Double Star Measures Using the Video Drift Method - XIV

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Abstract

Position angles and separations for 289 multiple star systems are presented using the video drift method.

Introduction

This is Paper 14 in our continuing series on double star measurements using the video drift method. We continue our practice of preferentially measuring multiple star systems in the Washington Double Star Catalog (WDS) that have less than 15 measurements and separations wider than about 3.0". This separation represents the current minimum resolution of the video drift method under excellent seeing conditions.

Methodology

We proposed the video drift method (Nugent and Iverson, 2011) as a way to reduce human intervention in the data collection and data analysis phases of double star measurements. We have further refined the measurement and analysis procedure in our subsequent papers. The sum of this development process has been used to obtain the current data set. All measurements were made with a pair of Meade 14-inch LX-200 telescopes (focal length 3556 mm at f/10, scale factor 0.6"/pixel). Astronomical video data collection systems require a onetime aspect ratio calibration. The reader is referred to our previous discussion of the problem and calibration procedure (Nugent and Iverson, 2014).

We obtained measurements for several doubles on more than one night. The data analysis procedure begins with calculating a simple average each night to determine the mean position angle (PA) and separation (SEP). A mean standard deviation was also calculated for both the PA and SEP. In those cases where a double star was measured on more than one night, the nightly means were combined using a weighted average. The weight assigned to each night's measurement is simply the inverse of that night's standard deviation squared. Taking a weighted average of the standard deviation produces an artificially lowered error measure as the number of nights increases. Therefore, in Table 1 we report the Standard Error of the Mean (SEM) which is the weighted standard deviation divided by the square root of the number of nights measurements were made. Double star systems measured on only one night, the SEM column in Table 1 lists the nightly standard deviation (Nugent and Iverson, 2018).

Image enhancement techniques were employed by both authors to reach fainter star systems. Co-author Iverson used a variation of the drift method employing an integrating video camera (Iverson and Nugent 2015) while co-author Nugent used a Collins I^3 image intensifier with a non-integrating camera. The faintest system measured in Table 1 had WDS primary/secondary magnitudes of +14.9, +15.6. Forty-nine

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systems had WDS secondary magnitudes greater than or equal to +13.0.

In a few cases we came across systems with a large magnitude difference between the components. At a nominal gain setting for the primary component, the fainter (secondary) component was usually not visible. If it was visible, the primary (brighter) component was overly saturated on the camera sensor. The resulting star image was larger than the measurement aperture in the *Limovie** program we use for reductions. The solution is to make two separate drift runs at different gain settings and then combine the measurements from both runs into a single file. With this data combining technique, our *VidPro** reduction program can now compute the PA and SEP for the system.

Other double star systems had separations close enough to cause *Limovie* to have difficulty keeping the respective measurement apertures on the proper star. This issue was resolved by enlarging a cropped region of the video field around the stars. This increased the number of pixels between the components and created enough space so that the *Limovie* measurement apertures could correctly follow each star. Cropping the video changed the scale factor to 0.2"/pixel. This technique and the one in the previous paragraph have been discussed previously in Nugent and Iverson, 2018.

LIg*ht* **M***easurement Tool for* **O***ccultation Observation Using* **VI***d***E***o Recorder*

VIdeo* **D***rift* **P***rogram* **R***educti***O***n*

Object	Designation	PA	PA-SEM	Sep	Sep-SEM	Date	Mag, 1	Mag. 2	Nights
00112+4933	ES 2577	311.00	0.04	66.23	0.06	2020.88	8.24	8.99	3
00352+4450	ROE 62	296.44	0.16	9.99	0.02	2020.86	9.45	9.9	2
00495+5534	STI1437	298.33	0.08	11.01	0.02	2020.87	9.73	10.98	3
01170+3828	STF 104	322.16	0.11	13.32	0.03	2020.88	8.03	9.83	3
01340+4416	ES 2586	99.03	0.06	44.63	0.04	2020.87	9.53	9.67	4
01376+0709	PLQ 19	76.33	0.05	40.03	0.05	2020.88	9.79	9.77	3
01517+4549	ARG 51	170.98	0.05	16.05	0.01	2020.87	9.37	9.73	4
01563+3758	ARN 87	283.87	0.06	56.23	0.04	2020.87	9.08	10.59	4
02002+0905	CHE 31	158.20	0.05	20.36	0.04	2020.88	9.86	9.93	3
02089+2031	CHE 61	203.79	0.11	10.09	0.02	2020.88	9.74	10.25	2
02091+4048	STF 215	60.39	0.08	19.64	0.03	2020.87	9.03	10.40	2
02235+2623	KU 76	349.30	0.07	32.02	0.05	2020.88	9.78	10.49	3
02283+4314	HJ 2137	133.23	0.07	27.73	0.03	2020.87	9.11	10.80	4
02345+5158	SKF 394	45.17	0.03	77.64	0.05	2020.87	9.34	10.34	4
02412+4241	HJ 2154	141.25	0.15	10.29	0.02	2020.88	9.49	10.93	2
02500+4222	KU 78	163.18	0.05	25.62	0.02	2020.87	9.75	10.22	4
03113+4431	POP 223	181.15	0.04	15.30	0.02	2020.87	9.82	11.03	4
03141+5445	HJ 2175	25.73	0.08	12.14	0.02	2020.87	9.4	10.6	3
03156+6041	DAM 655	129.15	0.04	46.81	0.03	2020.88	9.2	9.3	4
03266+6217	SKF2171	169.90	0.03	58.40	0.05	2020.88	9.6	10.1	4
03293+6425	HJL 48	51.27	0.05	22.97	0.02	2020.88	9.55	9.82	4
03422+5436	HJ 2198	308.51	0.04	41.44	0.03	2020.87	9.61	10.14	4

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03587+5013	SKF 392	137.48	0.07	32.96	0.04	2020.88	9.26	9.61	3
04170+3048	HJ 673	196.20	0.10	21.11	0.04	2020.88	9.68	10.1	3
04285+5239	SKF 770	327.57	0.04	29.53	0.02	2020.87	9.48	9.75	4
04431+3356	HJ 348	284.75	0.11	30.45	0.03	2020.88	7.42	9.50	2
04578+4801	HJ 2241	84.62	0.04	12.01	0.01	2020.12	9.34	9.47	4
05046+2339	AG 313	187.58	0.07	19.81	0.03	2020.88	9.4	10.0	3
05172+3747	HJ 3271	350.45	0.02	11.63	0.02	2020.12	9.36	9.96	4
05231+3110	STF 691	300.55	0.09	25.29	0.03	2020.88	9.13	9.86	3
05233+3409	MLB1037	291.51	0.39	17.67	0.05	2020.88	8.74	11.9	1
05556+5328	STT 120	143.31	0.03	48.91	0.03	2020.12	7.63	8.77	4
06063+0836	GRV 710	58.77	0.02	61.63	0.06	2020.12	9.32	9.67	4
06183+6212	STF 866AB	195.10	0.07	18.21	0.03	2020.12	8.89	10.12	3
06183+6212	STF 866AC	268.43	0.04	79.76	0.09	2020.12	8.89	9.58	3
06206+1803	STTA 75	129.56	0.05	47.20	0.05	2020.12	7.72	8.92	3
06391+0220	AG 118	306.08	0.07	35.32	0.06	2020.14	8.75	10.34	3
06404+1925	STF 947	174.52	0.06	18.74	0.03	2020.14	8.77	10.76	3
07219+4614	ES 2624	87.86	0.12	80.85	0.18	2020.12	8.12	8.25	3
07453+2052	HJ 428	277.22	0.11	14.45	0.02	2020.12	8.24	11.2	3
08041+2818	GRV 750	337.37	0.05	21.77	0.02	2020.12	9.82	10.00	3
08064+4159	STF1176	30.84	0.05	22.47	0.04	2020.09	8.09	10.06	2
08118-0717	GWP 994	146.08	0.06	14.70	0.09	2020.16	9.0	10.5	1
08140+2708	BU 1420	300.10	0.07	19.23	0.03	2020.12	8.81	10.6	4
08277+2734	STF1228	352.02	0.14	8.83	0.03	2020.16	8.87	9.68	1
08354+6616	STF1232	352.17	0.13	30.42	0.06	2020.16	8.73	8.97	1
08445+2827	STF1266	65.27	0.07	23.32	0.02	2020.14	8.75	9.99	3
08515+1154	CHE 120	144.53	0.08	31.42	0.06	2020.12	9.70	10.56	2
09001-0706	WFC 247	58.47	0.10	12.70	0.07	2020.16	8.94	9.69	1
09003+1312	STF1299	111.73	0.08	23.72	0.04	2020.14	9.69	11.11	3
09013+4154	ARN 70	297.92	0.05	44.45	0.06	2020.16	9.84	10.14	2
09042+0301	GRV 775	326.95	0.04	32.32	0.06	2020.14	9.03	9.34	3
09042-0252	HJ 116	44.22	0.08	32.47	0.15	2020.16	9.86	10.83	1
09056+5018	ES 2631	258.71	0.06	79.45	0.07	2020.14	7.84	8.47	3
09136+2627	STF1323	210.74	0.07	21.93	0.04	2020.16	9.5	10.3	2
09476+0534	SKF1843	139.77	0.03	111.67	0.17	2020.16	8.70	9.92	2
09560+5111	STF1391	316.16	0.09	13.39	0.02	2020.14	9.10	10.94	3
10092+3222	STF1411	309.67	0.06	31.12	0.05	2020.16	9.48	10.70	2
10166+4117	SHY 552	6.21	0.04	106.85	0.13	2020.14	7.40	8.78	3
10368-1332	STF1453AB	229.90	1.39	8.50	0.23	2020.31	8.99	9.81	1
10368-1332	SCA 80AC	146.20	0.28	74.00	0.28	2020.31	8.99	12.12	1
10368-1332	SCA 80BC	140.00	0.27	73.80	0.31	2020.31	9.81	12.12	1
10389-1301	SCA 85AB	276.70	1.53	12.20	0.30	2020.31	10.67	11.0	1
10389-1301	SCA 85AC	178.10	0.38	44.30	0.35	2020.31	10.67	12.41	1
10389-1301	SCA 85BC	163.60	0.39	47.70	0.36	2020.31	11.0	12.41	1
10395+2845	HJ 488	21.30	0.59	28.60	0.29	2020.31	8.71	12.72	1
10401-3425	HJ 4340	123.40	0.92	5.40	0.08	2020.31	10.88	13.2	1
10476-1538	STF1473AC	333.20	0.24	96.10	0.41	2020.31	7.74	12.50	1
10481-1458	BU 595AC	171.30	0.22	81.90	0.29	2020.31	9.00	12.32	1
10481-1458	FOX9027AD	104.70	0.33	93.90	0.57	2020.31	9.00	14.20	1

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10513-3321	PRO 95	55.00	0.61	6.80	0.07	2020.31	10.09	11.2	1
10535-2008	HO 533BC	132.10	1.13	13.70	0.27	2020.31	9.60	10.7	1
10535-2008	HO 533BD	297.40	0.72	40.50	0.39	2020.31	9.60	13.50	1
10553-2705	STN 20	208.20	0.93	3.60	0.07	2020.31	10.02	10.61	1
10590+3256	ES 2283AB	103.70	2.21	5.50	0.20	2020.31	11.13	12.62	1
11037+4420	HJ 2554	295.70	0.10	37.23	0.15	2020.16	7.44	9.30	2
11260+0357	HJ 1189	115.31	0.06	20.42	0.02	2020.16	9.48	10.5	2
11414+5855	ES 2638	352.70	0.05	30.15	0.06	2020.16	8.93	9.50	2
12139-2133	DON 516	160.40	1.31	4.40	0.10	2020.31	9.86	10.97	1
12215-2413	HWE 26AB	150.00	1.04	4.51	0.14	2020.31	10.02	10.18	1
12272-3408	COO 138	355.50	0.68	5.50	0.08	2020.31	8.62	10.1	1
12349-3125	B 2296	72.00	1.44	11.90	0.29	2020.31	9.1	14.	1
12384+1347	HJ 2616AC	303.00	1.30	20.60	0.44	2020.31	11.83	12.96	1
13092+2841	SMA 76AB	247.30	0.52	27.10	0.24	2020.39	9.14	11.30	1
13127-1354	BRT2733	95.60	1.36	3.70	0.13	2020.39	12.41	12.63	1
13202+1534	HJ 223AB	6.40	0.50	36.00	0.33	2020.39	7.25	12.23	1
13254-0209	BAL 550	320.20	0.98	17.90	0.35	2020.39	11.56	12.0	1
13283-0222	B 2753	52.20	2.32	8.20	0.37	2020.39	11.23	14.04	1
13324-3517	JSP 585AB,C	299.50	1.87	10.30	0.30	2020.39	10.1	13.	1
13352+3514	KZA 70AB	342.60	0.39	56.90	0.34	2020.39	11.84	13.52	1
13352+3514	KZA 70AC	359.40	0.23	87.60	0.37	2020.39	11.84	13.15	1
13372+3005	STF1766	68.18	0.05	20.24	0.02	2020.38	9.38	10.79	3
13400+3759	KZA 76AB,C	77.70	0.23	75.80	0.26	2020.39	9.72	12.03	1
13407+1957	STF1772AC	26.30	0.25	86.70	0.39	2020.39	5.76	12.23	1
13458+0451	LDS3097AB	95.90	0.94	23.60	0.39	2020.39	10.17	13.53	1
13582+4853	LDS5800	356.86	0.04	41.08	0.06	2020.38	9.81	11.29	3
14144-1521	LDS 483AC	277.30	0.46	63.60	0.50	2020.39	10.39	13.77	1
14172-0012	BAL1171	218.70	1.04	21.70	0.41	2020.39	11.11	12.08	1
14236+5205	BEM9019	14.88	0.08	13.94	0.03	2020.45	10.3	10.8	3
14298-2533	COO 172	58.40	1.13	12.30	0.27	2020.39	7.87	9.67	1
14329+4126	HJ 1255	336.74	0.03	46.59	0.05	2020.45	8.80	9.25	3
14547+5038	AG 196	139.08	0.04	27.63	0.02	2020.45	10.04	10.76	4
15021-2017	HLD 22AC	313.30	0.45	49.10	0.33	2020.39	9.19	12.96	1
15036-0734	B 2781	15.80	0.40	38.40	0.29	2020.39	7.70	11.93	1
15041-0653	HO 391AC	326.50	0.58	24.70	0.27	2020.39	7.83	12.3	1
15066-1621	ARA 4	357.20	1.09	11.50	0.26	2020.39	9.57	12.5	1
15073+1827	DRS 57AC	321.00	0.20	109.00	0.28	2020.39	6.04	11.39	1
15091+1420	HJ 248AB	276.90	1.40	13.00	0.32	2020.39	11.31	13.39	1
15092-0532	FMR 8	239.30	2.20	4.80	0.20	2020.39	13.3	13.9	1
15093-2503	HJ 4736	112.50	1.60	12.10	0.29	2020.39	10.2	11.7	1
15101-0120	BAL 881	137.70	0.89	6.30	0.10	2020.39	11.62	13.3	1
15108+4651	STF1920	109.34	0.04	18.62	0.01	2020.45	9.92	9.98	4
15141+2545	STF1924	305.61	0.06	15.24	0.02	2020.45	9.71	10.88	3
15174+3022	ARY 42	186.37	0.04	95.20	0.09	2020.45	9.30	9.63	3
15210+2022	HJ 2775	83.65	0.05	9.23	0.01	2020.45	9.6	10.0	3
15409+5009	ES 626	275.53	0.10	8.16	0.01	2020.45	9.2	9.2	3
16020+6029	STF2009	301.40	0.08	17.01	0.13	2020.38	9.42	10.71	1
16289+5636	ARG 102	53.38	0.06	80.54	0.13	2020.45	8.34	9.73	3

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16489+5930	STT 316	347.69	0.04	46.58	0.05	2020.45	7.79	8.93	3
16566+4505	ES 2655	66.85	0.07	47.55	0.04	2020.45	9.72	9.92	3
16566+5127	ES 2654	281.71	0.08	36.96	0.05	2020.44	9.21	9.83	2
17116+3916	STF2136AB,C	111.60	0.81	15.30	0.18	2020.49	8.47	10.48	1
17116+3916	WAL 78AB,E	311.40	0.38	57.40	0.29	2020.49	8.47	12.84	1
17120-1547	FOX 18CD	248.30	1.68	13.80	0.40	2020.49	12.1	13.5	1
17128-3322	COO 209	136.60	1.34	10.20	0.23	2020.49	7.83	10.06	1
17130-3215	I 1623AD	91.27	0.17	9.63	0.04	2020.49	8.76	11.11	1
17165+5433	DAM 27AD	3.06	0.05	40.86	0.05	2020.44	9.31	13.07	2
17165+5433	SCA9003AB	96.86	0.06	44.09	0.07	2020.45	9.31	10.63	3
17165+5433	SCA9003AC	332.32	0.04	80.70	0.07	2020.45	9.31	10.79	3
17267+3105	LDS 995	199.52	0.06	68.08	0.07	2020.45	8.48	9.67	3
18007-0717	LDS 621	298.20	3.31	7.20	0.41	2020.63	14.9	15.6	1
18008+0135	BAL1496	162.70	0.98	16.43	0.30	2020.63	10.7	12.3	1
18034-2237	ARA1839	42.47	1.09	12.40	0.20	2020.63	8.18	12.0	1
18039-2247	ARA1840	266.90	1.51	8.02	0.32	2020.63	11.18	11.5	1
18041-2230	ARA1841	33.27	2.48	7.53	0.33	2020.63	12.4	12.7	1
18042-2230	ARA1842DE	110.13	1.08	12.58	0.22	2020.63	10.6	12.9	1
18043-2603	J 1735	261.50	0.78	5.88	0.09	2020.63	11.98	11.67	1
18046+1329	HJ 1311	54.64	2.33	7.41	0.30	2020.63	11.5	11.7	1
18049-2326	ARA2210	144.97	1.97	8.73	0.29	2020.63	10.68	12.8	1
18083+1318	GWP2761AC	39.57	0.24	99.57	0.46	2020.63	10.7	12.7	1
18084-2132	ARA1514	185.60	1.63	14.47	0.45	2020.63	11.78	11.80	1
18090-1815	ARA 454	349.30	1.48	14.62	0.34	2020.63	11.59	12.20	1
18093-1827	ARA 455	96.87	2.27	11.73	0.45	2020.63	13.0	13.2	1
18099-2406	HJ 5026AC	138.57	0.52	33.74	0.29	2020.63	10.09	11.02	1
18112-2041	ARA1136	304.83	1.81	14.25	0.42	2020.63	12.4	12.5	1
18113-2111	ARA1516	274.30	1.69	13.42	0.44	2020.63	11.4	12.6	1
18396-3207	PRO 208	219.47	1.94	6.75	0.23	2020.72	11.2	11.4	1
18400-0747	STF2350	191.10	0.30	16.40	0.15	2020.72	6.00	11.94	1
18439+1601	OSO 103AF	246.13	1.81	12.40	0.38	2020.72	12.61	13.3	1
18549+0615	J 1267	235.57	1.64	5.38	0.17	2020.72	11.4	11.76	1
18579-2524	B 2871AB	295.83	1.12	14.45	0.26	2020.72	9.61	11.6	1
18579-2524	SIN 112AC	94.37	0.44	54.31	0.38	2020.72	9.61	13.34	1
18593-2653	RSS 501	124.30	2.47	11.50	0.44	2020.72	10.60	13.3	1
19010-2439	COO 230	195.43	1.74	8.45	0.27	2020.63	9.49	10.15	1
19016-1841	DYL 29AB	71.27	2.02	10.90	0.45	2020.63	11.5	13.0	1
19021+1426	HO 93AC	209.80	0.57	39.85	0.35	2020.63	7.43	12.2	1
19026-0621	A 42AB,C	319.47	0.25	72.77	0.32	2020.63	9.98	12.29	1
19027-0027	J 475AC	326.43	0.77	33.77	0.43	2020.63	11.82	12.89	1
19027-0027	J 475AD	268.97	1.11	17.10	0.48	2020.63	11.82	14.30	1
19029+2322	POU3666AB	52.20	1.40	14.19	0.34	2020.71	9.5	12.6	1
19039-2152	ARA1908	270.87	1.03	11.53	0.31	2020.63	10.7	12.6	1
19050-2121	ARA1561	214.03	2.89	8.39	0.44	2020.63	12.4	12.7	1
19061-2634	HLN 46AC	119.77	1.84	9.10	0.29	2020.63	11.40	11.96	1
19061-2721	B 423AB	194.03	0.38	38.78	0.22	2020.63	10.05	10.84	1
19061-2721	B 423BC	191.08	1.24	4.55	0.11	2020.63	10.84	11.10	1
19069+0847	HJ 2854AB	41.53	1.59	9.53	0.29	2020.63	9.46	12.0	1

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19134-1803	HJ 1373	245.53	1.73	7.44	0.24	2020.71	11.41	12.2	1
19179-0638	DAM 147	25.33	1.73	7.97	0.26	2020.71	10.2	11.	1
19201+2013	GRV 254	155.07	2.86	8.52	0.38	2020.63	11.2	11.6	1
19202+2446	POU3768	336.77	1.86	13.17	0.39	2020.63	13.0	13.4	1
19209-3303	HJ 5107AB	124.90	0.99	13.79	0.20	2020.63	8.23	10.26	1
19213+0404	BAL2509	213.03	1.39	9.30	0.24	2020.63	10.20	11.7	1
19217-1715	HO 272AB	57.57	0.73	16.98	0.26	2020.63	7.45	11.3	1
19222-2337	ARA2258	225.23	2.15	10.58	0.37	2020.63	12.3	13.3	1
19234-1800	HJ 2866AB	53.30	0.80	22.66	0.34	2020.63	8.69	8.65	1
19234-1800	HJ 2866AC	105.50	0.47	34.91	0.30	2020.63	8.69	9.57	1
19234-1800	ABH 116AD	147.93	0.63	38.12	0.38	2020.63	8.69	13.15	1
19234-1800	ABH 116AE	98.58	0.18	121.73	0.44	2020.63	8.69	13.14	1
19234-1800	ABH 116AF	76.98	0.20	104.23	0.40	2020.63	8.69	13.44	1
19234-1800	HJ 2866BC	145.73	0.65	27.69	0.30	2020.63	8.65	9.57	1
19234-1800	HJ 5112CD	209.35	0.88	26.12	0.38	2020.63	9.57	13.15	1
19243+0305	J 2694AC	139.80	2.32	7.77	0.31	2020.63	12.49	12.84	1
19255+0450	SCJ 21	214.35	0.06	42.04	0.05	2020.62	8.52	10.92	5
19255+1933	SLE 947AB	258.30	2.08	8.37	0.29	2020.63	11.44	12.5	1
19255+1933	SLE 947AC	212.47	1.69	10.92	0.31	2020.63	11.44	12.73	1
19257+2409	POU3818AB	354.07	1.82	10.49	0.31	2020.63	11.87	12.9	1
19257+2409	BKO 404AC	2.87	0.94	19.57	0.34	2020.63	11.87	13.0	1
19257+2409	BKO 404BC	12.30	2.67	9.42	0.42	2020.63	12.9	13.0	1
19259+0216	BAL1988	124.63	2.04	7.68	0.28	2020.63	10.9	13.0	1
19262-1236	J 2966	287.63	1.91	6.65	0.22	2020.63	10.45	12.3	1
19263-0002	BAL 909	176.90	1.41	12.41	0.39	2020.63	12.10	12.9	1
19266-3251	B 970AB,D	7.90	0.54	38.72	0.33	2020.63	10.80	10.70	1
19268+2110	KRU 8CD	137.40	0.71	10.23	0.17	2020.63	7.18	12.8	1
19270+0449	J 2548AB	195.17	0.99	34.25	0.59	2020.63	14.3	13.2	1
19274+1359	AG 379	82.66	0.08	13.20	0.02	2020.64	9.57	10.52	6
19276+0539	J 1760	140.60	1.77	8.65	0.28	2020.63	12.11	12.1	1
19287-2045	ARA1189	162.07	3.38	7.33	0.41	2020.63	13.6	14.0	1
19288+0809	HJ 2873AB	301.83	2.03	8.51	0.34	2020.63	10.82	12.3	1
19288+0809	HJ 2873AC	198.07	1.51	12.66	0.38	2020.63	10.82	12.7	1
19288+0809	ABH 118AG	301.10	0.19	99.15	0.35	2020.63	10.79	12.64	1
19288+0809	ABH 118AH	280.23	0.23	88.33	0.36	2020.63	10.79	12.70	1
19288+0809	ABH 118AI	103.47	0.27	106.19	0.46	2020.63	10.79	14.9	1
19289+0317	BAL2513	55.47	1.10	12.81	0.28	2020.63	9.5	12.8	1
19291+0239	SRW 9AB	259.33	0.54	29.24	0.29	2020.64	9.2	11.0	1
19291+0239	SRW 9AD	293.47	1.09	15.32	0.30	2020.64	9.2	12.3	1
19294+0255	BAL1992	223.87	1.65	12.84	0.37	2020.63	12.03	12.3	1
19294-2942	HJ 5120AC	311.77	0.55	52.96	0.42	2020.64	8.62	12.83	1
19304+2456	POU3871	104.43	2.36	9.35	0.38	2020.63	12.4	14.1	1
19309+1137	DAM 157AB,C	199.53	0.10	138.58	0.27	2020.72	9.21	11.50	1
19311+0201	BUP 191BC	215.73	0.22	79.73	0.29	2020.64	11.19	12.21	1
19317+0848	BU 1470	234.07	1.60	18.26	0.48	2020.64	11.2	12.2	1
19320-1649	HLD 152AC	349.07	0.57	43.01	0.46	2020.63	8.97	13.38	1
19344+0824	HLM 24	308.25	0.10	14.51	0.02	2020.64	9.29	10.8	6
19360+0005	A 1188AC	248.47	0.23	85.24	0.35	2020.72	7.62	12.46	1

Double Star Measures Using the Video Drift Method - XIV

19374-3055	HJ 5131AB	146.30	1.17	16.56	0.29	2020.72	10.6	10.8	1
19374-3055	HJ 5131BC	214.00	1.63	11.24	0.32	2020.72	10.8	10.9	1
19464+3344	STF2580AC	122.40	0.14	106.34	0.23	2020.72	5.06	9.44	1
19464+3344	STF2580BC	135.30	0.16	93.55	0.23	2020.72	9.25	9.44	1
19493+2726	MLB 603	28.61	0.16	8.15	0.05	2020.64	9.6	10.9	2
19560+1753	HJ 2908AC	12.00	0.77	18.00	0.23	2020.72	8.33	13.3	1
19574+2709	ARN 120	92.77	0.02	93.41	0.08	2020.64	9.80	10.39	4
20001+1731	BU 1477CE	114.40	0.35	45.87	0.29	2020.72	5.57	12.99	1
20202-2750	SEE 416AB,C	260.53	0.82	24.98	0.33	2020.72	9.95	12.6	1
20203+3920	SEI1090	154.23	0.09	13.86	0.03	2020.64	9.43	10.6	5
20203+3922	SEI1091	180.05	0.05	27.66	0.04	2020.64	8.92	11.39	5
20222-3541	I 430	345.40	0.84	20.73	0.27	2020.71	8.87	10.80	1
20257-2341	HJ 2957AB	275.50	1.04	14.98	0.25	2020.71	11.37	11.73	1
20257-2341	DAW 227AC	56.00	1.02	19.68	0.33	2020.71	11.37	13.1	1
20276+2803	AG 405	69.60	0.04	23.31	0.01	2020.64	9.22	9.88	5
20277-1731	ARA 302	270.16	0.88	6.22	0.14	2020.71	11.21	12.0	1
20283+1846	HO 131AC	69.07	0.26	64.38	0.30	2020.71	6.97	11.39	1
20283+1846	HO 131AD	97.00	0.22	76.86	0.35	2020.71	6.97	11.77	1
20289-1749	DOB 13DE	93.07	0.26	53.48	0.26	2020.71	6.67	10.60	1
20336+2106	ARN 83	74.76	0.05	58.55	0.06	2020.64	8.52	9.23	5
20339+4034	AG 409	265.61	0.11	9.84	0.01	2020.64	9.40	9.92	3
20391+1005	STT 533AB	278.27	0.45	46.28	0.98	2020.71	5.15	11.63	1
20396+2143	STF2709	295.34	0.18	10.19	0.02	2020.64	8.84	10.54	3
20397+2141	STF2710	163.37	0.09	19.02	0.04	2020.64	8.27	10.1	3
20423+3637	SEI1224	160.74	0.05	25.24	0.04	2020.64	9.92	10.46	3
20429-1857	KUI 100AB	322.63	0.35	81.43	0.51	2020.71	11.05	14.29	1
20429-1857	KUI 100AC	318.00	0.36	74.55	0.43	2020.71	11.05	12.87	1
20450+3827	ALI 947	68.80	2.45	6.91	0.25	2020.72	11.97	12.5	1
20496+1233	BU 1495AC	85.87	0.14	105.52	0.26	2020.72	6.04	11.07	1
20496+1233	BU 1495AD	275.83	0.10	189.64	0.76	2020.72	6.04	11.89	1
20516+0747	SKF1868	313.44	0.03	57.65	0.05	2020.62	9.69	9.73	5
21043+4806	ARN 51	340.14	0.05	47.30	0.05	2020.63	8.35	10.48	5
21044+4631	HDS3001	94.09	0.14	18.43	0.02	2020.63	9.33	10.74	3
21072-1355	BU 157AC	285.23	0.45	33.91	0.28	2020.72	7.29	11.56	1
21072-1355	KPR 5AD	45.83	0.09	224.95	0.36	2020.72	7.29	12.20	1
21086-2112	HJ 3009AB	60.67	0.29	70.61	0.36	2020.72	5.28	11.72	1
21101+0919	GWP3039	62.17	0.29	72.52	0.38	2020.71	12.5	13.2	1
21105+3418	ES 2706	33.29	0.07	13.65	0.02	2020.63	9.95	10.9	4
21143+3402	GYL 49	148.47	0.11	16.70	0.03	2020.62	9.0	10.0	5
21144+5015	SKF 393	205.73	0.04	44.67	0.05	2020.64	9.46	10.04	3
21156-3927	HJ 5254A,BC	190.90	0.30	57.78	0.26	2020.72	8.68	9.62	1
21180+0010	ENG 82AB	40.70	0.09	152.54	0.26	2020.71	8.29	9.53	1
21180+0010	TOB 317AD	52.93	0.16	123.29	0.35	2020.71	8.29	12.75	1
21180+0010	BUP 228BC	117.10	1.17	12.24	0.27	2020.71	9.53	11.2	1
21180+0010	LYS 44BD	181.20	0.37	41.22	0.32	2020.71	9.53	12.75	1
21206+4219	WSI 16	148.78	0.07	8.22	0.02	2020.64	9.7	9.9	3
21310-3633	HJ 5275AB,C	200.27	0.50	40.37	0.27	2020.72	7.69	11.3	1
21355-1846	I 380AC	69.07	0.47	42.45	0.34	2020.72	8.70	13.09	1

21477-3054	HJ 5296AB,C	342.57	0.58	32.10	0.36	2020.79	5.01	11.3	1
21501+3151	BU 692BC	292.33	0.56	40.81	0.30	2020.79	11.03	12.63	1
21538-2000	BU 168A,BC	72.91	0.73	5.51	0.07	2020.79	8.14	10.34	1
21556-2108	HJ 3065AB	125.23	0.54	41.62	0.34	2020.72	7.34	13.06	1
21556-2108	HJ 3065AC	333.17	0.23	64.98	0.26	2020.72	7.34	11.44	1
21560-3055	HJ 5307AB	159.63	0.47	32.57	0.24	2020.72	8.05	11.85	1
21560-3055	HJ 5307BC	160.97	1.01	26.16	0.40	2020.72	11.85	13.09	1
21566+3421	BU 1214AB,F	3.23	0.43	47.95	0.31	2020.79	9.32	14.50	1
21566+3421	BU 1214CD	244.71	0.80	4.83	0.06	2020.79	9.99	11.0	1
21595-2903	HJ 5311AB	291.30	0.44	39.84	0.27	2020.79	7.17	11.44	1
21595-2903	HJ 5311AC	223.37	0.39	43.10	0.29	2020.79	7.17	11.91	1
22047-3839	B 1395AB,C	84.73	1.75	12.53	0.36	2020.79	10.71	12.87	1
22091-1831	BU 170A,BC	40.27	0.09	160.95	0.26	2020.72	5.77	8.5	1
22091-1831	BU 170AD	28.18	0.20	81.33	0.28	2020.79	5.77	12.44	1
22104+1438	STF2869	253.80	0.52	20.76	0.18	2020.79	6.33	12.4	1
22116-3428	HDO9003AB,C	28.47	0.27	34.40	0.15	2020.79	7.06	13.2	1
22130+3426	COU1190A,BC	328.03	1.55	15.63	0.37	2020.79	10.9	13.0	1
22174-0102	BAL 631AC	134.00	0.75	26.40	0.36	2020.79	10.81	13.47	1
22226+0628	STF2899AB	33.73	0.67	19.72	0.23	2020.79	7.30	11.2	1
22226+0628	FOX9017AC	300.07	0.72	21.89	0.24	2020.79	7.30	13.8	1
22233-1654	ITF 177	197.10	1.09	22.56	0.43	2020.79	12.80	14.24	1
22271+3746	J 3167	319.11	2.07	5.31	0.18	2020.72	12.08	12.6	1
22290+0118	HDO 319AD	304.43	0.11	150.03	0.28	2020.79	10.16	9.90	1
22290+0118	FOX9018AE	346.53	1.11	25.97	0.49	2020.79	10.16	14.2	1
22294-2840	H N 34AB,C	297.85	0.54	34.61	0.29	2020.79	7.33	11.88	1
22564+1727	STF2957AC	43.40	0.14	127.88	0.30	2020.79	9.20	13.36	1
23180+3132	OSO 192AC	56.80	1.78	11.93	0.33	2020.79	11.75	13.4	1

Table 1. Results of 289 double stars using the video drift method.

Table 1 Notes:

All magnitudes taken from the WDS catalogue. All position angle/separation measurements are for the Equator and Equinox of date.

"**SEM**" is the Standard Error of the Mean. See the text for the definition and usage. "**Nights**" is the number of nights' drift runs were made for that system.

Acknowledgements

This research makes use of the *Washington Double Star Catalog* maintained at the US Naval Observatory.

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