

Divinus Lux Observatory Bulletin: Report 13

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Abstract: This report contains theta/rho measurements from 99 different double star systems. The time period spans from 2007.767 to 2007.915. 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.

A number of months ago, I became involved in working with some of the data that is contained in the 2006.5 CD version of the Washington Double Star Catalog, which has a greatly expanded list of double stars that is not contained in the 2001.0 version. While in the process of doing this, I have noticed that the magnitude listings for the various double stars are more accurate than in the 2001.0 version. There are also far fewer discrepancies between the listings in the 2006.5 version and what is actually observed at the telescope. Because these updates have made the 2006.5 catalog easier to use, I would like to express my appreciation to all of those who have labored to enhance the accuracy of this data.

An additional observation that could be made pertains to neglected doubles, which I have highlighted in a previous article. As was the case with the 2001.0 version, the 2006.5 version still contains a number of **very** neglected pairs that need measurements, but that exceed the capabilities of my instrumentation. One such example is HJ 764 (07374-1109), which is listed with one measurement made in 1820! The components have a rho value of 21" and magnitudes of +10.1 and +10.9. The frustration is that while double stars like this are viewable in my telescope, the companion star is too faint for me to measure when using an illuminated reticle micrometer.

The reason for mentioning this, again, is that researchers with larger telescopes would have the capability to provide such measurements. This could be of some importance since I have viewed a number of pairs, like HJ 764, that exceed the limits of my instrumentation and have had no published measurements for many decades. The fact that these types of double stars still appear in the 2006.5 version of the WDS catalog indicates that there is still a lot of valuable work to be done by those who are equipped to do it. It could be quite rewarding to be the first person to publish measurements of a neglected double star, like HJ 764, in almost 200 years!

As has been done in previous articles, the selected double star systems, which appear in this report, have been taken from the 2001.0 version of the Washington Double Star Catalog, with published measurements that are no more recent than ten years ago. Several systems are included from the 2006.5 version of the WDS. catalog as well. There are also some noteworthy items that are discussed pertaining to the following table.

As in previous reports, several double stars are identified as having undergone significant theta/rho shifts since the last published measurements were made. First of all, two double star systems have displayed increases in the rho values, since 1998,

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because of proper motions by both components. For HDS 478, this increase amounts to 5%, while in the case of ES 167, a 7% increase has been detected. Next, an increase in the theta value has been noted for BU 314 AB-C, amounting to about 2 degrees since 1998. Proper motions by the “AB” components are responsible for this. Another theta value shift, amounting to a decrease of around 2 degrees, has been measured for ARG 66. Proper motion by the companion star has caused this change to take place over the past decade.

Proper motions by the reference point stars, for two selected double stars, have resulted in noteworthy rho value increases as well. For STF 436, a 2.6% increase in the rho value has occurred since 1998, while for HLD 84 AB, an 8.6% increase has been

detected over the same time period. Another rho value increase, worthy of mention, pertains to ROE 28AB. For this double star, proper motions by both components have caused a 7.4% increase since 1998.

Lastly, rho value increases for three additional double stars are significant enough to highlight. In the case of BAL 182, proper motion by the reference point star has caused a 2% increase to occur since 1998. For STF 1133, an 11% increase in the rho value has been measured. Proper motion by the reference point star is responsible for this shift over the past ten years. The final rho value increase of note, in this report, pertains to HJ 767 AB. For this pair, proper motion by the “B” component has caused a 3% increase to occur since 1998.

NAME	RA DEC	MAGS	PA	SEP	DATE	N	NOTES
STF 341	03030-0205	7.5 10.0	222.8	8.89	2007.819	1n	1
STF 356	03067-1319	8.1 10.2	13.1	15.31	2007.819	1n	2
STF 351	03090+4415	9.2 9.7	115.5	27.16	2007.767	1n	3
H 117AB	03112+2225	8.5 10.5	321.3	33.08	2007.858	1n	4
STF 369	03171+4029	6.8 7.7	30.0	3.46	2007.819	1n	5
STF 383	03242+1733	8.4 9.1	120.0	5.43	2007.819	1n	6
STF 391	03293+4503	7.6 8.2	96.0	3.95	2007.819	1n	7
STF 401	03313+2734	6.6 6.9	270.2	11.36	2007.819	1n	8
STF 422	03368+0035	5.9 8.8	271.7	6.91	2007.819	1n	8
STF 436	03409-1237	7.6 9.1	239.3	46.91	2007.819	1n	10
HJ 2198	03422+5436	9.5 10.1	308.2	41.48	2007.767	1n	11
AG 70AB	03423+3716	9.9 10.2	28.1	6.91	2007.767	1n	12
FRK 4	03451+4005	7.5 10.5	133.9	52.34	2007.767	1n	13
KU 81	03451+3425	9.9 10.5	282.7	41.48	2007.767	1n	14
HDS 478	03464-0810	8.5 10.0	348.2	7.90	2007.767	1n	15
ES 167	03474+3521	10.3 10.5	313.9	7.41	2007.767	1n	16
AG 74	03495+1255	9.6 10.7	195.5	11.85	2007.767	1n	17
HLD 66AD	03526-0829	8.2 10.7	13.6	119.49	2007.767	1n	18
SEI 33	03572+3201	9.2 10.1	116.3	27.16	2007.819	1n	19
HJ 2636	04133-0928	9.0 9.8	37.9	20.24	2007.858	1n	20
STF 537	04221-0957	8.2 10.7	352.3	18.76	2007.858	1n	21

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NAME	RA DEC	MAGS	PA	SEP	DATE	N	NOTES
ARG 100AB-C	04230+5937	6.2 9.3	59.5	32.59	2007.858	1n	22
HJ 342AB	04233-0500	7.6 9.5	235.1	17.28	2007.767	1n	23
GAL 368	04253-0932	10.7 10.7	307.6	22.71	2007.786	1n	24
ES 2606AC	04258+4633	9.7 10.6	150.2	28.14	2007.858	1n	25
ES 1522AC	04267+4329	8.4 10.5	101.4	31.11	2007.786	1n	26
GAL 371	04283-1400	10.1 10.5	184.9	19.75	2007.786	1n	27
BRT2636	04293-1226	10.4 10.5	256.1	4.44	2007.786	1n	28
AG 80	04322+3630	9.5 10.7	2.1	15.80	2007.858	1n	29
STF 559	04335+1801	7.0 7.0	277.0	2.96	2007.901	1n	30
HJ 5461AB	04346+2858	5.9 10.3	101.2	25.18	2007.858	1n	31
S 451	04363+4722	7.5 7.9	202.2	55.79	2007.819	1n	32
STF 565AC	04381+4207	7.5 9.7	101.3	23.70	2007.858	1n	33
STF 575	04387-0024	9.4 10.1	159.6	4.44	2007.858	1n	34
HJ 346AB	04413+2837	5.7 10.6	54.1	42.96	2007.786	1n	35
STF 588AC	04433-0937	8.1 10.5	268.9	44.44	2007.786	1n	36
HJ 27	04455-0512	10.1 10.1	51.4	39.50	2007.786	1n	37
BU 314AB-C	04590-1623	5.7 10.3	55.0	53.33	2007.786	1n	38
STF 639	05040-0251	8.6 9.4	80.6	5.43	2007.863	1n	39
HJ 3265AB	05080+3703	10.3 10.2*	137.3	14.81	2007.863	1n	40
STT 61	05096+2947	6.7 8.4	245.1	68.14	2007.893	1n	41
TOB 22AC	05108+3622	9.0 10.5	108.5	29.13	2007.863	1n	42
STF 648AB	05110+3203	8.1 8.8	63.5	4.44	2007.893	1n	43
STT 62	05120+0650	7.5 7.6	51.9	125.41	2007.901	1n	44
BU 1006AC	05123-0212	9.3 10.0	178.4	51.84	2007.863	1n	45
AG 92AB	05154+3020	10.1 10.7	334.9	24.69	2007.863	1n	46
HJ 2253AC	05161+5157	7.8 10.3	11.8	51.84	2007.863	1n	47
HJ 2260AB	05177-1041	10.3 10.5	1.9	31.11	2007.863	1n	48
STF 681	05207+4658	6.6 9.2	180.6	23.21	2007.858	1n	49
SEI 217	05223+3256	9.7 10.5	223.7	21.73	2007.863	1n	50
WNC 2A-BC	05239-0052	6.8 7.0	158.0	2.96	2007.893	1n	51
H 68	05250-0249	7.3 9.1	282.2	135.29	2007.863	1n	52
GAL 180	05252-0956	9.6 10.2	252.9	5.43	2007.863	1n	53
STF 705	05266+3524	10.2 10.7	12.3	18.27	2007.877	1n	54

* Companion star is the brighter component.

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NAME	RA DEC	MAGS	PA	SEP	DATE	N	NOTES
BUP 79AC	05276+3429	5.1 10.7	70.7	62.21	2007.877	1n	55
BLL 15AD	05276+3429	5.1 8.1	14.9	211.33	2007.877	1n	55
STF 716AB	05293+2509	5.8 6.7	208.2	4.44	2007.901	1n	56
STT 63	05308+3950	6.4 7.6	276.5	76.04	2007.901	1n	57
STF 711AB	05315+5439	7.7 9.6	225.7	7.90	2007.893	1n	58
STF 730	05322+1703	6.1 6.4	141.9	9.38	2007.893	1n	59
STF 738AB	05351+0956	3.5 5.5	44.1	4.44	2007.901	1n	60
STF 738AD	05351+0956	3.5 9.6	271.2	78.01	2007.901	1n	60
GUI 9AE	05351+0956	3.5 9.2	278.9	151.09	2007.901	1n	60
SEI 350	05362+3407	10.5 10.5	74.3	15.31	2007.877	1n	61
STF 737	05364+3408	9.1 9.4	305.7	10.86	2007.877	1n	62
ARA2323	05387+3229	8.0 10.7	261.8	57.35	2007.877	1n	63
STF 785AB	05459+2555	7.3 8.3	347.8	14.81	2007.893	1n	64
STT 116AD	05459+2555	7.3 10.2	10.9	201.45	2007.893	1n	64
STT 66	05479+2441	6.8 7.5	167.5	93.81	2007.901	1n	65
STF 804AB	05489-0943	9.6 10.5	97.9	26.17	2007.877	1n	66
GAL 393	05490-1105	9.8 10.3	101.3	13.83	2007.877	1n	67
BUP 84	05495+1239	4.9 10.6	129.1	120.48	2007.877	1n	68
J 1912	05513+1800	9.8 9.8	202.2	7.90	2007.893	1n	69
BRT 564	05521-1540	10.1 10.3	136.0	4.44	2007.877	1n	70
STF 832AB	06011-1431	9.1 10.5	87.7	24.69	2007.877	1n	71
H 14	06049-0521	8.0 10.7	258.8	46.41	2007.899	1n	72
DUF 1	06084+2719	9.6 10.0	188.8	20.24	2007.899	1n	73
STF 871	06116-0046	8.9 9.4	306.2	7.41	2007.899	1n	74
HJ 2312	06194-0516	10.4 10.5	197.2	9.38	2007.899	1n	75
STF 902	06275+3457	9.5 10.4	151.5	11.36	2007.899	1n	76
AG 113	06284+3116	10.0 10.2	315.4	11.36	2007.899	1n	77
J 1949AB	06284-0428	9.2 10.6	245.5	50.36	2007.899	1n	78
J 910AC	06285+4304	9.9 10.5	33.3	45.43	2007.899	1n	79
STF 908	06310+5351	10.7 10.7	359.8	8.39	2007.899	1n	80
WFC 37	06339+4424	10.5 10.7	247.7	9.88	2007.899	1n	81
STF 928AB	06347+3832	7.8 8.6	133.0	3.46	2007.893	1n	82
HDS 922	06409-0434	9.0 10.5	56.6	17.28	2007.899	1n	83

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NAME	RA DEC	MAGS	PA	SEP	DATE	N	NOTES
HJ 2328	06446+5246	8.4 10.6	177.4	39.01	2007.904	1n	84
HLD 84AB	07035-0828	10.1 10.2	38.0	5.43	2007.904	1n	85
AG 136	07066+3802	10.0 10.3	216.5	6.91	2007.904	1n	86
STF1057AB-C	07148-1529	7.4 9.8	1.0	15.80	2007.904	1n	87
ARG 66	07162-0216	9.6 10.3	300.9	14.32	2007.904	1n	88
ROE 28AB	07165-1559	10.3 10.5	216.6	4.94	2007.904	1n	89
STF1077AB	07210-0040	9.9 9.7*	321.0	5.43	2007.915	1n	90
BAL 182	07351-0217	10.4 10.5	153.3	23.70	2007.915	1n	91
STF1117	07367+3523	9.1 10.6	228.6	11.85	2007.915	1n	92
ENG 32AC	07373-0407	5.1 10.3	353.0	119.28	2007.915	1n	93
STF1118AC	07374+3852	8.0 10.6	17.6	23.70	2007.915	1n	94
BU 200AC	07385+3503	5.6 9.9	100.9	157.51	2007.915	1n	95
HO 245AC	07387-0127	7.6 10.7	97.5	46.41	2007.915	1n	96
STF1133	07426-0402	8.8 9.9	108.3	4.44	2007.915	1n	97
KU 95AB	07451+3014	9.8 10.6	59.3	41.97	2007.915	1n	98
HJ 767AB	07453-0026	8.0 10.6	163.8	22.22	2007.915	1n	99

* Companion star is the brighter component.

Table Notes

1. In Eridanus. Common proper motion; p.a. decreasing. Spect. F5, F5.
2. In Eridanus. Relatively fixed. Common proper motion. Spect. F7V, F5V.
3. In Perseus. Position angle decreasing. Spect. A0, K.
4. In Aries. Common proper motion. Sep. dec.; p.a. inc. Spect. G5.
5. In Perseus. Relatively fixed. Common proper motion. Spect. B9V, B9.
6. In Aries. Relatively fixed. Common proper motion. Spect. G5, G5.
7. In Perseus. Relatively fixed. Spect. G8III, G8III.
8. In Taurus. Relatively fixed. Common proper motion. Spect. A2V, A0.
9. In Taurus. Common proper motion. Sep. & p.a. increasing. Spect. G8V, G5IV.
10. In Eridanus. Sep. & p.a. increasing. Spect. F5IV, K0.
11. In Camelopardis. Common proper motion; sep. increasing. Spect. F8, F8.
12. In Perseus. Common proper motion; p.a. increasing. Spect. A5, A5.
13. In Perseus. Position angle increasing. Spect. G5.
14. In Perseus. Position angle increasing. Spect. A2.

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15. In Eridanus. Sep. & p.a. increasing. Spect. F0, F0.
16. In Perseus. Sep. increasing; p.a. decreasing. Spect. G0.
17. In Taurus. Relatively fixed. Common proper motion. Spect. G0.
18. In Eridanus. Separation slightly increasing. Spect. F2.
19. In Perseus. Position angle decreasing. Spect. K2.
20. In Eridanus. Separation slightly decreasing. Spect. F5.
21. In Eridanus. Common proper motion; sep. & p.a. increasing. Spect. K5, K5.
22. In Camelopardis. Slight increase in position angle. Spect. A4V.
23. In Eridanus. Sep. & p.a. decreasing. Spect. K3III.
24. In Eridanus. Position angle increasing.
25. In Perseus. Separation slightly increasing. Spect. B8.
26. In Perseus. Separation slightly decreasing. Spect. K0.
27. In Eridanus. Sep. decreasing; p.a. increasing. Spect. G0.
28. In Eridanus. Separation and position angle slightly increasing.
29. In Perseus. Relatively fixed. Common proper motion. Spect. K0.
30. In Taurus. Position angle slightly decreasing. Spect. B9IV, B9IV.
31. In Taurus. Position angle decreasing. Spect. B9.
32. In Perseus. Sep. decreasing; p.a. increasing. Spect. F5, B5.
33. In Perseus. Sep. & p.a. decreasing. Spect. K0.
34. In Eridanus. Relatively fixed. Common proper motion. Spect. F8.
35. In Taurus. Sep. & p.a. decreasing. Spect. A2V.
36. In Eridanus. Sep. increasing; p.a. decreasing. Spect. G5.
37. In Eridanus. Relatively fixed. Common proper motion.
38. In Lepus. Sep. & p.a. increasing. Spect. F3V.
39. In Orion. Common proper motion; p.a. slightly increasing. Spect. F0, F0.
40. In Auriga (NGC 1778). Position angle slightly decreasing. Spect. B8, B8.
41. In Auriga. Relatively fixed. Common proper motion. Spect. F8V, G0.
42. In Auriga. Relatively fixed. Common proper motion. Spect. A2, B8.
43. In Auriga. Common proper motion; p.a. decreasing. Spect. G5, G5.
44. In Orion. Sep. & p.a. increasing. Spect. K0, K0.
45. In Orion. Relatively fixed. Common proper motion. Spect. F2V.
46. In Auriga. Separation increasing. Spect. G0.
47. In Auriga. Relatively fixed. Spect. B8.
48. In Orion. Common proper motion. Sep. & p.a. increasing. Spect. B, B.
49. In Auriga. Sep. & p.a. slightly decreasing. Spect. A2V.
50. In Auriga. Sep. & p.a. slightly decreasing.
51. In Orion. Sep. increasing; p.a. decreasing. Spect. F6V.
52. In Orion. Separation slightly decreasing. Spect. B5V, K0.

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53. In Orion. Separation slightly increasing. Spect. A0, A0.
54. In Auriga. Position angle slightly increasing. Spect. F8.
55. Phi or 24 Aurigae. AC= p.a. dec. AD = sep. inc. Spect. AD = K3III, B0.
56. 118 Tauri. Sep. dec; p.a. inc. Common proper motion. Spect. B9V, B9V.
57. In Auriga. Sep. & p.a. increasing. Spect. G9III, K0.
58. In Auriga. Common proper motion. Sep. & p.a. decreasing. Spect. G1, K2.
59. In Taurus. Relatively fixed. Common proper motion. Spect. B7III, B7III.
60. Lambda Orionis. AB = reifix; cpm. AD/AE = reifix. Spect. O8, B.5V, B9, B9.
61. In M 36 in Auriga. Relatively fixed. Common proper motion.
62. In M 36 in Auriga. Relatively fixed. Common proper motion. Spect. B2, B.
63. In Auriga. Position angle increasing. Spect. G0.
64. In Taurus. AB = sep. inc; p.a. dec. AD = relatively fixed. Spect. B9.
65. In Taurus. Relatively fixed. Spect. K2, K2.
66. In Orion. Relatively fixed. Spect. A2.
67. In Lepus. Position angle increasing. Spect. A0, A0.
68. 134 Orionis. Separation slightly increasing. Spect. B9IV.
69. In Taurus. Separation slightly decreasing.
70. In Lepus. Position angle increasing. Spect. F6V.
71. In Lepus. Position angle slightly decreasing. Spect. F0V.
72. In Monoceros. Relatively fixed. Spect. B9.
73. In Gemini. Separation slightly increasing. Spect. G0, G0.
74. In Orion. Relatively fixed. Common proper motion. Spect. A0, A0.
75. In Monoceros. Separation increasing.
76. In Auriga. Separation slightly decreasing. Spect. F8.
77. In Auriga. Common proper motion; sep. slightly increasing. Spect. G5, G5.
78. In Monoceros. Position angle slightly decreasing. Spect. B7.
79. In Auriga. Sep. & p.a. increasing. Spect. G5.
80. In Auriga. Common proper motion. Position angle increasing.
81. In Auriga. Relatively fixed. Common proper motion.
82. In Auriga. Relatively fixed. Common proper motion. Spect. F5, F5.
83. In Monoceros. Sep. & p.a. increasing. Spect. F0.
84. In Lynx. Position angle slightly increasing. Spect. K2.
85. In Monoceros. Sep. increasing; p.a. decreasing. Spect. A0.
86. In Auriga. Position angle increasing.
87. In Canis Major. Relatively fixed. Common proper motion. Spect. F5V.
88. In Monoceros. Position angle decreasing. Spect. G, G.
89. In Canis Major. Separation increasing. Spect. A2V.
90. In Monoceros. Relatively fixed. Spect. A3, A3.
91. In Monoceros. Separation increasing.

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- 92. In Lynx. Sep. & p.a. slightly increasing. Spect. F0.
- 93. 25 Monocerotis. Position angle increasing. Spect. F6III.
- 94. In Lynx. Sep. decreasing; p.a. increasing. Spect. A0.
- 95. 70 Geminorum. Sep. decreasing; p.a. increasing. Spect. K0III.
- 96. In Monoceros. Separation slightly decreasing. Spect. A3III.
- 97. In Monoceros. Sep. increasing; p.a. decreasing. Spect. A5, A5.
- 98. In Gemini. Sep. & p.a. increasing. Spect. G5.
- 99. In Monoceros. Separation increasing. Spect. A0.

Comment from Brian Mason

The acknowledgement of the work improving the WDS between the 2001.0 and 2006.5 editions is gratefully accepted. It is the work of many hands. First and foremost are my two USNO colleagues, Bill Hartkopf and Gary Wycoff. Also work by other professionals and amateurs in locating and measuring neglected pairs has also markedly improved the database. In many cases pairs which are still neglected are going to be the ones which still have poor magnitude information, so cases like HJ 764, discussed here, are not uncommon.

