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# Measurements of double stars 1993.67 - 1998.13⋆

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**Abstract.** 624 Micrometer Measurements of 224 pairs with a 32.5 cm Cassegrain, 719 Measurements of 310 double stars with a 360 mm Newtonian are given.

**Key words:** astrometry — stars: binaries: visual

## 1. Observing program

The observing program comprises the following double stars:
- long period binaries with non-definitive orbital elements, but considerable annual motion,
- wide pairs, which have not been measured for many years
- close pairs not observed by Hipparcos.
In the lists one will find many pairs with first class orbits as well as pairs having been measured by Hipparcos or recently by Speckle. It was, however, the author's intention to get as many calibration measurements as possible during the first two years of micrometer measurements with the Cassegrain.

## 2. Instrumentation

The principal instrument is a 32.5 cm, $f = 620.5$ cm Cassegrain running on a heavy German mounting. Two micrometers were used:
A. A RETEL filar micrometer with a screw value of $16\overset{''}{.}62 \pm 0\overset{''}{.}01$. This value was determined by timing transits of circumpolar stars. As the thickness of the tungsten wires is 12 $\mu$m resulting in an apparent thickness of $0\overset{''}{.}40$ of the wires, for some few close pairs a Barlow lense was used giving a screw value of $6\overset{''}{.}43$ and an apparent thickness of the wires of $0\overset{''}{.}15$. Red field-illumination was used. At least 5 settings were made for one position angle measurement, at least 2 double distances were taken for one separation. Without Barlow the magnifications was 496, with Barlow 642.
B. A MECA PRECIS double image micrometer, type B. Lyot, using the principle of a rotatable iceland spar plate. The value $e/f = 0.000653 \pm 0.5\%$ with $e$ = thickness of the spar plate and $f$ = focal length of the telescope was determined by distance measurements of some of Mullers fundamental stars (all of them measured by Hipparcos), double stars with definitive orbits, Speckle measurements of wide pairs in the range of 2 arcsec. and many pairs having been measured by Hipparcos. The same number of settings - at least 4, mostly 6 or more - was made for the position angles and the distances. This micrometer was mostly used for pairs under 2 arcsec. Magnifications were normally 620, for some few faint pairs 388 and 496.

It must be emphasized, that the distances of pairs with separations below about $1\overset{''}{.}5$ and brightness differences of not more than 1.5 mags are more accurate and very easily measurable with the double image micrometer.

The second instrument, a 360 mm, $f = 4.9$ Zeiss-Newtonian, was used 1993.67 - 1996.50. The angles were measured with wires fixed in eyepieces, the latter rotatable on a position angle vernier. For the distances several methods were used: for bright pairs wider than $1\overset{''}{.}0$ diffractionmeters, for pairs from $0\overset{''}{.}5$ to $1\overset{''}{.}2$ the distances were estimated by applying various diaphragms until the stars were just separated. Distances below $0\overset{''}{.}5$ are estimates with full aperture, as a rule.

For larger magnitude differences a diffractionmeter with $z = 1\overset{''}{.}4$ producing satellites $2\overset{m}{.}1$ fainter than the primary was very helpful for the distances and estimates of the magnitude differences. The magnification was 490 X, in few cases for close doubles 660 X. In this list one will find several stars in rapid motion neither measured by Hipparcos nor recently by speckle, for example STT159, STF1280 and STF2434BC.

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⋆ Tables 1 to 4 are available in electronic form only at the CDS 130.79.128.5 or via http://cdsweb.u-strasbg.fr/Abstract.html

**3. 624 Micrometer Measurements of 224 double stars at the 32.5 cm Cassegrain 1996.63 - 1998.13 (Table 1).**

In Table 1 the star is identified by its ADS-number, discoverer's name and 2000 coordinates. Almost all means were obtained during one season. For most pairs there is also an estimation of the magnitude difference dm. The micrometer is identified by $D$ = double image micrometer and $F$ = filar micrometer.

**4. Residuals (Table 2) and accuracy of the measurements at the Cassegrain.**

For comparison residuals to 147 orbits are given. Many a star was measured with both micrometers. Taking into account true deviations verified by several visual observers, speckle measurements or Hipparcos, the accuracy of the measurements is: for pairs with separations $0\farcs3$ to $1\farcs0$: $d$ theta = $\pm 2\fdg1$, $d$ rho = $\pm 0\farcs04$, for pairs $1\farcs0$ to $2\farcs0$: $d$ theta = $\pm 1\fdg1$, $d$ rho = $\pm 0\farcs07$, for pairs exceeding $2\farcs0$: $d$ theta = $\pm 0\fdg7$, $d$ rho = $\pm 0\farcs07$.

**5. 719 measurements of 310 double stars at a 360 mm Newtonian 1993.67 - 1996.50 (Table 3), residuals to 106 orbits (Table 4).**

**References**

Heintz W.D., unpublished orbits: http://laser.swarthmore.edu/html/research/heintzr.html. ars of micrometer measurements with the Cassegrain

**Table 1.** 624 measurements of 224 double stars at the 32.5 cm Cassegrain

| ADS | Name | Co. 2000 | | 1990+ | P.A. | Sep. | no | dm est | Micr. | |
|---|---|---|---|---|---|---|---|---|---|---|
| 48 | STT547 | 0 05.4 | + 45 49 | 6.78 | 180.5 | 6.11 | 4,3 | 0.0 | D | |
| | | | | 6.79 | 181.3 | 6.17 | 1 | - | F | |
| 61 | STF3062 | 0 06.3 | + 58 26 | 6.92 | 321.3 | 1.52 | 2 | 0.8 | D | |
| 102 | STF2 | 0 09.3 | + 79 43 | 6.89 | 19.3 | 0.74 | 2 | 0.3 | D | |
| 119 | STF3 | 0 10.0 | + 46 23 | 6.78 | 81.9 | 5.09 | 4,3 | 1.1 | D | |
| | | | | 6.79 | 82.7 | 4.91 | 1 | - | F | |
| 161 | STT2 | 0 13.4 | + 26 59 | 6.90 | 167.8 | 0.30 | 3 | 1.0 | D | |
| | | | | 6.86 | 163.2 | 0.30 | 1 | 0.7 | F | |
| 207 | STF13 | 0 16.2 | + 76 57 | 6.81 | 53.4 | 1.00 | 3 | 0.3 | D | |
| 221 | STT4 | 0 16.7 | + 36 30 | 7.84 | 138.7 | 0.33 | 3 | q.i. | F | |
| 283 | HJ1018 | 0 21.0 | + 67 40 | 6.82 | 87.1 | 1.66 | 1 | 0.6 | D | |
| | | | | 7.82 | 86.3 | 1.69 | 2 | 0.4 | F | |
| 293 | STT6 | 0 21.4 | + 67 00 | 6.82 | 158.4 | 0.67 | 1 | 0.8 | D | AB |
| | | | | 7.82 | 154.8 | 0.58 | 2 | 0.5 | F | AB |
| | | | | 7.84 | 115.2 | 13.78 | 3 | - | F | AC |
| 421 | STF33 | 0 31.0 | + 34 06 | 7.30 | 211.5 | 2.81 | 2 | 0.3 | F | |
| 588 | STT18 | 0 42.4 | + 4 10 | 7.29 | 205.1 | 2.17 | 4,5 | 1.8 | F | |
| 618 | STF55 | 0 44.4 | + 33 37 | 6.77 | 330.0 | 2.32 | 2 | 0.7 | D | |
| 683 | STF61 | 0 49.8 | + 27 43 | 6.80 | 116.1 | 4.53 | 4 | 0.1 | D | |
| 684 | BU232 | 0 50.5 | + 50 38 | 7.81 | 245.0 | 0.98 | 2 | 0.2 | F | AB |
| | | | | 7.81 | 297.7 | 25.26 | 2 | -10.5 | F | AC |
| 746 | STT20 | 0 54.6 | + 19 12 | 6.78 | 193.9 | 0.55 | 2 | 1.0 | D | |
| 754 | STF74 | 0 54.8 | + 9 26 | 7.15 | 299.0 | 3.21 | 3,2 | 0.8 | F | |
| 829 | MA1 | 1 00.6 | + 47 19 | 7.45 | 7.5 | 0.84 | 2 | 0.9 | F | |
| 862 | STT21 | 1 03.0 | + 47 23 | 7.37 | 175.3 | 1.25 | 2 | 1.0 | F | |
| | | | | 6.81 | 172.6 | 1.21 | 1 | 1.2 | D | |
| 873 | HO213 | 1 03.9 | + 35 28 | 6.81 | 105.8 | 0.30 | 1 | 0.0 | D | |
| 1339 | STF147 | 1 41.7 | - 11 19 | 7.50 | 95.3 | 0.99 | 2 | 0.9 | F | |
| 1438 | STF162 | 1 49.2 | + 47 54 | 7.38 | 202.5 | 2.03 | 2 | 0.9 | F | AB |
| | | | | 7.38 | 178.3 | 20.72 | 2 | - | F | AC |
| 1504 | STF170 | 1 55.5 | + 76 14 | 6.78 | 243.0 | 3.09 | 1 | 0.8 | D | |
| | | | | 6.86 | 242.2 | 3.04 | 1 | 1.0 | F | |
| 1538 | STF186 | 1 55.9 | + 1 51 | 6.97 | 240.6 | 1.34 | 2 | 0.4 | F | |
| | | | | 7.02 | 241.6 | 1.10 | 2 | 0.2 | D | |
| 1615 | STF202 | 2 02.0 | + 2 46 | 6.97 | 273.9 | 2.02 | 2 | 0.4 | F | |
| | | | | 7.05 | 276.9 | 1.90 | 3 | 0.6 | D | |
| 1588 | STF185 | 2 02.1 | + 75 30 | 6.78 | 9.3 | 1.13 | 1 | 1.2 | D | |
| 1631 | STF208 | 2 03.7 | + 25 56 | 6.78 | 333.8 | 1.10 | 2 | 1.8 | D | |
| 1654 | STF212 | 2 06.3 | + 25 06 | 6.95 | 161.5 | 1.95 | 1 | | D | |
| | | | | 6.93 | 162.9 | 2.05 | 1 | 0.4 | F | |
| 1697 | STF227 | 2 12.4 | + 30 18 | 6.95 | 70.2 | 3.81 | 1 | 1.2 | D | |
| | | | | 8.00 | 68.5 | 3.85 | 1 | 1.7 | F | |
| 1749 | STF240 | 2 17.4 | + 23 53 | 6.92 | 52.0 | 4.80 | 2 | 0.2 | F | |
| 1790 | STF250 | 2 21.3 | + 37 25 | 6.92 | 136.9 | 3.11 | 2 | 0.6 | F | |
| 2034 | STT43 | 2 40.7 | + 26 37 | 6.96 | 355.6 | 1.07 | 2 | 0.9 | F | |
| 2257 | STF333 | 2 59.2 | + 21 20 | 7.89 | 207.5 | 1.55 | 1 | 0.0 | F | |
| | | | | 8.09 | 209.5 | 1.45 | 2 | 0.0 | D | |
| 2397 | STT51 | 3 12.9 | + 44 17 | 7.06 | 331.4 | 0.88 | 3 | 0.1 | F | |
| 2416 | STF367 | 3 14.0 | + 0 44 | 8.07 | 135.3 | 1.17 | 2 | - | F | |
| | | | | 8.09 | 138.2 | 1.18 | 2 | - | D | |
| 2446 | STT53 | 3 17.7 | + 38 38 | 7.10 | 251.3 | 0.75 | 2 | 0.5 | F | |
| 2459 | AC2 | 3 18.4 | - 0 56 | 7.44 | 256.6 | 1.07 | 2 | 2.0 | D | |
| | | | | 7.52 | 255.2 | 1.30 | 2 | 2.5 | F | |
| 2644 | STF422 | 3 36.8 | + 0 35 | 6.95 | 271.9 | 6.73 | 1 | - | D | |
| | | | | 8.04 | 271.0 | 6.72 | 2 | - | F | |
| 2726 | BU535 | 3 44.3 | + 32 17 | 6.97 | 24.0 | 1.20 | 2 | 3.0 | F | |
| 2755 | BU536 | 3 46.3 | + 24 11 | 7.02 | 181.5 | 0.86 | 2 | 1.1 | F | AB |
| | S,h437 | | | 7.02 | 307.9 | 39.55 | 2 | - | F | A-BC |
| 2910 | STT69 | 3 59.7 | + 38 49 | 7.50 | 325.4 | 1.50 | 2 | 2.3 | F | |
| 2995 | STT531 | 4 07.6 | + 38 04 | 6.97 | 1.0 | 2.17 | 2 | 1.9 | F | |
| 3135 | STT79 | 4 18.7 | + 16 32 | 7.04 | 300.9 | 0.3: | 1 | 1.5 | D | |
| | | | | 7.06 | 287.1 | 0.3: | 3 | 1.0 | F | |
| | | | | 8.05 | 284.2 | 0.30 | 3 | - | F | |
| | | | | 8.09 | 302.3 | 0.30 | 1 | - | D | |
| 3114 | STF520 | 4 18.3 | + 22 49 | 8.06 | 71.3 | 0.46 | 3 | 0.3 | F | |
| | | | | 8.09 | 70.8 | 0.46 | 1 | - | D | |
| 3169 | STT82 | 4 22.7 | + 15 03 | 7.04 | 345.7 | 1.39 | 2 | 1.2 | D | |
| 3168 | STF529 | 4 22.9 | + 28 24 | 6.99 | 15.5 | 4.27 | 2 | 1.7 | F | |
| 3174 | STF535 | 4 23.3 | + 11 23 | 7.13 | 281.6 | 1.27 | 3,2 | 1.3 | F | |
| 3264 | STF554 | 4 30.1 | + 15 38 | 7.04 | 18.5 | 1.66 | 2 | 2.5 | D | |
| 3391 | A1013 | 4 43.3 | + 59 32 | 8.03 | 281.7 | 0.32 | 2 | q.i. | F | |
| 3400 | STF582 | 4 44.0 | + 42 25 | 7.57 | 23.4 | 5.58 | 2 | 2.3 | F | AB |

**Table 1.** continued

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 3589 | STT92 | 5 00.3 | + 39 24 | 7.10 | 281.8 | 3.78 | 2 | 3.0 | F | |
| 3596 | STT93 | 5 00.5 | + 5 06 | 7.02 | 243.7 | 1.39 | 2 | 0.4 | F | |
| 3672 | STT95 | 5 05.5 | + 19 48 | 7.04 | 300.4 | 0.96 | 2 | 0.5 | D | |
| 3711 | STT98 | 5 07.9 | + 8 30 | 7.04 | 327.3 | 0.76 | 3 | 0.8 | D | |
| | | | | 8.13 | 325.0 | 0.83 | 2 | 0.6 | D | |
| 3799 | STT517 | 5 13.5 | + 1 58 | 7.04 | 236.5 | 0.67 | 2 | 0.4 | D | |
| 3781 | STT101 | 5 13.8 | + 46 58 | 7.14 | 184.2 | 6.12 | 2 | - | F | |
| 3956 | STF677 | 5 24.7 | + 63 23 | 8.03 | 132.7 | 1.13 | 2 | 1.0 | F | |
| 4115 | STF728 | 5 30.8 | + 5 57 | 8.09 | 46.3 | 1.06 | 2 | 1.2 | D | |
| 4076 | A1034 | 5 32.2 | + 70 49 | 8.03 | 140.2 | 0.80 | 2 | 0.5 | F | |
| 4200 | STF742 | 5 36.4 | + 22 00 | 7.04 | 272.9 | 4.16 | 2 | 0.4 | D | |
| 4263 | STF774 | 5 40.7 | - 1 57 | 8.09 | 165.0 | 2.43 | 2 | 2.4 | D | AB |
| - | HEI670 | 5 50.0 | + 9 52 | 7.03 | 270.2 | 1.06 | 2 | 2.3 | F | |
| 4472 | BU1053 | 5 53.6 | + 37 20 | 7.13 | 356.4 | 1.88 | 2 | 2.0 | F | |
| 4505 | STT122 | 5 55.8 | + 36 56 | 7.13 | 84.0 | 0.30 | 2 | - | F | |
| - | KUI24 | 6 14.5 | + 17 54 | 8.13 | 143.1 | 0.49 | 2 | 0.0 | D | |
| 4850 | BU323 | 6 14.9 | - 1 43 | 7.10 | 96.8 | 2.24 | 2 | 2.0 | F | |
| 4841 | BU1008 | 6 14.9 | + 22 30 | 7.10 | 258.8 | 1.80 | 2 | 3.1 | F | |
| | | | | 8.11 | 262.1 | 1.64 | 2 | 3.1 | D | |
| 5042 | STT139 | 6 25.6 | + 22 27 | 7.41 | 251.1 | 0.48 | 2 | 1.3 | F | |
| 5197 | STF932 | 6 34.3 | + 14 44 | 8.10 | 309.7 | 1.72 | 2 | 0.0 | D | |
| 5234 | STT149 | 6 36.4 | + 27 17 | 7.11 | 298.3 | 0.61 | 4,2 | 1.4 | F | |
| | | | | 8.10 | 301.0 | 0.72 | 2 | 2.0 | D | |
| 5296 | STF945 | 6 40.4 | + 40 58 | 8.10 | 319.7 | 0.52 | 2 | 1.3 | D | |
| 5334 | STF3118 | 6 41.5 | + 9 50 | 7.58 | 173.3 | 3.33 | 2 | 0.5 | F | AB |
| 5400 | STF948 | 6 46.2 | + 59 27 | 7.96 | 72.7 | 1.73 | 2 | 0.7 | F | AB |
| | STF948 | | | 7.96 | 308.7 | 8.72 | 2 | 1.5 | F | AC |
| 5586 | STT159 | 6 57.3 | + 58 25 | 7.13 | 223.7 | 0.30 | 2 | 1.0 | F | |
| | | | | 8.10 | 220.9 | 0.30 | 2 | 1.0 | D | |
| 5958 | STT170 | 7 17.6 | + 9 18 | 7.06 | 71.0 | 0.61 | 2 | - | D | |
| | | | | 8.10 | 64.6 | 0.58 | 4 | 0.5 | D | |
| 5983 | STF1066 | 7 20.1 | + 21 59 | 7.11 | 224.3 | 5.88 | 2 | - | F | |
| 6117 | STF1093 | 7 30.3 | + 49 59 | 7.18 | 197.2 | 0.89 | 2,1 | 0.0 | F | |
| 6175 | STF1110 | 7 34.6 | + 31 53 | 7.17 | 69.7 | 3.56 | 2 | 0.7 | F | AB |
| | | | | 7.18 | 68.7 | 3.75 | 2 | - | D | |
| | | | | 8.07 | 68.8 | 3.77 | 1 | - | F | |
| | | | | 8.12 | 68.3 | 3.75 | 1 | - | D | |
| | | | | 7.18 | 163.1 | 70.68 | 2 | - | F | AC |
| 6263 | STF1126 | 7 40.1 | + 5 14 | 8.13 | 169.2 | 0.95 | 2 | 0.3 | D | |
| 6291 | STF1130 | 7 41.7 | + 9 42 | 7.15 | 188.6 | 0.35 | 2 | 0.0 | F | |
| 6454 | STF1157 | 7 54.6 | - 2 48 | 7.15 | 191.8 | 0.87 | 1 | - | F | |
| | | | | 7.64 | 192.2 | 0.76 | 4 | 0.0 | D | |
| 6532 | STF1175 | 8 02.5 | + 4 09 | 7.17 | 276.5 | 1.44 | 2 | 1.5 | F | |
| 6623 | STF1187 | 8 09.5 | + 32 13 | 7.15 | 24.4 | 2.81 | 1 | 0.8 | F | |
| | | | | 7.18 | 23.7 | 2.88 | 1 | 0.6 | D | |
| 6930 | BU585 | 8 41.3 | + 20 29 | 7.09 | 89.5 | 0.45 | 1 | 1.0 | F | |
| | | | | 8.10 | companion not seen | | | | | |
| 7067 | STF1280 | 8 55.7 | + 70 48 | 7.13 | 281.4 | 0.45 | 3 | 0.2 | F | |
| | | | | 8.03 | 303.4 | 0.47 | 2 | - | F | |
| 7203 | STF1306 | 9 10.4 | + 67 08 | 7.09 | 354.6 | 3.64 | 2 | 2.8 | F | |
| 7307 | STF1338 | 9 21.0 | + 38 11 | 7.23 | 281.5 | 1.06 | 2 | 0.3 | D | |
| 7632 | STF1406 | 10 05.6 | + 31 05 | 7.22 | 218.3 | 0.86 | 2 | 1.0 | F | |
| 7685 | STT213 | 10 13.2 | + 27 25 | 7.20 | 121.5 | 0.96 | 2 | 1.6 | F | |
| 7721 | STF1423 | 10 19.2 | + 20 34 | 7.20 | 352.0 | 0.93 | 2 | 1.0 | F | |
| 7724 | STF1424 | 10 20.0 | + 19 51 | 7.26 | 125.3 | 4.54 | 3 | - | D | |
| 7744 | STT216 | 10 22.7 | + 15 21 | 7.29 | 243.2 | 2.05 | 4,3 | 2.4 | F | |
| 7758 | STF1429 | 10 25.1 | + 24 38 | 7.30 | 168.8 | 0.52 | 3 | 0.1 | F | |
| 7871 | STT224 | 10 39.7 | + 8 51 | 7.30 | 157.5 | 0.45 | 3 | 1.1 | F | |
| 7929 | STT229 | 10 48.0 | + 41 07 | 7.23 | 272.7 | 0.76 | 2 | - | D | |
| 8105 | STF1521 | 11 15.4 | + 27 34 | 7.30 | 98.2 | 3.82 | 2 | 0.4 | D | |
| | | | | 7.31 | 98.1 | 3.66 | 1 | 0.7 | F | |
| 8119 | STF1523 | 11 18.2 | + 31 32 | 7.29 | 293.0 | 1.58 | 2 | 0.5 | D | |
| | | | | 7.32 | 292.1 | 1.68 | 2 | 0.3 | F | |
| 8128 | STF1527 | 11 19.0 | + 14 16 | 7.18 | 61.2 | 0.71 | 1 | 1.0 | D | |
| | | | | 7.25 | 61.8 | 0.64 | 2 | 0.8 | F | |
| 8286 | STF1569 | 11 44.3 | + 39 00 | 7.31 | 322.9 | 3.58 | 3 | 1.9 | F | |
| 8311 | BU603 | 11 48.6 | + 14 17 | 7.18 | 340.4 | 0.96 | 1 | 2.8 | D | |
| | | | | 7.33 | 342.7 | 1.29 | 2 | 2.4 | F | |
| 8406 | STF1596 | 12 04.3 | + 21 28 | 7.30 | 236.1 | 3.64 | 2 | 1.3 | D | |
| | | | | 7.31 | 236.0 | 3.57 | 1 | 1.6 | F | |
| 8446 | STF1606 | 12 10.8 | + 39 53 | 7.35 | 185.7 | 0.28 | 2 | 0.2 | F | |
| | | | | 7.38 | 184.7 | 0.30 | 2 | 0.0 | D | |
| 8553 | STF1643 | 12 27.3 | + 27 02 | 7.27 | 8.1 | 2.69 | 2 | 0.4 | F | |
| 8569 | STT251 | 12 29.1 | + 31 23 | 7.29 | 58.1 | 0.66 | 2 | 1.1 | F | |
| 8575 | STF1647 | 12 30.6 | + 9 43 | 7.29 | 241.8 | 1.42 | 2 | - | D | |
| | | | | 7.31 | 242.9 | 1.47 | 3 | 0.3 | F | |

**Table 1.** continued

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 8625 | STF1668 | 12 40.9 | + 8 50 | 7.31 | 187.2 | 1.21 | 2 | 0.6 | D | |
| 8630 | STF1670 | 12 41.7 | - 1 27 | 7.34 | 270.8 | 1.90 | 4 | 0.0 | D | |
| 8695 | STF1687 | 12 53.3 | + 21 14 | 7.37 | 182.9 | 1.22 | 1 | 2.0 | F | |
| | | | | 7.38 | 180.6 | 0.89 | 1 | 1.8 | D | |
| 8710 | STF1695 | 12 56.3 | + 54 06 | 7.34 | 281.7 | 3.81 | 2 | 1.4 | D | |
| | | | | 7.36 | 281.5 | 3.72 | 2 | 1.6 | F | |
| 8739 | BU1082 | 13 00.7 | + 56 22 | 7.35 | 73.8 | 1.45 | 3,2 | 3.0 | F | |
| 8786 | STF1719 | 13 07.3 | + 0 35 | 7.37 | 359.8 | 7.23 | 2 | 0.3 | D | |
| | | | | 7.36 | 358.7 | 6.88 | 2 | - | F | |
| 8814 | STT261 | 13 12.0 | + 32 05 | 7.36 | 338.7 | 2.54 | 2 | 0.0 | F | |
| 8934 | STF1755 | 13 32.4 | + 36 49 | 7.36 | 131.3 | 4.35 | 2 | 0.8 | D | |
| | | | | 7.36 | 130.6 | 4.15 | 2 | 1.0 | F | |
| 9019 | STF1781 | 13 46.1 | + 5 07 | 7.34 | 174.2 | 0.80 | 1 | 0.2 | F | |
| | | | | 7.39 | 175.4 | 0.72 | 1 | - | D | |
| 9031 | STF1785 | 13 49.1 | + 26 59 | 7.38 | 170.8 | 3.28 | 3 | - | D | |
| | | | | 7.44 | 172.1 | 3.41 | 1 | 0.7 | F | |
| 9071 | A1614 | 13 57.6 | + 52 00 | 7.33 | 304.9 | 1.41 | 2 | 0.0 | F | |
| 9089 | A1097 | 14 02.0 | + 57 13 | 7.33 | 237.5 | 0.35 | 2 | 0.5 | F | AB |
| | | | | 7.33 | 21.0 | 27.99 | 2 | - | F | AB-C |
| 9159 | STT278 | 14 12.2 | + 44 11 | 7.41 | 297.4 | 0.32 | 1 | 0.0 | D | |
| | | | | 7.43 | 293.3 | 0.28 | 1 | - | F | |
| 9167 | STF1820 | 14 13.1 | + 55 20 | 7.33 | 116.0 | 2.61 | 2 | 0.3 | F | |
| 9182 | STF1819 | 14 15.3 | + 3 08 | 7.39 | 204.2 | 0.91 | 2 | - | D | |
| 9229 | STF1834 | 14 20.3 | + 48 31 | 7.41 | 102.6 | 1.51 | 1 | 0.2 | D | |
| | | | | 7.42 | 103.6 | 1.39 | 2 | 0.1 | F | |
| 9251 | STF1838 | 14 24.1 | + 11 55 | 7.40 | 334.9 | 9.56 | 2 | 0.0 | D | |
| | | | | 7.36 | 334.9 | 9.29 | 2 | 0.3 | F | |
| 9343 | STF1865 | 14 41.3 | + 13 44 | 7.37 | 299.2 | 0.85 | 2 | 0.0 | D | |
| | | | | 7.37 | 299.3 | 0.82 | 1 | - | F | |
| 9372 | STF1877 | 14 45.0 | + 27 04 | 7.40 | 343.4 | 2.82 | 2 | - | D | |
| 9380 | STF1879 | 14 46.3 | + 9 40 | 7.37 | 85.6 | 1.65 | 2 | 0.5 | D | |
| 9413 | STF1888 | 14 51.4 | + 19 06 | 7.44 | 321.1 | 6.72 | 1,2 | 1.8 | D | |
| | | | | 7.46 | 320.7 | 6.65 | 2 | - | F | |
| 9418 | STT287 | 14 51.4 | + 44 58 | 7.41 | 348.3 | 0.87 | 1 | 0.0 | D | |
| | | | | 7.43 | 351.2 | 0.94 | 2 | 0.2 | F | |
| 9425 | STT288 | 14 53.4 | + 15 43 | 7.37 | 167.2 | 1.21 | 2 | 0.6 | D | |
| 9494 | STF1909 | 15 03.8 | + 47 39 | 7.43 | 53.1 | 1.95 | 2 | 1.0 | D | |
| | | | | 7.43 | 52.4 | 1.92 | 2 | 0.7 | F | |
| 9507 | STF1910 | 15 07.5 | + 9 14 | 7.44 | 210.8 | 3.95 | 1 | 0.2 | D | |
| | | | | 7.46 | 212.0 | 4.00 | 1,2 | - | F | |
| - | COU610 | 15 32.9 | + 31 22 | 7.38 | 199.0 | 0.78 | 2 | 2.0 | D | |
| 9701 | STF1954 | 15 34.8 | + 10 32 | 7.44 | 174.3 | 3.88 | 1,2 | 1.1 | D | |
| | | | | 7.47 | 174.7 | 4.08 | 3 | 1.0 | F | |
| 9716 | STT298 | 15 36.1 | + 39 48 | 7.38 | 125.9 | 0.26 | 3 | 0.0 | D | |
| 9769 | STF1989 | 15 39.7 | + 79 58 | 7.39 | 26.4 | 0.74 | 2 | 0.6 | D | |
| | | | | 7.42 | 26.1 | 0.69 | 1 | 0.7 | F | |
| 9880 | STT303 | 16 00.9 | + 13 16 | 7.47 | 171.1 | 1.47 | 2 | 0.4 | D | |
| | | | | 7.49 | 171.3 | 1.52 | 1 | 0.3 | F | |
| 9969 | STF2021 | 16 13.3 | + 13 32 | 7.44 | 353.7 | 4.07 | 1,2 | 0.0 | D | |
| 10075 | STF2052 | 16 28.9 | + 18 25 | 7.49 | 304.5 | 1.83 | 1 | 0.4 | F | |
| | | | | 7.50 | 306.4 | 1.91 | 1 | 0.3 | D | |
| 10093 | STF2059 | 16 30.9 | + 38 04 | 7.49 | 6.1 | 0.48 | 1 | 0.3 | F | |
| 10157 | STF2084 | 16 41.3 | + 31 36 | 7.38 | 44.0 | 1.29 | 2 | 2.6 | F | |
| | | | | 7.50 | 40.8 | 1.13 | 2,3 | 2.5 | D | |
| 10184 | STF2094 | 16 44.2 | + 23 31 | 7.53 | 75.1 | 1.20 | 2 | 0.3 | D | |
| 10229 | STF2106 | 16 51.1 | + 9 24 | 7.54 | 173.9 | 0.69 | 3,1 | 1.0 | D | |
| - | HEI894 | 17 09.6 | + 3 56 | 7.49 | 14.8 | 0.60 | 1 | 0.4 | F | |
| 10526 | STF2161 | 17 23.7 | + 37 08 | 7.54 | 319.0 | 4.04 | 4,5 | 1.0 | D | |
| 10690 | STF2207 | 17 37.1 | + 67 07 | 7.53 | 113.5 | 0.50 | 2 | 0.6 | D | |
| 10728 | STF2218 | 17 40.3 | + 63 41 | 7.49 | 316.2 | 1.52 | 1 | 1.3 | F | |
| | | | | 7.50 | 317.3 | 1.53 | 1 | 1.0 | D | |
| 10769 | STF2205 | 17 45.8 | + 17 43 | 7.54 | 351.4 | 1.19 | 2 | 0.2 | F | |
| 11006 | STT349 | 17 53.0 | + 83 54 | 7.54 | 42.1 | 0.45 | 2 | 0.3 | D | |
| | | | | 7.60 | 43.5 | 0.46 | 2 | 0.0 | F | |
| 10875 | BU130 | 17 53.3 | + 40 00 | 7.55 | 111.5 | 1.50 | 2,1 | 3.0 | F | |
| 10905 | STF2245 | 17 56.4 | + 18 20 | 7.67 | 291.6 | 2.64 | 2 | - | D | |
| 11373 | STF2320 | 18 27.8 | + 24 42 | 7.61 | 359.9 | 1.24 | 2 | 1.9 | F | |
| 11484 | STT357 | 18 36.0 | + 11 44 | 7.42 | 86.9 | 0.30 | 1 | 0.0 | F | |
| | | | | 7.56 | 87.4 | 0.25 | 1 | - | D | |
| 11584 | STT363 | 18 37.4 | + 77 41 | 7.54 | 345.6 | 0.33 | 2 | 0.0 | D | |
| 11632 | STF2398 | 18 43.2 | + 59 33 | 7.60 | 173.0 | 12.94 | 2 | 0.4 | F | |
| 11635 | STF2382 | 18 44.2 | + 39 40 | 6.63 | 352.2 | 2.52 | 3 | - | D | AB |
| | STF2383 | 18 44.4 | + 39 37 | 6.63 | 85.1 | 2.32 | 3 | - | D | CD |
| 11871 | BU648 | 18 57.0 | + 32 54 | 6.64 | 341.5 | 0.71 | 2 | 2.5 | D | |
| | | | | 7.60 | 331.5 | 0.77 | 2 | 2.8 | D | |
| | | | | 7.62 | 332.8 | - | 1,0 | - | F | |

**Table 1.** continued

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 11934 | HJ2850 | 19 00.8 | + 23 17 | 7.61 | 274.6 | 2.75 | 2 | 0.9 | F | |
| 11956 | STF2437 | 19 01.9 | + 19 11 | 7.61 | 14.9 | 0.48 | 2 | 0.4 | F | |
| 12040 | STF2454 | 19 06.2 | + 30 26 | 7.62 | 284.4 | 1.38 | 2 | 1.2 | F | |
| 12201 | STF2484 | 19 14.3 | + 19 04 | 7.62 | 237.2 | 2.20 | 2 | 1.5 | F | |
| 12239 | STT371 | 19 15.9 | + 27 27 | 6.66 | 159.8 | 0.92 | 2 | 0.5 | D | |
| 12540 | STFI43 | 19 30.7 | + 27 58 | 7.40 | 54.1 | 34.41 | 3,4 | - | F | |
| 12752 | STF2556 | 19 39.4 | + 22 15 | 7.61 | 184.8 | 0.32 | 2 | 0.1 | F | |
| | | | | 7.65 | 186.5 | 0.35 | 3 | 0.0 | D | |
| 12803 | STF2574 | 19 40.6 | + 62 40 | 7.60 | 265.7 | 0.43 | 2 | 0.0 | F | |
| 12831 | STT383 | 19 42.9 | + 40 43 | 6.65 | 17.0 | 0.86 | 2 | 0.9 | D | |
| 12851 | STT384 | 19 43.9 | + 38 19 | 6.66 | 194.9 | 1.05 | 2 | 0.6 | D | |
| 12861 | STF2569 | 19 44.8 | + 16 49 | 6.72 | 357.2 | 2.22 | 3 | 0.5 | D | |
| 12880 | STF2579 | 19 45.0 | + 45 08 | 6.76 | 226.9 | 2.47 | 3 | 3.5 | D | |
| | | | | 7.02 | 226.6 | 2.46 | 3,2 | 3.0 | F | |
| 12962 | STF2583 | 19 48.7 | + 11 48 | 6.99 | 104.8 | 1.44 | 3 | 0.8 | D | |
| 12965 | STT386 | 19 48.3 | + 37 09 | 6.70 | 252.0 | 0.99 | 2 | 0.2 | D | |
| 12972 | STT387 | 19 48.7 | + 35 19 | 6.68 | 144.4 | 0.68 | 3 | 0.5 | D | |
| | | | | 7.59 | 145.0 | 0.67 | 3 | 0.6 | D | |
| 13186 | STT392 | 19 57.9 | + 42 16 | 7.65 | round | | 2 | | D | |
| 13196 | STF2606 | 19 58.5 | + 33 17 | 7.69 | 140.8 | 0.71 | 1 | 0.5 | D | AB |
| | | | | 7.70 | 143.5 | 0.60 | 1 | 0.5 | F | |
| 13198 | STF2609 | 19 58.6 | + 38 07 | 7.08 | 22.5 | 2.01 | 3 | 1.0 | D | |
| 13277 | STT395 | 20 02.0 | + 24 56 | 6.95 | 120.9 | 0.91 | 3 | 0.0 | D | |
| 13312 | STF2624 | 20 03.5 | + 36 01 | 6.71 | 173.5 | 1.92 | 2 | 0.9 | D | |
| 13461 | STT400 | 20 10.2 | + 43 57 | 6.70 | 352.0 | 0.45 | 2 | 0.2 | D | |
| 13506 | STF2644 | 20 12.6 | + 0 52 | 7.68 | 206.7 | 2.66 | 2 | 0.2 | D | |
| 13542 | STF2651 | 20 13.8 | + 16 09 | 7.60 | 276.8 | 1.04 | 1 | 0.2 | F | |
| | | | | 7.66 | 279.1 | 1.10 | 2 | 0.0 | D | |
| 13723 | STT406 | 20 19.8 | + 45 22 | 7.59 | 111.9 | 0.52 | 3 | 0.9 | D | |
| 13750 | STF2672 | 20 21.6 | + 23 46 | 7.65 | 338.4 | 0.63 | 2 | 0.2 | F | |
| | | | | 7.69 | - | 0.66 | 0,1 | - | D | |
| 13920 | BU63 | 20 30.3 | + 10 54 | 6.74 | 352.0 | 0.96 | 3 | 2.1 | D | |
| 13964 | STF2695 | 20 32.0 | + 25 48 | 7.66 | round | | 2 | | D | |
| 13997 | STF2696 | 20 33.6 | + 5 26 | 7.66 | 298.1 | 0.49 | 2 | 0.3 | F | |
| 14073 | BU151 | 20 37.5 | + 14 36 | 6.71 | 326.8 | 0.30 | 2 | - | D | |
| | | | | 7.66 | 331.1 | 0.34 | 3 | - | D | |
| 14270 | STF2725 | 20 46.2 | + 15 54 | 6.74 | 10.7 | 6.23 | 4 | 0.7 | D | |
| | | | | 6.79 | 11.6 | 6.06 | 2 | - | F | |
| 14296 | STT413 | 20 47.4 | + 36 29 | 6.94 | 11.0 | 0.96 | 4 | 1.3 | D | |
| 14360 | STF2729 | 20 51.4 | - 5 38 | 7.67 | 19.4 | 1.00 | 2 | 1.0 | D | |
| 14397 | STT417 | 20 53.0 | + 29 09 | 6.71 | 27.0 | 0.91 | 2 | 0.4 | D | |
| 14421 | STT418 | 20 54.8 | + 32 42 | 6.66 | 283.9 | 1.14 | 2 | 0.0 | D | |
| 14424 | BU367 | 20 55.0 | + 28 05 | 7.34 | 130.6 | 0.38 | 3 | 0.4 | F | |
| 14504 | STF2741 | 20 58.6 | + 50 28 | 6.78 | 26.7 | 2.02 | 1 | 1.0 | D | |
| | | | | 6.79 | 26.4 | 2.10 | 1 | - | F | |
| 14499 | STF2737 | 20 59.1 | + 4 18 | 6.79 | 284.7 | 0.94 | 2 | 0.6 | D | |
| 14558 | STF2746 | 21 01.8 | + 39 16 | 7.78 | 318.5 | 1.14 | 2 | 0.6 | F | |
| 14575 | STF2751 | 21 02.2 | + 56 40 | 7.68 | 356.3 | 1.67 | 2 | 0.4 | D | |
| 14787 | AGC13 | 21 14.8 | + 38 03 | 6.73 | 323.9 | 0.82 | 3 | 3.0 | D | |
| | | | | 7.60 | 319.8 | 0.82 | 2 | 3.0 | D | |
| | | | | 7.69 | 319.6 | 0.80 | 2,1 | 3.0 | F | |
| 14889 | STT437 | 21 20.8 | + 32 27 | 6.66 | 22.3 | 2.36 | 2 | 0.2 | D | |
| | | | | 6.79 | 21.3 | 2.35 | 1 | - | F | |
| 14926 | A764 | 21 22.3 | + 57 34 | 7.79 | 10.2 | 1.16 | 3,2 | 2.0 | F | |
| 15007 | STF2799 | 21 28.9 | + 11 05 | 6.71 | 84.6 | 1.80 | 2 | 0.1 | D | |
| 15060 | STF2802 | 21 31.8 | + 33 48 | 6.83 | 189.4 | 3.85 | 2 | 0.1 | D | |
| | | | | 6.79 | 190.6 | 3.71 | 1 | 0.0 | F | |
| 15115 | HU371 | 21 35.4 | + 24 27 | 6.71 | 312.5 | 0.30 | 2 | 0.0 | D | |
| 15176 | BU1212 | 21 39.5 | - 0 03 | 7.61 | 271.9 | 0.55 | 1 | 0.0 | F | |
| | | | | 7.67 | 273.5 | 0.53 | 1 | 0.6 | D | |
| 15215 | STT448 | 21 41.0 | + 29 21 | 7.29 | 184.9 | 0.34 | 3 | 0.0 | D | |
| | | | | 7.61 | 177.4 | 0.29 | 2 | - | F | |
| 15270 | STF2822 | 21 44.1 | + 28 45 | 6.85 | 305.7 | 2.02 | 5 | 1.3 | D | |
| | | | | 6.79 | 305.8 | 1.93 | 1 | - | F | |
| 14447 | BU75 | 21 55.6 | + 10 53 | 7.61 | 16.8 | 0.75 | 1 | 0.7 | F | |
| | | | | 7.70 | 17.1 | 0.73 | 1 | 0.6 | D | |
| 15971 | STF2909 | 22 28.8 | - 0 01 | 6.78 | 192.2 | 1.95 | 4 | 0.4 | D | |
| 15988 | STF2912 | 22 30.0 | + 4 26 | 6.77 | 112.2 | 0.55 | 3 | 1.3 | D | |
| 16057 | STF2924 | 22 33.0 | + 69 55 | 7.82 | round | | 1 | | F | |
| 16185 | STF2934 | 22 41.8 | + 21 25 | 7.60 | 60.0 | 1.21 | 2 | 0.7 | F | |
| 16291 | STF2947 | 22 49.0 | + 68 34 | 7.12 | 56.3 | 4.52 | 3 | 0.0 | D | |
| 16316 | MLB433 | 22 51.0 | + 69 58 | 7.82 | 209.5 | 3.41 | 2 | - | F | |
| 16314 | HO482 | 22 51.4 | + 26 23 | 7.70 | 20.9 | 0.38 | 1 | 0.0 | D | |
| | | | | 7.78 | 19.8 | 0.44 | 2 | 0.6 | F | |
| 16326 | A632 | 22 52.0 | + 57 42 | 7.78 | 154.5 | 0.73 | 2 | 0.6 | F | |
| 16345 | BU382 | 22 53.7 | + 44 45 | 6.85 | 217.8 | 0.93 | 3 | 2.0 | D | |

**Table 1.** continued

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 7.78 | 219.6 | 1.02 | 2 | 1.6 | F |
| 16428 | STT483 | 22 59.2 | + 11 44 | 6.77 | 331.6 | 0.51 | 4,3 | 1.3 | D |
| 16538 | STT489 | 23 07.9 | + 75 23 | 6.76 | 344.2 | 1.04 | 2 | 2.3 | D |
| | | | | 7.66 | 343.7 | 1.00 | 2 | 2.1 | D |
| 16666 | STF3001 | 23 18.6 | + 68 07 | 6.84 | 219.4 | 3.10 | 2 | 2.3 | D |
| | | | | 7.82 | 219.5 | 3.36 | 2 | 2.5 | F |
| 16836 | BU720 | 23 34.0 | + 31 20 | 6.82 | 90.5 | 0.62 | 2 | 0.4 | D |
| 17020 | STT507 | 23 48.6 | + 64 53 | 6.90 | 312.1 | 0.71 | 2 | 0.8 | D |
| 17054 | STF3042 | 23 51.9 | + 37 53 | 6.85 | 87.0 | 5.67 | 2 | 0.0 | D |
| 17149 | STF3050 | 23 59.5 | + 33 43 | 6.80 | 325.8 | 2.00 | 6 | 0.1 | D |
| | | | | 6.83 | 326.6 | 2.15 | 2,1 | - | F |

**Table 2.** Residuals of 147 orbits

| ADS | Calc. year | Residuals | | | |
|---|---|---|---|---|---|
| 48 | Heintz 1993 | - 0.1 | + 0.04 | + 0.7 | + 0.10 |
| 61 | Baize 1957 | - 0.9 | + 0.02 | | |
| 102 | Heintz 1997 | - 0.2 | - 0.02 | | |
| 161 | Heintz 1979 | - 0.2 | - 0.02 | - 4.9 | - 0.02 |
| 207 | Heintz 1960 | + 1.2 | + 0.12 | | |
| 221 | Scardia 1982 | -14.6 | - 0.10 | | |
| 283 | Muller 1956 | + 0.7 | + 0.09 | - 0.1 | + 0.12 |
| 293 | Muller 1953 | + 8.9 | - 0.04 | + 5.0 | - 0.14 |
| 588 | Baize 1958 | - 6.4 | + 0.60 | | |
| 684 | Baize 1964 | + 0.5 | + 0.06 | | |
| 746 | Couteau 1984 | - 1.2 | + 0.07 | | |
| 862 | Heintz 1964 | - 0.1 | + 0.23 | - 2.8 | + 0.19 |
| 873 | Docobo/Ling 1994 | - 2.0 | 0.00 | | |
| 1538 | Volet 1933 | - 4.8 | + 0.30 | - 3.8 | + 0.06 |
| | Mourao 1976 | + 1.3 | + 0.17 | + 2.3 | - 0.07 |
| 1615 | Scardia 1981 | + 0.2 | + 0.18 | + 3.2 | + 0.06 |
| 1631 | Heintz 1995 | - 1.9 | - 0.12 | | |
| 2034 | Heintz 1962 | - 3.4 | + 0.10 | | |
| 2416 | Heintz 1963 | + 0.4 | + 0.08 | + 3.3 | + 0.09 |
| 2446 | Rabe 1948 | - 4.0 | - 0.04 | | |
| | Scardia 1980 | + 2.0 | + 0.06 | | |
| | Zulevic 1984 | + 1.3 | - 0.06 | | |
| | Alzner 1998 | - 1.2 | 0.00 | | |
| 2459 | Popovic/Zivkov1997 | + 3.7 | - 0.17 | + 2.2 | + 0.06 |
| 2644 | Hopmann 1964 | + 2.4 | + 0.07 | + 1.3 | + 0.05 |
| 2755 | Popovic/Pavlovic 1995, orbital | + 3.4 | + 0.22 | | |
| | Popovic/Pavlovic 1995, linear | - 0.3 | - 0.11 | | |
| 2995 | Heintz 1986 | + 2.0 | + 0.12 | | |
| 3114 | Heintz 1982 | - 4.3 | - 0.01 | - 4.8 | - 0.01 |
| 3135 | Heintz 1988 | + 1.7 | - 0.04 | -11.7 | - 0.04 |
| | | -19.8 | - 0.04 | - 1.9 | - 0.04 |
| Because of the considerable dm the star is currently too difficult for the Cassegrain. | | | | | |
| 3169 | Heintz 1969 | - 1.4 | - 0.01 | | |
| 3174 | Popovic 1981 | + 2.9 | + 0.26 | | |
| 3264 | Baize 1980 | + 1.2 | - 0.07 | | |
| 3391 | Docobo/Costa 1990 | + 0.7 | + 0.03 | | |
| 3596 | Baize 1980 | + 2.9 | + 0.37 | | |
| 3672 | Jasinta 1996 | + 0.1 | + 0.02 | | |
| 3711 | Baize 1969 | - 1.6 | + 0.01 | | |
| 3799 | van den Bos 1960 | - 6.2 | + 0.15 | | |
| 3956 | Heintz 1996 | - 2.1 | + 0.03 | | |
| 4076 | Heintz 1976 | + 2.5 | + 0.09 | | |
| 4115 | Siegrist 1951 | + 5.7 | + 0.02 | | |
| 4200 | Hopmann 1973 | - 0.4 | + 0.08 | | |
| 4263 | Hopmann 1967 | - 0.2 | + 0.14 | | |
| 4505 | Heintz 1996 | - 1.1 | - 0.04 | | |
| 4841 | Baize 1980 | + 2.0 | + 0.22 | | |
| 5042 | Heintz 1962 | - 5.5 | - 0.10 | | |
| 5234 | Heintz 1992 | - 4.6 | - 0.06 | - 0.6 | + 0.05 |
| 5400 | Popovic/Pavlovic 1995 | + 1.5 | + 0.04 | | |
| 5586 | Baize 1993 | - 4.5 | - 0.03 | - 9.6 | - 0.06 |
| 5958 | Popovic 1982 | + 8.9 | + 0.19 | + 7.1 | + 0.22 |
| 5983 | Hopmann1960 | - 0.8 | + 0.02 | | |
| 6117 | Baize 1958 | - 2.3 | + 0.11 | | |
| 6175AB | Heintz 1988 | + 1.5 | - 0.07 | + 0.5 | + 0.12 |
| | | + 1.5 | + 0.06 | + 1.1 | + 0.03 |
| 6175AC | Heintz 1988 | - 0.2 | - 0.16 | | |
| 6291 | Baize 1984 | - 25.0 | + 0.06 | | |

**Table 2.** continued

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Alzner 1998 | - 4.2 | - 0.02 | | | | |
| 6532 | Hopmann 1964 | - 10.6 | + 0.27 | | | | |
| 6623 | Hopmann 1971 | + 4.5 | - 0.04 | + 3.8 | + 0.03 | | |
| 7067 | Heintz 1997 | + 4.8 | + 0.01 | + 4.1 | - 0.07 | | |
| 7203 | Baize 1948 | - 0.6 | - 0.18 | | | | |
| | Scardia 1980 | - 1.5 | - 0.18 | | | | |
| 7307 | Arend 1953 | - 3.1 | + 0.02 | | | | |
| 7685 | Heintz 1962 | 0.0 | - 0.01 | | | | |
| 7721 | Heintz 1997 | - 0.7 | + 0.01 | | | | |
| 7724 | Rabe 1958 | + 0.9 | + 0.14 | | | | |
| 7758 | Zulevic 1981 | - 1.0 | - 0.14 | | | | |
| 7871 | Heintz 1983 | - 2.8 | - 0.13 | | | | |
| 7929 | Alzner 1996 | + 1.6 | + 0.04 | | | | |
| 8119 | Heintz 1996 | + 0.6 | + 0.01 | 0.0 | + 0.10 | | |
| 8128 | Popovic/Pavl.1995 | + 1.2 | + 0.09 | + 1.6 | + 0.02 | | |
| 8311 | Heintz 1991 | - 2.5 | - 0.20 | - 0.1 | + 0.13 | | |
| 8446 | Heintz 1997 | + 0.1 | 0.00 | - 0.9 | + 0.02 | | |
| 8553 | Hopmann 1964 | the Elements given in the publication are wrong. | | | | | |
| 8569 | Baize 1957 | + 0.7 | 0.00 | | | | |
| 8575 | Hopmann 1970 | - 4.7 | + 0.13 | - 4.0 | + 0.23 | | |
| 8630 | Heintz 1990 | + 0.3 | + 0.02 | | | | |
| 8695 | Heintz 1997 | + 1.1 | + 0.18 | - 1.2 | - 0.15 | | |
| 8739 | Scardia 1980 | + 1.8 | - 0.04 | | | | |
| | Heintz 1981 | - 1.8 | - 0.03 | | | | |
| 9019 | Heintz 1986 | + 3.7 | + 0.11 | + 4.9 | + 0.03 | | |
| 9031 | Heintz 1988 | - 0.4 | - 0.09 | + 0.9 | + 0.04 | | |
| 9071 | Mourao 1963 | - 3.4 | - 0.07 | | | | |
| 9089 | Janova 1960 | - 6.5 | - 0.08 | | | | |
| 9159 | Heintz 1996 | + 4.4 | + 0.02 | + 0.3 | - 0.02 | | |
| 9167 | Hopmann 1964 | - 2.3 | + 0.34 | | | | |
| 9182 | Houser 1987 | - 1.5 | + 0.02 | | | | |
| 9229 | van den Bos 1936 | - 2.0 | + 0.12 | - 1.0 | 0.00 | | |
| 9343 | Wierzbinski 1956 | - 1.1 | 0.00 | - 1.0 | - 0.03 | | |
| 9380 | Wierzbinski 1957 | + 0.4 | + 0.09 | | | | |
| 9413 | Wielen 1962 | + 1.5 | - 0.03 | + 1.1 | - 0.09 | | |
| 9418 | Heintz 1996 | - 3.8 | - 0.04 | - 0.9 | + 0.03 | | |
| 9425 | Heintz, u | + 0.3 | - 0.02 | | | | |
| 9425 | Zulevic 1994 | + 1.1 | - 0.01 | | | | |
| 9494 | Heintz 1997 | - 0.7 | - 0.12 | 0.0 | - 0.15 | | |
| 9701 | Hopmann 1973 | - 1.8 | - 0.39 | - 1.3 | - 0.19 | | |
| 9716 | Couteau 1989 | + 9.4 | + 0.02 | | | | |
| 9769 | Wierzbinski 1957 | + 1.5 | - 0.01 | + 1.2 | - 0.06 | | |
| | Giannuzzi 1956 | + 4.4 | + 0.14 | + 4.1 | + 0.09 | | |
| 9969 | Hopmann 1970 | + 1.8 | + 0.42 | | | | |
| 10075 | Siegrist 1952 | - 0.7 | - 0.06 | + 1.2 | + 0.02 | | |
| 10157 | Heintz 1994 | - 0.6 | + 0.08 | - 2.9 | - 0.06 | | |
| 10229 | Heintz 1963 | - 0.1 | + 0.02 | | | | |
| 10769 | Popovic/Pavlovic1995 | + 2.7 | - 0.11 | | | | |
| 11006 | Heintz 1996 | - 8.3 | + 0.02 | - 6.9 | + 0.03 | | |
| 11484 | Valbousquet 1981 | + 0.1 | - 0.07 | + 0.8 | - 0.12 | | |
| 11584 | Alzner 1996 | + 0.6 | + 0.01 | | | | |
| 11632 | Heintz 1987 | + 0.3 | + 0.15 | | | | |
| 11635AB | Guntzel-Lingner1956 | + 0.7 | - 0.07 | | | | |
| 11635CD | Docobo/Costa 1983 | + 1.3 | - 0.01 | | | | |
| 11871 | Heintz 1995 | + 1.8 | + 0.02 | - 0.3 | + 0.10 | + 1.2 | - |
| 12040 | Baize 1976 | + 0.2 | + 0.11 | | | | |
| 12201 | Hopmann 1973 | - 0.4 | + 0.05 | | | | |
| 12752 | Baize 1972 | - 9.5 | - 0.06 | - 7.7 | - 0.03 | | |
| 12880 | Baize 1973 | + 4.1 | - 0.01 | + 3.5 | - 0.02 | | |
| 12972 | Heintz 1996 | - 3.9 | + 0.02 | - 2.1 | + 0.01 | | |
| 13461 | Heintz 1996 | + 1.9 | + 0.02 | | | | |
| 13723 | Heintz 1976 | + 1.6 | 0.00 | | | | |
| 14073 | Finsen 1938 | + 3.1 | - 0.08 | - 0.1 | - 0.11 | | |
| | Couteau 1962 | + 5.4 | - 0.05 | + 1.6 | - 0.07 | | |
| | Hartkopf 1989 | + 8.9 | - 0.01 | + 3.8 | - 0.03 | | |
| | Alzner 1998 | + 6.0 | - 0.04 | + 2.1 | - 0.06 | | |
| 14270 | Hopmann 1973 | + 0.7 | + 0.19 | + 1.6 | + 0.02 | | |
| 14296 | Baize 1983 | + 1.1 | + 0.04 | | | | |
| 14360 | Heintz 1982 | - 0.8 | + 0.16 | | | | |
| 14424 | Heintz 1961 | - 3.2 | - 0.06 | | | | |
| 14499 | van den Bos 1933 | + 0.2 | + 0.04 | | | | |
| 14787 | van Biesbroeck1940 | - 2.6 | + 0.08 | - 1.1 | + 0.07 | - 0.8 | + 0.05 |
| | Heintz 1970 | - 3.0 | + 0.05 | - 1.6 | + 0.05 | - 1.2 | + 0.03 |
| 14926 | Heintz 1995 | - 2.7 | + 0.12 | | | | |
| 15007 | Popovic 1987 | + 1.6 | + 0.09 | | | | |
| 15115 | Baize 1961 | + 2.8 | - 0.01 | | | | |

**Table 2.** continued

| | | | | | |
|---|---|---|---|---|---|
| 15176 | Heintz 1994 | + 1.5 | + 0.02 | + 3.0 | 0.00 |
| 15215 | Alzner 1996 | + 2.1 | + 0.05 | - 4.8 | 0.00 |
| 15270 | Heintz 1996 | - 0.4 | + 0.12 | - 0.4 | + 0.03 |
| 15447 | Heintz 1996 | + 2.5 | + 0.01 | + 2.7 | - 0.02 |
| 15971 | Heintz 1983 | - 0.9 | + 0.01 | | |
| 15988 | Zulevic Circ.106 | - 5.4 | + 0.06 | | |
| 16185 | Heintz 1988 | 0.0 | + 0.04 | | |
| 16314 | Morel 1970 | - 1.5 | - 0.06 | - 2.6 | 0.00 |
| 16326 | Heintz 1991 | - 2.9 | + 0.06 | | |
| 16345 | Muller 1954 | - 3.4 | + 0.02 | - 2.6 | + 0.08 |
| | Rabe 1961 | - 4.1 | - 0.02 | - 3.4 | + 0.04 |
| 16428 | Heintz 1996 | - 0.1 | + 0.02 | | |
| 16538 | Baize 1992 | - 3.2 | - 0.10 | - 4.6 | - 0.14 |
| 16666 | Wierzbinski 1953 | - 2.5 | + 0.29 | - 2.4 | + 0.56 |
| 16836 | Baize 1976 | - 4.2 | + 0.09 | | |
| 17020 | Zulevic 1977 | + 1.6 | - 0.02 | | |
| 17149 | Heintz 1996 | - 2.2 | + 0.17 | - 1.5 | + 0.32 |

**Table 3.** 719 measures of 310 double stars with a 360 mm Zeiss-Newtonian 1993.67 - 1996.50 A. Measurements (-) not measured or dm not estimated, (:) P.A. values are scattered, or P.A. or distance could not be measured accurately, mostly in case of faint pairs

| ADS | Name | Co. 2000 | | 1990+ | P.A. | Sep. | no | dm est | |
|---|---|---|---|---|---|---|---|---|---|
| 17167 | HO208 | 0 01.5 | + 30 44 | 4.84 | 197.° 0 | 0." 93 | 1n | 2.1 | |
| 17175 | BU733 | 0 02.2 | + 27 05 | 5.81 | 136.3 | 0.8: | 1n | 2.3 | |
| 147 | BU255 | 0 11.9 | + 28 25 | 5.39 | 70.4 | 0.45 | 2n | 0.2 | |
| 161 | STT2 | 0 13.4 | + 26 59 | 5.81 | 172.1 | 0.39 | 2n | 0.8 | |
| 515 | BU1097 | 0 37.2 | + 58 01 | 4.44 | 258.6 | 0.39 | 2n | 0.3 | |
| 692 | BU781 | 0 51.6 | + 69 00 | 5.05 | 25.6 | 0.8: | 1n | 1.0 | |
| 746 | STT20 | 0 54.6 | + 19 12 | 5.46 | 199.3 | 0.50 | 3n | 0.5 | |
| 768 | BU500 | 0 55.4 | + 30 39 | 5.86 | 118.0 | 0.49 | 2n | 0.1 | |
| 784 | BU1099 | 0 56.8 | + 60 22 | 3.72 | 335.3 | 0.30 | 1n | - | |
| 805 | BU302 | 0 58.3 | + 21 25 | 5.85 | 180.5 | 0.43 | 2n | 1.0 | |
| 829 | MA1 | 1 00.6 | + 47 19 | 4.28 | 3.8 | 0.8: | 2n | 1.0 | |
| 940 | STT515 | 1 09.6 | + 47 15 | 4.65 | 127.5 | 0.50 | 2n | 0.8 | |
| 996 | BU1029 | 1 13.7 | + 7 33 | 5.81 | 78.3 | 1.60 | 1n | 3.3 | |
| 1097 | BU4 | 1 21.3 | + 11 32 | 5.87 | 113.7 | 0.55 | 1n | 0.7 | |
| 1339 | STF147 | 1 41.7 | - 11 19 | 5.37 | 96.8 | 1.15 | 2n | 1.1 | |
| 1359 | BU870 | 1 44.3 | + 57 32 | 5.50 | 353.2 | 0.78 | 2n | 1.7 | |
| 1411 | STT34 | 1 49.9 | + 80 53 | 6.04 | 279.5 | 0.50 | 1n | 0.0 | |
| 1631 | STF208 | 2 03.7 | + 25 56 | 5.92 | 333.1 | 1.18 | 2n | 2.1 | |
| 1630 | STT38 | 2 03.9 | + 42 20 | 4.92 | 106.6 | 0.51 | 2n | 0.9 | |
| 1659 | STF37 | 2 10.5 | + 81 29 | 6.04 | 205.7 | 1.2: | 1n | 2.5 | |
| 1786 | STF248 | 2 21.0 | + 42 47 | 5.82 | 262: | 0.28: | 2n | 0.0 | |
| 1799 | STT40 | 2 21.7 | + 38 30 | 5.00 | 54.5 | 0.64 | 2n | 0.6 | |
| --- | KUI8 | 2 28.0 | + 1 58 | 3.88 | 212.8 | 0.50 | 1n | 0.0 | |
| 2034 | STT43 | 2 40.7 | + 26 37 | 5.97 | 358.3 | 0.88 | 2n | 1.2 | |
| 2043 | STT45 | 2 40.9 | + 4 52 | 4.88 | 271.2 | 0.93 | 2n | 1.5 | |
| --- | VOU36 | 2 51.5 | + 1 41 | 4.89 | 194.6 | 0.39 | 2n | 0.0 | |
| 2236 | A2413 | 2 57.5 | + 1 53 | 6.02 | 131.0 | 0.39 | 2n | 0.2 | |
| 2336 | STF346 | 3 05.4 | + 25 15 | 4.94 | 254.4 | 0.33 | 2n | 0.0 | |
| 2397 | STT51 | 3 12.9 | + 44 17 | 5.97 | 334.2 | 0.75 | 2n | 0.3 | |
| 2436 | STT52 | 3 17.5 | + 65 40 | 4.92 | 63.2 | 0.44 | 1n | 0.3 | |
| 2459 | AC2 | 3 18.4 | - 0 56 | 5.19 | 256.3 | 1.12 | 5,4n | 2.3 | |
| 2581 | STF408 | 3 30.7 | - 4 17 | 5.53 | 322.7 | 0.85 | 2n | 0.4 | |
| 2704 | STT61 | 3 42.8 | + 7 54 | 5.81 | 131.0 | 1.2: | 1n | 3.0 | |
| 2730 | BU880 | 3 44.6 | + 32 10 | 5.59 | 17.9 | 0.47 | 2n | 0.2 | |
| 2755 | BU536 | 3 46.3 | + 24 11 | 4.56 | 183.2 | 0.62 | 2,3n | 1.1 | |
| 2765 | STT62 | 3 48.5 | + 64 49 | 5.04 | 151.6 | 0.33 | 1n | 0.3: | |
| --- | KUI15 | 3 52.0 | + 6 32 | 4.57 | 205.0 | 0.71 | 2n | 0.3 | |
| 2815 | STT66 | 3 52.1 | + 40 48 | 4.78 | 142.8 | 0.81 | 3,2n | 0.5 | |
| 2990 | STT71 | 4 06.9 | + 33 27 | 5.04 | 231.4 | 0.76 | 4,3n | var | |
| 2963 | STF460 | 4 10.0 | + 80 42 | 4.63 | 128.2 | 0.68 | 3n | 0.6 | |
| --- | COU703 | 4 12.4 | + 23 34 | 5.12 | 96.5 | 0.7: | 1n | 2.0 | |
| 3072 | BU547 | 4 13.9 | + 9 16 | 5.02 | 339.3 | 1.25: | 2n | 2.0 | |
| 3082 | STT77 | 4 15.9 | + 31 42 | 5.06 | 101.7 | 0.70 | 2n | 0.3 | |
| 3102 | HO328 | 4 17.0 | + 19 41 | 5.11 | 6.1 | 0.40 | 1n | 0.7 | |
| 3098 | STF511 | 4 17.9 | + 58 47 | 6.12 | 92.5 | 0.59 | 3n | 0.3 | |
| 3114 | STF520 | 4 18.3 | + 22 49 | 6.08 | 75.7 | 0.47 | 2n | 0.3 | |
| 3105 | STT75 | 4 18.6 | + 60 30 | 4.55 | 5.0 | 0.38 | 2n | 0.2 | |
| 3172 | STT80 | 4 23.6 | + 42 26 | 4.54 | 151.3 | 0.30 | 2n | 0.4 | |
| 3187 | HO15 | 4 24.4 | + 30 08 | 4.93 | 144.5 | 0.7: | 1n | 9.5_9.5 | |
| 3184 | A834 | 4 25.3 | + 56 23 | 5.65 | 220.3 | 0.53 | 2n | 0.8 | |
| --- | KUI17 | 4 25.5 | + 17 56 | 4.13 | 340.0 | 1.5: | 1n | - | |
| 3227 | BU745 | 4 28.7 | + 53 55 | 5.63 | 287.1 | 0.33 | 2n | 0.3 | |
| 3315 | HU1084 | 4 35.7 | + 39 44 | 5.42 | single | | 3n | | |
| 3329 | STT86 | 4 36.6 | + 19 45 | 4.58 | 187.4 | 0.43 | 2n | 0.2 | |
| 3325 | STT85 | 4 37.1 | + 48 24 | 5.18 | 25.5 | 1.30 | 1n | 3.0 | |
| 3358 | STF566 | 4 40.0 | + 53 28 | 4.63 | 209.4 | 0.72 | 4n | 1.2 | AB-C |
| | | | | 6.13 | 204.0 | 0.71 | 3n | 1.3 | |
| 3389 | A1014 | 4 43.2 | + 57 12 | 5.66 | 342.5 | 0.33 | 2n | 0.1 | |
| 3391 | A1013 | 4 43.2 | + 59 32 | 5.16 | 271.5 | 0.26 | 4,3n | 0.0 | |
| | | | | 6.16 | 273.4 | 0.28 | 2n | 0.2 | |
| 3434 | HU612 | 4 47.8 | + 53 18 | 5.09 | 350.2 | 0.57 | 4n | 1.4 | |
| 3483 | BU552 | 4 51.8 | + 13 39 | 4.84 | 209.9 | 0.45 | 1n | 1.5 | |
| | | | | 5.94 | 212.9 | 0.53 | 1n | 2.0 | |
| 3542 | STT91 | 4 56.3 | + 3 11 | 5.50 | 222.5 | 0.43 | 2n | 0.0 | |
| 3536 | DEM5 | 4 57.3 | + 53 45 | 5.08 | single | | 2n | | |
| 3614 | HU445 | 5 01.7 | + 20 50 | 5.58 | 296.2 | 0.39 | 2n | 0.5 | |
| --- | STT89 | 5 04.7 | + 74 04 | 4.42 | 299.7 | 0.33 | 4,6n | 0.9 | |

**Table 3.** continued

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 3672 | STT95 | 5 05.5 | + 19 48 | 5.06 | 301.7 | 0.82 | 4n | 0.4 | |
| 3659 | A1023 | 5 05.5 | + 46 55 | 5.16 | 58.4 | 0.35 | 1n | 1.0 | |
| --- | STT97 | 5 05.6 | + 23 04 | 4.40 | 153.9 | 0.28 | 3n | 0.7 | |
| 3678 | HU1095 | 5 06.5 | + 40 02 | 5.66 | 35.9 | 0.35 | 2n | 0.8 | |
| 3780 | HU821 | 5 14.0 | + 51 26 | 5.64 | no companion seen | | 2n | | |
| 3870 | STF657 | 5 18.8 | + 52 50 | 5.66 | 304.8 | 0.80 | 2,3n | 0.6 | |
| 3936 | STT105 | 5 21.6 | + 12 40 | 5.59 | single | | 2n | | |
| 3932 | STF684 | 5 22.2 | + 45 05 | 5.10 | 147.7 | 1.4: | 1n | 1.8 | |
| 3981 | STF694 | 5 24.1 | + 24 58 | 5.57 | 187.6 | 1.03 | 2,3n | 0.1 | |
| 3956 | STF677 | 5 24.7 | + 63 26 | 6.14 | 134.8 | 0.97 | 2n | 0.7 | |
| 4072 | HU217 | 5 29.7 | + 35 23 | 4.62 | 260.8 | 0.57 | 2n | 1.5 | |
| 4083 | STF715 | 5 30.2 | + 41 17 | 5.05 | 204.2 | 0.72 | 3n | 0.3 | |
| 4187 | DA4 | 5 35.4 | - 4 50 | 4.98 | 207.7 | 1.1 | 2n | 2.3 | |
| 4202 | DA3 | 5 35.9 | - 5 37 | 4.83 | 176.1 | 0.7: | 3n | 0.9 | |
| 4208 | STF749 | 5 37.5 | + 26 55 | 5.07 | 143.7 | 1.00 | 2n | 0.3 | |
| 4279 | BU1052 | 5 41.7 | - 2 54 | 4.10 | 191.3 | 0.56 | 3n | - | |
| 4323 | STT115 | 5 44.5 | + 15 04 | 4.49 | 121.8 | 0.39 | 3n | 0.6 | |
| 4349 | STF787 | 5 46.0 | + 21 19 | 5.28 | 60.6 | 0.71 | 4n | 0.6 | |
| 4373 | HU39 | 5 47.2 | + 21 53 | 5.01 | 221.3 | 0.33 | 4n | 0.1 | |
| | | | | 5.99 | 44.2 | 0.35 | 1n | 0.0 | |
| 4388 | STT119 | 5 47.9 | + 7 58 | 5.64 | 347.5 | 0.74 | 2n | 0.7 | |
| 4376 | STF3115 | 5 49.1 | + 62 49 | 4.79 | 350.6 | 0.73 | 3n | 0.7 | |
| --- | HEI670 | 5 50.0 | + 9 52 | 5.07 | 263.4 | 1.05 | 4n | 2.3 | |
| 4452 | STF799 | 5 52.2 | + 38 34 | 4.51 | 163.5 | 0.66 | 3n | 0.9 | |
| 4472 | BU1053 | 5 53.6 | + 37 20 | 5.65 | 356.1 | 1.56 | 2n | 2.1 | |
| 4505 | STT122 | 5 55.8 | + 36 56 | 4.56 | 86.6 | 0.30 | 3n | 0.1 | |
| 4562 | STT124 | 5 58.9 | + 12 49 | 4.37 | 301.0 | 0.51 | 4n | 1.2 | |
| 4577 | STT125 | 5 59.7 | + 22 28 | 5.65 | 1.2 | 1.40 | 2n | 1.5 | |
| 4603 | STT121 | 6 05.3 | + 74 00 | 5.19 | 227.7 | 0.35 | 1n | 0.5 | |
| 4696 | STT130 | 6 07.8 | + 42 40 | 5.55 | 206.9 | 0.43 | 2n | 1.0 | |
| 4709 | STT132 | 6 08.2 | + 37 59 | 5.22 | 330.6 | 1.60 | 1n | 2.0 | |
| 4799 | AC3 | 6 11.7 | - 4 40 | 5.19 | 202.8 | 0.70 | 3n | 1.5 | |
| 4841 | BU1008 | 6 14.9 | + 22 30 | 4.65 | 258.9 | 1.36 | 2n | 2.0 | |
| 4950 | STF881 | 6 22.1 | + 59 22 | 4.79 | 142.1 | 0.66 | 3n | 1.0 | |
| 4984 | HO25 | 6 22.4 | + 25 14 | 5.12 | 247.6 | 0.7: | 1n | 0.5 | |
| 5042 | STT139 | 6 25.6 | + 22 27 | 6.21 | 253.7 | 0.49 | 2n | 1.4 | |
| 5157 | BU1021 | 6 31.8 | + 28 23 | 5.20 | 77.6 | 0.7: | 1n | 0.6 | |
| 5234 | STT149 | 6 36.4 | + 27 17 | 6.08 | 302.7 | 0.73 | 2n | 1.5 | |
| 5290 | HSTR | 6 39.2 | + 9 39 | 5.16 | 282.4 | 0.73 | 2n | 0.2 | |
| 5296 | STF945 | 6 40.4 | + 40 58 | 4.48 | 322.7 | 0.50 | 3,4n | 0.7 | |
| 5455 | STT157 | 6 47.1 | + 0 20 | 4.19 | 188.3 | 0.33 | 2n | 0.0 | |
| 5447 | STT156 | 6 47.4 | + 18 12 | 4.13 | 224.4 | 0.4 | 2,1n | - | |
| 5586 | STT159 | 6 57.3 | + 58 25 | 3.19 | single | | 3n | | |
| | | | | 4.21 | single | | 2n | | |
| | | | | 5.11 | single | | 1n | | |
| | | | | 6.08 | 218.9 | 0.27 | 3n | 0.8 | |
| 5795 | BU328 | 7 06.7 | - 11 18 | 4.19 | 107.2 | 0.50 | 1n | 1.0 | |
| 5958 | STT170 | 7 17.6 | + 9 18 | 4.76 | 73.8 | 0.66 | 5,6n | 0.4 | |
| | | | | 6.08 | 73.4 | 0.68 | 2n | 0.5 | |
| 5996 | STF1074 | 7 20.5 | + 0 24 | 4.22 | 174.3 | 0.64 | 2n | 0.3 | |
| 6191 | STT174 | 7 35.9 | + 43 02 | 5.18 | 88.5 | 2.00 | 1n | 1.5 | |
| 6240 | STT176 | 7 38.5 | + 0 30 | 5.73 | 220.6 | 1.57 | 2n | 1.8 | |
| 6263 | STF1126 | 7 40.2 | + 5 14 | 6.22 | 166.7 | 0.86 | 1n | 0.3 | |
| 6276 | STT177 | 7 41.7 | + 37 26 | 4.13 | 161.0 | 0.40 | 1n | - | |
| 6291 | STF1130 | 7 41.7 | + 9 42 | 6.19 | 188.1 | 0.29 | 2n | 0.0 | |
| 6378 | WIL15 | 7 48.6 | + 23 08 | 4.69 | 47: | 0.25 | 2n | 0.0 | |
| 6454 | STF1157 | 7 54.8 | - 2 48 | 4.23 | 197.4 | 0.66 | 2n | 0.0 | |
| 6516 | STF1165 | 8 02.1 | + 28 23 | 6.22 | single | | 1n | | |
| 6549 | STT187 | 8 04.1 | + 33 02 | 4.13 | 344.1 | 0.40 | 2n | - | |
| 6545 | STF1172 | 8 04.6 | + 54 45 | 5.22 | 243.6 | 1.66 | 1n | 1.6 | |
| 6548 | A1073 | 8 04.9 | + 58 26 | 5.23 | 153.9 | 0.25 | 2n | 0.0 | |
| 6578 | A1333 | 8 07.1 | + 54 07 | 5.73 | 200.7 | 0.38 | 2n | 0.0 | |
| 6608 | A1074 | 8 11.4 | + 74 22 | 5.17 | 32.5 | 0.62 | 1n | 0.5 | |
| 6650 | STF1196 | 8 12.2 | + 17 39 | 6.28 | 110.9 | 0.70 | 2n | 0.4 | AB |
| | | | | 6.28 | 75.2 | - | 2n | 1.0 | AC |
| 6681 | HU1123 | 8 14.9 | + 36 30 | 6.22 | 154.5 | 0.43 | 1n | 0.5 | |
| 6721 | STF1211 | 8 18.3 | + 38 59 | 6.19 | single | | 2n | | |
| 6762 | STF1216 | 8 21.3 | - 1 36 | 6.19 | 291.6 | 0.58 | 2n | 0.4 | |
| --- | COU74 | 8 39.7 | + 20 05 | 5.19 | 141.4 | 0.42 | 2n | 0.9 | |
| 6930 | BU585 | 8 41.3 | + 20 29 | 5.52 | 85.6 | 0.43 | 3n | 1.5 | |
| 7039 | A2473 | 8 50.7 | + 18 00 | 5.19 | 61.4 | 0.28 | 1n | 0.0 | |
| 7067 | STF1280 | 8 55.7 | + 70 48 | 6.21 | 250.5 | 0.43 | 3n | 0.3 | |
| | | | | 6.46 | 258.1 | 0.44 | 2n | 0.4 | |
| --- | KUI37 | 9 00.6 | + 41 47 | 5.15 | 151.7 | 0.5: | 1n | 2.0 | |
| 7153 | HU720 | 9 03.2 | + 47 40 | 5.17 | 128.3 | 0.68 | 1n | 0.6 | |
| 7169 | J77 | 9 05.1 | + 10 29 | 5.19 | 136.7 | 0.75 | 1n | 0.2 | |

**Table 3.** continued

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7229 | STF1313 | 9 12.4 | + 69 59 | 5.87 | 279.5 | 1.0: | 3,2n | 0.3 |
| 7284 | STF3121 | 9 17.9 | + 28 34 | 6.25 | 1.2 | 0.48 | 2n | 0.2 |
| 7300 | STF1331 | 9 20.9 | + 61 21 | 5.31 | 155.3 | 0.90 | 1n | 0.4 |
| 7307 | STF1338 | 9 21.0 | + 38 11 | 4.26 | 277.9 | 1.00 | 2,1n | - |
| 7348 | STT200 | 9 24.9 | + 51 34 | 6.30 | 334.7 | 1.33 | 2n | 2.1 |
| 7365 | A222 | 9 26.1 | + 28 39 | 6.22 | 13: | 0.25 | 1n | 0.0 |
| 7368 | A4 | 9 26.3 | + 31 09 | 5.19 | 30.0 | 0.80 | 1n | 1.0 |
| --- | B2530 | 9 27.8 | - 6 04 | 4.24 | 151.2 | 0.55 | 3n | 1.0 |
| 7398 | A1985 | 9 30.0 | + 42 16 | 5.19 | 208.6 | 1.35 | 1n | 0.2 |
| 7601 | A2482 | 10 00.0 | + 16 11 | 5.22 | 36.3 | 0.73 | 1n | 0.7 |
| 7624 | HU631 | 10 04.1 | + 32 39 | 5.77 | 260.4 | 0.80 | 2n | 1.4 |
| 7631 | A2142 | 10 05.5 | + 41 03 | 5.22 | 295.7 | 0.95 | 1n | 0.6 |
| 7632 | STT211 | 10 05.7 | + 31 05 | 5.07 | 224.7 | 0.65 | 4n | 0.8 |
| 7758 | STF1429 | 10 25.1 | + 24 38 | 4.34 | 176.4 | 0.59 | 2n | 0.2 |
| | | | | 6.29 | 171.0 | 0.57 | 2n | 0.2 |
| 7775 | STT217 | 10 26.9 | + 17 13 | 4.32 | 144.1 | 0.46 | 2n | - |
| 7779 | STT218 | 10 27.5 | + 3 34 | 5.52 | 138.1 | 0.45 | 3n | 1.0 |
| 7792 | STT220 | 10 29.2 | + 10 09 | 4.63 | 102.5 | 0.53 | 3n | 1.2 |
| 7871 | STT224 | 10 39.7 | + 8 51 | 5.91 | 158.6 | 0.56 | 4n | 0.6 |
| 7874 | PER | 10 40.1 | + 19 15 | 5.25 | 230: | 0.75: | 2n | 2.1 |
| 7896 | A2768 | 10 42.7 | + 3 35 | 6.25 | 272.7 | 0.51 | 2n | 1.2 |
| 7929 | STT229 | 10 48.0 | + 41 07 | 4.77 | 275.2 | 0.67 | 4n | 0.2 |
| 7959 | A2773 | 10 52.6 | + 5 00 | 5.33 | 347.8 | 1.2: | 1n | 1.2 |
| 8094 | STF1517 | 11 13.7 | + 20 08 | 4.25 | 322.0 | 0.46 | 5n | 0.1 |
| | | | | 6.33 | 320.5 | 0.50 | 1n | 0.3 |
| 8102 | STT232 | 11 15.0 | + 37 35 | 5.30 | 241.6 | 0.58 | 5,4n | 0.6 |
| 8119 | STF1523 | 11 18.2 | + 31 32 | 6.28 | 300.0 | 1.38 | 2n | 0.3 |
| 8128 | STF1527 | 11 19.0 | + 14 16 | 5.32 | 52.4 | 0.70 | 3n | 0.8 |
| | | | | 6.33 | 51.5 | 0.65 | 1n | 0.6 |
| 8148 | STF1536 | 11 23.9 | + 10 32 | 6.29 | 113.4 | 1.60 | 4n | 2.5 |
| 8231 | STF1555 | 11 36.3 | + 27 47 | 4.23 | 145.8 | 0.68 | 3n | 0.0 |
| 8302 | BU602 | 11 46.8 | + 15 00 | 5.18 | 123.1 | 0.55 | 2n | 1.8 |
| 8311 | BU603 | 11 48.6 | + 14 17 | 4.67 | 347.0 | 1.0: | 5n | 2.1 |
| | | | | 6.32 | 342.0 | 1.0: | 2n | 2.3 |
| 8446 | STF1606 | 12 10.8 | + 39 53 | 4.23 | 205.3 | 0.30 | 3n | - |
| 8535 | STT249 | 12 23.8 | + 54 10 | 4.37 | 263.8 | 0.37 | 2n | 0.0 |
| 8540 | STT250 | 12 24.1 | + 43 05 | 4.31 | 164.7 | 0.35 | 2n | 0.0 |
| 8569 | STT251 | 12 29.1 | + 31 23 | 4.57 | 61.5 | 0.59 | 4n | 1.2 |
| | | | | 6.44 | 60.1 | 0.66 | 2n | 1.2 |
| 8611 | STT252 | 12 37.2 | + 21 12 | 4.33 | 81.3 | 0.58 | 2n | 0.9 |
| 8630 | STF1670 | 12 41.7 | - 1 27 | 4.33 | 277.7 | 2.36 | 2n | 0.0 |
| 8648 | A1603 | 12 44.1 | + 3 56 | 5.39 | 131.2 | 1.2: | 1n | 9.0-11.5 |
| 8651 | HO256 | 12 44.1 | + 35 46 | 4.34 | 116.3 | 0.64 | 3n | 1.7 |
| 8658 | J432 | 12 45.4 | + 3 31 | 5.38 | 252.4 | 0.97 | 2n | 0.7 |
| 8695 | STF1687 | 12 53.3 | + 21 14 | 4.33 | 177.8 | 1.26 | 2,1n | 2.1 |
| 8739 | BU1082 | 13 00.7 | + 56 22 | 4.57 | 70.1 | 1.38 | 3,4n | 2.6 |
| 8814 | STT261 | 13 12.0 | + 32 05 | 4.35 | 339.4 | - | 1n | 0.7 |
| 8855 | A2585 | 13 18.9 | + 0 30 | 5.35 | 218.2 | 0.73 | 2n | 0.3 |
| 8864 | STF1734 | 13 20.7 | + 2 57 | 4.35 | 178.1 | 0.91 | 2n | 0.5 |
| 8884 | A2489 | 13 23.8 | - 0 44 | 5.94 | 191.6 | 0.62 | 3n | 0.3 |
| 8890 | STF1742 | 13 24.3 | + 1 24 | 5.36 | 358.4 | 1.05 | 1n | 0.3 |
| 9019 | STF1781 | 13 46.1 | + 5 07 | 4.39 | 171.8 | 0.55 | 4n | 0.4 |
| | | | | 5.43 | 171.1 | 0.76 | 3n | 0.3 |
| --- | B2543 | 13 51.9 | + 10 08 | 4.40 | single | | 4n | |
| 9047 | BU614 | 13 53.9 | + 10 09 | 5.42 | 125: | 0.4: | 1n | 1.2 |
| | | | | 5.45 | single | | 2n | |
| 9139 | A1795 | 14 10.9 | + 4 25 | 5.41 | 188.5 | 1.2: | 1n | 2.0 |
| 9159 | STT278 | 14 12.0 | + 44 11 | 4.31 | 294.3 | 0.34 | 2n | 0.4 |
| 9158 | STT277 | 14 12.4 | + 28 43 | 4.32 | 58: | 0.27 | 3n | 0.1 |
| 9180 | HU900 | 14 12.4 | + 76 26 | 5.95 | 225.6 | 0.56 | 2n | 0.5 |
| 9174 | STF1816 | 14 13.9 | + 29 06 | 4.35 | 94.0 | 0.59 | 3n | 0.0 |
| 9177 | STF1817 | 14 14.2 | + 26 42 | 5.40 | 347.1 | 0.37 | 4n | 0.7 |
| 9182 | STF1819 | 14 15.3 | + 3 08 | 5.43 | 207.5 | 0.84 | 2n | 0.2 |
| 9214 | HU901 | 14 18.5 | + 34 12 | 5.39 | 25.5 | 0.58 | 1n | 0.7 |
| 9236 | STF1849 | 14 19.8 | + 76 42 | 6.11 | 7.1 | 0.88 | 3n | 0.5 |
| 9254 | STF1837 | 14 24.7 | - 11 40 | 4.37 | 278.3 | 1.06 | 2n | 1.1 |
| | | | | 6.44 | 278.3 | 1.4: | 1n | 1.2 |
| 9340 | STF1867 | 14 40.7 | + 31 17 | 4.40 | 356.3 | 0.69 | 2,3n | 0.6 |
| 9353 | A1109 | 14 42.9 | + 6 36 | 5.92 | 87.5 | 1.61 | 2n | 2.6 |
| 9392 | STF1883 | 14 48.9 | + 5 57 | 5.47 | 284.5 | 0.80 | 3n | 0.1 |
| 9400 | A1110 | 14 49.7 | + 7 59 | 4.74 | 247.2 | 0.51 | 3n | 0.6 |
| 9420 | HO389 | 14 52.2 | + 20 18 | 5.39 | 85.3 | 1.33 | 2n | 7.0-9.9 |
| 9425 | STT288 | 14 53.4 | + 15 42 | 4.94 | 166.8 | 1.17 | 4n | 0.6 |
| 9426 | BU942 | 14 53.6 | - 0 27 | 5.39 | 186.6 | 1.0: | 1n | 10.5-10.5 |
| 9553 | STF1926 | 15 14.9 | + 38 18 | 5.44 | 241.0 | 0.43 | 3n | 1.3 |
| 9554 | STT295 | 15 15.0 | + 36 49 | 4.93 | 148.7 | 0.51 | 4n | 1.1 |

**Table 3.** continued

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 9568 | A1117 | 15 17.3 | + 9 23 | 5.39 | 358.2 | 0.73 | 2n | 1.1 | |
| 9603 | A573 | 15 20.9 | + 42 43 | 5.39 | 174.8 | 0.55 | 1n | 1.3 | |
| 9619 | A1367 | 15 23.3 | + 36 19 | 5.41 | 151.7 | 0.7: | 1n | 0.0 | |
| 9628 | HU149 | 15 24.6 | + 54 13 | 4.46 | 272.7 | 0.59 | 2n | 0.3 | |
| 9647 | STF1944 | 15 27.7 | + 6 05 | 4.81 | 304.3 | 0.76 | 3n | 0.4 | |
| --- | COU610 | 15 30.9 | + 31 32 | 4.71 | 203.4 | 0.8: | 3n | 2.2 | |
| 9708 | STF1957 | 15 35.9 | + 12 55 | 5.11 | 140.8 | 0.42 | 3n | 1.4 | |
| 9718 | HU652 | 15 36.1 | + 48 49 | 5.62 | 182.4 | 1.20 | 1n | 0.6 | |
| 9756 | STF1969 | 15 41.4 | + 59 59 | 5.50 | 21.9 | 0.78 | 3n | 0.4 | |
| 9757 | STF1967 | 15 42.7 | + 26 18 | 4.40 | 117.5 | 0.70 | 4,5n | 1.3 | |
| 9794 | A1127 | 15 47.4 | + 59 29 | 5.43 | 287.5 | 0.30 | 1n | 0.0 | |
| 9942 | HU916 | 16 06.5 | + 75 46 | 5.43 | 167.5 | 0.50 | 1n | 0.2 | |
| 9961 | STT306 | 16 11.9 | + 34 24 | 5.36 | single | | 1n | | |
| | | | | 6.44 | 9.5 | 0.25 | 1n | 0.0? | |
| 9970 | STF2028 | 16 12.9 | + 39 21 | 5.41 | single | | 1n | | |
| 9985 | A1136 | 16 13.5 | + 71 47 | 5.42 | 3.3 | 0.70 | 2n | 0.4 | |
| 9975 | A1642 | 16 13.7 | + 46 39 | 5.48 | 186.8 | 0.50 | 2,3n | 0.9 | |
| 10006 | STT309 | 16 19.2 | + 41 40 | 4.48 | 298: | 0.30 | 4n | 0.1 | |
| 10093 | STF2059 | 16 30.9 | + 38 04 | 4.52 | 191.7 | 0.46 | 2n | 0.3 | |
| 10109 | YOU1 | 16 31.6 | + 57 46 | 5.43 | 219.5 | 1.2: | 1n | 1.5 | |
| 10157 | STF2084 | 16 41.3 | + 31 36 | 4.59 | 59.2 | 1.53 | 1n | 2.3 | |
| | | | | 5.53 | 56.3 | 1.42 | 4n | 2.5 | |
| 10169 | J738 | 16 42.1 | + 41 12 | 4.52 | 317.3 | 0.49 | 2n | 0.5 | |
| 10184 | STF2094 | 16 44.2 | + 23 31 | 5.00 | 76.5 | 1.14 | 2n | 0.5 | |
| 10230 | STT315 | 16 51.4 | + 1 13 | 4.71 | 330.7 | 0.42 | 4n | 1.2 | |
| 10277 | STT319 | 16 58.1 | + 15 08 | 5.53 | 63.8 | 0.93 | 2n | 0.5 | |
| 10295 | BU1298 | 16 59.5 | + 9 42 | 4.50 | 132.3 | 0.40 | 1n | 0.3 | |
| 10302 | STT322 | 16 59.7 | + 36 53 | 5.55 | 211.3 | 1.30 | 1n | 2.6 | |
| 10323 | BU822 | 17 03.8 | + 19 42 | 5.39 | 223.9 | 1.44 | 3n | 3.4 | |
| --- | HEI894 | 17 09.6 | + 3 56 | 6.54 | 17.9 | 0.58 | 1n | 0.5 | |
| 10690 | STF2207 | 17 37.0 | + 67 07 | 4.65 | 115.9 | 0.43 | 3n | 0.4 | |
| 10734 | HI41 | 17 39.8 | + 72 56 | 6.05 | 334.6 | 1.06 | 2n | 0.6 | |
| 10722 | STF2203 | 17 41.2 | + 41 39 | 4.54 | 299.6 | 0.69 | 2n | 0.3 | |
| 10742 | HO560 | 17 43.4 | + 33 57 | 5.11 | 86.7 | 1.10 | 5,2n | 0.1 | |
| 10795 | STF2215 | 17 47.1 | + 17 42 | 4.60 | 260.7 | 0.52 | 3n | 1.4 | |
| 10801 | A2185 | 17 48.0 | + 1 35 | 5.60 | 190: | 0.7: | 1n | 9.5-10.2 | |
| 10828 | STT337 | 17 50.5 | + 7 14 | 4.57 | 174.1 | 0.39 | 2n | 0.1 | |
| 10850 | STT338 | 17 52.0 | + 15 20 | 4.60 | 171.1 | 0.76 | 3n | 0.1 | |
| 10852 | HO422 | 17 52.5 | - 5 19 | 6.04 | 14: | 0.4: | 2n | 0.3 | |
| 11006 | STT349 | 17 53.0 | + 83 54 | 4.59 | 49.1 | 0.39 | 3,5n | 0.2 | |
| | | | | 5.56 | 46.1 | 0.42 | 3n | 0.2 | |
| 10874 | STF2243 | 17 53.3 | + 36 05 | 5.03 | 39.3 | 1.14 | 4,2n | 0.4 | |
| 10875 | BU130 | 17 53.3 | + 40 01 | 5.64 | 105.4 | 1.30 | 3n | 2.9 | |
| 10912 | STF2244 | 17 57.1 | + 0 04 | 5.02 | 95.9 | 0.49 | 4n | 0.3 | |
| 11001 | STF2267 | 18 01.6 | + 40 11 | 5.10 | 262.9 | 0.55 | 3n | 0.3 | |
| 11080 | STT524 | 18 07.5 | + 19 40 | 5.03 | 216.1 | 0.36 | 6n | 0.7 | |
| 11110 | STF2283 | 18 09.5 | + 6 08 | 5.64 | 59.8 | 0.64 | 2n | 0.4 | |
| 11155 | STF2292 | 18 12.0 | + 27 39 | 5.64 | 274.0 | 0.91 | 2n | 0.3 | |
| 11311 | STT353 | 18 20.8 | + 71 20 | 4.74 | 276.5 | 0.40 | 2n | 1.2 | |
| 11334 | STF2315 | 18 25.0 | + 27 23 | 5.07 | 123.9 | 0.68 | 4n | 0.8 | |
| 11339 | BU1203 | 18 26.3 | + 0 47 | 4.50 | 153.5 | 0.38 | 1n | 0.0 | |
| 11484 | STT357 | 18 31.0 | + 11 39 | 5.58 | 87.1 | 0.39 | 2n | 0.0 | |
| 11432 | STT354 | 18 32.0 | + 6 47 | 5.02 | 202.3 | 0.67 | 4n | 0.6 | |
| 11483 | STT358 | 18 35.9 | + 16 59 | 5.58 | 157.0 | 1.62 | 1n | 0.2 | |
| 11584 | STT363 | 18 37.4 | + 77 41 | 4.48 | 347.6 | 0.25 | 1n | 0.0 | |
| | | | | 4.74 | single | | 1n | | |
| | | | | 6.43 | 339.6 | 0.25 | 3n | 0.3 | |
| 11524 | HU198 | 18 38.3 | + 8 50 | 4.72 | 138.8 | 0.44 | 4n | var | |
| 11530 | HO87 | 18 38.6 | + 16 32 | 6.50 | 247.8 | 0.28 | 2n | 0.0 | |
| 11566 | HO437 | 18 40.6 | + 31 38 | 5.09 | 137.3 | 0.38 | 4n | 0.1 | |
| 11617 | STF2369 | 18 43.9 | + 2 37 | 5.49 | 62.5 | 0.39 | 2n | 0.6 | |
| 11661 | STF2403 | 18 44.3 | + 61 03 | 5.57 | 275.6 | 0.96 | 2n | 2.1 | |
| 11763 | STF2409 | 18 51.7 | + 13 31 | 6.46 | 20.9 | 0.8: | 1n | 1.2 | |
| 11871 | BU648 | 18 57.0 | + 32 54 | 4.58 | 353.0 | 0.62 | 2n | 2.2 | |
| | | | | 5.54 | 350.2 | 0.68 | 2n | 2.2 | |
| 11869 | STF2422 | 18 57.2 | + 26 05 | 5.54 | 76.7 | 0.82 | 2n | 0.5 | |
| 11956 | STF2437 | 19 01.9 | + 19 11 | 4.63 | 20.2 | 0.52 | 2n | 0.3 | |
| 11971 | STF2434 | 19 02.7 | - 0 42 | 5.48 | 305.5 | 0.54 | 8n | 1.0 | BC |
| --- | COU1614 | 19 06.1 | + 35 48 | 6.46 | 133.7 | 0.45 | 1n | 0.7 | |
| 12334 | HU1300 | 19 20.2 | + 34 10 | 6.46 | 184.4 | 0.8: | 1n | 1.4 | |
| --- | COU1937 | 19 22.3 | + 37 59 | 6.46 | 252: | elong. | 1n | 0.0 | |
| --- | COU1317 | 19 26.4 | + 33 04 | 6.46 | 294.5 | 0.40 | 1n | 0.0 | |
| 12667 | STT377 | 19 36.6 | + 35 49 | 5.25 | 214.2 | 0.86 | 2n | 0.2 | |
| 12786 | BU145 | 19 41.3 | + 30 43 | 5.16 | 275.4 | 0.83 | 2n | 1.8 | |
| 12798 | STT382 | 19 41.9 | + 27 23 | 5.22 | 330.3 | 0.30 | 2n | 0.2 | |
| 12831 | STT383 | 19 42.9 | + 40 43 | 5.66 | 16.1 | 0.91 | 3n | 1.0 | |

**Table 3.** continued

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 12904 | STT385 | 19 45.9 | + 40 33 | 5.77 | 50.6 | 1.20 | 1n | 2.1 |
| 12972 | STT387 | 19 48.7 | + 35 19 | 5.81 | 148.3 | 0.61 | 2n | 0.5 |
| 13055 | HO580 | 19 52.5 | + 22 28 | 4.60 | 276.0 | 0.65 | 2n | 0.5 |
| 13277 | STT395 | 20 02.0 | + 24 56 | 4.18 | 119.5 | 0.87 | 2,3n | 0.4 |
| 13756 | STT526 | 20 16.5 | + 81 20 | 5.61 | 159.5 | 1.20 | 1n | 2.0 |
| 13660 | BAR11 | 20 18.0 | + 33 12 | 5.21 | 199: | 0.29 | 4n | 0.1 |
| 13682 | STT405 | 20 18.7 | + 33 14 | 5.69 | 153.4 | 0.63 | 2n | 0.9 |
| 13887 | S,h323 | 20 28.9 | - 17 49 | 5.03 | 192.2 | 1.18 | 2n | 1.6 |
| 13920 | BU63 | 20 30.3 | + 10 54 | 5.47 | 350.5 | 1.00 | 1n | 2.2 |
| 14233 | STF2723 | 20 44.9 | + 12 19 | 4.66 | 129.2 | 0.88 | 4n | 1.2 |
| 14296 | STT413 | 20 47.4 | + 36 29 | 3.70 | 11.0 | 0.88 | 2n | - |
| 14421 | STT418 | 20 54.8 | + 32 42 | 3.98 | 283.3 | 1.08 | 2n | 0.0 |
| 14505 | STT424 | 20 59.3 | + 15 43 | 4.33 | 306.7 | 0.46 | 3n | 0.8 |
| 14666 | STT527 | 21 08.0 | + 5 09 | 4.68 | 127: | 0.25 | 2n | 0.0 |
| 14738 | STT430 | 21 12.0 | + 24 10 | 4.73 | 201.2 | 1.55 | 2,1n | 2.5 |
| 14839 | BU163 | 21 18.6 | + 11 34 | 4.61 | 256: | 0.3: | 1n | - |
| | | | | 5.77 | 261.2 | 0.43 | 1n | 1.0 |
| 14894 | STT435 | 21 21.4 | + 2 54 | 5.72 | 237.9 | 0.59 | 2n | 0.2 |
| 15109 | BU74 | 21 35.2 | + 21 24 | 5.81 | 333.1 | 1.20 | 1n | 2.1 |
| 15115 | HU371 | 21 35.4 | + 24 27 | 5.31 | 301.5 | 0.33 | 4n | 0.1 |
| 15177 | STT445 | 21 39.3 | + 20 43 | 5.84 | 121.5 | 0.90 | 2n | 0.3 |
| 15215 | STT448 | 21 41.0 | + 29 21 | 4.27 | 186.8 | 0.35 | 3n | 0.0 |
| 15270 | STF2822 | 21 44.1 | + 28 45 | 4.71 | 303.2 | 1.89 | 3n | 1.4 |
| 15460 | STT456 | 21 55.5 | + 52 31 | 5.87 | 35.4 | 1.60 | 1n | 0.7 |
| 15452 | STT452 | 21 55.7 | + 7 15 | 5.34 | 179.7 | 0.70 | 2n | 0.8 |
| 15467 | STT457 | 21 55.7 | + 65 19 | 4.90 | 244.5 | 1.09 | 1n | 2.2 |
| 15464 | STT453 | 21 56.5 | + 7 14 | 5.34 | 270.2 | 0.73 | 2n | 0.8 |
| 15707 | STT464 | 22 11.3 | + 40 11 | 4.73 | 162: | 0.28: | 4n | 0.1 |
| 15794 | HO180 | 22 15.7 | + 43 54 | 4.83 | 240.4 | 0.60 | 1n | 0.3 |
| 15956 | BU291 | 22 27.6 | + 4 32 | 5.81 | 219.9 | 0.25 | 2n | 0.4 |
| 15988 | STF2912 | 22 30.0 | + 4 26 | 5.81 | 119.1 | 0.54 | 2n | 1.2 |
| 16173 | HO296 | 22 40.9 | + 14 33 | 3.67 | 51.5 | 0.51 | 1,2n | - |
| 16214 | STT476 | 22 43.1 | + 47 10 | 3.83 | 305.3 | 0.50 | 1n | 0.3 |
| 16326 | A632 | 22 52.0 | + 57 42 | 5.86 | 157.0 | 0.75 | 4n | 0.9 |
| 16393 | STT484 | 22 56.2 | + 72 50 | 4.91 | 103.0 | 0.38 | 1n | 0.7 |
| 16428 | STT483 | 22 59.2 | + 11 44 | 4.30 | 325.0 | 0.50 | 2n | 1.4 |
| | | | | 5.80 | 326.3 | 0.48 | 3n | 1.4 |
| 16469 | STT487 | 23 01.2 | + 80 47 | 4.72 | 10: | 0.23: | 1n | - |
| 16665 | BU80 | 23 18.9 | + 5 24 | 5.81 | 348.7 | 0.41 | 2n | 0.8 |
| 16731 | STT495 | 23 24.1 | + 57 32 | 4.37 | 115.5 | 0.32 | 2n | 0.2 |
| 16748 | HO489 | 23 25.9 | + 27 42 | 4.83 | 229.8 | 0.50 | 1n | 0.0 |
| 16807 | STT497 | 23 30.9 | + 9 29 | 5.81 | 216.8 | 1.50 | 1n | 0.8 |
| 16836 | BU720 | 23 34.0 | + 31 20 | 4.83 | 90.9 | 0.53 | 2n | 0.4 |
| 16877 | STT500 | 23 37.5 | + 44 26 | 5.12 | 1.4 | 0.53 | 3n | 0.9 |
| 16937 | STT503 | 23 42.1 | + 20 18 | 3.87 | 130.4 | 1.2: | 1n | 0.5 |
| --- | B2547 | 23 48.6 | + 36 16 | 4.84 | 20.4 | 0.25 | 1n | 0.5 |
| 17020 | STT507 | 23 48.6 | + 64 53 | 3.83 | 313.7 | 0.65 | 1n | 0.4 |
| 17022 | STT508 | 23 48.8 | + 62 13 | 4.92 | 197.2 | 1.35 | 1n | 2.4 |
| 17050 | STT510 | 23 51.6 | + 42 05 | 5.16 | 120.6 | 0.50 | 3n | 0.3 |

**Table 4.** Residuals of 106 orbits and notes

| ADS | Calc. year | Residuals | |
|---|---|---|---|
| 17175 | Hall 1949 | - 7.4 | - |
| requires revision. also measured by CHARA and Heintz with the same tendency. | | | |
| 161 | Heintz 1979 | + 2.6 | + 0.08 |
| 746 | Couteau 1984 | + 2.3 | + 0.02 |
| 784 | Heintz 1978 | - 2.3 | 0.0 |
| 805 | Popovic&Pavlovic 1997 | + 3.1 | + 0.03 |
| | Zulevic 1997 | + 4.1 | 0.0 |
| 940 | Baize 1958 | - 2.7 | + 0.03 |
| 1359 | Popovic&Pavlovic 1995 | + 3.3 | + 0.07 |
| 1411 | Heintz 1997 | - 3.5 | - 0.06 |
| 1631 | Heintz 1996 | - 1.9 | - 0.01 |
| 1630 | Muller 1957 | + 1.9 | 0.0 |
| 1786 | Heintz 1995 | - 2.6 | + 0.04 |
| 2043 | Heintz 1962 | - 1.2 | - 0.10 |
| 2236 | Heintz 1990 | - 6.1 | + 0.01 |
| probably measurement error | | | |
| 2336 | Heintz 1982 | + 2.7 | - 0.02 |
| 2436 | Heintz, u | - 0.9 | 0.0 |
| 2459 | Valbousquet 1981 | + 5.8 | - 0.25 |
| | Popovic&Zivkov 1997 | + 4.1 | - 0.12 |
| 2755 | Popovic&Pavlovic 1995 | + 4.4 | - 0.03 |
| The rectilinear solution given by the same authors for this star is better. | | | |

**Table 4.** continued

| | | | | | |
|---|---|---|---|---|---|
| 2765 | Heintz 1973 | + 5.6 | - 0.06 | | |
| 2963 | Baize 1958 | - 0.6 | + 0.01 | | |
| 3082 | Scardia 1983 | + 0.1 | + 0.03 | | |
| 3102 | Heintz 1978 | - 0.6 | - 0.04 | | |
| 3098 | Heintz 1995 | - 0.4 | + 0.10 | | |
| 3114 | Heintz 1982 | + 1.9 | + 0.02 | | |
| 3358 | Heintz 1995 | + 6.6 | - 0.03 | + 1.6 | - 0.04 |
| 3389 | Heintz 1976 | - 3.4 | - 0.01 | | |
| 3391 | Docobo&Costa 1990 | - 4.6 | 0.0 | - 4.6 | + 0.01 |
| 3434 | Heintz 1979 | - 5.4 | + 0.05 | | |
| 3483 | Heintz 1984 | + 6.7 | - 0.01 | + 4.6 | + 0.06 |
| 3614 | Baize 1957 | + 2.9 | - 0.06 | | |
| STT89 | Alzner 1996 | - 1.8 | - 0.08 | | |
| 3956 | Heintz 1995 | - 2.2 | - 0.12 | | |
| 4279 | Heintz 1995 | - 3.0 | + 0.02 | | |
| 4373 | Alzner 1996, e=0.28 | - 1.8 | - 0.02 | + 1.6 | 0.0 |
| | Alzner 1998, e=0.95 | - 2.8 | + 0.01 | + 0.4 | + 0.02 |
| 4505 | Heintz 1995 | + 2.6 | - 0.03 | | |
| 4562 | Baize 1988 | - 0.8 | + 0.05 | | |
| 4603 | Docobo&Prieto 1995 | + 4.0 | + 0.06 | | |
| 4841 | Baize 1980 | + 1.5 | - 0.21 | | |
| 5042 | Heintz 1962 | - 2.6 | - 0.08 | | |
| 5234 | Heintz 1993 | - 1.5 | + 0.07 | | |
| 5455 | Heintz 1973 | + 2.3 | - 0.04 | | |
| 5447 | Baize 1992 | + 0.5 | 0.0 | | |
| 5586 | Baize 1993 | - 6.2 | - 0.02 | | |
| no other new measures are known | | | | | |
| 5958 | Popovic 1982 | + 4.7 | + 0.13 | + 7.9 | + 0.22 |
| the orbit has to be revised | | | | | |
| 6276 | Heintz 1982 | + 4.1 | - 0.05 | | |
| 6291 | Baize 1984 | -20.3 | + 0.01 | | |
| | Alzner 1998 | - 1.5 | - 0.08 | | |
| 6549 | Morel 1970 | - 0.1 | + 0.05 | | |
| 6548 | Heintz 1997 | + 3.3 | - 0.02 | | |
| 6650AB | Heintz 1996 | - 0.3 | 0.0 | | |
| 6650AC | Heintz 1996 | + 0.1 | - | | |
| 6762 | Docobo,Ling&Prieto 1994 | - 1.3 | + 0.07 | | |
| 7067 | Heintz 1997 | + 3.6 | 0.0 | + 3.0 | + 0.02 |
| KUI37 | Hartkopf,McAlister &Frantz 1989 | - 2.8 | - | | |
| | Heintz 1997 | + 1.4 | - | | |
| 7284 | van den Bos 1938 | - 2.9 | 0.0 | | |
| 7307 | Arend 1953 | - 1.3 | - 0.04 | | |
| B2530 | Heintz 1989 | - 0.8 | + 0.08 | | |
| 7758 | Zulevic 1981 | + 4.1 | - 0.06 | + 0.4 | - 0.08 |
| 7775 | Heintz 1975 | - 1.5 | - 0.14 | | |
| 7871 | Heintz 1983 | - 3.0 | - 0.02 | | |
| 7896 | Heintz 1988 | - 0.9 | + 0.09 | | |
| | Hartkopf,McAlister &Frantz 1989 | - 1.1 | + 0.08 | | |
| 7929 | Alzner 1996 | + 2.5 | - 0.06 | | |
| 8119 | Heintz 1995 | + 0.5 | + 0.04 | | |
| | Mason,McAlister, Hartkopf& Shara1995 | - 1.5 | + 0.01 | | |
| 8128 | Popovic&Pavlovic 1995 | - 2.4 | + 0.01 | | |
| 8148 | Heintz 1986 | - 1.4 | - 0.03 | | |
| 8311 | Heintz 1991 | + 2.7 | - | - 1.4 | - |
| 8446 | Heintz, u | - 3.2 | + 0.03 | | |
| 8659 | Baize 1957 | + 4.7 | - 0.06 | + 2.9 | 0.0 |
| | Heintz, u | - 1.1 | - 0.03 | - 0.9 | + 0.03 |
| 8630 | Heintz 1990 | - 0.6 | - 0.05 | | |
| 8695 | Heintz 1973 | + 0.9 | + 0.14 | | |
| 8739 | Heintz 1981 | + 0.1 | - 0.11 | | |
| 8884 | Alzner 1996, P=100 | - 0.6 | + 0.09 | | |
| A longperiodic solution with P=450, T=1928, a=0.66, e=0.57, i=105, omega=53.5, node=9.6, favoured by the author, was sent to the Circular No.128 together with the shortperiodic one, but was not published there. Shortperiodic solutions seem to be ruled out now by Heintz' and Hipparcos' measurements, but also the P=450 orbit does not fit the Hipparcos distance 0."778 well. Any longperiodic orbit will stay undetermined for many years. No speckle measurements. | | | | | |
| 9019 | Heintz 1986 | + 6.5 | - 0.07 | + 3.8 | + 0.11 |
| 9159 | Heintz 1995 | - 3.7 | + 0.04 | | |
| 9182 | Baize 1987 | + 4.6 | + 0.02 | | |
| | Houser 1987 | - 2.4 | - 0.05 | | |
| 9392 | Feierman 1969 | - 0.1 | + 0.03 | | |
| 9425 | Heintz, u | - 0.9 | - 0.09 | | |
| | Zulevic 1994 | - 0.5 | - 0.09 | | |

**Table 4.** continued

| | | | | | |
|---|---|---|---|---|---|
| 9756 | Heintz 1975 | - 3.2 | - 0.09 | | |
| 9757 | Hartkopf, McAlister&Frantz1989 | + 1.1 | + 0.03 | | |
| 9975 | Baize 1993 | + 0.5 | - 0.03 | | |
| 10157 | Heintz 1994 | - 2.6 | + 0.04 | - 0.5 | 0.0 |
| 10230 | Baize 1983 | +28.4 | + 0.11 | | |
| The orbit has to be revised | | | | | |
| 10795 | Popovic&Pavlovic 1995 | - 0.7 | - 0.06 | | |
| 11006 | Heintz 1995 | - 0.3 | - 0.03 | - 3.6 | 0.0 |
| starting retrograde motion? | | | | | |
| 11080 | Heintz 1995 | + 3.1 | + 0.02 | | |
| 11334 | Heintz 1960 | + 0.9 | - 0.08 | | |
| 11339 | Popovic&Pavlovic 1995 | + 4.4 | - 0.06 | | |
| 11484 | Valbousquet 1981 | + 1.3 | + 0.02 | | |
| 11483 | Heintz 1995 | - 0.2 | - 0.01 | | |
| 11524 | Baize 1980 | + 4.5 | + 0.01 | | |
| 11530 | Baize 1987 | + 1.5 | - 0.02 | | |
| 11871 | Heintz 1994 | - 1.9 | - 0.14 | + 2.0 | - 0.04 |
| 11971 | Alzner 1996 | + 3.4 | - 0.03 | | |
| 12972 | Heintz 1996 | - 1.1 | - 0.06 | | |
| 13887 | Heintz 1986 | - 3.8 | + 0.02 | | |
| 14296 | Baize 1983 | + 0.7 | - 0.04 | | |
| 14839 | Heintz 1995 | + 0.6 | + 0.01 | | |
| 15115 | Baize 1961 | - 7.0 | + 0.02 | | |
| 15215 | Alzner 1996 | - 1.1 | + 0.02 | | |
| 15270 | Heintz 1995 | - 1.7 | - 0.04 | | |
| 15988 | Zulevic, Circ. 106 | + 1.5 | + 0.02 | | |
| 16173 | Heintz 1986 | - 4.3 | + 0.02 | | |
| 16326 | Baize 1983 | - 1.3 | + 0.03 | | |
| | Heintz 1991 | - 2.6 | + 0.05 | | |
| 16428 | Heintz 1996 | - 0.6 | - 0.01 | - 3.0 | - 0.02 |
| 16665 | Heintz 1995 | - 1.5 | - 0.06 | | |
| 16836 | Baize 1976 | - 2.1 | 0.0 | | |
| 16877 | Zulevic 1981 | - 4.3 | + 0.06 | | |
| 17020 | Zulevic 1977 | + 4.4 | - 0.09 | | |