

# Double Star Measurements for First Half of the Year 2006

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**Abstract:** This semi annual report contains 116 measurements, 1 of which is a new discovery, of neglected double stars from the WDS Northern List. The instrumentation utilized was a 12-inch RCX400 at f8 and a CCD camera to record the images. Data reduction was done using Reduc software.

## Telescope

The telescope is a Meade RCX400 of 12" aperture with a 38% central obstruction by diameter. The telescope is mounted in Alt/Az and therefore each binary system that is imaged must contain a drift image to determine the correct PA orientation. Calibration of the PA and Sep was determined by imaging a known Calibration Candidate from the Sixth Catalog of Orbits of Visual Binary Stars. Images are taken without any additional amplification at a focal length of 2438 mm providing 0.71 arc seconds per pixel at the CCD detector.

## CCD Detector

The CCD detector is a Meade DSI Pro II. The Pixel size is 8.6x8.3 arranged in a 752x582 array on a Sony ICX429ALL image sensor. No binning was employed. The shutter is electronic and there is no cooling used.

## Data Reduction

All double star images were reduced using Reduc software kindly provided by Florent Losse. With careful technique it was possible to generate highly accurate and repeatable values for PA and Sep. To ensure the accuracy of the measurements, I utilized an initial Calibration Candidate from the Sixth Catalog of Orbits of Visual Binary Stars to calibrate the system and followed up with 3 blind Calibration Candidates, which were listed in the WDS Neglected Doubles List.

## General Information

Data is presented with the top row providing from left to right, the discoverer designation, WDS Epoch 2000 RA & Dec, WDS magnitudes, WO measured position angle in degrees, WO measured separation in arc seconds, Decimal date, and number of nights ob-

*(Continued on page 162)*

Discoverer Des.	WDS (2000)	WDS Mags	Theta (deg)	Rho (arcsec)	Date	n	Notes
STF2300 AB	18093+5945	9.00/10.30	42.61	13.868	2006.4365	1	
SEI 559	18104+3356	11.00/11.00	169.22	12.391	2006.4365	1	
SEI 563	18175+3403	9.40/10.70	92.12	13.872	2006.4365	1	
KU 117	18276+2509	10.28/11.30	14.95	20.347	2006.4365	1	
HJ 1326	18292+3220	10.00/10.00	4.25	11.819	2006.4365	1	
ES 2668	18343+4511	9.20/11.00	224.85	12.180	2006.4365	1	
SLE 220	18371+3201	10.10/10.90	236.73	18.376	2006.4365	1	
SLE 101	18394+3000	9.80/10.40	234.49	20.018	2006.4365	1	

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Discoverer Des.	WDS (2000)	WDS Mags	Theta (deg)	Rho (arcsec)	Date	n	Notes
SLE 94	18413+4102	10.40/10.40	102.75	16.793	2006.4365	1	
STF2398 AB	18428+5938	9.11/ 9.96	175.99	12.186	2006.4365	1	Note 1 Calibration Star
SEI 574	18457+3218	9.00/11.00	262.93	18.952	2006.4365	1	
HJ 1349	18488+3319	8.30/10.70	91.08	30.731	2006.4365	1	
HJ 1352	18501+2949	7.80/10.00	251.76	13.603	2006.4365	1	
HJ 1355	18541+2718	10.00/10.50	40.20	12.066	2006.4365	1	Note 2
SEI 554	18019+3123	10.20/11.00	47.16	24.941	2006.5233	1	
SEI 555	18020+3153	9.80/10.70	110.44	19.770	2006.5233	1	
SLE 131 AB	18054+3029	10.29/11.69	202.82	55.485	2006.5233	1	
SLE 187	18310+3857	9.70/10.80	207.66	24.242	2006.5233	1	
HJ 1332	18387+2439	8.16/10.36	231.14	27.995	2006.5233	1	
SLE 232	18387+5300	10.80/10.90	220.97	15.122	2006.5233	1	
SEI 572	18430+3445	11.00/11.00	52.38	22.802	2006.5233	1	
HJ 1348 AB	18474+4606	10.38/11.66	294.23	73.538	2006.5233	1	
ES 2569	18107+3903	9.50/10.00	275.91	9.636	2006.5315	1	
ES 1420 AB	18156+4417	9.60/10.80	67.44	9.330	2006.5315	1	
ES 2664	18157+3723	10.00/10.10	83.86	9.609	2006.5315	1	
HJ 1321	18213+3920	10.00/11.00	76.84	10.369	2006.5315	1	
MLB 648	18270+2832	9.70/11.00	21.42	10.840	2006.5315	1	
ES 475	18280+2708	9.60/10.60	219.83	10.907	2006.5315	1	
J 2913 AC	18293+2144	10.00/10.00	161.05	15.553	2006.5315	1	
SLE 182	18298+3930	9.80/10.10	253.80	11.602	2006.5315	1	
SLE 209	18339+3208	9.10/10.20	16.16	10.199	2006.5315	1	
SLE 211	18347+3158	10.60/11.00	270.50	9.539	2006.5315	1	
STI2380	18380+5722	9.80/10.80	3.17	10.449	2006.5315	1	

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Discoverer Des.	WDS (2000)	WDS Mags	Theta (deg)	Rho (arcsec)	Date	n	Notes
ES 478	18436+4237	10.30/10.80	183.32	9.847	2006.5315	1	
HJ 1354	18530+3621	9.70/ 9.80	5.66	10.702	2006.5315	1	
ES 2669	18550+6143	10.20/10.60	166.95	12.147	2006.5315	1	
MLB 852	18159+3840	11.42/12.10	40.09	9.846	2006.5343	1	
STI 865	18519+5948	10.40/10.90	178.53	3.154	2006.5343	1	
ES 2018	18077+3904	10.13/11.15	233.47	5.731	2006.5397	1	
MLB1078	18189+3918	12.70/12.70	136.59	6.753	2006.5397	1	
ES 2110	18210+3630	9.30/10.80	99.68	6.735	2006.5397	1	
ES 21	18332+4200	10.50/10.50	109.02	7.283	2006.5397	1	
SLE 362	18408+2703	11.00/11.00	100.83	7.158	2006.5397	1	
ES 1912	18494+6528	9.40/11.00	21.16	7.819	2006.5397	1	
MLB 857	18573+3925	9.80/10.00	341.73	5.078	2006.5397	1	
ES 1417 AB	18092+4314	9.50/10.40	208.05	13.507	2006.5452	1	
ES 2480	18101+3713	10.50/11.00	357.31	3.969	2006.5452	1	
SLE 141	18123+3106	10.50/10.90	23.39	6.446	2006.5452	1	
STF2305 AB	18162+5120	9.16/10.81	339.11	4.945	2006.5452	1	
BRT1915	18186+4104	10.00/10.90	15.51	5.343	2006.5452	1	
ES 2418	18267+3211	9.60/10.50	77.92	5.513	2006.5452	1	
MLB 854	18272+3847	11.80/12.00	12.23	6.871	2006.5452	1	
SLE 114	18409+3044	10.90/10.90	147.47	3.585	2006.5452	1	
ES 2482	18445+3733	10.00/10.50	161.34	11.858	2006.5452	1	
ES 2483	18449+3651	10.50/11.00	264.47	5.106	2006.5452	1	
STF2427 BC	18581+3813	9.93/10.20	79.52	7.248	2006.5452	1	
AG 367	18582+2924	9.90/10.90	301.27	5.147	2006.5452	1	
MLB 757	18590+3235	13.00/13.40	124.43	4.924	2006.5452	1	

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Discoverer Des.	WDS (2000)	WDS Mags	Theta (deg)	Rho (arcsec)	Date	n	Notes
STF2486 AB	19121+4951	6.54/ 6.67	204.89	7.741	2006.5452	1	Note 3 Calibration Star
J 756	18004+4611	12.31/12.31	182.29	3.742	2006.5507	1	
J 757	18031+3805	9.60/10.00	320.84	3.616	2006.5507	1	
ES 2109	18056+3727	9.00/11.00	141.25	4.313	2006.5507	1	
BRT1914	18072+4430	10.60/10.80	154.99	4.699	2006.5507	1	
AG 361	18251+2654	10.65/10.97	14.08	3.866	2006.5507	1	
J 2913 AB	18293+2144	10.00/10.30	115.51	3.150	2006.5507	1	
ES 2419	18343+3205	11.00/11.00	158.49	4.231	2006.5507	1	
BRT2448	18425+2116	10.60/11.00	296.06	4.009	2006.5507	1	
J 1208	18491+2834	9.50/10.00	333.32	4.964	2006.5507	1	
BRT2449	18498+2149	9.80/10.80	229.49	3.913	2006.5507	1	
BRT1922	18509+4259	11.29/11.85	294.23	3.377	2006.5507	1	
WFC 215	18549+6911	10.10/10.22	254.11	3.926	2006.5507	1	
ES 1657	18554+4052	10.40/11.00	352.57	3.892	2006.5507	1	
POP 194	18569+3505	12.00/13.00	125.63	3.567	2006.5507	1	
AG 349	16011+2808	9.59/10.86	226.78	12.289	2006.5562	1	
PKO 13	16065+6028	10.50/10.80	305.27	11.246	2006.5562	1	
HJ 260	16118+3725	11.00/10.00	26.79	20.509	2006.5562	1	
STF2032 AB	16147+3352	5.62/ 6.49	236.84	7.220	2006.5562	1	Note 4 Calibration Star
ES 1253	16185+4510	10.00/11.00	230.95	7.001	2006.5562	1	
ES 627	16186+5120	9.88/10.98	287.45	12.351	2006.5562	1	
HJ 261	16284+3724	10.00/11.43	100.60	21.927	2006.5562	1	
SEI 539	16358+3219	9.00/10.50	233.14	10.928	2006.5562	1	
KU 54	16430+4355	9.20/10.70	97.28	9.720	2006.5562	1	
ROE 49	16456+3705	9.50/11.00	79.71	11.303	2006.5562	1	

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Discoverer Des.	WDS (2000)	WDS Mags	Theta (deg)	Rho (arcsec)	Date	n	Notes
KZA 117	16509+4601	10.50/10.50	325.28	8.526	2006.5562	1	
KZA 120	16534+4601	10.50/10.50	78.74	11.038	2006.5562	1	
ES 1090	17005+4817	10.60/10.60	274.89	4.918	2006.7369	1	
BRT 340	16494+4127	10.20/10.80	201.61	3.484	2006.5644	1	
ES 344	17573+3351	9.70/10.20	30.55	9.311	2006.5644	1	
ES 1259	17521+4657	9.00/ 9.80	219.69	6.582	2006.5644	1	
ES 1414	17298+4334	10.40/10.80	227.66	7.157	2006.5644	1	
ES 1556	16010+4338	9.50/11.20	229.92	10.586	2006.5644	1	
ES 2169	17496+3649	10.10/10.40	336.30	8.735	2006.5644	1	
ES 2478	17595+3803	10.50/11.00	235.37	4.691	2006.5644	1	
ES 2567	17496+3756	11.00/11.00	194.77	5.661	2006.5644	1	
ES 2660	17372+4309	10.16/10.16	151.36	9.526	2006.5644	1	
ES 2663	17536+4313	10.60/10.90	332.70	10.273	2006.5644	1	
GYL 5 AC	17120+3158	11.34/12.36	320.26	17.142	2006.5644	1	
HEI 14 AB	17158+3829	9.60/11.00	313.03	7.530	2006.5644	1	
SOO 1	17158+3829	9.21/12.16	356.29	4.814	2006.5644	1	Discovery Note 1
HO 64	16308+2744	11.65/11.59	106.20	4.334	2006.5644	1	
HO 558	17105+6322	9.50/10.00	207.61	8.396	2006.5644	1	
J 1124	16415+4007	10.20/10.80	276.60	3.332	2006.5644	1	
MLB 850	17145+3833	14.00/14.20	187.00	5.872	2006.5644	1	
MLR 351	16304+7930	9.90/10.20	95.05	3.824	2006.5644	1	
PKO 14	16067+6000	10.50/10.60	143.26	2.109	2006.5644	1	
PTT 17	17167+3752	9.50/10.00	190.02	10.209	2006.5644	1	
SEI 545	17400+3144	10.30/10.30	148.31	11.876	2006.5644	1	
SEI 547	17460+3206	10.00/11.00	242.30	8.873	2006.5644	1	
SEI 549	17535+3240	11.00/11.00	131.98	12.613	2006.5644	1	

### Double Star Measurements for First Half of the Year 2006

Discoverer Des.	WDS (2000)	WDS Mags	Theta (deg)	Rho (arcsec)	Date	n	Notes
SEI 553	17569+3252	10.00/10.20	27.86	9.887	2006.5644	1	
SLE 11	17118+2906	10.10/11.00	284.74	9.528	2006.5644	1	
STF2225 AB	17452+5157	8.70/10.90	357.78	5.459	2006.5644	1	
STF2225 CD	17452+5157	10.20/10.56	318.25	8.751	2006.5644	1	
STF2229	17459+5011	8.30/10.30	337.58	6.612	2006.5644	1	
STI2357	17462+5613	10.20/10.60	171.62	12.155	2006.5644	1	
WFC 196	17352+2545	9.93/10.48	101.53	8.003	2006.5644	1	

#### 2006 Notes

- Comparative results of this blind calibration are as follows:  
 18428+5938 STF2398AB 2006.00 175.9 12.113 (WDS Sixth Catalogue)  
 2006.4365 175.99 12.186 (WO)
- Primary and Secondary need to be reversed to get Theta reading in keeping with previous observations of this system.
- Comparative results of this blind calibration are as follows:  
 19121+4951 STF2486AB 2006.00 205.6 7.405 (WDS Sixth Catalogue)  
 2006.5452 204.89 7.741 (WO)
- Comparative results of this blind calibration are as follows:  
 16147+3352 STF2032AB 2006.00 236.9 7.123 (WDS Sixth Catalogue)  
 2006.5562 236.84 7.220 (WO)

(Continued from page 157)

ject was observed. A notes column follows each row to expand on any peculiarities noted in the double star observation.

#### Discovery Notes

SOO 1 – 17hr 15m 48.00s +38deg 51' 60.00". Found while imaging HEI 14. This is a third fainter component, which I have measured in relation to the primary star in HEI 14. Positioning and magnitudes were confirmed by accessing online The Two Micron All Sky Survey (2MASS) images using the Aladin sky atlas. Image of this system is shown in Figure 1.

#### References

- "This publication makes use of data products from the Two Micron All Sky Survey, which is a joint project of the University of Massachusetts and the Infrared Processing and Analysis Center/California Institute of Technology, funded by the National Aeronautics and Space Administration and the National Science Foundation."
- The Washington Double Star Catalog

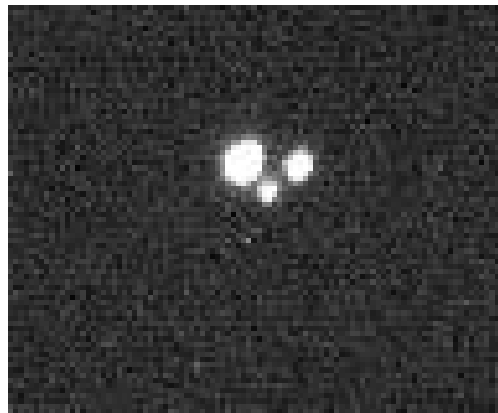


Figure 1: Image of HEI 14 showing newly discovered third component.