Double Star Measurements for December 2013

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Abstract: I report 288 measurements of binary systems from 2013.911. The observations were conducted with the T24 robotic telescope located at the iTelescope Observatory, Auberry CA, USA (http://www.itelescope.net/). Discussion includes notes on a number of the observed doubles. Several new components of existing binaries were discovered. One new multiple star system is described. Information about instrumentation and methodology and results is included.

Introduction and Instrumentation

I have been imaging double stars for a number of years using the equipment at iTelescopes.

This series of measurements of visual doubles used the T21 telescope at the iTelescopes Observatory. The instrument is a Planewave 24inch (0.61m) Dall-Kirkham Astrograph with a focal length of approximately 3962 mm. The CCD camera is a FLI-PL0900 with 12um square pixels. The field of view is 31.8 X 31.8 arc-mins. The resolution is 0.62 arc-sec/pixel.The OTA is mounted on a Planewave Ascension 200HR.

The instrument is capable of quickly and accurately slewing to a selected double star. The system takes about one minute to take short exposure and save the resulting image in a FITS format. Taking 5 to 6 exposures per double star allows 6 doubles to be imaged per hour. To maximize telescope time, the FITS images are stored on the iTelescopes server and are retrieved later to be analyzed by suitable software (in my case MPO Canopus).

Methods

Imaging was done by entering the coordinates of the double into the robotic telescope's web interface. A test exposure was done and checked for centering and proper exposure. If all was well an exposure run of 5 to 7 images through a clear filter was done for each pair. Exposures typically ran about 10-15 seconds for 10-13 magnitude doubles. After the observing session was completed, the images were retrieved from an ftp site provided by the iTelescope observatory. Some doubles appeared on more than one image and were measured more than 5 times.

Each image in the exposure sequence was examined and any trailed or sub-par images were discarded. MPO Canopus was used to reduce the images (Warner, 2006). Any image that the software could not reach a plate solution was also discarded. Canopus produces an astronomic solution to the image based on the UCAC3 catalog (Zacharias et all.2010) . The software measures double stars using a subroutine built into Canopus. It also produces a great amount of information about the astrometric solution. All images were copied to archival CD-ROM material and are available by request from the author. Each starting and ending image was blinked—just in case.

Results

Table 1 shows the results for the 288 doubles measured.

Discussion

POU1903. I report a new "C" component. See Notes following Table 1.

POU1912. I report a new "C" component. See Notes following Table 1.

I report that components of POU894, POU1470, POU1889, and POU 1920 have close doubles as one of their components. In each case, I measured to the

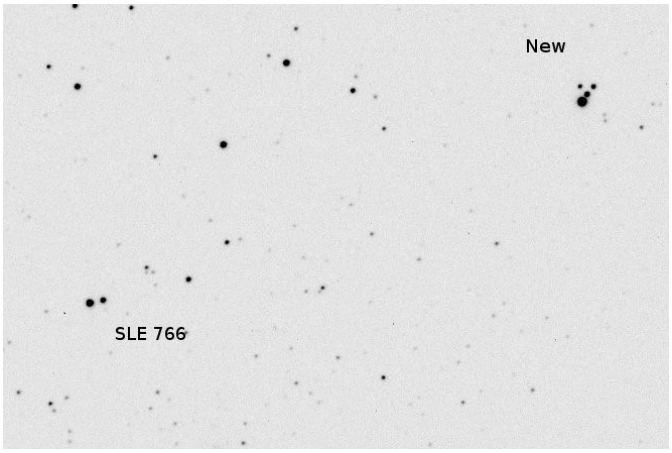

Figure 1. CCD image showing SLE766 and new doubles

brighter of the two new components, which will be a little different than previous measures.

New System

I am aware that WDS does not need any more doubles, but I could not resist measuring a striking quadruple star located near SLE 766. As usual, Dr. Mason and Dr. Hartkopf have the final say in determining if the measure warrants inclusion in the WDS catalog. See image of this system in Figure 1.

"A" star is UCAC4 503-030116. Position 06:42:25.0975+10:26:56.715. APASS V mag 10.382. proper motion PA 8.4 DEC -17.2.

"B" Star is UCAC4 503-030113. 2MASS J mag 11.215. proper motion PA -1.8 DEC -42.4.

"C" star is UCAC4 503-030109. 2MASS J mag 11.332. "C" is also URAT1 503-6011053 proper motion PA 0.9 DEC -2.4 .

"D" star is UCAC4 503-030108. 2MASS J mag 11.633. proper motion: PA 6.4 DEC -46.7. The "B" and "D" components have similar proper motions and could be a CPM pair.

Acknowledgements

"Thank you" to Dr. Mason and Dr. Hartkopf for being willing to work with amateurs and for answering data requests. "Thank you" also to my sister Gail Smith who proofread this article.

This article made use of the Washington Double Star Catalog maintained by the U.S. Naval Observatory.

This research made use of the VizierR Catalog Access Tool, CDS, Strasbourg, France. The original description of the Vizier service was published in A&AS 143,2.

References

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UCAC3 Catalog (Zacharias, et al. 2010).

UCAC4 Catalog (Zacharias, et al. 2012).

Warner, Brian 2006. MPO Canopus, http://www.minorplanetobserver.com/MPOSoftware/MPOCanopus.htm.

Table 1 starts on next page.

Double Star Measurements for December 2013

Table 1. Reported Measurements from December 2013

WDS ID	Discoverer		RA	DEC	PA	SEP	Epoch	No.	PAsd	SEPsd	Notes
06036+2427	POU862	AB	0604.5	2427	168.6	9.62	2013.911	5	0.10	0.054	
06036+2427	POU 863	AC	0604.5	2427	106.3	9.08	2013.911	5	0.28	0.107	
06043+2439	POU 882		0604.5	2445	34.2	12.81	2013.911	7	1.00	0.707	
06038+2416	POU 867		0604.7	2416	48.6	8.25	2013.911	5	0.74	0.088	
06039+2418	POU 868		0604.8	2418	252.6	14.68	2013.911	5	0.32	0.085	
06040+2425	POU 871		0604.9	2425	121.2	9.87	2013.911	5	0.31	0.065	
06042+2424	POU 881		0605.1	2424	116.7	11.09	2013.911	5	0.29	0.073	
06043+2422	POU 883		0605.2	2422	193.7	9.40	2013.911	5	0.34	0.021	
06046+2438	POU 894		0605.5	2437	1.4	12.70	2013.911	5	0.07	0.036	1
06046+3644	ALI 315		0605.5	3643	262.2	11.12	2013.911	5	0.07	0.085	
06048+2411	POU 898		0605.7	2411	358.7	11.69	2013.911	5	0.40	0.039	
06048+2408	POU 900		0605.7	2408	222.0	8.54	2013.911	5	0.83	0.144	
06048+2413	POU 897		0605.7	2412	327.6	13.56	2013.911	5	0.41	0.095	
06048+2410	POU 899		0605.7	2409	302.6	8.68	2013.911	5	0.27	0.164	
06050+2446	POU 903		0605.8	2446	110.0	13.88	2013.911	5	0.34	0.041	
06052+2443	POU 908		0606.0	2411	72.5	8.18	2013.911	5	0.73	0.075	
06052+2443	POU 910		0606.1	2442	27.5	14.62	2013.911	5	0.69	0.083	2
06053+2416	POU 914		0606.2	2416	228.8	14.88	2013.911	5	0.04	0.028	
06055+1336	SLE 832		0606.2	1336	64.5	10.96	2013.911	5	0.89	0.099	
06055+2439	POU 916		0606.4	2439	283.3	12.30	2013.911	5	0.11	0.020	
06058+1326	SLE 833	AB	0606.6	1326	343.5	38.56	2013.911	5	0.28	0.066	
06058+1326	SLE 833	AC	0606.6	1326	345.2	32.28	2013.911	5	0.20	0.248	
06059+3632	ALI 316		0606.8	3632	243.9	13.71	2013.911	5	0.37	0.040	
06277+2249	BTG 10		0628.7	2251	310.4	35.32	2013.911	2	0.12	0.105	
06277+2249	BTG 10	AC	0628.7	2251	310.8	35.36	2013.911	3	0.18	0.137	
06277+2249	J 1092	AB	0628.7	2251	226.5	6.28	2013.911	5	0.43	0.277	
06280+2332	POU 1338		0628.8	2331	149.9	18.74	2013.911	5	0.21	0.074	
06281+2320	POU 1340		0628.9	2320	11.2	16.07	2013.911	5	0.26	0.065	
06283+2325	POU 1343		0629.1	2325	166.8	7.50	2013.911	5	0.29	0.175	
06285+2307	POU 1345		0629.3	2307	180.8	16.63	2013.911	5	0.22	0.090	
06288+2313	POU 1347		0629.6	2311	80.5	14.59	2013.911	5	0.07	0.075	
06289+2322	POU 1350		0629.7	2321	157.2	15.78	2013.911	5	0.17	0.075	
06291+2322	POU 1355-2		0629.9	2326	141.7	8.83	2013.911	5	0.50	0.076	3
06294+2311	POU 1360		0630.2	2311	41.5	15.41	2013.911	5	0.23	0.083	
06293+2308	POU 1358		0630.2	2308	162.6	8.34	2013.911	5	0.38	0.078	
06342+2257	POU 1463		0635.0	2257	223.1	21.85	2013.911	6	0.09	0.089	
06342+2305	POU 1465		0635.0	2305	53.9	18.24	2013.911	6	0.10	0.092	
06343+2311	POU 1470		0635.2	2310	268.9	14.76	2013.911	6	0.11	0.083	4
06344+2408	POU 1478		0635.2	2308	56.8	15.10	2013.911	6	0.34	0.087	
06344+2314	POU 1476		0635.2	2314	80.1	15.48	2013.911	6	0.25	0.069	
06345+2322	POU 1481		0635.3	2321	302.5	7.58	2013.911	6	0.38	0.325	
06346+2318	POU 1489		0635.4	2318	169.1	12.35	2013.911	6	0.25	0.074	
06347+2310	POU 1492		0635.5	2310	315.9	15.07	2013.911	6	0.14	0.037	
06350+2302	POU 1508	AB	0635.8	2302	62.6	10.72	2013.911	6	0.43	0.088	

Table 1 continues on next page.

Double Star Measurements for December 2013

Table 1 (continued). Reported Measurements from December 2013

WDS ID	Discoverer		RA	DEC	PA	SEP	Epoch	No.	PAsd	SEPsd	Notes
06350+2302	POU 1509	AC	0635.8	2302	221.8	14.65	2013.911	6	0.26	0.069	
06351+2258	POU 1523		0635.9	2257	283.8	16.64	2013.911	6	0.21	0.051	
06353+2252	POU 1528		0636.1	2252	294.6	8.80	2013.911	6	0.03	0.036	
06353+2258	POU 1530		0636.1	2257	42.3	14.76	2013.911	5	0.28	0.072	
06356+2253	POU 1542		0636.4	2252	191.7	10.97	2013.911	5	0.38	0.019	
06356+2319	POU 1546		0636.5	2319	243.1	9.47	2013.911	6	0.74	0.088	
06357+2305	POU 1548		0636.5	2305	14.8	12.23	2013.911	6	0.41	0.074	
06357+2258	POU 1556	AB	0636.6	2257	131.0	11.54	2013.911	5	0.17	0.034	
06357+2258	POU 1557	AC	0636.6	2257	155.6	22.04	2013.911	5	0.19	0.065	
06258+2259	POU 1563		0636.6	2259	233.1	11.35	2013.911	6	0.42	0.059	
06358+2255	POU1564		0636.6	2254	298.5	14.13	2013.911	6	0.29	0.158	5
06359+2257	POU 1568		0636.7	2256	94.7	13.38	2013.911	6	0.11	0.058	
06359+2306	POU 1573		0636.7	2305	300.2	8.76	2013.911	6	0.64	0.084	
06361+2257	POU 1579		0636.9	2256	47.1	11.64	2013.911	6	0.47	0.091	
06363+2300	POU 1592		0637.1	2300	146.0	16.94	2013.911	6	0.35	0.117	
06364+2257	POU 1598		0637.2	2256	35.8	11.37	2013.911	6	0.35	0.057	
06370+2320	POU 1640		0637.8	2319	144.0	15.65	2013.911	6	0.12	0.064	
06371+2342	POU 1644		0637.9	2341	141.1	13.48	2013.911	7	0.08	0.052	
06370+2329	POU 1645		0637.9	2328	331.8	9.36	2013.911	6	0.30	0.036	
06371+2329	POU 1652		0638.0	2328	121.6	10.73	2013.911	6	0.26	0.056	
06371+2328	POU 1648		0638.0	2327	58.1	6.00	2013.911	6	0.90	0.216	
06372+2424	POU 1653		0638.1	2424	0.3	12.62	2013.911	5	0.12	0.043	6
06372+2426	POU 1654		0638.1	2425	129.8	13.09	2013.911	5	0.08	0.054	
06373+2429	POU 1655		0638.2	2428	136.9	12.49	2013.911	5	0.13	0.022	
06373+2430	POU 1657		0638.2	2430	263.4	12.19	2013.911	5	0.28	0.063	
06373+2326	POU 1660		0638.2	2325	230.6	15.19	2013.911	6	0.12	0.034	
06374+2325	POU 1666		0638.2	2324	27.0	7.07	2013.911	6	0.21	0.129	
06375+2321	POU 1671		0638.3	2321	234.7	17.27	2013.911	6	0.11	0.016	
06374+2443	POU 1662		0638.3	2442	234.5	13.89	2013.911	5	0.19	0.031	
06375+2347	POU 1672		0638.4	2346	197.2	10.47	2013.911	6	0.31	0.055	
06376+2337	POU 1679		0638.4	2336	216.0	14.06	2013.911	6	0.16	0.021	
06375+2411	POU 1676		0638.4	2410	249.7	9.42	2013.911	11	0.21	0.032	
06376+2429	POU 1681	AB	0638.5	2428	211.8	7.93	2013.911	5	0.23	0.123	
06376+2429	POU 1682	AC	0638.5	2428	29.5	12.05	2013.911	5	0.21	0.021	
06377+2353	POU 1688	AB	0638.6	2352	32.9	18.80	2013.911	6	0.12	0.018	
06377+2353	POU 1689	AC	0638.6	2352	208.4	9.70	2013.911	6	0.21	0.075	
06377+2353	POU 1690	AD	0638.6	2352	132.8	11.72	2013.911	6	0.07	0.062	
06377+2439	POU 1691		0638.6	2438	133.1	11.34	2013.911	5	0.38	0.076	
06377+2441	POU 1686		0638.6	2440	127.2	18.21	2013.911	5	0.17	0.039	
06377+2421	POU 1692		0638.6	2420	77.6	9.85	2013.911	5	0.34	0.039	
06379+2336	POU 1700	AB	0638.7	2335	33.5	22.56	2013.911	5	0.73	0.119	
06378+2322	POU 1697		0638.7	2321	225.9	13.53	2013.911	6	0.16	0.049	
06379+2413	POU 1701		0638.8	2412	252.6	12.63	2013.911	6	0.33	0.048	
06381+2344	POU 1708		0638.9	2343	257.6	11.02	2013.911	6	0.24	0.030	
06380+2425	POU 1707		0638.9	2425	327.7	17.64	2013.911	5	0.10	0.021	
06382+2334	POU 1717		0639.0	2333	226.5	10.87	2013.911	6	0.35	0.032	
06383+2323	POU1715		0639.0	2322	35.4	13.61	2013.911	6	0.24	0.036	
06383+2410	POU 1716		0639.1	2409	247.6	8.51	2013.911	11	0.08	0.086	
06382+2425	POU 1718		0639.2	2422	57.8	11.56	2013.911	5	0.19	0.057	
06385+2329	POU1725		0639.3	2328	266.4	8.98	2013.911	6	0.17	0.049	
06385+2337	POU 1724		0639.3	2336	1.6	11.54	2013.911	6	0.09	0.028	
06386+2321	POU1726		0639.4	2320	3.5	9.46	2013.911	6	0.62	0.079	
06386+2427	POU 1729		0639.4	2426	179.7	11.34	2013.911	5	0.11	0.043	
06387+2344	POU 1734		0639.5	2343	296.5	13.18	2013.911	11	0.18	0.061	

Table 1 continues on next page.

Double Star Measurements for December 2013

Table 1 (continued). Reported Measurements from December 2013

WDS ID	Discoverer		RA	DEC	PA	SEP	Epoch	No.	PAsd	SEPsd	Notes
063872317	POU 1735		0639.5	2316	66.3	15.66	2013.911	6	0.16	0.031	
06386+2426	POU 1730		0639.5	2425	32.1	13.13	2013.911	5	0.17	0.023	
06387+2356	POU 1731		0639.5	2355	27.2	13.35	2013.911	6	0.13	0.048	
06388+2304	POU 1740		0639.6	2303	185.1	7.52	2013.911	5	0.44	0.082	
06388+2301	POU 1737		0639.6	2300	223.7	6.52	2013.911	5	0.23	0.090	
06388+2350	POU 1739		0639.6	2349	216.2	9.03	2013.911	6	0.20	0.036	
06389+2359	POU 1741-1		0639.7	2358	97.6	12.62	2013.911	6	0.37	0.047	7
06389+2359	POU 1741-2		0639.8	2358	108.8	11.93	2013.911	6	0.92	0.095	7
06389+2341	POU 1744		0639.7	2340	112.8	12.17	2013.911	11	0.51	0.031	
06390+2446	POU 1746		0639.8	2445	33.9	9.17	2013.911	5	0.17	0.099	
06389+2444	POU 1742		0639.8	2443	100.6	17.22	2013.911	5	0.15	0.025	
06389+2448	POU 1743		0639.8	2447	109.8	17.28	2013.911	5	0.19	0.028	
06390+2410	POU 1749		0639.8	2409	197.9	10.77	2013.911	11	0.30	0.098	
06391+2405	POU 1757	AB	0639.9	2403	129.0	11.49	2013.911	11	0.19	0.039	
06391+2405	POU 1758	AC	0639.9	2403	53.8	16.94	2013.911	11	0.17	0.043	
06390+2453	POU 1750		0639.9	2452	298.7	12.20	2013.911	5	0.31	0.063	
06392+2314	POU 1761		0640.0	2313	156.1	15.50	2013.911	6	0.13	0.023	
06393+0357	BAL 2679		0640.0	0355	186.0	11.00	2013.911	5	0.03	0.051	
06392+2307	POU 1765		0640.0	2306	293.3	7.95	2013.911	5	0.28	0.159	
06393+2307	POU 1768	AB	0640.1	2306	331.0	9.39	2013.911	5	0.28	0.022	
06393+2307	POU 1769	AC	0640.1	2306	62.9	15.98	2013.911	5	0.16	0.022	
06392+2452	POU 1762		0640.1	2451	145.3	10.67	2013.911	5	0.31	0.054	
06393+2340	POU 1767		0640.1	2338	277.2	14.60	2013.911	5	0.20	0.054	
06394+2421	POU 1773		0640.2	2419	297.5	16.47	2013.911	6	0.29	0.068	
06393+2409	POU 1771		0640.2	2408	261.1	14.92	2013.911	16	0.31	0.057	
06394+2335	POU 1772		0640.2	2333	242.1	13.95	2013.911	5	0.21	0.042	
06394+2318	POU 1774		0640.2	2317	218.4	11.08	2013.911	6	0.19	0.038	
06396+0417	BAL 2681		0640.3	0416	295.4	11.07	2013.911	5	0.19	0.026	
06403+2320	POU1825		0640.3	2326	31.7	16.21	2013.911	5	0.08	0.025	
06395+2436	TOK 19		0640.4	2435	248.5	31.38	2013.911	3	0.27	0.110	
06396+2333	POU 1779	AB	0640.4	2332	340.6	5.86	2013.911	5	0.18	0.359	
06396+2333	POU 1780	AC	0640.4	2332	352.8	13.63	2013.911	5	0.26	0.118	
06397+0410	BAL 2683		0640.4	0409	302.5	9.01	2013.911	5	0.13	0.053	
06396+2338	POU 1781		0640.4	2337	256.7	11.88	2013.911	5	0.16	0.023	
06395+2355	POU 1777		0640.4	2354	134.9	7.35	2013.911	5	0.64	0.133	
06396+2340	POU 1782		0640.4	2339	13.5	13.88	2013.911	5	0.19	0.049	
06397+0334	HJ 2329		0640.5	0333	87.2	17.37	2013.911	5	0.02	0.031	
06397+2305	POU 1786		0640.5	2304	355.2	8.09	2013.911	5	0.61	0.104	
06397+2321	POU 1788		0640.5	2321	259.6	10.90	2013.911	5	0.26	0.061	
06396+2356	POU 1785		0640.5	2355	83.4	14.88	2013.911	5	0.51	0.065	
06397+2323	POU 1789		0640.6	2322	56.4	9.75	2013.911	5	0.10	0.064	
06397+2442	POU 1787		0640.6	2441	234.0	10.59	2013.911	10	0.23	0.054	
06398+2259	POU 1791		0640.6	2257	141.2	8.07	2013.911	5	0.15	0.048	
06398+0839	SLE 557		0640.6	0839	168.6	11.01	2013.911	5	0.21	0.062	
06398+2439	POU 1790		0640.7	2438	72.1	12.64	2013.911	10	0.24	0.033	
06398+2432	POU 1792		0640.7	2431	4.3	13.83	2013.911	5	0.20	0.028	
06398+2434	POU 1794		0640.7	2432	15.0	10.94	2013.911	5	0.35	0.076	
06399+2313	POU 1795		0640.7	2312	135.1	8.16	2013.911	5	0.32	0.019	
06400+2317	POU 1799		0640.8	2316	304.3	11.36	2013.911	5	0.24	0.116	
06400+2313	POU 1800		0640.8	2311	220.8	10.81	2013.911	5	0.43	0.038	
06399+2431	POU 1796		0640.8	2429	301.1	15.08	2013.911	5	0.38	0.046	
06403+2320	POU 1825		0640.8	2325	31.7	16.21	2013.911	5	0.08	0.025	
06401+2410	POU 1806	AB	0640.9	2408	166.1	8.87	2013.911	5	0.43	0.043	
06401+2410	POU 1807	AC	0640.9	2408	271.6	11.43	2013.911	5	0.25	0.124	

Table 1 continues on next page.

Double Star Measurements for December 2013

Table 1 (continued). Reported Measurements from December 2013

WDS ID	Discoverer		RA	DEC	PA	SEP	Epoch	No.	PAsd	SEPsd	Notes
06400+2414	POU 1802	AC	0640.9	2412	162.4	7.17	2013.911	5	0.56	0.152	
06400+2343	POU 1803		0640.9	2342	244.3	11.95	2013.911	5	0.20	0.036	
06401+2342	POU 1805		0640.9	2341	40.3	10.48	2013.911	10	0.32	0.077	
06400+2404	POU 1804		0640.9	2403	344.0	7.49	2013.911	10	1.26	0.083	
06401+2309	POU 1808		0640.9	2308	15.4	8.19	2013.911	5	0.31	0.053	
06403+0332	HJ 2331	AB	0641.0	0332	293.5	26.92	2013.911	5	0.15	0.087	
06403+0332	HJ 2331	AC	0641.0	0332	50.8	25.46	2013.911	5	0.15	0.031	
06402+2332	POU 1813		0641.0	2331	322.0	13.91	2013.911	9	0.29	0.091	
06402+2331	POU 1810		0641.0	2330	334.6	9.22	2013.911	10	0.19	0.046	
06402+2304	POU 1811		0641.0	2303	110.7	9.15	2013.911	5	0.29	0.051	
06402+2423	POU 1814	AB	0641.1	2422	17.6	7.09	2013.911	4	0.47	0.413	
06402+2423	POU 1815	AC	0641.1	2422	55.9	13.27	2013.911	5	0.33	0.143	
06403+2431	POU 1822	AC	0641.1	2430	55.8	13.22	2013.911	5	0.30	0.059	
06404+0344	BAL 2184		0641.1	0343	204.8	16.65	2013.911	5	0.06	0.036	
06402+2404	POU 1816		0641.1	2403	220.4	10.96	2013.911	10	0.30	0.040	
06402+2431	POU 1812		0641.1	2430	151.7	10.60	2013.911	5	0.24	0.032	
06402+2422	POU 1817		0641.1	2421	168.0	7.93	2013.911	7	0.29	0.094	
06404+2301	POU 1831	AB	0641.2	2300	152.1	11.26	2013.911	5	0.23	0.028	
06404+2301	POU 1832	AC	0641.2	2300	263.2	8.10	2013.911	5	0.49	0.092	
06404+2331	POU 1826	AB	0641.2	2330	77.6	17.78	2013.911	11	0.30	0.058	
06404+2331	POU 1827	AC	0641.2	2330	197.8	15.62	2013.911	11	0.44	0.072	
06403+2428	POU 1820		0641.2	2427	1.5	10.40	2013.911	5	0.52	0.094	
06405+2302	POU 1830		0641.2	2301	74.0	13.08	2013.911	5	0.35	0.102	
06403+2421	POU 1824		0641.2	2420	323.2	16.62	2013.911	5	0.25	0.049	
06406+0402	BAL 2687		0641.3	0402	164.3	18.08	2013.911	5	0.11	0.037	
06404+2307	POU 1836		0641.3	2305	280.7	11.95	2013.911	5	0.14	0.093	
06405+2438	POU 1837	AB	0641.4	2437	130.1	12.49	2013.911	5	0.22	0.038	
06405+2438	POU 1838	AC	0641.4	2437	171.5	21.29	2013.911	5	0.10	0.057	
06405+2424	POU 1834		0641.4	2422	200.1	12.57	2013.911	5	0.19	0.037	
06405+2349	POU 1835		0641.4	2348	138.7	15.84	2013.911	10	0.17	0.039	
06405+2413	POU 1839		0641.4	2412	280.9	12.22	2013.911	5	0.41	0.077	
06405+2354	POU 1840		0641.4	2353	289.8	5.51	2013.911	9	0.74	0.521	
06406+2411	POU 1841		0641.4	2410	8.6	6.66	2013.911	5	0.65	0.213	
06406+2402	POU 1842		0641.4	2400	296.5	5.27	2013.911	9	0.59	0.298	
06407+2315	POU 1847		0641.5	2313	335.7	11.19	2013.911	5	0.27	0.037	
06406+2319	POU 1844		0641.5	2320	256.2	18.89	2013.911	5	0.10	0.040	
06408+2357	POU 1848	AB	0641.6	2355	183.7	11.46	2013.911	9	0.25	0.034	
06408+2357	POU 1849	AC	0641.6	2355	112.2	17.43	2013.911	9	0.17	0.072	
06408+2424	POU 1851		0641.7	2423	233.5	11.90	2013.911	6	0.19	0.055	
06409+2328	POU 1853		0641.7	2326	122.3	12.95	2013.911	5	0.19	0.028	
06410+2418	POU 1854		0641.8	2418	204.2	8.28	2013.911	5	0.29	0.055	
06411+2355	POU 1855		0641.9	2348	206.0	15.53	2013.911	10	0.21	0.046	
06411+2415	POU 1856		0641.9	2414	313.9	12.73	2013.911	10	0.58	0.111	
06411+2347	POU 1857		0641.9	2346	321.5	10.69	2013.911	10	0.20	0.087	
06463+2425	POU 2002		0641.9	2449	273.5	7.89	2013.911	5	0.64	0.049	
06411+2425	POU 1863	AC	0642.0	2425	229.4	11.55	2013.911	5	0.22	0.093	
06412+2412	POU 1864		0642.0	2411	17.3	16.54	2013.911	5	0.21	0.051	
06411+2416	POU 1861		0642.0	2415	224.5	10.00	2013.911	5	0.58	0.160	
06411+2427	POU 1858		0642.0	2427	279.0	10.95	2013.911	5	0.40	0.068	
06411+2354	POU 1859		0642.0	2354	111.1	10.96	2013.911	9	0.45	0.104	
06411+2340	POU 1860		0642.0	2339	325.4	9.99	2013.911	10	0.21	0.049	
06412+2356	POU 1867	AB	0642.1	2356	211.2	11.68	2013.911	10	0.36	0.059	
06412+2356	POU 1868	AC	0642.1	2356	232.4	20.53	2013.911	10	0.11	0.060	
06412+2454	POU 1865		0642.1	2449	171.0	14.11	2013.911	5	0.24	0.012	

Table 1 continues on next page.

Double Star Measurements for December 2013

Table 1 (continued). Reported Measurements from December 2013

WDS ID	Discoverer		RA	DEC	PA	SEP	Epoch	No.	PAsd	SEPsd	Notes
06412+2418	POU 1869		0642.1	2418	126.1	7.50	2013.911	5	1.13	0.096	
06413+2412	POU 1870		0642.1	2412	111.4	12.00	2013.911	5	0.43	0.112	
06465+2359	POU 2004		0642.1	2423	29.8	7.26	2013.911	5	0.69	0.046	
06413+2408	POU 1873		0642.2	2408	160.1	15.94	2013.911	5	0.14	0.023	
06413+2439	POU 1875		0642.2	2439	292.0	8.79	2013.911	5	0.19	0.034	
06417+2359	POU 1894		0642.2	2358	221.9	10.96	2013.911	9	0.25	0.064	
06466+2423	POU 2005		0642.2	2447	43.4	13.85	2013.911	5	0.52	0.044	
06466+2431	POU 2006		0642.2	2455	335.1	5.35	2013.911	5	0.46	0.310	
06414+2336	POU 1883	AB	0642.3	2335	25.7	17.31	2013.911	5	0.33	0.062	
06414+2453	POU 1877		0642.3	2452	259.4	15.72	2013.911	5	0.22	0.069	
06414+2337	POU 1881		0642.3	2336	328.2	12.24	2013.911	5	0.32	0.043	
06415+2434	POU 1885		0642.3	2434	137.4	10.40	2013.911	5	0.37	0.069	
06414+2415	POU 1882		0642.3	2450	48.3	11.99	2013.911	5	0.31	0.038	13
06415+2314	POU 1886		0642.3	2341	109.3	9.94	2013.911	5	0.16	0.050	
06415+2421	POU 1889		0642.4	2420	140.3	15.86	2013.911	5	0.61	0.150	8
06415+2315	POU 1890		0642.4	2350	22.4	14.34	2013.911	5	0.28	0.031	
06417+2411	POU 1893		0642.5	2411	67.3	10.60	2013.911	5	0.31	0.112	
06417+2327	POU 1895		0642.6	2327	336.5	6.52	2013.911	5	0.80	0.315	
06470+2405	POU 2010		0642.6	2429	264.7	12.44	2013.911	6	0.34	0.077	
06418+2412	POU 1896		0642.6	2412	221.9	10.37	2013.911	5	0.41	0.051	
06419+2406	POU 1903	AB	0642.7	2406	98.9	14.89	2013.911	5	0.28	0.035	9
06419+2406	POU 1903	AC	0642.7	2406	127.0	14.18	2013.911	5	0.11	0.033	9
06419+2444	POU 1902		0642.7	2443	132.3	11.67	2013.911	5	0.40	0.070	11
06418+2436	POU 1901		0642.7	2436	128.9	15.57	2013.911	5	0.13	0.039	12
06419+2416	POU 1905		0642.8	2415	30.7	13.07	2013.911	5	0.13	0.032	
06419+2437	POU 1906		0642.8	2436	332.9	16.57	2013.911	5	0.26	0.095	
06419+2438	POU 1907		0642.8	2438	47.5	18.74	2013.911	5	0.05	0.024	
06742+2409	POU 2012		0642.8	2433	266.5	9.78	2013.911	5	0.13	0.009	
06420+2402	POU 1908		0642.8	2401	262.1	14.80	2013.911	5	0.20	0.047	
06421+2400	POU 1911		0642.9	2400	272.9	15.26	2013.911	5	0.22	0.029	
06421+2329	POU 1915		0642.9	2329	140.2	6.33	2013.911	5	0.65	0.121	
06421+2359	POU 1910		0642.9	2359	66.6	5.70	2013.911	5	0.23	0.201	
06421+2441	POU 1912	BC	0643.0	2440	141.3	8.63	2013.911	5	0.03	0.015	10
06421+2441	POU 1912	AB	0643.0	2441	202.8	15.75	2013.911	5	0.19	0.019	10
06421+2441	POU 1912	AC	0643.0	2441	182.0	21.27	2013.911	5	0.17	0.033	10
06421+2420	POU 1913		0643.0	2420	208.0	16.66	2013.911	5	0.19	0.038	
06422+2431	POU 1916		0643.0	2430	94.9	12.25	2013.911	5	0.38	0.061	
06474+2413	POU 2013		0643.0	2437	350.3	11.02	2013.911	5	0.30	0.038	
06421+2437	POU 1914		0643.0	2437	258.5	10.97	2013.911	5	0.08	0.014	
06422+2448	POU 1917		0643.1	2448	225.0	12.33	2013.911	5	0.24	0.068	
06423+2412	POU 1918		0643.1	2412	357.8	10.36	2013.911	5	0.39	0.064	
06423+2355	POU 1919		0643.1	2355	229.8	6.86	2013.911	5	0.38	0.200	
	NEW	AB	0643.2	1026	235.6	6.93	2013.911	5	0.55	0.157	14
	NEW	AC	0643.2	1026	278.1	12.40	2013.911	5	0.08	0.027	14
	NEW	AD	0643.2	1026	233.4	15.30	2013.911	5	0.18	0.036	14
06424+2423	POU 1921		0643.2	2422	107.7	10.76	2013.911	5	0.09	0.070	
06424+2448	POU 1920		0643.2	2448	350.7	15.02	2013.911	5	0.11	0.080	11
06422+2431	POU 2016		0643.2	2425	333.1	11.11	2013.911	5	0.50	0.044	
06424+2413	POU 1923		0643.3	2413	127.9	13.41	2013.911	6	0.13	0.018	
06477+2357	POU 2018		0643.3	2421	211.2	11.39	2013.911	5	0.38	0.077	
06478+2408	POU 2022		0643.4	2432	73.1	10.74	2013.911	5	0.06	0.016	
06426+1034	SLE 766		0643.4	1033	192.6	11.04	2013.911	5	0.24	0.053	
06478+2406	POU 2024		0643.4	2430	126.0	11.34	2013.911	5	0.23	0.026	
06478+2427	POU 2021		0643.4	2451	32.4	10.90	2013.911	5	0.27	0.063	

Table 1 continues on next page.

Double Star Measurements for December 2013

Table 1 (conclusion). Reported Measurements from December 2013

WDS ID	Discoverer		RA	DEC	PA	SEP	Epoch	No.	PAsd	SEPsd	Notes
06425+2438	POU 1925		0643.4	2437	152.0	17.66	2013.911	5	0.18	0.051	
06428+2436	POU 1933		0643.5	2436	129.9	16.47	2013.911	5	0.32	0.071	
06428+2427	POU 1930		0643.6	2426	222.8	13.61	2013.911	5	0.09	0.024	
06481+2401	POU 2025		0643.7	2425	191.7	8.67	2013.911	5	0.50	0.054	
06430+1020	SLE 767		0643.7	1019	61.5	19.41	2013.911	5	0.25	0.067	
06429+2422	POU 1934		0643.7	2421	309.1	16.96	2013.911	5	0.15	0.079	
06430+2436	POU 1938		0643.8	2435	107.2	11.19	2013.911	5	0.05	0.008	
063431+2425	POU 1940		0643.9	2424	60.8	16.88	2013.911	5	0.14	0.022	
06483+2405	POU 2027		0643.9	2429	227.6	14.92	2013.911	5	0.33	0.039	
06430+2442	POU 1939		0643.9	2441	78.0	8.44	2013.911	5	0.30	0.062	
06432+2430	POU 1948		0644.1	2430	27.3	16.17	2013.911	5	0.23	0.057	
06434+2419	POU 1952		0644.2	2419	281.9	14.49	2013.911	5	0.30	0.098	
06487+2359	POU 2032		0644.2	2424	194.9	8.38	2013.911	5	0.71	0.127	
06433+2432	POU 1950		0644.2	2432	330.4	8.07	2013.911	5	0.36	0.028	
06487+2403	POU 2033		0644.3	2427	167.3	13.89	2013.911	5	0.11	0.046	
06435+2439	POU 1955		0644.3	2437	129.2	13.26	2013.911	5	0.14	0.039	
06434+2418	POU 1953		0644.3	2418	76.4	9.21	2013.911	5	0.50	0.027	
06436+2421	POU 1956		0644.4	2419	288.4	16.28	2013.911	5	0.04	0.007	
06451+0251	BAL 1715		0645.8	0250	310.1	17.85	2013.911	5	0.27	0.080	
06452+0306	BAL 2191		0645.9	0306	120.4	11.03	2013.911	5	0.22	0.048	
06462+0256	BAL 2193		0647.1	0310	184.3	7.68	2013.911	6	0.36	0.118	
06463+0247	BAL 1721		0647.1	0246	71.2	12.31	2013.911	5	0.15	0.090	
06472+2346	POU 2011		0648.0	2344	208.6	7.87	2013.911	5	0.58	0.045	
06481+2337	POU 2026		0648.9	2337	356.2	9.63	2013.911	5	0.48	0.037	
06483+2337	POU 2029		0649.2	2337	91.6	12.99	2013.911	5	0.03	0.096	
06490+2345	POU 2035		0649.8	2344	110.4	12.41	2013.911	5	0.16	0.095	

Notes:

1. POU894. "A" star is a close binary, see Figure 2.
2. POU610. "B" star faint. 3UCAC 23005118 has a listed V mag of 15.903.
3. POU 1355. I'm measuring 3UCAC 227-059131 06:29:05.68 +23:26:25.3 Mag 14.9 as the "A" star and 3UCAC 227-059127 06:29:06.09+23:26:18.7 Mag 14.74 as the "B" star.
4. POU1470. "B" star is a close double. See image. I'm measuring to the brighter component 3UCAC 227-062476 Mag 12.59. The other star is 3UCAC 227-062480. See Figure 3.
5. POU1546. I'm measuring 3UCAC 226-064744 06:46.76.7+22:55:06.7 Mag 14.6 as the "A"star. "B" is 3UCAC 226-064729 06:35:45.86+22:55:13.3 Mag 15.2 is the "B" star.
6. POU1653."A" star is much fainter in my CCD image. "A" 3UCAC 229-069631 V mag 14.365, "B" 3UCAC 229-069633 V mag 13.37.
7. POU1741.There are two pairs available. One matches the 1906 measure and one matches 1998 measure. POU1741-1. Measuring 3UCAC 228-068389 V mag 15.04 and 3UCAC 228-068382 V mag 14.81. POU1741-2. Measuring: star at 06:38:57.47+23:58:36.3 mag 17.37, 06:38:58.32+23:58:32.6 mag 16.41
8. POU1889. 'B" star is a close double. See Figure 4.
9. POU1903. New "C" star. See Figure 5. "C" is UCAC-4 4UC571-033128. "A" and "B" stars have large and similar proper motions. Probable CPM pair.

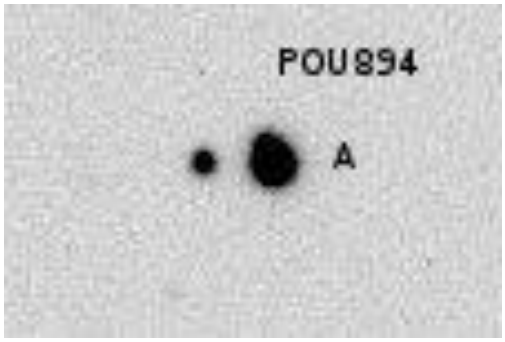

Figure 2. POU894. "A" is a close double

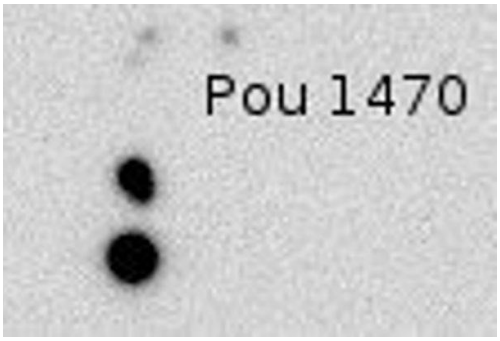

Figure 3. POU1470. "B" star is a close double

Double Star Measurements for December 2013

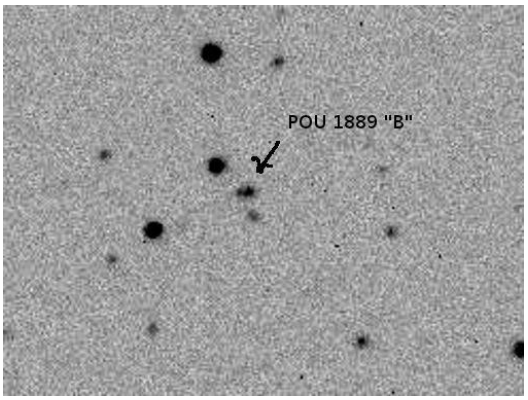

Illustration 4: POU1889 showing "B" star as a close double.

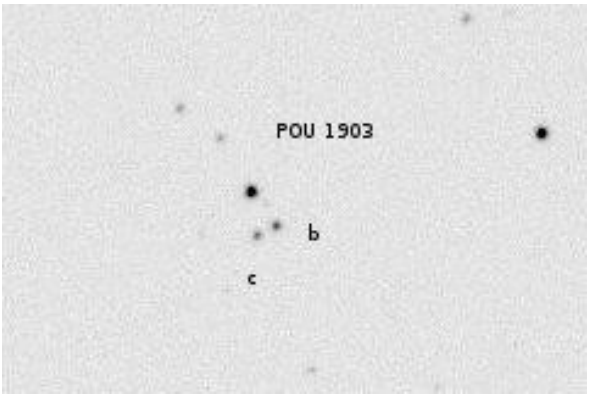

Figure 5. POU1903 showing "B" and "C" components.

10. POU1912. Measuring new "C" star. See Figure 6. "C" is 3UCAC 230-070508 Mag 15.73.
11. POU1920. "A" star is a close double. See Figure 7.
12. POU1901. I'm measuring 3UCAC 230-070377 and 3UCAC 230-070384. "A" star is at 06:41:52.31+24:44:02.5
13. POU1882. Position seems wrong. I'm measuring 3UCAC 230-070172 and 3UCAC 230-070181. "A" is at 06:41:29.46+24:51:14.8.
14. New quadruple star. See "Discussion".

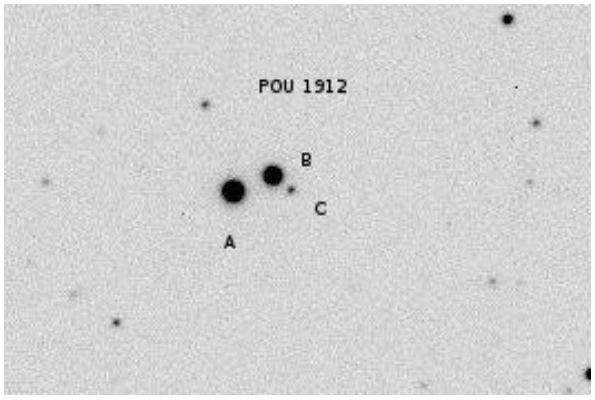

Figure 6. POU1912 showing new "C" component.

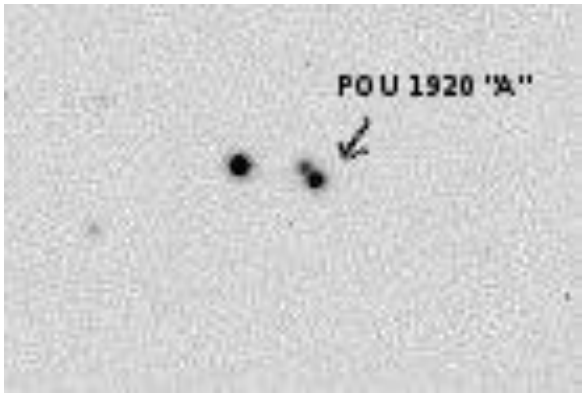

Figure 7. POU1920. Measuring to brighter companion.