

INTERNATIONAL ASTRONOMICAL UNION COMMISSION 26

(DOUBLE STARS)

INFORMATION CIRCULAR No. 186 (JUNE 2015)

NEW ORBITS

ADS α 2000 δ	Name n	P a	T i	e ω	Ω (2000) Last ob.	2015 2016	Author(s)
- 00152-1607	GJ 1005 79°1209	4 ^y 55 0 ^{''} 305	2018.08 145°2	0.361 338°5	56°3 2014.8535	286°9 0 ^{''} 333 247.8 0.409	PEREZ et al. (*)
363 00270-0752	A 431 7.3320	49.10 0.349	2003.90 110.7	0.606 116.1	206.9 2014.8535	323.4 0.168 314.4 0.166	PEREZ et al. (*)
671 00491+5749	STF 60 AB 0.7511	479.27 12.040	1889.93 35.6	0.497 269.8	278.0 2014.641	324.1 13.266 324.6 13.295	SCARDIA et al. (**)
- 01022+0503	BD+04 13.0672	27.55 0.457	2030.23 144.0	0.663 203.6	90.3 2014.7633	75.3 0.741 72.3 0.741	PEREZ et al. (*)
- 01102-6726	GJ 54 202.2472	1.78 0.139	2016.41 136.2	0.100 70.6	67.7 2015.0284	265.4 0.131 85.6 0.133	PEREZ et al. (*)
- 01350-2954	GJ 60 78.9474	4.56 0.167	2019.26 13.8	0.302 31.0	76.9 2015.0283	152.3 0.122 241.0 0.190	PEREZ et al. (*)
- 01398-5612	DUN 5 0.7576	475.2 7.826	1811.90 140.5	0.513 18.6	13.7 2013.710	187.0 11.604 186.7 11.610	SCARDIA et al. (**)
1615 02020+0246	STF 202 AB 0.1102	3267.4 7.400	2188.58 113.4	0.465 147.9	3.7 2015.112	263.3 1.832 262.7 1.833	SCARDIA et al. (**)
1709 02140+4729	STF 228 2.4758	145.41 0.885	1899.07 63.8	0.263 322.7	99.1 2015.113	299.0 0.721 300.7 0.695	SCARDIA et al. (**)
5447 06474+1812	STT 156 1.7535	205.3 0.445	2017.76 150.5	0.605 258.9	10.1 2014.239	139.1 0.166 130.1 0.160	SCARDIA et al. (**)
- 10373-4814	SEE 119 21.6203	16.651 0.361	2019.562 128.5	0.726 288.9	37.2 2014.060	254.1 0.424 247.0 0.399	DOCOBO & CAMPO

NEW ORBITS (continuation)

ADS α 2000 δ	Name n	P a	T i	e ω	Ω (2000) Last ob.	2015 2016	Author(s)
8639 12429+0516	A 1602 0.5147	699.4 1.567	1913.05 96.9	0.914 125.8	5.3 2014.30	27.0 0.591 26.8 0.598	DOCOBO & LING
- 13123-5955	SEE 170 13.1234	27.432 0.167	2021.872 57.7	0.687 199.3	98.2 2013.1291	126.8 0.183 131.6 0.160	DOCOBO & CAMPO
10075 16289+1825	STF 2052 AB 1.5648	230.06 2.245	1921.12 108.4	0.758 130.8	93.9 2014.511	119.2 2.365 119.0 2.386	SCARDIA et al. (**)

(*) PEREZ, MENDEZ & HORCH

(**) SCARDIA, PRIEUR, PANSECCHI, ARGYLE & ZANUTTA

NOTE

Response to Andrei Tokovinin's note (IAUDS Circular No. 185)

We'd like to thank our colleague and frequent collaborator for his many considered comments and suggestions to improve the double star database. There is indeed a recognized need for a unified and computer friendly system designating components of binary and multiple stars (2005HiA . . . 13.1011M); that same citation "... recommends that a uniform designation scheme, based on expansion of the Washington Multiplicity Catalog (WMC) system, be developed during the next three years ..." The rules of this scheme were rather explicitly spelled out at a double star meeting hosted by the former president of the commission (2004RMxAC . . 21 . . 83H). Although a half-hour RA slice of the WDS, reformatted and augmented with binaries discovered by other techniques, was used to generate a test version of the new catalog, staffing reductions prevented our desire to fully implement the WMC.

Alteration of WDS designations is kept to an absolute minimum to avoid confusion with published data; however, there are a couple reasons why a designation may occasionally require changing:

1. when a pair in the WDS is found to have an error in position so great that it adversely affects its selection for observation, and
2. when an entry is determined to be physically associated with a pair at another WDS coordinate.

An example of the former case (uncovered by WDS contributor Friederich Damm) would be HJ 74 (= BDS 4376), first resolved in 1836MmRAS...9..193H. The pair was inadvertently added at the wrong declination, and this error propagated through several double star catalogs, including the WDS. Much later, Roe announced ROE 32 (1910PA...18..354R). Herschel's correct 1825 coordinates, when precessed to 2000, matched those of the ROE pair already in the WDS. While Herschel's first measure was off in separation his second measure, predating Roe's "discovery" by almost 80 years, was a very good match. Roe's measure was subsequently merged with those of Herschel under a corrected WDS designation, and an explanation was added to the WDS notes file.

The precise position is a designation that is flexible depending on our knowledge of the system. For example, for a wide AB pair the precise position is the 0".1-precise J2000 position of the A component. The precise position for the BC pair in that same system would be the J2000 coordinates of the B component. However, all components of a multiple star system have the same ten digit WDS designator to identify the family. Therefore, an example of the latter reason for changing WDS designations would be the case of STF2576 and STF2580. STF2576 (= ADS 12889) and STF2580 (= ADS 12913) had different WDS designations in earlier (up to the 2006.5) versions of the WDS (19456+3337 and 19464+3344, respectively). However, upon closer analysis these pairs were found to be members of the same wide multiple system (the "F" component of one pair was the same star as the "A" component of the other). They are all currently found under the WDS designation 19464+3344, with STF2576 now designated as the "FG" components.

To continue addressing Andrei's first point, assigning the component designator "AB" to simple binaries would represent a loss of information. The presence of "AB" implies additional components whereas the absence of "AB" means it is a simple double.

In his second point, he considers the comma as delimiter. In the WMC (and therefore, WDS) designation, approved by IAU resolution, a comma is indeed used as the delimiter between components in a system, with the full component identifier before and after the comma (e.g., Aa,Ab). The only exception is if only two characters are provided the delimiter is assumed (e.g., WAK 8CD = WAK 8C,D). Further, the comma defines what is being measured relative to what. For example, in the case of the well-known multiple system STF1196 the component designation "AB,C" means the C component is measured relative to the photocenter of AB. This is useful when a technique/instrument incapable of resolving AB is utilized. When a higher resolution technique/instrument is used the component identifiers "AC" and "BC" are used instead.

As the WDS is ingested by many users (CDS and NASA to name two), and used in its current format, we try to make any format changes on an infrequent basis. Nevertheless, since Charles Worley left the USNO in 1998 we have made significant changes which, we think, provide a better product. In addition to improving the magnitudes, cross-references and spectral types in a piecemeal basis we added the precise position to aid in finding pairs, added the secondary proper motion to aid in identifying physicality, and added new column notes indicating physical/optical codes based on various criteria. In the last version of the WDS Charles prepared (WDS 1996.0; 1997A&AS..125..523W) the WDS contained 78,100 pairs from 451,546 mean positions. The only measure of physicality was the online visual orbit catalog, an update of Worley & Heintz (1983PUSNO..24g...1W), which contained 928 orbits of 847 systems. The known physicality total was thus 1.1%. The current version of the WDS contains 132,231 systems based on 1,268,765 mean po-

sitions, increases of 69% and 181%, respectively. The current orbit catalog contains 2518 orbits of 2413 systems (improvements of 171% and 185%, respectively) as described above; this and other indicators identify 20,468 pairs (15%) as physical, 4623 (3%) as optical and the remainder (107,140) as unknown.

Maintenance and improvement of the WDS has been taken very seriously ever since the double star database was turned over to the US Naval Observatory half a century ago (1966IAUTB..12..267V). While the catalog is officially under the aegis of the IAU (Commission 26 and after the forthcoming General Assembly Commission C.G1), it is for the user that the WDS is provided. We are considering many other format changes to make the WDS a better product, but to minimize disruption we are doing this with due deliberation and seek to make many changes at once for the user (after ample warning, of course). Among the changes we are currently considering implementing within the next three years are:

- expanding the WDS designation, as the current arcminute identification is not adequate in crowded fields;
- expanding the multiplicity field, which is currently not adequate for nested hierarchies;
- increasing the separation precision in the summary catalog, which is inadequate for current techniques;
- adding a separation code for much closer and wider separations (arcminute, milliarcseconds, microarcseconds); and
- adding additional flags for magnitudes in other filters (V,B,R,K ...).

Additional questions:

- Should proper motion unit (currently mas/yr) be expanded to 0.1 mas/yr precision?
- Should we include pm errors?
- We currently still use the long out-of-date DM (BD, CD, or CpD depending on declination) as a cross-reference. What catalog should we use? Are precise coordinates sufficient without a cross-reference name?
- Is more space needed for spectral type?
- Is more space for fractional year needed for fast moving systems?
- Should we move away from our own eight-character reference code to the 19-character bibcode? However, note that 7-8% of the references in the WDS have no bibcode at this time.

Regarding Andrei's third and fourth point, we have no objection to separating the component field from the discovery designation field; this will be a trivial change to make during the next major reformat of the WDS summary line. We likewise have no objection if people wish to discontinue use of the discovery designation. The field is specified in the WDS and will continue to be populated nonetheless. Inclusion of the DD does have some

advantages; knowledge of the discoverer often provides an indication whether a pair will likely be close or wide, bright or faint, visible mainly in the infrared, have a small or large magnitude difference. From a cataloging point of view, the main advantage of doing away with discovery designations is that it eliminates people “stamp collecting” new pairs. It is a waste of our time to catalog large numbers of new optical doubles which only serve to appease someone’s vanity.

The plethora of all-sky astrometric catalogs and the computer acumen of users has exacerbated the issue of which pairs to add to the WDS. Formerly, a pair would automatically be added when its components fell within some angular separation limit, such as 10". We now encourage users to only measure (or data mine) pairs which have some indication of physicality. An example of this would be our recent mining of the final UCAC catalog (2013AJ...146...76H). Of the more than 113 million entries in UCAC4, and despite the many close pairings we only added the 4082 pairs we determined to be likely physical.

Finally, it is possible that Gaia (or later Gaia data-miners) may identify large numbers of pairs that are preferentially optical. In order to address this we could construct a “Faint Object Supplement” to the WDS. Only those Gaia pairs subsequently identified as physical could then potentially “graduate” to the WDS.

We welcome any and all suggestions to improve the double star database for the user. Changes will, and should be, deliberate. However, if the user needs them to make a better product for the community we will strive to make those changes.

Brian D. Mason and William I. Hartkopf
U.S. Naval Observatory

RENÉ MANTÉ (1922-2014)

René Manté was born in Toulon on September 9, 1922 and passed away on June 14, 2014 in Marsella. After completing High School, René Manté studied at the University of Montpellier and became a Chemical Engineer. He worked in the Pennaroya Chemical Society. Later, he searched for work in Marsella and enrolled in courses of Electronics and Computer Science. For several years, he worked in a company that manufactured tartaric acid until it closed. At that point, he and some friends established a laboratory that analyzed food and chemical products. He retired in 1987 and dedicated himself to Astronomy, a field about which he was very passionate. After having used a refractor telescope, Manté ordered a reflector from a manufacturer in Trans-en-Provence (Department of Vart) but that company committed an error in the focal longitude and then went out of business. R. Manté, an amateur astronomer, was disappointed but he persevered and bought a second, and then a third telescope. His great love for Mathematics served him in his training that was necessary to carry out calculations associated with double stars. He presented his research at numerous meetings of the Double Star Commission of the Astronomical Society of France. Between 1998 and 2006, Manté published 49 preliminary orbits for visual double stars: four in the journal, *Observations et Travaux*, and forty-five in the *Information Circulars of Commission 26 (Double and Multiple Stars)* of the IAU.

In 2005, along with D. Bonneau, he published an article in the journal, L'Astronomie, entitled "*Dans la chaleur des forges de Vulcain : le systme multiple omicron Andromède*". A cerebro-vascular accident and a fracture of the femur sadly ended his activities as an astronomer.

Edgar Soulié and Suzanne Manté

The deadline for contributions to Information Circular No. 187 is:

October 15th 2015

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