Divinus Lux Observatory Bulletin: Report # 27

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Abstract: This report contains theta/rho measurements from 120 different double star systems. The time period spans from 2012.189 to 2012.443. Measurements were obtained using a 20-cm Schmidt-Cassegrain telescope and an illuminated reticle micrometer. This report represents a portion of the work that is currently being conducted in double star astronomy at Divinus Lux Observatory in Flagstaff, Arizona.

This article contains a listing of double star measurements that are part of a series, which have been continuously reported at Divinus Lux Observatory, since the spring of 2001. The selected double star systems, which appear in the table below, have been taken exclusively from the 2006.5 version of the Washington Double Star Catalog, with published measurements that are no more recent than ten years ago. There are also some noteworthy items that are discussed, which pertain to a few of the measured systems.

First of all, a significant theta/rho shift, because of proper motion by one of the components in a double star system, is being noted. In particular, proper motion by the "A" component, for HJ 162 Aa-B, has caused a rho value increase of 3.7% during the past decade.

Also being noted is a listing in the WDS catalog that doesn't appear to reflect theta/rho values that are obtained at the telescope. Specifically, the proper motion vectors and the measurements for ARN 15 AC (17037+1336) imply that the theta/rho values should be decreasing. However, the catalog values suggest a rho value increase and no change in the theta value. Perhaps AC warrants further scrutiny by others in order to determine, more accurately, what these parameters actually are.

Some other apparent discrepancies in the catalog involve the STF 2319 (18277+1918) star system. To begin with, the measurements for the AC components appear to more nearly match the parameters for BC, while the BC measurements appear to match the AC parameters. In addition, the theta measurements for AD appear to reflect a quadrant flip and the listed measurement more nearly matches parameters for BD, rather than AD. The table below reflects proposed corrected values for the STF 2319 components.

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NAME	RA DEC	MAGS	PA	SEP	DATE	N
FOR 1AB	12021+4303	5.2 6.6	61.5	275.51	2012.189	1
ARN 5AC	12021+4303	5.2 8.3	24.8	375.25	2012.189	1
FOR 1AD	12021+4303	5.2 8.8	267.6	364.39	2012.189	1
STF1597	12049+0910	9.4 10.5	147.3	30.61	2012.189	2
A 2982A-BC	12072-0605	7.7 10.5	192.6	142.20	2012.189	3
STF1603	12081+5528	7.8 8.2	82.7	22.22	2012.189	4
STF3078	12093+1118	8.5 10.7	303.3	9.38	2012.189	5
STF1616AC	12145+0847	7.5 10.1	296.3	167.88	2012.189	6
STF1619AB	12151-0715	8.0 8.2	266.4	6.91	2012.189	7
BLL 29AB	12154+5702	3.3 10.1	73.2	180.71	2012.189	8
SHJ 143AC	12225+2551	4.8 8.9	166.8	65.18	2012.189	9
ARN 6AD	12225+2551	4.8 10.1	132.2	213.30	2012.189	9
HJ 209	12239-0303	10.6 10.6	146.6	23.70	2012.189	10
FOX 175	12273+0714	8.2 10.0	320.2	62.21	2012.189	11
STF 21AB	12289+2555	5.2 6.6	250.4	145.16	2012.189	12
BUP 143AC	12300+5132	6.2 8.4	333.3	211.33	2012.191	13
SHJ 146AB	12312+0120	7.6 8.6	289.9	49.87	2012.191	14
STF1652	12325+2106	10.1 10.3	178.0	5.93	2012.191	15
HJ 212	12335+1012	10.0 10.1	264.3	21.73	2012.191	16
STF1658AC	12351+0727	8.0 8.9	265.9	128.38	2012.191	17
S 639AB	12387-0422	6.6 9.9	109.3	56.78	2012.191	18
GIR 3AC	12387-0422	6.6 10.1	359.2	164.91	2012.191	18
ENG 47AB	12392-0800	4.6 8.8	136.0	176.76	2012.191	19
ENG 47AD	12392-0800	4.6 8.9	331.3	320.94	2012.191	19
HJ 217AB	12459+1009	10.1 10.4	24.0	33.08	2012.191	20
STT 577	12464+0932	5.6 8.7	209.9	143.19	2012.191	21
BUP 145	12472+1157	6.1 9.9	0.7	139.24	2012.191	22
ENG 49AB	12489+1206	7.1 10.7	348.3	175.78	2012.191	23
STF1658AB	12519+1910	7.3 7.7	201.6	15.80	2012.191	24
SHJ 123AC	12519+1910	7.3 8.1	327.5	241.94	2012.191	24
S 643	12540-1802	7.0 8.1	294.6	23.70	2012.191	25
STF1701	12593+0630	7.5 9.8	305.0	21.23	2012.191	26
BU 112A-BC	13006+1822	6.2 10.1	359.5	139.24	2012.227	27
STF1715	13042+1924	9.9 10.5	232.1	7.41	2012.227	28
STF1719	13073+0035	7.5 8.1	359.1	6.91	2012.227	29
STF1721	13085+0107	10.1 10.2	357.5	6.42	2012.227	30

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NAME	RA DEC	MAGS	PA	SEP	DATE	N
HJ 162Aa-B	13149-1122	7.0 8.0	44.6	111.59	2012.227	31
S 649CA	13288+5956	5.5 8.1	110.3	181.70	2012.227	32
STU 25CD	13288+5956	5.5 8.7	60.8	413.76	2012.227	32
ARN 9CE	13288+5956	5.5 10.2	106.8	380.19	2012.227	32
HLM 5	13310+3626	10.0 10.7	160.9	5.93	2012.227	33
SHJ 165	13324-1240	7.6 8.5	78.1	47.89	2012.227	34
STT 269AB-C	13329+3454	6.8 9.1	331.8	123.44	2012.227	35
ARN 8AB-D	13329+3454	6.8 8.3	258.8	351.55	2012.227	35
ODE 11	13337+4801	9.5 9.8	134.9	124.43	2012.227	36
HJ 228	13356+1012	6.5 8.9	15.4	70.11	2012.230	37
STF1769AC	13381+3910	7.8 9.1	258.9	56.29	2012.230	38
STF1773AB	13416+0736	9.9 9.9	209.9	30.12	2012.230	39
STF1773AC	13416+0736	9.9 10.6	101.7	56.29	2012.230	39
HJ 230	13422+1807	10.2 10.6	319.9	63.69	2012.230	40
HJ 2676	13430+5002	7.7 10.0	126.5	27.16	2012.230	41
STF1775AB	13435-0416	7.1 10.0	336.4	27.65	2012.230	42
STF1782	13451+1822	7.9 9.8	185.4	30.12	2012.230	43
STF1793	13591+2549	7.4 8.4	243.1	4.94	2012.230	44
BUP 155AC	13594+2515	10.6 9.7#	91.3	312.05	2012.230	45
ARN 10AD	14016+0133	4.2 9.6	85.2	342.66	2012.265	46
STF1812AB-C	14124+2843	7.8 9.4	107.8	14.32	2012.265	47
STF1850	14286+2817	7.1 7.6	261.3	25.18	2012.265	48
STT 582AB	14347+2945	4.5 10.6	84.9	215.28	2012.265	49
BU 941AB-C	14358+0015	8.6 7.7#	115.7	191.58	2012.265	50
SHJ 186AB	14509-1603	2.7 5.1	313.9	231.08	2012.265	51
H 51AB	14576-0010	5.5 10.2	224.2	86.41	2012.265	52
ARN 13AC	14576-0010	5.5 10.2	173.5	267.61	2012.265	52
SHJ 191	14596+5352	6.8 7.5	341.7	40.49	2012.265	53
STF1904	15041+0530	7.1 7.3	347.5	9.88	2012.325	54
STF1916	15099+3859	8.3 10.5	331.0	9.88	2012.325	55
STF1921	15120+3840	8.5 8.7	282.4	30.61	2012.325	56
STT 292	15141+3147	6.0 9.2	157.6	118.50	2012.325	57
SHJ 195	15145-1826	6.7 8.3	139.9	46.91	2012.325	58
STT 138AB	15201+6023	7.6 7.7	195.2	152.08	2012.325	59
STT 138AC	15201+6023	7.6 9.2	162.2	90.36	2012.325	59
STF 28Aa-BC	15245+3723	4.3 7.0	170.9	108.13	2012.325	60

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NAME	RA DEC	MAGS	PA	SEP	DATE	N
BUP 162	15249+5858	3.3 8.7	49.5	253.79	2012.325	61
KU 108	15277+4253	7.5 9.6	318.9	40.49	2012.325	62
HJ 254AB	15303+1543	9.9 10.4	277.5	17.28	2012.328	63
STT 298AB-C	15360+3948	6.8 7.6	327.6	121.46	2012.328	64
ARY 10	15377+2329	8.5 9.3	315.4	79.49	2012.328	65
ARY 11	15383+2431	6.9 8.7	326.2	149.11	2012.328	66
ENG 54	15419-1941	4.7 10.3	282.6	169.85	2012.328	67
A 2230AC	15440+0231	5.9 9.0	207.7	193.55	2012.328	68
A 2230CE	15440+0231	9.0 7.2	235.3	172.81	2012.328	68
STF1973	15464+3627	7.6 8.7	321.2	30.61	2012.328	69
ENG 56AB	16160+1126	7.3 10.6	252.1	62.21	2012.383	70
HJ 225	16201-2003	7.4 8.1	332.8	46.91	2012.383	71
SHJ 226AB-C	16205-2007	7.6 8.3	20.1	12.84	2012.383	72
STF2051	16294+1036	7.6 9.3	18.9	13.83	2012.383	73
STF2079	16396+2300	7.5 8.1	90.5	16.79	2012.383	74
H 127	16436+0637	7.7 9.0	293.6	53.33	2012.383	75
GLP 12AC	16439-0032	10.1 10.1	300.3	105.66	2012.383	76
STF 2090AC	16449+0957	7.9 10.7	24.6	69.13	2012.383	77
STF 2090AD	16449+0957	7.9 10.1	27.9	90.36	2012.383	77
STF 2090CD	16449+0957	10.7 10.1#	38.4	21.73	2012.383	77
STT 585AB	16450+0605	6.6 10.3	190.7	162.94	2012.383	78
STT 585AC	16450+0605	6.6 10.7	252.5	129.36	2012.383	78
KPR 3AC	16458+3538	7.4 10.2	87.6	235.03	2012.383	79
SHJ 239AB	16458+0835	5.1 9.2	228.4	84.93	2012.383	80
ENG 58AB	16469+0215	6.7 8.8	217.3	149.11	2012.383	81
WAL 74AC	16487+3556	7.4 10.4	215.8	96.78	2012.383	82
STF 33AB	17037+1336	5.9 6.1	116.7	306.13	2012.402	83
STF 33Ab	17037+1336	5.9 10.3	137.8	177.75	2012.402	83
ARN 15AC	17037+1336	5.9 8.5	11.0	231.08	2012.402	83
HJ 264AE	17075+3557	10.5 5.4#	100.1	234.91	2012.402	84
STF2141	17166+0325	8.3 10.6	122.7	39.50	2012.402	85
SHJ 247	17208-1251	4.3 9.2	25.2	45.43	2012.402	86
S 687AB	17209+2430	5.1 9.3	56.1	223.18	2012.402	87
GUI 41AD	17209+2430	5.1 10.5	221.8	222.19	2012.402	87
STF2166	17279+1123	7.1 8.5	282.2	27.16	2012.402	88
ARY 13	17284+2950	8.6 8.9	89.0	102.70	2012.402	89

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NAME	RA DEC	MAGS	PA	SEP	DATE	N
GUI 18AC	17287+1029	9.3 7.1#	18.5	189.60	2012.402	90
HJ 4964	17348-1115	5.5 9.8	224.7	54.81	2012.402	91
SHJ 251AB	17391+0202	6.2 7.7	327.7	111.59	2012.402	92
SHJ 251AC	17391+0202	6.2 10.7	14.8	133.31	2012.402	92
STF2191AB	17398-0458	7.8 8.4	266.8	26.17	2012.402	93
ENG 62	17425+2434	5.5 9.6	260.8	145.16	2012.402	94
STF2259	17590+3003	7.2 8.4	277.3	19.75	2012.402	95
STT 341AE	18058+2127	7.1 10.2	37.6	66.66	2012.437	96
STT 341AG	18058+2127	7.1 7.6	238.4	133.31	2012.437	96
ENG 63AB	18068+0853	7.0 10.5	246.4	129.36	2012.437	97
STF2291	18102+3402	10.4 10.7	339.6	29.63	2012.437	98
ROE 121AC	18132+1053	10.2 10.7	19.8	39.01	2012.437	99
SHJ 263AB	18179-1848	6.7 9.2	11.3	53.82	2012.437	100
BUP 181AC	18181+2318	6.5 10.0	125.3	154.05	2012.437	101
STF2317AD	18253+2605	7.7 10.2	189.6	44.44	2012.437	102
SCJ 17	18266+0632	8.3 10.6	351.7	51.35	2012.437	103
BU 1326AC	18267+2627	6.5 9.6	60.2	61.72	2012.437	104
GUI 21Aa	18267+2627	6.5 7.1	285.1	162.94	2012.437	104
STF2319AB	18277+1918	8.2 8.4	189.8	5.43	2012.437	105
STF2319AC	18277+1918	8.2 10.6	269.0	42.96	2012.437	105
STF2319AD	18277+1918	8.2 9.1	70.6	157.01	2012.437	105
BU 966AB	18319-1908	6.7 9.0	251.7	66.16	2012.440	106
BU 966AE	18319-1908	6.7 8.8	280.9	143.19	2012.440	106
BU 966AG	18319-1908	6.7 8.0	253.7	429.56	2012.440	106
BU 966AH	18319-1908	6.7 10.3	294.8	72.09	2012.440	106
BU 966AI	18319-1908	6.7 8.9	193.9	164.91	2012.440	106
BU 966BC	18319-1908	9.0 9.2	205.0	164.91	2012.440	106
BU 966BQ	18319-1908	9.0 10.5	199.1	109.61	2012.440	106
BU 966CD	18319-1908	9.2 10.5	170.8	11.36	2012.440	106
BU 966EF	18319-1908	8.8 9.6	290.2	25.18	2012.440	106
BU 966EK	18319-1908	8.8 9.7	26.3	30.61	2012.440	106
BU 966HJ	18319-1908	10.3 10.0#	310.0	44.44	2012.440	106
BU 966JM	18319-1908	10.0 10.3	344.8	70.61	2012.440	106
BU 966SE	18319-1908	8.1 8.8	141.7	131.34	2012.440	106
STT 171AB	18329+3850	6.9 8.0	327.6	150.10	2012.440	107
STF2348AB-C	18339+5221	5.4 8.6	271.2	25.68	2012.443	108

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NAME	RA DEC	MAGS	PA	SEP	DATE	N
ARY 14AB	18340+4121	8.3 10.7	292.7	38.51	2012.443	109
ARY 14AC	18340+4121	8.3 9.3	345.7	118.50	2012.443	109
BU 50AC	18381+3935	9.5 10.4	327.8	72.58	2012.443	110
AG 225AB	18397+4035	10.2 10.3	354.6	6.42	2012.443	111
STF2355AC	18399+0722	6.3 10.5	38.3	109.61	2012.443	112
ARY 16	18407+0240	7.9 10.0	39.6	83.94	2012.443	113
STF2367AB-C	18413+3018	7.0 8.7	191.9	14.32	2012.443	114
H 36AC	18423-0903	4.7 10.6	130.4	51.84	2012.443	115
STF2380	18429+4456	7.2 8.6	8.1	25.68	2012.443	116
ENG 64AC	18470+1811	4.3 10.4	251.7	132.33	2012.443	117
STT 174	18479+1110	7.5 8.3	158.5	104.68	2012.443	118
H 3	18537+3658	5.6 9.8	19.5	175.78	2012.443	119
HJ 5504	18570+0228	7.6 10.7	305.6	68.63	2012.443	120

Companion star is the brighter component.
* Not listed in the WDS CATALOG.

Notes

1. 67 Ursa Majoris. AB=sep. dec. p.a. inc. AC=sep. & p.a. inc. Spect. A7, K0, K0,F5.
2. In Virgo. Position angle increasing. Spect. G0.
3. In Virgo. Sep. increasing; p.a. decreasing. Spect. K2.
4. In Ursa Major. Common proper motion; p.a. increasing. Spect. F8V, F9V.
5. In Virgo. Common proper motion. Sep. & p.a. decreasing. Spect. F5, F5.
6. In Virgo. Sep. & p.a. increasing. Spect. G0, G5.
7. In Virgo. Common proper motion. Sep. & p.a. decreasing. Spect. G5, G5.
8. Delta or 69 Ursa Majoris. Separation decreasing. Spect. A3V.
9. 12 Comae Berenicis. AC & AD = p.a. decreasing. Spect. F5, G, F8.
10. In Virgo. Common proper motion; sep. decreasing. Spect. K, K.
11. In Virgo. Sep. increasing; p.a. decreasing. Spect. K0, G5.
12. Alpha or 17 Comae Berenicis. Relfixed. Common proper motion. Spect. A0, A3.
13. In Canes Venatici. Sep. decreasing; p.a. increasing. Spect. F6V, A3.
14. In Virgo. Relatively fixed. Common proper motion. Spect. A5, F5.
15. In Coma Berenices. Common proper motion; p.a. decreasing. Spect. G0, F8.
16. In Virgo. Relatively fixed. Common proper motion. Spect. G5, K.
17. In Virgo. Sep. & p.a. increasing. Spect. F8, K2.
18. In Virgo. AB=sep. inc. AC=p.a. slightly inc. Spect. M0III, K0.
19. Chi or 26 Virginis. AB=sep. inc. AD=p.a. inc. Spect. K0, F0, K2.
20. In Virgo. Position angle decreasing. Spect. G2V. K.
21. 33 Virginis. Sep. decreasing; p.a. increasing. Spect. K1III, F5.
22. In Virgo. Sep. increasing; p.a. decreasing. Spect. A3V.
23. In Virgo. Sep. increasing; p.a. decreasing. Spect. G5V.

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24. In Coma Berenices. AB=relfix; cpm. AC=sep. dec. Spect. A8IV, F2, G5.
25. In Corvus. Relatively fixed. Common proper motion. Spect. A0, F0.
26. In Virgo. Common proper motion. Sep. & p.a. dec. Spect. G8IV, G.
27. In Coma Berenices. Sep. decreasing; p.a. increasing. Spect. F5V.
28. In Coma Berenices. Common proper motion. Sep. & p.a. increasing. Spect. F8, F8.
29. In Virgo. Common proper motion. Sep. & p.a. decreasing. Spect. F5V, F9V.
30. In Virgo. Relatively fixed. Common proper motion. Spect. F8, F8.
31. In Virgo. Sep. increasing; p.a. decreasing. Spect. G3, K0.
32. In Ursa Major. CA=relfix, cpm. CE=sep. inc., cpm. Spect. A1V, F8, F2, F8.
33. In Canes Venatici. Common proper motion. Sep. & p.a. decreasing.
34. In Virgo. Relatively fixed. Common proper motion. Spect. F3II, F0.
35. In Canes Venatici. AB-C=sep. inc.; p.a. dec. AB-D=sep. dec. Spect. A6III, F5, G0.
36. In Canes Venatici. Relatively fixed. Common proper motion. Spect. G0, G0.
37. In Virgo. Relatively fixed. Common proper motion. Spect. K0, F8.
38. In Canes Venatici. Relatively fixed. Common proper motion. Spect. G5, K2.
39. In Bootes. AB=sep. inc. AC=relfix. Spect. F8, K2, G5.
40. In Bootes. Sep. & p.a. increasing. Spect. K0, K2.
41. In Ursa Major. Separation decreasing. Spect. K0.
42. In Virgo. Position angle increasing. Spect. K2III.
43. In Bootes. Relatively fixed. Common proper motion. Spect. F5.
44. In Bootes. Common proper motion; p.a. slightly increasing. Spect. A5V, A5.
45. In Bootes. Sep. increasing; p.a. decreasing. Spect. K4, K0.
46. Tau or 93 Virginis. Separation decreasing. Spect. A3V, K0.
47. In Bootes. Relatively fixed. Common proper motion. Spect. F2V, F8.
48. In Bootes. Relatively fixed. Common proper motion. Spect. A1V, A1V.
49. Sigma or 28 Bootis. Sep. decreasing; p.a. increasing. Spect. F2V.
50. In Virgo. Separation decreasing. Spect. F8, G5.
51. Alpha (9, 8) Librae. Relatively fixed. Common proper motion. Spect. A3IV, F4IV.
52. In Virgo. AB & AC = position angle increasing. Spect. K1III.
53. In Bootes. Relatively fixed. Common proper motion. Spect. F1V, F1V.
54. In Virgo. Common proper motion; sep. slightly decreasing. Spect. F0V, F0.
55. In Bootes. Common proper motion. Sep. dec.; p.a. inc. Spect. F7V, F8.
56. In Bootes. Relatively fixed. Common proper motion. Spect. A2, A2.
57. In Bootes. Sep. decreasing; p.a. increasing. Spect. K5, K5.
58. In Libra. Relatively fixed. Common proper motion. Spect. F3IV, F5.
59. In Draco. AB & AC = sep. increasing; p.a. decreasing. Spect. F0, F2, K2.
60. Mu or 51 Bootis. Relatively fixed. Common proper motion. Spect. F2IV, GoV.
61. Iota or 12 Draconis. Relatively fixed. Spect. K2III, K7.
62. In Bootes. Relatively fixed. Common proper motion. Spect. G5, K.
63. In Serpens. Relatively fixed. Common proper motion. Spect. G5.
64. In Bootes. Relatively fixed. Common proper motion. Spect. K3V, K0.
65. In Serpens. Common proper motion. Sep. slightly decreasing. Spect. K2, K0.
66. In Serpens. Separation decreasing. Spect. M4, G5.

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67. Kappa or 43 Librae. Position angle increasing. Spect. M0III.
68. Psi or 23 Serpentis. AC = sep. dec. CE = p.a. inc. Spect. G3V, K2, K0.
69. In Corona Borealis. Common proper motion; p.a. decreasing. Spect. F5, G0.
70. In Hercules. Sep & p.a. decreasing. Spect. K0.
71. In Scorpius. Relatively fixed. Common proper motion. Spect. B9, B9.
72. In Scorpius. Relatively fixed. Common proper motion. Spect.A0, A.
73. In Hercules. Sep. & p.a decreasing. Spect. G5III, G5.
74. In Hercules. Common proper motion. Sep. slightly decreasing. Spect. F0, A5.
75. In Hercules. Position angle increasing. K0, F0.
76. In Ophiuchus. Separation increasing. Spect. G0.
77. In Hercules. AC = sep. inc. AD = p.a. dec. CD = sep. & p.a. dec. Spect. K7III.
78. In Hercules. AB = relfix, cpm. AC = sep. dec., p.a. inc. Spect. K0V, K3V, G0.
79. In Hercules. Position angle slightly increasing. Spect. F6V.
80. 43 Herculis. Separation increasing. Spect. K5III, K0.
81. In Ophiuchus. Position angle slightly decreasing. Spect. F0, B8.
82. In Hercules. Sep. & p.a. decreasing. Spect. F2.
83. In Hercules. AB=p.a. & sep. inc. Ab/AC=p.a. & sep. dec. Spect. A1V, K1III, G0.
84. In Hercules. Separation slightly decreasing. Spect. F8, A5.
85. In Ophiuchus. Sep. increasing; p.a. decreasing. Spect. F8.
86. Nu or 53 Serpentis. Sep. & p.a. decreasing. Spect. A2V.
87. 70 Herculis. AB = sep. inc. AD = sep. dec. Spect. A2V, F0.
88. In Ophiuchus. Relatively fixed. Common proper motion. Spect. A5V, A.
89. In Hercules. Sep. increasing; p.a. decreasing. Spect. A0, F8.
90. In Ophiuchus. Sep. increasing; p.a. decreasing. Spect. G5, A2.
91. In Serpens. Relatively fixed. Spect. B8V, F2.
92. In Ophiuchus. AB = relfix; cpm. AC = p.a. decreasing. Spect. K0, F0.
93. In Ophiuchus. Relatively fixed. Spect. F2V, F2.
94. 83 Herculis. Separation decreasing. Spect. K4III.
95. In Hercules. Sep. & p.a. increasing. Spect. G5II, A1V.
96. In Hercules. AE = sep. increasing. AG = sep. decreasing. Spect. G2V, F0.
97. In Ophiuchus. Position angle increasing. Spect. F5.
98. In Hercules. Separation increasing. Spect. A5, F8.
99. In Ophiuchus. Relatively fixed. Spect. A0, A2.
100. In Sagittarius. Position angle slightly decreasing. Spect. B8IV, B9V.
101. In Hercules. Separation decreasing. Spect. K5, F0.
102. In Hercules. Relatively fixed. Common proper motion. Spect. G7III.
103. In Aquila & NGC 6633 open cluster. Separation increasing. Spect. F5, A0.
104. In Hercules. AC & Aa = relatively fixed. Spect. B3V, A0, B3.
105. In Hercules. AB=sep. & p.a. dec., cpm. AC=p.a. dec. AD=p.a. inc. Spect. F5, F5.
106. In Sagittarius (M25 OC). AB=p.a. dec. AE=relfix. AG=sep. inc. Spect. A=G1.5I.
107. In Lyra. Sep. & p.a. increasing. Spect. F8, G5.
108. In Draco. Position angle slightly decreasing. Spect. G9III, F0.
109. In Lyra. AB = sep. dec. AC = sep. inc. Spect. AC = G5, F2.

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110. In Lyra. Separation increasing. Spect. F.
111. In Lyra. Relatively fixed. Common proper motion.
112. In Ophiuchus. Sep. increasing; p.a. decreasing. Spect. G8III.
113. In Serpens. Sep. & p.a. increasing. Spect. F2, R0.
114. In Lyra. Common proper motion; p.a. slightly decreasing. Spect. G3IV, G5.
115. Delta Scuti. Sep. & p.a. decreasing. Spect. F2III.
116. In Lyra. Relatively fixed. Common proper motion. Spect. G8III, F2V.
117. 111 Herculis. Sep. increasing; p.a. decreasing. Spect. A5III.
118. In Aquila. Position angle decreasing. Spect. B9, B9.
119. Delta or 1 Lyrae. Separation slightly increasing. Spect. B2.5V, K.
120. In Serpens. Separation increasing. Spect. F8, A2.