The SOUTHERN BINARY STARS (Version 0.0)

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Introduction

One of the penultimate interests of the double star observer is the derivation of the true orbit of two stars that are held by the laws of gravitation. From the derivation of many observations over previous decades or centuries, the positions of selected visual double star can result in the determination of a known orbit relative to the terrestrial observer. From the numerous measures of the scalar quantities of position angle and separation at any given observation date, the apparent positions can be reduced, by established mathematical formulae and statistics, to produce variables that defining the shape, size and orientation of the orbit. These useful values can, in turn, can be used to predict the past, present and future motion of both components. It can also be used to determine physical characteristics of the stellar system - including the orbital parameters. This includes :- the principal investigative components, stellar masses, and the establish such quantities as the absolute magnitude, radii, orbital period and evolutionary status of the system.

The true magic of all binaries is that their relative positions change overtime, but in most cases this takes more than ones lifetimes to observe. Those with periods between fifty (50) to (100) years are more likely to be perceived to change overtime. A very good example is Alpha Centauri, which in the last decade has slowly becoming more difficult to see in small telescopes. In the 1980's the components were easily spotted in 7.5cm, but presently in 2007 may require slightly larger telescopes to resolve.

The following is a selection of tables that gives the current information (2007) on the best pairs in the often neglected southern sky and lie south of -30 degrees declination. (The southern regions of the sky from mid southern latitudes). They are based on the elements from the U.S.N.O's “6th Orbital Catalogue” as of 1st January 2007. (See http://ad.usno.navy.mil/wds/orb6/orb6orbits.txt).

Hopefully all this is useful for amateurs as they are generally above 6.5 magnitude, with only modest differences in magnitude (Δm) and range in separation between arcsec and arcsec.

A few are presently invisible or unresolvable in to most amateur telescopes, but were sometime in the recent past or will be on the future visible in moderate telescopes.

Acknowledgement : This research has made use of the Washington Double Star Catalog maintained at the U.S. Naval Observatory.

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BRIGHT SOUTHERN BINARIES
(+30°S)

SELECTED EPHEMERIDES
The selections are useful for either calibration of equipment for testing small optical telescopes.

1. Wide calibration stars will be added with new versions of this document and some will be based on the Rectilinear Elements now with the 2007 Washington Double Star Catalogue (WDS).)
2. The explanation and calculation text is yet to be completed. (See WDS Site at http://ad.usno.navy.mil/wds/orb6/orb6text.html#intro)
3. Acknowledgement : This research has made use of the Washington Double Star Catalog maintained at the U.S. Naval Observatory.

ANY COMMENTS or CORRECTIONS ARE ALWAYS WELCOMED

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TABLE 1 : THIRTY-THREE BRIGHT SOUTHERN BINARY STARS : ALL DATA

No.	Star	Name WDS	WDS 2000 Coord.	HIP	R.A.(2000) hh mm.m	DEC o '	MagA V	MagB V	Δm mag	Peri.T Year	P years	a arcsec	e	i deg.	Ω deg.	ω deg.	
01	β Phe	SLR 1AB	01061-4643	5165	01 06.1	-46 43	4.10	4.19	0.09	2003.9	195	1.06	0.66	134.3	137.8	294.3	
02a	κ Tuc	I 27CD	01158-6853	5842	01 15.0	-68 49	7.22	7.77	0.55	1919	85.2	1.14	0.04	035.0	142.0	141	
02b	κ Tuc	HJ 3423AB	01158-6853	5896	01 15.8	-68 53	4.25	6.94	2.69	1763.5	857	5.96	0.384	127.1	010.3	284.9	
03		I 263	01220-6943	6377	01 22.0	-69 43	7.26	7.93	0.67	1940.8	4230	5.04	0.9084	072.7	222.8	321.9	
04	p Eri	DUN 5AB	01398-5612	7751	01 39.8	-56 11	5.82	5.86	0.04	1813.494	483.66	7.81689	0.5344	142.824	013.116	018.374	
05		GLE 1	04163-6057	19917	04 16.4	-60 56	6.34	7.05	0.71	1999.9	480	0.89	0.63	034.1	092.3	035.4	
06		HJ 3683	04403-5857	21756	04 00.3	-58 56	6.53	6.74	0.21	1923.449	240	1.902	0.994	143.0	046.88	133.79	
07		I 342	04496-5353	22431	04 49.6	-53 53	6.31	7.05	0.74	1963.1	868.05	3.827	0.915	127.0	074.6	127.3	
08		DUN 23	06048-4828	28796	06 04.8	-48 27	6.60	6.98	0.38	2047.34	304.2	3.26	0.592	073.0	132.4	087.1	
10		R 65AB	06298-5014	30953	06 29.8	-50 14	5.90	6.10	0.20	1969.1	52.9	0.484	0.959	133	124.8	046.5	
09		HJ 4087AB	08221-4059	41006	08 22.1	-40 59	7.60	8.05	0.45	1810	880	2.83	0.635	111.7	139.0	113.3	
11	δ Vel	I 10Aa-B	08447-5443	42913	08 44.7	-54 42	2.10	5.10	3.00	2000.8	142	1.99	0.47	105.2	163.6	188.0	
12	ψ Vel	COP 1	09307-4028	46651	09 30.7	-40 28	3.59	4.81	1.22	1969.68	33.95	0.862	0.433	058	291.0	044.3	
13		I 202	09387-3937	47328	09 38.7	-39 36	6.93	8.88	1.95	1999.3	110.4	2.042	0.913	096.1	005.4	077.4	
14		I 173	10062-4722	49485	10 06.2	-47 22	5.32	7.10	1.78	1932.8	232	0.64	0.72	035.7	020.6	178.3	(1)
15	μ Vel	R 155	10468-4925	52727	10 46.8	-49 25	2.69	5.72	3.03	1951.1	138	1.427	0.84	057	059.1	178.0	
16		I 212	10592-8133	53700	10 59.2	-81 33	6.70	6.71	0.01	1972.2	1210	2.04	0.699	070.7	004.2	219.4	
17		BSO 5	11247-6139	55691	11 24.7	-61 38	7.68	8.76	1.08	1918.37	399.37	5.672	0.668	049.5	075.1	017.9	
18	γ Cen	HJ 4539AB	12415-4858	61932	12 41.5	-48 57	2.20	2.29	0.09	1931.214	84.494	0.936	0.791	113.5	002.4	187.2	
19	β Mus	R 207	12463-6806	62322	12 46.3	-68 06	3.04	3.53	0.49	1872.29	383.12	1.735	0.526	061.3	161.81	098.32	
20	y Cen	HWE 28AB	13535-3540	67819	13 53.5	-35 39	5.53	5.57	0.04	1957.55	292.11	1.329	0.686	071.8	111.5	093.5	
21		SLR 19	14077-4952	69012	14 07.7	-49 52	6.45	6.68	0.23	1852.62	202.54	1.15	0.579	054.1	150.0	306.4	
22	α Cen	RHD 1AB	14396-6050	71683	14 39.6	-60 50	-0.01	1.35	1.36	1875.663	79.914	17.575	0.5179	079.205	204.849	231.651	(2)
22a		RHD 1AB	14396-6050	71683	14 39.6	-60 50	-0.01	1.35	1.36	1875.66	79.91	17.57	0.5179	079.205	204.85	231.65	(3)
23		HJ 4707	14542-6625	72921	14 54.2	-66 25	6.98	7.50	0.52	1933.9	346	1.577	0.3903	113.76	060.67	359.4	
24a	γ Cir	HJ 4757	15234-5919	75323	15 23.4	-59 19	4.48	5.36	0.88	2048.97	508.96	1.009	0.259	150	040.5	091.2	
24b	γ Cir	HJ 4757	15234-5919	75323	15 23.4	-59 19	4.48	5.36	0.88	1885.24	269.9	2.485	0.854	100.07	089.03	274.15	
25	γ Lup	HJ 4786	15351-4110	76297	15 35.1	-41 10	2.95	4.45	1.50	1885.	190.	0.655	0.510	95.	094.60	311.5	
26		MLO 4AB	17190-3459	84709	17 19.0	-34 59	6.37	7.38	1.01	1975.9	42.15	1.81	0.58	128	313.0	247.0	
27		BSO 13AB	17191-4638	84720	17 19.1	-46 38	5.47	8.68	3.21	1907.765	2204.982	23.9005	0.9014	044.883	137.025	331.806	

28		HJ 5014	18068-4325	88726	18	06.8	-43	25	4.92	5.00	0.08	1854.7	450.0	2.04	0.65	123.1	085.8	282.7
29	γ CrA	HJ 5084	19064-3704	93825	19	06.4	-37	03	4.23	4.30	0.07	2000.64	121.76	1.896	0.32	149.6	050.3	349.0
32		R 321	20269-3724	100852	20	26.9	-37	24	6.24	7.76	1.52	1949.5	177.5	1.045	0.67	140	148.0	223.0
33		SLR 14	23506-5142	117570	23	50.6	-51	42	8.28	8.59	0.31	1977.67	118.8	0.813	0.275	154.5	039.9	197.9
min									-0.01	1.35	0.01	1763.5	33.95	0.484	0.04	034.1	002.4	017.9
max									8.28	8.88	3.21	2048.97	4230	23.91	0.994	154.5	313.0	359.4
mean									5.29	6.23	0.94	1933.52	497.40	3.298	0.621	096.51	104.375	184.601

NOTES:

(1) HIP 49485 is not listed as such in the 6th Orbit (01/02/07) for I 173 (Contact them)
(2) Orbit based on Pbx2000b
(3) Orbit based on Pbx2002

TABLE 2 : THIRTY-THREE BRIGHT SOUTHERN BINARY STARS : GENERAL DATA

Star	Name WDS	WDS 2000 Coord.	HIP	RA (2000) hh mm.m	DEC o '	MagA V	MagB V	Δm mag.	Total Mag	Abs MagA	Abs MagB	M☉ A	M☉ B	ΣM☉ AB	Spect. Class	Comments
β Phe	SLR 1AB	01061-4643	5165	01 06.1	-46 43	4.10	4.19	0.09	3.39	0.2	0.3	3.1	3.0	6.1	G8IIIv	
κ Tuc	I 27CD	01158-6853	5842	01 15.0	-68 49	7.22	7.77	0.55	6.71	5.6	6.1	0.8	0.7	1.5	K2V	
κ Tuc	HJ 3423AB	01158-6853	5896	01 15.8	-68 53	4.25	6.94	2.69	4.16	2.7	5.4	1.7	0.9	2.5	F6IV	
	I 263	01220-6943	6377	01 22.0	-69 43	7.26	7.93	0.67	6.79	2.7	3.4	1.7	1.4	3.1	F3V	
p Eri	DUN 5AB	01398-5612	7751	01 39.8	-56 11	5.82	5.86	0.04	5.09	6.3	6.3	0.7	0.7	1.4	KOV	
	DUN 5AB	01398-5612	7751	01 39.8	-56 11	5.82	5.86	0.04	5.09	6.3	6.3	0.7	0.7	1.4	K5V	
	GLE 1	04163-6057	19917	04 16.4	-60 56	6.34	7.05	0.71	5.89	1.0	1.7	2.5	2.1	4.7	Ap...	TT Ret α2CVn
	HJ 3683	04403-5857	21756	04 00.3	-58 56	6.53	6.74	0.21	5.88	4.1	4.3	1.2	1.1	2.3	G5V	
	I 342	04496-5353	22431	04 49.6	-53 53	6.31	7.05	0.74	5.87	4.0	4.7	1.2	1.0	2.2	K1V	
	DUN 23	06048-4828	28796	06 04.8	-48 27	6.60	6.98	0.38	6.02	4.2	4.6	1.1	1.0	2.1	G6V	NSV2827 RS CVn
	R 65AB	06298-5014	30953	06 29.8	-50 14	5.90	6.10	0.20	5.24	1.2	1.4	1.8	1.7	3.6	F2V	R 65 AB
	R 65AB	06298-5014	30953	06 29.8	-50 14	5.90	6.10	0.20	5.24	2.3	2.5	1.8	1.7	3.6		R 65 C - CD
	HJ 4087AB	08221-4059	41006	08 22.1	-40 59	7.60	8.05	0.45	7.05	4.0	4.5	2.4	2.3	4.7	F5V	
δ Vel	I 10Aa-B	08447-5443	42913	08 44.7	-54 42	2.10	5.10	3.00	2.03	0.2	3.2	3.1	1.5	4.6	A1V	del Vel EclBin
ψ Vel	COP 1	09307-4028	46651	09 30.7	-40 28	3.59	4.81	1.22	3.28	2.2	3.5	1.9	1.4	3.2	F3IV+	LTT 3497
	I 202	09387-3937	47328	09 38.7	-39 36	6.93	8.88	1.95	6.76	3.9	5.8	1.2	0.8	2.0	F6IV	
	I 173	10062-4722	49485	10 06.2	-47 22	5.32	7.10	1.78	5.13	0.8	2.6	2.6	1.7	4.3	K1IV+...	(1)
μ Vel	R 155	10468-4925	52727	10 46.8	-49 25	2.69	5.72	3.03	2.63	-0.1	1.3	3.2	1.6	4.8	G5IIIa	
	I 212	10592-8133	53700	10 59.2	-81 33	6.70	6.71	0.01	5.95	1.9	1.9	2.0	2.0	4.1	F7IV	
	BSO 5	11247-6139	55691	11 24.7	-61 38	7.68	8.76	1.08	7.34	7.1	8.2	0.6	0.5	1.0	F7V	LHS 2402 0.6? 0.4?
γ Cen	HJ 4539AB	12415-4858	61932	12 41.5	-48 57	2.20	2.29	0.09	1.49	-0.8	-0.7	3.9	3.8	7.7	A1IV	LTT 4841
β Mus	R 207	12463-6806	62322	12 46.3	-68 06	3.04	3.53	0.49	2.51	-1.9	-1.4	5.0	4.5	9.5	B2.5V	
y Cen	HWE 28AB	13535-3540	67819	13 53.5	-35 39	5.53	5.57	0.04	4.80	2.0	2.1	2.0	1.9	3.9	F4V	y Cen not gamma Cen
	SLR 19	14077-4952	69012	14 07.7	-49 52	6.45	6.68	0.23	5.81	3.4	3.6	1.4	1.3	2.7	G3V	
α Cen	RHD 1AB	14396-6050	71683	14 39.6	-60 50	-0.01	1.35	1.36	-0.28	4.3	5.7	1.1	0.9	1.9	G2V	α Cen A 1.1? 0.8?
	RHD 1AB	14396-6050	71683	14 39.6	-60 50	-0.01	1.35	1.36	-0.28	4.3	5.7	1.1	0.9	1.9	K1V	α Cen B 1.1? 0.8?

	HJ 4707	14542-6625	72921	14 54.2	-66 25	6.98	7.50	0.52	6.46	3.8	4.3	1.3	1.1	2.4	G0V	LTT 5910	(2)
γ Cir	HJ 4757	15234-5919	75323	15 23.4	-59 19	4.48	5.36	0.88	4.08	-1.5	-0.6	4.6	3.7	8.3	B5IV+...		
γ Cir	HJ 4757	15234-5919	75323	15 23.4	-59 19	4.48	5.36	0.88	4.08	-1.5	-0.6	4.6	3.7	8.3	B5IV+...		
γ Lup	HJ 4786	15351-4110	76297	15 35.1	-41 10	2.95	4.45	1.50	3.21	-3.3	-1.7	7.0	4.9	11.9	B2IV	Hei 9.0 9.0 18.0? Mag.3.4/3.5?	
	MLO 4AB	17190-3459	84709	17 19.0	-34 59	6.37	7.38	1.01	6.01	7.2	8.2	0.6	0.4	1.0	K3IV...(K4V) NSV 8482		
41 Ara	BSO 13AB	17191-4638	84720	17 19.1	-46 38	5.47	8.68	3.21	5.41	5.8	9.0	0.8	0.4	1.2	G8V	41 Ara LHS 444	
	HJ 5014	18068-4325	88726	18 06.8	-43 25	4.92	5.00	0.08	4.21	1.7	1.8	2.1	2.1	4.2	A5V		
γ CrA	HJ 5084	19064-3704	93825	19 06.4	-37 03	4.23	4.30	0.07	3.51	3.0	3.0	1.3	1.3	2.6	F2IV-V	LTT 7565 1.6? 1.5? 3.1?	
	R 321	20269-3724	100852	20 26.9	-37 24	6.24	7.76	1.52	6.00	3.2	4.8	1.5	1.0	2.5	K2IV-V	LTT 8092	
	SLR 14	23506-5142	117570	23 50.6	-51 42	8.28	8.59	0.31	7.67	5.2	5.5	0.9	0.8	1.7	G9V		

NOTES:
(1) HIP 49485 is not listed as such in the 6th Orbit (01/02/07) for I 173 (Contact them)

(2) HJ 4707 has two possible orbits in the 6th orbit. The alternative spectral class
is (B5III+B8) and the variable star *gam Cir Be*

(3) Masses quoted here are only approximate, and have been checked with various reference sources.
They were obtained using both the Hipparcos distances and also by calculating the dynamical parallaxes.
Errors maybe in the order of 20%, but at least they are good enough for amateur useage.

TABLE 3 : THIRTY-THREE BRIGHT SOUTHERN BINARY STARS : KINEMATIC DATA

Star	Name WDS	WDS 2000 Coord.	HIP	RA (2000) hh mm.m	DEC o '	Plx mas	pmRA mas	pmDec mas	R.V. kms^{-1}	D (pc)	D (ly)	Err. %
β Phe	SLR 1AB	01061-4643	5165	01 06.1	-46 43	16.46±22.22	- 70.16±18.96	+ 31.60±14.92	-01.1±0.5	60.75	198.15	-.-%
κ Tuc	I 27CD	01158-6853	5842	01 15.0	-68 49	47.36± 1.25	+ 416.56± 1.53	+ 75.97± 1.05	+06.1±0.2	21.12±0.56	68.9± 1.8	2.6%
κ Tuc	HJ 3423AB	01158-6853	5896	01 15.8	-68 53	48.94± 0.53	+ 411.10± 0.51	+127.45± 0.47	+09.2±2.0	20.43±0.22	66.7± 0.7	1.1%
	I 263	01220-6943	6377	01 22.0	-69 43	12.38± 1.08	- 6.02± 1.01	+ 3.75± 0.95	±??	80.78±7.10	263.4±23.2	8.8%
p Eri	DUN 5AB	01398-5612	7751	01 39.8	-56 11	122.75± 1.41	+ 286.10± 1.42	+ 16.67± 0.99	±??	8.15±0.09	26.6± 0.3	1.1%
	DUN 5AB	01398-5612	7751	01 39.8	-56 11	122.75± 1.41	+ 282 ±25	+ 22 ±25	+19.5±0.9	8.15±0.09	26.6± 0.3	1.1%
	GLE 1	04163-6057	19917	04 16.4	-60 56	8.41± 0.53	+ 43.73± 0.91	+ 25.05± 0.59	+26.5±?	118.91±7.52	387.8±24.5	6.3%
	HJ 3683	04403-5857	21756	04 00.3	-58 56	32.30± 0.98	+ 30.97± 1.13	+174.81± 0.92	+10.1±2	30.96±0.94	101.0± 3.7	3.0%
	I 342	04496-5353	22431	04 49.6	-53 53	34.10± 1.06	+ 135.24± 1.04	+231.90± 1.00	±??	29.33±0.91	95.6± 2.8	3.1%
	DUN 23	06048-4828	28796	06 04.8	-48 27	33.64± 0.84	- 105.63± 0.96	- 23.30± 0.73	+20.0±1.9	29.73±0.74	94.0± 2.4	2.5%
	R 65AB	06298-5014	30953	06 29.8	-50 14	19.33± 0.66	- 67.56± 0.95	- 51.83± 0.76	+02±10	51.73±1.77	168.7± 5.8	3.4%
R 65 AB-C	DUN 30	06298-5014	30953	06 29.8	-50 14	19.33± 0.66	- 54.7 ± 4.2	- 68.0 ± 4.2	±??	51.73±1.77	168.7± 5.8	3.4%
	HJ 4087AB	08221-4059	41006	08 22.1	-40 59	11.31± 0.90	+ 3.21± 0.87	+ 41.93± 0.65	+33.7±11	88.42±7.08	288.4±23.1	8.0%
δ Vel	I 10Aa-B	08447-5443	42913	08 44.7	-54 42	40.90± 0.38	+ 28.78± 0.43	-104.14± 0.42	+02.2±2	24.45±0.23	79.8± 0.7	0.9%
ψ Vel	COP 1	09307-4028	46651	09 30.7	-40 28	53.89± 0.70	- 147.14± 0.80	+ 46.53± 0.55	+08.8±2	18.56±0.24	60.5± 0.8	1.3%
	I 202	09387-3937	47328	09 38.7	-39 36	24.66± 0.88	- 42.05± 0.70	- 66.11± 0.60	+02.5±0.5	40.55±1.45	132.3± 4.7	3.6%
	I 173	10062-4722	49485	10 06.2	-47 22	12.63± 0.55	- 10.84± 0.51	- 53.46± 0.41	+21.2±0.9	79.18±3.45	258.2±11.3	4.4%
μ Vel	R 155	10468-4925	52727	10 46.8	-49 25	28.18± 0.49	+ 62.33± 0.40	- 53.37± 0.37	+06.2±0.9	35.49±0.62	115.7± 2.0	1.7%
	I 212	10592-8133	53700	10 59.2	-81 33	10.72± 0.62	- 148.92± 0.65	+ 67.61± 0.53	+11.2±0.2	93.28±5.41	304.3±17.7	5.8%
	BSO 5	11247-6139	55691	11 24.7	-61 38	77.58± 1.82	- 510.93± 2.05	+ 77.98± 1.71	+04.7±2	12.89±0.30	42.0± 1.0	2.3%
γ Cen	HJ 4539AB	12415-4858	61932	12 41.5	-48 57	25.01± 1.01	- 187.28± 0.82	- 1.20± 0.73	-05.5±2	39.98±1.62	130.4± 5.3	4.0%
β Mus	R 207	12463-6806	62322	12 46.3	-68 06	10.48± 0.65	- 40.40± 0.63	+ 10.32± 0.54	+42±10	95.42±5.94	311.2±19.4	6.2%
y Cen	HWE 28AB	13535-3540	67819	13 53.5	-35 39	19.97± 1.46	- 82.39± 1.60	- 22.28± 1.19	-08±10	50.07±3.68	163.3±12.0	7.4%
	SLR 19	14077-4952	69012	14 07.7	-49 52	24.76± 1.26	- 37.28± 1.23	+106.39± 0.98	±??	40.39±2.06	131.7± 6.7	5.1%
α Cen	RHD 1A	14396-6050	71683	14 39.6	-60 50	742.24± 1.40	-3679.26± 1.68	+483.03± 0.99	-24.6±0.9	1.347±0.003	4.4±0.01	0.2%
	RHD 1A	14396-6050	71683	14 39.6	-60 50	742.22± 1.40	-3601.08±28.61	+953.36±15.91	-20.7±0.9	1.347±0.003	4.4±0.01	0.2%
	HJ 4707	14542-6625	72921	14 54.2	-66 25	23.05± 2.02	- 263.97± 1.94	-172.74± 0.97	-35.3±0.2	43.38±3.8	141.5±12.5	8.8%
γ Cir	HJ 4757	15234-5919	75323	15 23.4	-59 19	06.40± 0.99	- 10.29± 0.89	- 36.57± 0.71	-16.9±2	156.30±24.8	509.6±80.8	15.8%
γ Cir	HJ 4757	15234-5919	75323	15 23.4	-59 19	06.40± 0.99	- 10.29± 0.89	- 36.57± 0.71	-16.9±2	156.30±24.8	509.6±80.8	15.8%
γ Lup	HJ 4786	15351-4110	76297	15 35.1	-41 10	05.75± 1.24	- 16.05± 1.33	- 25.52± 0.91	+02.3±5	173.90±39.3	567.2±128	22.6%

	MLO 4AB	17190-3459	84709	17 19.0	-34 59	143.45±17.12	+1149.24±16.79	- 90.76± 9.15	+00.0±5	6.97±0.84	22.7± 2.8	12.1%
41 Ara	BSO 13AB	17191-4638	84720	17 19.1	-46 38	113.81± 1.36	+1035.20± 1.40	+109.26± 0.60	+25.3±0.1	8.79±0.11	28.7± 0.3	1.2%
	HJ 5014	18068-4325	88726	18 06.8	-43 25	22.79± 1.22	+ 9.49± 1.33	-104.72± 0.63	±??	43.88±2.36	143.1± 7.7	5.4%
γ CrA	HJ 5084	19064-3704	93825	19 06.4	-37 03	55.89± 1.94	+ 96.93± 2.44	-279.67± 1.34	-51.6±0.9	17.89±0.62	58.4± 2.0	3.5%
	R 321	20269-3724	100852	20 26.9	-37 24	25.21± 1.31	- 255.06± 1.71	-114.25± 1.09	+23.4±5	39.67±2.07	129.4± 6.7	5.2%
	SLR 14	23506-5142	117570	23 50.6	-51 42	24.45± 2.38	+ 55.03± 2.53	-109.53± 2.01	- 6.9±0.1	40.90±4.02	133.4±13.1	9.8%

Distance Conversions : Parallax (π) to milli-arcsec (mas).

π (mas)	D (pc)	D (ly)
1.00	1000.00	3261.6
2.00	500.00	1630.8
3.00	333.33	1087.2
4.00	250.00	815.4
5.00	200.00	652.3
10.0	100.00	326.2
15.0	66.67	217.4
20.0	50.00	163.1
25.0	40.00	130.5
30.0	33.33	108.7
35.0	28.57	93.19
40.0	25.00	81.54
45.0	22.22	72.48
50.0	20.00	65.23
75.0	13.33	43.49

π (mas)	D (pc)	D (ly)
100	10.00	32.62
200	5.00	16.31
250	4.00	13.05
400	2.50	8.15
500	2.00	6.52
600	1.67	5.44
700	1.43	4.66
800	1.25	4.08
900	1.11	3.62
1000	1.00	3.26

TABLE 4 : THIRTY-THREE BRIGHT SOUTHERN BINARY STARS : ORBITAL ELEMENTS

Star	Name	PeriT	P	a	e	i	Ω	ω	Grade	Orbit
	WDS	Year	years	arcsec		o	o	o		Year
β Phe	SLR 1AB	2003.9	195	1.06	0.66	134.3	137.8	294.3	5	2001
κ Tuc	I 27CD	1919	85.2	1.14	0.04	035.0	142.0	141.0	3	1999
κ Tuc	HJ 3423AB	1763.5	857	5.96	0.384	127.1	010.3	284.9	5	2005
	I 263	1940.8	4230	5.04	0.9084	072.7	222.8	321.9	5	1999
p Eri	DUN 5AB	1813.494	483.66	7.81689	0.5344	142.824	013.116	018.374	5	1957
	GLE 1	1999.9	480	0.89	0.63	034.1	092.3	035.4	5	2006
	HJ 3683	1923.449	240	1.902	0.994	143.0	046.88	133.79	5	1981
	I 342	1963.1	868.05	3.827	0.915	127.0	074.6	127.3	5	2006
	DUN 23	2047.34	304.2	3.26	0.592	073.0	132.4	087.1	5	2001
	R 65AB	1969.1	52.9	0.484	0.959	133.0	124.8	046.5	4	1978
	HJ 4087AB	1810	880	2.83	0.635	111.7	139.0	113.3	5	2002
δ Vel	I 10Aa-B	2000.8	142	1.99	0.47	105.2	163.6	188.0	5	2000
ψ Vel	COP 1	1969.68	33.95	0.862	0.433	058.0	291.0	044.3	5	2001
	I 202	1999.3	110.4	2.042	0.913	096.1	005.4	077.4	4	2002
	I 173	1932.8	232	0.64	0.72	035.7	020.6	178.3	2	1960
μ Vel	R 155	1951.1	138	1.427	0.84	057.0	059.1	178	4	1986
	I 212	1972.2	1210	2.04	0.699	070.7	004.2	219.4	5	2002
	BSO 5	1918.37	399.37	5.672	0.668	049.5	075.1	017.9	5	2002
γ Cen	HJ 4539AB	1931.214	84.494	0.936	0.791	113.5	002.4	187.2	5	1981
β Mus	R 207	1872.29	383.12	1.735	0.526	061.3	161.81	098.32	4	1964
γ Cen	HWE 28AB	1957.55	292.11	1.329	0.686	071.8	111.5	093.5	3	1981
	SLR 19	1852.62	202.54	1.15	0.579	054.1	150.0	306.4	5	1998
α Cen	RHD 1AB	1875.663	79.914	17.575	0.5179	079.205	204.849	231.651	5	2000
	RHD 1AB	1875.66	79.91	17.57	0.5179	079.205	204.85	231.65	5	2002
	HJ 4707	1933.9	346	1.577	0.3903	113.76	060.67	359.4	2	1999
γ Cir	HJ 4757	2048.97	508.96	1.009	0.259	150.0	040.5	091.2	4	1982
γ Cir	HJ 4757	1885.24	269.9	2.485	0.854	100.07	089.03	274.15	5	2005
γ Lup	HJ 4786	1885.	190.	0.655	0.51	095.	094.6	311.5	3	1990
	MLO 4AB	1975.9	42.15	1.81	0.58	128.0	313.0	247	5	1999

	BSO 13AB	1907.765	2204.982	23.9005	0.9014	044.883	137.025	331.806	2	1962
	HJ 5014	1854.7	450	2.04	0.65	123.1	085.8	282.7	5	2001
γ CrA	HJ 5084	2000.64	121.76	1.896	0.32	149.6	050.3	349	3	1986
	R 321	1949.5	177.5	1.045	0.67	140.0	148.0	223	4	1988
	SLR 14	1977.67	118.8	0.813	0.275	154.5	39.9	197.9	3	1997
STATISTICS										
min		1763.5	33.95	0.484	0.04	034.1	002.4	17.9		
max		2048.97	4230	23.91	0.994	154.5	313	359.4		
mean		1935.05	507.00	3.381	0.625	096.55	104.681	180.637		

TABLE 5 : THIRTY-THREE BRIGHT SOUTHERN BINARY STARS : EPHEMERIDES

	2005		2006		2007		2008		2009		2010		
	PA	Sep	PA	Sep	PA	Sep	PA	Sep	PA	Sep	PA	Sep	
β Phe	180.2	00.30	169.2	00.33	160.1	00.36	152.5	00.40	146.0	00.43			
κ Tuc (CD)	291.9	01.03	296.0	01.05	300.1	01.06	304.0	01.07	307.9	01.08	(1) I 27 CD		
κ Tuc (AB)	320.4	05.00	320.0	05.00	319.7	05.00	319.4	04.99	319.0	04.99	(2) HJ 4323 AB		
I 263	269.3	00.53	270.3	00.53	271.2	00.53	272.2	00.53	273.2	00.53			
p Eri/Δ5AB	189.4	11.60	189.2	11.61	189.0	11.63	188.7	11.64	188.5	11.65			
GLE 1	180.8	00.32	184.4	00.33	187.8	00.34	191.1	00.34	194.3	00.35			
HJ 3683	089.8	03.53	089.7	03.55	089.7	03.57	089.7	03.59	089.6	03.61			
I 342	135.1	03.08	135.0	03.09	134.8	03.11	134.7	03.13	134.5	03.14			
DUN 23	121.2	02.58	121.7	02.57	122.1	02.56	122.6	02.55	123.0	02.54			
R 65 AB	264.2	00.71	263.5	00.70	262.9	00.68	262.2	00.66	261.4	00.63			
HJ 4087 AB	257.4	01.46	257.0	01.46	256.5	01.46	256.1	01.46	255.6	01.45			
δ Vel	331.1	00.87	327.7	00.80	323.7	00.73	318.9	00.66	312.8	00.58			
ψ Vel	008.2	00.28	050.3	00.34	074.1	00.47	087.0	00.61	095.3	00.70			
I 202	180.0	00.98	179.5	01.04	178.9	01.09	178.5	01.14	178.0	01.17			
I 173	005.1	00.97	005.5	00.98	005.9	00.98	006.2	00.99	006.6	00.99			
μ Vel	054.5	02.52	054.7	02.53	055.0	02.55	055.2	02.56	055.4	02.57			
I 212	309.9	00.32	312.7	00.33	315.3	00.34	317.7	00.36	319.8	00.37			
BSO 5	245.3	07.03	245.6	07.08	245.9	07.13	246.2	07.18	246.4	07.23			
γ Cen	341.1	00.73	339.2	00.66	336.9	00.59	333.9	00.52	330.0	00.44			
β Mus	046.4	01.28	047.1	01.27	047.8	01.27	048.5	01.27	049.2	01.27			
γ Cen	313.3	00.96	313.8	00.96	314.4	00.96	314.9	00.96	315.5	00.95			
SLR 19	318.4	01.41	318.9	01.40	319.5	01.39	320.1	01.38	320.7	01.37			
α Cen (*1)	229.7	10.57	231.8	09.81	234.3	09.05	237.3	08.29	240.9	07.53			(3) Pbx2002
α Cen (*2)	229.6	10.58	231.8	09.83	234.2	09.06	237.2	08.31	240.7	07.51			(4) Pbx2000b
HJ 4707	277.9	00.97	276.9	00.99	275.9	01.01	275.0	01.03	274.1	01.05			
γ Cir (*1)	353.0	00.80	351.8	00.81	350.6	00.81	349.5	00.81	348.4	00.82			(5) Lin2005a
γ Cir (*2)	005.1	00.77	004.1	00.77	003.0	00.76	002.0	00.76	000.9	00.75	359.9	00.75	(6) Nys1982
γ Lup	277.5	00.81	277.4	00.82	277.3	00.82	277.2	00.82	277.1	00.82	277.0	00.82	
MLO 4 AB	221.2	01.57	215.3	01.53	209.1	01.49	202.6	01.45	195.8	01.42			

BSO 13 AB	253.7	10.07	254.0	10.15	254.3	10.24	254.5	10.32	254.8	10.40
HJ 5014	004.8	01.71	004.3	01.71	003.8	01.71	003.4	01.71	002.9	01.72
γ CrA	037.3	01.31	032.3	01.32	027.3	01.32	022.3	01.33	017.4	01.33
R 321	129.4	01.51	128.9	01.52	128.3	01.53	127.8	01.54	127.2	01.54
SLR 14	085.2	00.80	082.5	00.82	080.0	00.83	077.5	00.84	075.1	00.86

Stats	2005	2006	2007	2008	2009
min	0.283	0.329	0.336	0.344	0.352
max	11.599	11.612	11.625	11.638	11.650
mean	2.161	2.168	2.177	2.185	2.193

TABLE 6 : EIGHTY BRIGHT BINARY STARS : ORBIT SELECTION : ALL SKY

	Star Name	WDS	RA (2000) hh mm.m	Dec o '	MagA V	MagB V	2005 Sep	2005 PA	2010 Sep	2010 A	2015 Sep	2015 PA	Spectral Class
1	η Cas	STF 60	00 49.2	+57 49	3.52	7.36	12.53	320.71	12.67	322.54	12.79	324.81	G0V+dM0
2	36 And	STF 73AB	00 55.0	+23 38	6.12	6.54	00.98	316.55	01.06	323.38	01.13	329.31	K1IV
3	β Phe	SLR 1AB	01 06.1	-46 43	4.10	4.19	00.30	179.56	00.46	139.99	00.57	119.46	G8IIIv
4a	κ Tuc	I 27CD	01 15.0	-68 49	7.84	8.44	01.03	291.86	01.09	311.72	01.10	330.50	K2V
4b	κ Tuc	HJ 3423AB	01 15.8	-68 53	5.00	7.74	05.00	320.38	04.99	318.71	04.97	317.03	F6IV
5		I 263	01 22.0	-69 43	7.66	8.61	00.53	269.12	00.53	274.12	00.52	279.00	F3V
6		BU 1000AB-C	01 35.0	-29 55	8.06	9.31	01.59	358.65	01.57	009.67	01.55	021.01	K0
7	τ Scl	HJ 3447	01 36.1	-29 54	5.97	7.35	00.80	178.29	00.81	186.55	00.84	194.42	F2V
8	p Eri	DUN 5AB	01 39.8	-56 11	5.97	6.15	11.60	189.44	11.66	188.31	11.71	187.18	F2V
9	ϵ Scl	HJ 3461AB	01 45.6	-25 03	5.38	8.50	04.65	021.50	45.65	019.99	04.65	018.48	F2V
10	α Psc	STF 202AB	02 02.0	+02 45	4.10	5.17	01.79	268.16	01.77	264.59	01.75	260.92	A0p A3m
11	α For	HJ 3555	03 12.1	-28 59	3.98	7.19	05.08	299.39	05.23	299.82	05.35	300.23	F8V
12		GLE 1	04 16.4	-60 56	6.34	7.05	00.98	335.89	00.98	336.37	00.97	336.85	ApEuCrSr: (1)
13		HJ 3683	04 40.3	-58 56	7.33	7.45	03.17	088.32	03.23	088.09	03.28	087.87	B5V
14		I 342	04 49.6	-53 53	8.28	8.77	01.41	163.63	01.52	160.18	01.63	157.21	K1V
15	32 Ori	STF 728	05 30.8	+05 56	4.44	5.75	00.26	092.98	00.31	082.38	00.36	074.61	B5V
16	ζ Ori	STF 774Aa-B	05 40.8	-01 56	1.88	3.70	02.25	165.33	02.23	165.68	02.20	166.44	O9.5Ibe+BOIII
17		DUN 23	06 04.8	-48 27	7.30	7.69	02.59	117.19	02.60	117.51	02.60	117.84	G6V
18	η Gem	BU 1008	06 14.9	+22 30	3.52	6.15	01.59	254.93	01.60	253.77	01.61	252.31	M3.5I-II
19		R 65AB	06 29.8	-50 14	5.97	6.15	00.71	264.20	00.61	260.64	00.45	255.06	F2V
20	α CMa	AGC 1AB	06 45.1	-16 42	-1.46	8.50	06.75	111.03	08.81	091.34	10.32	078.49	A1VM
21	α Gem	STF1110AB	07 34.6	+31 53	1.93	2.97	04.29	061.22	04.68	057.76	05.06	054.83	A1V+A2Vm
22	α CMi	SHB 1AB	07 39.3	+05 14	0.38	10.8	05.06	033.70	04.83	051.23	04.39	071.37	F5IV-V
23a	ζ Cnc	STF1196AB	08 12.2	+17 38	5.30	6.25	00.96	056.49	01.06	036.22	01.12	018.99	F8V
23b	ζ Cnc	STF1196AB	08 12.2	+17 38	5.30	6.25							F8V
24		HJ 4087AB	08 22.1	-40 59	7.58	7.98	01.46	257.39	01.45	255.19	01.45	252.96	F5V
25	δ Vel	I 10Aa-B	08 44.7	-54 42	1.99	5.87	00.87	331.05	00.51	305.01	00.41	236.09	A1V
26a	ϵ Hya	STF1273AB-C	08 46.8	+06 25	3.49	6.66	02.88	301.36	02.89	304.88	02.90	308.37	
26b	ϵ Hya	STF1273AB-C	08 46.8	+06 25	3.49	6.66							

Star	Name	WDS	RA (2000) hh mm.m	Dec o '	MagA V	MagB V	2005 Sep	2005 PA	2010 Sep	2010 A	2015 Sep	2015 PA	Spectral Class	
27	ω Leo	STF1356	09 28.5	+09 03	5.69	7.28	00.68	094.32	00.76	102.39	00.84	108.89	F9IV	
28	ψ Vel	COP 1	09 30.7	-40 28	3.91	5.12	00.28	008.37	00.85	101.27	01.10	120.05	FOIV+F3IV	
29		I 202	09 38.7	-39 36	7.02	8.37	00.98	180.04	01.21	177.62	01.31	175.78	F6V	(2)
30		I 173	10 06.2	-47 22	5.32	7.10	00.97	005.12	01.00	006.97	01.02	008.72	K1IV+G5V	
31	γ Leo	STF 1424AB	10 20.0	+19 50	2.37	3.64							KOIII	
32	μ Vel	R 155	10 46.8	-49 25	2.82	5.65	02.52	054.47	02.58	055.68	02.61	056.84	G5III+G2V	
33		I 212	10 59.2	-81 33	7.57	7.58	00.32	309.90	00.39	321.82	00.47	329.79		
34	ξ UMa	STF1523AB	11 18.2	+31 31	4.33	4.80	01.75	245.52	01.61	211.20	01.78	176.95	F9V+G9V	
35		BSO 5	11 24.7	-61 38	7.68	8.76	07.03	245.33	07.27	247.70	07.50	247.98	K5/M0V	
36		STF1555AB	11 36.3	+27 46	6.41	6.78	00.45	168.97	01.40	013.49	02.29	355.86	F0V	
37	γ Cen	HJ 4539AB	12 41.5	-48 57	2.82	2.88	00.73	341.10	00.36	324.26	00.19	196.39	A1IV	
38	γ Vir	STF1670AB	12 41.7	-01 26	3.48	3.53	00.37	153.54	01.49	020.90	02.35	004.92	F0V F0V	
39	β Mus	R 207	12 46.3	-68 06	3.52	3.98	01.28	046.35	01.27	049.93	01.26	053.55	B2.5V	
40	y Cen	HWE 28AB	13 53.5	-35 39	6.27	6.38	00.96	313.29	00.95	316.00	00.94	318.76	F4V	
41		SLR 19	14 07.7	-49 52	7.14	7.38	01.41	318.36	01.36	321.28	01.30	324.46	G3V	
42a	α Cen	RHD 1AB	14 39.6	-60 50	0.14	1.24	10.58	229.65	06.80	245.19	04.13	288.42	G2V+K1V	
42b	α Cen	RHD 1AB	14 39.6	-60 50	0.14	1.24	09.70	232.17	05.96	251.82	04.04	305.34	G2V+K1V	
43		HJ 4707	14 54.2	-66 25	7.53	8.09	00.97	277.97	01.07	273.30	01.18	269.54	G0V	
44		H N 28AB	14 57.5	-21 25	5.88	8.18	25.87	310.70	26.20	310.97	26.52	311.24	K5Ve M2V	
45	44 Boo	STF1909	15 03.8	+47 39	5.20	6.10	02.35	055.10	02.35	057.05	02.16	059.17	F7V+K4V	
46	η CrB	STF1937AB	15 23.2	+30 17	5.64	5.95	00.53	107.56	00.59	166.76	00.65	206.78	F8V+G0V	
47a	γ Cir	HJ 4757	15 23.4	-59 19	4.94	5.72	00.91	005.91	00.92	001.83	00.93	357.80	B5IV+F8	
47b	γ Cir	HJ 4757	15 23.4	-59 19	4.94	5.72	00.77	005.00	00.75	359.06	00.73	354.20	B5IV+F8	
48	δ Ser	STF1954AB	15 34.8	+10 32	4.17	5.16	04.33	175.90	04.36	175.49	04.40	175.13	F0IV	
49	γ Lup	HJ 4786	15 35.1	-41 10	2.95	4.45	00.80	277.50	00.82	277.03	00.83	276.05	B2IV	
50	σ CrB	STF2032AB	16 14.7	+33 51	5.62	6.49	07.11	236.76	07.19	237.50	07.28	238.17	G0V+G1V	
51	α Sco	GNT 1	16 29.4	-26 25	0.96	5.40	02.68	276.58	02.64	276.86	02.60	277.16	M1.5Iab-Ib+B4Ve	
52	λ Oph	STF 2055AB	16 30.9	+01 59	4.15	5.15	01.55	033.90	01.55	037.71	01.53	041.55	A0V+A0V	
53	ζ Her	STF 2084I	16 41.3	+31 36	2.95	5.40	00.94	227.03	01.17	177.70	01.28	138.44	G1IV	

Star	Name	WDS	RA (2000) hh mm.m	Dec o '	MagA V	MagB V	2005 Sep	2005 PA	2010 Sep	2010 A	2015 Sep	2015 PA	Spectral Class
54	μ Dra	STF 2130AB	17 05.3	+54 28	5.66	5.69	02.28	011.80	02.36	006.16	02.45	000.89	F7V
55	η Oph	BU 1118AB	17 10.4	-15 43	3.05	3.27	00.59	238.57	00.60	235.17	00.59	231.79	A1IV+A1IV
55b	η Oph	BU 1118AB	17 10.4	-15 43	3.05	3.27	00.57	239.89	00.58	236.26	00.57	232.64	A1IV+A1IV
56	α Her	STF2140Aa-B	17 14.6	+14 23	3.48	5.40	04.65	104.02	04.64	103.56	04.64	103.10	G5III+F2V
57	36 Oph	SHJ 243AB	17 15.3	-26 36	5.12	5.12	04.90	144.53	04.96	142.71	05.02	140.95	K0V K1V
58		MLO 4AB	17 19.0	-34 59	6.37	7.38	01.57	221.16	01.39	188.65	01.12	145.79	K3V+K5V
59		BSO 13AB	17 19.1	-46 38	5.61	8.88	10.07	253.70	10.48	255.06	10.88	256.31	G8V+M0V
60	ψ1 Dra	STF 2241AB	17 41.9	+72 08	4.60	5.59	29.78	015.39	29.76	015.52	29.73	015.64	F5IV F8V
61	τ Oph	STF 2262AB	18 03.1	-08 10	5.27	5.86	01.69	282.92	01.62	284.89	01.55	287.03	F4IV F5V
62	70 Oph	STF 2272AB	18 05.5	+02 30	4.22	6.17	04.87	138.35	05.72	131.62	06.31	126.41	K0V+K4V
63		HJ 5014	18 06.8	-43 25	5.65	5.68	01.73	000.57	01.74	358.27	01.76	356.02	A5V A5V
64a	ϵ1 Lyr	STF 2382AB	18 44.3	+39 40	5.01	6.10	02.54	349.04	02.51	347.67	02.48	346.27	A4V F1V
64b	ϵ1 Lyr	STF 2382AB	18 44.3	+39 40	5.01	6.10	02.43	349.00	02.39	347.55	02.35	346.04	A4V F1V
64c	ϵ1 Lyr	STF 2382AB	18 44.3	+39 40	5.01	6.10	02.40	349.11	02.34	347.61	02.27	346.03	A4V F1V (3)
64d	ϵ2 Lyr	STF2383Cc-D	18 44.3	+39 40	5.25	5.38	02.35	080.32	02.37	078.23	02.38	076.12	A8Vn+F0Vn
65	γ CRa	HJ 5084	19 06.4	-37 03	4.53	6.42	01.31	037.30	01.34	012.57	01.40	349.38	F8V+F8V
66		STF 2486AB	19 12.1	+49 51	6.54	6.67	07.42	205.75	07.33	205.03	07.24	204.28	G3V+G3V
67	δ Cyg	STF 2579AB	19 45.0	+45 07	2.89	6.27	02.64	222.21	02.68	219.95	02.72	217.74	B9.5IV
68		KUI 95	19 45.8	+27 09	12.7	13.6	01.81	050.80	02.14	053.66	02.45	055.78	M4
69		R 321	20 26.9	-37 24	6.58	8.09	01.51	129.40	01.55	126.71	01.57	124.13	K2IV K1V
71	γ Del	STF 2727	20 46.6	+16 07	4.36	5.03	09.17	265.61	09.07	265.33	08.97	265.04	K1IV F7V
72	61 Cyg	STF 2758AB	21 06.9	+38 44	5.35	6.10	31.05	150.77	31.34	151.63	31.62	152.48	K5V+K7V
73	μ Cyg	STF 2822AB	21 44.1	+28 44	4.75	6.18	01.75	312.20	01.66	316.38	01.56	321.10	F6V+G2V
74	53 Aqr	SHJ 345AB	22 26.6	-16 44	6.29	6.39	01.48	190.94	01.63	189.36	01.76	188.03	G0V+G0V
75		KR 60	22 28.0	+57 42	9.93	11.41	02.53	068.83	01.86	025.91	01.40	301.78	M3.5+M4.5 (4)
76	ζ2 Aqr	STF2909AB	22 28.8	-00 01	4.34	4.49	03.72	005.62	03.72	004.95	03.71	004.28	F3IV-V
77	π Cep	STT 489AB	23 07.9	+75 23	9.61	9.68	01.17	354.53	01.19	358.60	02.00	002.58	G0
78	EQ Peg	WIR 1AB	23 31.7	+19 56	10.5	12.4	04.73	084.94	04.31	078.71	03.43	070.24	M4+M5
79		SLR 14	23 50.6	-51 42	8.28	8.59	00.80	085.18	00.87	072.73	00.92	062.00	G5
80		STF 3050AB	23 59.5	+33 43	6.46	6.72	01.87	321.29	01.98	327.41	02.07	332.94	F8V

NOTES
(1) Variable Star : TT Ret
(2) I 202 : Max sep 1.108 at PA123.0 mid-Dec 2016
(3) Separation of $\epsilon^{1,2}$ Lyra is 5.01 5.25 AB-CD 174 210.5 (1998)
(4) KR 60 is Kurger's Star

SELECTED EPHEMERIDES : ALPHA CENTAURI

1980 to 2100 (YEAR : Sep : PA) Pbx2000

1980 21.7782 209.51	2012 05.4474 257.28	2044 11.8780 198.43	2076 16.6879 218.60
1981 21.7780 209.98	2013 04.8749 265.71	2045 13.2676 199.84	2077 16.0863 219.43
1982 21.7266 210.45	2014 04.4204 276.11	2046 14.5208 200.99	2078 15.4607 220.33
1983 21.6266 210.92	2015 04.1276 288.42	2047 15.6459 201.97	2079 14.8108 221.30
1984 21.4802 211.40	2016 04.0349 301.91	2048 16.6514 202.83	2080 14.1398 222.37
1985 21.2891 211.89	2017 04.1555 315.32	2049 17.5442 203.59	2081 13.4477 223.54
1986 21.0560 212.39	2018 04.4702 327.42	2050 18.3329 204.28	2082 12.7380 224.84
1987 20.7816 212.90	2019 04.9356 337.56	2051 19.0249 204.92	2083 12.0111 226.30
1988 20.4683 213.42	2020 05.5063 345.79	2052 19.6262 205.52	2084 11.2698 227.94
1989 20.1177 213.96	2021 06.1406 352.39	2053 20.1431 206.08	2085 10.5166 229.83
1990 19.7316 214.52	2022 06.8080 357.73	2054 20.5805 206.62	2086 09.7556 232.00
1991 19.3104 215.11	2023 07.4820 002.10	2055 20.9433 207.13	2087 08.9921 234.54
1992 18.8568 215.72	2024 08.1409 005.76	2056 21.2362 207.64	2088 08.2298 237.55
1993 18.3709 216.37	2025 08.7626 008.88	2057 21.4627 208.12	2089 07.4758 241.18
1994 17.8554 217.04	2026 09.3256 011.61	2058 21.6268 208.60	2090 06.7415 245.60
1995 17.3111 217.76	2027 09.8062 014.04	2059 21.7316 209.08	2091 06.0411 251.08
1996 16.7378 218.53	2028 10.1757 016.27	2060 21.7803 209.55	2092 05.3939 257.94
1997 16.1395 219.36	2029 10.4007 018.37	2061 21.7755 210.02	2093 04.8308 266.52
1998 15.5148 220.25	2030 10.4407 020.42	2062 21.7200 210.49	2094 04.3885 277.09
1999 14.8678 221.22	2031 10.2486 022.49	2063 21.6159 210.96	2095 04.1115 289.54
2000 14.1985 222.27	2032 09.7720 024.71	2064 21.4653 211.45	2096 04.0369 303.10
2001 13.5078 223.43	2033 08.9616 027.24	2065 21.2707 211.93	2097 04.1756 316.44
2002 12.7993 224.72	2034 07.7861 030.41	2066 21.0337 212.43	2098 04.5048 328.37
2003 12.0732 226.17	2035 06.2568 034.95	2067 20.7562 212.94	2099 04.9811 338.34
2004 11.3340 227.79	2036 04.4573 042.90	2068 20.4400 213.47	2100 05.5586 346.42
2005 10.5824 229.65	2037 02.6237 062.15	2069 20.0861 214.01	
2006 09.8213 231.80	2038 01.7285 120.51	2070 19.6968 214.57	
2007 09.0572 234.30	2039 03.0050 168.62	2071 19.2726 215.16	
2008 08.2950 237.27	2040 04.9209 183.78	2072 18.8161 215.78	
2009 07.5403 240.83	2041 06.8463 190.38	2073 18.3283 216.42	
2010 06.8030 245.19	2042 08.6641 194.13	2074 17.8102 217.10	
2011 06.0992 250.56	2043 10.3439 196.61	2075 17.2624 217.83	

SELECTED EPHEMERIDES : ALPHA CENTAURI

2007 to 2025 (YEAR : Sep : PA) Pbx2000

01/01/2007 9.0572 234.30	01/12/2010 6.1521 250.10	01/11/2014 4.1624 286.31	01/10/2018 4.8101 335.26	01/09/2022 7.2612 0.75
31/01/2007 8.9947 234.53	01/01/2011 6.0992 250.56	01/12/2014 4.1438 287.39	01/11/2018 4.8523 336.06	01/10/2022 7.3172 1.10
02/03/2007 8.9271 234.77	31/01/2011 6.0433 251.06	01/01/2015 4.1276 288.42	01/12/2018 4.8951 336.85	01/11/2022 7.3737 1.45
02/04/2007 8.8634 235.01	02/03/2011 5.9835 251.61	31/01/2015 4.1121 289.50	01/01/2019 4.9356 337.56	01/12/2022 7.4300 1.79
02/05/2007 8.7986 235.25	02/04/2011 5.9274 252.13	02/03/2015 4.0970 290.66	31/01/2019 4.9789 338.30	01/01/2023 7.4820 2.10
02/06/2007 8.7351 235.49	02/05/2011 5.8719 252.67	02/04/2015 4.0841 291.77	02/03/2019 5.0264 339.09	31/01/2023 7.5369 2.43
02/07/2007 8.6718 235.74	02/06/2011 5.8168 253.21	02/05/2015 4.0726 292.90	02/04/2019 5.0722 339.83	02/03/2023 7.5961 2.77
02/08/2007 8.6072 235.99	02/07/2011 5.7612 253.78	02/05/2015 4.0726 292.90	02/04/2019 5.0722 339.83	02/04/2023 7.6519 3.09
01/09/2007 8.5453 236.24	02/08/2011 5.7072 254.34	02/06/2015 4.0625 294.04	02/05/2019 5.1187 340.54	02/05/2023 7.7080 3.41
02/10/2007 8.4796 236.50	01/09/2011 5.6547 254.90	02/07/2015 4.0542 295.16	02/06/2019 5.1663 341.26	02/06/2023 7.7631 3.72
01/11/2007 8.4180 236.75	02/10/2011 5.5997 255.51	02/08/2015 4.0472 296.30	02/07/2019 5.2137 341.95	02/07/2023 7.8185 4.03
01/12/2007 8.3538 237.02	01/11/2011 5.5484 256.09	01/09/2015 4.0419 297.40	02/08/2019 5.2623 342.63	02/08/2023 7.8735 4.33
01/01/2008 8.2950 237.27	01/12/2011 5.4956 256.70	02/10/2015 4.0377 298.59	01/09/2019 5.3090 343.27	01/09/2023 7.9266 4.62
31/01/2008 8.2324 237.54	01/01/2012 5.4474 257.28	01/11/2015 4.0353 299.71	02/10/2019 5.3599 343.95	02/10/2023 7.9830 4.93
02/03/2008 8.1647 237.83	31/01/2012 5.3968 257.91	01/12/2015 4.0344 300.85	01/11/2019 5.4081 344.58	01/11/2023 8.0361 5.21
01/04/2008 8.1036 238.11	02/03/2012 5.3430 258.59	01/01/2016 4.0349 301.91	01/12/2019 5.4591 345.22	01/12/2023 8.0901 5.50
02/05/2008 8.0375 238.40	01/04/2012 5.2947 259.23	31/01/2016 4.0368 303.04	01/01/2020 5.5063 345.79	01/01/2024 8.1409 5.76
01/06/2008 7.9767 238.68	02/05/2012 5.2432 259.92	02/03/2016 4.0405 304.26	31/01/2020 5.5562 346.39	31/01/2024 8.1933 6.04
01/07/2008 7.9135 238.98	01/06/2012 5.1953 260.59	01/04/2016 4.0454 305.36	02/03/2020 5.6104 347.02	02/03/2024 8.2496 6.33
01/08/2008 7.8505 239.28	01/07/2012 5.1472 261.29	02/05/2016 4.0521 306.53	01/04/2020 5.6609 347.59	01/04/2024 8.3011 6.59
31/08/2008 7.7876 239.58	01/08/2012 5.0998 262.00	01/06/2016 4.0598 307.62	02/05/2020 5.7148 348.18	02/05/2024 8.3562 6.87
01/10/2008 7.7236 239.90	31/08/2012 5.0532 262.71	01/07/2016 4.0695 308.77	01/06/2020 5.7665 348.74	01/06/2024 8.4067 7.13
31/10/2008 7.6623 240.21	01/10/2012 5.0057 263.47	01/08/2016 4.0804 309.89	01/07/2020 5.8192 349.29	01/07/2024 8.4595 7.39
01/12/2008 7.5987 240.53	31/10/2012 4.9616 264.20	31/08/2016 4.0925 310.98	01/08/2020 5.8728 349.84	01/08/2024 8.5116 7.65
31/12/2008 7.5365 240.85	01/12/2012 4.9157 264.99	01/10/2016 4.1068 312.12	31/08/2020 5.9259 350.37	31/08/2024 8.5619 7.90
30/01/2009 7.4809 241.15	31/12/2012 4.8724 265.75	31/10/2016 4.1216 313.19	01/10/2020 5.9806 350.90	01/10/2024 8.6143 8.16
02/03/2009 7.4128 241.52	30/01/2013 4.8341 266.46	01/12/2016 4.1387 314.31	31/10/2020 6.0339 351.41	31/10/2024 8.6641 8.40
01/04/2009 7.3525 241.85	02/03/2013 4.7877 267.34	31/12/2016 4.1565 315.38	01/12/2020 6.0897 351.93	01/12/2024 8.7159 8.66
02/05/2009 7.2886 242.21	01/04/2013 4.7479 268.13	30/01/2017 4.1739 316.35	31/12/2020 6.1439 352.42	31/12/2024 8.7651 8.90
01/06/2009 7.2288 242.55	02/05/2013 4.7059 269.00	02/03/2017 4.1964 317.50	30/01/2021 6.1932 352.86	**********
02/07/2009 7.1642 242.93	01/06/2013 4.6679 269.81	01/04/2017 4.2180 318.53	02/03/2021 6.2534 353.38	
01/08/2009 7.1048 243.28	02/07/2013 4.6280 270.71	02/05/2017 4.2420 319.60	01/04/2021 6.3069 353.84	ENDS of DATA
01/09/2009 7.0431 243.65	01/08/2013 4.5913 271.56	01/06/2017 4.2660 320.61	02/05/2021 6.3645 354.32	01/01/2025
01/10/2009 6.9818 244.03	01/09/2013 4.5543 272.46	02/07/2017 4.2925 321.65	01/06/2021 6.4180 354.76	
31/10/2009 6.9219 244.41	01/10/2013 4.5190 273.36	01/08/2017 4.3189 322.63	02/07/2021 6.4756 355.22	**********
01/12/2009 6.8599 244.81	31/10/2013 4.4848 274.27	01/09/2017 4.3472 323.62	01/08/2021 6.5298 355.65	
01/12/2009 6.8599 244.81	01/12/2013 4.4505 275.23	01/10/2017 4.3772 324.62	01/09/2021 6.5865 356.09	
31/12/2009 6.8006 245.20	31/12/2013 4.4187 276.16	31/10/2017 4.4072 325.57	01/10/2021 6.6431 356.52	
31/01/2010 6.7439 245.59	31/01/2014 4.3896 277.05	01/12/2017 4.4393 326.53	31/10/2021 6.6979 356.93	
02/03/2010 6.6804 246.02	02/03/2014 4.3578 278.08	31/12/2017 4.4718 327.46	01/12/2021 6.7559 357.35	
02/04/2010 6.6208 246.44	02/04/2014 4.3289 279.07	31/01/2018 4.5031 328.32	31/12/2021 6.8113 357.75	
02/05/2010 6.5603 246.88	02/05/2014 4.3013 280.07	02/03/2018 4.5398 329.28	31/01/2022 6.8632 358.12	
02/06/2010 6.5014 247.31	02/06/2014 4.2745 281.10	02/04/2018 4.5758 330.18	02/03/2022 6.9233 358.53	
02/07/2010 6.4417 247.76	02/07/2014 4.2495 282.12	02/05/2018 4.6126 331.06	02/04/2022 6.9798 358.92	
01/08/2010 6.3846 248.20	01/08/2014 4.2263 283.13	02/06/2018 4.6509 331.94	02/05/2022 7.0362 359.30	
01/09/2010 6.3267 248.66	01/09/2014 4.2035 284.18	02/07/2018 4.6894 332.79	02/06/2022 7.0932 359.68	
01/10/2010 6.2681 249.13	01/10/2014 4.1824 285.23	01/08/2018 4.7280 333.62	02/07/2022 7.1500 0.05	
01/11/2010 6.2099 249.61		01/09/2018 4.7687 334.45	01/08/2022 7.2041 0.39	

SELECTED EPHEMERIDES : ALPHA CENTAURI

1980 to 2100 (YEAR : Sep : PA) Pbx2002

1980 21.7735 209.95	2012 4.7606 267.85	2044 13.9198 200.45	2076 15.5857 220.14
1981 21.7246 210.43	2013 4.3352 278.81	2045 15.1153 201.52	2077 14.9354 221.11
1982 21.6262 210.90	2014 4.0848 291.60	2046 16.1868 202.44	2078 14.2621 222.16
1983 21.4802 211.39	2015 4.0441 305.34	2047 17.1386 203.25	2079 13.5681 223.32
1984 21.2893 211.88	2016 4.2186 318.62	2048 17.9815 203.97	2080 12.8546 224.61
1985 21.0547 212.38	2017 4.5803 330.33	2049 18.7229 204.64	2081 12.1243 226.05
1986 20.7785 212.89	2018 5.0832 340.02	2050 19.3691 205.26	2082 11.3792 227.68
1987 20.4628 213.42	2019 5.6810 347.83	2051 19.9265 205.84	2083 10.6213 229.54
1988 20.1095 213.97	2020 6.3332 354.08	2052 20.4010 206.40	2084 9.8551 231.69
1989 19.7189 214.54	2021 7.0111 359.15	2053 20.7977 206.93	2085 9.0842 234.20
1990 19.2940 215.13	2022 7.6887 003.32	2054 21.1211 207.44	2086 8.3139 237.18
1991 18.8353 215.74	2023 8.3432 006.82	2055 21.3756 207.93	2087 7.5524 240.76
1992 18.3438 216.39	2024 8.9539 009.83	2056 21.5652 208.42	2088 6.8086 245.14
1993 17.8222 217.08	2025 9.4964 012.46	2057 21.6931 208.90	2089 6.0988 250.55
1994 17.2713 217.81	2026 9.9461 014.84	2058 21.7628 209.38	2090 5.4411 257.34
1995 16.6922 218.59	2027 10.2718 017.04	2059 21.7771 209.85	2091 4.8655 265.86
1996 16.0855 219.43	2028 10.4362 019.13	2060 21.7388 210.33	2092 4.4099 276.39
1997 15.4543 220.33	2029 10.3955 021.19	2061 21.6503 210.80	2093 4.1200 288.86
1998 14.7996 221.31	2030 10.0990 023.32	2062 21.5140 211.29	2094 4.0345 302.51
1999 14.1212 222.39	2031 9.4927 025.65	2063 21.3321 211.78	2095 4.1664 316.01
2000 13.4237 223.58	2032 8.5311 028.41	2064 21.1063 212.28	2096 4.4930 328.08
2001 12.7061 224.89	2033 7.1950 032.05	2065 20.8385 212.79	2097 4.9714 338.20
2002 11.9723 226.37	2034 5.5235 037.66	2066 20.5307 213.31	2098 5.5528 346.37
2003 11.2242 228.04	2035 3.6479 048.79	2067 20.1850 213.85	2099 6.1970 352.91
2004 10.4643 229.96	2036 1.9900 081.18	2068 19.8022 214.42	2100 6.8717 358.19
2005 9.6970 232.17	2037 2.1150 148.86	2069 19.3841 215.00	
2006 8.9262 234.77	2038 3.8601 177.40	2070 18.9317 215.62	
2007 8.1562 237.86	2039 5.8245 187.40	2071 18.4469 216.26	
2008 7.3984 241.58	2040 7.7229 192.38	2072 17.9317 216.94	
2009 6.6597 246.16	2041 9.4907 195.44	2073 17.3869 217.66	
2010 5.9589 251.82	2042 11.1139 197.57	2074 16.8123 218.43	
2011 5.3155 258.93	2043 12.5875 199.17	2075 16.2120 219.25	

SELECTED EPHEMERIDES : ALPHA CENTAURI

2007 to 2024 (YEAR : Sep : PA) Pbx2002

01/01/2007 8.1562 237.86	01/12/2010 5.3622 258.33	01/11/2014 4.0357 303.10	01/10/2018 5.5278 346.07	01/09/2022 8.1318 5.73
31/01/2007 8.0939 238.14	01/01/2011 5.3155 258.93	01/12/2014 4.0393 304.25	01/11/2018 5.5794 346.68	01/10/2022 8.1857 6.01
02/03/2007 8.0265 238.44	31/01/2011 5.2657 259.60	01/01/2015 4.0441 305.34	01/12/2018 5.6313 347.28	01/11/2022 8.2399 6.29
02/04/2007 7.9632 238.74	02/03/2011 5.2137 260.31	31/01/2015 4.0505 306.46	01/01/2019 5.6810 347.83	01/12/2022 8.2936 6.56
02/05/2007 7.8987 239.04	02/04/2011 5.1644 261.02	02/03/2015 4.0591 307.68	31/01/2019 5.7326 348.39	31/01/2023 8.3952 7.08
02/06/2007 7.8344 239.35	02/05/2011 5.1158 261.73	02/04/2015 4.0686 308.80	02/03/2019 5.7893 349.00	02/03/2023 8.4514 7.36
02/07/2007 7.7716 239.65	02/06/2011 5.0681 262.46	02/05/2015 4.0798 309.94	02/04/2019 5.8428 349.55	02/04/2023 8.5036 7.62
02/08/2007 7.7077 239.97	02/07/2011 5.0211 263.20	02/06/2015 4.0924 311.07	02/05/2019 5.8966 350.09	02/05/2023 8.5559 7.88
01/09/2007 7.6465 240.28	02/08/2011 4.9750 263.95	02/07/2015 4.1065 312.19	02/06/2019 5.9513 350.63	02/06/2023 8.6077 8.14
02/10/2007 7.5804 240.62	01/09/2011 4.9314 264.69	02/08/2015 4.1220 313.30	02/07/2019 6.0061 351.16	02/07/2023 8.6588 8.39
01/11/2007 7.5195 240.93	02/10/2011 4.8853 265.50	01/09/2015 4.1386 314.38	02/08/2019 6.0611 351.68	02/08/2023 8.7100 8.64
01/12/2007 7.4564 241.27	01/11/2011 4.8426 266.28	02/10/2015 4.1575 315.51	01/09/2019 6.1144 352.17	01/09/2023 8.7586 8.88
01/01/2008 7.3984 241.58	01/12/2011 4.8000 267.08	01/11/2015 4.1767 316.56	02/10/2019 6.1720 352.69	02/10/2023 8.8105 9.13
31/01/2008 7.3369 241.92	01/01/2012 4.7606 267.85	01/12/2015 4.1976 317.62	01/11/2019 6.2254 353.16	01/11/2023 8.8591 9.37
02/03/2008 7.2706 242.30	31/01/2012 4.7199 268.68	01/01/2016 4.2186 318.62	01/12/2019 6.2814 353.64	01/12/2023 8.9084 9.61
01/04/2008 7.2096 242.65	02/03/2012 4.6778 269.57	31/01/2016 4.2419 319.65	01/01/2020 6.3332 354.08	**********
02/05/2008 7.1451 243.03	01/04/2012 4.6398 270.41	02/03/2016 4.2681 320.75	31/01/2020 6.3884 354.54	
01/06/2008 7.0858 243.38	02/05/2012 4.6000 271.33	01/04/2016 4.2939 321.75	02/03/2020 6.4476 355.02	ENDS of DATA
01/07/2008 7.0230 243.77	01/06/2012 4.5640 272.19	02/05/2016 4.3222 322.79	01/04/2020 6.5027 355.46	01/01/2025
01/08/2008 6.9617 244.15	01/07/2012 4.5277 273.10	01/06/2016 4.3502 323.77	02/05/2020 6.5611 355.91	
31/08/2008 6.9020 244.53	01/08/2012 4.4926 274.02	01/07/2016 4.3798 324.75	01/06/2020 6.6160 356.33	**********
01/10/2008 6.8388 244.94	31/08/2012 4.4586 274.96	01/08/2016 4.4110 325.73	01/07/2020 6.6733 356.76	
31/10/2008 6.7784 245.34	01/10/2012 4.4252 275.93	31/08/2016 4.4427 326.67	01/08/2020 6.7297 357.18	
01/12/2008 6.7171 245.76	31/10/2012 4.3942 276.87	01/10/2016 4.4766 327.63	31/08/2020 6.7860 357.58	
31/12/2008 6.6573 246.17	01/12/2012 4.3627 277.88	31/10/2016 4.5103 328.55	01/10/2020 6.8437 357.99	
30/01/2009 6.6026 246.56	31/12/2012 4.3336 278.86	01/12/2016 4.5466 329.49	31/10/2020 6.8997 358.39	
02/03/2009 6.5375 247.03	30/01/2013 4.3083 279.77	31/12/2016 4.5822 330.37	01/12/2020 6.9580 358.79	
01/04/2009 6.4799 247.46	02/03/2013 4.2791 280.87	30/01/2017 4.6161 331.18	31/12/2020 7.0144 359.17	
02/05/2009 6.4179 247.93	01/04/2013 4.2543 281.87	02/03/2017 4.6577 332.13	30/01/2021 7.0657 359.51	
01/06/2009 6.3610 248.37	02/05/2013 4.2290 282.95	01/04/2017 4.6957 332.96	02/03/2021 7.1274 359.91	
02/07/2009 6.2999 248.86	01/06/2013 4.2064 283.99	02/05/2017 4.7371 333.83	01/04/2021 7.1824 0.27	
01/08/2009 6.2426 249.33	02/07/2013 4.1840 285.09	01/06/2017 4.7766 334.63	02/05/2021 7.2412 0.64	
01/09/2009 6.1845 249.81	01/08/2013 4.1645 286.13	02/07/2017 4.8202 335.49	01/06/2021 7.2965 0.99	
01/10/2009 6.1269 250.31	01/09/2013 4.1453 287.23	01/08/2017 4.8618 336.27	02/07/2021 7.3555 1.35	
31/10/2009 6.0697 250.81	01/10/2013 4.1280 288.32	01/09/2017 4.9055 337.06	01/08/2021 7.4102 1.69	
01/12/2009 6.0119 251.33	31/10/2013 4.1120 289.41	01/10/2017 4.9498 337.84	01/09/2021 7.4671 2.03	
31/12/2009 5.9556 251.85	01/12/2013 4.0971 290.56	31/10/2017 4.9932 338.57	01/10/2021 7.5236 2.36	
31/01/2010 5.9031 252.35	31/12/2013 4.0841 291.66	01/12/2017 5.0402 339.34	31/10/2021 7.5789 2.69	
02/03/2010 5.8445 252.92	31/01/2014 4.0732 292.72	31/12/2017 5.0855 340.06	01/12/2021 7.6363 3.02	
02/04/2010 5.7886 253.48	02/03/2014 4.0624 293.91	31/01/2018 5.1298 340.74	31/12/2021 7.6918 3.33	
02/05/2010 5.7333 254.05	02/04/2014 4.0537 295.05	02/03/2018 5.1798 341.48	31/01/2022 7.7439 3.63	
02/06/2010 5.6785 254.63	02/05/2014 4.0466 296.19	02/04/2018 5.2281 342.18	02/03/2022 7.8024 3.95	
02/07/2010 5.6242 255.22	02/06/2014 4.0409 297.36	02/05/2018 5.2768 342.86	02/04/2022 7.8583 4.26	
01/08/2010 5.5727 255.79	02/07/2014 4.0367 298.52	02/06/2018 5.3260 343.52	02/05/2022 7.9137 4.57	
01/09/2010 5.5186 256.42	01/08/2014 4.0343 299.62	02/07/2018 5.3763 344.19	02/06/2022 7.9687 4.86	
01/10/2010 5.4661 257.04	01/09/2014 4.0332 300.78	01/08/2018 5.4254 344.82	02/07/2022 8.0240 5.16	
01/11/2010 5.4143 257.67	01/10/2014 4.0337 301.94	01/09/2018 5.4764 345.45	01/08/2022 8.0767 5.44	

SELECTED EPHEMERIDES : *p* Eridani / DUN 05 / Δ5

1820 to 2400 (YEAR : Sep : PA) vAb1957

1820 3.4564 342.15	1820 3.4564 342.15	1820 3.4564 342.15
1825 3.4039 329.09	1825 3.4039 329.09	1825 3.4039 329.09
1830 3.4116 315.86	1830 3.4116 315.86	1830 3.4116 315.86
1835 3.4944 302.96	1835 3.4944 302.96	1835 3.4944 302.96
1840 3.6548 290.92	1840 3.6548 290.92	1840 3.6548 290.92
1845 3.8840 280.10	1845 3.8840 280.10	1845 3.8840 280.10
1850 4.1677 270.61	1850 4.1677 270.61	1850 4.1677 270.61
1855 4.4899 262.42	1855 4.4899 262.42	1855 4.4899 262.42
1860 4.8371 255.36	1860 4.8371 255.36	1860 4.8371 255.36
1865 5.1984 249.27	1865 5.1984 249.27	1865 5.1984 249.27
1870 5.5653 243.97	1870 5.5653 243.97	1870 5.5653 243.97
1875 5.9328 239.33	1875 5.9328 239.33	1875 5.9328 239.33
1880 6.2957 235.23	1880 6.2957 235.23	1880 6.2957 235.23
1885 6.6509 231.58	1885 6.6509 231.58	1885 6.6509 231.58
1890 6.9973 228.28	1890 6.9973 228.28	1890 6.9973 228.28
1895 7.3326 225.30	1895 7.3326 225.30	1895 7.3326 225.30
1900 7.6564 222.57	1900 7.6564 222.57	1900 7.6564 222.57
1905 7.9678 220.06	1905 7.9678 220.06	1905 7.9678 220.06
1910 8.2667 217.73	1910 8.2667 217.73	1910 8.2667 217.73
1915 8.5526 215.57	1915 8.5526 215.57	1915 8.5526 215.57
1920 8.8253 213.54	1920 8.8253 213.54	1920 8.8253 213.54
1925 9.0850 211.63	1925 9.0850 211.63	1925 9.0850 211.63
1930 9.3321 209.82	1930 9.3321 209.82	1930 9.3321 209.82
1935 9.5664 208.11	1935 9.5664 208.11	1935 9.5664 208.11
1940 9.7879 206.47	1940 9.7879 206.47	1940 9.7879 206.47
1945 9.9968 204.91	1945 9.9968 204.91	1945 9.9968 204.91
1950 10.1935 203.40	1950 10.1935 203.40	1950 10.1935 203.40
1955 10.3782 201.95	1955 10.3782 201.95	1955 10.3782 201.95
1960 10.5508 200.56	1960 10.5508 200.56	1960 10.5508 200.56
1965 10.7117 199.20	1965 10.7117 199.20	1965 10.7117 199.20
1970 10.8611 197.88	1970 10.8611 197.88	1970 10.8611 197.88
1975 10.9988 196.60	1975 10.9988 196.60	1975 10.9988 196.60

Orbital Elements
***p* Eri : DUN 5: Δ5**
(11182+3132)
Class 5 orbit!
Mag:4.33V and 4.80V

(Van Albada, G.B. 1957)

P = 483.660
T = 1813.494
a = 7.817
e = 0.534
i = 142.820
Ω = 13.12
ω = 18.37

SELECTED EPHEMERIDES : GAMMA VIRGINIS

2005 to 2015 (YEAR : Sep : PA) Pbx2002

31/01/2005 0.3668 146.61	02/10/2007 0.9805 38.24	02/06/2010 1.5789 18.84	01/09/2010 1.6277 17.72	02/03/2013 2.0701 9.24
02/03/2005 0.3631 138.97	01/11/2007 1.0012 37.30	02/07/2010 1.5953 18.46	02/10/2010 1.6443 17.35	02/04/2013 2.0836 9.02
02/04/2005 0.3632 131.64	02/12/2007 1.0232 36.32	02/08/2010 1.6118 18.08	01/11/2010 1.6598 17.01	02/05/2013 2.0973 8.79
02/05/2005 0.3670 124.39	01/01/2008 1.0423 35.51	01/09/2010 1.6277 17.72	02/12/2010 1.6764 16.65	02/06/2013 2.1105 8.58
02/06/2005 0.3743 117.33	01/02/2008 1.0631 34.64	02/10/2010 1.6443 17.35	01/01/2011 1.6904 16.35	02/07/2013 2.1241 8.36
02/07/2005 0.3849 110.62	02/03/2008 1.0846 33.77	01/11/2010 1.6598 17.01	31/01/2011 1.7059 16.02	02/08/2013 2.1374 8.15
02/08/2005 0.3983 104.32	02/04/2008 1.1051 32.97	02/12/2010 1.6764 16.65	03/03/2011 1.7231 15.66	01/09/2013 2.1502 7.94
01/09/2005 0.4136 98.65	02/05/2008 1.1255 32.19	01/01/2011 1.6904 16.35	02/04/2011 1.7380 15.35	02/10/2013 2.1638 7.73
02/10/2005 0.4321 93.07	02/06/2008 1.1454 31.45	31/01/2011 1.7059 16.02	03/05/2011 1.7541 15.02	01/11/2013 2.1767 7.53
01/11/2005 0.4511 88.27	02/07/2008 1.1654 30.72	03/03/2011 1.7231 15.66	02/06/2011 1.7689 14.72	01/12/2013 2.1896 7.33
01/12/2005 0.4720 83.73	01/08/2008 1.1846 30.05	02/04/2011 1.7380 15.35	03/07/2011 1.7846 14.41	01/01/2014 2.2017 7.14
01/01/2006 0.4924 79.88	01/09/2008 1.2043 29.37	03/05/2011 1.7541 15.02	02/08/2011 1.7993 14.12	31/01/2014 2.2144 6.95
31/01/2006 0.5147 76.14	01/10/2008 1.2237 28.71	02/06/2011 1.7689 14.72	02/09/2011 1.8144 13.82	03/03/2014 2.2284 6.74
03/03/2006 0.5400 72.37	01/11/2008 1.2429 28.08	03/07/2011 1.7846 14.41	02/10/2011 1.8294 13.53	02/04/2014 2.2409 6.55
02/04/2006 0.5628 69.30	01/12/2008 1.2619 27.46	02/08/2011 1.7993 14.12	01/11/2011 1.8439 13.25	03/05/2014 2.2541 6.35
03/05/2006 0.5876 66.28	01/01/2009 1.2796 26.91	02/09/2011 1.8144 13.82	02/12/2011 1.8592 12.96	02/06/2014 2.2664 6.17
02/06/2006 0.6110 63.68	31/01/2009 1.2980 26.34	02/10/2011 1.8294 13.53	01/01/2012 1.8724 12.71	02/07/2014 2.2789 5.98
02/07/2006 0.6352 61.20	02/03/2009 1.3176 25.74	01/11/2011 1.8439 13.25	01/02/2012 1.8871 12.44	02/08/2014 2.2915 5.80
02/08/2006 0.6594 58.89	02/04/2009 1.3360 25.20	02/12/2011 1.8592 12.96	02/03/2012 1.9020 12.16	01/09/2014 2.3038 5.62
01/09/2006 0.6827 56.82	02/05/2009 1.3544 24.66	01/01/2012 1.8724 12.71	02/04/2012 1.9165 11.90	02/10/2014 2.3167 5.43
02/10/2006 0.7075 54.76	02/06/2009 1.3727 24.14	01/02/2012 1.8871 12.44	02/05/2012 1.9311 11.63	01/11/2014 2.3285 5.26
01/11/2006 0.7308 52.94	02/07/2009 1.3906 23.63	02/03/2012 1.9020 12.16	02/06/2012 1.9454 11.38	02/12/2014 2.3414 5.08
02/12/2006 0.7553 51.14	02/08/2009 1.4085 23.14	02/04/2012 1.9165 11.90	02/07/2012 1.9595 11.13	**********
01/01/2007 0.7764 49.67	01/09/2009 1.4256 22.68	02/05/2012 1.9311 11.63	01/08/2012 1.9735 10.88	**γ VIRGINUS (Sca2006b)**
31/01/2007 0.7994 48.14	02/10/2009 1.4439 22.19	02/06/2012 1.9454 11.38	01/09/2012 1.9874 10.64	**STF 1670 AB (12417-0127)**
03/03/2007 0.8246 46.55	01/11/2009 1.4607 21.75	02/07/2012 1.9595 11.13	01/10/2012 2.0014 10.40	**2.74 / 2.79 V Mag**
02/04/2007 0.8469 45.21	01/12/2009 1.4781 21.30	01/08/2012 1.9735 10.88	01/11/2012 2.0154 10.16	P = 169.1
03/05/2007 0.8704 43.86	01/01/2010 1.4941 20.90	01/09/2012 1.9874 10.64	01/12/2012 2.0292 9.92	T = 2005.31
02/06/2007 0.8923 42.66	31/01/2010 1.5108 20.48	01/10/2012 2.0014 10.40	01/01/2013 2.0421 9.70	a = 3.643
03/07/2007 0.9153 41.44	03/03/2010 1.5293 20.03	02/06/2010 1.5789 18.84	31/01/2013 2.0557 9.48	e = 0.882
02/08/2007 0.9368 40.35	02/04/2010 1.5457 19.63	02/07/2010 1.5953 18.46	02/03/2013 2.0701 9.24	i = 149.4
02/09/2007 0.9588 39.27	03/05/2010 1.5628 19.22	02/08/2010 1.6118 18.08	02/04/2013 2.0836 9.02	Ω = 35.3
				ω = 255

SELECTED EPHEMERIDES : XI URSA MAJORIS

1935 to 2015 (YEAR : Sep : PA) Msn 1995

1941 1.8259 269.37
1943 1.8175 258.09
1945 1.7511 246.27
1947 1.6722 233.38
1949 1.6169 219.36
1951 1.6099 204.78
1953 1.6615 190.59
1955 1.7678 177.68
1957 1.9154 166.51
1959 2.0885 157.06
1961 2.2725 149.11
1963 2.4555 142.35
1965 2.6279 136.51
1967 2.7820 131.36
1969 2.9110 126.70
1971 3.0089 122.41
1973 3.0700 118.33
1975 3.0884 114.36
1977 3.0578 110.38
1979 2.9715 106.24
1981 2.8220 101.75
1983 2.6018 96.64
1985 2.3035 90.38
1987 1.9247 81.92
1989 1.4789 68.72
1991 1.0412 43.91
1993 0.8626 358.34
1985 2.3035 90.38
1987 1.9247 81.92
1985 2.3035 90.38
1987 1.9247 81.92
1989 1.4789 68.72
1991 1.0412 43.91

1993 0.8626 358.34
1995 1.1230 317.19
1997 1.4898 294.80
1999 1.7340 280.44
2001 1.8280 268.68
2003 1.8146 257.39
2005 1.7462 245.52
2007 1.6678 232.55
2009 1.6149 218.48
2011 1.6113 203.90
2013 1.6665 189.77
2015 1.7758 176.95
2017 1.9254 165.88
2019 2.0996 156.54
2021 2.2838 148.67
2023 2.4664 141.97
2025 2.6379 136.18
2027 2.7906 131.06
2029 2.9179 126.43
2031 3.0137 122.15
2033 3.0724 118.09
2035 3.0880 114.12
2037 3.0542 110.13
2039 2.9643 105.98
2041 2.8107 101.46
2043 2.5859 96.30
2045 2.2828 89.94
2047 1.8991 81.29
2049 1.4506 67.65
2051 1.0191 41.75
2053 0.8676 355.26
2055 1.1461 315.40

<-- Two Year Divisions

Orbital Elements
Xi UMa : STF 1523
(11182+3132)
Class 1 orbit!
Mag:4.33V and 4.80V

(Msn 1995)

P = 59.878
T = 1935.195
a = 2.536
e = 0.398
i = 122.130
Ω = 101.850
ω = 127.940

Five Years --> Divisions

1935 1.1002 319.06
1940 1.7918 275.12
1945 1.7511 246.27
1950 1.6063 212.09
1955 1.7678 177.68
1960 2.1800 152.92
1965 2.6279 136.51
1970 2.9642 124.52
1975 3.0884 114.36
1980 2.9052 104.05
1985 2.3035 90.38
1990 1.2492 58.50
1995 1.1230 317.19
2000 1.7977 274.41
2005 1.7462 245.52
2010 1.6060 211.20
2015 1.7758 176.95
2020 2.1912 152.44
2025 2.6379 136.18
2030 2.9701 124.26
2035 3.0880 114.12
2040 2.8959 103.78
2045 2.2828 89.94
2050 1.2220 56.99

SELECTED EPHEMERIDES : 32 Ori / STF 728

2005 to 2215 (YEAR : Sep : PA)

2005 1.2220 45.41	2115 1.7600 37.81	**Orbital Elements**
2010 1.2704 44.87	2120 1.7516 37.54	**32 Ori : STF 728**
2015 1.3171 44.36	2125 1.7397 37.26	**(05308+0557)**
2020 1.3619 43.89	2130 1.7243 36.98	**Class 3 Orbit.**
2025 1.4049 43.45	2135 1.7053 36.69	**Mags. 4.44 5.75**
2030 1.4459 43.03	2140 1.6827 36.40	**(Sey 1999b)**
2035 1.4847 42.64	2145 1.6563 36.10	
2040 1.5215 42.26	2150 1.6262 35.78	P = 611.69
2045 1.5560 41.91	2155 1.5922 35.45	T = 2297.03
2050 1.5881 41.57	2160 1.5545 35.11	a = 1.604
2055 1.6179 41.24	2165 1.5128 34.75	e = 0.221
2060 1.6452 40.92	2170 1.4672 34.37	i = 96.6
2065 1.6700 40.61	2175 1.4178 33.97	Ω = 217.1
2070 1.6921 40.31	2180 1.3645 33.53	ω = 302.5
2075 1.7115 40.02	2185 1.3073 33.06	
2080 1.7282 39.73	2190 1.2462 32.54	
2085 1.7419 39.45	2195 1.1813 31.96	
2090 1.7527 39.18	2200 1.1127 31.32	
2095 1.7605 38.90	2205 1.0406 30.59	
2100 1.7652 38.63	2210 0.9650 29.75	
2105 1.7668 38.36	2215 0.8861 28.76	
2110 1.7651 38.09	2220 0.8043 27.57	

SELECTED EPHEMERIDES : SIRIUS - ALPHA CANIS MAJORIS

1981 to 2045 (YEAR : Sep : PA) Hrt 1989

1981 9.9688 046.39	2012 9.4927 085.70	2038 6.2682 021.79
1982 9.6074 043.93	2013 9.7960 083.16	2039 5.4707 014.91
1983 9.1932 041.25	2014 10.0735 080.76	2040 4.6146 005.56
1984 8.7230 038.31	2015 10.3242 078.49	2041 3.7399 351.85
1985 8.1920 035.00	2016 10.5473 076.32	2042 2.9626 330.30
1986 7.5970 031.21	2017 10.7423 074.23	2043 2.5404 297.86
1987 6.9339 026.73	2018 10.9082 072.22	2044 2.6786 261.96
1988 6.1997 021.24	2019 11.0444 070.26	2045 3.1000 233.40
1989 5.3957 014.19	2020 11.1503 068.34	
1990 4.5353 004.54	2021 11.2249 066.45	**********
1991 3.6632 350.30	2022 11.2673 064.58	
1992 2.9051 327.82	2023 11.2767 062.72	
1993 2.5302 294.55	2024 11.2519 060.86	**Orbital Elements**
1994 2.7121 259.02	2025 11.1916 058.98	**α CMa : AGC 1**
1995 3.1373 231.21	2026 11.0947 057.08	**(06451-1643)**
1996 3.4837 209.72	2027 10.9596 055.14	**Class 1 orbit!**
1997 3.7363 191.60	2028 10.7843 053.14	**-1.46 V and 8.5v**
1998 3.9777 175.68	2029 10.5675 051.07	**(Hrt 1989)**
1999 4.2602 161.70	2030 10.3063 048.90	
2000 4.5979 149.61	2031 9.9990 046.61	P = 50.090
2001 4.9843 139.28	2032 9.6421 044.16	T = 1894.130
2002 5.4056 130.50	2033 9.2329 041.50	a = 7.500
2003 5.8474 123.02	2034 8.7676 038.59	e = 0.592
2004 6.2983 116.60	2035 8.2427 035.32	i = 136.530
2005 6.7494 111.03	2036 7.6537 031.58	Ω = 44.570
2006 7.1927 106.17	2037 6.9966 027.17	ω = 147.270
2007 7.6244 101.86	2038 6.2682 021.79	
2008 8.0396 098.00	2034 8.7676 038.59	
2009 8.4361 094.52	2035 8.2427 035.32	
2010 8.8112 091.34	2036 7.6537 031.58	
2011 9.1640 088.41	2037 6.9966 027.17	