No. 51 MICROMETRIC MEASURES OF DOUBLE STARS

by G. VAN BIESBROECK

May 15, 1965

The present series of measures is the continuation of the observations published in Vol. IX, Part II, of the *Publications of the Yerkes Observatory* (1960). The four different telescopes at which these measurements were made are, in order of aperture, the 36-inch reflector of the McDonald Observatory, the 40-inch refractor of the Yerkes Observatory, the 82-inch reflector of the McDonald Observatory, and lastly, the 84-inch reflector of the Kitt Peak National Observatory. Rather than indicating which instrument was used for each measure, the dates of observation are listed to enable the reader to identify the telescope employed:

Date	*Telescope*
Before 1959	36″
59.624 to .660	36
59.950	82
60.523 to .601	82
60.870	40
61.097	40
61.201 to .265	36
61.330 to .428	40
61.551 to .580	40
61.864	36
62.288	36
62.285 to .313	82
62.373	40
62.690 to .710	36
62.953 to .959	36
63.334 to .359	36
64.090	82
64.404 to .408	82
After 64.78	84

The telescopes generally used for double-star work are of smaller aperture than the four mentioned above. Therefore, I devoted my attention whenever possible to the very close binaries and to the others that passed near periastron. Only when the seeing conditions were not adequate was the micrometer used on wider pairs, preference being given to those that are too faint to be reliably measurable with smaller instruments.

The star positions are referred to the equinox of 1950. For identification, the BD number has been added except when the star is bright enough to have a Greek letter designation. The magnitudes are on the Harvard scale and mostly taken (as were the spectra) from the new Index Catalogue (IDS) (Jeffers, van den Bos, and Greeby, 1963).

Comparisons have been made with the latest available orbits and are given in the notes. Also added are dynamical parallaxes whenever the accumulated material suffices for a good determination. For them the precepts of H. N. Russell and C. E. Moore were used (1940). Many of these dynamical parallaxes supersede earlier determinations from shorter arcs.

Acknowledgments. This work has been supported by Grant No. GP-2335 from the National Science Foundation which is hereby gratefully acknowledged.

REFERENCES

Jeffers, Hamilton M., van den Bos, Willem H., and Greeby, Frances M. 1963, "Index Catalogue of Visual Double Stars, 1961.0," *Publications of the Lick Observatory, 21,* parts 1 and 2 (Mount Hamilton: University of California Printing Department).

Russell, Henry N. and Moore, C. E. 1940, "The Masses of the Stars with a General Catalogue of Dynamical Parallaxes," *Astrophysical Monographs* (Chicago: University of Chicago Press).

Van Biesbroeck, G. 1960, "Measurements of Double Stars," *Publications of the Yerkes Observatory,* 9, part 2 (Chicago: University of Chicago Press).

2 Mlb 106

$0^h0^m.0$ +59°26' 10.5-10.7

59.638	43°.5	2".06
59.646	41.7	2.10
59.950	41.4	1.81
60.618	44.8	2.11
59.96	42.9	2.02 4n

13 β 861 +68°1422

$0^h0^m.5$ +69°25' 10.5-10.9

59.638	180°.7	1".56	Δm = 0.4
59.646	176.6	1.64	
59.950	178.3	1.75	Δm = 0.4
59.74	178.5	1.65 3n	

Change questionable. The Δm is certainly much smaller than $1^m.3$ given in ADS.

25 J 628

$0^h1^m.4$ +21°13' 10.5-10.5

60.870	194°.3	3".38
61.842	194.0	3.34
61.36	194.2	3.36 2n

No change since 1911.
Identified as Par. ph. +22°, 0^h0^m, No. 185 which gives the corrected position.

34 β 862 +37°4930

$0^h2^m.2$ +37°54' 10.1-10.4

59.656	325°.8	0".24
60.618	328.6	0.28
60.14	327.2	0.26 2n

Couteau's orbit (1959) gives the residuals -0°.8 and 0".00.

62 J 143 +12°5065

$0^h3^m.5$ +12°59' 11.8-11.7

59.942	89°.5	2".45
59.964	88.2	2.65
60.722	89.7	2.44
60.870	89.0	2.61
60.37	89.1	2.54 4n

Distance increasing.

80 Kü 3 +19°2

$0^h4^m.9$ +20°13' 10.2-10.2

61.664	80°.7	0".93
61.718	79.4	0.96
61.820	81.6	0.82
62.645	78.8	0.91
62.710	80.3	0.92
64.740	78.0	1.06
65.034	80.5	1.08
62.90	79.9	0.95 7n

Unchanged since 1901.

97 Mlb 37 +56°5

$0^h5^m.9$ +56°45' 10.9-11.0

59.624	199°.9	3".00
59.638	198.5	2.96
59.646	198.7	3.00
59.950	198.1	2.95
59.71	198.8	2.98 4n

Unchanged since 1918.

134 Kr 1 +57°23

$0^h8^m.3$ +57°34' 10.0-10.5

61.580	192°.8	2".48
61.716	191°.9	2".51
61.842	194.2	2.54
61.71	193.0	2.51 3n

The increase in distance indicates dp = 0".023.

143 Σ 7 +55°15

$0^h9^m.0$ +55°41' 7.9-9.4 B8

61.580	214°.1	1".57
61.710	211.2	1.72
61.718	210.9	1.79
61.842	213.2	1.72
61.71	212.3	1.70 4n

Very small change in 130 years.

147 β 255 +27°12

$0^h9^m.3$ +28°9' 8.5-8.8 F5

59.638	87°.3	0".70
59.646	87.6	0.67
59.950	85.4	0.59
60.601	87.5	0.60
60.615	86.6	0.58
61.718	83.7	0.64
61.771	86.4	0.59
61.820	88.9	0.69
60.73	86.7	0.63 8n

Slow decrease in angle and increase in distance corresponding to dp = 0".0041.

148 β1026 +52°19

$0^h9^m.5$ +53°21' 7.2-8.0 F0

59.656	332°.3	0".36
59.939	335.9	0.40
59.950	329.3	0.42
60.618	336.7	0.37
60.04	333.6	0.39 4n

Baize's orbit (1955) gives the residuals +6°.0 and +0".04.

202 Es 865 +51°33

$0^h13^m.2$ +52°16' 10.9-11.1

AB

59.638	356°.9	1".41
59.656	355.1	1.23
59.950	356.1	1.23
60.618	359.0	1.12
59.97	356.8	1.25 4n

AC

60.618	72°.8	11".90

AC is unchanged but there is a large change in AB.

207 Σ 13 +76°5

$0^h13^m.4$ +76°40' 6.7-7.2 B9

59.624	68°.3	0".96
59.638	65.5	0.80
59.646	67.5	0.86
59.64	67.1	0.87 3n

How completely undeterminate the elements still are is shown by the nearly similar residuals from the orbit of Rabe (1961) with a period of 720 years and that of Heintz (1960) with a period of 1600 years:

Rabe	+3°.6	+0".04
Heintz	+3.5	0.00

274 J 630 +20°26

$0^h17^m.6$ +21°13' 10.0-10.6

62.940	118°.4	2".55
64.037	117.0	2.67
63.49	117.7	2.61 2n

Change questionable.

285 AC 1 +32°48

$0^h18^m.3$ +32°42' 7.5-8.0 F5

59.624	290°.3	1".60
59.638	290.2	1.50
59.646	288.5	1.49
59.64	289.7	1.53 3n

Slow change in both coordinates making dp = 0".018.

287 β 1093 +10°32

$0^h18^m.3$ +10°42' 7.0-7.9 A0

61.820	103°.5	0".54 1n

Long period binary with dp = 0".009.

293 OΣ 6 +66°20

AB

$0^h18^m.6$ +66°44' 7.2-9.5 A0

62.701	153°.6	0".47
62.718	150.1	0.51
62.959	155.9	0.43
64.733	149.2	0.54
65.040	149.5	0.46
63.63	151.7	0.48 5n

Muller's orbit (1954) gives the residuals -2°.6 and +0".01.

328 Hu 506 +51°62

$0^h21^m.6$ +51°45' 5.5-8.0 B3

59.656	16°.8	0".17
59.687	11.0	0.14
59.939	19.3	0.14
59.952	10.0	0.17
60.601	19.2	0.18
60.618	16.8	0.18
60.08	15.5	0.16 6n

The distance is hardly changed but the angular motion indicates a period of about 130 years and dp = 0".0030.

344 Ho 210 +35°66

$0^h23^m.0$ +36°12' 8.4-10.1 F0

61.820	78°.7	0".97
62.718	72.8	0.93
62.959	74.0	0.97
65.040	79.7	0.93
63.13	76.3	0.95 4n

Little change in 80 years.

350 OΣ 9 +55°72

$0^h23^m.5$ +56°30' 6.9-9.9 G0

61.716	50°.7	2".43
61.718	52.2	2.26
62.701	50.3	2.25
62.718	54.2	2.23
62.959	54.3	2.15
64.730	50.8	2.26
65.037	54.8	2.28
63.08	52.5	2.27 7n

The small change since 1847 indicates a dp of 0".071.

363 A 431 -8°65

$0^h24^m.6$ - 8°9' 9.1-9.1 G5

60.777	333°.0	0".23
61.820	342.8	0.27
62.718	333.6	0.24
61.77	336.5	0.25 3n

Muller's orbit (1954) gives the residuals +10°.1 and +0".07.

371 Hu 1007 +62°84

$0^h25^m.5$ +63°28' 10.0-10.0 G0

58.660	229°.2	0".44
59.950	223.2	0.46
62.701	229.4	0.45
62.959	227.2	0.37
61.07	227.2	0.43 4n

The slow change corresponds to dp = 0".0067.

465 Hu 511 +49°126

$0^h30^m.9$ +49°50' 9.0-9.6

61.718	178°.0	4".34
61.771	179.3	4.49
62.695	176.0	4.66
62.701	176.5	4.54
62.718	176.7	4.40
64.903	178.2	4.55
62.75	177.4	4.50 6n

Unchanged.

490 Ho 212 13 Cet

$0^h32^m.7$ - 3°52' 5.6-6.4 G0

62.718	262°.8	0".34
62.940	259.7	0.33
64.905	290.3	0.34
64.947	289.1	0.37
65.037	293.0	0.30
62.83	261.2	0.34 2n
64.96	290.8	0.34 3n

The residuals from Luyten's orbit (1933) are:

62.83	+ 9°.8	+0".05
64.97	+ 3.7	+0.10

518 Fox 54 + 7°79

$0^h34^m.6$ + 7°50' 11.4-11.8

61.664	154°.9	1".94
61.820	152.2	2.01
61.74	153.6	1.98 2n

Slow change.

572 A 2204 +16°64

$0^h38^m.8$ +17°17' 10.2-11.1 F8

58.592	339°.3	0".82
59.650	342.2	0.83
59.964	339.0	0.89
59.40	340.2	0.85 3n

Slow increase in angle corresponding to dp = 0".0045.

584 Hu 1012 +76°20

$0^h39^m.6$ +76°43' 9.0-10.5 G5

62.701	160°.1	0".42
62.959	156.8	0.38
62.83	158.4	0.40 2n

Slow motion corresponding to dp = 0".0085.

588 OΣ 18 + 3°93

$0^h39^m.8$ + 3°54' 7.7-9.8 F8

61.738	188°.7	1".54
62.710	184.2	1.65
62.718	185.2	1.46
64.947	186.9	1.54
65.037	184.3	1.60
63.43	185.9	1.56 5n

The residuals from Baize's orbit (1958) are -2°.3 and +0".16.

611 Hu 1015 +64°74

$0^h41^m.2$ +64°45' 9.7-11.0 F5

59.646	316°.1	0".72
59.656	326.4	0.80
62.701	320.2	0.85
62.959	323.2	0.66
61.24	321.5	0.76 4n

Slow angular increase.

616 Σ 52 +45°187

$0^h41^m.4$ +45°58' 7.9-8.9 F5

61.718	12°.5	1".68
61.771	12.5	1.94
61.842	9.3	1.61
62.695	11.6	1.47
62.701	10.8	1.68
62.704	8.2	1.63
62.710	10.3	1.52
62.940	11.3	1.40
64.730	10.7	1.50
65.040	9.0	1.45
62.89	10.6	1.59 10n

The slow change in angle makes dp = 0".006.

684 β 232 +49°215

$0^h47^m.6$ +50°22' 8.5-9.0 F5

59.638	223°.6	0".60
59.646	228.4	0.61
59.939	223.4	0.54
60.601	229.0	0.50
60.615	226.8	0.61
60.618	225.8	0.63
60.18	226.2	0.58 6n

The residuals from my orbit (1954) are +2°.3 and -0".08.

692 β 781 +68°56

$0^h48^m.4$ +68°43' 8.7-9.2 A2

61.718	22°.1	0".92
61.842	23.0	1.14
61.78	22.6	1.03 2n

The slow decrease in angle makes dp = 0".010.

713 Hu 201 -14°152

$0^h49^m.6$ -13°30' 10.0-10.6 K0

62.713	84°.3	0".44
62.940	88.5	0.52
62.959	85.0	0.44
64.905	87.1	0.48
64.947	89.4	0.55
63.69	86.9	0.49 5n

The residuals from Couteau's orbit (1961) are -1°.2 and -0".05.

715 A 2306 +16°83

$0^h49^m.8$ +17°24' 9.8-10.7 F8

59.646	302°.8	1".29
59.964	299.7	1.19
60.774	304.2	1.31
60.870	303.7	1.14
60.31	302.6	1.23 4n

Hardly changed since 1910.

746 OΣ 20 +18°122

$0^h51^m.9$ +18°55' 6.1-7.2 A0

60.722	252°.8	0".54
60.765	251.1	0.50
60.774	252.5	0.56
61.820	249.0	0.52
61.842	251.5	0.47
61.921	253.9	0.49
61.31	251°.8	0".51 6n

The residuals from Couteau's orbit (1963) are +2°.7 and +0".02.

763 A 2209 +18°127

$0^h52^m.6$ +18°40' 10.2-10.2

60.765	333°.9	1".54
60.774	333.6	1.72
60.870	337.5	1.76
60.80	335.0	1.67 3n

Hardly changed in 50 years.

789 Ho 307 +31°147

$0^h54^m.0$ +31°56' 10.1-10.3

64.730	86°.9	2".86
65.037	87.8	3.05
64.88	87.4	2.96 2n

The increase in distance makes dp = 0".013.

795 Hn 4 +53°184

$0^h54^m.6$ +54°8' 9.0-9.5 G0

60.601	150°.8	0".46
62.701	156.8	0.46
62.940	153.1	0.46
62.964	153.5	0.48
62.30	153.5	0.47 4n

To the increase in angle and decrease in distance corresponds dp = 0".019.

828 β 867 +11°130

$0^h57^m.6$ +11°40' 9.3-9.8 F5

59.656	147°.7	0".31
59.964	147.2	0.28
59.81	147.4	0.30 2n

Large change in both coordinates making dp = 0".028.

836 A 2901 +68°64

$0^h58^m.2$ +69°05' 7.5-7.5 B9

62.701	49°.1	0".39
62.940	47.2	0.40
62.959	43.5	0.35
65.037	45.8	0.43
65.040	43.4	0.38
63.74	45.8	0.39 5n

To the increase in both coordinates corresponds dp = 0".005.

845 A 927 +45°257

$0^h58^m.9$ +46°19' 9.4-9.9

59.638	359°.7	3".00
59.646	360.5	2.68
60.601	359.4	2.82
59.96	359.9	2.83 3n

Slow motion indicating dp = 0".021.

859 β 1161 +51°216

$1^h0^m.0$ +51°32' 7.2-8.0 B5

62.701	359°.6	0".40
62.940	362.5	0.42
64.730	358.8	0.45
65.040	361.4	0.44
63.85	360.6	0.43 4n

To the slow increase in angle corresponds dp = 0".0067.

869 J 874

$1^h0^m.6$ +22°16' 9.5-12.0

62.953	305°.0	2".67
62.959	302.6	2.50
62.96	303.8	2.58 2n

Slow decrease in angle.

896 AG 14 +20°154

$1^h2^m.9$ +20°52' 9.7-10.1 K0

59.964	111°.1	0".36
62.959	99.4	0.32

A pair to watch as it closes in and speeds up in angle. dp comes out 0".017.

902 β 1228 +12°133

$1^h3^m.2$ +13°3' 9.9-11.0 G0

59.646	259°.1	0".76
59.964	264.8	0.74
60.774	266.2	0.73
61.820	264.5	0.78
60.55	263.6	0.75 4n

Practically unchanged in 70 years.

967 β 1162 +35°215

$1^h7^m.8$ +35°41' 9.9-10.1 A5

60.618	145°.8	0".34
62.959	149.0	0.33
61.79	147.4	0.34 2n

Hardly changed in 70 years.

989 Hu 1024 +50°240

$1^h10^m.2$ +50°50' 9.4-10.2

59.646	206°.6	0".85
59.964	204.5	0.68
59.80	205.6	0.76 2n

No material change in 55 years.

999 β 1100 +60°193

$1^h11^m.6$ +60°41' 8.3-8.3 F5

59.687	53°.3	0".30
59.964	52.4	0.36
60.601	56.0	0.37
60.08	53.9	0.34 3n

Muller's orbit (1958) gives the residuals +8°.4 and -0".05.

1058 Mlb 186

$1^h16^m.3$ +64°2' 9.7-10.3

59.638	235°.6	2".08
59.646	238.8	1.97
59.964	235.3	1.82
59.75	236.6	1.96 3n

To the advance in angle corresponds dp = 0".024. The star was identified as Vat. ph. 63°3288 which gives the corrected position.

1097 β4 +10°168

$1^h18^m.7$ +11°17' 7.4-7.9 F0

60.774	134°.3	0".28
64.090	131.7	0.32
65.040	131.4	0.27
63.30	132.5	0.29 3n

Muller's orbit (1961) gives the residuals +6°.8 and -0".02.

1123 β 1163 -7°223

$1^h21^m.8$ - 7°10' 6.7-6.9 F0

64.090	213°.8	0".32
64.905	217.0	0.36
65.037	211°.2	0".34
64.68	214.0	0.34 3n

Van den Bos' orbit (1963) gives the small residuals +0°.1 and -0".01.

1145 β 1102 +59°251

$1^h24^m.2$ +60°2' 8.6-10.3 B2

BC

59.646	339°.2	1".06
60.601	342.8	0.82
62.957	339.7	0.81
61.07	340.6	0.90 3n

Hardly changed in 72 years.

1161 AC 14 +42°308

$1^h25^m.3$ +42°31' 8.1-9.1 G5

59.646	96°.7	1".07
59.687	94.2	0.95
60.601	95.3	0.92
60.618	96.1	0.94
60.14	95.6	0.97 4n

Change questionable after a century.

1177 A 2214 +19°243

$1^h26^m.5$ +19°48' 10.2-10.3

58.077	198°.2	0".74
59.687	197.7	0.82
60.588	198.5	0.73
60.774	194.2	0.68
59.78	197.2	0.74 4n

To the small change in angle corresponds dp = 0".006.

1183 A 1910 +22°236

$1^h27^m.0$ +22°34' 7.5-7.7 A0

59.687	161°.9	0".26
60.588	162.9	0.26
60.744	161.6	0.19
65.040	162.3	0.23
61.51	162.2	0.24 4n

The residuals from Muller's orbit (1958) are +5°.9 and 0".00.

L726-8 = UV Ceti

$1^h36^m.4$ -18°12' 12 - 12

61.743	15°.8	2".56
62.340	9.4	2.76
62.959	9.5	2.58
64.905	1.8	2.55
64.947	2.4	2.40
63.38	7.8	2.57 5n

The residuals from Luyten's orbit (1961) are -7°.5 and -0".20.

1294 β 508 +26°276

$1^h36^m.4$ +26°41' 9.8-10.3 F8

60.774	63°.6	0".55
61.743	64.4	0.64
61.844	62.8	0.66
61.45	63.6	0.62 3n

The longer arc makes dp = 0".008.

1345 A 1 -7°282

$1^h39^m.9$ - 7°0' 8.5-9.0 F2

62.718	239°.0	0".72
62.940	234.4	0.70
62.959	232.7	0.68
64.705	234.4	0.83
64.947	236.2	0.87
63.65	235.3	0.76 5n

The longer arc makes dp = 0".016.

1368 Σ 149 +39°393

$1^h41^m.5$ +39°42' 8.3-9.8 F5

61.842	88°.8	1".85
62.701	90.3	1.95
62.718	90.2	2.00
62.940	91.9	2.05
62.55	90.3	1.96 4n

Slow motion in both coordinates making dp = -0".014.

1380 Σ 148 +63°236

$1^h42^m.5$ +63°34' 9.0-9.6 G5

59.638	149°.4	0".89
59.687	150.5	0.97
59.66	150.0	0.93 2n

Slow orbital motion making dp = 0".006.

1432 Hill 1 +65°207

$1^h45^m.9$ +66°2' 8.9-13 A5

59.638	25°.3	3".35
61.842	24.7	3.58
60.74	25.0	3.46 2n

The 0".034 proper motion of the bright component proves the physical connection. Hardly changed after 38 years.

1458 A 2602 -4°281

$1^h47^m.4$ - 4°22' 10.4-10.4 K2

58.598	358°.4	0".45
59.656	360.2	0.54
60.774	361.7	0.39
59.68	0.1	0.46 3n

The change in both coordinates makes dp = 0".006.

1473 Ho 311 +23°246

$1^h48^m.4$ +24°24' 7.6-7.8 A5

60.870	203°.8	0".38
61.743	203.1	0.44
61.921	200.6	0.38
61.51	202.5	0.40 3n

To the slow increase in angle corresponds dp= 0".0020.

1499 J 671

$1^h50^m.1$ +21°37' 9.5-9.7

61.738	155°.8	2".93
61.743	154.5	2.80
61.74	155.2	2.87 2n

No appreciable change in 50 years. In the Paris zone +22°, 1^h44^m, No. 135 the star is marked as "double?" The pair is also Paris +21°, 1^h48^m, Nos. 45 and 46 making 1893.91 157°.0 2".50.

1503 β 260 +14°298

$1^h50^m.5$ +15°11' 8.8-9.5 F5

60.870	251°.4	0".97
61.664	252.6	1.26
61.738	255.7	1.24
61.811	252.6	1.13
61.820	253.8	1.24
61.921	252.9	1.14
61.64	253.2	1.16 6n

To the increase in both coordinates corresponds dp = 0".013.

1530 A 2407 +2°296

$1^h52^m.8$ + 2°43' 9.6-11.6 K0

62.959	190°.2	0".69
64.740	193.4	0.79
63.85	191.8	0.74 2n

Both coordinates increase making dp = 0".007.

1533 A 2408 +1°346

$1^h53^m.0$ +1°31' 10.0-10.3 K2

61.844	64°.6	0".86
61.921	63.6	0.94
62.704	59.0	0.92
62.707	64.2	0.89
62.718	64.7	0.87
62.38	63.2	0.90 5n

No change in distance but the increase in angle makes dp = 0".007.

1658 Ho 312 +25°349

$2^h4^m.0$ +25°28' 6.0-11.5 B8

59.638	343°.8	1".60
62.940	344.8	1.64
62.959	339.6	1.48
64.090	341.3	1.55
62.41	342.4	1.57 4n

Slow increase in angle with no definite change in distance making dp = 0".005. The 0".04 proper motion of the bright component confirms the physical connection.

1674 Hu 16 -10°438

$2^h6^m.2$ -10°19' 10.2-11.4

61.844	3°.9	1".05
62.704	8.0	0.98
62.718	6.6	1.09
62.940	5.7	0.96
64.090	3.0	1.18
62.86	5.4	1.05 5n

The longer arc makes dp = 0".012.

1680 A 2325 +0°358

$2^h7^m.2$ + 0°34' 9.3-9.9 K2

59.656	118°.0	0".31
61.743	125.9	0.29
61.844	121.6	0.29
64.090	118.7	0.33
64.740	121.8	0.27
62.41	121.2	0.30 5n

Only a slight increase in angle after 50 years.

1780 A 961 +29°393

$2^h17^m.2$ +29°35' 9.3-9.3 F5

62.704	329°.6	0".47
62.954	323.6	0.46
65.040	323.2	0.39
63.57	325.5	0.44 3n

Orbital motion corresponding to dp = 0".007.

1786 Σ 248 +42°501

$2^h17^m.9$ +42°33' 9.6-9.6

59.638	125°.6	0".84
59.933	124.6	0.95
59.79	125.1	0.90 2n

Slow orbital motion indicating a dp = 0".013.

1792 A 962 +29°396

$2^h18^m.2$ +29°43' 9.8-10.1 G0

59.638	69°.8	0".84
59.939	66.9	1.03

59.950	69°.9	1".07
59.84	68.9	0.98 3n

The angle is hardly changed in 55 years but to the increase in distance corresponds dp = 0".013.

1833 Σ 257 +60°472

$2^h21^m.9$ +61°20' 7.6-8.1 B8

59.964	10°.9	0".29
62.704	12.1	0.31
62.959	12.5	0.26
64.740	12.7	0.28
65.040	10.0	0.25
63.08	11.6	0.28 5n

Residuals from Toledo's orbit (1954): -1°.1 and +0".03.

1837 A 446 -6°473

$2^h22^m.2$ - 6°07' 10.1-10.3 F5

61.811	364°.1	0".55
61.820	360.8	0.49
61.844	364.0	0.48
62.940	352.0	0.46
62.959	354.5	0.46
64.090	363.3	0.59
64.740	360.7	0.51
64.905	357.8	0.48
63.14	359.6	0.50 8n

To the slow increase in angle corresponds dp = 0".0031.

1865 A 2329 +3°339

$2^h25^m.1$ + 4°12' 9.3-9.5 K5

61.571	295°.4	0".42
61.718	300.4	0.50
61.743	298.0	0.44
61.68	297.9	0.45 3n

Van den Bos' orbit (1962) gives the residuals -0°.6 and +0".09.

Kui 8 +1°431

$2^h25^m.4$ + 1°44' 7.1-7.5 K0

59.656	28°.8	0".45
60.618	28.3	0.46
60.774	32.7	0.49
60.870	32.2	0.42
65.133	29.3	0.40
65.136	29.6	0.45
62.03	30.2	0.44 6n

Both angle and distance have increased since 1939 making dp = 0".005.

1938 OΣ 42 +51°588

$2^h29^m.9$ +52°5' 7.0-7.5 A2

59.151	270°.2	0".16
59.687	278.4	0.20
59.964	273.6	0.20
59.60	274.1	0.19 3n

The quadrant remained uncertain.

1942 Es 1611 +39°563

$2^h30^m.1$ +40°6' 10.7-10.9 K0

59.638	107°.3	1".42
59.933	108.0	1.48
59.79	107.6	1.45 2n

Change questionable after 42 years.

1949 Mlb 332 +62°418

$2^h30^m.8$ +62°43' 10.3-11.4

59.638	278°.1	2".29
62.940	280°.5	2".49
62.959	278.9	2.41
64.090	280.8	2.28
64.730	278.9	2.25
64.740	277.1	2.28
63.18	279.0	2.33 6n

Slow increase in angle.

1951 Hu 203 +52°599

$2^h31^m.3$ +52°33' 10.3-10.3 G5

59.638	83°.6	0".67
59.933	79.7	0.71
59.79	81.6	0.69 2n

To the slow change in angle corresponds dp = 0".0026.

1990 Hu 1216 -11°493

$2^h34^m.7$ -11°25' 8.6-10.6 G0

57.995	318°.4	0".46
64.740	323.1	0.43
61.37	320.7	0.44 2n

No certain change in distance but the angle has increased by 70° since 1900 making dp = 0".0025.

1992 A 1278 +45°641

$2^h35^m.0$ +45°51' 8.9-9.0 F5

59.151	264°.7	0".12
59.964	268.8	0.11
59.56	266.8	0.12 2n

Both angle and distance have decreased. A pair to watch.

2007 Hu 1043 = AG 43 +14°438

$2^h36^m.2$ +15°13' 10.2-10.2 F8

61.664	64°.3	2".87
61.771	64.2	2.88
61.811	63.9	2.77
61.820	63.2	3.01
61.921	63.7	2.84
61.80	63.9	2.87 5n

No certain change in distance but the slow increase in angle makes dp = 0".011.

2010 A 2023 +25°432

$2^h36^m.4$ +25°39' 9.7-9.7 F0

61.664	227°.6	0".83
61.743	224.6	0.75
61.820	226.0	0.77
61.921	224.5	0.83
61.79	225.7	0.80 4n

Change inappreciable in 52 years.

2025 Es 1875 +60°544

$2^h37^m.2$ +60°55' 10.2-10.7 B2

59.638	170°.0	2".22
61.842	168.7	2.33
61.864	170.6	2.36
61.11	169.8	2.30 3n

Slow change.

2029 AG 45 +7°410

$2^h37^m.5$ + 7°40' 10.0-10.1 G5

59.638	343°.9	4".61
59.656	343.4	4.79
60.774	341.3	4.71
60.02	342.9	4.70 3n

No change in 52 years.

2034 OΣ 43 +25°436

$2^h37^m.8$ +26°25' 8.3-9.9 F5

60.774	23°.4	0".99
60.870	24.7	0.95
61.664	20.8	0.99
61.743	20.7	1.11
61.820	23.4	1.03
61.37	22.6	1.01 5n

Heintz' orbit (1961) gives the residuals +4°.9 and -0".06.

2051 Hu 539 +48°737

$2^h38^m.9$ +49°12' 9.2-9.4 F2

58.506	48°.1	0".30
62.701	49.6	0.29
62.704	46.8	0.27
64.090	42.8	0.34
62.00	46.8	0.30 4n

No change in distance but to the decrease in angle corresponds dp = 0".0022.

2063 Es 1812 +60°556

$2^h39^m.7$ +60°43' 10.5-11.8

59.638	90°.8	2".11
61.842	88.7	2.22
62.701	89.8	2.31
62.704	88.2	2.21
62.940	89.7	2.22
61.96	89.4	2.21 5n

Little change in 40 years.

2117 β 9 +34°513

$2^h44^m.0$ +35°21' 6.4-8.5 F2

59.638	187°.5	1".72
59.933	186.9	1.56
59.964	186.9	1.59
60.870	183.0	1.60
61.664	184.6	1.70
61.820	184.4	1.51
60.65	185.6	1.61 6n

The increase in angle gives a dp = 0".014.

2155 A 2412 + 0°466

$2^h46^m.7$ + 0°28' 9.1-9.8 F8

57.995	83°.3	0".32
58.086	84.3	0.27
64.740	88.2	0.30
60.27	85.3	0.30 3n

Unchanged except a little reduction in distance.

2200 β 524 +37°655

$2^h50^m.6$ +38°8' 5.6-6.7 F0

59.964	258°.7	0".20
61.820	252.6	0.19
60.89	255.6	0.20 2n

Van den Bos' first orbit (1938) gives the residuals +15°.0 and +0".05.

2226 Σ 317 +68°209

$2^h53^m.5$ +69°0' 8.0-9.7 F2

59.638	86°.1	4".00
61.842	84.3	3.96
61.864	85.3	3.90
61.11	85.2	3.95 3n

The angle has hardly changed in 130 years but to the increase in distance corresponds dp = 0".017.

2236 A 2413 +1°515

$2^h54^m.6$ + 1°41' 8.5-8.6 G0

61.664	39°.5	0".47
61.743	35.5	0.47
61.779	34.6	0.53
61.820	39.5	0.48
61.921	39.3	0.49
61.79	37.7	0.49 5n

Muller's orbit (1952) gives the residuals +1°.5 and +0".05.

2253 β 525 +21°397

$2^h56^m.0$ +21°25' 7.5-7.5 A3

61.664	250°.2	0".52
61.718	247.7	0.46
61.820	253.0	0.42
61.921	251.6	0.44
61.78	250.6	0.46 4n

The residuals from Baize's orbit (1958) are +1°.7 and +0".08.

2279 OΣ 49 +17°471

$2^h57^m.7$ +17°49' 7.0-10.0 A0

61.664	57°.2	2".00
61.718	58.2	2.06
61.743	55.8	2.03
61.779	57.7	1.99
61.73	57.2	2.02 4n

To the slow decrease in angle and increase in distance corresponds dp = 0".009.

2373 A 2030 +4°501

$3^h7^m.0$ + 5°0' 9.4-9.4 G0

60.774	349°.2	0".33
62.701	348.2	0.33
62.940	352.5	0.32
62.14	350.0	0.33 3n

Couteau's orbit (1962) gives the residuals +3°.2 and +0".01.

2377 OΣ 50 +70°230

$3^h7^m.6$ +71°22' 8.5-8.5 F8

61.220	182°.2	1".48
62.707	181.6	1.39
62.959	179.8	1.34
62.30	181.2	1.40 3n

The longer arc makes dp = 0".016.

2484 Ho 320 +0°570

$3^h18^m.3$ + 0°59' 8.0-10.5 G0

61.718	171°.7	2".40
61.743	171.9	2.26
61.779	170.5	2.20
61.75	171.4	2.29 3n

The 0".15 yearly proper motion of the bright component establishes the physical connection. To the increase in distance corresponds dp = 0".031.

2491 Σ 380 +8°500

$3^h19^m.0$ + 8°35' 8.7-8.7 G0

59.638	39°.7	1".16
59.964	33.4	1.17
59.967	36.0	1.09
59.86	36.4	1.14 3n

The longer arc again makes dp = 0".014.

2525 Ho 321 +44°695

$3^h22^m.2$ +45°20' 7.7-10.2 B8

60.192	30°.8	1".85
62.940	29.6	1.83
64.730	27.6	1.81
65.040	29.6	1.90
63.23	29.4	1.85 4n

Very slow change.

2526 Ho 322 +45°764

$3^h22^m.6$ +45°25' 10.1-10.4 B8

59.638	126°.3	1".97
59.950	125.7	2.05
60.192	124.4	1.90
59.93	125.5	1.97 3n

Hardly changed in 67 years.

2530 J 889

$3^h23^m.4$ +41°0' 9.7-9.7

62.940	94°.9	3".05
62.950	94.7	2.81
62.953	94.3	2.94
64.947	96.4	3.06
65.040	96.8	2.72
63.77	95.4	2.92 5n

Angle decreases.

2601 Es 1515 +41°705

$3^h30^m.1$ +41°37' 10.9-11.0

62.211	307°.6	4".47
62.228	309.5	4.61
62.707	309.4	4.62
62.929	309.2	4.72
62.940	311.1	4.40
62.60	309.4	4.56 5n

Slow decrease in distance.

2612 Σ400 +59°675

$3^h30^m.9$ +59°52' 6.9-7.9 F5

62.704	256°.6	0".74
62.940	259.4	0.72
62.950	259.1	0.72
62.953	257.2	0.83
64.090	259.4	0.83
64.730	255.8	1.05
64.740	254.3	1.07
62.89	258.1	0.75 4n
64.52	256.5	0.98 3n

The residuals from Baize's orbit (1951) are:

62.89	+ 8°.3	-0".05
64.52	+ 5.4	+0.12

2628 β 533 +31°619

$3^h32^m.5$ +31°31' 7.6-7.6 F0

61.220	45°.4	1".35
61.718	44.3	1.20
61.748	43.3	1.26
61.811	43.1	1.26
61.62	44.0	1.27 4n

The longer arc makes dp = 0".015.

2711 A 989 +29°599

$3^h40^m.4$ +29°26' 10.1-10.4

61.718	358°.1	3".39
61.743	358.3	3.30
61.811	359.5	3.46
61.76	358.6	3.38 3n

Very slow change.

2730 β 880 +31°643

$3^h41^m.4$ +32°0' 8.9-9.1 B5 - A0

61.220	12°.3	0".74
61.811	11.4	0.64
62.704	10.8	0.61
62.940	14.4	0.56
62.948	15.2	0.57
64.730	10.7	0.66
62.73	12.5	0.63 6n

Slow increase in both coordinates making dp = 0".011.

2799 OΣ 65 +25°624

$3^h47^m.3$ +25°26' 6.0-6.3 A3

60.774	204°.8	0".53 1n

The residuals from Danjon's orbit (1938) are +3°.1 and -0".04.

Kui 15 +6°594

$3^h49^m.3$ + 6°23' 6.3-6.4 B9

60.192	211°.4	0".49
60.774	215.3	0.53
65.133	209.2	0.57
65.136	215.2	0.50
65.140	209.5	0.51
63.28	212.1	0.52 5n

The angle of 31 Tau has changed very little since 1930 but there is an increase in the distance.

2828 A 1293 +52°722

$3^h49^m.9$ +53°8' 8.5-8.9 G0

64.090	214°.5	0".34
65.040	215.6	0.38
64.56	215.0	0.36 2n

The residuals from Couteau's orbit (1962) are +5°.1 and +0".04.

2911 Hu 27 +9°523

$3^h56^m.3$ + 9°38' 8.6-8.8 G0

57.992	261°.1	0".26
57.995	262.7	0.33
58.020	265.6	0.29
59.964	259.2	0.27
59.967	259.2	0.28
60.186	260.6	0.26
59.02	261.4	0.28 6n

The longer arc makes dp = 0".008.

2959 Σ 483 +39°918

$4^h0^m.7$ +39°23' 7.4-8.9 G5

64.090	104°.2	0".84
65.040	102.2	0.65
64.56	103.2	0.74 2n

The residuals from Couteau's orbit (1958) are -0°.1 and +0".02.

2995 OΣ 531 +37°878

$4^h4^m.2$ +37°57' 7.3-9.0 G5

61.100	36°.0	1".04
61.811	34.3	0.95
62.940	30.3	0.94
62.948	27.4	0.83
62.959	28.7	1.08
64.740	23.4	1.04
62.75	30.0	0.98 6n

Rabe's orbit (1956) gives the residuals +2°.3 and -0".09.

3017 β 1232 +28°624

$4^h5^m.8$ +29°4' 9.0-9.9 G0

60.186	6°.4	0".32

62.940	3°.5	0".31
62.948	7.7	0.34
62.959	8.2	0.29
62.26	6.4	0.32 4n

The residuals from Baize's orbit (1961) are +12°.1 and +0".01.

3041 A 2801 -5°841

$4^h8^m.2$ - 5°0' 8.3-8.3 G0

59.967	12°.1	0".19
60.192	11.8	0.16
60.08	12.0	0.18 2n

The residuals from Muller's orbit (1954) are +0°.3 and -0".03.

3098 Σ 511 +58°727

$4^h13^m.7$ +58°40' 7.4-7.9 A0

59.967	138°.4	0".38
60.198	142.4	0.36
61.220	133.7	0.38
61.256	133.9	0.43
62.228	131.0	0.38
60.97	135.9	0.39 5n

The residuals from Baize's orbit (1958) are +5°.4 and +0".02.

3102 Ho 328 +19°689

$4^h14^m.1$ +19°33' 8.4-8.4 F5

59.964	357°.4	0".39
59.967	352.9	0.31
60.186	356.1	0.36
60.774	357.7	0.34
64.740	348.1	0.22
65.140	352.2	0.18
60.22	356.0	0.35 4n
64.94	350.2	0.20 2n

Muller's orbit (1958) gives the residuals:

60.82	+ 4°.1	+0".03
64.94	+ 4.8	-0.01

3114 Σ 520 +22°670

$4^h15^m.3$ +32°41' 8.3-8.3 F5

59.967	155°.8	0".29
60.186	156.0	0.31
60.774	148.0	0.34
61.100	156.7	0.31
60.51	154.1	0.31 4n

A pair to watch as it closes in.

3169 OΣ82 +14°690

$4^h19^m.9$ +14°56' 7.3-9.3 G0

64.740	12°.6	1".36
65.037	9.9	1.34
65.040	11.7	1.42
64.94	11.4	1.37 3n

Muller's orbit (1963) gives the residuals +0°.6 and +0".13.

3174 Σ 535 +11°601

$4^h20^m.5$ +11°16' 7.1-8.6 A2

60.774	302°.9	1".26
61.080	303.3	1.40
61.094	305.3	1.25
61.097	305.2	1.22
61.108	305.1	1.22
61.03	304.4	1.27 5n

Long period binary. The arc described since 1831 makes dp = 0".018.

3210 β 1185 +18°638

$4^h22^m.9$ +18°45' 8.2-8.8 G0

59.157	221°.6	0".12
59.967	219.1	0.15
60.186	216.9	0.15
60.192	214.7	0.20
59.88	218.1	0.15 4n

Wierzbinski's orbit (1962) gives for that date 251°.1 0".07 which shows that his period is too long.

3303 Hu 1082 +38°912

$4^h31^m.5$ +39°3' 9.3-9.8

62.948	180°.8	0".29
62.959	177.6	0.27
62.95	179.2	0.28 2n

Baize's second orbit (1956) leaves the residuals +6°.7 and 0.00.

3370 Hu 442 +22°728

$4^h37^m.0$ +22°55' 9.3-9.9 A2

59.967	11°.0	0".39
60.186	12.8	0.39
60.774	16.3	0.35
62.948	15.8	0.34
62.959	11.1	0.40
61.37	13.4	0.37 5n

The longer arc makes dp = 0".008.

3390 Σ577 +37°957

$4^h38^m.8$ +37°25' 8.6-8.6 F8

64.740	34°.7	1".32
64.905	31.8	1.31
64.947	34.4	1.32
65.037	31.5	1.35
64.91	33.1	1.32 4n

The longer arc makes dp = 0".014.
The residuals from Popovic's premature orbit (1964) are +1°.1 and +0".06. Based on an arc of only 60° it is still completely indeterminate.

3391 A 1013 +59°826

$4^h39^m.0$ +59°26' 7.3-7.3 A3

60.190	356°.5	0".26
60.198	355.3	0.26
60.194	355.9	0.26 2n

The angular velocity is speeding up as the distance decreases.

3475 β 883 +10°654

$4^h48^m.4$ +10°59' 7.8-7.8 F5

65.037	60°.7	0".30
65.130	56.2	0.26
65.140	59.2	0.26
65.10	58.7	0.27 3n

Wierzbinski's orbit (1961) leaves the residuals +4°.6 and -0".01.

3476 Hu 553 +51°985

$4^h48^m.5$ +51°19' 9.1-11.3

62.228	84°.3	3".34
62.289	83.6	3.11
62.940	81.8	3.16
62.948	82.3	3.26
64.730	80.3	3.15
64.740	83.8	3.04
63.31	82.7	3.18 6n

No definite change in 60 years. The 0".034 proper motion of the bright component proves the physical connection.

3481 Hu 554 +49°1262

$4^h49^m.0$ +49°58' 9.4-10.9

62.289	307°.7	2".08
62.940	310.7	2.07
62.948	309.8	1.86
62.950	310.5	2.28
62.953	308.2	2.22
64.730	310.8	2.02
64.947	310.1	1.92
63.39	309.7	2.06 7n

No definite change in 60 years.

3486 Es 1070 +49°1263

$4^h49^m.4$ +50°2' 10.5-11.7

62.203	112°.2	2".19
62.211	110.8	2.35
62.289	109.0	2.19
62.292	112.4	2.20
62.25	111.1	2.23 4n

Unchanged in 50 years.

3488 Hu 819 +35°917

$4^h49^m.6$ +35°43' 8.9-9.5 A0

62.285	288°.2	0".35
62.940	284.2	0.37
62.948	283.6	0.37
62.959	288.8	0.43
62.78	286.2	0.38 4n

To the very slow change corresponds dp = 0".0018.

3535 Kr 25 +56°988

$4^h53^m.3$ +56°34' 9.7-10.2

61.201	118°.8	3".30
61.204	119.1	3.11
61.220	121.8	3.00
61.245	119.3	3.21
61.253	119.0	3.06
61.256	120.1	3.04
61.23	119.7	3.12 6n

Very slow change.

3542 OΣ 91 +2°818

$4^h53^m.6$ + 3°6' 8.5-9.0 B9

61.080	234°.8	0".55
61.097	234.6	0.66
61.09	234.7	0.60 2n

The longer arc reduces dp to 0".003.

3591 J 47 +0°913

$4^h57^m.3$ + 0°26' 10.6-10.9 F5

65.130	302°.1	4".46
65.133	300.5	4.36
65.136	300.3	4.36
65.13	301.0	4.39 3n

Van den Bos' uniform linear motion gives the residuals +2°.9 and -0".11.

3602 β 1238 +26°774

$4^h58^m.2$ +26°28' 9.7-11.1 B5

60.186	13°.9	1".68
62.965	17.9	2.03
64.948	15.3	1.75
65.130	15.8	2.02
65.133	18.3	1.88
63.67	16.2	1.87 5n

Change very slow if any.

3614 Hu 445 +20°863

$4^h58^m.8$ +20°46' 8.6-8.9 G0

65.130	242°.4	0".35
65.133	245.1	0.35
65.13	243.8	0.35 2n

Comparison with two orbits give the residuals:

Kummritz (1956)	+4°.7	-0".02
Arend (1959)	-1.6	-0.05

3622 J 240

$4^h59^m.4$ +35°1' 10.0-10.2

60.198	204°.1	1".57
62.950	209.3	1.54
64.947	209.6	1.42
65.130	210.9	1.63
65.133	206.5	1.56
65.136	205.7	1.60
63.92	207.7	1.55 6n

No change in angle but distance increased.

3658 Σ 615 +73°271

$5^h1^m.8$ +73°32' 8.2-10.0

61.256	7°.3	1".34
61.265	7.6	1.42
62.228	6.8	1.37
62.288	7.7	1.34
62.964	5.6	1.46
62.00	7.0	1.39 5n

The longer arc reduces dp to 0".006.

3678 Hu 1095 +39°1169

$5^h3^m.0$ +39°58' 8.1-9.3 A0

61.204	17°.4	0".35
61.265	19.4	0.32
62.285	19.5	0.36
61.58	18.8	0.34 3n

Very slow increase in angle corresponding to dp = 0".0016.

3689 Σ635 +54°862

$5^h3^m.8$ +54°55' 8.7-8.7 B9

61.097	302°.7	0".82
61.201	298.7	0.98
61.204	299.3	1.02
61.220	302.7	0.87
61.245	299.7	1.02
61.253	302.3	0.96
61.256	300.5	1.03
61.21	300.8	0.96 7n

The slow change in 131 years shows a dp = 0".0066.

3697 J 14

$5^h4^m.3$ +27°9' 9.6-9.9

61.097	229°.5	2".90
61.220	233.2	2.73
65.130	233.8	2.80
62.48	232.2	2.81 3n

Motion slow if any. Identified as Oxf. ph. +27°10488 and +28°9407 which gives the corrected declination.

3747 Hu 1099 +64°504

$5^h8^m.1$ +64°41' 9.0-9.3 F5

61.201	25°.7	0".57
61.256	24.4	0.51
62.203	27.2	0.47
62.288	27.0	0.56
61.74	26.1	0.53 4n

The longer arc reduces dp to 0".003.

3799 OΣ 517 +1°938

$5^h10^m.9$ + 1°55' 6.9-7.1 A2

64.905	232°.6	0".43
64.947	233.8	0.39
65.130	231.8	0.38
65.140	228.2	0.42
65.03	231.6	0.40 4n

The residuals from Van den Bos' orbit (1959) are +1°.8 and +0".01.

3816 J 1250

$5^h11^m.6$ +31°42' 9.5-9.8

61.204	298°.2	2".68
61.217	299.5	2.58
61.220	299.4	2.54
61.237	295.3	2.44
61.22	298.1	2.56 4n

Change questionable. Identified in the Oxford Zones as +31°10728 and +32°17365.

3844 J 48 +1°940

$5^h13^m.1$ + 1°10' 10.3-10.7

62.940	38°.6	2".35
64.905	37.7	2.21
63.92	38.2	2.28 2n

Slow increase in angle.

Capella H (Stearns 3)

$5^h13^m.7$ +45°47' 10.5-10.5

59.964	145°.2	3".13
59.967	143.4	3.18
60.198	143.1	2.94
65.037	152.0	3.22
65.040	152.4	3.34
65.130	149.9	3.19
65.133	151.2	3.18
65.209	149.7	3.30
60.04	143.9	3.08 3n
65.11	151.0	3.25 5n

The orbital motion gives a dp = 0".086 which confirms the physical connection with Capella.

3870 Σ 657 +52°942

$5^h14^m.8$ +52°47' 8.7-9.2 F5

61.097	298°.1	0".98
61.201	297.2	1.01
61.217	293.6	1.12
61.237	298.4	1.14
61.240	294.7	1.17
61.20	296.4	1.08 5n

The longer arc confirms dp = 0".009.

3956 Σ 677 +63°579

$5^h20^m.0$ +63°21' 7.9-8.2 G0

61.097	189°.0	1".22
61.204	188.9	0.99
61.237	188.5	1.03
61.18	188.8	1.08 3n

Heintz' orbit (1962) gives the residuals +3°.5 and +0".09.

3959 A 2641 +2°934

$5^h20^m.0$ + 2°34' 8.4-10.9 G5

59.137	345°.2	1".05
59.157	342.1	0.99
60.186	335.0	0.89
62.940	330.4	1.10
60.35	338.1	1.01 4n

Residuals from Baize's orbit (1958) are +2°.1 and -0".01.

3982 A 846 +74°241

$5^h21^m.1$ +74°31' 7.2-10.7 A0

61.240	342°.6	1".28
61.256	346.1	1.16
62.203	343.0	1.13
61.57	343.9	1.19 3n

No definite change after 57 years.

4020 A 848 -0°945

$5^h23^m.0$ - 0°35' 6.7-7.3 B9

60.186	137°.3	0".17
60.198	139.4	0.14
60.19	138.4	0.16 2n

The angle increased by 100° since 1904 and the distance diminished.

4032 Ho 226 +27°771

$5^h23^m.9$ +27°34' 8.6-8.6 F8

61.097	256°.6	0".73
61.100	255.1	0.67
61.152	256.4	0.72
61.12	256.0	0.71 3n

The longer arc makes dp = 0".007.

4097 Σ 725 -1°913

$5^h27^m.2$ - 1°08' 5.0-10.2 K5

61.100	88°.2	13".04
61.152	86.9	12.89
61.168	88.3	12.78
61.14	87.8	12.90 3n

The proper motion of 31 Orionis is negligible in right ascension but it is 0".022 south according to Boss or 0".012 according to the Yale Zone. If the companion did not belong to the bright star this p.m. would have decreased the angle by 13 and 7 degrees, respectively, since Struve's measure in 1829. That there is no change proves the physical connection.

4166 β 1267 +30°942

$5^h31^m.9$ +30°54' 8.8-8.8 F5

61.201	206°.3	0".65
61.204	206.8	0.76
61.220	204.7	0.62
61.21	205.9	0.68 3n

Slow orbital motion corresponding to dp = 0".005.

4180 Σ 741 -0°1005

$5^h32^m.4$ - 0°9' 8.0-11.0 B5

61.152	285°.1	10".12
61.168	286.2	10.05
61.217	286.4	10.38
61.237	285.8	10.28
61.19	285.9	10.21 4n

The proper motion is 0".018 according to Boss and 0".008 in the Yale catalogue. If the companion were a background star this would have changed the angle by 11 and 5 degrees, respectively, since Struve's first measure in 1831. The angle is practically unchanged, hence this is a physical pair.

4224 A 2708 +8°1019

$5^h35^m.2$ + 8°55' 8.7-9.5 G0

61.265	295°.3	0".59
61.811	295.6	0.55
62.940	288.7	0.56
62.964	291.2	0.76

64.090	292.9	0".60
62.61	292.7	0.61 5n

The slow change over the 48 year interval since the discovery makes dp = 0".007.

4241 β 1032 -2°1326

$5^h36^m.2$ - 2°38' 4.0-6.0 B3

61.811	202.2	0".28
62.940	198.8	0.29
62.38	200.5	0.28 2n

Kummritz's orbit (1957) gives the residuals +1.2 and +0".09.

4243 OΣ 112 +37°1277

$5^h36^m.5$ +37°56' 7.8-8.5 B9

60.186	49.6	0".61
60.192	54.3	0.67
60.198	53.3	0.64
60.19	52.4	0.64 3n

The longer arc reduces dp to 0".0030.

4265 β 1007 +16°841

$5^h38^m.4$ +16°31' 5.6-5.8 B3

60.186	236.3	0".33
60.192	239.8	0.34
60.19	238.0	0.34 2n

The residuals from Baize's orbit (1961) are +3.5 and +0".06.

4313 Hu 1110 +37°1306

$5^h41^m.4$ +37°33' 8.5-11.7 F0

61.237	240.3	1".47
61.256	239.3	1.25
61.259	236.9	1.38
61.265	238.2	1.47
61.25	238.7	1.39 4n

The longer arc reduces dp to 0".015.

4370 J 35 +6°1021

$5^h44^m.1$ + 6°22' 10.3-10.5

62.940	9.8	0".91
62.953	11.9	1.15
62.964	8.3	1.11
64.905	10.9	1.13
63.44	10.2	1.08 4n

Slow orbital motion.

4472 β 1053 +37°1347

$5^h50^m.1$ +37°20' 6.9-8.9 F5

61.220	350.0	1".40
61.231	346.5	1.50
61.234	348.0	1.44
61.23	348.2	1.45 3n

To the large change in both coordinates corresponds dp = 0".025.

4619 A 120 +25°1089

$5^h59^m.8$ +25°53' 8.3-9.5 F8

60.186	170.1	0".68
61.097	171.8	0.77
61.201	169.7	0.85
61.204	170.7	0.72
61.231	170.9	0.64
61.234	172.9	0.78
61.03	171.0	0.74 6n

Very slow increase in both coordinates.

Kui 23 1 Gem

$6^h1^m.1$ +23°16' 4.9-5.2 G5

60.186	164.9	0".27
60.192	159.2	0.27
61.201	169.1	0.28
61.228	170.7	0.28
61.231	176.3	0.31
61.234	173.7	0.29
61.237	178.5	0.31
62.964	183.5	0.29
64.090	193.0	0.24
60.19	162.0	0.27 2n
61.23	173.7	0.29 5n
63.53	188.2	0.26 2n

Comparison with Heintz' orbit (1961) gives the residuals:

60.19	- 7.2	+0".04
61.23	- 5.9	+0.04
63.53	-11.3	+0.04

4647 J 335 +11°1012

$6^h1^m.4$ +11°1' 8.3-10.0 F8

62.953	288.7	1".24
62.964	286.3	1.32
64.947	284.6	1.34
65.037	286.8	1.43
63.98	286.6	1.33 4n

Motion in both coordinates indicating a dp = 0".019.

4768 β 1058 +23°1232

$6^h7^m.5$ +23°1' 7.3-7.6 B9

60.186	249.8	0".31
60.192	252.9	0.29
60.198	254.3	0.33
61.201	244.8	0.32
61.220	253.9	0.31
61.231	247.8	0.34
61.234	248.1	0.30
61.237	242.3	0.29
60.19	252.3	0.31 3n
61.22	247.4	0.31 5n

To the slow decrease in angle corresponds dp = 0".0017.

Kui 24 +17°1182

$6^h11^m.6$ +17°55' 6.5-6.5 A5

60.186	138.8	0".43
60.192	142.6	0.41
60.198	136.7	0.43
60.19	139.4	0.42 3n

Hardly changed since 1934.

Rst 5225 +1°1275

$6^h13^m.3$ + 1°11' 7.1-7.1 F5

60.198 269.5 0".20 1n

4971 A 2667 +2°1197

$6^h18^m.8$ + 2°18' 6.5-6.8 A5

64.090	133.0	0".47
65.130	130.8	0.42
64.61	131.9	0.45 2n

Lategan's orbit (1961) gives the residuals +1.7 and -0".01.

5042 OΣ 139 +22°1323

$6^h22^m.6$ +22°29' 7.8-10.3 A3

59.151	238.2	0".39
60.198	242.6	0.41
61.234	239.2	0.37
61.265	237.2	0.44
60.46	239.3	0.40 4n

Heintz's orbit (1962) gives the residuals +5°.6 and +0".04.

5054 β 1191 +18°1214

$6^h23^m.2$ +18°48' 6.9-13.9 K0

64.090	300°.8	1".96
64.905	309.0	1.90
65.130	302.1	2.02
65.140	306.5	2.13
64.82	304.6	2.00 4n

This angle differs by 140 degrees from Burnham's angle in 1890, a motion that leads to a dp of 0".054! There were no intermediate observations. The 0".21 yearly proper motion of the bright component proves the physical connection.

5079 J 1092 +22°1334

$6^h24^m.8$ +22°53' 9.5-10.4

62.953	234°.4	4".27
64.905	235.1	4.30
65.136	233.8	4.46
64.33	234.4	4.34 3n

The angle has decreased by 20 degrees since 1915 and the distance has more than doubled. This would correspond to an improbably large value of dp = 0".031. Probably optical.

Wor 6 +52°1088

$6^h28^m.3$ +52°27' 10.3-10.4 M0

61.234	152°.2	0".98
61.240	149.3	0.84
61.256	154.5	0.91
61.259	151.5	0.90
61.265	153.4	0.79
61.25	152.2	0.88 5n

5159 A 2817 +7°1327

$6^h28^m.7$ + 7°52' 9.3-9.3 G5

59.967	135°.8	0".14
60.172	128.3	0.14
60.07	132.0	0.14 2n

Popovic's orbit (1964) gives the large residuals +27°.1 and -0".04.

5212 Ho 234 -11°1536

$6^h32^m.2$ -11°11' 8.2-8.2 F0

61.811	120°.9	0".34
62.964	123.5	0.36
64.090	118.4	0.38
65.037	118.0	0.35
65.130	122.4	0.36
63.81	120.6	0.36 5n

Baize's orbit (1958) reverses the quadrant and gives the residuals -6°.0 and +0".08.

5280 OΣ 150 +42°1586

$6^h35^m.8$ +42°3' 8.6-9.5 A0

59.964	41°.0	0".13
62.288	29.8	0.16
61.13	35.4	0.14 2n

Evidently a short period binary but the measures are too scarce to define the orbit.

5296 Σ 945 +41°1484

$6^h36^m.8$ +41°1' 7.3-8.2 F2

60.198	298°.9	0".58
61.201	301.5	0.58
61.204	303.6	0.69
61.223	300.7	0.52
61.231	304.8	0.60
61.234	302°.0	0".58
61.237	300.4	0.65
61.08	301.7	0.60 7n

The longer arc reduces dp to 0".008.

5332 A 218 +30°1303

$6^h38^m.6$ +30°44' 8.8-8.8 F5

59.964	139°.9	0".13
60.198	140.8	0.15
62.288	138.9	0.13
60.82	139.9	0.14 3n

Popovic's orbit (1964) gives the residuals +23°.7 and +0".02.

5423 AGC 1 Sirius

$6^h43^m.0$ -16°39' -1.6-8.5 A0

64.740 80°.9 10".41

The residuals from Van den Bos' orbit (1960) are +2°.1 and +0".13.

5444 J 802 -4°1653

$6^h44^m.3$ - 4°11' 10.9-12.4

62.953	124°.2	4".31
62.964	124.2	4.03
65.130	123.1	4.12
65.133	122.7	3.94
64.04	123.6	4.10 4n

Slow increase in angle.

5455 OΣ 157 +0°1604

$6^h45^m.2$ + 0°24' 7.4-7.9 A2

60.201	271°.3	0".34
61.204	269.5	0.32
61.228	266.9	0.36
61.231	266.1	0.32
61.237	270.5	0.35
61.02	268.9	0.34 5n

Residuals from Heintz' orbit (1961) are +7°.9 and +0".01.

5514 Σ 963 +59°1028

$6^h48^m.7$ +59°31' 5.7-6.9 F5

59.964	222°.4	0".34
60.198	218.8	0.38
60.201	217.1	0.36
61.201	219.7	0.35
61.240	220.8	0.37
60.56	219.8	0.36 5n

Residuals from two recent orbits are:

Couteau (1956)	-9°.8	+0".06
Heintz (1963)	-7.0	+0.01

5519 A 1956 +4°1474

$6^h48^m.9$ + 4°2' 9.3-10.0 G5

61.811	240°.4	0".49
62.313	241.1	0.54
62.06	240.8	0.52 2n

To the large changes in both coordinates corresponds dp = 0".008.

5524 Mlb 119 +59°1029

$6^h49^m.1$ +59°14' 10.6-10.7

60.148	306°.7	2".93
61.201	305.4	2.93
61.220	306.0	2.85
61.231	303.9	2.86
61.240	305.6	2.80
61.01	305.5	2.87 5n

Change questionable.

5556 Doo −

$6^h51^m.6$ +18°21' 10.2-11.5

61.217	12°.3	4".57
61.220	13.2	4.39
61.234	13.0	4.43
61.237	12.9	4.57
61.240	13.4	4.50
61.23	13.0	4.49 5n

No definite change since 1911. The star was identified as Par. ph. +18°, 6^h48^m, No. 287.

Wor 18 +27°1311

$7^h2^m.6$ +27°33' 10.6-13.4

62.288	298°.0	12".05
62.291	297.6	12.22
62.29	297.8	12.14 2n

5841 J 703

$7^h7^m.7$ +15°49' 9.7-9.7

62.953	118°.9	6".56
65.037	120.6	6.55
65.209	117.7	6.51
64.40	119.1	6.54 3n

Slow change in both coordinates.

5866 AG − +18°1524

$7^h9^m.4$ +18°44' 9.1-9.1

60.186	190°.3	0".93
61.097	189.8	0.96
61.220	190.8	1.06
61.223	191.8	0.95
61.231	189.8	1.02
60.99	190.5	0.98 5n

Little change.

5928 J 42 +8°1711

$7^h12^m.6$ + 7°59' 10.4-10.6

62.953	94°.8	2".26
64.948	95.8	2.05
63.95	95.3	2.16 2n

To the increase in angle corresponds dp = 0".014.

5963 A 3046 -17°1898

$7^h15^m.3$ -18°7' 9.2-10.7 B9

61.234	60°.6	1".06
61.240	62.9	1.18
64.905	63.2	1.25
62.46	62.2	1.16 3n

Change immaterial.

6079 A 2866 +4°1699

$7^h24^m.0$ + 4°30' 9.1-10.1 G0

61.240	155°.1	0".62
61.256	149.8	0.50
61.265	154.4	0.49
61.25	153.1	0.54 3n

Distance increased.

6138 A 2869 +8°1789

$7^h27^m.8$ + 7°50' 8.3-8.5 A5

61.240	56°.5	0".29
61.256	53.4	0.33
61.259	50.7	0.32
62.288	53.4	0.37
61.51	53.5	0.33 4n

Change mostly in angle making dp = 0".0046.

6154 Hu 1244 +14°1690

$7^h29^m.4$ +14°12' 11.2-11.2

61.240	306°.0	0".50
61.256	302.6	0.44
62.288	301.3	0.47
61.59	303.3	0.47 3n

Baize's orbit (1957) gives the residuals +2°.9 and +0".04.

6175 Σ1110 Castor

$7^h31^m.4$ +32°0' 2.0-2.8 A0

61.094	164°.0	1".99
61.097	164.2	1.98
61.152	165.3	2.03
61.201	167.0	2.17
61.214	166.4	2.06
61.231	165.8	2.22
61.237	165.6	2.17
61.242	166.1	2.14
61.245	165.5	2.07
62.067	162.0	2.00
62.069	163.3	1.95
62.203	162.7	2.05
62.225	160.0	2.09
62.228	162.7	2.18
62.285	164.4	2.09
62.288	164.7	2.16
62.291	160.8	2.03
62.953	159.3	2.05
63.337	161.9	1.91
63.340	160.5	1.93
63.351	160.9	1.96
63.362	160.6	1.92
64.905	153.0	2.02
65.037	148.2	2.11
65.040	149.0	2.10
61.19	165.5	2.09 9n
62.21	162.6	2.07 8n
63.27	160.6	1.95 5n
64.99	150.1	2.08 3n

Comparison with Rabe's orbit (1958) gives:

61.19	+ 1°.5	-0".04
62.21	+ 1.8	0.00
63.28	+ 3.1	-0.06
64.99	- 0.9	+0.14

6185 OΣ 175 +31°1620

$7^h32^m.0$ +31°4' 5.8-6.4 K0

59.964	330°.5	0".37
60.186	329.1	0.36
60.198	330.2	0.41
60.201	332.3	0.36
65.133	328.6	0.33
65.136	329.3	6.33
60.14	330.5	0.38 4n
65.13	329.0	0.33 2n

The angle has hardly changed in 118 years but after passing a maximum in the first half of the century the distance is now decreasing rapidly, showing that the orbit will be very elongated.

6228 Hu 841 +66°518

$7^h35^m.2$ +66°10' 9.4-9.4

62.203	175°.3	0".28
62.288	176.9	0.28
65.140	178.4	0.24
63.21	176.9	0.27 3n

Motion mostly in angle indicating a dp = 0".005.

6256 AG -8°2015

$7^h36^m.9$ - 8°34' 9.2-9.3 A0

61.121	318°.4	2".34
61.168	319.5	2.54
62.453	317.6	2.47

64.905	318°.7	2".43
62.41	318.6	2.44 4n

Hardly changed in 47 years.

6263 Σ 1126 +5°1742

$7^h37^m.5$ + 5°21' 6.4-6.7 A0

61.097	158°.4	1".11
61.100	160.7	1.19
61.168	159.1	1.25
61.223	159.8	1.19
61.228	156.0	1.29
61.231	161.1	1.19
61.17	159.2	1.20 6n

The longer arc makes dp = 0".010.

6291 Σ 1130 +10°1599

$7^h39^m.0$ + 9°49' 8.7-9.2 G0

61.097	238°.3	0".41
61.237	235.9	0.36
61.240	236.3	0.41
61.256	238.0	0.37
61.259	235.6	0.35
65.133	262.8	0.30
65.140	260.9	0.32
61.22	236.8	0.38 5n
65.14	261.8	0.31 2n

The angle has increased by 100 degrees since 1829 and the distance has closed in considerably making dp = 0".0105. A pair to watch!

6307 Es 2158 +37°1757

$7^h40^m.0$ +37°3' 9.6-11.1-11.4

AC

65.130	331°.8	2".44
65.133	331.9	2.70
65.140	332.3	2.53
65.13	332.0	2.56 3n

BC (Van B.)

59.137	146°.9	1".20
59.964	147.2	1.06
60.198	145.9	1.05
65.130	146.1	1.20
65.133	147.6	1.23
65.140	146.8	1.15
62.45	146.8	1.15 6n

Unchanged. The position has been corrected from the astrographic catalogue.

6354 Hu 1247 +60°1082

$7^h43^m.7$ +60°25' 7.7-7.7 F5

62.288	308°.0	0".24
62.305	314.5	0.24
65.136	280.7	0.24
65.140	278.7	0.24
62.30	311.2	0.24 2n
65.14	279.7	0.24 2n

Residuals from Baize's orbit (1961) are:

62.30	- 1°.4	+0".05
65.14	- 5.1	+0.01

6369 A 1331 +54°1175

$7^h44^m.8$ +53°48' 8.6-13.1

60.201	253°.6	4".74
61.231	255.4	4.84
61.234	254.8	4.62
61.256	253.4	4.69
60.98	254.3	4.72 4n

The 0".55 proper motion establishes the physical connection. The relative motion is mostly in distance making dp as large as 0".059.

6374 J 418

$7^h45^m.0$ + 1°30' 10.1-10.2

62.940	117°.2	2".11
62.953	118.5	2.22
62.95	117.8	2.16 2n

Slow increase in angle corresponding to dp = 0".007.

6406 Σ 1136 +65°599

$7^h48^m.3$ +65°2' 7.6-11.3 K3

61.217	218°.2	5".69
61.228	215.9	5.90
61.231	216.0	5.62
61.234	219.9	5.72
61.242	216.0	5.90
61.23	217.2	5.77 5n

So far there is no clear indication of curvature in the relative path. Probably optical because the big change since 1830 would lead to an improbable dp = 0".108.

6420 β 101 9 Argus

$7^h49^m.5$ -13°46' 5.8-6.4 G0

64.905	283°.4	0".59
65.037	279.0	0.48
65.140	286.8	0.55
65.03	283.1	0.54 3n

Woolley-Symms' orbit (1933) leaves the residuals -4°.1 and +0".02.

6428 J 1100

$7^h50^m.4$ +17°40' 10.0-12.0

62.953	267°.7	4".09
65.209	269.0	3.99
64.08	268.4	4.04 2n

Slow increase in both coordinates.

6450 Hu 846 +66°530

$7^h51^m.8$ +66°42' 9.4-10.1 G5

59.964	281°.2	0".34
60.198	282.0	0.28
61.256	279.7	0.28
62.288	278.5	0.32
62.305	274.7	0.35
61.20	279.2	0.31 5n

The angular decrease accelerates as the distance diminishes. The corresponding dp is 0".008.

6476 J 69 +3°1844

$7^h53^m.8$ + 3°32' 9.5-12.1 A

61.240	258°.4	2".55
61.265	259.6	2.49
62.940	261.1	2.37
62.953	260.8	2.54
65.136	260.2	2.38
65.209	259.9	2.46
63.12	260.0	2.46 6n

Slow change in both coordinates indicating a dp = 0".016.

6516 Σ 1165 +55°1240

$7^h58^m.2$ +54°46' 8.2-10.5 A0

60.188	284°.0	0".38
65.140	282.8	0.45
62.66	283.4	0.42 2n

The longer arc makes dp = 0".004.

6547 A 1581 -6°2423

$8^h0^m.7$ - 6°16' 10.0-10.0

62.940	286°.4	0".64
64.905	285.3	0.59
63.92	285.8	0.62 2n

Baize's orbit (1960) changes the quadrant and gives the residuals -6°.6 and +0".09.

6549 OΣ187 +33°1636

$8^h1^m.0$ +33°10' 7.1-7.7 A0

59.964	20°.3	0".27
60.198	17.1	0.23
60.201	16.2	0.23
61.288	18.5	0.26
62.305	18.4	0.26
60.79	18.1	0.25 5n

The residuals from my orbit (1954) are +3°.8 and +0".06.

6578 A 1333 54°1200

$8^h3^m.2$ +54°16' 8.8-8.8 A0

60.198	210°.8	0".27
62.288	214.7	0.26
62.305	211.7	0.30
61.60	212.4	0.28 3n

Slow orbital motion corresponding to dp = 0".0030.

6582 A 1971 -0°1904

$8^h3^m.5$ - 0°38' 9.1-9.2 G5

61.228	26°.4	0".92
61.237	28.4	0.88
61.245	23.6	1.00
61.24	26.1	0.93 3n

To the large change in both coordinates corresponds dp = 0".008.

6616 J 375 +12°1780

$8^h6^m.1$ +12°21' 11.3-11.3-14.5

AB

61.231	146°.2	7".26
61.240	147.4	7.41
61.296	147.2	7.46
61.24	146.9	7.38 3n

AC

61.231	348°.3	13".96
61.240	348.7	13.93
61.256	347.9	14.10
61.24	348.3	14.00 3n

The marked motion in AB seems to indicate an optical system.

6619 J 734 +8°1979

$8^h6^m.2$ + 7°58' 10.7-11.0

61.231	237°.0	2".38
61.234	238.1	2.16
61.237	240.4	2.26
61.240	238.2	2.23
61.245	239.1	2.11
61.24	238.6	2.23 5n

No definite change.

6620 H 1335 +56°1269

$8^h6^m.3$ +55°57' 8.0-11.3 A2

60.198	225°.2	1".48
60.201	226.2	1.56
60.20	225.7	1.52 2n

To the increase in angle corresponds dp = 0".014.

6650 Σ 1196 ζ Cancri

$8^h9^m.3$ +17°48' 5.6-6.0-6.3 G2

AB

62.940	356°.9	1".28
62.959	358.3	1.18
62.95	357.6	1.23 2n

AC

62.940	85°.5	5".88
62.959	84.8	5.91
62.95	85.2	5.90 2n

Gasteyer's orbit (1954) for AB gives the residuals +2°.7 and +0".08.

6671 β1244 +2°1904

$8^h11^m.2$ + 2°8' 8.3-8.5 A0

61.231	18°.5	1".01
61.234	20.6	1.02
61.257	20.5	0.97
61.240	20.1	1.03
61.245	20.4	1.02
61.24	20.0	1.01 5n

The longer arc makes dp = 0".010.

6677 J 377

$8^h11^m.5$ + 7°7' 9.4-10.0

62.940	18°.6	1".84
65.136	16.0	2.00
64.04	17.3	1.92 2n

Slow decrease in angle.

6718 J 422

$8^h14^m.8$ - 0°47' 9.6-10.0

61.256	76°.0	4".95
62.953	77.8	5.10
63.348	76.2	5.11
65.136	75.5	5.04
63.17	76.4	5.05 4n

Distance increased.
The star is Alg. ph. 0°, 8^h16^m No. 162 and -1°, 8^h12^m, No. 179.

6719 A 337 -4°2288

$8^h14^m.8$ - 5°13' 8.4-8.7 F2

61.231	132°.4	0".37
61.240	133.8	0.42
61.256	136.7	0.38
61.265	136.3	0.46
61.25	134.8	0.41 4n

Baize's orbit (1960) gives the residuals -3°.2 and +0".06.

6721 Σ 1211 +39°2083

$8^h15^m.0$ +39°9' 9.1-9.6

60.198	323°.3	0".36
61.234	327.1	0.36
61.240	327.2	0.40
61.256	324.5	0.40
61.265	323.6	0.33
62.288	324.4	0.36
65.130	320.4	0.39
65.133	321.9	0.40
65.140	316.9	0.44
65.209	317.8	0.45
61.25	325.0	0.37 6n
65.15	319.2	0.42 4n

Heintz' orbit (1961) will require correction since the residuals are:

61.26	+12°.8	+0".03
65.15	+13.0	+0.18

Finsen 346 +9°1954

$8^h17^m.2$ + 4°6' 7.1-7.1 G5

60.198	89°.7	0".26
62.940	90.4	0.26
65.037	90.4	0.24
65.133	91.9	0.27
65.140	87.2	0.26
63.69	89.9	0.26 5n

No change so far.

6762 Σ1216 -1°2017

$8^h18^m.8$ - 1°26' 6.9-7.6 A0

61.097	265°.4	0".51
61.220	269.7	0.57
61.228	270.6	0.59
61.231	265.3	0.63
61.234	270.7	0.59
62.285	266.7	0.65
61.38	268.1	0.59 6n

The residuals from Ekenberg's orbit (1945) are +6°.3 and +0".03.

6775 Hu 854 +65°630

$8^h20^m.1$ +65°38' 9.8-10.1 K0

60.198	215°.3	1".52
60.201	214.9	1.68
61.201	216.3	1.63
61.234	215.6	1.62
61.237	213.7	1.53
61.240	214.6	1.65
61.259	214.2	1.56
60.94	214.9	1.60 7n

No appreciable change in 57 years.

6796 Hu 856 +37°1856

$8^h22^m.2$ +37°33' 8.3-9.0 F5

59.964	198°.7	0".17
60.198	202.4	0.17
62.285	206.7	0.19
65.120	214.7	0.22
65.209	219.8	0.20
60.82	202.6	0.18 3n
65.16	217.2	0.21 2n

The residuals from Couteau's orbit (1962) are:

60.81	+ 2°.3	-0".01
65.17	+ 3.5	+0.02

6811 A 1746 +25°1920

$8^h23^m.7$ +24°42' 8.4-8.4 G

60.186	301°.7	0".16
60.198	304.3	0.16
65.130	32.9	0.16
65.209	30.9	0.15
60.19	303.0	0.16 2n
65.17	31.9	0.16 2n

Baize's orbit (1958) gives the residuals:

60.19	+ 1°.6	-0".02
65.17	+18.5	+0.01

6852 A 3062 -9°2547

$8^h28^m.5$ -10°0' 9.3-12.1

61.234	222°.3	4".00
61.245	222.5	3.81
61.24	222.4	3.90 2n

Unchanged after 37 years.

6861 J 416 -3°2380

$8^h29^m.3$ - 3°37' 9.0-10.1 F8

62.940	190°.1	0".46
62.953	191.7	0.43
64.905	189°.9	0".43
63.60	190.6	0.44 3n

Doubtful change.

Couteau 10 +89°13'

$8^h43^m.7$ +88°46' 7.1-10.4 A0

61.256	63°.1	1".90
61.259	60.1	2.13
61.265	62.6	2.07
61.26	61.9	2.03 3n

The position is corrected from the Greenwich astrographic catalogue.

7037 J 74 +1°2181

$8^h47^m.7$ + 1°36' 11.3-11.4

63.340	120°.7	6".69
63.351	119.2	6.86
64.905	120.0	6.90
63.87	120.0	6.82 3n

The relative change leads to an improbably large dp = 0".12. Probably optical.

7044 Van de Kamp 3 +8°2131

$8^h48^m.0$ + 8°3' 10.3-10.4

62.940	123°.5	2".66
63.337	122.5	2.77
63.340	122.0	2.50
63.348	121.5	2.68
64.905	122.7	2.67
63.57	122.4	2.66 5n

The increase in distance seems to have slowed down to a maximum. The relative motion corresponds to dp = 0".060.

7054 A 1584 +55°1297

$8^h49^m.4$ +55°8' 8.2-8.2 G0

61.201	112°.5	0".70
61.228	109.9	0.79
61.237	111.9	0.66
61.240	108.3	0.76
61.250	111.7	0.72
63.337	115.2	0.71
63.348	113.5	0.71
65.037	120.0	0.62
65.040	115.4	0.58
65.133	117.5	0.59
65.140	120.5	0.62
61.23	110.9	0.73 5n
63.34	114.3	0.71 2n
65.09	118.4	0.60 4n

Dommanget's orbit (1962) gives the residuals:

61.23	+ 1°.1	+0".08
63.34	+ 2.3	+0.07
65.09	+ 5.6	-0.03

7067 Σ 1280 +71°482

$8^h51^m.0$ +71°0' 9.3-9.4 K5

65.037	78°.1	2".24
65.040	78.6	2.22
65.04	78.4	2.23 2n

Comparison with Rabe's orbits (1956) gives the residuals:

orbit 1	- 4°.0	+0".40
orbit 2	+ 9.3	-0.20

7102 A 2968 +11°194

$8^h54^m.4$ +10°57' 9.2-9.2 F5

61.259	137°.1	1".19
61.265	138.3	1.32
61.26	137.7	1.26 2n

No change.

Kui 37 +42°1956

$8^h57^m.4$ +41°59' 4.3-6.3 F5

60.198	9°.7	0".64
61.240	3.5	0.52
61.250	0.1	0.66
61.256	358.5	0.70
61.259	0.5	0.62
62.285	357.0	0.70
65.130	307.8	0.56
65.140	303.3	0.47
65.209	305.7	0.48
61.25	1.5	0.64 6n
65.16	305.6	0.50 3n

Baize's orbit (1954) leaves the small residuals:

61.25	+ 0°.4	-0".01
65.16	- 2.3	+0.02

7124 Hu 718 +32°1826

$8^h57^m.4$ 32°37' 9.4-9.6 G5

61.259	147°.2	0".25
61.265	149.8	0.26
62.285	147.7	0.26
61.60	148.2	0.26 3n

The longer arc reduces dp to 0".007.

7138 J 744 +5°2095

$8^h58^m.4$ + 5°30' 11.1-11.8

61.265	260°.2	2".74
62.228	260.8	2.52
62.288	258.1	2.52
62.292	261.3	2.43
62.02	260.1	2.55 4n

Distance increased.

7142 A 1755 -1°2183

$8^h58^m.8$ - 2°20' 8.5-12.7 M0

61.234	149°.8	3".06
62.940	151.2	3.17
64.905	151.8	2.82
65.209	151.2	2.85
63.57	151.0	2.98 4n

Large change in both coordinates making dp = 0".055.

7152 β 211 +3°2124

$8^h59^m.4$ + 2°52' 7.1-9.6 A2

61.265	263°.8	1".37
62.228	261.0	1.49
62.940	266.0	1.34
63.348	263.0	1.40
63.351	260.7	1.47
64.905	262.3	1.48
63.01	262.8	1.42 6n

No definite change in angle but increase in distance.

7153 Hu 720 +48°1716

$8^h59^m.8$ +47°52' 8.6-8.9 F5

61.228	145°.4	0".73
61.237	141.6	0.72
61.240	142.5	0.89
61.250	145.3	0.89
61.256	144.2	0.86
61.24	143.8	0.82 5n

Hardly changed in 57 years.

7161 J 384

$9^h0^m.7$ - 3°24' 9.2-9.5

63.340	200°.6	2".51
63.348	200°.7	2".67
64.905	202.4	2.43
65.209	201.9	2.42
64.20	201.4	2.51 4n

Distance increasing.

7173 Hu 845 +36°1906

$9^h2^m.6$ +36°19' 10.3-10.7 F8

65.130	359°.5	0".37
65.140	353.3	0.34
65.209	357.6	0.35
65.16	356.8	0.35 3n

Little change in 60 years.

7203 Σ 1306 +67°577

$9^h6^m.0$ +67°20' 5.0-8.2 F8

59.151	16°.2	2".42
60.186	15.4	2.30
60.198	17.6	2.51
61.201	17.8	2.59
61.220	16.1	2.33
61.223	17.3	2.47
60.53	16.7	2.44 6n

The residuals from Baize's orbit (1948) are -1°.5 and -0".05.

Kui 39 +77°361

$9^h12^m.2$ +77°27' 10.2-10.5 K5

59.151	243°.9	0".54
60.198	243.3	0.54
62.203	241.2	0.64
62.285	240.5	0.60
65.140	224.6	0.72
65.209	226.2	0.68
65.215	222.8	0.66
60.96	242.2	0.58 4n
65.19	224.5	0.69 3n

Baize's orbit (1964) gives the residuals:

60.96	+ 6°.8	-0".02
65.19	+ 7.0	+0.05

7262 A 2754 +6°2135

$9^h12^m.7$ + 6°14' 10.0-10.8 G5

61.234	6°.7	1".14
61.237	8.4	1.06
61.240	6.8	1.03
61.250	6.2	0.91
61.256	8.4	1.07
61.24	7.3	1.04 5n

Slow orbital motion indicating a dp = 0".014.

7294 Ho 43 +21°2009

$9^h15^m.8$ +21°1' 9.1-9.6 F5

60.198	182°.3	0".31
61.240	181.8	0.30
61.265	176.0	0.30
62.228	175.1	0.33
62.285	177.6	0.28
65.209	158.6	0.23
65.136	156.8	0.22
65.203	155.6	0.25
65.215	152.5	0.23
61.44	178.6	0.30 5n
65.19	155.9	0.23 4n

Comparison with Kummritz's orbit (1956) gives the residuals:

61.64	+ 3°.7	+0".02
65.18	+ 9.1	-0.02

7337 J 386 +10°1987

$9^h20^m.5$ +10°20' 9.7-9.7

62.940	217°.7	0".90

63.337	215°3	0".90	
64.947	216.3	0.82	
63.74	216.4	0.87	3n

Slow change.

7341 A 2477 +18°2182

$9^h20^m.7$ 18°21' 7.3-8.8 G0

63.348	304°5	0".37	
65.136	308.6	0.31	
65.140	306.8	0.34	
65.209	311.5	0.35	
65.215	310.6	0.33	
64.81	308.4	0.34	5n

The angle has increased by 70 degrees in 52 years. The corresponding dp is 0".0023.

7359 Hu 869 +15°2043

$9^h22^m.4$ +15°2' 10.1-10.3 K0

60.198	281°5	0".40	
61.265	280.6	0.49	
62.228	281.3	0.47	
61.23	281.1	0.45	3n

Slow orbital motion corresponding to dp = 0".0043.

7384 Ho 366 +32°1884

$9^h24^m.9$ +31°41' 9.4-9.6 G0

59.964	36°6	0".35	
61.237	39.5	0.37	
61.240	40.8	0.33	
61.256	35.6	0.31	
61.259	39.0	0.35	
61.265	42.4	0.34	
61.04	39.0	0.34	6n

Slow orbital motion indicating dp = 0".008.

7390 Σ 1356 ω Leo

$9^h25^m.8$ + 9°17' 5.9-6.7 G0

59.964	294°2	0".33	
60.186	298.8	0.34	
60.195	296.4	0.35	
61.179	306.0	0.35	
61.228	308.6	0.28	
62.289	315.2	0.43	
62.292	316.7	0.45	
62.940	322.3	0.41	
63.348	326.1	0.44	
63.351	320.4	0.41	
64.905	330.4	0.45	
65.037	323.5	0.47	
65.133	324.5	0.43	
65.209	326.6	0.49	
60.12	296.5	0.34	3n
61.20	307.3	0.32	2n
62.29	316.0	0.44	2n
63.21	322.9	0.42	3n
65.07	326.2	0.46	4n

Comparison with Muller's orbit (1957) gives:

60.12	- 4°2	+0".05
61.20	- 3.2	-0.02
62.39	- 0.7	+0.07
63.21	+ 1.4	-0.03
65.07	- 3.8	-0.01

7472 J 78 +3°2244

$9^h36^m.3$ + 2°55' 10.9-12.7

62.440	154°4	3".10	
63.337	152.7	3.32	
63.340	151.3	3.02	
65.133	150.3	3.30	
65.209	153.0	3.30	
63.89	152.3	3.21	5n

To the 58 degrees decrease in angle since 1910 corresponds an improbably large dp = 0".066. Probably optical.

Kui 44 20 Leo

$9^h47^m.0$ +21°25' 6.6-6.9 F0

59.964	209°2	0".30	
60.186	213.5	0.34	
65.130	210.6	0.34	
65.136	207.9	0.30	
65.209	206.9	0.36	
65.212	208.7	0.35	
63.47	209.5	0.33	6n

Hardly changed in 28 years.

7541 Ho 369 +37°2023

$9^h48^m.2$ +36°43' 8.5-8.6 F2

60.186	93°0	0".34	
61.228	96.4	0.32	
61.237	94.8	0.29	
61.250	92.6	0.32	
61.256	93.0	0.33	
61.265	93.2	0.33	
61.07	93.8	0.32	6n

Since the quadrant is undeterminate the true nature of the orbit is still unknown.

7555 AC 5 8 Sex

$9^h50^m.0$ - 7°52' 5.8-6.1 A2

60.186	186°2	0".16	
60.195	193.5	0.14	
62.285	157.9	0.24	
62.301	158.1	0.26	
62.313	156.2	0.29	
62.318	153.0	0.29	
62.373	158.2	0.28	
62.940	148.2	0.29	
63.334	146.4	0.29	
63.348	138.5	0.30	
63.351	141.4	0.28	
64.905	126.8	0.27	
65.037	126.4	0.30	
65.040	125.9	0.32	
60.19	189.8	0.15	2n
62.32	156.7	0.27	5n
63.24	143.6	0.29	4n
64.99	126.4	0.30	3n

Comparison with Van den Bos' orbit (1960) gives the residuals:

60.19	+ 3°4	+0".01
62.33	+ 4.5	+0.09
63.34	+ 2.7	+0.09
64.99	- 0.3	+0.06

Kui 47 75°403

$10^h6^m.3$ +75°23' 10.6-10.7 M0

62.203	257°1	0".49	
62.301	259.2	0.58	
62.940	262.3	0.52	
62.48	259.5	0.53	3n

Baize's orbit (1960) gives the residuals -2°8 and -0".05.

7662 A 2145 +21°2156

$10^h6^m.6$ +20°35' 7.4-7.4 F5

62.285	211°3	0".24	
62.301	217.4	0.21	
62.313	211.6	0.25	
64.905	209.4	0.23	
65.037	212.2	0.19	
65.040	208.3	0.23	
62.30	213.4	0.23	3n
64.99	210.0	0.22	3n

Baize's orbit (1956) gives the residuals:

62.30	+ 5°.3	+0".03
64.99	+ 4.9	+0.03

7707 A 2148 +23°2204

$10^h14^m.2$ +22°44' 10.4-10.5

61.265	163°.7	0".28
62.285	168.3	0.31
61.78	166.0	0.30 2n

Little change in angle but the distance has been halved since 1910. The corresponding dp is 0".0057.

7729 M1b 127 +57°1264

$10^h17^m.9$ +56°40' 11.1-11.2

60.186	232°.3	2".42
60.201	233.8	2.54
61.160	232.5	2.31
60.52	232.9	2.42 3n

Unchanged in 40 years.

7758 Σ 1429 +25°2247

$10^h22^m.3$ +24°53' 7.0-9.0 G5

61.097	202°.7	0".59
61.160	201.3	0.65
61.179	204.8	0.61
61.15	202.9	0.62 3n

The longer arc makes dp = 0".011.

7775 OΣ 217 +17°2224

$10^h24^m.2$ +17°29' 7.9-8.4 F8

62.285	166°.5	0".27
62.301	170.4	0.32
63.334	169.9	0.33
62.64	168.9	0.31 3n

Residuals from Heintz' orbit (1963) are +2°.0 and +0".10.

7780 Hu 879 β Leo Min

$10^h25^m.0$ +36°58' 4.8-7.0

64.905	209°.8	0".28
65.037	211.2	0.20
65.040	210.2	0.25
64.99	210.4	0.24 3n

Comparison with Baize's orbit (1950) gives the differences +5°.8 and -0".02.

7831 A 2054 +46°1639

$10^h31^m.0$ +46°28' 9.5-9.5

62.285	204°.7	0".19
62.301	204.0	0.20
62.313	205.8	0.22
62.30	204.8	0.20 3n

Motion questionable.

7844 A 2055 +45°1844

$10^h33^m.6$ +44°46' 8.9-8.9 F8

62.285	153°.8	0".36
62.292	152.0	0.34
62.301	155.7	0.34
62.940	157.5	0.36
63.334	158.9	0.35
65.136	158.3	0.36
65.140	158.8	0.38
65.212	157.2	0.39
63.58	156.5	0.36 8n

To the slow change in both coordinates corresponds dp = 0".0042.

7855 OΣ 222 +60°1274

$10^h35^m.1$ +60°24' 7.0-11.0 F8

61.220	339°.1	4".22
61.223	342.0	4.05
61.237	339.5	4.24
61.240	339.5	4.37
61.250	339.9	4.25
61.23	340.0	4.23 5n

After 114 years the motion is still questionable. The common proper motion of 0".21 establishes the physical connection.

7860 Σ 1454 +27°1914

$10^h35^m.4$ +26°52' 8.8-11.5 K0

61.179	333°.2	2".37
61.220	330.4	2.17
61.224	333.9	2.27
61.21	332.5	2.27 3n

Slow orbital motion. The longer arc corresponds to dp = 0".029.

7871 OΣ 224 +9°2382

$10^h37^m.1$ + 9°6' 8.1-10.1 F5

61.265	205°.9	0".43
61.330	199.4	0.45
61.335	202.3	0.45
62.228	202.9	0.46
62.285	199.2	0.50
61.69	201.9	0.46 5n

Baize's orbit (1958) makes the residuals +2°.7 and + 0".01.

7877 J 1351

$10^h37^m.6$ + 7°41' 9.5-9.9

63.334	127°.8	4".65
65.037	126.4	4.84
65.209	125.8	4.62
64.53	126.7	4.70 3n

Angle decreasing.

7881 A 1351 -1°2422

$10^h38^m.1$ - 1°56' 10.0-10.2 G5

61.234	359°.9	0".34
61.335	356.4	0.34
62.313	356.7	0.39
61.63	357.7	0.36 3n

Slow decrease in angle.

7982 β 1076 +1°2501

$10^h53^m.1$ + 1°0' 6.0-10.5 F2

63.334	80°.5	0".92
65.040	80.3	1.02
64.19	80.4	0.97 2n

Baize's orbit (1957) requires correction since the residuals are +10°.9 and +0".19.

8011 A 2376 +20°2541

$10^h57^m.6$ +19°42' 10.4-10.9 G5

62.285	9°.8	0".23 1n

Unchanged in 51 years.

8032 A 1590 +55°1439

$11^h0^m.6$ +54°49' 9.2-9.7 G0

61.160	356°.2	1".16
61.201	355.0	1.10
61.220	355.4	1.24
61.224	356.7	1.16
61.237	355.0	1.23
61.21	355.7	1.18 5n

Heintz' orbit (1963) gives the residuals +1°.1 and +0".06.

8039 J 1262

$11^h1^m.0$ +19°7' 9.6-9.6

61.168	178°.0	2".25
61.220	177.0	2.36
61.224	180.2	2.34
61.237	177.8	2.50
61.256	178.0	2.33
61.22	178.2	2.36 5n

Probably unchanged.

Kui 47 X Leo

$11^h2^m.4$ + 7°36' 4.7-11 F0

59.151	264°.3	3".48
60.198	266.8	3.56
62.940	265.2	3.41
63.334	268.2	3.43
63.348	265.2	3.42
64.905	264.8	3.58
62.31	265.8	3.48 6n

The increase in both coordinates corresponds to a dp = 0".052.

8060 β 599 +2°2387

$11^h4^m.4$ + 2°14' 5.7-11.6 A0

61.179	101°.4	3".00
62.220	104.5	3.05
62.223	100.1	2.88
62.234	101.2	2.93
61.96	101.8	2.97 4n

Long period binary. In the Lick Index Catalogue the magnitude is given erroneously as 8.1.

8085 A 2156 +35°2219

$11^h9^m.3$ +35°17' 8.3-9.1 A2

61.237	236°.3	0".34
61.330	234.6	0.36
62.285	234.1	0.38
62.305	232.3	0.37
61.79	234.3	0.36 4n

Slow decrease in angle with little change in distance.

8094 Σ1517 +20°2572

$11^h11^m.1$ +20°25' 7.7-7.7 G0

65.037	170°.0	0".32
65.040	169.4	0.33
65.130	170.2	0.32
65.136	171.0	0.28
65.140	168.1	0.32
65.10	169.7	0.31 5n

It is now evident that the total angular motion is 120° and that after the minimum distance around 1950 the pair is now opening up in the second quadrant. Long period binary.

8148 Σ 1536 ι Leo

$11^h21^m.3$ +10°48' 4.1-7.3 F5

60.198	213°.1	0".97
61.220	213.8	1.16
61.223	209.5	0.98
63.334	202.7	1.11
63.337	199.5	1.11
63.348	201.8	1.00
63.368	198.3	1.06
65.037	188.9	1.22
65.040	193.5	1.09
65.140	191.3	1.06
60.88	212.1	1.04 3n
63.35	200.6	1.07 4n
65.07	191.2	1.12 3n

The residuals from Rabe's orbit (1958) are:

60.88	+ 2°.0	-0".08
63.35	- 3.1	0.00
65.07	- 7.5	-0.04

8166 Hu 462 -14°3326

$11^h24^m.7$ -15°22' 8.3-8.7 K6

63.334	114°.1	0".40
65.037	95.2	0.44
64.19	104.6	0.42 2n

Comparison with Couteau's orbit (1962) gives the residuals +0°.8 and +0".03.

8182 A 7 -5°3300

$11^h27^m.2$ - 6°2' 9.7-9.7 F8

61.335	244°.5	0".36
62.228	242.8	0.32
61.78	243.6	0.34 2n

The longer arc makes dp = 0".0044.

8189 OΣ 234 +42°2214

$11^h28^m.1$ +41°34' 7.6-8.0 F5

65.037	343°.7	0".28
65.040	350.4	0.28
65.140	347.1	0.25
65.212	345.9	0.24
65.215	344.0	0.27
65.13	346.2	0.26 5n

Muller's orbit (1955) gives the residuals +12°.9 and +0".01.

8231 Σ 1555 +28°2022

$11^h33^m.7$ +28°3' 6.4-6.8 A3

60.186	139°.0	0".36
60.400	141.1	0.36
65.130	135.3	0.42
65.136	138.9	0.40
65.140	138.0	0.38
65.215	135.4	0.41
63.53	138.0	0.39 6n

Long period orbital motion.

8242 Kü 39 +48°1958

$11^h34^m.6$ +47°45' 11.1-11.4 M0

60.198	58°.5	1".94
60.500	60.8	1.92
60.35	59.6	1.93 2n

To the change in both coordinates corresponds dp = 0".037.

8302 β 602 +15°2378

$11^h44^m.3$ +15°17' 8.0-10.5 A5

62.228	106°.0	0".48
62.285	104.0	0.54
63.334	108.2	0.51
62.62	106.1	0.51 3n

The longer arc reduces dp to 0".003.

8311 β 603 +15°2381

$11^h46^m.1$ +14°34' 5.9-10.1 A5

60.198	13°.0	0".62
61.335	8.4	0.64
62.285	8.7	0.66
65.130	7.0	0.72
65.140	3.8	0.70
61.27	10.3	0.64 3n
65.14	5.4	0.71 2n

Comparison with Heintz' orbit (1963) gives the residuals: 61.27 -0°.5 -0".09
65.14 +0.4 -0.09

8312 Kü 40 +34°2259

$11^h46^m.3$ +33°59' 10.2-10.8

60.186	185°.6	2".88
61.220	187.1	2.91
61.224	186.3	2.94
60.88	186.3	2.91 3n

Unchanged in 59 years.

8322 Es 1644

$11^h48^m.6$ +38°46' 10.0-10.1

This star was not found (60.186) in the catalogue position which is blank.

8323 Hu 730 +51°1705

$11^h48^m.8$ +50°49' 10.5-10.5

62.203	178°.0	0".27
62.285	177.6	0.29
65.140	174.2	0.27
65.209	175.8	0.27
63.71	176.4	0.28 4n

The longer arc reduces dp to 0".006.

8325 Hu 731 +48°1978

$11^h49^m.4$ +48°22' 9.6-9.8

61.237	337°.2	0".33
61.256	335.2	0.35
61.335	334.6	0.33
62.203	337.3	0.34
62.285	333.4	0.37
62.305	331.3	0.33
61.77	334.8	0.34 6n

The angular change corresponds to a period of about 150 years but the orbit is still undetermined.

8337 β 794 +74°476

$11^h51^m.0$ +74° 02' 7.1-8.4 F5

65.037	123°.6	0".46
65.040	124.5	0.42
65.136	125.5	0.40
65.140	126.2	0.42
65.09	125.0	0.42 4n

Heintz' orbit (1963) gives the residuals +1°.2 and 0".00.

8345 Es 724 +51°1710

$11^h51^m.7$ +50°50' 9.9-12.2

61.237	229°.7	2".64
61.256	226.6	2.80
61.259	226.1	2.63
61.322	224.8	2.77
61.330	228.4	2.60
61.335	228.0	2.59
61.29	227.3	2.67 6n

Unchanged.

Wor 20 +16°2316

$11^h51^m.9$ +15°32' 11.0-11.2 M0

62.285	316°.1	1".45
62.301	316.8	1.46
62.29	316.4	1.46 2n

Wor 21

$11^h56^m.3$ +59°50' 11.8-13.4 M0

62.203	279°.3	0".99
62.285	277.5	1.19
62.24	278.4	1.09 2n

It is 61°22221 and 60°22753 in the Vatican Astrographic Catalogue.

8415 A 1358 +57°1354

$12^h2^m.8$ +57°3' 9.8-10.0 G5

65.136	235°.4	0".70
65.140	231.1	0.79
65.212	233.1	0.69
65.16	233.2	0.73 3n

Hardly changed in 59 years. The position is corrected from Aitken's General Catalogue.

8419 Σ 3123 +69°644

$12^h3^m.5$ +68°59' 7.9-7.9 F5

61.256	99°.3	0".29
61.322	96.5	0.32
61.330	98.9	0.31
61.30	98.2	0.31 3n

Baize's orbit (1944) gives the residuals +5°.1 and +0".03.

8424 A 76 +71°603

$12^h3^m.7$ +70°39' 10.0-11.1-12.1 K0

A - BC

61.223	42°.9	22".29
61.330	43.0	22.38
62.203	42.5	22.21
62.285	42.7	22.13
61.76	42.8	22.25 4n

BC

61.223	321°.8	1".43
61.330	318.7	1.32
62.203	322.8	1.42
62.285	321.1	1.33
61.76	321.1	1.38 4n

No change in the wide pair since 1900 but the angle of BC has decreased making dp = 0".0012.

8433 A 1998 +43°2191

$12^h5^m.3$ +42°59' 9.6-9.6 F8

61.179	15°.2	0".36
61.223	13.0	0.33
62.203	19.5	0.29
62.285	18.2	0.33
61.72	16.5	0.33 4n

Hardly changed in 52 years.

8446 Σ 1606 +40°2508

$12^h8^m.3$ +40°10' 7.3 - 8.0 A3

60.186	297°.9	0".54
60.500	301.4	0.62
61.179	298.3	0.50
61.220	300.2	0.56
61.223	299.0	0.64
60.86	299.4	0.57 5n

Change in both coordinates corresponding to dp = 0".011.

8468 Hu 891 +79°387

$12^h11^m.4$ +78°43' 9.0-9.1 G5

63.334	10°.9	2".77
63.348	10.3	2.58
63.359	13.6	2.74
65.209	12.9	2.70
63.81	11.9	2.70 4n

Unchanged

8480 A 1999 +40°2514

$12^h13^m.0$ +40°24' 9.0-11.0 K2

65.140	345°.8	0".99
65.212	348.2	0.90
65.215	343.5	0.93
65.19	345.8	0.94 3n

Slow increase in angle corresponding to dp = 0".010.

8486 Σ 1621 +6°2573

$12^h13^m.5$ + 5°55' 10.2-11.7 K8

61.179	179°.3	0".64
61.220	183.4	0.74
61.237	179.2	0.64
61.330	183.8	0.70
61.332	181.8	0.68
61.26	181.5	0.68 5n

Baize's orbit (1958) gives the residuals -10°.3 and +0".05.

8498 Σ 1626 +70°690

$12^h14^m.4$ +70°25' 8.9-9.0 G0

63.334	5°.5	2".18
63.337	4.0	2.31
63.348	6.9	2.13
63.359	4.8	2.36
65.037	6.9	2.23
63.68	5.6	2.24 5n

Hardly changed in 132 years.

8528 Hn 12 -1°2656

$12^h19^m.2$ - 2°20' 11.2-11.7 G0

61.179	101°.1	0".87
61.220	101.0	0.98
61.223	100.2	0.89
61.21	100.8	0.91 3n

Little change in 80 years.

8564 Es 436 +30°2277

$12^h26^m.0$ +30°09' 10.5-10.5

60.186	316°.8	1".99
60.198	315.6	2.10
60.19	316.2	2.04 2n

Unchanged in 53 years.

8631 Ho 54 +10°2459

$12^h39^m.3$ +10°10' 10.7-10.7

61.335	144°.6	2".55
61.347	144.3	2.63
61.393	143.3	2.40
61.36	144.1	2.53 3n

Marked increase in distance corresponding to dp = 0".025. The 0".06 proper motion establishes the physical connection.

8632 A 1782 +8°2632

$12^h39^m.3$ + 7°39' 9.3-12.8 K5

61.179	139°.6	2".60
61.223	142.5	2.54
61.237	140.1	2.68
61.250	138.8	2.58
61.330	139.9	2.40
61.332	138.0	2.37
61.26	139.8	2.53 6n

Distance increased.

8635 A 1851 +27°2163

$12^h39^m.7$ +26°39' 10.2-10.6 K0

61.335	107°.6	0".28
61.393	106.2	0.32
61.36	106.9	0.30 2n

Couteau's orbit (1960) gives the residuals -2°.6 and -0".04.

8680 Hu 640 +21°2462

$12^h48^m.2$ +20°48' K5

61.179	126°.8	0".71
61.220	124.0	0.72
61.224	124.8	0.73
61.237	121.9	0.74
61.250	125.2	0.80
61.22	124.5	0.74 5n

Baize's orbit (1956) gives the residuals +2°.2 and -0".01.

8691 Es 1404 +40°2584

$12^h49^m.7$ +40°28' 10.9-14.9

61.327	30°.2	2".85
61.396	30.1	3.02
62.313	32.8	2.87
61.68	31.0	2.91 3n

Probably unchanged.

8695 Σ 1687 +22°2519

$12^h50^m.8$ +21°31' 5.2-8.0 K0

65.037	142°.7	0".99
65.136	148.1	0.92
65.212	147.5	0.88
65.13	146.1	0.93 3n

The residuals from Schmeidler's orbit (1939) are -3°.6 and +0".03.

8739 β 1082 +57°1408

$12^h58^m.6$ +56°38' 4.9-8.5 F0

61.223	7°.8	1".12
61.237	10.7	1.18
61.250	6.6	1.34
61.327	7.3	1.20
61.26	8.1	1.21 4n

Baize's orbit (1948) gives the residuals +0°.7 and +0".16.

8767 Hu 1258 +65°915

$13^h3^m.1$ +64°52' 7.8-10.1 G5

62.228	211°.6	0".35
62.285	196.6	0.36
62.313	206.1	0.40
62.28	204.8	0.37 3n

Slow orbital change corresponding to dp = 0".0032.

8778 Hu 739 +21°2486

$13^h3^m.8$ +21°0' 9.2-14.9 K7

60.198	332°.9	1".05
61.220	334.2	1.08
61.385	335.1	1.03
65.140	325.5	0.96
65.212	328.2	0.93
62.63	331.2	1.01 5n

The longer arc makes dp = 0".028. The companion is certainly brighter than 14.9, more like 12.5 mag.

Couteau 11 +21°2487

$13^h3^m.9$ +21°26' 6.1-9.1 F5

60.503	323°.0	0".99
61.223	325.3	0.96
61.330	324.0	1.08
62.373	323.6	0.96
61.36	324.0	1.00 4n

No change so far.

8790 Mlb 170

$13^h5^m.6$ +54°56' 11.0-11.4

61.250	272°.1	4".00
61.327	272.2	3.81
61.396	273.0	3.91
61.32	272.4	3.91 3n

Change questionable. This pair is Vab. ph. 56°45825-6 which indicates

18.18	270°.0	3".30

8804 Σ 1728 42 Comae

$13^h7^m.6$ +17°47' 5.2-5.2 F5

64.404	11°.3	0".43
64.410	12.6	0.46
65.037	12.6	0.42
64.62	12.2	0.44 3n

Pavel's orbit (1944) gives the residuals +0°.3 and +0".11.

8805 β 608 +39°2614

$13^h7^m.8$ +38°46' 6.2-11.2 B9

61.220	273°.5	1".29
61.223	274.8	1.29
61.237	273.4	1.26
61.250	272.2	1.48
61.256	269.8	1.29
61.330	270.1	1.39
61.25	272.3	1.33 6n

A slow decrease in angle is now evident. To this change corresponds dp = 0".007.

Rst 3829 -10°3635

$13^h12^m.3$ -11°6' 7.1-9.0 G0

61.250	290°.7	0".83
61.423	287.8	0.83
61.426	290.9	0.90
61.37	289.8	0.85 3n

Increase in both coordinates indicating a dp = 0".042.

8862 Hu 644 +48°2108

$13^h17^m.6$ +48°2' 9.0-9.8 K0

65.037	83°.7	0".96
65.130	84.7	1.11
65.136	83.7	1.09
65.212	83.5	0.93
65.13	83.9	1.02 4n

Heintz' orbit (1963) leaves the residuals -5°.0 and +0".04.

8864 Σ 1734 +3°2758

$13^h18^m.2$ + 3°12' 6.7-7.4 A0

63.334	180°.9	1".38
63.348	179.9	1.38
63.359	181.4	1.42
64.404	181.4	1.35
65.130	183.0	1.52
65.136	181.4	1.43
65.209	181.1	1.46
64.27	181.3	1.42 7n

Orbital motion mostly in distance. The longer arc makes dp = 0".0076.

8875 A 565 +27°2243

$13^h19^m.9$ +26°27' 9.2-11.0 K7

65.140	20°.8	0".72
65.212	16.8	0.64
65.18	18.8	0.68 2n

Change immaterial.

8887 Ho 260 +29°2405

$13^h21^m.3$ +29°29' 9.5-9.8 K5

61.189	52°.2	0".73
61.220	51.0	0.80
61.224	55.8	0.78
61.237	50.8	0.78
61.250	54.0	0.80
61.256	51.2	0.78
65.037	58.3	0.76
65.040	55.6	0.81
65.043	56.5	0.71
61.23	52.5	0.78 6n
65.04	56.8	0.76 3n

Comparison with Baize's orbit (1963) gives the residuals:

61.23	- 0°.2	+0".02
65.04	- 1.0	-0.03

8901 A 1609 +45°2108

$13^h23^m.6$ +44°45' 9.0-9.0-13.0

AB K0

60.500	22°.4	0".48
60.503	23.6	0.42
61.220	22.2	0.50
61.224	24.7	0.48
61.250	26.6	0.41
61.256	26.3	0.44
65.037	35.8	0.42
65.130	36.7	0.46
65.136	36.0	0.47
60.99	24.3	0.46 6n
65.10	36.2	0.45 3n

Comparison with Baize's orbit (1956) gives the residuals:

60.99	+ 5°.7	-0".05
65.10	+ 7.3	-0.05

AB - C

65.037	199°.4	2".60
65.130	202.7	2.34
65.136	204.0	2.64
65.10	202.0	2.53 3n

The proper motion of 0".040 proves the physical connection.

8987 β 612 +11°2589

$13^h37^m.1$ +11°0' 6.3-6.3 F2

60.500	204°.7	0".28
60.503	203.1	0.30
61.179	210.5	0.30
61.250	207.3	0.35
61.256	208.6	0.35
64.404	216.6	0.35
64.410	215.1	0.34
65.040	219.5	0.33
65.130	225.2	0.33
65.136	221.7	0.32
65.140	220.2	0.36
65.215	220.8	0.35
60.50	203.9	0.29 2n
61.23	208.8	0.33 3n
64.62	217.1	0.34 3n
65.16	222.0	0.34 4n

Danjon's orbit (1956) gives the residuals:

60.50	- 0°.3	0".00
61.23	+ 1.5	+0.03
64.62	- 2.8	+0.03
65.15	- 1.1	+0.03

9019 Σ 1781 +5°2794

$13^h43^m.6$ + 5°22' 7.8-8.2 G0

60.503	348°.1	0".48
60.523	350.8	0.44
60.526	352.1	0.53
60.606	350.1	0.48
65.130	363.3	0.37
65.212	360.9	0.44
65.215	359.6	0.47
60.54	350.3	0.48 4n
65.19	1.3	0.43 3n

The residuals from Heintz' orbit (1963) are:

60.54	+ 4°.3	+0".06
65.19	+ 0.1	0.00

Kui 65 -8°3639

$13^h44^m.6$ - 9°28' 6.6-7.6 K0

61.220	264°.2	0".46
61.237	263.5	0.44
61.423	266.5	0.42
62.373	268.2	0.44
61.56	265.6	0.44 4n

Hardly changed since 1935.

9071 A 1614 +52°1757

$13^h55^m.8$ +52°14' 9.4-9.5 G5

64.404	140°.1	1".02
65.037	137.6	0.90
64.72	138.8	0.96 2n

The residuals from Muller's orbit (1955) are -0°.5 and 0".00.

9089 A 1097 +57°1478

$14^h0^m.3$ +57°28' 8.4-8.7 F5

60.503	194°.7	0".32
60.529	198.1	0.36
60.588	195.1	0.30
60.592	198.4	0.35
60.55	196.6	0.33 4n

Couteau's orbit (1959) leaves the residuals +2°.9 and +0".05.

9090 Swift — +47°2112

$14^h0^m.5$ +46°35' 10.0-10.0 M4

63.359	19°.2	3".65
64.404	20.1	3.49
65.037	18.7	3.60
65.140	19.5	3.65
64.48	19.4	3.60 4n

This change is mostly an increase in distance. The corresponding dp is 0".032. Physical connection is established by the 0".55 proper motion.

9094 β 1270 +9°2842

$14^h1^m.2$ + 8°44' 8.5-8.6 F5

61.423	294°.8	0".19
61.426	297.2	0.20
61.574	291.7	0.25
62.375	293.5	0.21
61.70	294.3	0.21 4n

Finsen's orbit (1938) gives the residuals -2°.0 and -0".04.

9096 Hu 1148 +67°820

$14^h1^m.4$ +67°20' 8.2-12.2 F8

60.503	119°.5	0".93
61.220	118.8	0.86
61.393	122.2	0.88
62.313	120.4	0.88
61.36	120.2	0.89 4n

Hardly changed in 56 years.

9159 OΣ 278 +44°2336

$14^h10^m.3$ +44°25' 8.4-8.6 F2

61.393	349°.3	0".25
61.418	350.9	0.26
61.423	353.2	0.27
61.428	356.6	0.26
61.574	353.3	0.28
62.228	350.3	0.28
62.285	357.7	0.27
62.305	358.0	0.25
65.040	354.3	0.27
65.140	355.3	0.24
65.215	356.0	0.29
61.45	352.7	0.26 5n
62.27	355.3	0.27 3n
65.13	355.2	0.27 3n

Baize's orbit (1954) requires improvement since the residuals are:

61.45	+10°.6	-0".01
62.27	+13.9	+0.01
65.13	+20.7	+0.01

9165 β 224 +13°2762

$14^h11^m.0$ +12°48' 8.7-9.1 G0

60.503	292°.2	0".17
60.618	290.1	0.18
61.418	292.4	0.18
61.423	284.2	0.18
61.426	284.3	0.22
61.574	285.1	0.19
62.373	285.6	0.22
65.136	274.3	0.28
65.212	273.6	0.24
61.33	287.7	0.19 7n
65.17	274.0	0.26 2n

Comparison with Baize's orbit (1960) gives the residuals:

61.34	+ 2°.6	-0".03
65.17	+ 3.3	+0.01

9167 Σ 1820 +56°1718

$14^h11^m.4$ +55°33' 8.8-9.1 K2

63.334	105°.6	2".34
63.337	105.4	2.31
63.348	105.8	2.40
64.404	105.4	2.46
65.037	105.1	2.37
63.89	105.5	2.38 5n

The longer arc makes dp = 0".022.

9174 Σ 1816 +29°2508

$14^h11^m.7$ +29°20' 7.5-7.6 F0 - A2

60.186	87°.6	0".99
60.189	87.6	1.10
60.529	89.8	1.17
60.30	88.3	1.09 3n

The longer arc confirms dp = 0".010.

Kui 66 15 Boo

$14^h12^m.4$ +10°20' 5.5-8.1 G5

60.503	121°.6	0".91
60.523	124.2	0.93
60.595	122.3	0.89
60.54	122.7	0.91 3n

No definite change in 24 years.

9205 A 1617 +46°1950

$14^h15^m.2$ +45°43' 9.6-10.2 G

62.285	262°.5	0".41
62.313	264.9	0.42

62.30	263°.7	0".42	2n

To the slow angular increase corresponds dp = 0".004.

9220 A 1102 +69°743

$14^h17^m.0$ +69°28' 8.9-9.1 F2

60.529	137°.7	0".22
60.588	137.3	0.24
60.595	133.8	0.25
61.393	136.1	0.23
61.567	135.0	0.24
61.574	132.5	0.24
61.583	134.9	0.26
60.57	136.3	0.24 3n
61.53	134.6	0.24 4n

Couteau's orbit (1960) gives the residuals:

60.57	+ 3°.8	+0.02
61.53	+ 5.1	+0.02

9229 Σ 1834 +49°2294

$14^h18^m.5$ +48°44' 7.9-8.0 F8

63.334	101°.0	1".03
63.337	102.6	1.06
63.348	100.4	1.10
63.34	101.3	1.06 3n

Van den Bos' orbit (1939) still holds well. The residuals are -1°.3 and 0".00.

9247 β 1111 +9°2882

$14^h20^m.9$ + 8°40' 7.4-7.7 A0

60.186	218°.5	0".16
60.189	220.3	0.16
60.503	216.2	0.18
60.526	220.6	0.17
64.418	266.1	0.16
65.040	265.4	0.16
60.35	218.9	0.17 4n
64.73	265.7	0.16 2n

Van den Bos' earlier orbit (1938) gives smaller residuals than Couteau's more recent one (1958):

	Van den Bos		Couteau	
60.35	-1°.7	-0".01	-5°.7	-0".01
64.70	-1.1	-0.03	-6.6	-0.02

9264 A 2069 +17°2737

$14^h24^m.4$ +16°38' 8.4-8.6 F8

60.503	211°.1	0".27
60.526	208.9	0.25
61.393	208.8	0.26
60.81	209.6	0.26 3n

Residuals from Baize's orbit (1953) are +2°.9 and +0".02.

9269 Ho 542 +21°2655

$14^h25^m.2$ +20°51' 10.7-10.7 G5

60.503	228°.6	0".62
60.523	230.7	0.72
60.51	229.6	0.67 2n

To the angular decrease corresponds dp = 0".007.

9285 Hu 1268 +36°2496

$14^h27^m.5$ +36°26' 9.5-10.0 F5

60.526	227°.2	0".12
60.529	234.6	0.14
60.606	230.5	0.12
60.609	235.8	0.14
60.57	232.0	0.13 4n

To the large change in both coordinates corresponds a dp = 0".005. This will be a very difficult pair for some years.

9318 β 941 +0°3206

$14^h33^m.2$ + 0°28' 9.6-9.6 F8

62.450	186°.5	0".47
62.466	182.7	0.43
64.418	186.9	0.53
63.11	185.4	0.48 3n

The longer arc reduces dp to 0".0030.

9324 A 347 +48°2222

$14^h35^m.2$ +48°26' 8.5-8.7 F2

64.418	292°.7	0".50
65.037	295.2	0.49
64.73	294.0	0.50 2n

Comparison with the orbit of Guntzel-Lingner (1955) gives the small residuals +0°.7 and -0".02.

9378 OΣ 285 +42°2531

$14^h43^m.6$ +42°35' 7.7-8.2 F5

61.393	2°.8	0".24
61.418	0.3	0.23
61.423	2.4	0.27
61.426	4.0	0.27
61.428	0.1	0.24
65.037	337.7	0.18
65.040	340.4	0.21
61.42	1.9	0.25 5n
65.04	339.0	0.20 2n

Simonov's orbit (1937) gives the residuals:

61.42	+ 1°.0	+0".03
65.04	+11.0	+0.04.

9392 Σ 1883 +6°2946

$14^h46^m.4$ + 6°10' 7.5-7.5 F8

61.396	100°.5	0".38
61.418	98.6	0.34
61.429	102.6	0.35
61.426	100.8	0.36
61.428	97.8	0.38
61.42	100.1	0.36 5n

Baize's orbit (1961) gives the residuals +4°.9 and -0".01.

9397 A 2983 +10°2747

$14^h46^m.8$ +10°26' 9.3-9.3 G5

60.526	243°.3	0".12
60.529	244.0	0.12
60.606	246.4	0.13
60.615	246.9	0.13
60.618	245.7	0.14
60.58	245.3	0.13 5n

Comparison with Van den Bos' orbit (1954) gives the residuals -13°.1 and -0".01.

9400 A 1110 +8°2925

$14^h47^m.2$ + 8°11' 7.5-7.9 F5

62.450	255°.9	0".53
62.455	253.7	0.49
62.466	254.2	0.48
62.46	254.6	0.50 3n

The slow change gives a dp = 0".005.

9441 A 1627 +40°2829

$14^h53^m.8$ +39°51' 8.7-8.7 F0

60.526	16°.2	0".25
60.598	17.1	0.24
60.606	12.5	0.22
60.609	16.2	0.21
60.58	15.5	0.23 4n

Baize's orbit (1959) gives the residuals -4°.4 and +0".08.

9463 A 2072 +18°2965

$14^h56^m.7$ +17°44' 10.1-10.1

62.466	268°.0	0".78	
64.418	268.2	0.69	
63.44	268.1	0.74	2n

To the slow change in angle corresponds dp = 0".007.

9473 Hu 907 +22°2769

$14^h57^m.9$ +21°41' 9.7-10.2 G0

61.393	208°.8	0".26	
61.418	208.1	0.20	
61.423	208.6	0.24	
61.428	206.2	0.24	
61.489	206.6	0.26	
61.43	207.7	0.24	5n

Slow orbital motion indicating a dp = 0".0027.

9480 β 348 +0°3297

$14^h59^m.2$ + 0°03' 6.0-8.3 K0

62.450	111°.5	0".48	
62.455	112.6	0.59	
63.344	112.3	0.47	
64.418	114.6	0.54	
65.040	114.7	0.56	
63.54	113.1	0.53	5n

No clear evidence of change in 88 years.

9482 A 1629 +42°2557

$14^h59^m.4$ +41°45' 9.0-13.0 K

60.526	280°.7	2".03	
60.588	279.9	2.07	
60.595	279.7	1.91	
60.57	280.1	2.00	3n

Hardly changed in 53 years.

9483 Hu 1155 +15°2806

$14^h59^m.5$ +15°18' 9.4-10.9 F8

59.627	17°.8	4".03	
59.640	16.4	3.87	
59.660	15.1	4.01	
59.64	16.4	3.97	3n

No evidence of a change in 54 years.

9494 Σ 1909 44 Boo

$15^h2^m.2$ +47°51' 5.3-6.2 G0

59.151	269°.2	0".99	
59.422	267.7	1.06	
59.632	268.7	1.10	
59.656	266.3	0.96	
59.663	268.9	0.96	
60.500	273.9	0.99	
61.179	272.1	0.92	
61.217	271.8	1.00	
61.220	273.5	0.95	
61.223	271.7	0.95	
61.237	272.8	1.04	
61.486	274.6	0.96	
62.288	278.3	1.06	
62.285	276.0	0.11	
62.305	275.1	0.99	
62.373	280.2	0.96	
62.450	279.2	0.92	
62.698	274.1	1.00	
63.334	281.4	0.80	
63.337	282.0	0.82	
63.348	277.0	0.90	
63.359	279.3	0.79	
64.415	285.5	0.80	
64.418	283°.6	0".74	
65.037	287.9	0.70	
65.040	286.7	0.64	
65.130	285.4	0.71	
65.136	291.0	0.73	
65.140	286.0	0.64	
65.209	287.5	0.72	
65.212	286.8	0.59	
65.215	287.1	0.58	
59.50	268.2	1.01	5n
61.15	272.9	0.97	7n
62.40	277.1	0.84	6n
63.34	279.9	0.83	4n
64.42	284.6	0.77	2n
65.14	287.3	0.66	8n

Heintz' orbit (1963) leaves the residuals:

59.50	+ 1°.3	+0".01
61.17	+ 1.9	+0.07
62.42	+ 2.3	+0.04
63.44	+ 1.4	+0.09
64.42	+ 1.9	+0.08
65.07	+ 1.3	+0.01

9504 A 689 -1°3021

$15^h4^m.6$ - 2°5' 9.0-9.5 F8

60.523	328°.2	0".31	
60.529	327.9	0.31	
60.601	330.6	0.33	
62.446	321.3	0.32	
64.418	322.5	0.32	
60.55	328.9	0.32	3n
63.43	321.9	0.32	2n

May be the quadrant is to be reversed which would indicate a 175° decrease in angle.

9511 Hu 143 55°1733

$15^h6^m.1$ +55°27' 6.0-10.3 G5

60.526	149°.8	0".63	
60.588	152.6	0.65	
60.592	151.0	0.67	
61.220	148.7	0.66	
61.223	148.6	0.69	
61.237	141.2	0.72	
61.250	141.7	0.56	
61.256	147.8	0.66	
64.418	146.4	0.70	
65.136	148.6	0.63	
65.212	143.7	0.55	
60.57	151.1	0.65	3n
61.24	145.6	0.66	5n
64.92	146.2	0.63	3n

Slow increase in angle corresponding to dp = 0".0033.

9533 Σ 1917 +15°2829

$15^h10^m.2$ +15°34' 9.5-9.8 F8

59.627	236°.4	2".42	
59.640	237.7	2.45	
59.660	235.1	2.34	
59.64	236.4	2.40	3n

Hardly changed in 130 years.

9553 Σ 1926 +38°2631

$15^h13^m.0$ +38°29' 7.2-9.5 F0

61.220	254°.3	0".80	
61.223	246.5	0.66	
61.237	253.3	0.72	
61.250	247.8	0.75	
61.393	246.7	0.66	
61.26	249.7	0.72	5n

Slow orbital motion. The longer arc makes dp = 0".010.

9558 Hu 1273 +36°2586

$15^h13^m.5$ +36°9' 9.5-10.0

64.418	80°.4	0".33

Unchanged in 60 years.

9600 Hu 146 +21°2759

$15^h18^m.8$ +21°15' 9.3-9.6 G0

62.450	141°.9	0".47
62.466	137.4	0.50
62.46	139.6	0.48 2n

The longer arc makes dp = 0".009.

9623 Hu 909 +61°1500

$15^h22^m.2$ +61°10' 8.3-12.3 F5

62.450	293°.3	1".52
64.404	287.4	1.60
65.212	287.7	1.50
65.215	289.6	1.47
64.32	289.5	1.52 4n

Hardly changed in 58 years.

9628 Hu 149 +54°1745

$15^h23^m.2$ +54°23' 7.5-7.6

65.105	273°.5	0".60
65.136	271.4	0.46
65.212	270.6	0.60
65.215	270.2	0.49
65.17	271.4	0.54 4n

Slow orbital motion corresponding to dp = 0".009.

9636 A 18 -5°4076

$15^h24^m.0$ - 5°29' 8.9-9.4 F5

59.550	166°.0	0".78
59.640	170.7	0.66
60.198	168.1	0.62
60.523	170.8	0.59
60.529	168.2	0.63
60.09	168.8	0.66 5n

To the slow increase in angle corresponds dp = 0".0034.

9643 A 1120 +10°2854

$15^h24^m.9$ + 9°53' 8.4-9.1 G0

59.550	333°.3	0".28
59.656	339.0	0.33
60.523	333.2	0.31
60.598	336.6	0.32
61.423	332.8	0.21
61.426	335.7	0.25
61.428	334.9	0.29
61.483	336.3	0.28
61.489	336.1	0.28
62.450	336.6	0.25
62.466	339.2	0.29
60.08	335.5	0.31 4n
61.45	335.2	0.26 5n
62.46	337.9	0.27 2n

Comparison with Muller's orbit (1955) gives the residuals:

60.08	+ 1°.9	+0".03
61.46	+ 0.7	-0.01
62.46	+ 2.8	-0.01

9645 A 2074 +18°3024

$15^h25^m.1$ +17°48' 8.2-8.9 F8

59.550	267°.1	0".33
60.198	266.4	0.35
60.500	271.4	0.29
60.519	271.6	0.29
60.526	271.2	0.33
61.423	267°.0	0".32
61.426	268.3	0.32
61.428	271.4	0.27
61.483	270.7	0.27
61.489	271.5	0.29
60.26	270.0	0.32 5n
61.45	269.8	0.29 5n

Residuals from Baize's orbit (1955) are:

60.26	+ 7°.1	+0".02
61.45	+ 6.1	-0.01

9654 A 2175 +3°3034

$15^h25^m.7$ + 3°2' 8.9-8.9 A5

59.550	179°.0	0".21
60.523	178.5	0.26
60.529	179.0	0.24
62.450	184.7	0.24
62.466	179.0	0.25
60.20	178.8	0.24 3n
62.46	182.8	0.24 2n

Heintz' orbit (1963) gives the residuals:

60.20	+ 2°.5	+0".01
62.46	+ 0.2	+0.01

9692 Hu 577 +20°3118

$15^h30^m.6$ +19°55' 8.8-8.8 F5

59.656	236.0	0".16
60.523	238.8	0.18
60.526	239.3	0.20
60.606	238.3	0.21
60.609	237.6	0.18
61.428	253.5	0.22
61.483	246.3	0.21
61.489	248.4	0.21
61.567	250.1	0.22
62.450	248.4	0.23
62.466	249.3	0.23
64.418	253.1	0.20
60.38	238.0	0.19 5n
61.49	249.6	0.22 4n
63.11	250.3	0.22 3n

The residuals from Baize's orbit (1960) are:

60.38	- 3°.1	+0".02
61.49	+ 3.9	+0.02
63.11	+ 0.6	+0.03

9694 Σ 1956 +42°2617

$15^h31^m.5$ +41°59' 8.5-10.0 G5

61.220	40°.3	0".88
61.223	38.4	0.80
61.237	34.4	0.92
61.250	38.5	0.94
61.393	37.4	0.81
61.26	37.8	0.87 5n

The decrease in distance leads to dp = 0".022.

9708 Σ 1957 +63°2969

$15^h33^m.5$ +13°5' 8.0-9.7 F8

59.550	150°.5	0".73
59.627	151.1	0.67
59.640	153.6	0.56
60.519	155.8	0.64
60.523	152.0	0.64
60.526	157.5	0.72
61.220	150.6	0.62
61.223	154.6	0.59
61.250	150.3	0.75
61.396	159.3	0.68
60.06	153.4	0.66 6n
61.27	153.7	0.66 4n

To the decrease in both coordinates corresponds dp = 0".010.

9716 OΣ 298 +40°2905

$15^h34^m.3$ +39°58' 7.4-7.7

65.040	190°5	1".26
65.130	192.2	1.33
65.136	190.3	1.32
65.10	191.0	1.30 3n

Stephen's orbit (1939) gives the residuals +2°0 and +0".02.

9730 Hu 1168 +64°1081

$15^h36^m.3$ +64°36' 9.5-9.7 G5

60.526	242°7	0".34
60.592	244.9	0.29
60.595	242.5	0.34
60.57	243.4	0.32 3n

To the decrease in angle corresponds dp = 0".0045.

9742 A 2076 +19°3000

$15^h38^m.2$ +18°50' 8.4-8.4 A2

62.450	176°0	0".66
62.466	171.2	0.69
62.543	178.0	0.86
63.359	177.4	0.67
64.418	176.1	0.70
63.05	175.7	0.72 5n

The increase in both coordinates makes dp = 0".010.

9744 Hu 580 ι Ser

$15^h39^m.3$ +19°50' 5.3-5.3 A2

59.539	75°4	0".25
59.550	75.0	0.20
59.553	77.6	0.19
60.189	75.4	0.17
60.500	70.8	0.17
60.508	76.6	0.16
60.519	71.1	0.17
60.523	74.3	0.18
61.418	75.7	0.19
61.423	78.7	0.23
61.426	74.4	0.24
61.428	79.5	0.23
61.483	79.1	0.22
61.489	80.4	0.22
61.497	79.2	0.19
62.466	80.3	0.16
64.418	<0.10	
65.040	<0.10	
59.55	76.0	0.21 3n
60.45	73.6	0.17 5n
61.45	78.1	0.22 7n
62.47	80.3	0.16 1n

Van den Bos's 11 year orbit (1937) still holds well. The residuals are:

59.55	+ 5°7	0".00
60.46	+ 2.0	-0.03
61.45	+ 5.0	+0.03
62.47	+ 4.8	0.00

The computed distances for 64.418 and 65.040 are 0".05 and 0".03. The double period (orbit II) does not satisfy these measures.

9747 A 2176 +0°3389

$15^h39^m.5$ + 0°37' 8.2-8.2 A0

60.500	190°5	0".24
60.503	192.3	0.23
60.523	199.9	0.23
60.529	198.3	0.23
61.423	203.9	0.20
61.489	199.3	0.27
61.567	203.3	0.26
62.288	198.9	0.28
62.450	205.6	0.25
62.466	200.5	0.23
60.51	195.2	0.23 4n
61.49	202.2	0.24 3n
62.40	201.7	0.25 3n

The residuals from my orbit (1960) are:

60.51	- 1°8	0".00
61.49	+ 3.0	+0.01
62.38	+ 1.1	+0.02

9756 Σ 1969 +60°1629

$15^h40^m.4$ +60°8' 8.9-9.6 K0

60.598	235°2	0".16
60.606	232.8	0.17
60.609	240.7	0.13
60.615	231.3	0.15
60.618	242.7	0.14
60.61	236.5	0.15 5n

This pair is passing through a critical part of its orbit.

9769 Σ 1989 π^2 UMi

$15^h42^m.3$ +80°8' 7.3-8.3 F2

59.627	43°9	0".64
59.635	45.4	0.52
59.640	40.2	0.65
60.526	39.9	0.54
60.592	38.8	0.63
60.595	41.7	0.69
61.250	37.5	0.72
61.497	40.7	0.60
61.567	36.2	0.76
61.571	39.3	0.63
62.455	37.9	0.56
62.698	35.1	0.74
59.63	43.2	0.60 3n
60.57	40.1	0.62 3n
61.47	38.4	0.68 4n
62.58	36.5	0.65 2n

The residuals from Giannuzi's orbit (1956) are:

60.57	+ 8°4	+0".03
61.50	+ 5.8	+0.09
62.58	+ 4.7	+0.06

9797 A 1126 +5°3090

$15^h46^m.9$ + 5°12' 9.4-9.4 K0

60.523	236°4	0".14
60.529	235.1	0.16
60.595	230.1	0.15
60.601	238.9	0.13
61.423	231.8	0.16
61.489	237.2	0.15
61.574	235.6	0.17
60.56	235.1	0.14 4n
61.50	234.9	0.16 3n

There may have been a change of quadrant in this difficult pair.

9806 Hu 912 +60°1637

$15^h48^m.4$ +60°41' 8.5-8.6 F5

59.627	230°8	0".27
60.519	225.2	0.29
60.526	224.0	0.31
60.592	230.8	0.30
60.595	225.2	0.32
64.418	224.4	0.32
61.05	226.7	0.30 6n

The residuals from Heintz' orbit (1963) are +8°2 and +0".05.

9831 A 2080 +17°2929

$15^h51^m.9$ +17°8' 8.5-8.5 F2

60.500	68°3	0".24
60.523	67.5	0.22
60.529	69.2	0.25
61.423	69.5	0.22
61.483	77.3	0.21
61.489	74.7	0.24
61.574	70.8	0.20
60.52	68.3	0.24 3n
61.49	73.1	0.22 4n

Baize's orbit (1955) reverses the quadrant with the residuals:

60.52	- 4°.9	+0".02
61.49	- 2.0	0.00

9850 Σ 1988 +12°2918

$15^h54^m.4$ +12°37' 7.4-8.1 F2

59.539	257°.7	2".12
59.566	256.8	1.94
59.613	256.1	2.17
59.616	257.3	2.11
59.660	257.5	2.20
65.130	256.5	2.11
65.209	255.3	2.03
65.212	256.9	1.96
61.69	256.8	2.08 8n

Slow change in angle but marked decrease in distance making dp = 0".014.

9931 A 1798 +14°2999

$16^h5^m.6$ +14°33' 8.4-8.9 F0

61.483	68°.0	0".19
61.489	64.7	0.17
61.574	64.5	0.18
64.418	58.8	0.17
62.24	64.0	0.18 4n

Decrease in both coordinates making dp = 0".005.

Finsen 354 +10°2971

$16^h9^m.1$ + 9°50' 7.3-7.3 A3

60.523	87°.1	0".12
60.526	89.9	0.13
60.529	87.2	0.13
60.598	88.8	0.12
60.54	88.2	0.12 4n

9952 A 1799 +15°2964

$16^h9^m.2$ +15°15' 9.2-9.3 G5

59.539	137°.8	0".45
59.613	140.3	0.50
59.616	140.1	0.53
59.663	139.9	0.52
62.466	134.8	0.52
62.543	136.3	0.45
65.204	137.1	0.55
65.215	135.0	0.46
59.61	139.5	0.50 4n
63.86	135.8	0.50 4n

To the large change in both coordinates corresponds dp = 0".006.

9961 OΣ 306 +34°2745

$16^h10^m.0$ +34°31' 8.4-9.9 G5

59.656	25°.5	0".33
59.687	26.0	0.27
60.519	26.4	0.27
60.523	30.4	0.32
60.595	29.6	0.27
60.20	27.6	0.29 5n

Very slow angular motion.

9970 Σ 2028 +39°2963

$16^h11^m.1$ +39°29' 8.7-9.2 G0

59.422	162°.9	0".28
59.656	161.0	0.32
59.660	160.6	0.30
59.58	161.5	0.30 3n

Slow orbital motion.

9974 Σ 2023 +5°3169

$16^h12^m.0$ + 5°39' 8.9-9.9 F5

59.553	226°.0	1".88
59.583	226.8	1.94
59.632	227.0	1.76
59.59	226.6	1.86 3n

Slow orbital motion indicating dp = 0".008.

9982 Σ 2026 +8°3125

$16^h13^m.5$ + 7°30' 9.1-9.6 K5

62.455	30°.1	2".43
62.466	31.7	2.36
62.543	28.7	2.25
62.553	29.2	2.30
62.689	27.5	2.35
63.334	27.8	2.32
63.337	27.1	2.43
63.359	26.7	2.29
64.418	29.2	2.38
65.136	27.4	2.40
65.209	28.8	2.39
62.54	29.4	2.34 5n
64.13	27.8	2.37 6n

Comparison with Heintz' orbit (1963) gives the residuals:

62.54	+ 0°.9	0".00
64.13	- 0.2	-0.01

9989 A 2181 +1°3191

$16^h14^m.3$ + 1°18' 10.3-10.3 G0

60.523	17°.2	0".39
60.529	17.5	0.41
60.588	23.2	0.41
60.598	21.3	0.43
61.423	23.6	0.37
61.426	18.2	0.41
61.483	18.2	0.39
61.489	20.6	0.37
61.01	20.0	0.40 8n

To the increase in angle corresponds dp = 0".009.

10006 OΣ 309 +41°2689

$16^h17^m.6$ +41°47' 8.6-8.8 A5 - G

59.613	273°.2	0".40
59.627	268.1	0.36
59.646	267.8	0.35
59.663	270.7	0.41
62.455	271.5	0.43
62.466	275.2	0.38
62.689	275.6	0.38
62.698	273.1	0.40
59.64	270.0	0.38 4n
62.58	273.8	0.40 4n

Slow orbital motion. The longer arc makes dp = 0".0020.

Kui 72 +40°3005

$16^h18^m.2$ +39°50' 5.5-10.7 F2

62.455	142°.0	1".79
62.466	142.7	1.89
65.215	137.9	2.01
63.38	140.9	1.90 3n

Since 1935 the angle has slowly decreased but there is a marked increase in distance. The corresponding dp is 0".013.

10017 Hu 481 +23°2924

$16^h19^m.1$ +23°6' 8.0-9.9 F8

59.634	174°.4	0".77
59.672	178.0	0.76
60.526	177.5	0.63
60.592	173.9	0.68

60.11	176°.0	0".71	4n

To the change in both coordinates corresponds dp = 0".010.

10036 β 951 +33°2722

$16^h21^m.6$ +33°28' 9.6-9.8

AB = VB

59.660	107°.3	0".20
60.526	105.3	0.24
60.595	107.2	0.25
62.455	106.4	0.26
62.466	110.0	0.26
64.418	106.1	0.25
61.69	107.0	0.24 6n

Slow decrease in angle.

10046 β 950 -9°4381

$16^h22^m.5$ - 9°45' 8.7-9.8 F0

61.220	349°.4	0".90
61.250	350.0	1.14
61.483	347.5	0.96
61.489	349.2	1.08
61.497	350.6	0.94
61.567	349.9	1.20
61.42	349.4	1.04 6n

Very slow decrease in angle.

10054 β 625 ω Her

$16^h23^m.1$ +14°9' 4.5-11.5 A0

60.523	221°.8	0".98
60.529	224.5	0.97
60.53	223.2	0.98 2n

This pair becomes very difficult as the distance decreases. To the change in both coordinates corresponds dp = 0".020.

10065 A 1859 +12°3016

$16^h24^m.4$ +12°10' 9.1-9.1

60.523	49°.4	0".16
60.526	50.4	0.20
60.595	47.8	0.20
60.55	49.2	0.19 3n

Unchanged in 52 years.

Rst 3949 ν Oph

$16^h25^m.1$ - 8°16' 4.6-7.8 A2

62.450	104°.0	0".96
62.455	100.7	0.91
62.553	99.9	1.12
62.49	101.5	1.00 3n

The angle has increased by 50° since 1935.

10087 Σ 2055 λ Oph

$16^h28^m.4$ + 2°6' 3.9-6.9 A0

62.450	347°.8	0".91
62.455	348.8	0.85
62.466	346.4	0.82
62.543	345.6	0.99
62.553	348.8	1.00
62.49	347.5	0.91 5n

Rabe's orbit (1948) leaves the residuals +5°.6 and -0".03.

10092 Σ 3105 -6°4446

$16^h29^m.1$ - 6°56' 7.3-7.3 A0

59.151	259°.3	0".13
59.687	256.6	0.16
60.500	253.0	0.13
60.523	257.7	0.13
60.526	257°.9	0".16
60.529	258.8	0.18
60.595	257.2	0.15
60.618	259.4	0.13
61.574	256.1	0.18
61.588	258.8	0.16
59.42	258.0	0.14 2n
60.55	257.3	0.15 6n
61.58	257.4	0.17 2n

The residuals from Pensado's orbit (1957) are:

59.42	- 5°.6	0".00
60.55	+ 0.3	+0.01
61.58	+ 6.7	+0.04

10095 A 693 -1°3206

$16^h29^m.2$ - 2°9' 9.3-9.3 F5

60.523	30°.3	0".22
60.526	32.3	0.24
60.595	28.7	0.23
60.55	30.4	0.23 3n

Heintz' orbit (1963) gives the residuals +4°.6 and +0".01.

10108 A 2234 +2°3128

$16^h30^m.5$ + 2°39' 9.0-13.0 K0

61.220	123°.5	1".20
61.588	120.3	1.07
61.40	121.9	1.14 2n

Only a small decrease in angle. The proper motion 0".023 proves the physical connection.

10133 A 1863 -5°4328

$16^h35^m.7$ - 5°53' 9.8-11.1 A3

61.220	286°.7	0".69
61.250	284.9	0.66
61.567	284.9	0.63
61.571	282.6	0.60
61.40	284.8	0.64 4n

To the slow increase in angle corresponds dp = 0".006.

10140 β 953 +70°887

$16^h36^m.9$ +69°53' 8.5-9.0 F5

62.689	126°.4	0".38
62.707	129.9	0.44
62.710	126.0	0.39
62.70	127.4	0.40 3n

The residuals from Baize's orbit (1953) are +4°.9 and +0".01.

10158 A 349 +30°2860

$16^h39^m.4$ +30°11' 10.6-11.2

59.660	230°.8	0".28
60.526	232.0	0.29
60.529	232.7	0.28
60.24	231.8	0.28 3n

The residuals from Van den Bos's orbit (1959) are +12°.7 and +0".03.

10165 Hu 487 +22°3007

$16^h40^m.0$ +21°57' 9.9-9.9 F8

59.663	44°.7	0".38
60.523	43.1	0.36
60.529	43.0	0.34
60.24	43.6	0.36 3n

To the slow change corresponds dp = 0".0045.

10188 Δ 15 +43°2639

$16^h42^m.4$ +43°34' 9.1-9.1 K5

62.455	156°.2	1".22
62.553	156.7	1.03
62.707	160.8	1.25
62.710	160.3	1.28
63.334	159.9	1.26
63.337	157.9	1.20
63.359	157.9	1.30
62.61	158.5	1.20 4n
63.34	158.6	1.25 3n

The residuals from my orbit (1927) are:

62.51	+ 4°.1	-0".02
63.34	+ 4.7	+0.03

10196 A 1141 -0°3178

$16^h43^m.2$ - 0°39' 8.7-8.7 F8

60.529	22°.9	0".14
60.595	21.8	0.14
60.601	24.8	0.15
60.58	23.2	0.14 3n

Residuals from Baize's orbit (1961) are +2°.5 and +0".02.

10229 Σ 2106 +9°3287

$16^h48^m.7$ + 9°30' 7.0-8.7 F8

59.523	200°.6	0".34
59.627	201.3	0.35
59.679	196.6	0.40
60.523	200.9	0.38
60.529	193.3	0.43
60.588	194.5	0.40
60.595	193.9	0.42
60.15	197.3	0.39 7n

Long period binary.

10230 OΣ 315 +1°3323

$16^h48^m.9$ + 1°18' 5.7-7.6 A0

59.627	133°.9	0".42
59.679	132.1	0.50
60.523	131.2	0.44
60.529	133.7	0.47
60.09	132.7	0.46 4n

To the slow orbital motion corresponds dp = 0".013.

10276 A 1143 +57°1716

$16^h55^m.7$ +57°16' 9.8-9.9 G0

61.571	123°.6	0".40
61.574	118.8	0.35
61.580	121.8	0.34
61.583	118.4	0.41
61.58	120.6	0.37 4n

Baize's orbit (1961) gives the residuals +19°.3 and +0".10.

10279 Σ2118 +65°1159

$16^h56^m.2$ +65° 7' 6.9-7.4 F0

59.422	72°.0	0".98
59.656	69.8	0.97
59.660	69.2	0.95
62.707	70.0	1.02
62.710	71.3	0.99
62.713	69.6	1.03
62.718	71.7	0.98
61.37	70.5	0.99 7n

Maximum separation in the first quadrant seems still far off.

10295 β 1298 +9°3303

$16^h57^m.1$ + 9°46' 8.7-8.9 F0

59.550	114°.1	0".36
59.553	108.2	0.34
59.566	110°.0	0".34
59.616	113.0	0.39
60.519	114.5	0.41
59.76	112.0	0.37 5n

To the slow change in angle corresponds dp = 0".0019. On three of these nights the difference in magnitude of the components was estimated as $0^m.2$, certainly much less than $1^m.3$ given by Burnham.

10305 Hu 163 -12°4641

$16^h58^m.4$ -12°9' 9.6-9.9 G0

60.526	339°.2	0".21
60.529	337.7	0.20
60.598	338.9	0.21
60.55	338.6	0.21 3n

Hardly changed in 60 years.

10341 β 823 +0°3633

$17^h4^m.0$ + 0°43' 8.7-9.7 G0

59.566	89°.8	0".85
59.613	90.3	0.90
59.616	94.7	0.96
59.640	93.0	0.88
59.61	92.0	0.90 4n

Arend's orbit (1955) gives the residuals +2°.3 and +0".06.

10374 β 1118 η Oph

$17^h7^m.5$ -15°40' 3.1-3.6 A2

60.523	333°.0	0".30
60.526	335.2	0.31
60,529	332.4	0.33
60.53	333.5	0.31 3n

My orbit (1960) leaves the residuals -3°.6 and +0".04.

Kui 79 +45°2505

$17^h10^m.6$ +45°47' 10.1-10.6 K5

62.707	206°.6	0".74
62.710	210.3	0.84
62.71	208.4	0.79 2n

Baize's orbit (1952) gives the residuals ±2°.0 and -0".04.

10403 A 2087 +17°3199

$17^h11^m.4$ +17°20' 9.9-9.9

59.660	118°.4	0".14
60.529	115.0	0.16
60.598	132.2	0.14
60.601	120.1	0.13
60.606	126.5	0.14
60.609	121.8	0.15
60.615	130.1	0.15
60.46	123.4	0.14 7n

Couteau's orbit (1965) gives the residuals -4°.8 and -0".01.

10409 A 1147 +6°3373

$17^h11^m.8$ + 6°25' 9.8-10.0 A2

60.523	358°.5	0".21
60.529	353.5	0.25
60.532	354.1	0.22
60.53	355.4	0.23 3n

The change is almost all in the distance.

10423 A 2592 -9°4525

$17^h12^m.9$ - 9°45' 7.6-8.1 F5

59.550	275°.2	0".45
59.613	272.4	0.42
59.635	273.8	0.36
60.523	272.1	0.39
59.83	273.4	0.40 4n

The change in both coordinates leads to dp = 0".007.

10425 OΣ 327 +56°1959

$17^h13^m.2$ +56°11' 8.5-8.8 F2

59.656	41°.5	0".15
59.660	42.6	0.14
60.523	48.6	0.15
60.526	42.5	0.13
60.529	47.8	0.16
60.598	48.3	0.16
60.601	44.9	0.15
59.66	42.0	0.14 2n
60.56	46.4	0.15 5n

My orbit (1960) gives the residuals:

59.66	+ 2°.8	+0".03
60.56	+ 2.5	+0.04

10435 HW 15 +26°2990

$17^h14^m.6$ +26°38' 9.7-10.7 G5

AB of Σ 2145

59.660	27°.2	0".15
60.526	29.8	0.15
60.601	31.3	0.16
60.606	30.8	0.16
60.35	29.8	0.16 4n

The change is mostly in the distance which has closed in considerably. The corresponding dp is 0".0065.

10459 β 628 +32°2888

$17^h16^m.5$ +32°43' 9.4-9.9

59.640	309°.0	0".43
59.660	307.3	0.42
59.663	306.8	0.46
59.65	307.7	0.44 3n

With little change in distance the angle has decreased by 60° since 1878 making dp = 0".005.

10478 Hu 670 +49°2617

$17^h18^m.0$ +49°20' 10.7-11.7

60.523	27°.9	0".13
60.526	23.5	0.14
60.529	22.2	0.15
60.601	27.5	0.13
60.54	25.3	0.14 4n

The change is mostly in distance. The period may be short.

10480 A 2593 -6°4581

$17^h18^m.0$ - 7°3' 9.5-9.7 G5

60.523	220°.2	0".12
60.526	219.5	0.14
60.529	218.8	0.14
60.595	208.0	0.16
60.601	219.4	0.13
60.55	217.2	0.14 5n

Couteau's orbit (1962) gives the residuals +6°.3 and +0".01.

10513 β 1249 +53°1938

$17^h21^m.0$ +53°54' 10.0-10.2

59.656	100°.7	0".20
59.660	93.2	0.17
60.523	102.8	0.22
60.526	92°.4	0".20
60.529	99.1	0.18
60.18	97.6	0.19 5n

Change in both coordinates making dp = 0".005.

10531 Hu 1179 +38°2928

$17^h22^m.4$ +38°38' 7.1-7.7 F8

59.656	249°.1	0".11
59.660	252.9	0.13
59.663	262.8	0.11
59.687	255.2	0.13
60.526	258.1	0.12
60.529	255.2	0.11
60.595	248.5	0.13
60.601	254.9	0.11
60.11	254.6	0.12 8n

To the slow decrease in angle and distance corresponds dp = 0".0016.

10585 A 351 +29°3029

$17^h27^m.4$ +29°26' 9.7-10.1 K2

59.640	65°.0	0".55
59.656	61.6	0.59
59.660	62.4	0.60
62.450	67.5	0.49
62.466	66.8	0.53
59.65	63.0	0.58 3n
62.46	67.2	0.51 2n

Baize's orbit (1954) gives the residuals:

59.65	+ 2°.3	+0".07
62.46	+ 3.3	-0.01

10617 A 1155 +74°713

$17^h29^m.9$ +74°32' 8.3-10.9 F2

60.523	301°.0	0".58
60.526	295.1	0.56
60.601	299.5	0.64
60.618	299.4	0.54
60.57	298.8	0.58 4n

Slow orbital motion making dp = 0".008.

10621 A 352 +28°2771

$17^h30^m.1$ +28°50' 8.9-8.9 F2

59.656	189°.5	0".17
59.660	182.2	0.15
60.523	190.6	0.13
60.526	186.2	0.19
60.529	185.7	0.20
60.18	186.8	0.17 5n

Baize's orbit (1958) gives the residuals +10°.3 and +0".01.

10624 Hu 1181 +34°2990

$17^h30^m.8$ +34°47' 8.4-8.7 G0

59.656	6°.8	0".14
59.660	11.4	0.13
60.523	10.3	0.12
60.526	10.6	0.12
60.529	8.4	0.13
60.601	12.5	0.12
60.25	10.0	0.13 6n

The quadrant could not be ascertained at such a small distance. Orbital motion evident but its nature is still indeterminate.

Kui 83 +27°2853

$17^h35^m.2$ +27°55' 11.3-11.5 K5

59.656	345°.2	0".26
59.660	338.8	0.29
59.663	340.5	0.25
61.483	314.7	0.25

61.489	313°.7	0".26
61.580	310.3	0.24
59.66	341.5	0.27 3n
61.52	312.9	0.25 3n

Baize's orbit (1963) gives the residuals:

59.66	+ 6°.7	+0".05
61.52	+ 3.5	+0.04

10660 β 962 26 Dra

$17^h34^m.5$ +61°55' 5.3-9.9 F8

59.627	150°.1	1".46
59.632	153.9	1.40
59.635	150.7	1.50
59.640	152.4	1.36
60.601	145.3	1.33
60.618	148.9	1.36
59.63	151.8	1.43 4n
60.61	147.1	1.35 2n

Baize's recent orbit (1965) makes the residuals:

59.63	+ 3°.1	+0".05
60.61	+ 2.3	+0.08

10683 Hu 181 -15°4635

$17^h36^m.5$ -15°40' 9.8-10.2 K0

60.529	35°.8	0".49
60.598	33.6	0.55
60.601	31.8	0.60
60.606	34.1	0.60
60.58	33.8	0.56 4n

Orbital motion evident.

10686 Es 1257 +45°2574

$17^h36^m.8$ +45°2' 10.1-10.6

61.217	295°.9	2".72
61.220	297.2	2.90
61.223	298.7	2.77
61.240	298.1	2.88
61.393	296.2	2.97
61.26	297.2	2.85 5n

Slow increase in angle.

10702 A 1160 -0°3342

$17^h38^m.0$ - 0°42' 10.3-10.3 A2

60.588	20°.1	1".63
60.592	19.4	1.71
60.609	19.0	1.70
60.60	19.5	1.68 3n

To the slow increase in both coordinates corresponds dp = 0".0085.

10705 A 2685 -5°4480

$17^h38^m.1$ - 5°19' 10.1-10.4 G8

60.609	183°.1	0".96
60.615	179.5	0.86
60.618	179.4	0.98
60.61	180.7	0.93 3n

Slow orbital motion.

10711 AG 211 +20°3540

$17^h38^m.5$ +20°18' 9.5-10.0 F8

60.590	130°.4	2".73
60.598	130.5	2.75
60.59	130.4	2.74 2n

Unchanged.

10730 AG 212 +5°3457

$17^h40^m.2$ + 5°21' 9.9-9.9 F0

60.588	26°.3	2".66
60.592	27°.1	2".69
60.595	25.7	2.54
60.598	26.8	2.67
60.59	26.5	2.64 4n

Unchanged.

10733 Hu 1283 +12°3278

$17^h40^m.7$ +12°17' 9.5-10.3 A2

60.609	351°.4	0".37
60.615	352.0	0.39
60.618	348.8	0.38
61.574	348.7	0.34
61.580	347.2	0.36
61.588	351.4	0.37
61.10	349.9	0.37 6n

The slow change indicates a dp = 0".0025.

10734 HI 41 +73°786

$17^h40^m.8$ +72°57' 9.0-9.4 F2

60.590	341°.0	1".37
60.605	339.2	1.38
60.616	338.6	1.44
60.60	339.6	1.40 3n

Unchanged.

10752 Es 2168 +36°2931

$17^h42^m.1$ +36°57' 11.0-11.6 G0

60.588	291°.9	6".91
60.595	293.0	6.90
60.598	293.2	7.05
60.59	292.7	6.95 3n

10755 Hu 1286 +22°3201

$17^h42^m.4$ +22°38' 11.0-11.6

60.592	271°.2	3".38
60.595	272.4	3.27
60.59	271.8	3.32 2n

Change questionable.

10756 Σ 2206 +19°3416

$17^h42^m.4$ +19°1' 8.2-9.8 B9

60.592	249°.5	1".11
60.595	247.5	1.25
60.601	249.9	1.23
60.606	249.1	1.19
60.60	249.0	1.19 4n

No definite change after 130 years.

10773 Ho 70 +30°3054

$17^h43^m.7$ +30°33' 9.7-9.7 G5

60.606	100°.9	0".42
60.609	101.3	0.52
60.615	96.3	0.49
60.61	99.5	0.48 3n

Very slow decrease in angle corresponding to dp = 0".0011.

10786 AC 7 μ Her

$17^h44^m.5$ +27°46' 10.2-10.7 G5

BC

60.503	203°.6	0".69
60.519	202.4	0.68
62.450	218.2	0.80
62.455	218.6	0.88
62.465	221.2	0.86
62.553	222.5	0.87
62.686	219.2	0.88
64.736	232.3	1.13

60.51	203°.0	0".68	2n
62.52	219.9	0.86	5n
64.74	232.3	1.13	1n

Couteau's orbit (1958) gives the residuals:

60.51	+ 1°.0	-0".04
62.52	- 1.3	-0.06
64.74	- 2.3	+0.05

10791 J 456

$17^h44^m.6$ - 1°30' 9.5-9.5

60.609	100°.8	3".15	
60.612	99.4	3.01	
60.61	100.1	3.08	2n

Change doubtful.

10801 A 2185 +1°3510

$17^h45^m.5$ +1°36' 8.9-10.6 A0

60.609	183°.4	0".59	
60.618	180.5	0.67	
61.483	187.1	0.56	
61.551	183.2	0.64	
61.583	185.4	0.58	
61.17	183.9	0.61	5n

Hardly changed in 51 years.

10814 Hu 1182 +35°3074

$17^h46^m.9$ +35°37' 9.3-9.7

59.663	344°.5	0".63	
59.640	343.5	0.62	
59.663	342.7	0.70	
59.66	343.6	0.65	3n

To the decrease in angle corresponds dp = 0".0037.

10816 Es 1092 +49°2694

$17^h47^m.1$ +49°42' 10.9-11.3

60.598	23°.7	4".01	
60.601	21.6	3.92	
60.615	23.6	4.13	
60.60	23.0	4.02	3n

Unchanged.

10819 A 2186 +0°3789

$17^h47^m.4$ + 0°31' 9.2-9.4 G5

60.523	357°.2	0".11	
60.529	359.7	0.12	
60.598	360.8	0.13	
60.618	360.7	0.14	
60.631	353.7	0.12	
60.58	358.4	0.12	5n

The change in both coordinates indicates a dp = 0".0026.

10828 OΣ 337 +7°3481

$17^h48^m.2$ + 7°15' 8.2-8.7 F2

60.526	194°.6	0".27	
60.598	197.3	0.32	
60.601	191.7	0.30	
60.618	194.2	0.32	
62.450	198.9	0.30	
62.466	198.1	0.31	
62.553	195.6	0.31	
62.683	198.7	0.29	
61.56	196.1	0.30	8n

Heintz' orbit (1963) gives the residuals +0°.8 and +0".02.

10831 Fox 22 +15°3286

$17^h48^m.4$ +15°19' 11.0-11.4

62.450	340°.8	0".69	
62.466	337°.5	0".83	
62.686	339.8	0.72	
62.53	339.4	0.75	3n

Unchanged in 51 years.

10845 β 964 +48°2584

$17^h49^m.5$ +48°25' 8.8-13.8 K0

60.526	153°.6	1".05	
60.618	154.0	1.09	
60.57	153.8	1.07	2n

Unchanged.

10857 L 17

$17^h50^m.3$ +15°33' 10.5-11.2

60.595	291°.5	2".64	
60.608	292.7	2.61	
60.606	293.5	2.64	
60.60	292.6	2.63	3n

Change questionable.

10860 A 234 +25°3365

$17^h50^m.6$ +25°37' 9.2-9.5 A3

59.656	52°.7	0".28	
59.660	52.0	0.26	
60.503	53.5	0.28	
62.450	56.7	0.24	
62.466	54.6	0.24	
60.95	53.9	0.26	5n

The slow change makes dp = 0".0038.

10866 AC 8 +29°3134

$17^h51^m.0$ +29°41' 8.9-8.9 A5

58.598	260°.5	0".23	
59.663	264.7	0.24	
59.687	263.3	0.27	
60.503	260.5	0.26	
59.61	262.2	0.25	4n

Slow orbital motion.

10868 Ho 562 +20°3595

$17^h51^m.2$ +20°56' 10.1-10.6

60.595	257°.1	3".62	
60.601	257.6	3.58	
60.606	258.6	3.72	
60.60	257.8	3.64	3n

Unchanged in 64 years.

10871 A 235 +25°3368

$17^h51^m.3$ +25°0' 8.8-9.1 K0

59.663	105°.5	0".29	
59.687	105.6	0.29	
60.503	115.4	0.26	
60.519	113.1	0.24	
60.588	115.0	0.28	
60.595	118.8	0.25	
62.450	128.9	0.20	
62.466	124.4	0.21	
62.553	121.4	0.24	
59.68	105.6	0.29	2n
60.55	115.6	0.26	4n
62.49	124.9	0.22	3n

The deviations from Baize's orbit (1957) show that the period has to be lengthened:

59.68	- 3°.3	+0".08
60.55	- 3.8	+0.10
62.49	-23.0	+0.12

10895 J 457

$17^h53^m.5$ + 8°27' 9.5-11.0

60.595	218°.4	2".61
60.601	217.6	2.94
60.606	218.8	2.79
60.60	218.3	2.78 3n

Unchanged. The position is corrected from the astrographic catalogue.

10896 J 458

$17^h53^m.7$ + 8°32' 9.3-11.0

60.595	116°.2	4".33
60.601	117.5	4.48
60.606	115.3	4.32
60.60	116.3	4.38 3n

Probably unchanged.

10912 Σ 2244 +0°3816

$17^h54^m.5$ + 0°4' 6.8-7.0 A2

59.550	281°.2	0".38
59.566	283.9	0.34
59.613	286.6	0.36
59.656	289.4	0.34
59.663	286.7	0.32
61.483	285.8	0.30
61.497	287.7	0.32
61.551	282.2	0.36
61.556	286.0	0.30
62.450	287.6	0.29
62.466	288.7	0.31
62.553	291.6	0.31
62.600	286.5	0.29
59.61	285.6	0.35 5n
61.52	285.4	0.32 4n
62.52	288.6	0.30 4n

The longer arc makes dp = 0".0039.

10916 β 1299 +10°3337

$17^h55^m.1$ +10°58' 8.8-8.8 K5

59.656	343°.5	0".12
59.660	348.2	0.12
60.523	357.4	0.13
60.601	351.8	0.14
60.618	353.0	0.15
59.66	345.8	0.12 2n
60.58	354.1	0.14 3n

Baize's orbit (1959) gives the residuals:

59.66	- 8°.8	0".00
60.58	- 7.9	+0.01

10938 Hu 190 -13°4807

$17^h55^m.9$ -13°4' 9.8-11.1 G0

60.609	164°.8	0".54
60.618	164.4	0.66
60.621	165.2	0.63
60.62	164.8	0.61 3n

Motion in both coordinates making dp = 0".011.

Kui 84 +5°3562

$17^h56^m.0$ + 4°28' 10.9-11.5 K8

60.598	350°.8	0".14
60.606	351.5	0.15
60.609	355.6	0.14
60.60	352.6	0.14 3n

No clear evidence of motion so far.

10954 Hu 1185 +32°3024

$17^h57^m.2$ +32°28' 9.6-10.6

59.656	36°.3	0".12
59.660	34.8	0.13
59.663	36.3	0.15
59.66	35.8	0.13 3n

The period may be short!

10977 β 47 -10°4583

$17^h58^m.7$ -10°14' 8.5-10.5 G0

59.638	309°.9	0".91
59.640	305.3	0.86
59.663	304.4	0.84
59.65	306.5	0.87 3n

Change in both coordinates making dp = 0".0037.

10990 β 1125 68 Oph

$17^h59^m.2$ + 1°18' 4.4-9.2 A2

59.550	65°.3	0".65
59.566	70.8	0.70
60.609	69.3	0.58
59.91	68.5	0.64 3n

The longer arc makes dp = 0".009.

11002 β 635 +1°3565

$18^h0^m.2$ + 1°37' 9.5-10.5 A5

60.609	122°.1	1".56
60.615	120.0	1.59
60.61	121.0	1.58 2n

Very slow angular increase.

11006 OΣ 349 +83°527

$18^h0^m.9$ +83°54' 8.1-8.6 G5

59.656	57°.1	0".28
60.523	57.4	0.26
61.250	67.8	0.27
61.567	68.3	0.28
61.571	65.6	0.27
60.09	57.2	0.27 2n
61.46	67.2	0.27 3n

The residuals from Heintz' orbits (1962)

	I		II	
60.07	+18°.2	+0".00	+15°.8	+0".05
61.46	+26.0	+0.06	+23.6	+0.06

show that further correction of the elements is required.

11010 β 1127 +44°2812

$18^h1^m.0$ +44°14' 7.2-9.3 F2

62.686	88°.1	0".83
62.689	90.5	0.86
62.707	91.3	0.93
62.710	87.2	0.90
62.70	89.3	0.88 4n

The longer arc makes dp = 0".024.

11022 Es 1416 +44°2813

$18^h1^m.6$ +44°42' 11.0-11.2

60.598	72°.9	1".67
60.601	75.4	1.80
60.606	76.2	1.62
60.60	74.8	1.70 3n

Unchanged.

11023 Σ 2275 +39°3308

$18^h1^m.6$ +39°21' 9.3-9.5

59.651	157°.6	0".31
59.660	155.6	0.28
60.615	155.8	0.34
60.621	158.6	0.28
64.418	159.4	0.30
60.99	157.4	0.30 5n

Larger change especially in angle indicating dp = 0".009. A pair to watch as it closes in.

11060 OΣ341 +21°3302

$18^h3^m.7$ +21°26' 7.2-8.5 G0

59.656	91°.8	0".19
59.660	96.1	0.16
59.663	95.9	0.18
59.66	94.6	0.18 3n

My orbit (1951) gives the residuals +6°.7 and -0".01.

11067 Ho 79 +33°3025

$18^h4^m.3$ +33°25' 10.8-10.8

59.663	22°.3	0".37
59.687	22.1	0.40
60.523	24.5	0.35
60.526	26.4	0.41
60.529	21.0	0.37
60.19	23.3	0.38 5n

To the increase in angle corresponds dp = 0".0026.

11068 Couteau 8 +13°3524

$18^h4^m.5$ +13°59' 10.2-10.4

61.571	130°.7	0".69
61.583	128.7	0.68
62.450	131.3	0.69
62.600	129.0	0.76
64.418	126.6	0.71
62.52	129.3	0.71 5n

Little change so far.

11071 Hu 1186 +38°3077

$18^h4^m.6$ +38°24' 8.7-8.8

61.256	100°.2	0".33
61.512	99.1	0.35
61.567	94.3	0.34
61.571	95.3	0.38
62.686	94.8	0.36
62.689	93.6	0.40
62.710	90.2	0.39
62.718	89.2	0.36
62.713	95.2	0.39
61.48	97.2	0.35 4n
62.70	92.6	0.38 5n

Heintz' orbit (1964) gives the residuals:

61.48	+ 0°.2	-0".01
62.70	+ 1.2	+0.02

11079 AG 216 +3°3596

$18^h5^m.2$ + 3°17' 9.8-9.9

60.609	89°.8	2".43
60.612	89.2	2.51
60.61	89.5	2.47 2n

No definite change.

11080 OΣ 524 +19°3533

$18^h5^m.3$ +19°39' 7.7-9.0 A2

59.656	265°.0	0".14
59.660	271.3	0.14
59.663	270.5	0.13
60.606	266.7	0.15
60.609	267.8	0.15
60.04	268.3	0.14 5n

My orbit (1960) gives the residuals +6°.7 and +0".01.

11098 Hu 314 +18°3566

$18^h6^m.4$ +18°38' 8.6-8.7 A0

62.450	115°.8	0".33
62.466	112.2	0.34
62.600	115.2	0.30
62.51	114.4	0.32 3n

The longer arc makes dp = 0".0045.

11111 Σ 2281 73 Oph

$18^h7^m.1$ + 3°59' 5.9-7.4

61.571	33°.8	0".36
61.580	32.4	0.34
61.588	33.7	0.34
61.58	33.3	0.35 3n

Heintz' orbit (1959) gives the residuals +16°.6 and +0".02.

11127 β 132 -19°4886

$18^h8^m.3$ -19°52' 6.9-7.3 A2

62.689	200°.1	1".42
62.707	197.8	1.60
62.718	198.8	1.67
63.334	199.7	1.55
62.86	199.1	1.56 4n

The longer arc makes dp = 0".016.

11149 Ho 82 +33°3044

$18^h9^m.9$ +33°26' 6.4-6.7-9.8 A2

AB = B 2545

59.656	246°.6	0".12
59.663	240.5	0.12
60.523	246.8	0.11
60.526	244.3	0.13
60.529	242.9	0.13
60.18	244.2	0.12 5n

AB - C

59.656	219°.1	0".81
59.663	218.3	0.83
60.523	219.8	0.75
60.526	216.8	0.70
60.529	218.5	0.85
60.18	218.5	0.79 5n

The slow change in AB-C indicates a dp = 0".006.

11163 Hu 65 +84°409

$18^h10^m.7$ +84°36' 9.7-10.5 G5

62.689	262°.4	2".01
62.704	264.8	1.89
62.707	260.2	1.91
64.736	263.3	2.03
63.21	262.7	1.96 4n

The longer arc makes dp = 0".021.

11170 β 1091 +38°3109

$18^h10^m.9$ +38°35' 9.4-9.4 F8

60.601	346°.2	0".31
60.615	347.6	0.34
60.61	346.9	0.32 2n

The slow decrease in both coordinates makes dp = 0".005.

11188 A 1376 +52°2166

$18^h12^m.2$ +52°41' 10.1-10.1 A3

62.704 33°.6 0".26 1n

Hardly changed in 56 years.

11225 Hu 1291 +36°3076

$18^h14^m.5$ +36°24' 9.3-10.0

59.687	303°.7	0".34
60.523	300.3	0.34
60.526	301.2	0.31
60.529	303.5	0.30
62.707	300.9	0.30
60.79	301.9	0.32 5n

Both coordinates slowly decrease indicating dp = 0".006.

11234 A 241 +26°3211

$18^h15^m.2$ +26°39' 10.2-10.5

59.550	289°.0	0".74	
59.640	290.9	0.59	
59.60	290.0	0.66	2n

Hardly changed in 58 years.

11239 A 577 +43°2936

$18^h15^m.8$ +43°54' 9.1-12.6

58.658	287°.6	0".88	
59.616	291.8	0.81	
59.656	286.7	0.80	
59.660	290.5	0.86	
60.523	290.5	0.70	
59.62	289.4	0.81	5n

Little change after 56 years.

11247 A 578 +43°2938

$18^h16^m.3$ +43°49' 9.2-9.9-13.4

AB

58.658	309°.7	0".23	
59.656	309.8	0.28	
59.660	307.0	0.27	
60.523	307.8	0.28	
60.529	306.5	0.24	
59.81	308.2	0.26	5n

AB-C

58.658	169°.1	1".84	
59.656	168.9	1.86	
59.660	167.8	2.01	
60.523	168.3	1.89	
60.529	169.4	1.94	
59.81	168.7	1.91	5n

The 80° decrease in the angle of the close pair in 57 years makes dp = 0".0036. There is no appreciable change in AB-C.

11260 Hu 197 +10°3473

$18^h17^m.3$ +10°15' 8.5-9.6 G0

59.550	214°.2	0".37	
59.663	211.5	0.41	
60.598	216.0	0.44	
60.601	215.6	0.43	
62.450	212.1	0.36	
62.466	212.5	0.44	
62.553	216.2	0.41	
62.600	213.0	0.45	
60.10	214.3	0.41	4n
62.52	213.4	0.42	4n

Comparison with Baize's orbit (1955) gives:

60.08	+ 1°.9	-0".03
62.51	+ 5.9	-0.02

11284 Ho 430 +20°3750

$18^h19^m.5$ +20°29' 9.8-10.3 A5

59.553	193°.3	2".41	
59.566	194.2	2.34	
59.613	194.1	2.46	
59.640	196.0	2.42	
59.59	194.4	2.41	4n

No change since 1890.

11300 Hu 581 +14°3507

$18^h20^m.6$ +14°57' 8.8-9.4

59.663	126°.9	0".34	
59.687	128.8	0.33	
60.526	126.8	0.33	
60.529	128.0	0.32	
62.707	127°.9	0".30	
60.62	127.7	0.32	5n

Residuals from Baize's orbit (1957) are -3°.3 and +0".02.

11305 A 700 +45°2702

$18^h21^m.0$ +45°43' 10.0-10.1

60.523	106°.1	0".13	
60.529	108.3	0.16	
60.601	101.4	0.17	
60.55	105.3	0.15	3n

The uncertainty of the quadrant makes the large change hard to interpret.

11311 OΣ 353 φ Dra

$18^h21^m.5$ +71°19' 4.4-6.1 A0

60.529	301°.2	0".27	
60.601	305.1	0.31	
60.606	302.0	0.28	
60.609	306.3	0.30	
60.612	306.6	0.30	
61.567	304.7	0.28	
60.75	304.3	0.29	6n

Since 1856 the angle of this long period binary has decreased by 120° and the distance has closed in, but the orbit is still quite indeterminate.

11313 Ho 83 +27°3010

$18^h21^m.5$ +27°29' 9.4-9.4 A3

61.912	101°.2	0".80	
62.553	98.4	0.79	
62.686	102.5	0.85	
62.710	104.1	0.77	
64.736	100.6	0.98	
62.92	101.4	0.84	5n

To the slow increase in both coordinates corresponds dp = 0".012.

11324 AC 11 -1°3486

$18^h22^m.4$ - 1°36' 6.8-7.0 F5

59.550	358°.8	0".80	
59.553	358.0	0.88	
59.560	360.0	0.70	
59.566	359.7	0.70	
59.627	360.5	0.69	
62.543	359.4	0.79	
62.553	360.3	0.85	
62.686	361.7	0.82	
62.689	356.9	0.80	
62.707	359.7	0.83	
64.740	357.4	0.84	
59.57	359.4	0.75	5n
62.99	359.2	0.82	6n

Residuals from Heintz' orbit (1950) are:

59.57	+ 2°.1	+0".04
62.99	+ 2.0	+0.09

11339 β 1203 +0°3931

$18^h23^m.5$ + 0°45' 7.6-7.8 A3

59.663	134°.2	0".31	
59.679	133.2	0.34	
59.687	131.6	0.34	
60.526	135.8	0.34	
60.529	133.1	0.33	
60.02	133.6	0.33	5n

The 65° increase in angle since 1890 makes dp = 0".0029.

11344 Hu 66 +48°2692

$18^h24^m.0$ +48°44' 7.9-8.1-8.2 G5

AB

60.523	266°.1	0".40
60.526	263.8	0.40
60.529	266.9	0.36
60.53	265.6	0.39 3n

AC

60.523	19°.4	0".72
60.526	18.4	0.80
60.529	18.6	0.87
60.53	18.8	0.80 3n

Both pairs indicated the same dp = 0".0041.

11366 β 464 +6°3780

$18^h25^m.2$ + 6°31' 9.0-10.0 A3

60.595	109°.0	1".20
60.609	108.3	1.08
60.615	108.0	1.08
60.61	108.4	1.12 3n

Hardly changed in 84 years.

11385 Hu 320 +16°3515

$18^h26^m.4$ +16°12' 9.7-10.1

60.592	145°.4	2".03
60.595	145.7	2.02
60.601	145.6	2.00
60.60	145.6	2.02 3n

Unchanged in 59 years.

11387 A 581 +4°3760

$18^h26^m.6$ + 4°6' 8.9-9.4 B8

61.571	116°.9	0".37
61.580	115.5	0.36
61.588	110.0	0.41
61.58	114.1	0.38 3n

The increased angle indicates a dp = 0".0042.

11454 Hu 322 +17°3627

$18^h31^m.6$ +17°42' 7.7-7.9-8.0 F5

AB

59.656	56°.0	0".10
59.660	61.1	0.10
60.606		<0".1

AB - C = Σ 2339

59.656	275°.6	2".04
59.660	273.2	2.10
60.606	274.6	2.08
59.97	274.5	2.07 3n

Slow decrease in distance.

11479 OΣ 359 +23°3385

$18^h33^m.4$ +23°34' 6.4-6.7 K0

61.220	18°.8	0".47
61.512	16.4	0.52
61.551	17.3	0.56
61.560	15.0	0.49
61.567	16.0	0.51
62.553	16.1	0.55
62.600	18.9	0.56
61.79	16.9	0.52 7n

Arend's orbit (1951) gives the residuals +4°.9 and +0".05.

11484 OΣ 357 +11°3518

$18^h33^m.6$ +11°41' 8.1-8.1 A2

59.679	132°.6	0".29
59.687	137.0	0.28
60.500	132.4	0.30
60.526	136°.7	0".28
60.529	132.3	0.28
62.707	127.3	0.31
62.710	129.9	0.28
62.718	132.8	0.29
62.723	128.5	0.33
61.31	132.2	0.29 9n

Florsch's orbit (1955) gives the residuals +7°.6 and -0".02.

11502 Hu 247 +10°3588

$18^h34^m.7$ +10°14' 9.7-10.0 A2

59.663	27°.1	0".44
59.679	25.5	0.39
60.526	26.6	0.46
59.96	26.4	0.43 3n

The slow decrease in angle makes dp = 0".0027.

11508 Hu 70 -11°4692

$18^h35^m.0$ -11°24' 9.2-9.7 F8

59.663	206°.0	0".56
60.529	204.6	0.48
60.10	205.3	0.52 2n

The longer arc confirms dp = 0".009.

11524 Hu 198 X Oph

$18^h36^m.0$ + 8°47' Var-8.6 M

59.550	146°.2	0".37
59.556	143.8	0.38
59.663	146.7	0.40
60.606	145.6	0.40
62.707	141.8	0.44
62.710	143.4	0.39
62.713	145.7	0.38
62.718	142.4	0.44
61.28	144.4	0.40 8n

To the slow decrease in angle and increase in distance corresponds dp = 0".0037.

11530 Ho 87 +16°3572

$18^h36^m.4$ +16°30' 8.4-8.4 G5

59.656	185°.3	0".30
59.660	179.6	0.28
59.663	187.1	0.32
60.000	181.1	0.30
60.519	190.2	0.28
60.526	184.9	0.27
60.598	185.7	0.29
60.09	184.8	0.29 7n

The longer arc makes dp = 0".0037.

11560 Σ 2364 +24°3491

$18^h38^m.0$ +24°39' 8.1-10.3 K0

61.560	175°.5	9".47
61.563	175.4	9.44
62.543	175.5	9.36
61.89	175.5	9.42 3n

The proper motion is too small to establish the physical connection. The relative motion corresponds to dp = 0".020.

11574 A 2988 +24°3493

$18^h38^m.9$ +24°47' 8.6-8.6 A5

59.663	216°.1	0".16
60.523	219.6	0.14
60.529	219.2	0.17
60.24	218.3	0.16 3n

Couteau's orbit (1961) gives the residuals +3°.4 and 0".00.

11579 Σ 2367 +30°3271

$18^h39^m.4$ +30°15' 7.4-7.9 G5

62.707	70°.2	0".34
62.710	65.4	0.33
62.713	69.5	0.36
62.718	66.2	0.37
62.71	67.8	0.35 4n

The residuals from Baize's orbit (1950) are +5°.8 and +0".02.

11584 OΣ 363 +77°702

$18^h39^m.8$ +77°38' 7.6-7.8 F0

60.529	128°.6	0".16
60.601	125.6	0.20
60.606	129.3	0.15
60.609	129.7	0.16
60.59	128.3	0.17 4n

Clear orbital motion corresponding to dp = 0".0056.

11593 B 2546 +34°3285

$18^h40^m.3$ +34°42' 6.5-7.5 B5

59.656	255°.7	0".12
59.660	249.1	0.14
59.687	258.2	0.15
60.519	255.6	0.14
59.88	254.6	0.14 4n

11617 Σ 2369 +2°3668

$18^h41^m.4$ + 2°34' 8.2-8.7 G0

59.550	86°.2	0".59
59.553	84.4	0.67
59.556	86.4	0.56
59.632	88.4	0.64
59.640	84.3	0.63
62.543	87.3	0.63
62.689	85.0	0.69
62.702	85.0	0.64
62.718	83.2	0.64
64.736	85.9	0.65
61.33	86.0	0.63 10 n

The longer arc makes dp = 0".010.

11640 Σ 2375 +5°3941

$18^h43^m.0$ + 5°27'

AB = Fin 332 6.5-6.7 A0

60.523	140°.6	0".14
60.526	135.5	0.12
60.529	138.2	0.14
60.598	139.3	0.15
60.601	138.0	0.14
60.606	137.7	0.14
60.56	138.2	0.14 6n

CD = Fin 332 7.5-7.5 A0

60.523	130°.8	0".13
60.526	135.8	0.12
60.529	133.9	0.12
60.598	133.4	0.14
60.601	130.4	0.14
60.606	130.4	0.14
60.56	132.4	0.13 6n

11680 Hu 1191 +38°3292

$18^h44^m.9$ +38°18' 8.6-9.1 G5

59.660	316°.5	0".27
60.519	318.8	0.25
60.523	318.5	0.28
60.526	317.7	0.28
60.529	320.3	0.26
60.601	312.7	0.28
60.621	315.4	0.28
61.567	313°.2	0".27
62.207	308.5	0.28
60.75	315.7	0.27 9n

Comparison with my orbit (1960) gives the residuals -0°.4 and +0".03.

11683 Hu 584 +15°3566

$18^h45^m.2$ +15°34' 9.9-9.9 F5

60.621 25°.3 0".39 1n

No certain change.

11687 Hu 252 +9°3873

$18^h45^m.4$ + 9°12' 9.2-9.7 B9

60.598	159°.3	0".14
60.601	152.7	0.12
60.606	158.1	0.12
60.60	156.7	0.13 3n

The longer arc makes dp = 0".0057.

11717 Hu 936 +33°3212

$18^h46^m.9$ +33°58' 9.4-9.7

60.592	101°.2	1".70
60.595	100.2	1.84
60.598	101.3	1.79
60.601	102.1	1.82
60.606	100.8	1.86
60.60	101.1	1.80 5n

Unchanged in 56 years.

11769 Hu 199 +11°3642

$18^h49^m.8$ +11°44' 9.1-9.5 F5

59.613	357°.0	0".70
59.679	355.3	0.66
62.543	354.4	0.77
62.553	350.8	0.65
62.689	349.9	0.74
64.730	356.8	0.80
64.736	352.0	0.80
62.36	353.7	0.73 7n

To the increase in distance corresponds dp = 0".0094.

11791 A 93 -5°4798

$18^h51^m.0$ - 5°36' 9.4-10.0 G5

61.571	127°.6	0".65
61.580	130.1	0.55
61.583	129.0	0.62
61.710	124.5	0.68
61.61	127.8	0.62 4n

Wilson's orbit (1954) gives the deviations +8°.7 and +0".03.

11818 J 1275

$18^h52^m.5$ + 7°11' 9.5-10.5

61.551	200°.1	2".12
61.567	202.1	2.19
61.580	201.0	2.08
61.588	200.3	2.18
61.57	200.9	2.14 4n

No certain change.

11842 A 2192 +3°3836

$18^h53^m.3$ + 3°23' 7.7-7.7 A2

59.663	141°.3	0".28
59.687	145.7	0.27
60.500	143.9	0.27
60.503	142.8	0.29
60.523	145.7	0.29
60.526	142.9	0.27

60.23	143°.7	0".28 6n

Heintz' orbits 1 and 2 (1963) give the residuals:

1)	+ 4°.5	+0".05
2)	+ 4.0	+0.05

11869 Σ 2422 +25°3672

$18^h55^m.1$ +26°2' 8.0-8.1 A0

61.220	84°.0	0".84
61.512	85.5	0.86
61.551	87.2	0.86
61.567	82.2	0.94
61.571	83.8	0.89
61.48	84.5	0.88 5n

The longer arc reduces dp to 0".0029.

11897 Σ 2438 +58°1849

$18^h56^m.6$ +58°9' 6.8-7.4 A2

59.613	10°.9	0".92
59.616	12.3	1.01
59.620	10.2	1.06
59.640	12.1	0.90
59.676	13.1	0.90
60.592	12.8	0.91
59.78	11.9	0.95 6n

The two orbits by Jastrzebski (1958 and 1959) give the same residuals +5°.8 and +0".14.

11923 M1b 414 +67°1105

$18^h58^m.1$ +67°11' 10.1-11.3 G5

59.616	148°.2	1".93
59.638	147.8	1.94
59.641	148.9	2.15
59.63	148.3	2.01 3n

Change questionable.

11939 J 1280

$18^h58^m.9$ +22°1' 9.7-9.7

60.598	108°.6	3".77
60.609	108.9	3.84
60.60	108.8	3.80 2n

Unchanged.
The star was identified in the Paris astrographic catalogue as +22°, 18^h56^m, No. 437 and +21°, 19^h0^m, No. 18.

11947 β 973 +8°3945

$18^h59^m.3$ + 8°40' 9.9-12.8

58.582	350°.4	1".48
60.601	351.7	1.52
64.730	352.9	1.54
61.30	351.7	1.51 3n

CD = Howe 45 12.3-12.8

60.601	260°.2	3".09
64.730	260.2	3.23
64.736	259.0	3.24
63.36	259.8	3.19 3n

No definite change in either pair.

11956 Σ 2437 +18°3920

$18^h59^m.7$ +19°6' 8.2-8.4 G5

59.553	43°.5	0".70
59.556	39.1	0.70
59.613	39.1	0.80
59.627	41.1	0.73
59.640	43.5	0.70
59.60	41.3	0.73 5n

The longer arc makes dp = 0".008.

11960 A 1388 +52°2321

$18^h59^m.9$ +53°7' 9.1-13.6

60.609	261°.4	5".09
60.618	261.1	5.19
60.61	261.2	5.14 2n

Unchanged. The 0".058 yearly proper motion proves the physical connection.

11974 A 2195 +1°3861

$19^h0^m.3$ + 1°42' 8.1-11.9 K0

59.632	41°.6	2".13
59.638	43.8	1.99
62.543	44.6	1.86
62.689	41.3	2.09
61.13	42.8	2.02 4n

The change is mostly in angle making dp = 0".011.

11979 Hu 757 +52°2326

$19^h0^m.9$ +52°11' 9.2-9.8

BC

59.660	346°.3	0".11
60.529	346.0	0.11
60.601	343.8	0.11
60.606	341.7	0.12
60.618	342.9	0.11
60.40	344.1	0.11 5n

To the large change in both coordinates corresponds dp = 0".0053.

11998 A 2992 +26°3437

$19^h1^m.8$ +26°37' 9.8-9.8 F8

60.529	118°.3	0".19
60.606	115.3	0.24
60.609	118.9	0.19
60.58	117.5	0.21 3n

Orbital motion of indeterminate nature so far.

12013 J 1209

$19^h2^m.6$ +34°2' 9.5-10.0

60.598	155°.4	4".76
60.615	155.2	4.88
60.61	155.3	4.82 2n

Unchanged. The two components are in the astrographic catalogue 33°57440 and 57491.

12017 J 478 +12°3794

$19^h2^m.7$ +12°57' 11.1-11.2

60.615	343°.8	1".70
62.689	345.6	1.69
62.707	346.5	1.89
62.00	345.3	1.76 3n

Unchanged.

12045 Ho 441 -12°5283

$19^h4^m.5$ -12°45' 11.3-11.3

59.627	204°.1	2".29
59.638	205.5	2.49
61.560	203.0	2.29
61.580	201.7	2.23
60.60	203.6	2.32 4n

To the large increase in distance would correspond a dp = 0".025. Probably optical.

12123 A 150 +20°4067

$19^h8^m.2$ +20°25' 9.5-9.6 A0

59.640	113°.3	0".46
59.687	112.9	0.52
60.529	110.5	0.53

60.606	110°.9	0".51
60.12	111.9	0.50 4n

To the increase in both coordinates corresponds dp = 0".004.

12126 A 95 -7°4876

$19^h8^m.3$ - 7°31' 7.4-7.8 G0

60.744	101°.3	0".23
61.710	100.9	0.26
61.716	99.2	0.27
61.39	100.5	0.25 3n

Van den Bos's orbit (1960) gives the small residuals +0°.5 and +0".01.

12144 A 1391 +54°2095

$19^h9^m.5$ +54°24' 9.0-9.5

59.656	126°.8	0".16
60.526	130.3	0.19
60.609	128.6	0.19
60.26	128.6	0.18 3n

Motion in both coordinates making dp = 0".0018.

12145 Secchi 2 +38°3466

$19^h9^m.5$ +38°42' 8.3-9.3 K0

BC

59.656	243°.8	0".13
59.660	238.6	0.14
60.523	241.1	0.12
59.95	241.2	0.13 3n

Baize's orbit (1961) gives the residuals +21°.7 and +0".02 showing that the orbit has to be improved.

12147 β 1204 +2°3815

$19^h9^m.5$ + 2°32' 7.4-7.7 B9

59.687	189°.7	0".30
60.615	187.5	0.28
60.774	193.5	0.31
62.689	193.7	0.32
62.701	192.0	0.34
62.704	193.1	0.33
61.53	191.6	0.31 6n

I never felt doubt about the quadrant and estimated Δm = 0.3. The change is very slow.

12166 A 264 +24°3677

$19^h10^m.6$ +24°29' 8.0-13.5 F5

AB

58.655	289°.4	3".45
60.529	290.9	3.43
60.615	288.7	3.49
62.710	289.3	3.60
60.63	289.6	3.49 4n

Marked increase in distance without change in angle.

AC 8.0-12.5 F5

58.655	6°.3	2".28
60.615	4.8	2.43
59.63	5.6	2.36 2n

Probably optical system.

12187 Hu 335 +19°3949

$19^h11^m.4$ +20°7' 8.0-11.7

58.655	222°.4	0".60
62.710	219.9	0.53
60.68	221.2	0.56 2n

Hardly changed since 1901.

12201 Σ 2484 +18°3998

$19^h12^m.1$ +18°59' 7.9-9.4 F8

59.553	231°.9	2".39
59.556	231.3	2.27
59.627	234.9	2.38
59.640	233.8	2.38
59.59	233.0	2.36 4n

The longer arc makes dp = 0".013.

12246 Σ 2491 +28°3268

$19^h14^m.2$ +28°11' 8.4-9.7 A2

59.556	224°.2	1".28
59.638	226.4	1.24
59.687	226.6	1.23
59.63	225.7	1.25 3n

The longer arc confirms dp = 0".0061.

12258 A 363 +7°4011

$19^h14^m.6$ + 7°19' 8.6-13.5 B9

57.623	170°.8	2".02
60.615	172.1	2.15
59.12	171.4	2.08 2n

No definite change.

12261 A 1392 +54°2113

$19^h14^m.8$ +54°52' 8.8-9.0 K0

59.656	83°.9	0".43
59.660	79.4	0.42
59.687	83.8	0.43
60.523	80.3	0.40
60.526	83.1	0.44
60.609	78.3	0.43
60.612	78.3	0.41
60.18	81.0	0.42 7n

To the slow change in both coordinates corresponds dp = 0".004.

12274 A 1176 +9°4051

$19^h15^m.3$ +10°9' 9.8-10.8 A0

60.609	106°.0	1".02
60.615	105.0	1.05
60.61	105.5	1.04 2n

Unchanged in 55 years.

12296 Σ 2509 +62°1702

$19^h16^m.4$ +63°7' 7.2-8.3 F5

59.613	331°.8	1".56
59.616	333.0	1.66
59.627	334.2	1.77
59.640	332.7	1.66
59.62	332.9	1.66 4n

The longer arc makes dp = 0".015.

12366 β 1129 +52°2400

$19^h20^m.4$ +52°17' 7.7-7.7 A5

59.660	322°.4	0".23
60.526	323.7	0.19
60.601	321.8	0.24
60.609	320.5	0.21
60.615	320.4	0.24
60.621	322.7	0.23
60.44	321.9	0.22 6n

To the slow decrease in both coordinates corresponds dp = 0".004.

12412 OΣ 373 +46°2681

$19^h22^m.6$ +46°20' 7.4-10.8 A0

59.616	234°.4	2".11
59.627	235.2	2.12
59.638	235.4	2.14
61.220	235.8	2.23

61.567	235°3	2".09
60.33	235.2	2.14 5n

Hardly changed in 103 years.

12452 A 1181 +11°3842

$19^h24^m.6$ +11°58' 6.9-9.1 A0

61.710	199°0	0".72
61.771	198.7	0.75
62.543	197.5	0.69
62.01	198.4	0.72 3n

To the increase in distance corresponds dp = 0".0027.

12488 A 1650 +15°3827

$19^h26^m.1$ +16°11' 9.5-9.5 F8

60.529	56°7	0".17
60.606	55.2	0.17
60.57	56.0	0.17 2n

Change immaterial after 53 years.

12515 A 1653 +12°3929

$19^h27^m.3$ +12°18' 8.0-9.2 A3

60.609	226°0	0".22
60.618	222.2	0.25
60.61	224.1	0.24 2n

Without change in distance the angle has decreased by 78° since 1907 making dp = 0".003.

12552 A 712 +56°2250

$19^h29^m.2$ +56°32' 7.3-7.8 A0

59.656	108°9	0".13
59.660	109.4	0.14
59.66	109.2	0.14 2n

It is difficult to ascertain the quadrant in such a close pair. The period is probably of the order of a century.

12557 Σ 2536 +17°3992

$19^h29^m.4$ +17°41' 8.4-11.4 G0

59.638	98°6	2".04
59.640	98.1	2.02
59.646	95.6	1.88
60.539	96.6	1.99
60.609	96.3	1.89
60.01	97.0	1.96 5n

Without change in distance the angle has increased by 60° since 1831 making dp = 0".019.

12567 A 713 +47°2854

$19^h29^m.8$ +47°22' 7.7-8.2 A3

59.687	254°4	0".48
60.687	252.4	0.44
60.526	256.6	0.45
60.609	255.5	0.46
60.38	254.7	0.46 4n

To the increase in both distance and angle corresponds dp = 0".009.

12577 Hu 951 +63°1530

$19^h30^m.3$ +63°31' 9.4-9.6 F

59.656	59°1	0".16
59.660	60.4	0.16
60.526	59.1	0.14
60.609	61.7	0.14
60.11	60.1	0.15 4n

Fairly rapid orbital motion. The longer arc reduces dp to 0".006.

12600 Ho 108 +33°3499

$19^h31^m.4$ +33°22' 9.0-9.0 F8

60.609	46°2	0".19
60.618	44.0	0.17
60.61	45.1	0.18 2n

The measures are too scarce to bring out the nature of the motion.

12618 A 597 +42°3382

$19^h32^m.2$ +42°15' 8.4-10.9 G0

62.689	108°3	1".82
62.701	111.1	1.80
62.704	109.1	1.91
62.710	108.4	1.92
62.70	109.2	1.86 4n

To the change in both coordinates corresponds dp = 0".035. The 0".075 proper motion establishes the physical connection.

12631 A 162 +23°3699

$19^h32^m.9$ +23°22' 8.9-8.9 A0

58.601	231°7	0".19
60.606	235.7	0.22
60.609	233.6	0.20
60.615	231.9	0.23
60.11	233.2	0.21 4n

The angle has increased by a quadrant in 60 years. The longer arc makes dp = 0".003.

12648 A 163 +22°3738

$19^h33^m.6$ +23°9' 9.8-9.9 F5

58.601	158°3	0".16
60.609	154.1	0.12
60.618	155.9	0.14
59.94	156.1	0.14 3n

The marked decrease in both coordinates makes dp = 0".005.

12673 A 1655 +14°3975

$19^h34^m.6$ +14°23' 9.6-10.0

59.627	70°0	1".81
59.638	67.9	1.75
59.646	67.4	1.90
59.64	68.4	1.82 3n

Slow increase in both coordinates making dp = 0".015.

12679 Σ 2544 +8°4163

$19^h34^m.7$ + 8°12' 8.5-10.2 A3

59.566	195°9	1".27
59.627	191.3	1.30
59.638	194.8	1.40
59.61	194.0	1.32 3n

Slow change making dp = 0".008.

12729 A 864 +72°904

$19^h36^m.4$ +73°1' 9.5-9.7 F2

61.560	31°4	1".04
61.567	33.6	0.96
61.874	32.6	0.90
61.580	31.5	0.98
61.842	33.8	0.98
61.68	32.6	0.97 5n

Slow change in both coordinates making dp = 0".008.

12746 Hu 953 +34°3645

$19^h37^m.1$ +35°7' 8.8-9.2 G0

62.543	204°.1	0".77
62.633	206.6	0.58
62.701	206.4	0.66
62.704	203.3	0.67
62.710	204.4	0.64
62.66	205.0	0.66 5n

The slow change in both coordinates makes dp = 0".012.

12752 Σ 2556 +21°3862

$19^h37^m.3$ +22°8' 7.7-8.2 F2

62.543	67°.5	0".41
62.689	66.0	0.40
62.701	68.8	0.38
62.704	65.5	0.42
62.710	67.2	0.35
62.67	67.0	0.39 5n

Gunzel-Lingner's orbit (1956) gives the residuals +13°.7 and +0".07.

12803 Σ 2574 +62°1747

$19^h40^m.0$ +62°33' 8.1-8.1 F5

58.650	223°.9	0".28
59.656	225.3	0.30
59.660	227.7	0.31
59.687	225.2	0.26
60.601	229.4	0.30
60.609	224.0	0.29
61.567	227.7	0.30
61.574	233.8	0.30
61.580	230.5	0.34
61.588	231.1	0.35
59.81	225.9	0.29 6n
61.58	230.8	0.32 4n

The change since 1832 makes dp = 0".0095.

Kui 94 +39°3878

$19^h40^m.2$ +40°8' 6.5-7.8 A3

59.656	134°.8	0".25
60.618	135.4	0.28
60.14	135.1	0.26 2n

The change since 1937 makes dp = 0".011.

Kui 95 = Ross 165

$19^h43^m.8$ +27°2' 12.7-13.6 Ma

58.660	242°.6	0".94
59.656	246.1	0.80
60.618	247.4	1.06
59.64	245.4	0.93 3n

The angle has increased by 100° since 1934. The period is probably less than a century. The corresponding dp is 0".057.

12898 A 600 +43°3352

$19^h44^m.0$ +43°22' 9.5-10.0

60.526	30°.8	0".34
61.567	32.9	0.32
61.710	34.5	0.32
62.701	36.5	0.29
62.710	36.4	0.28
61.84	34.2	0.31 5n

To the slow increase in angle corresponds dp = 0".0025.

12910 J 1335 +19°4145

$19^h44^m.3$ +19°16' 11.2-11.3

60.615	176°.2	1".14
60.618	180.5	1.03
60.621	180.7	0.91
60.62	179.1	1.03 3n

Unchanged since 1914.

Van de Kamp +31°3767

$19^h44^m.4$ +31°54' 10.0-11.0 M0

61.560	133°.7	3".43
61.567	131.0	3.60
61.574	131.6	3.54
61.577	132.8	3.52
61.580	134.0	3.59
61.57	132.6	3.54 5n

The change is nearly all in increased distance and corresponds to dp = 0".083. The period will be long.

12927 A 717 -2°5116

$19^h45^m.1$ - 2°2' 9.4-10.9 F8

58.669	98°.2	0".46
61.710	99.6	0.50
62.701	99.2	0.40
61.03	99.0	0.45 3n

To the slow increase in angle corresponds dp = 0".0046.

12937 Hu 347 +18°4242

$19^h45^m.4$ +19°9' 8.7-11.7 F5

58.669	335°.4	1".18
61.710	333.6	1.37
62.689	334.0	1.35
62.701	332.1	1.27
62.707	328.1	1.20
64.730	331.3	1.31
62.20	332.4	1.28 6n

The slow change in both coordinates makes dp = 0".009.

12961 A 1658 +14°4048

$19^h46^m.4$ +14°56' 8.2-8.5 F5

60.606	318°.2	0".30
61.710	318.0	0.27
62.689	320.3	0.29
61.67	318.8	0.29 3n

Residuals from Couteau's orbit (1961) are +6°.4 and +0".06.

12972 OΣ 387 +34°3727

$19^h46^m.8$ +35°11' 6.9-7.9 F5

62.543	204°.6	0".49
62.689	204.0	0.46
62.701	200.0	0.52
62.704	200.4	0.53
62.707	200.5	0.58
62.718	201.7	0.51
62.68	201.9	0.52 6n

Baize's orbit (1961) leaves the residuals +2°.5 and 0".00.

12973 AGC 11 ζ Sge

$19^h46^m.8$ +19°1' 5.4-6.4 A2

60.606	183°.1	0".24
62.695	180.8	0.29
62.701	178.6	0.25
62.710	183.2	0.27
62.718	177.1	0.26
62.29	180.6	0.26 5n

Finsen's orbit (1937) makes the residuals +6°.7 and +0".03.

12986 A 718 +44°3261

$19^h47^m.4$ +44°15' 8.2-8.7 B8

BC

59.660	47°.4	0".28

59.933	48°.5	0".31
60.526	48.2	0.28
61.574	46.4	0.29
62.701	48.1	0.27
60.88	47.7	0.29 5n

Hardly changed in 57 years.

12993 Hu 349 +16°4023

$19^h47^m.7$ +16°54' 8.3-12.7 B9

59.640	234°.4	2".57
59.643	236.3	2.49
59.682	236.6	2.60
60.529	236.7	2.60
59.87	236.0	2.56 4n

Unchanged in 58 years.

Djurkovic 13 Vul

$19^h51^m.3$ +23°57' 4.6-7.8 A0

61.560	242°.2	0".76
61.567	239.3	0.72
61.571	239.5	0.68
61.57	240.3	0.72 3n

Unchanged so far.

13104 Σ 2597 -7°5102

$19^h52^m.6$ - 6°52' 6.7-7.8 F2

58.669	86°.3	0".48
60.774	90.5	0.41
62.543	90.8	0.46
62.689	85.5	0.43
62.701	86.0	0.43
62.707	90.4	0.43
61.68	88.3	0.44 6n

To the marked decrease in distance corresponds dp = 0".018.

13156 A 604 +4°4286

$19^h54^m.8$ + 5°5' 9.3-9.4 F8

60.606	274°.8	0".28
60.744	279.4	0.25
62.543	276.7	0.28
62.689	276.3	0.29
62.695	274.2	0.29
62.701	278.3	0.25
62.710	275.5	0.27
62.10	276.5	0.27 7n

The quadrant remained uncertain.

13169 A 606 +4°4292

$19^h55^m.6$ + 4°48' 9.5-9.5 G5

62.543	280°.0	0".38
62.689	280.2	0.36
62.701	278.2	0.36
62.710	285.3	0.41
62.66	280.9	0.38 4n

The residuals from Baize's orbit are +7°.0 and -0".02.

13212 A 378 +31°3876

$19^h57^m.4$ +31°58' 9.0-9.4 G5

62.543	303°.2	0".74
62.689	305.6	0.63
62.701	306.1	0.63
62.704	305.2	0.70
62.66	305.0	0.68 4n

Both coordinates have changed making dp = 0".006.

13258 J 784

$19^h59^m.0$ +19°9' 9.7-9.9

60.615	159°.9	2".35
60.618	159.6	2.29
60.62	159.8	2.32 2n

Unchanged.

Identified in the astrographic catalogue as +19°, 19^h56^m, No 183 and +20°, 20^h0^m, No 1176 which gives the corrected position.

13262 β 1289 +37°3723

$19^h59^m.2$ +37°34' 9.0-9.9 B5

60.609	56°.7	0".69
60.615	58.3	0.80
60.618	55.8	0.69
60.621	57.2	0.72
60.62	57.0	0.72 4n

Hardly changed in 61 years.

13289 Hu 353 +19°4258

$20^h0^m.4$ +19°57' 9.3-10.9

59.640	354°.6	0".47
61.574	352.7	0.54
61.710	353.0	0.48
60.97	353.4	0.50 3n

The longer arc makes dp = 0".004.

13304 A 1666 +14°4155

$20^h1^m.0$ +14°55' 9.5-10.2

58.669	64°.6	0".39
60.606	67.4	0.39
60.722	66.0	0.38
60.774	62.8	0.36
60.19	65.2	0.38 4n

Slow increase in angle.

13322 Mlb 293 +68°1100

$20^h1^m.9$ +69°14' 10.1-12.3 F8

60.609	92°.7	4".83
60.618	93.6	4.89
60.61	93.2	4.86 2n

Probably an optical system. To the increase of 1" in the distance since 1923 would correspond an improbably large value of dp = 0".075.

13401 A 867 +72°933

$20^h5^m.3$ +72°51' 8.1-13.1 G

59.640	149°.8	2".28
61.574	146.2	2.37
61.588	147.2	2.23
60.93	147.7	2.29 3n

Change doubtful.

13418 A 383 +41°3617

$20^h6^m.4$ +41°53' 10.1-10.1

59.660	216°.3	0".33
61.567	212.0	0.33
61.574	213.5	0.36
60.93	213.9	0.34 3n

To the slow decrease in angle corresponds dp = 0".0034.

13449 Σ 2652 +61°1975

$20^h8^m.2$ +61°56' 7.2-7.5 A0

60.601	239°.3	0".31
61.580	238.9	0.33
61.710	240.6	0.31
61.754	236.2	0.32
61.41	238.7	0.32 4n

To the slow retrograde motion corresponds dp =

0".0012.

13461 OΣ 400 +43°3513

$20^h8^m.6$ +43°48' 7.5-8.7 G5

60.519	286°.2	0".24
60.526	286.1	0.27
60.615	285.2	0.27
62.701	283.4	0.24
61.09	285.2	0.26 4n

Heintz' orbit (1963) gives the residuals +7°.1 and +0".04.

13622 J 785

$20^h14^m.5$ +33°56' 9.5-9.8

AB

59.613	26°.8	2".90
59.638	25.0	2.93
59.643	27.0	2.71
60.588	28.1	2.92
62.707	25.7	2.72
64.710	24.5	2.65
64.730	25.3	2.88
61.38	26.1	2.82 7n

AC 9.5-9.9

59.613	14°.4	10".43
59.638	14.0	10.36
60.588	13.7	10.27
62.707	13.8	10.40
62.710	13.8	10.49
64.730	14.2	10.20
61.66	14.0	10.36 6n

Change questionable.

13641 A 1423 +36°3987

$20^h15^m.2$ +37°16' 8.1-12.1 0

61.574	130°.0	4".60
61.577	131.7	4.66
61.716	129.8	4.48
61.62	130.5	4.58 3n

Unchanged.

13647 Sei 1065 = J 1169

$20^h15^m.5$ +31°51' 9.7-10.0

61.574	3°.8	3".75
61.577	4.0	3.58
61.58	3.9	3.66 2n

Unchanged.

13650 J 1340

$20^h15^m.5$ +17°48' 9.4-9.4

62.702	132°.6	1".93
62.707	133.8	2.00
62.718	134.7	1.86
62.71	133.7	1.93 3n

Unchanged in 48 years. The star was identified in the astrographic catalogue as +18°, 20^h16^m No 25, "prob. double" and +17° 20^h12^m No 272.
The star is erroneously called J 1440 in Aitken's G. C. and J 1370 in the Lick Index Catalogue.

13663 J 1147 = Sei 1073 +35°4058

$20^h16^m.1$ +36°3' 11.0-11.7

62.942	133°.4	4".20
64.730	132.9	4.42
63.84	133.2	4.31 2n

Angle increasing.

13681 A 286 +34°3968

$20^h16^m.8$ +34°57' 9.4-9.4-11.1

AB

60.618	106°.4	0".13
60.621	104.6	0.16
60.62	105.5	0.15 2n

The angle is decreasing.

AB-C = β 986

60.618	240°.8	4".56 1n

Unchanged since 1880.

13686 A 1425 +37°3879

$20^h17^m.0$ +38°7' 8.5-8.5 B1

AB

60.618	272°.3	0".19
60.621	275.9	0.17
60.62	274.1	0.18 2n

Slow decrease in angle.

13728 A 1427 +38°4021

$20^h18^m.4$ +39°15' 6.3-8.3 A0

60.621	92°.6	0".25
61.567	89.4	0.28
61.571	89.4	0.24
61.711	92.0	0.27
61.37	90.8	0.26 4n

Muller's orbit (1954) gives the residuals +4°.2 and +0".04.

13744 A 725 +44°3436

$20^h19^m.3$ +44°27' 9.3-10.1

61.571	238°.8	0".29
62.701	239.4	0.36
64.903	237.3	0.30
63.06	238.5	0.32 3n

Muller's orbit (1955) gives the residuals +3°.6 and +0".05.

13830 β 432 +35°4102

$20^h22^m.9$ +35°36' 9.0-10.3 F8

59.635	200°.2	1".42
59.638	199.2	1.58
59.640	198.7	1.54
59.643	200.1	1.60
59.64	199.6	1.54 4n

The longer arc makes dp = 0".010.

13850 A 730 +59°2228

$20^h24^m.0$ +59°26' 6.8-7.0 A0

60.609	349°.5	0".22
60.621	343.2	0.24
64.905	337.3	0.20
64.947	339.1	0.22
62.77	342.3	0.22 4n

Baize's orbit (1955) gives the small residuals -1°.2 and +0".01.

13869 A 293 +41°3752

$20^h25^m.1$ +41°42' 9.6-9.8

59.608	119°.6	1".61
59.613	122.5	1.68
59.627	121.4	1.54
59.635	120.8	1.74
59.62	121.1	1.64 4n

Distance increased.

13894 A 610 +6°4543

$20^h26^m.6$ + 6°59' 9.2-9.4 G0

60.722	281°.8	0".48
60.768	282.2	0.40
60.777	283.6	0.42
61.567	283.0	0.42
61.571	281.0	0.39
61.08	282.3	0.42 5n

Heintz' orbit (1962) gives the residuals: +3°.1 and 0".00.

13944 A 1675 +15°4181

$20^h28^m.8$ +15°38' 7.6-7.6 A2

59.687	149°.1	0".17
59.933	153.5	0.19
60.588	156.0	0.21
60.609	155.5	0.18
60.20	153.5	0.19 4n

Baize's orbit (1954) gives the residuals -13°.1 and -0".01.

13946 Da 1 = OΣ 407 +10°4307

$20^h28^m.8$ +11°5' 7.9-8.0 A0

59.656	242°.1	0".24
59.687	245.4	0.18
60.609	243.8	0.22
59.98	243.8	0.21 3n

Long period orbital motion approaching a critical phase.

13964 Σ 2695 +25°4272

$20^h29^m.8$ +25°38' 6.5-8.3 A2-G

59.566	86°.3	0".60
59.627	87.5	0.62
59.640	85.5	0.52
60.768	84.3	0.59
59.90	85.9	0.58 4n

This pair deserves attention as it closes in.

13966 Hu 761 +60°2132

$20^h29^m.9$ +60°56' 9.5-9.5 F8

60.609	142°.0	0".23
60.621	142.3	0.19
60.62	142.2	0.21 2n

There may have been a change of quadrant around 1955.

13986 β 670 +13°4435

$20^h30^m.6$ +13°46' 8.9-9.2

AB

62.543	26°.1	0".71
62.689	22.8	0.62
62.701	26.7	0.59
62.704	23.8	0.71
62.710	23.1	0.61
62.67	24.5	0.65 5n

The distance has remained substantially unchanged but the decrease in angle makes dp = 0".006.

13987 L 35 +13°4434

$20^h30^m.6$ +13°47' 10.3-10.8 K0

62.543	340°.6	0".33
62.701	344.6	0.36
62.704	339.1	0.36
62.710	345.0	0.31
62.66	342.3	0.34 4n

Comparison with Baize's orbit (1957) gives +7°.4 and -0".02.

13997 Σ 2696 +4°4484

$20^h31^m.0$ + 5°16' 8.3-8.7 A2

59.566	300°.9	0".59
59.613	300.5	0.62
59.643	304.4	0.69
59.61	301.9	0.63 3n

The angle hardly changed in 138 years but the distance diminished steadily. The longer arc makes dp = 0".0053.

14010 A 738 +46°2972

$20^h31^m.9$ +46°53' 9.1-10.9-10.3

AB

59.638	254°.2	2".23
59.646	254.0	2.31
59.933	256.0	2.31
59.74	254.7	2.28 3n

AC

59.638	269°.5	6".26
59.646	267.8	6.47
59.933	265.6	6.45
59.74	267.6	6.39 3n

Unchanged.

14023 A 396 +42°3785

$20^h32^m.5$ +43°17' 8.8-11.6 K0

61.567	147°.6	1".92
61.574	147.4	1.77
61.577	147.9	1.86
61.689	146.5	1.87
61.718	146.1	----
64.730	146.3	1.88
62.14	147.0	1.86 6-5n

Slow change in both angle and distance making dp = 0".007.

14031 Fox 94

$20^h32^m.7$ - 6°26' 10.8-10.4

60.722	242°.9	2".60
60.744	242.1	2.39
60.765	240.0	2.33
60.768	242.5	2.36
60.75	241.9	2.42 4n

No change since 1922. The pair was identified in the astrographic catalogue as -6°, 20^h32^m, No. 68 and -7°, 20^h28^m, No. 154.

14090 J 1242

$20^h36^m.1$ +11°8' 9.6-11.0

62.702	192°.3	4".53
62.704	194.7	4.49
62.710	193.0	4.55
62.718	194.3	4.55
64.736	195.6	4.69
63.11	194.0	4.56 5n

No certain change.
Identification with the astrographic catalogue +10° 20^h32^m No. 914 and +11° 20^h36^m No. 36 gave the corrected position.

14238 β 64 +12°4452

$20^h42^m.6$ +12°33' 9.1-9.3 G

60.722	157°.9	0".56
60.765	158.3	0.58
60.774	155.3	0.45
62.543	154.4	0.48
62.701	157.7	0.47
62.704	156.2	0.56
62.707	156.5	0.49
64.740	154.7	0.57
60.75	157.2	0.53 3n
63.08	155.9	0.51 5n

Baize's orbit (1957) gives the residuals:
60.75 + 4°.3 +0".03 and

63.13	+ 1°.2	0.00

14312 β 66 +26°3995

$20^h46^m.0$ +27°16' 8.5-9.0 F0

59.566	170°.3	1".27
59.613	165.8	1.37
59.627	167.2	1.31
59.640	167.4	1.36
59.61	167.7	1.33 4n

To the slow motion in angle corresponds dp = 0".0032.

14314 A 1434 +38°4235

$20^h46^m.1$ +29°6' -7.0-13.7 F5

60.595	251°.0	2".44
60.609	249.4	2.56
60.60	250.2	2.50 2n

Hardly changed. The bright component appeared single (<0".10) on both nights.

14333 J 194 +10°4385

$20^h47^m.0$ +11°13' 10.2-10.2 K5

60.609	251°.1	0".44
60.618	250.6	0.44
62.543	245.0	0.50
62.701	241.5	0.47
64.740	237.3	0.55
60.61	250.8	0.44 2n
63.33	241.3	0.51 3n

Baize's orbit (1957) gives the residuals +3°.5 and +0".01, and +4°.1 and +0".03.

14379 Ho 144 +19°4544

$20^h50^m.1$ +19°56' 8.0-8.0 F5

59.656	360°.9	0".26
59.687	358.2	0.25
59.939	360.6	0.28
60.588	361.4	0.30
60.601	361.7	0.30
62.543	357.3	0.25
62.701	351.8	0.26
62.704	357.0	0.31
62.710	358.9	0.27
62.718	355.2	0.27
64.733	349.6	0.29
64.740	349.2	0.31
60.09	0.6	0.28 5n
62.68	356.0	0.27 5n
64.74	349.4	0.30 2n

Slow orbital motion.

14412 A 751 +58°2187

$20^h52^m.5$ +59°7' 7.4-7.7 F2-A2

59.656	44°.6	0".22
59.660	41.5	0.20
60.606	40.0	0.19
60.609	41.8	0.23
60.13	42.0	0.21 4n

Heintz' orbit (1955) gives the small residuals +0°.1 and -0".01.

14473 A 755 +56°2516

$20^h55^m.4$ +56°44' 9.2-9.3 B8

59.660	170°.5	0".12
60.609	165.3	0.12
60.621	166.9	0.12
60.30	167.6	0.12 3n

Quadrant indeterminate.

14507 A 757 +47°3241

$20^h57^m.0$ +47°22' 9.0-14.3

60.618	104°.3	4".19
64.736	103.6	4.01
62.68	104.0	4.10 2n

Unchanged in 58 years.

14553 A 1687 +13°4599

$20^h59^m.7$ +14°12' 9.8-10.0

60.218	184°.4	0".54 1n

Unchanged after 53 years.

14585 β 1138 = Ho 282 +45°3374

$21^h1^m.0$ +45°39' 7.0-7.0 B8

61.771	192°.1	0".28
62.701	186.1	0.24
62.704	189.4	0.26
62.718	193.5	0.24
64.905	189.8	0.25
64.947	191.0	0.23
63.29	190.3	0.25 6n

No evidence of change in 75 years.

14597 OΣ 427 +30°4299

$21^h1^m.6$ +30°52' 7.8-11.9 K2

59.566	151°.6	4".76
59.613	152.2	4.58
59.624	152.5	4.64
59.640	153.0	4.64
59.61	152.3	4.66 4n

To the slow decrease in distance corresponds dp = 0".016.

14660 Ho 149 -12°5913

$21^h5^m.2$ -11°53' 10.0-10.0 G5

59.638	317°.0	0".88
59.690	319.6	0.74
59.643	319.6	0.75
59.66	318.7	0.79 3n

The change in both coordinates makes dp = 0".008.

14662 Es 1452 +42°3978

$21^h5^m.3$ +43°10' 9.9-11.3

59.624	20°.5	2".43
59.635	23.6	2.32
59.640	20.5	2.23
59.63	21.5	2.33 3n

Hardly changed.

14666 OΣ 527 +4°4615

$21^h5^m.5$ +4° 57' 6.9-8.4 A2

59.685	204°.0	0".12
60.609	201.3	0.14
60.621	197.0	0.15
60.31	200.8	0.14 3n

Djurkovic's two recent orbits (1964) give the residuals: I. +12°.9 +0".04
II. + 0.3 +0.04

The elements are still quite indeterminate.

14761 Hu 767 +15°4375

$21^h11^m.1$ +15°46' 7.0-7.0 A5

59.687	135°.8	0".24
59.939	135.8	0.18
59.942	130.5	0.19
59.950	129.4	0.18
60.595	132.0	0.23

60.618	133°.2	0".22	
60.774	137.7	0.18	
61.571	132.1	0.23	
61.710	136.7	0.24	
61.771	138.5	0.26	
64.733	142.9	0.22	
64.740	142.8	0.24	
59.88	132.9	0.20	4n
60.66	134.3	0.21	3n
61.68	135.8	0.24	3n
64.74	142.8	0.23	2n

Baize's orbit (1961) gives the representation:

59.88	+ 4°.9	0".00
60.66	+ 3.5	0.00
61.68	+ 1.7	+0.02
64.74	+ 0.4	-0.02

14766 A 884 +46°3231

$21^h11^m.6$ +46°42' 9.4-9.5 F0

59.624	150°.6	0".40
59.635	151.8	0.40
59.640	149.3	0.43
59.656	151.3	0.45
60.595	153.1	0.44
59.83	151.2	0.42 5n

To the slow angular increase corresponds dp = 0".0035.

14775 A 883 -1°4131

$21^h12^m.1$ -1° 2' 8.0-8.2 A0

60.621	133°.3	0".13
60.774	132.2	0.14
60.70	132.8	0.14 2n

Baize's orbit (1959) gives the residuals +6°.1 and -0".01.

14783 AC 19 +63°1708

$21^h12^m.7$ +64°12' 7.1-7.3 G0

59.613	254°.7	1".12
59.616	254.4	1.06
59.624	251.6	0.93
59.627	253.6	1.02
59.62	253.6	1.03 4n

No evidence of change in a century.

14830 Hu 368 +17°4542

$21^h15^m.6$ +18°18' 9.6-10.6

60.609	9°.9	0".26
60.621	6.7	0.20
60.62	8.3	0.23 2n

Clear orbital motion indicating dp = 0".0045.

14839 β 163 +10°4514

$21^h16^m.2$ +11°22' 7.2-9.1 G0

60.656	250°.7	0".83
60.722	254.5	0.99
60.765	255.3	0.95
60.71	253.5	0.92 3n

Comparison with Baize's orbit (1955) gives +1°.0 and +0".08.

14893 A 617 +9°4786

$21^h18^m.9$ +10° 7' 7.7-7.7 F5

59.687	90°.8	0".16
59.942	79.4	0.16
59.964	63.8	0.13
60.609	48.2	0.14
60.618	47.3	0.14
59.86	78.0	0.15 3n
60.61	47.8	0.14 2n

The quadrant is reversed from that given by Baize's orbit (1959), which gives the residuals:

59.86	+ 1°.8	+0".01
60.61	+ 1.5	+0.02

14926 A 764 +56°2564

$21^h20^m.9$ +57°21' 8.4-9.6 G5

59.624	344°.5	1".10
59.635	347.7	0.98
59.638	345.6	0.99
59.63	345.9	1.02 3n

The longer arc makes dp = 0".009.

15115 Hu 371 +23°4346

$21^h33^m.2$ +24°14' 6.6-7.1 A3

59.687	279°.1	0".25
59.942	274.2	0.26
60.588	277.8	0.25
60.595	279.8	0.24
61.571	275.9	0.26
61.710	284.5	0.20
61.771	283.0	0.25
61.784	277.2	0.27
62.543	281.5	0.27
62.702	286.6	0.27
62.718	285.4	0.28
62.940	288.6	0.26
62.959	289.3	0.29
64.740	282.0	0.32
64.905	287.4	0.28
60.20	277.7	0.25 4n
61.71	280.2	0.24 4n
62.77	286.3	0.27 5n
64.82	284.7	0.30 2n

Comparison with Baize's orbit (1960) gives the residuals:

60.31	+ 5°.2	+0".01
61.71	+ 5.7	-0.01
64.82	+ 6.1	+0.04

Kui 108 77 Cyg

$21^h40^m.4$ +40°51' 6.2-6.4 A0

61.571	20°.9	0".22
62.701	18.8	0.25
62.704	22.2	0.25
62.959	17.0	0.26
62.964	16.8	0.20
62.58	19.1	0.24 5n

Comparison with my orbit (1960) gives +17°.8 and +0".06 showing that the preliminary orbit will have to be improved soon.

15267 Ho 166 +27°4145

$21^h41^m.7$ +27°37' 8.8-8.9 F5

60.722	136°.8	0".32
60.765	139.5	0.30
60.768	139.3	0.29
62.940	137.2	0.32
62.959	137.3	0.32
62.964	133.2	0.35
64.730	129.3	0.36
64.740	128.3	0.32
60.75	138.5	0.30 3n
62.95	135.9	0.33 3n
64.74	128.8	0.34 2n

Couteau's orbit (1958) gives the residuals:

60.75	- 2°.5	-0".03
62.95	+ 0.3	+0.01
64.74	- 1.0	+0.01

Couteau 14 +16°4612

$21^h47^m.8$ +17°4' 5.5-7.5 F2

60.609	55°.8	0".35
60.722	60.2	0.29
60.765	60.3	0.31

60.768	60°.5	0".32	
60.774	58.4	0.36	
61.571	68.0	0.36	
61.710	63.4	0.32	
61.780	68.1	0.31	
61.842	66.2	0.33	
62.718	78.6	0.26	
62.964	70.8	0.24	
60.73	59.0	0.33	5n
61.73	66.4	0.33	4n
62.84	74.7	0.25	2n

Rapid orbital motion is evident.

15363 Es 681 +53°2715

$21^h47^m.9$ +53°28' 10.9-11.0

59.613	46°.8	2".18	
59.624	47.9	2.23	
59.635	47.7	2.01	
59.640	47.3	2.28	
59.63	47.4	2.18	4n

Unchanged in 51 years.

15373 Ho 467 +21°4630

$21^h48^m.3$ +22° 1' 8.1-10.3 K2

59.656	211°.0	2".08	
59.942	211.0	2.04	
59.964	209.5	2.11	
59.85	210.5	2.08	3n

The change would lead to an improbably large value of dp = 0".040. If B is a fixed background star the p.m. would be +0".01 and +0".015. The Yale zone gives +0".014 and -0".006 -- optical system.

15375 Ho 170 +38°4618

$21^h48^m.4$ +39°11' 8.8-8.8 A3

54.773	213°.8	0".20	
54.789	216.0	0.18	
54.792	212.2	0.19	
58.576	213.7	0.22	
58.606	213.3	0.23	
58.663	211.1	0.20	
59.656	220.3	0.25	
59.942	214.3	0.27	
59.964	219.0	0.30	
60.588	226.5	0.30	
60.595	220.5	0.33	
60.609	227.4	0.35	
62.701	226.4	0.30	
62.959	231.8	0.36	
54.78	214.0	0.19	3n
58.61	212.7	0.22	3n
59.85	217.9	0.27	3n
60.60	224.8	0.33	3n
62.83	229.1	0.33	2n

To the orbital motion corresponds dp = 0".004.

15385 Hu 694 +49°3641

$21^h49^m.3$ +50° 9' 9.8-10.3

59.624	193°.8	1".62	
59.638	192.4	1.58	
62.701	194.2	1.71	
62.704	192.5	1.69	
62.959	193.9	1.80	
64.947	192.6	1.64	
62.10	193.2	1.67	6n

Unchanged in 57 years.

15389 A 1225 +71°1092

$21^h49^m.5$ +71°32' 8.9-10.9 G0

58.576	183°.1	1".11	
59.635	185.2	1.24	
59.638	183.1	1.18	
59.640	183°.4	1".23	
59.37	183.7	1.19	4n

To the increase in both coordinates corresponds dp = 0".0034. The 0".074 proper motion confirms the physical connection.

15426 β 841 +53°2728

$21^h51^m.8$ +54° 2' 9.5-12.5

59.631	196°.8	2".40	
61.300	197.5	2.48	
64.905	196.2	2.45	
61.95	196.8	2.44	3n

Unchanged after 81 years.

15444 Kü 62 +38°4636

$21^h52^m.9$ +38°28' 8.9-10.0 A0

60.765	53°.7	1".76	
60.777	53.5	1.72	
62.543	53.5	1.79	
62.718	52.8	1.70	
61.70	53.4	1.74	4n

No definite change in 60 years.

15447 β 75 +10°4659

$21^h53^m.1$ +10°39' 8.4-8.9 G5

59.656	165°.9	0".28	
59.687	168.2	0.28	
59.942	162.9	0.28	
59.964	161.2	0.26	
60.609	172.6	0.31	
60.615	172.6	0.30	
60.618	170.6	0.30	
60.774	169.1	0.32	
60.870	170.6	0.32	
62.543	180.3	0.34	
62.701	184.8	0.35	
62.704	180.6	0.35	
62.704	185.0	0.32	
62.940	180.0	0.34	
64.730	188.0	0.34	
64.736	187.6	0.38	
64.740	191.4	0.33	
59.81	164.6	0.28	4n
60.70	171.1	0.31	5n
62.72	182.1	0.34	5n
64.74	189.0	0.35	3n

The residuals from Heintz' orbit (1963) are:

59.67	+ 2°.1	+0".02
60.72	+ 1.8	+0.04
62.29	+ 3.6	+0.05
64.74	- 0.9	+0.02

15472 Hu 382 +18°4892

$21^h54^m.2$ +19°26' 9.9-10.3

59.656	193°.4	0".39	
59.942	196.2	0.40	
59.964	189.9	0.38	
60.722	196.7	0.38	
60.744	190.6	0.34	
60.870	195.2	0.36	
62.701	193.3	0.34	
62.959	192.2	0.38	
60.94	193.4	0.37	8n

The angle increases without change in distance. The longer arc reduces dp to 0".003.

15476 OΣ 537 +59°2435

$21^h54^m.4$ +59°35' 7.9-11.0 A0

59.624	205°.1	2".22	
59.635	206.8	1.99	
59.638	204.1	2.23	
59.640	204.5	2.08	
59.63	205.1	2.13	4n

Change in distance is questionable but the

increase in angle makes dp = 0".006. The 0".06 proper motion confirms the physical connection.

15477 β 1214 +33°4387

$21^h54^m.4$ +34° 4' 9.7-11.0 A0

59.635	207°.4	1".38
59.638	208.3	1.43
59.643	206.4	1.46
59.933	209.1	1.47
59.942	205.5	1.40
59.76	207.3	1.43 5n

Unchanged in 70 years.

15481 OΣ 458 +59°2436

$21^h54^m.9$ +59°32' 7.0-8.5 A0

59.640	348°.9	0".98
59.643	349.9	1.00
59.64	349.4	0.99 2n

Slow increase in distance.

15494 Σ 2847 -4°5585

$21^h55^m.5$ - 3°43' 8.4-8.8 F0

59.613	307°.6	0".98
59.643	308.8	0.98
59.646	310.0	0.88
62.929	310.1	0.96
62.949	307.9	1.09
62.959	308.8	1.10
64.740	309.6	1.07
61.78	309.0	1.01 7n

To the very slow change corresponds dp = 0".003.

15505 Λ 1898 +55°2658

$21^h56^m.6$ +56° 1' 9.2-9.8 A2

59.613	229°.7	1".34
59.624	231.4	1.36
59.635	230.9	1.41
59.640	232.8	1.46
59.63	231.2	1.39 4n

Unchanged in 51 years.

15691 OΣ 463 +13°4860

$22^h7^m.9$ +13°30' 8.2-12.1 G0

61.551	359°.8	4".13
61.571	359.4	3.89
61.577	360.5	3.95
61.580	358.9	4.09
61.661	359.1	3.92
61.59	359.5	4.00 5n

The 0".15 proper motion proves the physical connection; to the slow change in both coordinates corresponds dp = 0".025.

15707 OΣ 464 +39°4775

$22^h9^m.1$ +40°06' 8.6-8.8 A2

59.656	107°.7	0".29
59.964	108.5	0.26
60.595	110.8	0.29
60.618	109.8	0.32
60.701	111.2	0.32
62.950	108.7	0.29
62.959	109.4	0.29
61.06	109.4	0.29 7n

This pair is closing in and should be watched in the coming years. To the large change in both coordinates corresponds dp = 0".008.

15735 Hu 978 +13°4869

$22^h10^m.3$ +13°40' 9.1-9.6 G0

60.765	211°.4	0".96
60.768	210.2	1.14
60.774	214.7	1.07
60.777	213.8	1.02
60.77	212.5	1.05 4n

Slow orbital motion. The longer arc makes dp = 0".010.

15738 Ho 179 +29°4607

$22^h10^m.4$ +29°58' 8.7-9.7 F5

60.768	272°.4	0".70
62.543	275.1	0.74
62.701	273.8	0.64
62.704	275.4	0.78
62.718	275.2	0.84
62.29	274.4	0.74 5n

Increase in both coordinates making dp = 0".006.

15835 Hu 383 +20°5127

$22^h17^m.2$ +20°52' 9.4-9.4 F5

59.964	38°.6	0".29
60.618	40.6	0.28
60.774	38.2	0.24
60.870	36.7	0.29
60.56	38.5	0.28 4n

No definite change in 59 years.

15838 Es 1020 +52°3180

$22^h17^m.4$ +52°54' 10.2-10.4

59.613	259°.8	1".85
59.624	260.4	2.13
59.635	259.8	1.96
59.950	259.1	1.91
60.588	262.4	2.01
59.88	260.3	1.97 5n

To the increasein angle corresponds dp = 0".015.

15858 β1217 +30°4685

$22^h18^m.7$ +31° 2' 7.7-10.6 K0

60.774	221°.3	0".43
62.701	219.1	0.42
62.954	223.5	0.44
62.14	221.3	0.43 3n

No definite change so far.

15859 A 628 +10°4735

$22^h18^m.7$ +10°39' 8.9-11.9 K0

59.624	227°.7	1".20
59.635	226.9	1.25
60.774	229.8	1.29
60.01	228.1	1.25 3n

No definite change but the 0".05 proper motion proves the physical connection.

15861 Kr 58 +59°2508

$22^h18^m.9$ +59°37' 9.6-9.7

59.613	26°.9	2".24
59.624	27.5	2.01
59.635	28.0	2.15
59.950	28.3	2.15
59.71	27.7	2.14 4n

Change questionable.

15889 Ho 292 +4°4849

$22^h20^m.7$ + 5°24' 7.5-11.0 A2

61.551	64°.5	4".53

61.580	66°.5	4".39
61.661	68.0	4.59
61.60	66.3	4.50 3n

No definite change in 74 years but the 0".06 proper motion establishes the physical connection.

15915 Ho 183 +21°4747

$22^h22^m.4$ +22°19' 9.2-12.6 M0

59.624	203°.4	1".34
59.628	201.0	1.42
59.933	203.2	1.31
59.939	202.2	1.36
60.618	204.1	1.41
59.95	202.8	1.37 5n

The slow change in both coordinates makes dp = 0".008. Physical connection is confirmed by the 0".22 proper motion.

15921 Es 536

$22^h22^m.8$ +27° 9' 10.2-10.2

59.624	270°.8	3".32
59.635	272.3	3.40
59.939	270.1	3.48
60.588	270.1	3.48
59.95	270.8	3.42 4n

Change doubtful after 52 years. The star was identified in the astrographic catalogue as +27°66759, +26°76093 and +26°76543 which gives the corrected position.

15939 Ho 185 +37°4573

$22^h24^m.3$ +38°22' 9.6-12.1

61.571	205°.0	3".23
61.580	204.6	3.26
61.588	206.3	3.05
61.664	206.2	3.12
61.60	205.5	3.16 4n

An optical system. The 0".035 proper motion of the bright component accounts for the change.

15956 β 291 +3°4709

$22^h25^m.2$ + 4°16' 9.8-9.8 F8

60.774	205°.5	0".28
60.870	203.1	0.30
60.82	204.3	0.29 2n

To the uniform angular increase corresponds a dp = 0".0026.

15962 β 701 +11°4804

$22^h25^m.6$ +12° 0' 7.3-10.3 K0

59.624	226°.6	1".18
59.635	226.0	1.06
59.638	228.2	1.01
59.63	226.9	1.08 3n

The distance has hardly changed but the decrease in angle makes dp = 0".012.

15963 J 180 +8°4873

$22^h25^m.7$ + 8°55' 10.2-10.2

AB = Couteau 5

59.624	249°.4	1".10
59.633	251.0	1.01
59.935	247.6	1.12
60.609	254.2	1.05
60.870	252.4	0.91
64.740	251.7	1.10
59.73	249.3	1.08 3n
62.07	252.8	1.02 3n

Change questionable so far.

15971 Σ 2909 ζ Aqr

$22^h26^m.2$ -0°17' 4.4-4.6 F2

59.613	265°.3	1".96
59.624	264.2	1.76
59.635	263.2	1.93
59.942	260.3	1.95
59.950	264.1	1.84
62.543	258.6	1.95
62.704	261.2	1.90
62.718	258.5	1.84
62.929	261.2	1.90
64.730	256.4	2.04
64.736	254.0	2.01
64.740	255.4	1.93
59.75	263.4	1.89 5n
62.72	259.9	1.90 4n
64.74	255.3	1.99 3n

Comparison with Rabe's orbit (1954) and the one by Franz (1958):

	Rabe		Franz	
59.75	+6°.5	-0".07	+2°.3	+0".02
62.71	+2.0	-0.04	+5.8	+0.06
64.73	+1.9	-0.06	+5.6	+0.17

seems to favor the earlier orbit.

15980 J 856

$22^h26^m.7$ +29° 4' 9.0-10.4

59.939	218°.0	1".60
59.942	216.0	1.43
59.950	218.6	1.36
59.94	217.5	1.46 3n

The Δm is much greater than $0^m.2$ given in the Lick Index Catalogue. I estimated it as $1^m.2$, $1^m.5$ and $1^m.6$ on the three nights. Questionable change.

15988 Σ 2912 37 Peg

$22^h27^m.4$ + 4°11' 5.8-7.2 F5

60.722	119°.7	1".21
60.765	117.2	1.08
60.774	119.2	1.12
60.777	118.0	1.10
60.76	118.5	1.13 4n

Knipe's orbit (1959) gives the residuals +1°.3 and +0".05.

15992 Hu 388 +21°4770

$22^h27^m.8$ +22°13' 8.5-9.0 F0

60.722	42°.9	0".26
60.678	40.7	0.28
64.740	43.8	0.29
62.05	42.5	0.28 3n

Rabe's orbit (1955) gives the residuals +4°.6 and 0".00.

16011 Hu 981 +60°2403

$22^h28^m.8$ +61°22' 7.6-7.8 A0

62.704	225°.1	0".35
62.718	225.1	0.40
62.620	226.1	0.35
64.740	224.2	0.36
63.20	225.1	0.36 4n

The longer arc makes dp = 0".0036.

16057 Σ 2924 +69°1262

$22^h31^m.6$ +69°39' 6.5-7.0 F2-A5

59.656	73°.8	0".50
59.687	72.0	0.46
59.942	75.7	0.43
59.950	75.2	0.47
59.964	72.4	0.45

62.701	73°2	0".56
62.704	76.0	0.50
62.718	77.2	0.57
62.940	77.1	0.48
62.959	79.4	0.53
59.84	73.8	0.46 5n
62.80	76.6	0.53 5n

Heintz' orbit (1955) gives the small residuals:

59.84	- 0°5	+0".03
62.80	+ 0.2	+0.01

16072 Hu 983 +65°1782

$22^h32^m.2$ +65°34' 8.2-8.3 K0

59.656	184°6	0".22
59.687	183.7	0.20
59.959	178.6	0.18
59.964	185.5	0.17
59.82	183.1	0.19 4n

Slow orbital change.

16111 β 1092 +72°1050

$22^h34^m.8$ +72°37' 8.3-8.3 F5

59.656	210°8	0".26
59.687	210.0	0.27
59.942	211.2	0.26
59.964	210.1	0.22
59.81	210.5	0.25 4n

Slow decrease in angle with some reduction in distance. The longer arc makes dp = 0".003.

16116 Hu 391 +23°4575

$22^h35^m.0$ +23°41' 9.8-11.1 K8

60.768	195°6	0".89
60.940	196.0	0.80
62.950	194.9	0.76
62.959	197.6	0.70
61.90	196.0	0.79 4n

No definite change in distance but increase in angle making dp = 0".010.

16142 Hu 393 +19°4976

$22^h36^m.7$ +19°58' 9.4-11.9

59.624	231°1	0".42
59.638	231.8	0.38
59.939	230.7	0.40
60.774	233.8	0.40
61.820	232.6	0.46
60.36	232.0	0.41 5n

Increase in angle without change in distance. The longer arc reduces dp to 0".003.

16164 Ho 188 +36°4905

$22^h37^m.9$ +37°16' 8.7-8.7 F8

59.964	160°4	0".15
60.595	162.9	0.19
60.609	165.4	0.18
60.39	162.9	0.17 3n

The angle has increased by 120° since 1885 and the distance has been halved. The corresponding dp is 0".006.

16173 Ho 296 +43°4971

$22^h38^m.4$ +14°17' 6.6-6.6 G5

60.774	1°8	0".15
64.740	105.0	0.19
64.905	106.8	0.23
64.947	107.3	0.24
60.77	1.8	0.15 1n
64.86	106.4	0.22 3n

Baize's orbit (1956) makes the residuals:

60.77	+ 3°1	-0".01
64.86	+12.8	0.00

16185 Σ 2934 +20°5208

$22^h39^m.4$ +21°10' 8.7-9.7 G0

60.777	95°7	1".00
62.695	94.2	0.98
62.704	95.2	0.94
62.710	93.1	1.02
62.718	94.3	0.92
62.32	94.5	0.97 5n

Heintz' orbit (1960) leaves the residuals +3°7 and +0".07.

16186 Hu 781 +14°4851

$22^h39^m.5$ +14°58' 8.9-9.1 F8

61.588	340°7	0".40
61.664	338.1	0.40
61.710	337.7	0.44
61.771	337.8	0.39
61.68	338.6	0.41 4n

The change in both coordinates leads to dp = 0".0044.

16204 A 414 +43°4276

$22^h40^m.4$ +43°45' 9.6-9.7 G0

59.613	16°8	1".96
59.624	16.2	1.80
59.635	16.5	1.97
59.950	15.1	1.89
59.71	16.2	1.90 4n

Unchanged in 57 years.

16209 Hu 394 +5°5060

$22^h40^m.5$ + 6°21' 9.3-11.0 G5

59.624	95°1	0".55
59.638	91.1	0.60
60.774	94.1	0.48
60.01	93.4	0.54 3n

The longer arc reduces dp to 0".008.

16237 A 2295 +1°4644

$22^h42^m.6$ + 2°20' 10.1-12.8 K2

60.774	86°4	1".21
60.870	84.7	1.34
61.588	82.5	1.29
61.710	82.5	1.40
61.921	83.7	1.31
61.37	84.0	1.31 5n

The slow increase in angle makes dp = 0".004.

16256 Hu 784 +51°3462

$22^h43^m.7$ +52°16' 9.3-12.2 B9

59.624	273°7	2".04
59.635	275.4	2.17
59.950	275.4	2.30
59.74	274.8	2.17 3n

No definite change in 55 years.

16314 Ho 482 +25°4828

$22^h49^m.0$ +26°8' 7.5-7.5 A3

60.722	74°4	0".20
60.768	76.8	0.22
60.774	76.0	0.23
60.75	75.7	0.22 3n

Residuals from Couteau's orbit (1963) are +3°5 and 0".00.

16326 A 632 +56°2890

$22^h50^m.0$ +57°27' 8.2-9.0 K0

60.777	184°.7	1".05
62.695	180.1	1.02
62.701	184.2	1.11
62.710	182.8	1.10
62.718	185.0	0.99
64.947	181.1	0.99
62.76	183.0	1.04 6n

Comparison with Heintz' orbit (1962) gives the residuals +3°.1 and +0".02.

16345 β 382 +43°4331

$22^h51^m.4$ +44°29' 5.8-7.8 A0

59.624	180°.5	0".67
59.635	186.3	0.67
59.942	181.1	0.58
59.950	183.8	0.64
62.695	188.8	0.67
62.701	187.2	0.66
62.710	186.3	0.69
62.718	185.8	0.72
59.79	182.9	0.64 4n
62.71	187.0	0.68 4n

Comparison with Muller's orbit (1954) shows the residuals:

59.79	+ 3°.8	-0".02
62.71	+ 2.6	-0.04

16367 β 848 +57°2639

$22^h52^m.8$ +58° 6' 9.0-13.4 A0

61.588	3°.4	2".70
62.701	6.4	2.47
62.14	4.9	2.59 2n

No definite change in 81 years.

16373 Hu 987 +15°4729

$22^h53^m.2$ +15°31' 9.1-9.3

59.635	118°.6	0".54
59.933	118.0	0.54
59.939	117.8	0.51
59.84	118.1	0.53 3n

Residuals from Baize's orbit (1958) are +9°.2 and +0".01.

16417 OΣ 536 +8°4973

$22^h56^m.0$ + 9° 6' 7.0-7.5 G0

62.695	164°.2	0".31
62.710	169.5	0.25
62.718	168.1	0.25
62.71	167.3	0.27 3n

Residuals from my orbit (1935) are +1°.3 and +0".04.

16435 Hn 56 +41°4656

$22^h57^m.4$ +41°33' 9.3-9.4

61.577	100°.8	1".16
61.580	101.4	1.04
61.588	104.2	1.20
61.664	104.0	1.06
61.842	103.9	1.17
61.65	102.9	1.13 5n

The longer arc reduces dp to 0".004.

16517 J 212

$23^h4^m.9$ +19°53' 9.6-9.6

61.551	340°.8	4".56
61.695	343.4	4.51
64.730	342.2	4.50
64.947	342.6	4.45
63.23	342.2	4.50 4n

No evidence of change.

16538 OΣ489 π Cep

$23^h6^m.3$ +75°7' 4.7-7.0 G5

60.601	306°.4	0".89
61.921	310.8	0.84
62.701	308.4	0.86
62.710	305.7	0.73
64.905	306.2	0.89
62.57	307.5	0.84 5n

Muller's orbit (1955) gives the residuals -3°.7 and +0".02.

16539 A 1238 +10°4887

$23^h6^m.3$ +10°41' 8.0-8.5 F5

59.939	13°.1	0".15
59.942	9.4	0.17
59.94	11.2	0.16 2n

Muller's orbit (1955) will require improvement since the residuals are +29°.2 and 0".00.

16582 J 623

$23^h9^m.4$ +36°3' 9.6-9.8

61.588	237°.7	2".17
61.664	240.5	2.24
61.716	236.6	2.23
61.66	238.3	2.21 3n

No evidence of change.
The star was identified in the Hyberdad zone as +36°62666.

16638 β992 +63°1958

$23^h13^m.7$ +63°50' 8.2-8.4 F0

60.601	67°.2	0".25
61.588	65.9	0.27
61.921	67.5	0.28
61.37	66.9	0.27 3n

Heintz' orbit (1962) leaves the residuals +8°.4 and +0".06.

16644 β 182 -14°6437

$23^h14^m.5$ -14° 6' 9.0-9.2 F8

59.624	45°.3	0".77
59.635	45.0	0.70
59.638	44.5	0.73
61.710	47.8	0.80
61.921	42.4	0.74
60.51	45.0	0.75 5n

Baize's orbit (1960) makes the residuals -0°.6 and +0".06.

16649 β 79 -2°5920

$23^h15^m.0$ - 1°48' 8.4-10.0 G5

60.768	40°.0	1".36
60.774	37.0	1.48
60.870	39.1	1.25
60.80	38.7	1.36 3n

Heintz' orbit (1960) makes the residuals +5°.2 and -0".02.

16650 Hu 400 +17°4891

$23^h15^m.1$ +18°2' 7.0-8.4 F0

60.774	170°.6	0".39
61.164	165.0	0.45
61.710	170.0	0.50
61.771	165.8	0.46
61.35	167.8	0.45 4n

Heintz' orbit (1960) gives the residuals +2°.0 and +0".06.

16655 Kr 64

$23^h15^m.4$ +55°25' 9.4-9.5

61.580	241°.7	2".10
61.588	241.6	2.05
61.664	242.2	1.95
61.842	239.5	2.00
61.864	241.2	2.06
61.71	241.2	2.03 5n

Change doubtful.

16731 OΣ 495 +56°2999

$23^h21^m.8$ +57°16' 7.5-7.5 B5

59.687	114°.5	0".18
59.939	116.6	0.17
59.81	115.6	0.18 2n

Slowly closing in.

16777 β1222 +2°4669

$23^h26^m.0$ + 3°17' 10.0-10.1 G5

59.942	45°.5	1".23
60.615	44.4	1.39
60.870	42.0	1.23
60.48	44.0	1.28 3n

Little change in 70 years.

Wirtanen +19°5116

$23^h29^m.2$ +19°40' 10.7-13.2

60.595	144°.0	3".90
60.601	144.9	3.66
62.940	143.6	3.88
62.959	144.4	3.80
64.733	138.8	3.99
64.740	139.0	3.94
64.903	140.1	3.80
64.906	138.4	3.97
61.77	144.2	3.81 4n
64.82	139.1	3.93 4n

Comparison with Hopmann's orbit (1956) of this proper motion star gives the residuals:

61.77	+ 1°.0	+0".02
64.81	+ 0.6	+0.13

16819 Hu 298 +6°5168

$23^h29^m.7$ + 6°49' 7.3-7.9 F5

59.942	235°.4	0".15
60.595	239.4	0.17
60.609	240.4	0.16
60.38	238.4	0.16 3n

Muller's orbit (1955) gives the residuals +7°.1 and +0".02.

16861 A 1491 +53°3202

$23^h33^m.9$ +54°12' 8.7-10.2 F0

59.646	279°.9	0".69
60.601	282.3	0.74
60.12	281.1	0.72 2n

No change in 54 years. The 0".05 proper motion favors a physical connection.

16882 A 1241 = β1336 +12°5008

$23^h35^m.5$ +12°36' 9.2-10.2 A2

AB

58.650	354°.2	0".39
60.595	358.2	0.42
60.774	354.7	0.38
64.733	358.3	0.43
61.19	356.3	0.40 4n

The angle has increased by 40° since 1905 making dp = 0".005.

Muller 4 +45°4301

$23^h38^m.7$ +45°56' 7.8-8.1 F5

59.656	248°.7	0".18
59.687	244.8	0.18
59.937	249.9	0.21
59.950	250.0	0.20
60.595	256.5	0.22
60.601	259.8	0.22
60.615	260.9	0.24
64.740	290.8	0.13
65.040	291.5	0.14
59.81	248.3	0.19 4n
60.60	259.1	0.23 3n
64.89	291.2	0.14 2n

Evidently a short period binary.

16937 OΣ 503 +19°5138

$23^h39^m.5$ +20° 1' 8.1-8.7 F8

60.722	133°.3	1".47
60.765	134.1	1.39
60.768	134.0	1.51
60.774	131.5	1.49
60.76	133.2	1.46 4n

No change in angle in 112 years but the distance slowly diminishes indicating a dp = 0".006.

16954 Hu 796 +79°792

$23^h40^m.8$ +80°15' 10.3-10.6 K0

59.624	308°.2	0".57
59.646	309.2	0.48
59.656	305.7	0.59
60.601	307.3	0.59
59.88	307.6	0.56 4n

Unchanged in 55 years.

16957 AGC 14 78 Peg

$23^h41^m.4$ +29° 6' 5.0-8.2 K0

60.722	231°.5	0".83
60.768	232.8	0.99
60.870	232.2	0.82
60.79	232.2	0.88 3n

Slow orbital motion. The longer arc makes dp = 0".0135.

17019 OΣ 506 +35°5107

$23^h46^m.1$ +36° 1' 7.6-8.6 G0

AB = B 2547

59.964	347°.6	0".29
60.618	349.3	0.35
61.711	349.5	0.30
62.704	348.6	0.28
64.740	347.2	0.34
61.95	348.4	0.31 5n

No motion so far.

17036 A 792 +46°4184

$23^h48^m.0$ +46°46' 9.3-9.5

60.601	263°.4	0".52
62.695	261.5	0.64
62.701	259.2	0.57
62.704	258.0	0.61
62.710	262.5	0.58
62.28	260.9	0.58 5n

Slow change in both coordinates indicating dp = 0".006.

17049 Hu 699 +50°4171

$23^h49^m.0$ +51°15' 8.6-13.2 A0

59.624	109°.8	1".11
59.646	108.4	1.04
59.64	109.1	1.08 2n

Unchanged in 57 years.

17062 β 996 +74°1047

$23^h49^m.6$ +75°16' 6.6-11.5 K2

62.959	99°.1	4".45
64.730	101.7	4.54
63.84	100.4	4.50 2n

The longer arc makes dp = 0".067.

17122 A 799 +47°4335

$23^h55^m.0$ +47°48' 9.2-9.3 A5

59.613	14°.9	2".00
59.624	12.5	1.80
59.638	13.5	1.88
59.646	14.6	1.99
59.950	10.4	1.91
59.69	13.2	1.92 5n

No change in angle but the increase in distance makes dp = 0".010.

17149 Σ 3050 +32°4747

$23^h56^m.9$ +33°27' 6.6-6.6 F8

62.695	283°.7	1".50
62.701	281.9	1.35
62.710	281.4	1.32
62.718	283.1	1.42
62.942	281.2	1.41
62.75	282.3	1.40 5n

Franz's orbit (1953) gives the small residuals +0°.7 and +0".02.

17178 Hn 60 +38°5112

$23^h58^m.8$ +39°22' 9.2-9.6 G5

60.777	196°.5	0".91
61.580	198.2	0.90
61.588	196.5	0.90
61.664	197.2	0.94
61.40	197.1	0.91 4n

Comparison with Heintz's orbit (1963) gives the residuals +3°.4 and +0".06.

ADDENDUM

11334 Σ 2315 +27°3016

$18^h23^m.0$ +27°22' 6.6-7.6 A0

61.426	138°.8	0".57
61.497	137.4	0.59
61.46	138.1	0.58 2n

Residuals from Heintz' orbit (1959) are +1°.6 and 0".00.