Neglected Double Observations 2006 No. 1: With Notes on Use of a Robotic Telescope

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Abstract: I report the observational results for 60 "neglected doubles" found between 5hr and 10.0 hr RA and +20º and +40º DEC made with the AREO2 robotic telescope located at the RAS Observatory, Mayhill, NM, USA (http://www.remote-astronomical-society.org). In addition to theta and rho values (and standard deviations), I report the UCAC2.0 and USNO 2.0 catalogue numbers of pairs, many of which lack good positional information and proper motion values. A short discussion of the instrumentation details the advantages and some limitations of robotic observations.

Introduction and Instrumentation

I was drawn to double star research after reading articles in Argyle (2004), and in particular the paper by fellow Kansan Doug West (2004) on using CCD imaging for measuring visual doubles. A bit of investigation suggested that a fruitful avenue of research would be relatively faint visual doubles that are neglected. After some frustrating attempts to use my existing telescope/CCD combination on a non-Go-To mount to acquire these faint doubles, I began to look for alternative instrumentation. I found the solution for quickly acquiring and imaging faint doubles at the Robotic Astronomy Society (RAS) Observatory, a facility that makes various robotic instruments available by subscription. I considered their fee to be nominal given the advantages. The RAS Observatory is located near Mayhill, New Mexico, close to the National Solar Observatory.

In 2006 I embarked on a program of measuring visual doubles using one of the RAS Takahashi Mewlon 300 Dall-Kirkham cassegrainian reflectors. 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 11.5x17.3 arcminutes. The optical tube assembly is mounted on a Bisque Paramount 1100 German equatorial mount with quite accurate pointing capability.

There are several scientific advantages to using a robotic instrument, as at the RAS Observatory. First, the work goes very quickly. Doubles can be imaged at the rate of about 10-12 pairs per hour with 4-5 exposures per pair with careful planning. Second, reductions can be performed at leisure after the imaging session with suitable software (in my case MPO Canopus). Third, there is a permanent record of the observations in the form of a FITS image. Fourth, additional unplanned measures can always be performed. For example, I present additional "non-neglected" doubles data retrieved from images that have multiple pairs per image. Finally, weather is usually good and seeing is usually exceptional at the observatory.

There is one major limitation. One is restricted to measuring relatively wide visual pairs that lay within the capabilities of the instrument. With a subscription instrument, it is not reasonable to ask the owner of the facility to switch configurations (e.g. adding a Barlow) unless one is willing to pay a great deal more for the service. Limitations of what can be imaged will naturally vary depending on sky conditions, but pairs as close of 5 arcseconds may be successfully measured on most nights and I have attempted to measure pairs as close as 3 arcseconds, although the results are mar-

ginal, as discussed below.

Methods

This study concentrates on neglected doubles that have not been measured in 50 or more years. To insure that the pairs measured are truly neglected, I requested observing lists from Brian Mason at the USNO (Mason, 2006). I visualized each pair on the list using Carte de Ciel 2.7 (Chevalley, 2001), overlain by DSS sky survey images. Once the pair (or the likely pair) is identified on the DSS image, I gather coordinates by overlaying the USNO2.0 catalogue (Monet et al., 1998) and harvested the coordinates of the primary. Coordinates were entered into VizieR (Ochsenbein et al., 2000) and plotted. I then obtained from the Aladin server an image of the field that I downloaded and printed (usually a DSS1 image). The UCAC2.0 catalogue numbers magnitudes and proper motions were harvested from the UCAC2.0 database (Zacharias et al., 2004), when available, once the pair was confirmed by comparing coordinates, PA and SEP against the WDS catalogue. Occasionally there was no reasonable candidate pair to be found, and this observation is noted. Additional data were harvested from Simbad as appropriate. I found this procedure necessary to insure that a reasonable conclusion had been made that a particular pair was actually correlated with the WDS catalogue when positions differed, which they usually did for these particular doubles.

Imaging was straight-forward. Coordinates were entered into the instrument's Web interface and the instrument slewed to the target. Based on magnitude and separation values, an exposure was made and checked against the Aladin image to insure that the pair was in the middle of the field (Dall-Kirkham optics require good centering). If not near the center of the field, the telescope was slewed to center. (This was rarely needed as pointing is quite accurate.) Exposures were carried out with a clear filter and the initial image was checked by downloading a JPEG of the FITS image. I made the decision not to attempt photometry which permitted me to image many more pairs per session. I believe this is reasonable until such time that proper motion studies establish the nature of the pair as binary, CMP or optical. In general, pairs of 11-13 magnitude were exposed for 7-15 seconds. If the exposure looked acceptable, then a minimum of three additional images were made. If not, then exposure times were adjusted and rechecked. The images were retrieved from an ftp site provided by the RAS Observatory. MPO Canopus was used to reduce the images (Warner, 2006). It produces an astrometric solution to the image based on the UCAC 2.0 catalogue (Zacharias et al., 2004). The pair was measured using a convenient double star harvesting subroutine built into Canopus.

Results

Table 1 presents results for 60 neglected doubles not measured in the past 50+ years bounded by 5.0 hr to 10.0 hr RA and +20º to +40 º DEC. Table 2 presents the UCAC2.0 or USNO2.0 catalogue numbers when available as well as the history of previous observations (as summarized in the WDS catalogue) and comparisons of this history with the mean measurements obtained in this study. Table 3 presents measurements and catalogue numbers for a number of pairs that are not neglected but which appeared in the images taken.

Discussion

A scatter plot of separation versus standard deviation of separation (Table 1) shows a significant (greater than 0) correlation between the separation distances and the standard deviations obtained (r^2 = 0.38; $p<0.01$), but not between position angles and position angle standard deviations (r^2 = 0.03, p = 0.84). The greatest variations in standard deviation among pairs of similar separation are encountered among close pairs, probably as a result of seeing causing large scatter in the resulting image and thus variations in centroid determination. However, this is a casual observation based on image quality and should be confirmed with careful records of FWHM (full width at half maximum) values that can be obtained at the RAS Observatory facility.

Comparisons with the historical record (Table 2) demonstrates that the measurements obtained are reasonable and thus in most cases refer to the neglected double in question. Doubts can be addressed through the catalogue numbers provided. Anomalies are annotated in Notes.

Comparison of recently measured doubles (Table 3) with published records in the Washington Double Star Catalogue (Mason et al., 2001 et seq.) demonstrate that this rapid and easy method of obtaining measures is sufficiently accurate to enable a large number of neglected doubles to be located and measured with a minimum of instrument time so long as the pairs are picked with due regard to the capabilities of the instrument and seeing conditions. The RAS Observatory supports active research programs, such as mine,

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WDS ID	Discovr.	Mags	PA	PAsd	SEP	SEPsd	Epoch	N	Notes
05066+2321	POU 543	13.08, 12.46	247.9	0.69	14.87	0.07	2006.16	5	1,2
05135+2451	POU 587	12.65, 11.67	175.7	0.61	9.24	0.12	2006.16	4	1,3
?05157+3738	SEI 125 AB ?	13.0,13**	317.8	0.43	23.40	0.23	2006.16	7	1
?05157+3738	SEI 125 BC ?	13**, unk	344.	2.0	4.32	0.53	2006.16	6	1,4
05175+2446	POU 637	11.8, 11.5**	202.9	na	1.73	na	2006.16	1	1
05210+3728	SEI 203 AB	11.25, 13.47	251.9	0.63	21.49	0.03	2006.16	4	1
05307+3725	SEI 311 AB	10.58, 11.58	357.3	0.11	22.67	0.07	2006.16	4	1,5
05325+2818	HJ 704	10.56, 11.64	93.6	0.23	13.42	0.09	2006.16	7	1
05345+3727	SEI 330-1895	10.56, 13.29	141.9	0.67	7.34	0.64	2006.16	5	1,6
05345+3727	SEI 330-1930	10.32, 12.17	196.4	0.56	8.31	0.07	2006.16	4	1,6
05403+3757	SEI 367	10.46, 12.30	348.3	0.37	11.93	0.04	2006.16	4	1,7
05421+3245	HJ 3695	10.91, 12.28	326.2	0.93	15.29	0.11	2006.16	4	1
05423+3247	HJ 370	11.19, 11.21	259.1	0.21	12.74	0.13	2006.16	5	1
05485+2451	POU 782	12.37, 13.18*	307.	1.1	11.14	0.20	2006.16	5	1
05498+3127	SEI 392	11.5, 12.29*	309.4	0.56	8.69	0.07	2006.16	4	1
05524+2428	POU 799	12.48, 13.03	68.0	0.86	13.08	0.23	2006.16	5	1
06009+2424	POU 842	12.02, 12.8**	130.	1.3	3.99	0.22	2006.19	4	1
06022+2440	POU 849 AB	11.88, 10.10	358.4	0.29	21.15	0.15	2006.16	4	1
06022+2440	POU 850 AC	11.88, 13.22	91.	1.3	7.04	0.33	2006.16	4	1
06090+2416	POU1030	8.38, 13.3**	132.5	0.75	10.78	0.17	2006.19	4	1
06092+2418	POU1037	11.7, 14.35	234.	1.00	13.57	0.15	2006.19	4	1
06280+2415	HJ 390	10.82, 11.36	227.6	0.18	14.12	0.05	2006.18	4	1,8
06353+2252	POU1528	11.96, 12.66	294.3	0.53	8.97	0.11	2006.18	5	1
06537+2450	POU2106	12.43, 13.38	194	0.73	13.12	0.10	2006.18	4	1
06549+3503	ALI 98	11.71, 11.56	286.7	0.21	13.30	0.08	2006.18	4	1
06598+2303	POU2236	10.87, 13.24	309.0	0.46	11.05	0.13	2006.18	4	1
07046+2117	J 1989 AB	9.76, 10.67	255.5	0.13	37.33	0.15	2006.18	5	1
07186+2255	POU2669-1909	13.15*, 13.69	73.6	0.57	11.01	0.09	2006.18	6	1,9
07186+2255	POU 2669-1954	13.89, 13.07	81.9	0.71	16.22	0.07	2006.18	6	1,9
07202+2336	POU2695	9.3, 13.8**	180.7	0.37	14.54	0.201	2006.18	5	1
07204+2344	POU2698	10.68, 11.40	180.5	0.48	9.20	0.08	2006.18	6	1
07258+2413	POU2763	12.89, 12.8**	188.9	0.33	12.52	0.048	2006.18	4	1
07310+2435	POU2820	13.86, 15.05	316.1	na	10.21	na	2006.18	1	1,10
07331+2255	POU2828	10.42, 13.36	18.2	0.29	20.02	0.10	2006.18	3	1
07378+2324	POU2848	11.72, 13.15	328.2	0.72	16.19	0.065	2006.19	6	1
07395+2449	POU2857	10.48, 12.72	58.8	0.40	12.73	0.14	2006.18	5	1
07407+2350	POU2863	12.89, 13.45*	168.4	1.55	5.84	0.61	2006.18	4	1,11
08026+2028	DOO 47	11.9, 11.72	120.4	0.15	23.34	0.048	2006.26	4	1
08034+2305	POU2921	10.30, 11.4**	219.6	2.59	3.91	0.388	2006.19	5	1,11
?08036+2303	POU2923-1898?	13.72, 14.51	272.1	0.55	13.5	0.167	2006.26	4	1,12
?08036+2303	POU2923-1950?	13.47, 13.72	306.7	0.22	21.83	0.083	2006.26	4	1,12

Table 1. Summary data for neglected doubles reported. WDS ID and Discovr. Are Washington Doubles Star Catalogue identifiers and discoverer codes. Magnitudes (Mags) are UCAC 2.0 approximate magnitudes except for some WDS (*) and some instrument (**) approximate magnitudes. PAsd and SEPsd refer to standard deviations of the respective angle (PA) and separation (SEP) based on N images measured. *continued on next page*

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WDS ID	Discovr.	Mags	PA	PAsd	SEP	SEPsd	Epoch	N	Notes
08042+3136	HJ 438	9.79, 11.85	128.2	0.07	24.64	0.031	2006.26	5	1
08067+2245	POU2930	10.87, 12.15	180.2	0.91	8.31	0.186	2006.19	4	1
08100+2329	HJ 440	10.61, 11.07	122	0.1	15.58	0.023	2006.19	5	1
08136+2543	FOX 13 BC	10.74, 12.23	67.2	0.1	24.46	0.068	2006.19	5	1
08136+2543	HJ 441 AC	10.74, 12.23	67.1	0.11	24.45	0.064	2006.26	5	1
08139+2747	HO 38 CD	12.24, 13.3	214.3	0.52	11.29	0.123	2006.26	5	1
08291+3245	SEI 501	12.44, 13.64	215.5	0.32	6.73	0.058	2006.26	5	1,13
?09015+3604	ALI 354? (1)	13.84, 14.83	268.9	0.6	16.1	0.151	2006.21	5	1,14
?09015+3604	ALI 354? (2)	12.86, 13.09	231.20	0.14	21.85	0.039	2006.21	5	1,14
09044+3914	ALI1085	12.41, 12.74	220.2	0.13	16.25	0.139	2006.23	4	1
09052+2314	POU3024	12.1, 14.65	36.2	0.39	16.93	0.211	2006.26	6	1
09058+2358	POU3027	11.14, 12.95	310.7	0.3	14.43	0.016	2006.21	4	1
09061+3537	ALI 355	12.01, 12.28	255.7	0.12	32.06	0.038	2006.21	5	1
09104+2916	BOH 1	10.95, 11.33	147.8	0.16	10.95	0.03	2006.26	4	1,15
09287+2307	POU3045	12.41, 13.97	214.9	0.54	14.09	0.116	2006.23	4	1
09319+3430	ES 299 AB	9.52, 12.02	288.6	0.03	63.55	0.044	2006.26	4	1
09431+3824	ALI 846	11.76, 12.30	94.9	0.26	19.76	0.074	2006.23	4	1
09488+2424	POU3059	11.85, 13.28*	66.6	0.66	7.85	0.065	2006.21	4	1
09537+2239	POU3061	12.4**,13.4**	264.9	0.33	20.58	0.05	2006.23	4	1

Table 1. *continued from previous page.* Summary data for neglected doubles reported. WDS ID and Discovr. Are Washington Doubles Star Catalogue identifiers and discoverer codes. Magnitudes (Mags) are UCAC 2.0 approximate magnitudes except for some WDS (*) and some instrument (**) approximate magnitudes. PAsd and SEPsd refer to standard deviations of the respective angle (PA) and separation (SEP) based on N images measured.

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with inexpensive subscription rates and high quality equipment. I would especially recommend the facility to those who are disabled, live in large cities, or who, like myself, lack the instrumentation to carry out such programs but wish to engage in an active research program. RAS Observatory is a research affiliate of Global Rent-A-Scope (http://www.global-rent-a-scope.com)

Acknowledgements

Thanks to Brian Mason (observe lists), Gary Wycoff (information on SEI 330) and Norbert Zacharias (copy of UCAC 2.0) of the U.S. Naval Observatory. Special thanks to Jim Daley for his invaluable help in starting me on the road to the joys of measuring doubles. Thanks to Martin Nicholson for his RAS seminar on data mining at the CDS that opened my eyes, as a beginner, to the possibilities for obtaining much of the information presented (available on line at the RAS Observatory Web site). Special thanks to Carl Kirby for donating some of his telescope time to this project and to Arnie Rosner (Global Rent-A-Scope) for his invaluable help in getting me started in robotic observation.

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Name	UCAC2/p	UCAC2/s	1st obs	Last obs	N Obs	PA1	PA last	PA obs.	SEP1	SEP last	SEP obs	Notes
POU 543	39975736	39975739	1897	1955	2	249	249	247.9	15.8	16.4	14.87	1,2
POU 587	40475510	40475512	1897	1951	3	178	175	175.7	8.4	10	9.24	1,3
SEI 125 AB	44971144	1275-04592925*	1895	1895	2	317	309	317.8	23.5	19.3	23.40	1
SEI 125 BC?	1275-04592925	uncat						344.0			4.32	1,4
POU 637	40476260	uncat	1898	1951	2	219	214	202.9	13.6	11.4	1.73	1
SEI 203 AB	44804115	44804110	1895	1929	2	251	251	251.9	21.9	21.5	21.49	1
SEI 311 AB	44806409	44806407	1895	1928	2	355	357	357.3	23.4	40	22.67	1,5
HJ 704	41675085	41675089	1897	1899	2	92	94	93.6	13.8	13.9	13.42	1
SEI 330-1895	44807090	44807093	1895	1895	1	135	135	141.9	8.7	8.7	7.34	1,6
SEI 330-1930	44807099	44807098	1930	1930	1	195	195	196.4	9.2	9.2	8.31	1,6
SEI 367	44976912	44976911	1895	1929	2	350	349	348.3	12.2	12.2	11.93	1,7
HJ 369	43243500	43243496	1895	1933	3	327	327	326.2	15.1	15.1	15.29	1
HJ 370	43243521	43243516	1894	1998	7	261	259	259.1	11.2	12.6	12.74	1
POU 782	40481728	1125-02839021	1906	1951	2	297	203	307.0	9.4	17.4	11.14	1
SEI 392	42727626	1200-03870477	1899	1933	3	307	308	309.4	8.6	9.7	8.69	1
POU 799	40317010	40317004	1906	1951	2	68	67	68.0	13.5	13.7	13.08	1
POU 842	40319359	uncat	1902	1954	2	141	213	130.4	4.8	7	3.99	1
POU 849 AB	40485807	40485805	1994	1954	4	353	0	358.4	20.9	21.7	21.15	1
POU 850 AC	40485807	40485808	1902	1954	4	96	89	91.2	7.0	8.6	7.04	1
POU1030	40322106	uncat	1926	1926	1	131	131	132.5	10.6	10.6	10.78	1
POU1037	40322200	40322195	1926	1998	2	234	234	234.4	13.0	13.6	13.57	1
HJ 390	40328213	40328211	1895	1925	5	227	47	227.6	12.7	14	14.12	1,8
POU1528	39824581	39824578	1894	1906	2	294	296	294.3	11.2	10.7	8.97	1
POU2106	40500663	40500659	1905	1907	2	196	191	194.0	11.3	10.5	13.12	1
ALI 98	44123226	44123222	1928	1948	2	286	286	286.7	13	13.5	13.30	1
POU2236	40004315	40004311	1892	1908	3	308	307	309.0	11.5	11.3	11.05	1
J 1989 AB	39300018	39300004	1893	1941	4	258	260	255.5	29.2	20	37.33	1
POU2669-1909	1125-05020665*	39836646	1909	1909	1	81	81	73.6	11.3	11.3	11.01	1,9

Table 2: Catalog numbers for neglected doubles reported in Table 1, with comparison of previous observations. UCAC2/p and /s are USCA2 catalog numbers of primary and secondary. Hyphenated numbers are USNO V2.0 numbers, "uncat" refers to stars not found in either catalog. Dates, number of observations and reported values for PA and SEP for previous observations are taken from the WDS catalog. PA obs and SEP obs refer to mean PA and SEP as reported in Table 1 and are included for comparison. *continued on next page.*

Name	UCAC2/p	UCAC2/s	1st obs	Last obs	N Obs	PA1	PA last	PA obs.	SEP1	SEP last	SEP obs	Notes
POU2669-1954	39836618	39836621	1954	1954	1	83	83	81.9	16.2	16.2	16.22	1,9
POU2695	40185381	uncat	1909	1954	2	175	173	180.7	15.3	16.3	14.54	1
POU2698	40175393	40175392	1892	1954	5	199	192	180.5	9.9	11.6	9.20	1
POU2763	40178311	1125-05117058	1905	1954	3	193	198	188.9	14.2	18.7	12.52	1
POU2820	40507554	40507552	1902	1954	2	315	318	316.1	9.2	9.3	10.21	1,10
POU2828	39838950	39838951	1892	1954	2	16	18	18.2	19.8	20.4	20.02	1
POU2848	40011135	40011134	1892	1954	3	329	326	328.2	16.7	16.6	16.19	1
POU2857	40508663	40508668	1893	1954	3	57	28	58.8	12.6	13.9	12.73	1
POU2863	40178311	uncat	1899	1954	2	161	146	168.4	8	10.2	5.84	1,11
DOO 47	38967880	38967883	1911	1911	1	1911	1911	120.4	25.1	25.1	23.34	1
POU2921	40013932	uncat	1893	1950	3	224	217	219.6	6	8.1	3.91	1,11
POU2923_1-2	40013949	40013947	1898	1950?	2?	265	268	272.1	12.9	20.2	13.5	1,12
POU2923_3-1?	40013950	40013949		1950?	1?			306.7			21.83	1,12
HJ 438	42922138	42922141	1820	1820	1	135	135	128.2	20.0	20.0	24.64	1
POU2930	39842468	39842467	1893	1898	3	189	184	180.2	10.9	10.7	8.31	1
HJ 440	40014549	40014552	1892	1911	4	110	112	122.0	14.9	11.2	15.58	1
FOX 13 BC	40850819	40850822	1915	1927	2	66	66	67.2	21.9	21.2	24.46	1
HJ 441 AC	40850818	40850822	1914	1914	1	68	68	67.1	21.9	21.9	24.45	1
HO 38 CD	41535968	uncat	1904	1904	1	219	219	214.3	7.4	7.4	11.29	1
SEI 501	43268405	43268402	1894	1894	1	43/223	43/223	215.5	8.1	8.1	6.73	1,13
ALI 354-1?	44483502	44483500	1932	1932	1	55/235	55/235	268.9	9.1	9.1	16.1	1,14
ALI 354-2?	44483492	44483495	1932	1932	1	55/235	55/235	231.2	9.1	9.1	21.85	1,14
ALI1085	45503726	45503725	1928	1928	1	219	219	220.2	13.0	13.0	16.25	1
POU3024	40018195	40018196	1899	1899	1	65	65	36.2	9.2	9.2	16.93	1
POU3027	40184791	40184790	1899	1899	1	227	227	310.7	16.4	16.4	14.43	1

Table 2: *(continued from previous page)* Catalog numbers for neglected doubles reported in Table 1, with comparison of previous observations. UCAC2/p and /s are USCA2 catalog numbers of primary and secondary. Hyphenated numbers are USNO V2.0 numbers, "uncat" refers to stars not found in either catalog. Dates, number of observations and reported values for PA and SEP for previous observations are taken from the WDS catalog. PA obs and SEP obs refer to mean PA and SEP as reported in Table 1 and are included for comparison. *continued on next page.*

Name	UCAC2/p	UCAC2/s	1st obs	Last obs	N Obs	PA1	PA last	PA obs.	SEP1	SEP last	SEP obs	Notes
ALI 355	44306650	44306651	1933	1933	1	175	175	255.7	14.2	14.2	32.06	1
BOH 1	42058936	42058937	1915	1915	1	309	309	147.8	5.3	5.3	10.95	1
POU3045	40019236	40019235	1905	1905	1	243	243	214.9	12.1	12.1	14.09	1,15
ES 299 AB	43960415	43960410	1906	1906	1	0	0	288.6	55.9	55.9	63.55	1
ALI 846	45169780	45169785	1929	1929	1	95	95	94.9	13.6	13.6	19.76	1
POU3059	40351319	uncat	1907	1907	1	55	55	66.6	8.1	8.1	7.85	1
POU3061	1125-06003148	1125-06003084	1909	1909	1	272	272	264.9	7.2	7.2	20.58	1

Table 2: *(continued from previous page)* Catalog numbers for neglected doubles reported in Table 1, with comparison of previous observations. UCAC2/p and /s are USCA2 catalog numbers of primary and secondary. Hyphenated numbers are USNO V2.0 numbers, "uncat" refers to stars not found in either catalog. Dates, number of observations and reported values for PA and SEP for previous observations are taken from the WDS catalog. PA obs and SEP obs refer to mean PA and SEP as reported in Table 1 and are included for comparison.

WDS ID	Discovr.	Mags	PA	PAsd	SEP	SEPsd	Epoch	No Obs	UCAC2/p	UCAC2/s
05206+3727	SEI 200	12.17, 13.17	209.70	0.56	10.06	0.16	2006.159	4	44804013	44804012
06091+2416	POU1032	10.73, 12.30	173.1	0.14	19.42	0.08	2006.192	4	40322156	40322160
06093+2417	POU1046	11.86, 12.8**	196.4	0.39	11.10	0.18	2006.192	4	40322246	uncat
06093+2418	POU1045	11.96, 11.86	137.6	0.28	10.67	0.07	2006.192	4	40322250	40322256
06094+2420	BRT 140	11.21, 11.9**	151.5	2.23	3.37	0.22	2006.192	4	40322330	uncat
07308+2437	POU2817	12.23, 14.1**	304.5	0.65	12.77	0.21	2006.176	4	40507533	1125-05177944
07309+2441	HJ 424AB	11.08,11.76	113.60	0.11	16.59	0.08	2006.176	4	40507553	40507558

Table 3. Summary data for recently measured doubles re-measured in this paper. PAsd and SEPsd refer to standard deviations of the respective measure. N is the number of CCD images measured, UCAC2/p and -/s are the J2000 positions of the primary and secondary reported in the UCAC2.0 catalogue as returned in VizieR. The USNO catalogue number (hyphenated)r is used for the secondary of POU 2817. Some secondary do not appear in either catalogue as returned by VizieR (uncat.).

Neglected Double Observations 2006 No. 1: With Notes on Use of a Robotic Telescope

Notes

1. 300mm Cassegrainian reflector, F9.1, CCD camera image analyzed using the astrometric/ photometric program MPO Canopus.

2. POU 543 is CCDM J05065+2331AB.

3. POU 587 is probably switched and is reported herein with A to north.

4. Is SEI 125BC a double? Note the high standard deviation for separation. The images were partly merged and the measurements are probably unreliable.

5. SEI 311AB. There is a wide discrepancy in the 1928 separation measure compared to 1895 and that reported here. I suspect that the 1928 measure was in error. It might refer to Tycho 2415-00915-1 and USNO 1200-03407262 located north and west of the pair measured in 1895, with the "primary" and "secondary" switched.

6. SEI 330. First and last measurements reported in the WDS refer to two different pairs, as noted by the date attached. Both were measured by Scheiner in 1895. SEI 330-1 of PA 242.2º taken by Scheiner in 1895.2 and re-measured in 1929 and 1930 (present PA = 196.4 º) will retain the designation SEI 330. SEI "330"-2 also taken by Scheiner in 1895 (first PA = 134.9º; PA reported herein = 141.9 º) will become SEI 332 in an update of the WDS (G. Wycoff, USNO, Pers. Comm., 28 March 2006).

7. SEI 367. The 1895 measure is the inverse of the 1929 and the present measure, based on magnitudes of primary and secondary.

8. HJ 390. The apparent anomalies in the 1895 and 1925 measures are caused by switching primary and secondary.

9. POU 2669-09, -54. Although the measures of 1909 and 1954 look reasonable, I suspect that they refer to two different pairs, as reflected in the UCAC2.0 numbers in Table 2. This should be checked.

10. POU 2820. Only a single image was acceptable, reported for position.

11. POU 2863 and POU2921 represent attempts to explore the limits of resolution under average seeing conditions at the RAS Observatory. Note very high standard deviations caused by partial merging of the images. Measurements must be considered crude and these pairs should be re-measured for more reliable PA and SEP.

12. POU 2923 is a curious "pair." Although 1898 measurement and 1950 measurements, while agrees in angle are widely divergent in separation. I believe that examination of the UCAC2.0 catalogue will show that the measurements refer to different pairs that form a triplet (of unknown status) in the field

13. The 1894 measure is inverted given measured magnitudes.

14. ALI 354 (1, 2). There are two candidates for this entry. "ALI 354(1)" is closest to the WDS reported position, but "ALI 354(2)" is a better match, with primary and secondary switched (PA=50.9º compared to the last reported of 52 º if the pair is switched).

15. BOH 1. Primary and secondary switched based on magnitudes.

(Continued from page 148)

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