

This article was downloaded by:[Bochkarev, N.]
On: 10 December 2007
Access Details: [subscription number 746126554]
Publisher: Taylor & Francis
Informa Ltd Registered in England and Wales Registered Number: 1072954
Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



Astronomical & Astrophysical Transactions

The Journal of the Eurasian Astronomical Society

Publication details, including instructions for authors and subscription information:
<http://www.informaworld.com/smpp/title~content=t713453505>

Catalogue of massive close binaries with early-type components of the main sequence: observed characteristics

T. S. Polushina ^a

^a Astronomical Observatory of A. M. Gorjki Ural State University, Ekaterinburg, Russia

Online Publication Date: 01 June 2004

To cite this Article: Polushina, T. S. (2004) 'Catalogue of massive close binaries with early-type components of the main sequence: observed characteristics', *Astronomical & Astrophysical Transactions*, 23:3, 213 - 227

To link to this article: DOI: 10.1080/10556790410001691997

URL: <http://dx.doi.org/10.1080/10556790410001691997>

PLEASE SCROLL DOWN FOR ARTICLE

Full terms and conditions of use: <http://www.informaworld.com/terms-and-conditions-of-access.pdf>

This article maybe used for research, teaching and private study purposes. Any substantial or systematic reproduction, re-distribution, re-selling, loan or sub-licensing, systematic supply or distribution in any form to anyone is expressly forbidden.

The publisher does not give any warranty express or implied or make any representation that the contents will be complete or accurate or up to date. The accuracy of any instructions, formulae and drug doses should be independently verified with primary sources. The publisher shall not be liable for any loss, actions, claims, proceedings, demand or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.

CATALOGUE OF MASSIVE CLOSE BINARIES WITH EARLY-TYPE COMPONENTS OF THE MAIN SEQUENCE: OBSERVED CHARACTERISTICS

T. S. POLUSHINA*

Astronomical Observatory of A. M. Gorjki Ural State University, Ekaterinburg 620083, Russia

(Received 16 September 2003)

Compilations of observable data for 176 massive close binaries with components earlier than approximately B5 of the main sequence are presented.

Keywords: Massive close binaries; Gas around binaries; Catalogue of star characteristics

1 INTRODUCTION

A catalogue of massive close binaries with early-type components of the main sequence was created. This catalogue includes physical, geometrical and evolution characteristics of these objects, spectral and photometry specifics and orbiting specifics. The aim of this work was to research observational phenomena of gas presence around these binaries. The catalogue also contains data on radio and X-ray observations.

The catalogue can be used for the creation of observational programmes, for analysis and interpretation of the binary star observational data and for statistical investigations.

It is created from the database of Galactic massive close binaries ($m > 10m_{\odot}$) with early-type components in Microsoft Access. This database is compiled from the *General Catalogue of Variable Stars* (GCVS) (Kholopov *et al.*, 1985), the eighth catalogue of the orbital elements of spectroscopic binary systems (Batten *et al.*, 1989), and the Sternberg Astronomical Institute card catalogue of variable stars and current original publications. It excludes O(f), O((f)) and WR stars and systems with relativistic objects. The current sample includes 176 close binaries earlier than about B5. The results of systematization are in two tables. Table I contains the monitoring list of massive close binaries with their basic data. 73 of these systems have been the subject of some spectral observations and some observations of light curves; therefore the absolute parameters of these systems may be determined. Table II consists of massive close binaries with early-type components of the main-sequence catalogue, which consists of these 73 systems. They are grouped in the following configurations: detached main-sequence systems,

* E-mail: tatyana.polushina@usu.ru

TABLE I Monitoring list of massive close binaries with early-type components.

Database number N	Name in GCVS	Henry Draper number	Spectral type	Component masses $m_1 + m_2$ (solar-units)	Neighbourhood	Comments spectral types	Number of references
1	V337 Aql	177284	B0.5V + B2.5V	16 + 10		*	70
2	V599 Aql	176853	B3.5V + B3.5V	10.5 + 6.5			44
3	V688 Aql	353804(b)					22
4	V822 Aql	183794	B2.5 + B9.5		1.67"	*	29
5	V1182 Aql	175514	O8 + B1	37.8 + 13.5	0.012' (?)		30
6	V1331 Aql	173198	B1 + B2	13 : + 8 :			8
7	LR Ara		B2				6
8	EO Aur	34333	B1III + O9 - B0	20.4 + 20.4		*	43
9	IU Aur	35652	O9.5V + B0.5IV - V	21.3 + 14.4		*	68
10	IY Aur		B5 : p				6
11	LY Aur	35921	O9 + O8.5	30 + 18.6	0.6", NGC 1907	*	83
12	SZ Cam	25638/9	O9IV + B0.5V	15.3 + 10.7	18", NGC 1502	*	86
13	UW CMa	57060	O7.5Iab + O9.7Iab	25 + 25	NGC 2362	*	184
14	EW CMa	56014	B3IIIe	>2000	0.102'		99
15	FF CMa	55173	B2V + B2V		Cr-132a		14
16	FM CMa	53756	B1Vn		In area of nebula SN		12
17	FZ CMa	52942	B2.5 + B2.5	18	In area of nebula SN	*	20
18	DW Car	305543	B1V + B1V		Cr-228		19
19	EM Car	97484	O8.5V + O8V	22.3 + 20.3		*	27
20	EN Car	306180	B3 - B5		Tr-18		7
21	GG Car	94878	B0Ve			*	36
22	GL Car	306168	B0.5 + B1	13.5 + 13		*	4
23	GW Car	83475	B1IIIln	9 + ?		*	18
24	HH Car	303503	O8V + B0III	17 + 14	5", 13", 15"	*	12
25	HI Car	305867	B4 - B5				8
26	HP Car	89714	B1III		0.4"		7
27	QX Car	86118	B2V + B2V	9.27 + 8.48		*	12
28	QZ Car	93206	O9.5Ib + O9.5III	$m_1 + m_2 = 60$	4-pte, Co 228 nebula π Car	*	37

29	V348 Car	90707	B III + B0III(e)	$m_1 + m_2 = 65$	IC 2581 nebula in H II area core	*	15
30	V381 Car	92024		14.6+?		*	2
31	V560 Car	93205		63.3+24.5	Tr16		1
32	TX Cas		B1.5 - 1.3 + B7				32
33	UU Cas		B0.5III	34.5 + 25.7		*	40
34	XX Cas		B4Vn + B8			*	40
35	AO Cas	1337	O9.5I + O8V	29 + 24.5		*	149
36	AQ Cas		O8.5III + O8.5III*	29.5 + 24.6		*	32
37	CC Cas	19820	O8.5III + B0.5V	24.2 + 11.8		*	97
38	DN Cas		O8V + O			*	21
39	GU Cas						9
40	IL Cas		B5*				10
41	KL Cas		OB				6
42	LR Cas		B5				17
43	OX Cas		B2.5 + B3V	11.0 + 10.3	NGC 381	*	47
44	V368 Cas	19644	B3 + (A1)	6.7 + 1.7			19
45	V373 Cas	224151	B0.5II + B4III	21 + 15.5		*	55
46	V375 Cas		B3				29
47	V381 Cas		B3				10
48	V486 Cas	3950	B1V + B2III		Stock 208		6
49	V518 Cas		B3				4
50	V529 Cas	15238	B5V*				7
51	V649 Cas	219634	(B2.5V + B5.5V)mk	8.7 + 3.0		*	12
52	V742 Cas	698	B7II - Ib + [B0.5V]	15 + 14			5
53	RZ Cen	113016	B1IV : n				14
54	SV Cen	102552	B1V + B6.5II - III	11.2 + 9.4		*	71
55	VZ Cen	103146	B1III				9
56	BF Cen	100915	B8	8.7 + 3.8	NGC 3766		13
57	BH Cen	308826	B3 + B3		IC 2944	*	26
58	LW Cen	101084	B1.5V		IC 2944		12
59	LZ Cen	102892	B0.5 + B1*	12.5 + 13.5		*	16
60	MN Cen	99769	B2 - B4		7''		7

(continued)

TABLE I Continued.

Database number N	Name in GCVS	Henry Draper number	Spectral type	Component masses $m_1 + m_2$ (solar-units)	Neighbourhood	Comments spectral types	Number of references
61	MQ Cen	309074	B6 – B7				6
62	V346Cen	101837	B0.5 – I + B0.5 – I	11.8 + 8.4		*	5
63	V380Cen	116795	B4 – B5				13
64	V495Cen		Be				5
65	V593Cen		B1Vn		Stock 16		6
66	V606Cen	115937	B0 – B1	14.7 + 8.0			8
67	V883Cen	123335					1
68	XZ Cep		B1..5II/III + B1..III – V	14.2 + 18.1		*	45
69	AH Cep	216014	B0.5Vn + B0.5n	17.7 + 15.6		*	96
70	AI Cep	239767	B0.5Vp				23
71	CW Cep	218066	B0.5V + B1V	11.8 + 11.1	20"	*	100
72	DH Cep	215835	O6V(m) + O6n	29.4 + 25.0	NGC 7380	*	55
73	DN Cep		B5				10
74	EM Cep	208392	B0.5V + B1Ve		19.8", NGC 7160	*	40
75	IL Cep	216629	B3e		7"		6
76	LZ Cep	209481	O9.5V + B2V	19.7 + 9.33		*	62
77	NY Cep	217312	B0.5V + B2V	12.9 + 9.4	10"	*	31
78	β Cep		B2IIIeV				1
79	AQ Cir		OB				4
80	AB Cru	106871	O8V + B0.5	19.7 + 7.0			12
81	AI Cru		B2IVe		NGC 4103		20
82	Y Cyg	198846	O9.3 + O9.4	17.5 + 17.3		*	198
83	DL Cyg		B3 + A0	14.8 + 9.1			13
84	KV Cyg		B1V				17
85	V380Cyg	187879	B1..5II + B2V	12.1 + 7.3		*	90
86	V382Cyg	228854	O7V + O(7 – 8)V	26.0 + 19.3	11"	*	78
87	V448Cyg	190967	O9.5e + B1Ib – II	25.2 + 14.0	NGC 6871	*	98
88	V453Cyg	227696	B0.5IV + B0.5IV	13.9 + 10.7	NGC 6871	*	102

89	V454Cyg	B5		IC 4996					5
90	V455Cyg	B2ep						*	17
91	V470Cyg	B2e + [B4]	13.8 + 12.1						26
92	V478 Cyg	O9.5V + O9.5V	16.6 + 16.3	4", Dol 42				*	48
93	V483 Cyg	B6							5
94	V498 Cyg	B1 : III							18
95	V698 Cyg	B2							18
96	V699 Cyg	B2		Near nebula				*	5
97	V725 Cyg	Of + Of							6
98	V729 Cyg	O7Ianf + O6IIa	58.5 + 13.7	1.5"					56
99	V1187 Cyg	B1		IC 1318, in nebula					4
100	V1356 Cyg	B0V							5
101	V1362 Cyg	B5IIIn							11
102	V1418 Cyg	B5							1
103	V1481 Cyg	B2V		NGC 7128					6
104	V1765 Cyg	B0.5Ib + B2V	23.5 + 11.7					*	6
105	60 Cyg	B1Ve		Visual component of magnitude 4.5 fainter, is 2.6" away				*	7
106	SV Gem	B3 + ?							15
107	WW Gem	B6	10.5 + 10.3						27
108	LT Gem	B1V		Associated with Gem I					4
109	CS Lac	B5V							9
110	CY Lac	B5							5
111	OO Lac	B7							10
112	OT Lac	B5							2
113	HI Mon	B4							7
114	V450 Mon	B5							2
115	V505 Mon	B3III - II	50 + 27	NGC 2244				*	29
116	V521 Mon	A0							3
117	V578 Mon	B2		NGC 2244, nebula Rosette					6
118	V640 Mon	O7.5I + O6I*	51.0 + 42.5					*	51
119	V641 Mon	B1.5IV + B2							2
120	TU Mus	O8.5Vn + [O8]*	17.2 + 10.8*					*	27

(continued)

TABLE I Continued.

Database number N	Name in GCVS	Henry Draper number	Spectral type	Component masses $m_1 + m_2$ (solar-units)	Neighbourhood	Comments spectral types	Number of references
121	BR Mus		B3				9
122	Z Nor	143882	B3IV*				11
123	GN Nor		B0 + B0	15.0 + 15.0		*	3
124	UW Ori		B1 + B2	13 + 6.7			23
125	VV Ori	36695	B1 + B5	10.8 + 4.5*		*	114
126	V1028 Ori	255930	B2IV		8.7", 13.1", NGC 1976, nebula		3
127	δ Ori	36486	O9.5II + B1*	23 + 9	0.15", 14"	*	236
128	η Ori	35411	B1V + B2e	14.9 + 12.3 + 13.6 3.6	0.037", 1.6"	*	154
129	ι Ori	37043	O9III + B1III*	36.1 + 21.4		*	7
130	$8\pi^5$ Ori	31237	B2III - IV + B0V	8.9 + 3.7		*	86
131	ψ Ori	35715	B1III + B2V*	12.0 + 7.6*	2.7", 83"	*	65
132	τ Ori		O9III + B1III			*	1
133	V436Per = 1Per	11241	B1.5V + B5V	10 + 10		*	29
134	38 o Per	23180	B2III + B2V		0.98', IC 348	*	140
135	40 o Per	22951	B0V				19
136	δ Pic		O9V + B3III*	42 + 15*		*	59
137	SU Psc		B3III + B5III				17
138	V Pup	65818	B1V + (B1.5)	17.0 + 9.3*	7", 19", H II area	*	91
139	V402 Pup	64315	O6Vn				1
140	V2349 Sgr	170097	B1Vne				6
141	V3792 Sgr	165814			10"	*	4
142	V3903 Sgr	165921	O7V + O9V	30 + ?	Co 367		8
143	FV Sco	155550	B6V*				17
144	V453 Sco	163181	O8 + B0I*	22 + 13	13.5"		68
145	V474 Sco		B3 - 5				2
146	V499 Sco	158155	B5*				15
147	V565 Sco	322138	B3				3

148	V590 Sco	326527	B5			NGC 6231		4
149	V700 Sco	317690	B5					3
150	V701 Sco	317844	B1 – B1.5+		10.3 + 10.3	NGC 6383	*	30
			B1 – B1.5n					
151	V861 Sco	152667	B0Ia + B2V		40 – 60 + 12.5*	NGC 6232	*	66
152	V883 Sco	152901	B2.5Vn			9'		1
153	V954 Sco	149779	B2IV					1
154	V918 Sco	149404	O8.5I + O7III(f)					1
155	V1007 Sco	152248	O7Ib : (m)(fp)		29.6 + 29.9			2
156	V1012 Sco	155775	O					1
157	V1036 Sco	159176	O		30.9 + 32.6			1
158	β Sco		B0V + B2V		20.7 + 13.1		*	1
159	μ' Sco	151890	B0V + B2V*		14.0 + 9.3		*	37
160	RY Sct	169515	O6 – O7 + O9.5 –		11 + 35*		*	79
			B0					
161	MY Ser	167971	O8Ibf				*	6
162	CT Tau	249751	B2 + B2*					7
163	AA Vel	301073	B2					3
164	AC Vel	93468	B3III/V + B3III/V					3
165	EQ Vel		B7					2
166	FX Vel		Be				*	2
167	FY Vel	72754	B2Ib:photoelectric					4
168	α Vir	116658	B1III – IV + B2 –		10.9 + 7.1	0.0025", 0.05", 0.5"		78
			2.5V*					
169	AT Vul	345185	B3					5
170	DR Vul	339770	B0V + B0.5V		13.2 + 12.1	Quadruple	*	19
171		15558	O5III(f)			IC 1805		1
172		17514			48 + 13.5			1
173		93403	Of + O8		42.8 + 28.2	Tr13		1
174		166734	O		31.5 + 33.7			1
175		191201	O		17.4 + 16.3			1
176		228766	O		37.0 + 34.9			1

TABLE II Catalogue of massive close binaries with early-type components in mean-sequence systems.

Database number	Name in GCVS	Shape of light curve	Evolutionary status of system	P (days)	ΔP	Spectral type	Spectral specifics	Component masses		Orbital eccentricity e	Neighbourhood	Comments spectral types
								$m_1 + m_2$ (solar units)	Δm (solar units)			
<i>Detached main-sequence systems</i>												
17	FZ CMa			1.273	Variable	B2.5 + B2.5		18			In area of nebula H II λ 5295	*
19	EM Car	EA		3.414		O8.5V + O8V		22.3 + 20.3		0.012		*
22	GL Car	EA		2.422		B0.5 + B1	*	13.5 + 13		0.1457		*
24	HH Car	EA		3.231	Variable	O8V + B0III	He emission	17 + 14		0.16*	5''; 13''; 15''	*
43	OX Cas	EA		2.489	Variable	B2.5 + B3V		11.0 + 10.3		0.058	NGC 381	*
51	V649 Cas	EB		2.391		(B2.5V + B5.5V)mk	Variable	8.7 + 3.0	*			*
59	LZ Cen	EB	1 near the end of their life in MS	2.758		B0.5 + B1*		12.5 + 13.5				*
68	XZ Cep	EB	2	5.097	Variable	B1.5II/III + B1.1III - V		14.2 + 18.1		0.09		*
71	CW Cep	EA		2.729		B0.5V + B1V	He emission variable	11.8 + 11.1	10^{-8} *	0.058, 0.032	20''	*
77	NY Cep	EA		15.275		B0.5V + B2V		12.9 + 9.4		0.49	10''	*
83	DL Cyg	EA; EB		4.830		B3 + A0		14.8 + 9.1				*
85	V380 Cyg	EA	Near the end of their life in MS, 2 near ZAMS	12.426		B1.5II + B2V	He much greater	12.1 + 7.3		0.22		*
88	V453 Cyg	EA		3.889		B0.5IV + B0.5IV		13.9 + 10.7		0.02	NGC 6871	*
92	V478 Cyg	EA		2.881		O9.5V + O9.5V		16.6 + 16.3		0.019	4'', Dol 42	*

127	δ Ori	EA		5.732	Variable	O9.5III + B1*	P Cyg $\lambda\lambda$ NV, SII V, CIV, variable $T_1 = T_2$	23 + 9		0.09, decrease	0.15"; 14"	*
128	η Ori	EA + β Cep		7.989 + 0.432		B1V + B2e		14.9 + 12.3 + 13.6	9×10^{-11}	0.1	0.037"; 1.6"	*
170	DR Vul	EA		2.250 days + 18 years + 47 year	Variable?	B0V + B0.5V		13.2 + 12.1		0.06 – 0.092	4-ple	*
1	V337 Aql	EB		2.734	Variable	B0.5V + B2.5V	$e(P)$	16 + 10			Quadruple	*
28	QZ Car	EB		5.998 + 20.73		O9.5Ib + O9.5III	H α emission	$m_1 + m_2 = 60$			Co 228 nebula π Car	*
36	AQ Cas	EA	Hotter star fill.	11.721	Variable	O8.5III + O8.5III*		29.5 + 24.6	5×10^{-7}	0.035		*
37	CC Cas	EB		3.368	Variable	O8.5III + B0.5V		24.2 + 11.8	$3 \times 10^{-7-6}$	0.102* (sp)		*
44	V368 Cas	EA		4.452		B3 + (A1)		6.7 + 1.7				*
87	V448 Cyg	EB	2 fill.	6.520	Variable	O9.5e + B1Ib-II	H α emission	25.2 + 14.0	$10^{-6-10^{-7}}$	0.038	NGC 6871	*
118	V640 Mon		MS	14.396		O7.5I + O6I*	H α variable; emission; P Cyg λ	51.0 + 42.5	*			*
124	UW Ori	EB	2 fill.	2.038	Variable	B1 + B2		13 + 6.7				*
151	V861 Sco	EB		7.848 + 0.6		B0Ia + B2V	H α emission	40 – 60 + 12.5*	3×10^{-6}	0.080* (sp)	NGC 6232	*
<i>Contact systems</i>												
2	V599 Aql	EB		1.849		B3.5V + B3.5V		10.5 + 6.5		0.033		*
13	UW CMa	EB		4.393	Variable	O7.5Iab + O9.7Iab	H emission*	25 + 25	*	0.353, 0.06 – 0.15	NGC 2362	*
18	DW Car	EA		1.328		B1V + B1V					Cr 228	*
20	EN Car	EA		1.535		B3-B5					Tr 18	*
23	GW Car	EB		1.129		B1IIIcn		9 + ?			IC 2581	*
29	V348 Car	EB		5.562		B1III + B0III(e)	β Cep*	$m_1 + m_2 = 65$			nebula, in core H II	*
57	BH Cen	EB	ZAMS	0.792	Variable	B3+B3					IC 2944	*
65	V593 Cen	EW		0.755		B1Vn					Stock 16	*

(continued)

TABLE II Continued.

Database number	Name in GCVS	Shape of light curve	Evolutionary status of system	P (days)	ΔP	Spectral type	Spectral specifics	Component masses $m_1 + m_2$ (solar units)	Δm (solar units)	Orbital eccentricity e	Neighbourhood	Comments spectral types
74	EM Cep	EB; EW	Main sequence (He overabundant)	0.806	Variable	B0.5V+B1Ve	rapidly rotating magnetic B star		8×10^{-4}		19.8"/NGC 7160	*
79	AQ Cir	E		1.150 (0.572)		OB						
97	V725 Cyg	EA		6.6(1.463)	Variable	Of+Of						*
113	HI Mon	EB		1.574		B4	*					*
120	TU Mus	EB, EW		1.387	Variable	O8.5Vn + [O8]*	*	17.2 + 10.8*				*
121	BR Mus	EB	Near ZAMS	0.798		B3						
142	V3903 Sgr	EB	ZAMS	1.744		O7V+O9V		30+?		0.03	Co 367	*
150	V701 Sco	EW, EB	Near ZAMS	0.762	Variable	B1-B1.5 + B1-B1.5n		10.3 + 10.3	1.5×10^{-5} *		NGC 6383	*
152	V883 Sco	EB		1.295	Variable?	B2.5Vn					9"	
153	V954 Sco	EW		1.269		B2IV						
162	CT Tau	EW		0.667	Variable	B2 + B2*						*
166	FX Vel	EB, KE		1.052		Be						*
<i>Detached main sequence-semi-detached main sequence systems</i>												
12	SZ Cam	EB		2.698	Variable	O9IV+B0.5V		15.3 + 10.7			18", NGC 1502	*
69	AH Cep	EB; EA		1.775	Variable	B0.5Vn+B0.5n	*Ha emission variable	17.7 + 15.6		0.034		*
80	AB Cru	EA	2 fill.	3.413	Variable	O8V+B0.5	2 star have strong the overabundance of Helium	19.7 + 7.0				*
84	KV Cyg	EA		2.839		B1V						
<i>Detached main sequence-contact systems</i>												
8	EO Aur	EA		4.065		B1III+O9-B0	*Variable, Ultraviolet	20.4 + 20.4		0.051		*
66	V606 Cen	EB		1.495		B0-B1						
86	V382 Cyg	EB, EW		1.886	Variable	O7V+O(7-8)V		26.0+19.3	4×10^{-5}		11"	*

125	VV Ori	EA, EB		119.086/1.485	Variable	B1+B5	10.8 + 4.5*	0.29	*
<i>Semidetached main sequence-contact systems</i>									
9	IU Aur	EB		1.811	Variable	O9.5V+B0.5IV-V	21.3 + 14.4	3 body	*
11	LY Aur	EB		4.002 (4.025)		O9+O8.5	30 + 18.6		*
15	FF CMa	EB		1.213		B2V+B2V			*
35	AO Cas	EII		3.523	Variable	O9.5I+O8V	29 + 24.5	5 * 10 ⁻⁶	*
46	V375 Cas	EB	2 fill	1.473		B3		0.037	
54	SV Cen	EB	2 fill?	1.658	Variable	B1V+B6.5II-III	11.2 + 9.4	10 ⁻⁴	*
58	LW Cen	EB		1.003		B1.5V			
63	V380 Cen	EA, EB		1.087		B4-B5			
76	LZ Cep	EII	2 fill	3.070		O9.5V+B2V	19.7 + 9.33	0.049	*
81	AI Cru	EA		1.418		B2Ive			
138	V Pup	EB	2 fill, near ZAMS*	1.454	Variable?	B1V+(B1.5)	17.0 + 9.3*		*
<i>Detached main sequence-semidetached main sequence - contact systems</i>									
32	TX Cas	EB	ZAMS, 2 fill.	2.927	Variable	B1.5-1.3+B7			
72	DH Cep	EII	Near ZAMS	2.111		O6V(m)+O6n	29.4 + 25.0	2 * 10 ⁻⁶	*
91	V470 Cyg	EII	Both near ZAMS	1.873		B2e+[B4]	13.8 + 12.1	0.056	
136	δ Pic	EB	2 fill., near ZAMS*	1.672		O9V+B3III*	42 + 15*	0.05	*
159	μ' Sco	EB	2 fill., both ZAMS	1.446	Variable?	B0V+B2V*	14.0 + 9.3	0.057	*
<i>Giant and supergiant systems</i>									
21	GG Car	EB		62.086, 31.030		B0Ve			*
45	V373 Cas	E	Both evolved	13.419		B0.5II+B4III	21 + 15.5	5 * 10 ⁻⁷	*
167	FY Vel	EB		33.72		B2Ipe		0.137	*

H α emission / N,C
PCyg

H I e, P Cyg*
*H α emission
*H emission

H α emission / N,C
PCyg

H I e, P Cyg*
*H α emission
*H emission

semidetached main-sequence systems, contact systems, four groups which are combinations of these, and finally giant and supergiant systems.

The full electronic version of this catalogue consists of two databases. One of these is the database of observational data and of the results of theoretical analysis. The other database includes the individual bibliography and abstracts to data sources for each binary. This full version of the catalogue may be requested from the author by email (Tatyana.Polusina@usu.ru).

2 DESCRIPTION

All variables in the present data set in Tables I and II are arranged in the order of their names inside constellations. The asterisks in the fourth and fifth columns specify large differences in estimates of mass and of spectral types on account of spectral peculiarities. Greek or Latin adopted star names before variability was discovered and the very well known are arranged at the end of the list.

In Table I the spectral types and component masses are according to the latest investigation. The asterisks in the seventh column denote the existence of important additional data concerning observational specifics of the system given later in Table III. The eighth column shows the number of original publications on the star that were employed in the computation of the database.

In the third column of Table II the types of light curve areas follows: EA, Algo-type light curve; EB, B Lyrae-type light curve; Ell, binary systems, whose variability is caused by ellipsoidal shapes; EW, W uMa-type light curve. The evolutionary status classification in the fourth column takes into account the degree of inner Roche lobe filling by the components: fill., filling of inner roche lobes; ZAMS, zoo-age main sequence. In the fifth column the orbital period P is given to three decimal points; the sixth column indicates the change an orbital period, if it exists. The spectral type and component masses (in the seventh and ninth columns respectively) are according to the latest investigation employing spectral and photometry observations. In the eighth column on spectral specifics, the asterisk specifies a spread of more than 3σ , and variations in spectral type estimates on account of spectral peculiarities. In the tenth column, Δm is the mass transfer or mass loss; the asterisk indicates large differences in mass estimates, by a factor of more than 2. The twelfth column, entitled neighborhood, indicates the presence of visual multiple stars. As in Table 1 the asterisks in the final column relate to Table III given later.

The spectral parameters obtained by different researchers are highly discrepant for many systems. The spectral types of some systems vary with phase of period. Spectral types are indicated with an asterisk in these instances. The same applies to the masses of components.

Some stars in the catalogue have masses $m < 10m_{\odot}$. This may account for the large spread in mass estimates often obtained by different workers.

TABLE III Additional comments on the observational data of the systems.

Database number N	Name in GCVS	Comments
1	V337 Aql	Light curves variable
4	V822 Aql	Light curves variable; Sp variable; radio source
8	EO Aur	One of the components may be variable.
9	IU Aur	One of the components has an envelope; inclination increase; orbit may be precessing with $P = 335$ years; Third-body mass $m_3 = 18m_\odot$; third-body high intensity $L_3 = 20\%$; Quadruple system
11	LY Aur	Depth of minimum varies with a magnitude of 0.02–0.03
12	SZ Cam	May be 4-ple system with $P = 50.7$ years; light curves variable.
13	UW CMa	X-ray variable; envelope expanding with $V = 1000 \text{ km s}^{-1}$
17	FZ CMa	Possible third body; asynchronous rotation
19	EM Car	Apsidal motion with $P = 42$ years
21	GG Car	Envelope; variable component
22	GL Car	Apsidal motion
23	GW Car	Possible apsidal motion
24	HH Car	Possible apsidal motion; misleading light curves
27	QX Car	Possible apsidal motion
28	QZ Car	X-ray source; envelope
29	V348 Car	Possible β Cep-type pulsation
30	V381 Car	Main component, β Cep-type star
33	UU Cas	Light curves variable
34	XX Cas	Light curves variable; possible apsidal motion
35	AO Cas	Possible apsidal motion; envelope expanding with $V = 2400 \text{ km s}^{-1}$; light curves variable and asymmetric
36	AQ Cas	Light curves asymmetric; accretor with asynchronous rotation $F_1 = 7.3$
37	CC Cas	Light curves variable; radio variable
38	DN Cas	Light curves asymmetric
43	OX Cas	Apsidal motion; radio source
45	V373 Cas	Apsidal motion
51	V649 Cas	Light curves variable; L_3 ; 4U2316 + 61
54	SV Cen	Amplitude increase; common envelope; possible third body; P variable; light curves variable and asymmetric
57	BH Cen	Possible third body; short-period pulsations on light curves and small pulsations of light curves about 50 years
59	LZ Cen	Asynchronous rotation; possible apsidal motion
68	XZ Cep	Common envelope + envelope about second component; mass outflow variable; possible third body
69	AH Cep	Amplitude variable; $m_3 = 8m_\odot$; $P_2 = 62$ years; light curves variable and asymmetric
71	CW Cep	Possible non-stationary envelope; apsidal motion with $P = 39$ years; asynchronous rotation; light curves asymmetric; possible non-stationary star
72	DH Cep	Reddening in agreement with cluster reddening; apsidal motion with $P = 2.6$ years; asynchronous rotation; light curves variable
74	EM Cep	Light curves variable; common envelope; occurrence of flares
76	LZ Cep	Possible apsidal motion with $P = 369$ years
77	NY Cep	Possible apsidal motion with $P = 1300$ years; $V_{\text{ap}} = 0.28' \text{ years}^{-1}$
82	Y Cyg	Apsidal motion with $P = 47.6$ years; stellar wind on ultraviolet resonance lines
85	V380Cyg	Apsidal motion with $P = 1395$ years?
86	V382Cyg	Shape of the light curves and depth of min II are variable; common envelope; min II = $F(\tau)$
87	V448Cyg	Circumstellar matter; not star rotating in more than synchronous; light curves variable and asymmetric; long-period variability

(continued)

TABLE III Continued.

<i>Database number N</i>	<i>Name in GCVS</i>	<i>Comments</i>
88	V453Cyg	Circumstellar matter; apsidal motion with $P = 72$ years; non-stationary has active and non-active stages
90	V455Cyg	P variable
92	V478Cyg	Misleading light curves; apsidal motion with $P = 26.3$ years
97	V725Cyg	Radio variability.
104	V1765 Cyg	Possible apsidal motion with $P = 1930$ years
105	60 Cyg	V1931 Cyg
115	V505 Mon	Possible envelope
118	V640 Mon	Eruptive variability; common envelope; asynchronous rotation of first component; Plackets star
120	TU Mus	Light curves variable
123	GN Nor	Possible apsidal motion with $P = 500$ years
125	VV Ori	Light time effect with $P = 1200$ years; m_3 agrees with A3V; light curves variable
127	δ Ori	Common envelope expansion with $V = 1000\text{--}2000$ km s ⁻¹ ; third body; apsidal motion with $P = 227$ years; radio source; soft X-ray source depends on phase period
128	η Ori	Common envelope; one of the components variable; third body; multiple system; $P = 9.2$ years
129	j Ori	Apsidal motion; asynchronous rotation; variable stellar wind
130	$8\pi^5$ Ori	Apsidal motion with $P = 215$ years; X-ray source variable
131	ψ Ori	Possible apsidal motion with $P = 149$ years; misleading light curves
132	τ Ori	Very large eccentricity
133	V436Per	Possible apsidal motion
134	38 o Per	Envelope; radio emission
136	δ Pic	Common envelope + envelope about one of the components
138	V Pup	Common envelope; apsidal motion; X-ray source variable
141	V3792 Sgr	Light curves very variable
150	V701 Sco	Envelope?
151	V861 Sco	4U 1702-42; 38'' pulsations; X-ray source variable; possible second is black holes
158	β Sco	Apsidal motion with $P = 735$ years
159	μ' Sco	Common envelope expansion with $V = 300$ km s ⁻¹ ; apsidal motion with $P = 133$ years
160	RY Sct	Common envelope + envelope about second component; in H II area; radio source
161	MY Ser	Multiple system
166	FX Vel	Light curves variable
170	DR Vul	Apsidal motion with $P = 36.56$ years

References

- Batten, A. H., Fletcher, J. M., and MacCarthy, D. G. (1989) *Publ. Dom. Astrophys. Observ.* 17.
- Kholopov, P. N., Samus, N. N., Frolov, M. S., Goranskij, V. P., Gorynya, N. A., Karitskaya, E. A., Kireeva, N. N., Kukarkina, N. P., Kurochkin, N. E., Medvedeva, G. I., Perova, N. B., and Shugarov, S. Yu. (1985) *General Catalogue of Variable Stars*, Nauka, Moscow.

