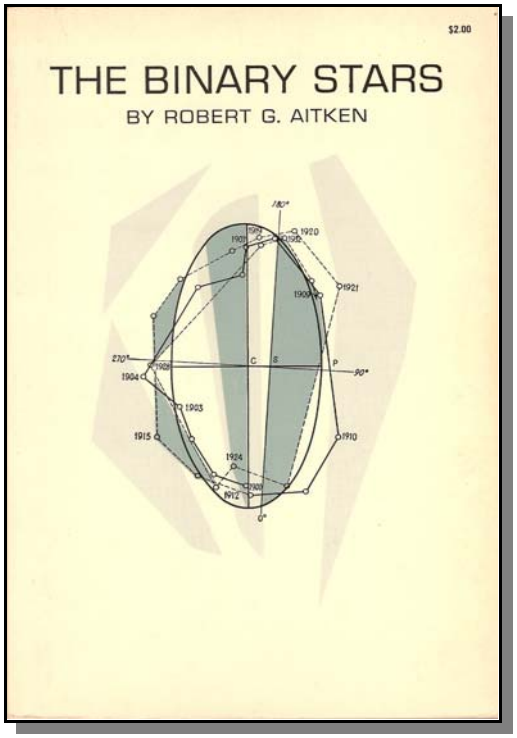
University of South Alabama

Journal of Double Star Observations

VOLUME 3 NUMBER 3 SUMMER 2007



Don't miss Ed Wiley's review of the classic book, *The Binary Stars,* by Robert Aitken. It starts on page 135.

Inside this issue:

Neglected Double Observations for 2006 No. 3: 17th and 18th Hour Doubles

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Abstract: I report the observational results for 72 neglected doubles (including 30 confirmations), six new pairs, and 25 additional doubles found between 17.0hr and 18.59 hr RA and +0º and +40º DEC. New pairs are reported result from resolving components of existing systems or named to avoid confusion in crowded fields. Observations were made with the AREO2 robotic telescope located at the Remote Astronomical Society Observatory, Mayhill, NM, USA (http://www.remote-astronomical-society.org/). Nineteen measures of 16 pairs are reported from catalog positions. In addition to theta and rho values (and standard deviations), I report catalog numbers of pairs, some of which lack precise positional information.

In this paper, I report a total of 103 mean and standard deviation measures of theta (PA) and rho- (Sep) values of double stars imaged using a Takahashi Mewlon 300 Dall-Kirkham cassegrainian reflector located at the Remote Astronomical Society Observatory in Mayhill, New Mexico. The instrument, with a focal reducer, works at F9.1, with an approximate focal length of 2730mm. It is equipped with a non-antiblooming ST8E CCD camera (9 micron pixels) and the combination has an approximate resolution of 0.6 arcseconds/pixel with a field of view of 11.5 x 17.3 arcminutes. The OTA is mounted on a Bisque Paramount 1100 GEM. In addition, 21 single measures of 16 additional pairs and their J and K magnitudes are reported from positions and magnitudes given in the 2MASS of A2002.2 catalogues.

Methods

Methods largely follow Wiley (2006a). Observing lists were requested from the USNO (Mason, 2006). Following a procedure recommended by Dr. William I. Hartkopf (USNO), my catalog queries have been modified to maximize catalog information. A query is submitted to the Aladin interactive sky atlas (Bonnarel et al., 2000) at the CDS, Strasburg, for the coordinates listed in the Washington Double Star Catalogue (Mason et al., 2006). As the plate is being downloaded, I then select the "Surveys" option in the Sever Selection window and download information from a number of catalogs, minimally UCAC2.0 (Zacharias et al., 2004), GSC2.3 (STScI, 2006), Tycho-2 (Høg et al., 2000), 2MASS (Skrutskie et al., 2006), and AC2000.2 (Urban, 1998). Each is downloaded as a separate file so that each can be queried individually. For doubles with no precise coordinates, proper motions, or delta magnitudes, selected catalog information is copied and pasted into an Excel file and the information is forwarded to the USNO for their use. In addition, 2MASS J, H, and K magnitudes are harvested, delta magnitudes computed and forwarded to USNO for pairs that lack delta-magnitude measures. The UCAC, GSC catalog numbers or 2MASS unique identifiers and magnitudes are recorded, as appropriate. A search of the field is then undertaken using Guide8.0 (Project Pluto. 2006) to determine if other resolvable WDS pairs are in the same field. If so, their catalogue information is also collected. The image is then printed and annotated for use as a finder chart.

Exposures are carried out with a clear filter and

Neglected Double Observations for 2006 No. 3: 17th and 18th Hour Doubles

the initial image was checked by downloading a JPEG of the FITS image to insure that the correct field was imaged. Exposures ranged from 12 to 40 seconds, depending on magnitude. If the exposure looked acceptable, then a minimum of three additional images are made. If not, then exposure times are adjusted and rechecked. MPO Canopus (Warner, 2006) is used to reduce the images . It produces either an automatic or manual astrometric solution to the image based on the UCAC 2.0 catalog (Zacharias et al., 2004). The pair is measured using a convenient double star harvesting subroutine built into MPO Canopus. Canopus then computes the average and standard deviation for each pair. A final check is made using the information downloaded from CDS in concert with the WDS catalog entries to insure that I am minimizing errors of identification.

Components of each pair are identified by catalog number in the tables to insure that future investigators can check my results. In the past, I have attempted to report the UCAC2.0 catalog number, where possible. However, in this paper I report GSC2.3 and 2-MASS catalog numbers and associated magnitudes (V and J respectively) in order to report differences in magnitude for each pair.

Some of the pairs on my schedule for this study proved either too close to measure or acceptable images were not obtained owing to seeing. Additional measures were obtained using 2MASS positions and are reported with the Epoch of observation and the 2MASS J(ir) and K(ir) magnitudes for each member of the pair. In a few cases, inspection of the images obtained and/or the survey plates examined showed that primaries or secondaries were actually more than one star. These, and a limited number of other new pairs, are recognized using recommendations for naming in Hartkopf and Mason (2004).

Results

Measures of neglected doubles, including a number of confirmations are presented in Table 1. Measures of more recently measured doubles are presented in Table 2. Table 3 contains measures taken from various catalogs.

(Continued on page 116)

WDS/Disc	Primary	Secondary	Mags	DM	PA	PAsd	SEP	SEPsd	Epoch	N	Notes
17010+3755 HJ 262	N5YB000576	N5YB000575	12.84 13.11	0.270	123.9	0.15	20.38	0.08	2006.518	4	1
17046+3900 HJ 2804 AB	2M245875982	2M245875981	9.628 10.314	0.686	244.3	0.31	6.43	0.15	2006.518	3	2
17046+3900 HJ 2804 AC	N5YN000114	N5YN000120	11.0 12.96	1.960	173.9	0.06	83.62	0.09	2006.518	3	1
17048+0142 BAL1484	N3A7000070	N3A7025668	11.99 12.99	1.000	138.4	0.65	5.34	0.04	2006.518	4	1
17072+0647 LDS 988	N3AI010541	N3AI010542	9.66 9.77	0.110	216.3	0.08	18.25	0.04	2006.518	4	1
17075+3557 BU 1455 AC	N3DF000450	N3DF003829	10.55 12.68	2.130	221.8	0.06	12.04	0.03	2006.518	4	1
17076+0332B AL2434	N39X000610	N39X000609	12.72 13.13	0.410	317.7	0.06	15.31	0.04	2006.614	4	1
17162+2401P OU3275	N3HD000101	N3HD000100	12.89 13.49	0.600	264.9	0.15	8.83	0.04	2006.614	4	1,3

Table. 1. Measures of 73 neglected doubles not measured in the past 50+ years bounded by 17.0 hr to 18.59 hr RA and +0º to +40 º DEC. Primary and Secondary catalogue numbers or either, GSC2.3 ("N") or the 2MASS unique identifier (2M). Magnitudes follow catalogue magnitudes, with GSC2.3 V-magnitudes and 2MASS magnitudes in J(ir), unless noted. Stars that do not appear in UCAC2.0, GSC2.3, USNOB1.0 or Tycho catalogues are listed as "uncat" and WDS magnitudes are listed for these. Differences in magnitude are computed from catalogue magnitudes. Abbreviations: WDS/Disc., Washington Double Star Catalogue 2000 position, discoverer and number; Primary, secondary, Mags are catalogue numbers and catalogue magnitudes for primary and secondary respectively; DM is magnitude difference; PA, is theta in degrees, PAsd is the standard deviation of theta for N measures; SEP is rho in seconds of arc, SEPsd is the standard deviation of rho for N measures; Epoch is the date of observation; N is the number of images measured. Measures were taken from images obtained from a 300mm Cassegrainian reflector, F9.1, CCD camera, and a clear filter and measured using MPO Canopus.

Table 1 continued on next page.

Neglected Double Observations for 2006 No. 3: 17th and 18th Hour Doubles

WDS/Disc	Primary	Secondary	Mags	DM	PA	PAsd	SEP	SEPsd	Epoch	N	Notes
17165+0413 LDS 989	N3BT000262	N3BT000257	12.39 12.80	0.410	318.6	0.08	20.33	0.06	2006.614	4	1
17172+2421 POU3279	N3HD000010	N3HD000012	13.45 13.79	0.340	169.4	0.13	13.20	0.03	2006.614	4	1
17189+0427 BAL2886	2M1136971550	2M1136971554	10.385 11.036	0.651	158.8	0.32	6.94	0.02	2006.614	4	2
17331+0243 BAL1939	2M1139772395	2M1139772402	8.571 10.330	1.759	0.6	0.09	16.62	0.11	2006.614	5	2
17398+2444 POU3306	2M1053450858	2M1053450857	10.679 12.415	1.737	96.4	0.79	4.24	0.27	2006.614	4	2
17478+2536 HJ 1304	2M982365223	3M982365220	9.742 10.955	1.213	228.9	0.17	7.26	0.05	2006.614	4	2
17493+3745 MLB 753	N3DX000414	N3DX000413	12.70 14.44	1.740	352.2	0.23	10.05	0.04	2006.614	4	1
17504+0433 BAL2902AC	2M1129846789	2M1129846786	10.238 10.657	0.419	47.7	0.29	21.14	0.11	2006.614	4	2
17504+0433 BAL2902BC	2M1129846786	2M1129846774	10.657 11.236	0.579	47.4	0.44	18.65	0.26	2006.614	4	2
17525+1530 FOX 209AC?	N392000712	N392000713	11.90 12.50	0.600	121.9	0.02	38.21	0.04	2006.614	4	1
17550+2330 POU3324	N3GJ000953	N3GJ000956	13.39 14.13	0.740	152.1	0.19	12.22	0.03	2006.614	4	4
17567+1539 J 2098AC	2M1115533752	2M1115533757	10.667 11.944	1.277	307.5	0.09	20.96	0.20	2006.614	4	2
17579+3741 ROE 4	N4DZ000479	N3DZ000473	10.96 12.61	1.650	355.6	0.08	16.89	0.03	2006.682	5	"1,3"
17586+2417 POU3331	2M587404575	2M587404585	10.417 12.020	1.603	213	0.41	8.27	0.07	2006.614	4	2
17589+2303 POU3332	2M1043087882	2M1043087888	11.525 12.277	0.752	161.1	0.55	6.99	0.02	2006.614	4	2
18053+0504 BAL3013	2M871236679	2M871236684	8.818 9.778	0.960	73.4	0.32	5.16	0.47	2006.644	4	2
18066+0452 BAL2913	N1MF000214	N1MF000210	12.59 12.76	0.170	14.1	0.07	12.31	0.11	2006.644	4	1
18073+2334 POU3349AB	2M267459050	2M267459041	10.547 12.209	1.662	218.6	1.27	9.23	0.02	2006.682	3	2
18073+2334 WLY 8AC	2M267459050	2M267459046	10.547 11.797	1.250	133.3	NA	3.80	NA	2006.682	2	2
18083+0230 BAL1953	N1L8001056	N1L8001060	11.83 13.08	1.250	121.7	0.25	17.16	0.04	2006.682	4	1
18080+0222 WLY 9	2M505526250	2M505526253	9.637 8.670	0.967	94.2	0.11	16.40	0.05	2006.68	4	2
18088+1015 ROE 98AC	2M507649144	2M507649140	10.493 11.679	1.186	261.2	0.39	30.29	0.13	2006.682	4	2
18088+2450 POU3352?	2M1032379662	2M1032379661	11.584 11.860	0.276	300	NA	2.10	NA	2006.682	1	2

Table 1 continued on next page.

Neglected Double Observations for 2006 No. 3: 17th and 18th Hour Doubles

WDS/Disc	Primary	Secondary	Mags	DM	PA	PAsd	SEP	SEPsd	Epoch	N	Notes
18163+2016 HO 269	2M586932248	2M586932255	9.272 11.691	2.419	152.5	0.39	8.61	0.07	2006.682	4	2
18166+2327 POU3376	N212000207	N212000209	11.72 12.95	1.070	248	0.14	17.29	0.08	2006.707	6	1,3
18169+2718 MIL 4	N22M000763	N22M000766	10.90 12.87	1.970	129.8	0.10	16.63	0.02	2006.707	4	1
18182+0557 HJ 2830	N1M0000569	N1M0000570	10.97 12.47	1.500	93.3	0.18	11.26	0.02	2006.707	4	1
18190+2330 POU3383	N213000382	N213002605	13.29 13.73	0.440	253.5	0.35	7.70	0.07	2006.707	4	1
18212+2326 POU3391	N210000405	N210000402	13.13 13.87	0.740	325.5	0.64	10.69	0.04	2006.707	4	1
18227+2323 POU3395	2M1038271165	2M1038271158	11.962 12.497	0.805	184.5	0.79	7.00	0.13	2006.707	4	1
18230+2742 HJ 1322	N22B000293	N22B000295	10.51 11.94	1.430	239.3	0.06	21.57	0.03	2006.707	4	1
18257+2503 POU3409	N22H000470	N22H000471	12.86 12.76	0.100	247.6	0.28	12.18	0.05	2006.707	4	1
18305+0852 BRT2608AB	2M877257044	2M877257049	9.412 11.447	2.035	40.1	0.97	4.48	0.224	2006.72	4	2
18305+0852 WLY 10AC	2M877257044	2m 877257046	9.412 9.433	0.021	79.3	0.23	12.28	0.03	2006.72	4	2
18329+1529 J 2100	2M323082742	2M323082749	11.291 12.034	0.743	356.6	0.66	6.69	0.37	2006.72	3	2
18342+0341 ABT9001	N1RH000015	N1RH000012	10.24 12.34	2.100	339.8	0.24	20.35	0.09	2006.72	4	1
18348+2509 POU3433AB	N21R000369	N21R000366	11.91 14.16	2.250	344.5	0.36	9.91	0.10	2006.707	5	1
18348+2509 POU3434AC	N21R000369	N21R000367	11.91 13.97	2.060	69.3	0.16	14.55	0.05	2006.707	5	1
18355+0927 J 2136AC	2M1058866875	2M1058866875	8.929 11.757	2.828	263.3	0.36	11.31	0.18	2006.707	4	2
18357+2403 POU3436	2M1033310697	2M1033310706	12.073 12.568	0.495	166.8	0.50	4.86	0.19	2006.734	4	2
18368+2320 POU3438	N292000217	N292000213	13.37 13.43	0.060	358.2	0.18	8.56	0.02	2006.734	4	1
18392+2341 POU3454	N21L000354	N21L000353	12.59 13.02	0.000	274.6	0.09	13.17	0.03	2006.734	4	1,3
18394+3430 SEI 568	N253000204	N253022558	11.63 12.12	0.490	191.8	0.15	10.52	0.06	2006.734	4	1
18395+2415 POU3455	N21P000043	N21P015523	12.17 14.97	2.800	84.9	0.41	13.31	0.05	2006.734	5	1
18407+1749 ROE 88AB	N29E031144	N29E000675	12.94 12.50	0.440	129.5	0.32	8.17	0.17	2006.737	4	1
18407+1749 ROE 88AC	N29E031144	N29E000673	12.94 13.14	0.200	329.9	0.05	35.67	0.13	2006.737	4	1

Table 1 continued on next page.

Neglected Double Observations for 2006 No. 3: 17th and 18th Hour Doubles

WDS/Disc	Primary	Secondary	Mags	DM	PA	PAsd	SEP	SEPsd	Epoch	N	Notes
18407+1749 WLY 11AD	N29E031144	N29E031145	12.94 14.24	1.300	322.1	0.37	14.74	0.085	2006.737	4	1
18409+2447 POU3477	N21E000411	N21E044028	12.39 14.03	1.640	146.8	0.73	13.96	0.17	2006.737	4	1
18414+2350 POU3481	N21E000127	N21E009723	12.82 13.61	0.790	8.9	0.49	6.70	0.16	2006.737	4	4
18448+2431 POU3524	N0221103447	40549120	12.97 13.44	0.470	345.6	0.27	14.04	0.06	2006.737	4	1
18449+2433 WLY 12	40549138	40549142	13.01 13.08	0.070	320.2	0.40	17.05	0.15	2006.737	4	1
18451+2323 POU3525	N28X000283	N28X000284	12.1 13.56	1.460	233.3	0.50	10.17	0.21	2006.737	4	1
18452+2318 WLY 13	N28X033519	N28X033520	14.31 15.19	0.880	263.4	0.58	11.13	0.19	2006.737	4	1
18457+2337 POU3535	N28X053038	N28X053256	13.75 14.43	0.680	42.7	NA	16.70	NA	2006.737	1	1
18467+2325 POU3546	N28Z058947	N28Z058968	13.62 14.27	0.650	48.9	0.74	11.82	0.21	2006.737	3	1
18497+2337 POU3561	N28W044940	N28W000104	13.43 13.78	0.350	357.6	0.14	16.57	0.02	2006.775	4	1
18518+2428 POU3571	N24G000682	N24G011052	12.75 14.12	1.370	192.8	0.27	8.15	0.06	2006.775	4	4
18527+3301 BAR 46AC	N259000321	N259000323	12.27 11.39	0.880	250.8	0.13	41.13	0.11	2006.775	4	1
18546+2409 POU3584?	N23K000272	N23K015020	13.67 14.27	0.600	287.1	0.35	7.85	0.06	2006.775	4	4
18546+3656 ELS 7AB	Uncat.	N2DV059038	11.0 11.3	NA	338.7	0.37	8.61	0.11	2006.775	4	1
18546+3656 ELS 7AC	Uncat.	Uncat	11.0 13.5	NA	119.1	1.35	10.17	0.32	2006.775	3	
18549+2433 POU3588	N23K000802	N23K000803	13.56 14.18	0.620	115.2	0.34	8.37	0.07	2006.775	4	1
18553+2443 POU3593	2M1053821800	2M1053821823	6.742 11.868	5.126	194.3	0.52	10.11	0.05	2006.775	4	2
18555+0816 J 1191	N1NH000189	N1NH022289	13.28 13.33	0.050	38.2	0.29	8.33	0.07	2006.775	4	4
18560+2422 POU3599	N23K000941	N23K000005	13.05 13.65	0.600	213.7	0.40	13.47	0.07	2006.775	4	1,3

Table 1 continued on next page.

Neglected Double Observations for 2006 No. 3: 17th and 18th Hour Doubles

WDS/Disc	Primary	Secondary	Mags	DM	PA	PAsd	SEP	SEPsd	Epoch	N	Notes
18561+2350 POU3598	N260000105	N260000103	12.48 12.68	0.200	52	0.25	15.66	0.07	2006.775	4	1
18565+1555 J 1278AC	N2BU000381	N2BU000382	11.93 13.06	1.130	106.5	0.08	25.67	0.06	2006.775	4	1,5
18566+2417 POU3601	N23K000096	N23K024051	14.15 14.57	0.420	236.5	1.07	7.12	0.18	2006.775	7	4
18568+2421 POU3604	N23K000036	N23K027751	10.26 11.32	1.060	60.6	0.09	11.23	0.09	2006.775	7	1
18568+2456 POU3605	N23N000357	N23N000360	13.62 13.58	0.050	118	0.32	11.19	0.15	2006.775	4	1

Table 1 Notes

[1] GSC2.3 V magnitudes.

[2] 2 Mass J magnitudes.

[3] PA reversed from WDS based on magnitudes.

[4] GSC2.3 B magnitudes.

[5] A is probably composite magnitude of A+B.

WDS/Disc	Primary	Secondary	Mags	DM	PA	PAsd	Dist	Dsd	Epoch	N	Notes
17014+3754 HJ 263	N5YB000590	N5YB000592	10.56 12.50	1.94	114.3	0.19	18.68	0.021	2006.518	4	1
17025+2023 BRT2427	2M1064287492	2M1064287480	11.081 11.641	0.56	19.5	0.24	9.3	0.051	2006.518	4	2
17046+3900 HJ 2804AD	N5YN000114	N5YN000119	11.0 12.68	1.68	138.4	0.08	93.59	0.226	2006.518	3	1
17170+2421 POU3277	2M 701522621	2M1115595835	10.708 11.745	1.037	167.6	0.3	6.44	0.181	2006.614	4	2
17420+2349 POU3310?	2M745911774	2M745911764	11.618 13.630	2.012	183.3	0.15	19.68	0.074	2006.614	4	2,3
17496+3756 ES 2567	2M257932662	2M257932665	12.264 12.649	0.385	193.5	0.85	5.28	0.102	2006.614	4	2
17504+0433 BAL2902AB	3M1129846789	2M1129846786	10.238 10.657	0.419	52	1.27	2.52	0.217	2006.614	3	2

Table 2. Measures of 25 recently measured doubles appearing on the same plates as those doubles reported in Table 1 bounded by17.0 hr to 18.59 hr RA and +0° to +40 ° DEC. Primary and Secondary catalogue numbers or either UCAC2.0 (number alone), GSC2.2 (prefix "N"), or 2MASS (prefix 2m). Magnitudes follow catalogue magnitudes, with GSC2.2 magnitudes in F photometric band (red), except as noted. Stars that do not appear in UCAC2.0, GSC2.3, Tyco 2 or 2MASS catalogues are listed as "uncat" and WDS magnitudes are listed for these. Abbreviations: PA, is theta in degrees, PAsd is the standard deviations of N measures; SEP is separation in seconds of arc, SEPsd is the standard deviation of N measures; Epoch is the date of observation; N is the number of images measured. Measures were taken from images obtained from a 300mm Cassegrainian reflector, F9.1, CCD camera, and a clear filter using MPO Canopus.

Table 2 continued on next page.

Neglected Double Observations for 2006 No. 3: 17th and 18th Hour Doubles

WDS/Disc	Primary	Secondary	Mags	DM	PA	PAsd	Dist	Dsd	Epoch	N	Notes
17525+1530 L 17AB	N392000712	uncat	11.90 --	NA	288.3	0.39	2.19	0.019	2006.614	4	
17567+1539 J 2098AB	2M1115533752	2M1115533747	10.667 11.053	0.386	132	1.23	3.64	0.157	2006.614	4	2
17574+3540 STF2257AB	N3DT000695	N3DT000699	7.69 11.29	3.6	152.3	0.08	22.73	0.048	2006.614	4	2
17574+3540 WAL 86AC	N3DT000695	N3DT000698	7.69 11.12	3.43	260.5	0.1	121.74	0.224	2006.614	4	1,4
18088+1015 ROE 98AB	2M507649144	2M507649145	10.493 10.766	0.273	271.3	0.46	4.14	0.173	2006.682	4	2
18270+2832 MLB 648	2M 693726042	2M 693726048	10.613 12.391	1.778	21.1	0.38	10.14	0.056	2006.72	4	2
18272+3847 MLB 854	2M1313120237	2M1313120244	10.760 11.113	0.353	8.1	0.51	5.96	0.216	2006.707	4	2
18355+0927 J 2136AB	2M1058866875	uncat	8.929 --	NA	310.5	2.04	2.39	0.004	2006.707	2	
18387+2422 POU3452	N21P000008	N21P000004	11.19 12.31	1.12	318.9	0.17	16.14	0.016	2006.72	2	1,3
18410+2445 POU3478	N21E000419	N21E000420	13.49 14.80	1.31	115.5	0.43	9.77	0.093	2006.737	4	1
18453+2321 POU3530	N28X000298	N28X036692	13.23 14.55	1.32	301.4	0.25	11.39	0.224	2006.737	4	1
18464+3116 HJ 1345	N261000472	N261000474	12.19 12.57	0.38	168.9	0.35	11.7	0.028	2006.737	4	1
18547+2409 POU3586	2M1115594300	2M1115594304	8.664 12.490	3.826	78.9	0.26	9.99	0.068	2006.775	4	2,3
18550+2430 POU3589	2M1115595837	3M1115595835	11.475 12.194	0.719	149.6	1.31	3.72	0.082	2006.775	4	2
18551+2430 POU3590	2M1053823027	2M1053823037	10.565 12.662	2.097	332.7	0.59	7.93	0.04	2006.775	4	2,3
18570+2413 POU3606	N23K000157	N23K000162	12.19 12.30	0.21	150	0.06	12.37	0.025	2006.775	4	1
18570+2413 POU3608	N23K000160	N23K000155	12.76 13.07	0.31	151.9	0.22	15.23	0.049	2006.775	4	1,3
18571+2456 HDS2686	2M637922223	2M637922224	8.657 10.159	1.502	273.1	0.16	8.05	0.075	2006.775	4	2

Table 2 Notes

1 GSC2.3 V magnitudes.

2 2 MASS J-magnitudes.

3 PA reversed based on magnitudes.

4 Magnitude is composite of HO 73AB.

Neglected Double Observations for 2006 No. 3: 17th and 18th Hour Doubles

Component	Primary	Secondary	PA	SEP	Epoch	Jmag	Kmag	Notes
17159+2413 POU3272	701495931	701495926	216.5	6.94	1999.426	9.144 11.833	8.568 11.389	
17572+3541 HO 73AB	Tyc 260-437-1	Tyc 2620-437-2	215.9	1.74	1991.550	11.795 12.258	11.118 11.438	1
17572+3541 STF2256AC	215293420	215293428	341.6	8.74	1998.290	9.335 11.933	8.959 11.608	
18073+2334 POU3349AB	267459050	267459041	217.4	9.3	1998.368	10.547 12.209	9.606 11.961	
18073+2334 WLY 8AC	267459050	267459046	132.3	4.38	1998.368	10.547 11.797	9.606 11.092	
18088+2450 POU3352?	1032379662	1032379661	291.6	3.63	2000.2109	11.584 12.741	11.266 11.522	
18089+3254 ES 184	382888187	382888182	159.9	4.88	1998.2914	9.186 10.279	8.998 10.193	
18119+2927 BRT 34	AC1005615	AC1005616	146.7	3.93	1906.466	12.82 13.03		2
18119+2927 BRT 34	1029161403	1029161399	163.5	5.42	2000.2299	10.917 10.584	10.279 9.864	
18152+2350 POU3369	586877941	586877946	132.4	4.59	1999.2388	12.397 12.286	12.016 11.887	
18155+1156 ROE 144	190629031	190629025	290.8	6.39	1998.1931	8.553 11.966	7.332 10.975	
18164+1832 LDS1009	586938557	586938561	250.3	27.15	1999.2388	10.063 10.32	9.696 9.922	
18305+0852 BRT2608AB	877257044	877257049	40.4	4.76	2000.2133	9.412 11.447	9.081 11.093	
18305+0852 WLY 10AC	AC371165	AC371170	72.1	14.58	1907.132	11.35 12.05		2
18305+0852 WLY 10AC	877257044	877257046	78.3	12.49	2000.2133	9.421 9.433	9.081 8.751	
18411+2447 LDS6330	1030393291	1030393278	6.2	5.20	2000.2573	7.528 8.86	6.616 7.774	
18527+3301 BAR 46AC	219744845	219744830	251.0	42.49	1998.3052	11.652 10.198	11.325 9.803	
18555+0816 J 1191	AC282663	AC282660	30.4	4.46	1919.631	12.53 12.81		2
18555+0816 J 1191	606409422	606409395	38.6	8.25	1999.5802	10.781 11.349	10.273 11.339	

Table 3. Measures of neglected doubles taken from catalogue positions. Catalogue entries are from three sources, 2Mass, Tycho 2 (Tyc) and AC200.2 (AC). Magnitudes are 2Mass J and K magnitudes, except as noted. PA is theta (in degrees), Sep is separation (in seconds).

Table 3 Notes

1 Tycho2 BT and VT magnitudes.

2 Blue magnitude, AC2002.2 catalogue numbers assigned by USNO.

Neglected Double Observations for 2006 No. 3: 17th and 18th Hour Doubles

(Continued from page 109)

Discussion of Selected Measured Pairs

A number of systems lie in crowded, star-rich, fields and at least two of the systems measured are probably synonymous with other WDS entries. These and other comments are presented below, in order of their WDS catalog entries.

17072+0647LDS 988 (Table 1) is probably 17087+4945STF 2123 in spite of the great difference in magnitude reported for LDS 988. The 1936 theta closely matches the reciprocal 1830 and 2004 angles and the rho is a close match to both. Both have similar proper motions. No candidate pair with LDS988 magnitudes reported in the WDS matches the measures in the field examined.

17525+1530FOX 209AC?. Fox 209AC (Table 1) is entered in the WDS in the same position as L 17, a recently measured double (reported in Table 2). If the measure reported herein is, in fact, Fox 209AC (problematic), then the original measure was incorrectly entered or transcribed as the angle is completely off (by some 60º). The AC2000.2 catalog positions indicate no significant movement of the components.

17574+3540 and 17572+3541 complex (Tables 2, 3): STF 2257; STF 2256; HO 73AB; WAL 46; POP 10. Various components of this complex have been named by F. Struve, Wallenquist, Hough, and Popovic. Observations of STF2257AB and WAL 86AC are reported in Table 2. HO73 was too close for me to measure, but catalog measures are reported in Table 3. (As noted in the WDS, HO 73 AB is synonymous with POP 10AB.) HO 73AB is a high proper motion pair whose position can be interpreted as close to the position of WAL 86C in 1944. If this interpretation is correct, then WAL 86C is a composite of HO 73AB. If so, then WAL 86CD as well as POP 10AC (already in synonymy, WDS Notes) can be synonymized with 17572+3541STF2256AC. The problem is that this hypothesis required that the original measures of WAL 86CD both be reversed and inaccurate as the 1944 theta (as reversed) and rho are some 14º and 2" off the 1949 STF 2256AC measure. Failing this, nothing else seems to match WAL 86CD in the field. Thus, it is either dubious or in synonymy and is tagged as "uncertain" in the WDS records (Brian Mason, pers. comm.).

18073+2334POU3349AB and 18073+2334WLY 8AC. The A component of POU2239 is resolved as two stars. To avoid confusion, I propose 18073+2334WLY 8AC, for which both observational (Table 1) and catalog (Table 3) measures are provided. The 1905 measure of POU 3349 is reversed given magnitudes. The 1954 measure corresponds to the middle of the two stars (POU3349B and WLY 8C) from a measurement taken from the POSSII plate. I have taken the northern of the two stars as POU3349A based on 2MASS J magnitudes (2MASS unique identifier 267459046). POU3349B does not appear in the UCAC2.0 catalog and only a single composite(?) measure appears in the USNO B1.0 catalog, so proper motions are unavailable. In addition there is a fourth star lying at about PA=274º, SEP= 8".

18083+0230BAL1953 and 18080+0222WLY 9 (Table 1). BAL1953 is pair in a crowded field. The 1909 positions from the AC2000.2 catalog yields almost an exact match to the original measure. Unreported in the WDS is a pair almost directly west consisting of UCAC2.0 32576195 and 32576299. Casual inspection of the proper motions indicates that the pair is optical, but designation as WLY 9 seems appropriate to avoid confusion. Magnitudes appear inverted, but this is due probably due to the magnitude of the B component being overestimated due to another star on the plate (relationships to B is unknown). I thank Dr. William I. Hartkopf (USNO) for his confirmation this identification. WLY 9 probably would have been reported as a pair if both components had been included in the catalogs summarized by AC2002.2

18305+0852BRT2608AB and 18305+0852WLY 10AC (Tables 1, 3). BRT2608AB is in a crowded field. The observed measures (Table 1) agree closely with catalog measures taken from UCAC2.0 positions (Table 3). The AC2002.2 catalog positions agree with the measure of 1919 for 18305+0852BRT2608AB, indicating that this is a pair. However, the WDS 2005 measure does not match anything in the immediate field. The star UCAC2.0 34882726 (79.3º, 12.28" from the A component) is not a good match for the 2005 measure. I have designated 18305+0852WLY 10AC to prevent future confusion.

18357+2403 POU3436 (Table 1) lies in a crowded field. The measure reported herein matches fairly well in magnitude and closely with 1904 measure. It does not match with the 1951 measure. No possible pair in the vicinity can be identified with the 1951 measures reported in the WDS from the plates examined or my images.

18407+1749ROE 88 and WLY 11AD. This is a complex system. Proper motions of ROE 88B and

WLY 11D are fairly similar, but the error in RA associated with UCAC2.0 38110707 exceeds the measure.

18411+2447LDS6330 (Table 3) is listed as "identification uncertain" in the WDS. The pair reported is a reasonable candidate. Unfortunately, there are no proper motion values associated with either star to see if the discrepancy between the original measure and the 2MASS measure could be rectified.

18448+2431POU3524 and WLY 12 (Table 1) are in a crowded field. POU3524 might be confused with the optical pair herein designated WLY 12.

18451+2323POU3525 and WLY 13 (Table 1). POU3525 is another pair in a crowded field, with POU 3530 (Table 2) in the same field. The measures reported are a fair match to the original 1905 measure, but differ from the 1951 measure. One possibility is that the 1951 measure is of another pair. The most likely candidate, closely matching the 1951 measure in theta and rho and delta magnitude (but not actual magnitude) is designated WLY 13.

18497+2337POU3561. This is a crowded field, but I am fairly confident that the pair reported is POU3561.

18527+3301BAR 46. (Tables 1 and 3) gives measures for BAR46AB that agree with the 1990 measures in the WDS. The C component appears slightly elongate in the POSSII blue plate I consulted, but not elongate in the 2MASS J(ir) plate. The 2MASS catalog has two entries (unique identifiers 219744830, 219744828, theta 113.3º, rho 5.54"). The first correlates with UCAC 43470920 (magnitude 12.46), whose measures (Table 1; Table 3) agree well with the first and last measures for BAR 46AC given proper motion. The point source, supposedly of similar magnitude, does not appear on the 2MASS images in any wavelength nor can I detect an elongation of the C component in my images, in spite of the fact that BAR 46AB can be detected (if not measured reliably). Therefore, I conclude that the 2MASS point source 219744828 may be spurious.

18546+2409 POU3584? The pair reported herein is the only pair in the field that is close to the original measures of 1905 and 1951, but with primary and secondary reversed.

18555+0816J 1191 is probably the same pair as 18555+0815BRT3336. The approximate positions of these two doubles reported in the WDS brackets the position of the pair imaged and measured. Although magnitudes differ considerably, differences in theta and rho are closer. The 1915 measure of J 1191 (Table 3) is similar to the 1919 measure of BRT 3336 and probably within a reasonable margin of error. Given the magnitude differences, one might think that the nearby "pair" composed of UCAC 2.0 34705373 and 34705378 might be BRT3336. However, rough approximation of the 1915 position of these stars using Guide8 places them at about the correct PA (ca. 26º) but at 19-20" separation, not 5".

18561+2350POU3598 (Table 1). The 1951 measure does not agree with the original measure or the measure reported herein. UCAC2.0 40223194, just SW of the A component is not part of this pair.

18568+2456POU3605 (Table 1). This pair is in a crowded field. The measure herein agrees with the 1906 measure, as does the blue magnitude. The stars UCAC2.0 40553068 and 40553073, lying just SW of POU3605, might cause confusion although they are obviously fainter.

18571+2456HDS2686 (Table 2). This pair was first measured in 1991 and the present measures might seem anomalous. However, both are high proper motion stars and the UCAC2.0 1991.25 measure agrees well with the original measure. Casual inspection of the proper motions indicates that this is an optical pairing.

Other Comments

The following pairs could not be identified in the fields examined in ALADIN: 17112+2317POU3259, 17128+2433POU3264, 17152+2420POU3268, 17349+0102DOO 67, 17518+3756ES 2568, 17591+1613J 1135AC, 18218+3038L 21, 18260+2606L 22, 18319+2516GCB 33, 18341+1742J 2915AC, and 18386+2422POU3450.

Acknowledgements

This research has made use of the ALADIN Interactive Sky Atlas, the VizieR database of astronomical catalogs and associated catalogs (UCAC2.0, USNOB1.0, GSC 2.3, Tycho-2, 2MASS and AC2000.2), all maintained at the Centre de Données astronomiques de Strasbourg, France. Thanks to Drs. Brian Mason, Gary Wycoff, and Bill Hartkopf, U. S. Naval Observatory for their help with various parts of this research. Thanks to Arnie Rosner and Brad Moore, Global Rent-A-Scope (http://www.global-rent-a-scope.com/) for their support of research to the Remote Astronomical Society Observatory and to Mike and Lynne Rice of New Mexico Skies (http://www.nmskies.com) for ground support for the observatory.

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Divinus Lux Observatory Bulletin: Report #10

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Abstract: This report contains theta/rho measurements from 94 different double star systems. The time period spans from 2006.899 to 2007.230. 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.

In a previous article, it was mentioned that a number of double stars in the WDS CATALOG, bearing the "WFC" prefix, were brighter than the listed magnitudes. As a consequence, many of these pairs were noted as being within the measuring capabilities of a small telescope that is fitted with a micrometer, and the vast majority of these double stars appear to share a common proper motion as well.

A second series of double stars, bearing the "KU" prefix, has recently come to my attention because, like the "WFC" doubles, many of these pairs are as bright, or brighter, than the magnitude listings in the WDS CATALOG. While a lower percentage of these double stars appear to share a common proper motion, there are a greater number that can be measured with smaller instruments than is the case with the "WFC" series. Hence, the reader may wish to consider giving the "KU" doubles some attention as a way of increasing the number of targets on the measuring list.

Conversely, there are also some double star prefixes than appear to be consistently fainter than the magnitude listings in the WDS CATALOG. Among these types of pairs are prefixes such as BAL, MLB, SEI, and KZA. Unless the doubles with these 4 prefixes have had some recent published measurements, many of them will be out of range to measure with a smaller telescope. If the reader spends some time working with the WDS CATALOG, additional discoveries of this sort will likely be noted besides those that have been listed in these above paragraphs.

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. There are also some noteworthy items that are discussed pertaining to the following table.

As has been previously noted, this report contains measurements indicative of the fact that large theta/rho shifts have occurred because of proper motion by one or both of the components of a double star. To begin with, ENG 20 has displayed an increase of 5 degrees in the theta value and 30" in the rho value since 1991. This huge shift has been caused by a large proper motion from the reference point star. Proper motion by the companion star, for J 2840, has caused a decrease in the theta value of almost 6 degrees since 1997. A 3.6% increase in the rho value is being noted for STT 564 AC. This has occurred since 1991 because of proper motion by the "A" component. Proper motions by both "A" and "C" have caused dramatic shifts in the theta/rho parameters for OPI 13 Aa-C. Since 1926, the date of the last listed published measurements, the rho value has increased by 25" and the theta value has increased by about 8.5 degrees. Also of note is the fact that BU 1433 Aa-B has undergone a 3 degrees decrease in the theta value, since 1991, resulting from proper motion by the "A" component.

Five double star systems listed in this report, while not displaying significant shifts in theta values, are found to have undergone noteworthy rho value shifts as a consequence of the directions of proper motion. STF 926 Aa-B has displayed a 3.3% rho value increase, since 1997, because of proper motion by both "A" and "B." BU 1059 A-BC has shown a 3.1% rho value decrease, since 1990, as a result of a large proper motion by the "A" component. For HO 237, proper motion by the reference point star, and the passage of 120 years since the last published measurements, have combined to give a rho value increase of 40% since 1887. A 3.2% rho value increase is being noted for STF 5 AF (Pollux). This shift has been caused by the "A" component's proper motion since 1991. Likewise, proper motion by the reference point star, for HJ 1181, has resulted in a 3% increase in the rho value since 1997.

The final proper motion shift to be discussed in this report, just like the one mentioned for ENG 20 above, is huge by about any standard one would choose to use. In this case, KUI 51 has displayed a nine degrees decrease in the theta value and an increase of 41%, or 11".0, in the rho value, since 1991. As in many of the systems highlighted in this article, the motion of the reference point star is the cause of this shift.

Orbital motion is primarily responsible for a 3 degrees increase in the theta value, for STF 1321 AB, since 1997. This visual binary star has had its orbital elements calculated, and these can be found in SKY CATALOGUE 2000.0, Volume 2. When calculating the theta/rho values from the listed orbital elements, for 2007.129, I found that these values matched up very well with what I measured on that date. Perhaps the listed orbital elements are more accurately known than the "grade 5" ranking would imply from the catalog.

In regards to LDS 5535, it appears that the rho measurement is in error in the WDS CATALOG. Only one measurement was recorded in 1960, at a value of 253".0, but a value of approximately 180" is a more accurate figure. Proper motion cannot account for such a large shift in 46 years. Additionally, the theta value in the CATALOG is off by 8 degrees, and this discrepancy is in a contrary direction to the proper motion of the reference point star. More measurements of this double star would help to accurately determine the theta/rho parameters.

Several discrepancies appear to exist in the historical record for the STF 1121 multiple star system (M 47). First of all, the measurements for STF 1121 AE, in the WDS CATALOG, appear to more nearly match the parameters for STF 1121 BE. The table lists measurements as being for "BE" because this is how the parameters matched up telescopically when M47 was the subject of study. In addition, it is noted that the various catalogs (WDS CATALOG 2001.0, WDS DOUBLE STAR CD 2001.0, and WDS DOUBLE STAR CD 2006.5) list theta/rho values for the components of this system that vary to some extent. Because the components that appear in the following table are all relatively fixed, such discrepancies should be minimal. Hence, it is being suggested that all of the system components might need measurements from several researchers in order to bring increased accuracy to all published theta/rho values that are listed for M 47.

Another possible error in the WDS CATALOG pertains to listed measurements for ES 2629 in 1991, which have theta/rho values of 297 degrees and 40".1. Measurements in this report match up much more closely with the 1903 values of 289 degrees and 16".3. When one considers such factors as the common proper motions of both components, it is readily apparent that the 1991 rho value could not possibly be so large and, to a lesser extent, that the theta value is also too large.

As in previous articles, the following table contains new submissions for possible common proper motion double stars that don't appear to have been previously cataloged. These submissions are identified as ARN 91 (05500+2258), ARN 92 (05097+2549), ARN 93 (06255+0650), and ARN 94 (07061+5259). The companion star for ARN 91 is supposedly the reference point star for POU 789 (05499+2259), but the companion star for POU 789 was not visible with my instrumentation and did not appear on my star chart. Perhaps researchers with larger telescopes could verify whether or not this apparently missing star has any level of visibility with moderated sized instruments. ARN 92 is located near HDS 680 (05097+2546). ARN 93 appears near GRV 716 (06259+0655). ARN 94 is in the vicinity of STF 1009 (07057+5245).

Divinus Lux Observatory Bulletin: Report #10

Name	RA Dec	Mag 1	Mag 2	PA	Sep	Date	N	Notes
STF 404 AC	03314+2148	9.7	9.8	50.4	121.46	2006.899	1n	1
STF 416 AB	03349+1949	8.7	10.5	67.5	30.12	2006.899	1n	2
STF 458	03496+1817	10.4	10.5	202.0	4.94	2006.899	1n	3
LDS6118	03497+2320	8.1	9.1	322.6	179.73	2006.899	1n	4
GUI 4 AD	04101+2407	10.1	9.1*	205.9	89.37	2006.937	1n	5
LDS5535	04173+2035	4.9	9.5	118.3	179.73	2006.937	1n	6
BUP 52 Aa-B	04184+2135	5.6	10.3	61.1	158.99	2006.937	1n	7
H 101 AC	04255+1756	4.3	10.5	235.5	77.03	2006.937	1n	8
ARN 62 AD	04255+1756	4.3	9.0	39.5	412.78	2006.937	1n	8
STF 559	04335+1801	7.0	7.0	277.0	2.96	2006.937	1n	9
BUP 66 AC	04382+1231	4.3	10.3	309.4	122.45	2006.937	1n	10
STF 589	04448+0517	8.7	8.8	279.3	4.44	2006.937	1n	11
STT 55	04491+0513	8.1	9.2	17.1	37.53	2006.937	1n	12
BUP 70	04514+1850	5.1	10.5	301.8	179.73	2006.937	1n	13
STF 609	04518+0115	8.7	9.6	70.0	2.96	2006.937	1n	14
ARN 92 **	05097+2549	9.9	9.9	135.5	25.68	2006.984	1n	15
STT 62	05120+0650	7.5	7.6	52.5	124.92	2006.984	1n	16
A 212 AC	05158+2928	9.2	10.7	16.8	21.23	2006.997	1n	17
CTT 4 AC	05175+3312	7.7	10.3	282.8	111.59	2006.984	1n	18
STF 679	05197+2511	10.0	10.2	317.0	20.24	2006.956	1n	19
J 144	05222+2008	9.7	10.3	167.4	5.93	2006.956	1n	20
HJ 364	05242+2208	10.1	10.5	143.2	10.86	2006.956	1n	21
STF 716 AB	05293+2509	5.8	6.7	208.0	4.44	2006.984	1n	22
STT 63	05308+3950	6.4	7.6	277.0	76.03	2006.984	1n	23
STF 731 AB	05314-0206	8.6	9.1	327.2	4.94	2006.956	1n	24

Divinus Lux Observatory Bulletin: Report #10

Name	RA Dec	Mag 1	Mag 2	PA	Sep	Date	N	Notes
GUI 8 AC	05314-0206	8.6	9.5	135.3	169.93	2006.956	1n	24
ENG 20	05314-0336	8.0	10.6	318.1	276.50	2006.997	1n	25
STF 738 AB	05351+0956	3.5	5.5	44.0	4.44	2006.984	1n	26
STF 738 AD	05351+0956	3.5	9.6	271.1	78.01	2006.984	1n	26
GUI 9 AE	05351+0956	3.5	9.2	279.4	151.09	2006.984	1n	26
STF 749 AC	05371+2655	6.6	9.6	299.6	179.73	2006.997	1n	27
STF 771 AB	05418+1933	10.2	10.3	54.7	21.73	2006.956	1n	28
STF 773 AB	05428+3322#	9.6	10.7	219.5	27.16	2006.956	1n	29
STF 777	05434+2213	9.3	9.8	84.5	4.94	2006.956	1n	30
POU 768	05437+2504	9.2	10.6	272.4	11.85	2006.956	1n	31
STF 779 AB	05444+2744	7.5	9.8	254.2	8.89	2006.956	1n	32
HJ 5539	05456+1737	10.0	10.2	281.5	27.65	2006.956	1n	33
STT 66	05479+2441	6.8	7.5	167.2	93.81	2006.984	1n	34
ARN 91 **	05500+2258	8.3	8.9	312.2	112.08	2006.984	1n	35
AG 220	05566+1033	9.5	10.0	13.1	22.71	2006.956	1n	36
JRN 23 JI	06085+1358	10.4	10.6	90.0	43.45	2006.962	1n	37
SCA 37	06099+2032	10.5	10.6	94.3	24.69	2006.956	1n	38
STF 845	06116+4843	6.2	6.8	358.5	7.41	2006.997	1n	39
STT 70	06141+2359	7.5	7.9	179.1	114.55	2006.997	1n	40
H 23 AB	06171+1551	7.3	10.5	229.9	43.94	2006.962	1n	41
ARN 39 AC	06171+1551	7.3	10.1	87.5	103.69	2006.962	1n	41
S 513 AB	06212+2108	7.3	8.9	259.2	58.26	2007.071	1n	42
S 513 AD	06212+2108	7.3	7.6	25.2	264.65	2007.071	1n	42
STF 897	06224+2640	8.8	9.0	348.7	18.27	2006.962	1n	43

Divinus Lux Observatory Bulletin: Report #10

Name	RA Dec	Mag 1	Mag 2	PA	Sep	Date	N	Notes
BU 1059 A-BC	06230+2231	2.9	10.5	140.4	107.64	2007.071	1n	44
ARN 93**	06255+0650	9.2	10.3	210.9	23.21	2007.071	1n	45
STF 926 Aa-B	06317+0546	7.2	8.6	290.2	11.36	2007.071	1n	46
STF 929	06353+3743	7.2	8.4	24.1	5.93	2007.071	1n	47
HO 237	06421+0315	7.1	10.6	54.8	168.86	2007.071	1n	48
STF 978 AB	06555+3755	6.7	10.0	86.4	18.76	2006.962	1n	49
STF1009 AB	07057+5245	6.7	7.0	147.7	4.44	2007.074	1n	50
ARN 94**	07061+5259	10.5	10.7	91.5	16.79	2007.074	1n	51
STF1056	07156-0152	7.9	8.8	300.4	3.95	2007.074	1n	52
DUF 2	07160+1644	9.2	9.3	112.8	41.48	2006.989	1n	53
STF1063 AB**	07181+0421	9.1	10.4	289.8	51.35	2006.989	1n	54
GIC 72 AB	07224+0854	9.4	10.5	166.6	302.18	2006.989	1n	55
BID 2	07261+2153	9.3	9.7	320.9	100.23	2006.989	1n	56
STF1089 AB	07262+1450	8.9	8.9	5.9	6.91	2007.074	1n	57
SHJ 368 Aa-C	07277+2127	5.2	10.6	220.8	133.31	2006.989	1n	58
STF1121 AB	07366-1429	6.9	7.3	305.1	7.90	2007.074	1n	59
STF1121 AD	07366-1429	6.9	9.5	102.3	72.09	2007.074	1n	59
STF1121 BE**	07366-1429	7.3	9.9	232.8	69.13	2007.074	1n	59
STF1121 AH	07366-1429	6.9	9.4	269.3	150.10	2007.074	1n	59
J 2840	07377+1330	10.4	10.6	281.3	7.90	2007.074	1n	60
STF 5 AF	07453+2802	1.2	10.5	78.6	309.09	2007.071	1n	61
HJ 2418	07506+2001	10.1	10.1	217.2	21.73	2006.989	1n	62
STF1153	07526+1201	10.1	10.3	357.6	19.75	2006.989	1n	63
BUP 110 AC	08069+2530	9.8	10.4	127.6	254.78	2007.016	1n	64

Divinus Lux Observatory Bulletin: Report #10

Name	RA Dec	Mag 1	Mag 2	PA	Sep	Date	N	Notes
STT 564 AC	08116+3227	6.8	10.7	66.2	289.34	2007.093	1n	65
CHE 88	08137+0833	10.2	10.7	110.5	45.43	2007.016	1n	66
OPI 13 Aa-C	08160+1842	7.6	9.7	78.6	65.18	2007.093	1n	67
ES 2629	08269+5210	9.7	10.1	290.4	15.80	2007.093	1n	68
S 571 AC	08399+1933	7.3	7.4	156.8	45.43	2007.093	1n	69
S 571 AD	08399+1933	7.3	6.6*	241.8	92.83	2007.093	1n	69
STT 569 Aa-C	09123+1500	6.5	10.4	216.7	204.41	2007.167	1n	70
HJ 122	09137+1109	10.2	10.4	91.3	9.88	2007.038	1n	71
STF1321 AB	09144+5241	7.6	7.7	95.1	17.28	2007.129	1n	72
HJ 2490	09150+1253	10.2	10.5	67.9	21.73	2007.038	1n	73
STF1332	09174+2339	7.8	8.1	28.8	5.93	2007.129	1n	74
HJ 2492 AC	09186+5231	10.1	9.1*	129.5	221.69	2007.038	1n	75
STF1401	10002+0615	7.7	9.7	21.2	24.19	2007.167	1n	76
STF1402 AB	10049+5529	7.7	8.9	105.7	32.09	2007.167	1n	77
GIR 2 AC	10049+5529	7.7	9.6	175.4	132.33	2007.167	1n	77
STF1446	10336+1513	9.2	10.0	250.2	5.43	2007.060	1n	78
KUI 51	10365-1214	5.7	10.2	0.2	37.53	2007.205	1n	79
STF1486	10550+5207	8.3	9.6	99.8	31.60	2007.167	1n	80
HJ 1181	11006-1819	8.9	9.9	268.3	63.20	2007.205	1n	81
LDS 342 AB	11154-1807	10.2	10.1*	261.7	18.76	2007.115	1n	82
STF1521	11154+2734	7.6	8.0	98.1	3.46	2007.205	1n	83
STF1547 AB	11317+1422	6.3	9.0	330.2	15.80	2007.205	1n	84
BGH 35	11324+1212	8.4	9.4	106.3	395.00	2007.115	1n	85
STF1552 AB	11347+1648	6.3	7.3	209.0	3.46	2007.205	1n	86

Divinus Lux Observatory Bulletin: Report #10

Name	RA Dec	Mag 1	Mag 2	PA	Sep	Date	N	Notes
STF1552 AC	11347+1648	6.3	9.8	234.9	63.20	2007.205	1n	86
STF1596	12043+2128	6.2	7.4	236.0	3.95	2007.230	1n	87
STF1600	12056+5156	7.5	8.3	92.8	7.90	2007.205	1n	88
BU 1433 Aa-B	12337+4121	4.2	10.6	199.8	264.65	2007.230	1n	89
BGH 40 AB	12396+1956	8.4	8.8	148.1	415.74	2007.115	1n	90
HJ 2617 AB	12406+4017	8.3	9.6	2.5	5.93	2007.230	1n	91
STF1719	13073+0035	7.5	8.1	359.3	6.91	2007.230	1n	92
STF1723	13082+3844	8.6	10.0	11.1	6.42	2007.230	1n	93
HJ 2687	13520-1955	10.1	10.4	140.2	15.80	2007.115	1n	94

* The companion star is the brighter component.
** Not listed in the WDS CATALOG.
\# System coordinates appear to be closer to 05435+3317.

Notes

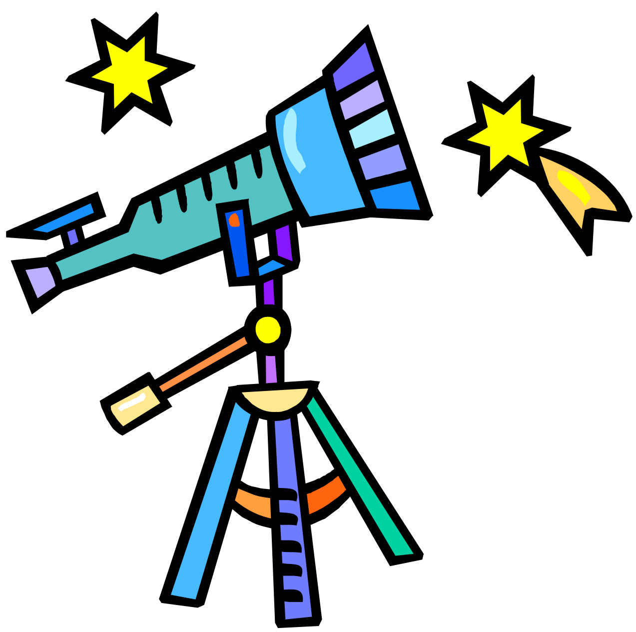
1. In Taurus. Position angle increasing. Spect. K0, F2.
2. In Taurus. Sep. & p.a. increasing. Spect. K5, K5.
3. In Taurus. Common proper motion; p.a. increasing. Spect. F8.
4. In Taurus. Common proper motion; p.a. slightly increasing. Spect. A2, F8.
5. In Taurus. Sep. & p.a. slightly decreasing. Spect. G0, F5.
6. In Taurus. Position angle decreasing. Spect. A3, K5.
7. 51 Tauri. Separation decreasing. Spect. F0V.
8. Delta or 68 Tauri. AC = sep. inc. AD = relfix, cpm. Spect. AD = A2IV, K2V.
9. In Taurus. Slight decrease in p.a. Spect. B9IV, B9IV.
10. 90 Tauri. Separation increasing. Spect. A6V.
11. In Orion. Common proper motion; p.a. decreasing. Spect. G5, G5.
12. In Orion. Relatively fixed. Common proper motion. Spect. K, F.
13. 97 Tauri. Separation increasing. Spect. A7IV, F5.
14. In Orion. Sep. increasing; p.a. decreasing. Spect. F8.
15. In Taurus. Common proper motion. Near HDS 680.
16. In Orion. Sep. & p.a. increasing. Spect. K0, K0.
17. In Auriga. Sep. increasing; p.a. decreasing. Spect. G2V.
18. In Auriga. Position angle slightly increasing. Spect. A2.
19. In Taurus. Relatively fixed. Common proper motion. Spect. G5, G0.
20. In Taurus. Common proper motion; p.a. decreasing. Spect. F.
21. In Taurus. Relatively fixed. Spect. F2, F5.
22. 118 Tauri. Sep. dec; p.a. inc. Common proper motion. Spect. B8.5V, B9V.
23. In Auriga. Position angle increasing. Spect. G9III, K0.
24. In Orion. AB = p.a. decreasing. AC = relatively fixed. Spect. A0, A0, A2.
25. In Orion. Sep. & p.a. increasing. Spect. M1.5V, F8.

Divinus Lux Observatory Bulletin: Report #10

26. 39 Orionis. AB = cpm. AD = relfix. AE = sep. inc. Spect. O8, B.5V, B9, B9.
27. In Taurus. Sep. increasing; p.a. decreasing. Spect. B9IV.
28. In Taurus. Separation decreasing. Spect. A0.
29. In Auriga. Relatively fixed. Spect. K0.
30. In Taurus. Relatively fixed. Spect. A0, A0.
31. In Taurus. Common proper motion; p.a. decreasing. Spect. A2.
32. In Taurus. Relatively fixed. Common proper motion. Spect. A0, A0.
33. In Taurus. Separation increasing. Spect. A0.
34. In Taurus. Relatively fixed. Spect. K2, K2.
35. In Taurus. Common proper motion. Spect. A2, F0.
36. In Orion. Relatively fixed. Common proper motion. Spect. G5.
37. In Orion. Part of STF 848 system. Relatively fixed. Common proper motion.
38. In Orion. Separation slightly decreasing. Spect. F0.
39. 41 Aurigae. Common proper motion; p.a. increasing. Spect. A1V, A6V.
40. In Gemini. Sep. slightly decreasing. Spect. F0.
41. In Orion. AB = sep. slightly dec. AC = p.a. slightly dec. Spect. B8II.
42. In Gemini. AB & AD = relatively fixed. Spect. B9II, A0, A0.
43. In Gemini. Relatively fixed. Spect. A0, A0.
44. Mu Geminorum. Separation decreasing. Spect. M3II.
45. In Monoceros. Common proper motion. Spect. A7, F5.
46. In Monoceros. Sep. & p.a. increasing. Spect. A1, A5.
47. In Auriga. Relatively fixed. Common proper motion. Spect. G5, G5.
48. In Monoceros. Separation increasing. Spect. A2V.
49. In Auriga. Sep. increasing; p.a. decreasing. Spect. K0.
50. In Lynx. Sep. inc; p.a. dec.; common proper motion. Spect. A3V, A3V.
51. In Lynx. Common proper motion.
52. In Monoceros. Position angle increasing. Spect. G0, G0.
53. In Gemini. Position angle increasing. Spect. A5III, F0.
54. In Canis Minor. Sep. inc. WDS listing = A-BC. Spect. F8, A5.
55. In Canis Minor. Relatively fixed. Common proper motion. Spect. F2.
56. In Gemini. Relatively fixed. Spect. R5.
57. In Gemini. Position angle slightly decreasing. Spect. A2, A2.
58. In Gemini. Sep. decreasing; p.a. increasing. Spect. F5V.
59. In Puppis (M 47). All components relatively fixed. Spect. AB = B6V, B6V.
60. In Gemini. Position angle decreasing.
61. Pollux, Beta, or 78 Geminorum. Sep. & p.a. increasing. Spect. K0III.
62. In Gemini. Relatively fixed. Common proper motion. Spect. A0, F2.
63. In Canis Minor. Relatively fixed. Spect. F8, F5.
64. In Cancer. Slight decrease in p.a. Spect. K5.
65. In Cancer. Sep. increasing; p.a. decreasing. Spect. G4V.
66. In Cancer. Sep. & p.a. increasing.
67. In Cancer. Sep. & p.a. increasing. Spect. K0, K0.
68. In Lynx. Sep. dec.; p.a. inc.; common proper motion. Spect. K4.
69. In Cancer. AC & AD = relfixed; common proper motion. Spect. A0, A0, K0.
70. In Cancer. Sep. & p.a. decreasing. Spect. G8V, F0.
71. In Cancer. Common proper motion. Sep. slightly increasing. Spect. F, F.
72. In Ursa Major. Common proper motion; p.a. increasing. Spect. M0V, K2.
73. In Cancer. Common proper motion. Sep. slightly increasing. Spect. K0, K.
74. In Cancer. Common proper motion; p.a. increasing. Spect. F6V, F7V.
75. In Ursa Major. Position angle slightly increasing. Spect. F2.
76. In Sextans. Relatively fixed. Common proper motion. Spect. F5.

Divinus Lux Observatory Bulletin: Report #10

77. In Ursa Major. AB = sep. & p.a. inc. AC = relfix. Spect. K5, K5, G0.
78. In Leo. Relatively fixed. Common proper motion. Spect. G0, G0.
79. In Hydra. Sep. increasing; p.a. decreasing. Spect. F7V.
80. In Ursa Major. Sep. increasing; p.a. decreasing. Spect. K5, F5.
81. In Crater. Separation decreasing. Spect. M7, F2.
82. In Crater. Common proper motion; p.a. slightly increasing. Spect. K7V, K7V.
83. In Leo. Common proper motion; p.a. increasing. Spect. A5, A5.
84. 88 Leonis. Common proper motion; p.a. increasing. Spect. G0IV, G0V.
85. In Leo. Relatively fixed. Common proper motion. Spect. F5, G5.
86. 90 Leonis. AB & AC = separation increasing. Spect. B4V, B3, F5.
87. 2 Comae Berenicis. Relfixed. Common proper motion. Spect. F0IV, F0IV.
88. In Ursa Major. Common proper motion; p.a. decreasing. Spect. G8III, G8III.
89. Beta Canes Venaticorum. Position angle decreasing. Spect. G0, K0.
90. In Coma Berenices. Relatively fixed. Common proper motion. Spect. G5, K0.
91. In Canes Venatici. Common proper motion. Sep. inc.; p.a. dec. Spect. G0, G0.
92. In Virgo. Common proper motion; p.a. decreasing. Spect. F5V, F9V.
93. In Canes Venatici. Common proper motion; p.a. increasing. Spect. G5, G5.
94. In Virgo. Sep. & p.a. increasing. Spect. F0, F0.



BEA 1 a New "Old" Companion of WDS 06167+3852 J 591 in Auriga

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Abstract: In this paper I offer confirmation of the single observation of J 591 AB as well as an observation of a new component. Both components were observed during a neglected doubles stars measurements session. Also, both were previously registered in older professional images.

Although I have visually observed double stars for a long time, it was only in 2006 that I started making CCD measurements. The instrument I used is a Takahashi Mewlon 300. This is a good 300 mm Dall-Kirkham reflector with a focal length of 3,572 mm mounted on a 10 Micron GM 2000 equatorial mount. This last is a rock-solid german mount resembling the Astro-Physics GE 900GTO (accredited with having a 3 second periodical error and is a well-tested) with FS2 controller. This mount is fixed and well aligned to the north pole and therefore is very easy to take images of a considerable number of pairs in a night. The sensor is the very well known, cooled SBIG ST7XME with precise square 9 micron pixels. Finally, the optical train is composed of the telescope, an Astronomik anti IR filter, a 2X TeleVue Barlow lens, one flip mirror, and lastly the SBIG camera. The distance from the Barlow lens and the sensor is pretty long and so the equivalent focal length of the system is about 12500 mm with a image scale of about 0.15"/pixel.

For data reduction I use Reduc 3.63, a well known and fine program by Florent Losse. (http://www.astrosurf.com/hfosaf/Reduc/Tutorial.htm)

For calibration stars I usually use the pairs from the Guy Morlet list that Florent Losse sent me with the Reduc program, one pair at the start of the measurement session and one pair at the end. The error, using these stars, is well under the errors imposed by

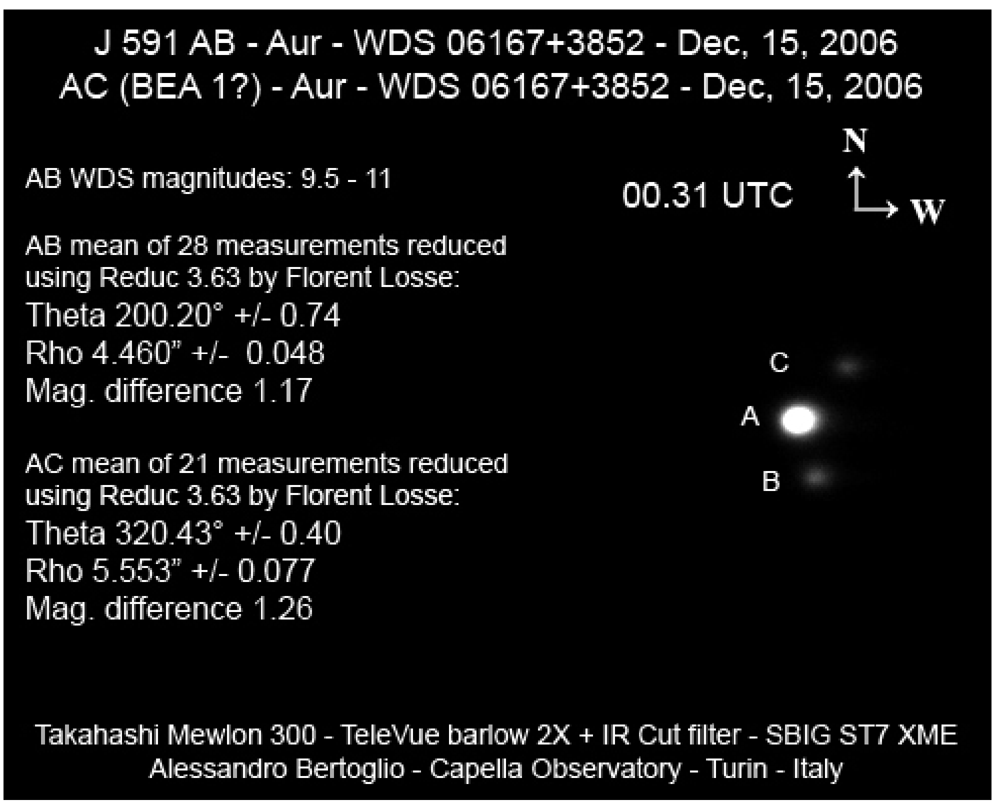


Figure 1: CCD image of J 591 made by the author.

BEA 1 a New "Old" Companion of WDS 06167+3852 J 591 in Auriga

the night conditions. I make an average of the calibration parameters from these two pairs and I use this average for the reduction of all double stars measured during the night.

Normally, I take from 50 to 100 images of each pair. Then, with Reduc I measure every image, discarding the worst, Finally, I obtain an average of separations and position angles and the errors (sigma) of the remaining images. Reduc is also able to estimate the magnitude difference but it's not a photometric program (and the technique I use is not well suited for this work), but normally the error is pretty low, about 0.1 – 0.3 magnitudes.

I made a personal list of neglected doubles from the last general list of this kind of pairs published on the WDS web site. One of these stars is J 591. The last catalog reports only one measurement of this star made in 1911 (I think by the discoverer) and nothing else: theta 187 degrees, rho 5 seconds and magnitudes 9.5 and 11. Moreover, in the catalog this star is composed only by this two components. On December 15 2006 at 0.31 UTC I obtained 100 images of this pair, see Figure 1, and it was obvious that a third C component was easily visible at about the same distance as the AB pair. My measurements of this system are given in Table 1.

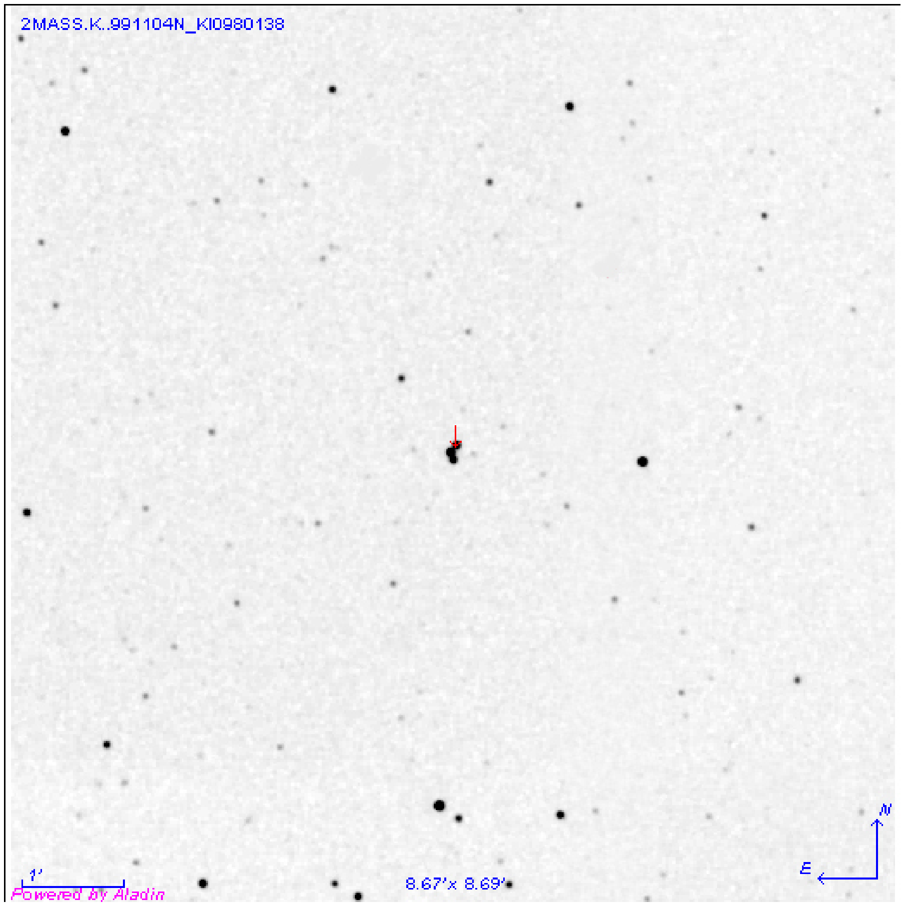


Figure 2: 2MASS image of J 591 AB showing the new companion.

The WDS has a note for J 591 AB indicating that Giacobini tried to confirm the single measurement of this pair and could not and there is doubt as to its existence. My image, as well as the 2 MASS image (Figure 2), clearly show the B component. Moreover, my measurements of the PA and sep. of the B component are consistent with the original 1911 measurements.

As for the new C component; initially, I thought it to be a reflection. But it is a real image as I could see it with the eyepiece attached to the flip mirror. The eyepiece was a 40 mm Plossl at about 300X. Moreover, there are previous professional images that show

(Continued on page 130)

Name	RA+DEC	Mag Diff	PA	PA sigma	Sep	Sep sigma	Epoch	N
J 591 AB	06167+3852	1.17	200.2	0.7	4.46	0.05	2006.9543	28
BEA 1 AC	06167+3852	1.26	320.4	0.4	5.55	0.08	2005.9543	21

Table 1: Position angle and separation measurements of the original pair and the new companion to J 591.

BEA 1 a New "Old" Companion of WDS 06167+3852 J 591 in Auriga

this third star, see Figure 2.

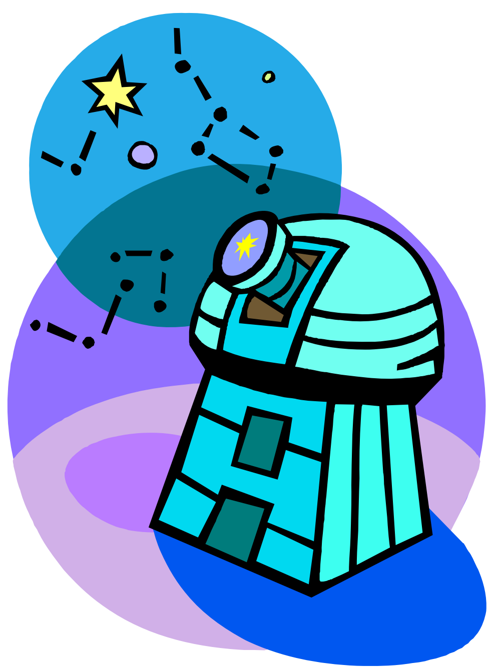
Since the separation of the components AB and AC very similar, and the magnitude difference between B and C only about 0.1 magnitude, I am very surprised that the discoverer did not report the C star. It is an obvious triple, even in smaller instruments. Maybe the C component was too close in 1911? Is C a variable star? There is interesting material for further study. I hope other double star observers will search for this system to confirm my observations.

For an amateur such as me, there is great satisfaction in this small "discovery". Usually for us there is only great cold and tiredness.

Acknowledgements

I wish to thank Florent Losse for his kind patience and continuous encouragement and for his excellent software Reduc. Thanks to my good friend Dr. Paolo Tanga of Nice Astronomical Observatory and to Dr. Luigi Pansecchi of Merate Astronomical Observatory for their valuable suggestions. Finally, I want to thank my wife, Tais, for her constant assistance during long sessions of data reduction.

Mr Bertoglio tells us that when he was seven his father gave him a small telescope starting his passion for astronomy. From 1986 to 1993 he was involved in photoelectric photometry work in collaboration with other amateur and professional astronomers in I.A.P.P.P. and was coauthor of the published results in AJ and IBVS. In 1981 he founded the Gruppo Astrofili W. Herschel, the Turin local amateur astronomy group.



Double Star Measurements Using a Webcam

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Abstract: I report on the measurements of 48 double stars using a standard webcam.

In my observations I use a small 8" Newtonian telescope with a standard webcam. For measurements of double stars, I use two different focal lengths, 1500 mm and 3000 mm.

For automatic analyses of those records, I use a software tool. This program is called REDUC and was written by Mr. Florent Losse, a French double star observer. REDUC is a special tool for analyses of double star measurements. It is a freeware program that I got from Mr. Losse by email.

For each double star system I observe, I make a short video of 10 seconds up to 30 seconds. Later the best 30 to 100 frames are evaluated automatically. The statistical results of the measurements are very good and repeatable.

The critical part of the measurements is the scale calibration of the optical systems. For this I made many star trails with different stars. For my 1500 mm videos, this method works very well, but not so for my 3000 mm records. The bias was about 0.5% up to 1%. So I had to correct the scale calibration manually by comparison with 3 different data sets: 1) my own data set of the 1500 mm measurements; 2) ephemerides from calibrating systems; and 3) data from the 4th interferometric catalogue

The manually corrected 3000 mm scale calibration is best for double stars with separation from 1.6" up to 30".

In the table are my measurements for 48 double stars. The magnitudes are from Washington Double Star Catalogue and not measured by me.

Name	RA + DEC	Mags	P.A.	Separation	Date	N	Notes
STFA 1	00464+3057	7.25 7.43	55.1	47.04	2006.789	1	
STF 60 AB	00491+5749	3.52 7.36	320.6	13.12	2006.986	1	
STF 668 A-BC	05145-0812	0.3 6.8	203.6	9.00	2006.986	1	
STF 738 AB	05351+0956	3.51 5.45	45.3	4.33	2006.986	1	

Table continued on next page

Double Star Measurements Using a Webcam

Name	RA + DEC	Mags	P.A.	Separation	Date	N	Notes
STF 738AC	05351+0956	3.7 10.72	184.5	28.78	2006.968	1	
STF 738AD	05351+0956	3.51 9.63	271.2	77.83	2006.968	1	
STF 738AE	05351+0956	3.51 9.22	279.0	150.10	2006.968	1	
STF 748Aa-B	05353-0523	6.55 7.49	31.0	8.67	2006.986	1	
STF 748Aa-C	05353-0523	6.55 5.06	131.4	12.76	2006.986	1	
STF 748Aa-D	05353-0523	6.55 6.38	95.4	21.35	2006.986	1	
STFA 16AB	05354-0525	5.03 6.19	92.7	52.06	2006.986	1	
STFA 16AC	05354-0525	5.2 9.1	97.7	127.60	2006.986	1	
STF 761AB	05386-0233	7.86 8.39	202.6	67.69	2006.986	1	
STF 761AB	05386-0233	7.86 8.55	208.8	71.54	2006.986	1	
STF 762AB-C	05387-0236	3.73 8.79	238.3	10.85	2006.986	1	
STF 762AB-D	05387-0236	3.76 6.56	83.7	12.92	2006.986	1	
STF 762AB-E	05387-0236	3.76 6.34	61.7	41.40	2006.986	1	
STF 774AaB	05407-0157	1.88 3.70	173.4	2.30	2006.986	1	
STF 774AaC	05407-0157	1.88 9.55	9.9	58.03	2006.986	1	
STF1110AB	07346+3153	1.93 2.97	59.4	4.39	2006.986	1	
STF 180AB	01535+1918	4.52 4.58	0.2	7.42	2006.830	1	
H 5 12AB	01579+2336	4.80 6.65	47.3	37.12	2006.986	1	
STF 205A-BC	02039+4220	2.31 5.02	62.7	9.67	2006.789	1	1
STF1523	11182+3132	4.33 4.80	238.1	1.67	2006.312	1	
SHJ 162Aa-B	13149-1122	7.11 8.18	142.2	107.30	2006.425	1	
H 3 7AC	16054-1948	2.59 4.52	21.1	13.51	2006.477	1	
H 5 6Aa-C	16120-1928	4.21 6.60	336.6	40.86	2006.460	1	
STFA 31Aa-B	16406+0413	5.76 6.92	229.4	69.03	2006.460	1	

Table continued on next page

Double Star Measurements Using a Webcam

Name	RA + DEC	Mags	P.A.	Separation	Date	N	Notes
STF2140	17146+1423	3.48 5.40	100.9	4.93	2006.460	1	
STF3127 Aa-B	17150+2450	3.14 8.3	282.0	11.57	2006.460	1	
STF2161 Aa-B	17237+3709	4.5 5.4	317.4	4.12	2006.441	1	
STF2202 AB	17446+0235	6.13 6.47	93.5	20.48	2006.501	1	
STF2220 A-BC	17465+2743	3.42 9.78	249.1	34.58	2006.501	1	
STF2264	18015+2136	4.85 5.20	254.1	6.28	2006.477	1	
STF2272 AB	18055+0230	4.20 6.20	136.6	5.28	2006.582	4	
STF2280 Aa-B	18078+2606	5.81 5.84	183.6	14.23	2006.540	1	
STF2382 AB	18443+3940	5.01 6.10	348.5	2.35	2006.616	3	2
STF2383 Cc-D	18443+3940	5.25 5.38	79.6	2.33	2006.616	3	3
STF2417 AB	18562+0412	4.59 4.93	103.9	22.12	2006.545	1	
SHJ 289	19135+3902	8.01 8.71	56.5	38.93	2006.679	1	
STF2487 AB	19138+3909	4.38 8.58	80.6	28.33	2006.679	1	
STFA 43 Aa-B	19307+2758	3.37 4.68	54.2	34.27	2006.477	4	
STF2580 AB	19464+3344	5.06 9.25	68.1	26.01	2006.786	1	
STF2690 Aa-BC	20312+1116	7.12 7.39	254.1	17.28	2006.690	1	
STF2727	20467+1607	4.36 5.03	265.5	9.03	2006.690	1	
STF2758 AB	21069+3845	5.35 6.10	151.1	30.86	2006.810	2	
STF2993 AB	23141-0855	7.60 8.17	175.6	24.93	2006.874	1	
STF3008	23238-0828	7.21 7.67	150.6	6.00	2006.874	1	

Notes to table:

1: STF 205A-BC, Gamma Andromedae: STF 205A-BC was discovered by the German astronomer Christian Mayer on January 29, 1777. Source: Christian Gründliche Vertheidigung neuer Beobachtungen von Fixsterntrabanten, welche zu Mannheim auf der kurfürstlichen Sternwarte entdeckt worden sind, Christian Mayer, Mannheim 1778

(Continued on page 134)

Double Star Measurements Using a Webcam

(Continued from page 133)

see also : http://www.epsilon-lyrae.de/Doppelsterne/Galerie/Andromeda.html

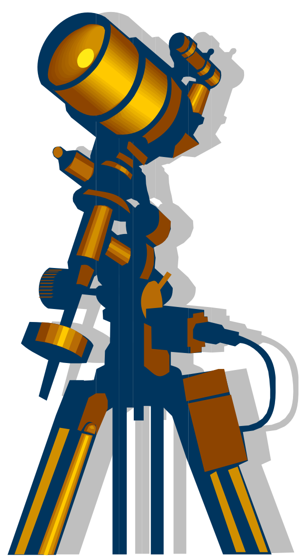
2: STF2382, Epsilon 1 Lyrae: STF2382 was discovered by the German astronomer Christian Mayer on August 15, 1778. His results in polar coordinates were 3.4" and 31 deg (average of 7 measurements). Source: De novis in coelo sidereo phaenomenis in miris stellarum fixarum comitibus, Christian Mayer, Mannheim 1779 See also:

http://www.epsilon-lyrae.de/Beobachtungstipp/Beobachtungstipp.html#Christian_Mayers_Beobachtungen_

http://www.epsilon-lyrae.de/Beobachtungstipp/CM_Observationen/CM_Notizen_1778_08_15.html

3: STF2383, Epsilon 2 Lyrae : STF2383 was also discovered by Christian Mayer on August 23, 1778: 2.8" and 155 deg (average of 10 measurements). Source : De novis in coelo sidereo phaenomenis in miris stellarum fixarum comitibus, Christian Mayer, Mannheim 1779 See also:

http://www.epsilon-lyrae.de/Beobachtungstipp/CM_Observationen/CM_Buch3_1778_08_23.html



BOOK REVIEW

The Binary Stars

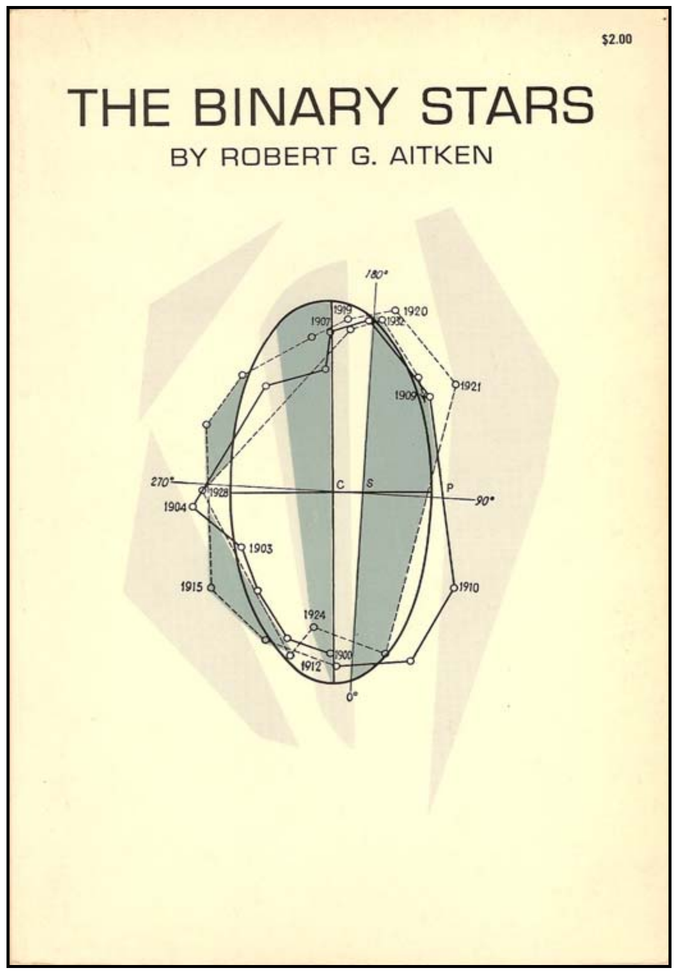
Robert Grant Aitken. Series of Semi-Centennial Publications, University of California. New York: Douglas C. McMurtrie, 1918. 2nd edn. New York: McGraw-Hill, 1935; rpt. New York: Dover, 1935, 1964.

The Binary Stars is R. G. Aitken's first general synthesis of double star research and is dedicated to Sherburne Wesley Burnham. The book is organized into two preliminary chapters on the history of reach on binary stars followed by nine chapters that cover visual, spectrographic, and eclipsing binaries: what can be learned from known orbits, how to assess the statistical data on visuals, and what is known of the origins of binaries. Chapter Four, "The Radial Velocity of a Star," is written by J. H. Moore, and is the only section not written by Aitken.

Aitken (1864-1951) is an excellent but demanding writer who assumes the reader is somewhat familiar with Latin and the calculus, meaning one needs more than a passing knowledge of algebra and trigonometry. Aitken takes us through what many of us value the most—specific, practical examples of micrometer measuring and orbital determination. For example, in the section on observing methods of visual binaries, we are treated to the detailed case of Barnard's calibration of the micrometer screw of the 40-inch Yerkes refractor followed by Aitken's own data reduction. After explaining approaches to orbital determination for visual binaries, he offers several examples that illustrate methods of determining orbits.

Moore's chapter is a nicely crafted introduction to spectography and how the photographic study of stellar spectra revolutionized the study of radial velocity. Radial velocities are important parameters because they allow us to determine motion along line-of sight and this is critical to establishing the linear dimensions of an orbit, given the relative proportions via orbital calculations. And, of course, it allows the additional bonus of the possible discovery of new spectrographic binaries, analysis of eclipsing binaries, and periodic variations in radial velocity to identify a binary system (but watch out for the Cepheid variables!). The theme of radial velocity and its uses is carried over by Aitken into subsequent chapters on orbital calculations for spectroscopic binaries and eclipsing binaries, all supported by detailed examples. Of course, not all eclipsing binaries were (or are)

(Continued on page 136)



Cover of the 1964 Dover Edition

BOOK REVIEW: *The Binary Stars*

bright enough for spectroscopic analysis, so Aitken also covers what we can know about those for which we have only have light curves.

Three of the remaining chapters synthesize what we can know of and learn from binaries. Perhaps most importantly, binaries of known orbit are the only means by which we can calculate stellar mass and density. In the chapter on binaries of special interest we find discussion of examples of determining the nature of pairs (optical, binary) from diverse data sources that discuss the discovery of the nature of these systems. The penultimate chapter details Aitken's attempts to understand the general nature of visual binary systems through statistical study of northern visual binaries. The book ends, predictably, with a chapter offering theories as to the possible origins of binary systems.

The 1918 edition is a classic for all interested in binary stars and is free via the Google Book Project (Google Books: enter "The Binary Stars"). Print copies are occasionally available (ca. $60-$100). A second edition (1935, McGraw-Hill; ca. $40-$110) updates the first (you will find the "Aitken Criterion" in the second edition, not the first) and was reprinted in soft cover by Dover Publishing in 1964 (ca. $20-$40).

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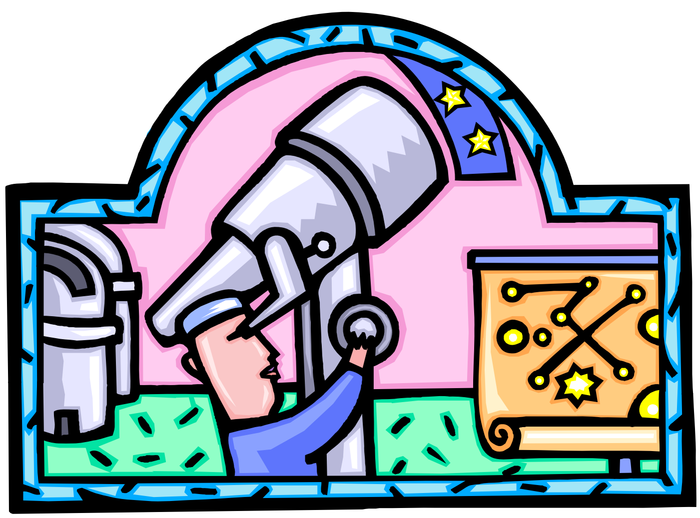


Journal of Double Star Observations

Summer 2007
Volume 3, Number 3

The *Journal of Double Star Observations* is an electronic journal published quarterly by the University of South Alabama. Copies can be freely downloaded from http://www.jdso.org.

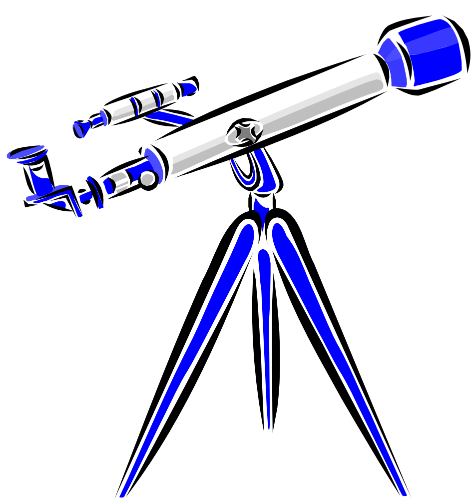
Questions, comments, or submissions may be directed to rkentclark@jaguar1.usouthal.edu or to rmollise@bellsouth.net

The *Journal of Double Star Observations* (*JDSO*) publishes articles on any and all aspects of astronomy involving double and binary stars. The *JDSO* is especially interested in observations made by amateur astronomers. Submitted articles announcing measurements, discoveries, or conclusions about double or binary stars may undergo a peer review. This means that a paper submitted by an amateur astronomer will be reviewed by other amateur astronomers doing similar work.

Not all articles will undergo a peer-review. Articles that are of more general interest but that have little new scientific content such as articles generally describing double stars, observing sessions, star parties, etc. will not be refereed.

Submitted manuscripts must be original, unpublished material and written in English. They should contain an abstract and a short description or biography (2 or 3 sentences) of the author(s). For more information about format of submitted articles, please see our web site at www.jdso.org

Submissions should be made electronically via e-mail to rclark@jaguar1.usouthal.edu or to rmollise@bellsouth.net. Articles should be attached to the email in Microsoft Word, Word Perfect, Open Office, or text format. All images should be in jpg or fits format.



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