On the Identification of Some Northern LDS Systems

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Abstract: We report improved data for some LDS systems for which no accurate coordinates are provided in the Washington Double Stars (WDS) Catalog. For some of the pairs identified, the large differences between the new values found (mainly in separations and/or position angles) and those quoted in the WDS make our identification rather uncertain to the point that we can not ascertain whether the double star we report herein is the LDS we were searching for, or a new overlooked pair.

Introduction

Continuing with our Data Mining, we have now oriented our attention to those pairs for which the astrometric data quoted in WDS is either incomplete or only approximate. In this sense, we have isolated northern LDS systems which are X-coded (column 109 of the WDS), meaning in general they are Dubious Double.

It is important to note that no accurate right ascension and declination is provided for these systems (columns 113 to 130 of the WDS); however, proper motion values are given for most of the A component of each system. Nevertheless, we have found large differences between the proper motion given in WDS and those quoted in NOMAD (Zacharias *et a*l. 2005) or UCAC3 (Zacharias *et al*. 2009), among other astrometric databases.

Search and Results

In order to proceed with the identification of these systems, we isolated on the order of 300 northern LDS pairs from the main WDS as well as from the Neglected Double lists. Since no accurate coordinates are provided for these systems, we started our search with the approximate coordinates given in columns 1 to 10 of the WDS, which are in fact part of the designation of the double. We entered these "coordinates" in Aladin's Server Selector and downloaded POSS1 and POSS2 images which were then superimposed using the RGB Image Generator tool to visually detect common proper motion stars in an area of about twelve by twelve arc minutes. In some cases, the two images were also blinked using the Image Association tool with the same purpose.

In most of the zones checked we found no stars which could be assumed to be the LDS pair we were searching for. However, in those areas where we did

find a potential common proper motion pair, we regarded as positive identifications those stars showing some level of agreement -in either position angle (PA), separation (Sep) or proper motion- between our new proposed identification and the values included in the WDS. In general, the parallelism in the proper motion vectors was confirmed analyzing the NOMAD, UCAC3 or LSPM-North (Lepine and Shara, 2005) catalogs. Nevertheless, when proper motions were not available in the checked astrometric databases, or when they seemed not to coincide with the actual displacement of the stellar images, we considered the result of our visual inspection of the superimposed (or blinking) images to be sufficient –and only preliminary- evidence of the common proper motion nature of the pair under consideration.

We present our identifications in Table 1. Except where noted, Right Ascensions, Declinations, as well as epoch of observation have been taken from 2MASS, while the B magnitude for the two components was taken from NOMAD. Position angles and separations were computed from the given coordinates. For comparison purposes, we have also included the PA and Sep quoted in the WDS.

Table 2 presents the proper motions for each proposed component. For some of the pairs, the large differences in the amount of the proper motions between components or between the two sources used make the common proper motion nature of these systems rather doubtful when the Halbwachs (1986) criteria are applied.

Since some of the proper motions reported in the checked astrometric databases do not coincide –prima facie- with the visual analysis of the blinking of POSS1 and POSS2 images, the re-determination of these proper motions is highly recommended in order to confirm or reject the common proper motion nature of most of the systems included in this note.

Acknowledgements

This research has made use of the Washington Double Star Catalogue maintained at the U.S. Naval Observatory and the Aladin facilities.

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.

References

Halbwachs, J. L. (1986) “Common proper motion stars in the AGK 3” Astronomy and Astrophysics Supplement Series 66, 131-148.

Lepine, S. Shara, M. 2005, “A Catalog of Northern stars with annual proper motions larger than 0.15"” VizieR Online Data Catalogue I/298.

Table 1: Coordinates, separations and position angles

LDS	RA + Dec (2000.0)	Mag	Epoch	PA	Sep	PA (WDS)	Sep (WDS)	Notes
1586 A	04 04 20.85 +71 49 38.4	18.3	1999.0	317	6.7	59	6.0	
B	04 04 19.87 +71 49 43.3	20.6						
1157 A	04 12 34.72 +11 58 13.8	15.1	1999.9	316	8.3	225	8.0	
B	04 12 34.33 +11 58 19.8	18.2						
1591 A	04 18 53.78 +73 44 03.2	19.5	1999.1	194	91.8	35	69.0	1
B	04 18 48.65 +73 42 34.0	19.9						
1185 A	04 40 21.80 +27 08 49.6	15.6	1998.8	4	212.5	2	212.0	
B	04 40 22.99 +27 12 21.5	16.0						
2514 A	06 00 25.53 +63 00 23.7		1999.0	66	4.6	293	4.0	2
B	06 00 26.15 +63 00 25.6							
1691 A	09 11 36.96 +72 32 40.3	18.2	2000.2	32	11.4	143	11.0	
B	09 11 38.30 +72 32 49.8	18.4						
6236 A	10 56 26.69 +42 01 33.5	16.1	2000.0	112	580.3	114	580.0	
B	10 57 14.96 +41 57 56.4	17.3						

Table 1 continued on next page.

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Table 1 (continued): Coordinates, separations and position angles

LDS	RA + Dec (2000.0)	Mag	Epoch	PA	Sep	PA (WDS)	Sep (WDS)	Notes
2610 A	11 42 30.65 +59 47 36.4	16.4	1999.1	140	132.8	139	94.0	
B	11 42 42.02 +59 45 55.1	17.8						
1289 A	12 18 15.33 +28 21 16.4	16.3	1999.1	181	117.6	178	51.0	
B	12 18 15.18 +28 19 18.8	16.3						
2653 A	12 36 00.15 +64 57 57.8	14.3	1999.2	249	25.6	247	6.0	
B	12 35 56.38 +64 57 48.7	18.9						
1339 A	12 53 17.98 +33 40 07.9	16.6	2000.0	165	92.8	165	9.0	3
B	12 53 19.90 +33 38 38.2	19.0						
2894 A	12 59 21.34 +19 58 38.3	11.0	1999.2	116	42.1	121	117.0	
B	12 59 24.03 +19 58 20.0	16.2						
1413 A	14 17 45.44 +19 53 14.2	19.5	1998.4	180	69.2	179	70.0	
B	14 17 45.47 +19 52 05.0	18.4						
2353 A	15 08 50.90 +63 09 47.7	16.3	1999.3	82	14.5	66	8.0	4
B	15 08 53.03 +63 09 49.6	18.8						
1850 A	16 35 26.31 +73 43 19.7	17.9	1999.4	101	234.0	109	236.0	
B	16 36 20.89 +73 42 34.3	19.0						
2415 A	18 30 18.00 +62 44 49.7	17.4	1999.4	315	68.8	313	71.0	
B	18 30 10.89 +62 45 38.2	20.6						
2759 A	19 06 41.53 +63 19 40.1	13.3	1999.4	353	146.5	355	217.0	
B	19 06 38.89 +63 22 05.5	15.9						
2444 A	19 32 46.03 +68 12 21.0	15.4	1999.4	175	12.0	164	8.0	
B	19 32 46.23 +68 12 09.1	17.6						
1025 A	19 33 03.74 +03 45 39.7	12.1	1999.6	288	27.9	338	13.0	
B	19 33 01.97 +03 45 48.4	13.5						
1471 A	20 20 14.88 +61 20 02.8	12.9	1999.4	143	8.4	141	8.0	
B	20 20 15.59 +61 19 56.1							
1984 A	22 27 25.20 +75 05 22.8	18.0	1999.8	93	82.2	91	116.0	
B	22 27 46.47 +75 05 18.9	18.3						

Notes to Table 1:

1. For this system we found no agreement (in either PA, Sep or proper motion) between our proposed identification and the data included in the WDS. NOMAD does not provide proper motion for the A component; however, the blinking of POSS1 and POSS2 images shows the two stars we have identified share a very similar proper motion, thus confirming the common proper motion nature of the system.
2. NOMAD shows only one –rather confusing- detection between the two 2MASS (A and B components).
3. Coordinates for both components taken from NOMAD.
4. NOMAD gives two very close detections for the B component; the magnitude we report corresponds to the NOMAD 1531-0256295.

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Table 2: Proper motions for each component

LDS	NOMAD		UCAC3		Notes
	RA	Dec	RA	Dec	
1586 A	2.0	96.0	-52.4	13.8	
B	18.0	66.0			
1157 A	220.0	-158.0	142.4	-38.7	
B	-16.0	84.0			1
1591 A					
B	88.0	-30.0			
1185 A	36.0	14.0			2
B	-12.0	-126.0			
2514 A			13.0	-115.5	
B					
1691 A	-58.0	-90.0			
B					
6236 A	-250.0	-230.0	-252.0	-197.0	3
B	-269.0	-260.5	-274.0	-262.0	
2610 A	-98.0	16.0	-110.5	20.1	
B	-100.0	28.0	-124.9	22.3	
1289 A	-90.0	-28.0			
B	-130.0	-20.0			
2653 A	-60.0	-8.0	-68.5	4.1	4
B	-66.0	30.0			
1339 A	-188.0	0.0	-197.0	-10.0	
B	-134.0	24.0			
2894 A	-92.4	-33.6	-91.9	-33.6	
B	5.0	-19.4			5
1413 A	-8.0	-72.0			
B	-20.0	-46.0			
2353 A	-44.0	-64.0	-59.7	64.3	6
B	-38.0	72.0			
1850 A	-24.0	98.0	-6.6	90.6	
B	-32.0	92.0			

Table 2 continued on next page.

Table 2 *(continued)*: Proper motions for each component

LDS	NOMAD		UCAC3		Notes
	RA	Dec	RA	Dec	
2415 A	-68.0	22.0			
B	-4.0	56.0			
2759 A	-2.0	98.0	-5.1	95.9	
B	8.0	86.0	0.3	84.6	
2444 A					
B	-28.0	110.0	-40.1	96.7	
1025 A	15.5	-66.2	15.4	-66.2	
B	14.0	-58.0			
1471 A	60.3	76.2	51.0	72.5	
B	126.0	-38.0			7
1984 A	72.0	10.0			
B	60.0	14.0			

Notes to Table 2:

1. This proper motion does not coincide with the analysis of the blinking of POSS1 and POSS2 images.
2. This proper motion does not coincide with the analysis of the blinking of POSS1 and POSS2 images.
3. Both components are included in the LSPM catalogue.
4. The NOMAD proper motion of the A and B component we propose shows no parallelism at all. On the other hand, the (NOMAD) proper motion of our B star is rather similar to the proper motion of the A component quoted in the WDS.
5. The proper motion we report for our B component corresponds to NOMAD 1099-0214550 (equal to 2MASS 12592403+1958200), which does not coincide with the analysis of the blinking of POSS1 and POSS2 images. On the other hand, located at about two arc seconds to the East, is NOMAD 1099-0214549 -whose proper motion is -78.0 and -26.0 in RA and Dec, respectively- but it is not identified with any 2MASS object.
6. The NOMAD proper motion, mainly in Dec, does not coincide with the analysis of the blinking of POSS1 and POSS2 images.
7. This proper motion corresponds to NOMAD 1513-0274038, which is the closet NOMAD detection to the 2MASS position we report for the B component of the system. In addition, the direction of this proper motion does not coincide with the analysis of the blinking of POSS1 and POSS2 images.

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