovinin, 1997). Sep. AB= 0''45; Aa= 0''049 (Hartkopf et al., 1996). Period discovered by visual observations. HIP catalogue suggested 5.699 d.  
 V963 Cen = Very eccentric. 0.08 mag. scatter at maximum: possible RS-type.  
 V1046 Sco = Eccentric.  
 V1082 Sco = Very eccentric. Also possible ACYG-type.  
 V2383 Oph = Koen and Eyer (2002) give per= 0.12555 d.  
 V4386 Sgr = Too few observations of minima II. Secondary minimum might be the primary.  
 WZ Pic = Koen and Eyer (2002) give per= 0.60835 d.



**Figure 1.** Lightcurve of HD 101131 showing Hipparcos and ASAS-3 observations.



**Figure 2.** Lightcurve of V373 Nor showing Hipparcos and ASAS-3 observations.



**Figure 3.** Lightcurve of V414 Pup showing Hipparcos and ASAS-3 observations.

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