



THE
INDIAN
ASTRONOMICAL EPHEMERIS

FOR THE YEAR

2027

POSITIONAL ASTRONOMY CENTRE
INDIA METEOROLOGICAL DEPARTMENT
MINISTRY OF EARTH SCIENCES

THE

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ASTRONOMICAL EPHEMERIS

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INDIA METEOROLOGICAL DEPARTMENT

Issued under the authority of

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PREFACE

The Indian Astronomical Ephemeris is published annually by the India Meteorological Department (IMD) for providing data to astronomers. The speciality of this publication is that it contains calendric information which caters to the requirement of the country's panchang makers and other users. Thus, it has great civil and cultural significance. This has been mandate given to the Positional Astronomy Centre at Kolkata by the Govt. of India.

The calculations of the Indian Calendar portion, such as tithi, nakshatra, etc. are given in Indian Standard Time (IST) and covers an extended period upto 21st March, 2028 which is the end of the year 1949 Saka Era of the Indian National Calendar. A separate note has also been given to explain the terminology and the basis of different calculations relating to the Indian Calendar.

The epoch of the standard reference system in this publication is J 2000.0 and the argument of the ephemerides is Terrestrial Time (TT). Resolutions of the Indian Astronomical Union (IAU) recommending the changes from time to time including a list of new IAU constants are given in Part VI – Indian Calendar and Explanation.

Our sincere thanks are due to the Nautical Almanac Office, United States Naval Observatory and Her Majesty's Nautical Almanac office, U.K.

The work of preparation and publication of the Indian Astronomical Ephemeris for 2027 has been done under the supervision of Dr. Gopi Nath Raha, Head, Positional Astronomy Centre, India Meteorological Department, Kolkata.

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New Delhi – 110 003
29th July, 2026 A.D.
(7 Sravana, 1948 Saka Era)

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PART - I

TIME, SUN, MOON, PLANETS

Julian date for Standard epoch

1900 January	0,	12^h U.T.	=	JD	241	5020.0
B	1950.0	= 1950 Jan. 0.923	=	JD	243	3282.423
B	2027.0	= 2027 Jan. 0.573	=	JD	246	1406.073
J	2027.5	= 2027 July 2.875	=	JD	246	1589.375
J	2000.0	= 2000 Jan. 1.5	=	JD	245	1545.0

Tabulations of Julian date against calendar date for 2027 are given on pages 4 to12 and for other years are given at Table IX of Part-V on page 363.

The fraction of the year from 2020.5 is tabulated with the Besselian day numbers on pages 244-251.

The lengths of the principal years and mean months at 2025.0 as derived from the Sun's mean motion and mean Orbital elements respectively are:

Length of the year (ephemeris days) :

	d	d	h	m	s
Tropical (equinox to equinox)	365.242190	= 365	05	48	45.2
Sidereal (fixed star to fixed star)	365.256363	= 365	06	09	09.8
Anomalistic (perigee to perigee)	365. 259635	= 365	06	13	52.5
Eclipse (node to node)	346. 620074	= 346	14	52	54.4

Length of the Month (ephemeris days)

	d	d	h	m	s
Synodic (new moon to new moon)	29.5305888	= 29	12	44	02.9
Tropical (equinox to equinox)	27.3215822	= 27	07	43	04.7
Sidereal (fixed star to fixed star)	27.3216615	= 27	07	43	11.6
Anomalistic (perigee to perigee)	27.5545501	= 27	13	18	33.1
Nodical (node to node)	27.2122207	= 27	05	05	35.9

		h	m	s
Length of the day:	Mean Sidereal	23	56	04.09053 of mean Solar time.
	Mean Solar	24	03	56.55537 of mean Sidereal time.

CHRONOLOGICAL TABLE

CHRONOLOGICAL CYCLES

Golden Number or Lunar Cycle	XIV	Solar Cycle	20
Epact	22	Roman Indiction	5
Dominical Letter	C		

CHRONOLOGICAL ERAS

The year 1949 of the Saka Era (Indian National Calendar) begins on March 22, 2027.
The year 1949 of the Saka Era or Saka Shalivahana (Lunisolar, Traditional Calendar) begins on April 7, 2027.
The year 1949 of the Saka Era (Solar, Traditional Calendar) begins on April 14, 2027.
The year 5128 Kali Era begins on April 14, 2027.
The year 2084 of the Vikram Samvat begins on April 7, 2027 (Chaitradi) and October 30, 2027 (Kartikadi) according to different systems of reckoning.
The year 1434 of the Bengali San on April 15, 2027.
The year 1203 of the Kollam Era begins on August 18, 2027.
Jovian year (Barhaspatya Varsa or 60-year cycle of Jupiter) 55 Durmati begins on May 3, 2027 (North Indian Usage), and 41 Plavanga April 7, 2027 (Lunar Chaitradi) or April 14, 2027 (Solar) (South Indian Usage).
Vedanga Jyotisa year 3- Idavatsara of the 5-year cycle (390 th cycle of Paitamaha Siddhanta) begins on February 7, 2027.
The year 2571 of the Buddha Nirvana era begins on May 20, 2027.
The year 2554 of the Mahavira Nirvana Era begins on October 29, 2027.
The year 1449 of the Mohammedan Era begins on June 7, 2027.
The year 1397 of the Yazdejardi Era begins on August 15, 2027 according to the Indian Parsi (Shahenshahi) Calendar.
The year 6740 of the Julian period begins on January 14, 2027.
The year 5788 of the Jewish Era (A.M.) begins on October 2, 2027.
The year 2803 of the Greek Olympiad, being the 3rd year of the 4-Year cycle (701 th Olympiad) begins on July, 2027.
The year 2780 of the Foundation of Rome (A.U.C.) begins on January 14, 2027.
The year 2776 of the Nabonassar begins on April 17, 2027.
The year 2339 of the Seleucidean era begins in the present-day usage of the Syrians on September 14 or October 14, 2027 according to different sects.
The Gregorian Year 2027 begins on January 1, 2027.

CALENDAR, 2027

Day of Month		Day of Year	Day of Week	Days since J 2027.5	Fraction of Year since Jan. 1.0	Julian Day (at 0h U.T.)	Indian Calendar		Phases of the Moon
							Day of Month	Day of Year	
						2461	1948 Saka Era		
Dec., 26	27	361	Sun	-187.875	-0.0137	401.5	Pausha 6	281	
	28	362	Mon	186.875	-0.0110	402.5	7	282	
	29	363	Tue	185.875	-0.0082	403.5	8	283	
	30	364	Wed	184.875	-0.0055	404.5	9	284	30-Last Quarter
Dec., 26	31	365	Thu	183.875	-0.0027	405.5	10	285	$18^h\ 59^m$ U.T.
Jan., 27	1	1	Fri	182.875	0.0000	406.5	11	286	
	2	2	Sat	181.875	0.0027	407.5	12	287	
	3	3	Sun	-180.875	0.0055	408.5	13	288	
	4	4	Mon	179.875	0.0082	409.5	14	289	
	5	5	Tue	178.875	0.0110	410.5	15	290	
	6	6	Wed	177.875	0.0137	411.5	16	291	
	7	7	Thu	176.875	0.0164	412.5	17	292	7-New Moon
	8	8	Fri	175.875	0.0192	413.5	18	293	$20^h\ 24^m$ U.T.
	9	9	Sat	174.875	0.0219	414.5	19	294	
	10	10	Sun	-173.875	0.0246	415.5	20	295	
	11	11	Mon	172.875	0.0274	416.5	21	296	
	12	12	Tue	171.875	0.0301	417.5	22	297	
	13	13	Wed	170.875	0.0329	418.5	23	298	
	14	14	Thu	169.875	0.0356	419.5	24	299	
	15	15	Fri	168.875	0.0383	420.5	25	300	15-First Quarter
	16	16	Sat	167.875	0.0411	421.5	26	301	$20^h\ 34^m$ U.T.
	17	17	Sun	-166.875	0.0438	422.5	27	302	
	18	18	Mon	165.875	0.0465	423.5	28	303	
	19	19	Tue	164.875	0.0493	424.5	29	304	
	20	20	Wed	163.875	0.0520	425.5	30	305	
	21	21	Thu	162.875	0.0548	426.5	Magha 1	306	
	22	22	Fri	161.875	0.0575	427.5	2	307	22-Full Moon
	23	23	Sat	160.875	0.0602	428.5	3	308	$12^h\ 17^m$ U.T.
	24	24	Sun	-159.875	0.0630	429.5	4	309	
	25	25	Mon	158.875	0.0657	430.5	5	310	
	26	26	Tue	157.875	0.0684	431.5	6	311	
	27	27	Wed	156.875	0.0712	432.5	7	312	
	28	28	Thu	155.875	0.0739	433.5	8	313	
	29	29	Fri	154.875	0.0767	434.5	9	314	29-Last Quarter
	30	30	Sat	153.875	0.0794	435.5	10	315	$10^h\ 55^m$ U.T.
	31	31	Sun	-152.875	0.0821	436.5	11	316	
Feb.	1	32	Mon	151.875	0.0849	437.5	12	317	
	2	33	Tue	150.875	0.0876	438.5	13	318	
	3	34	Wed	149.875	0.0904	439.5	14	319	
	4	35	Thu	148.875	0.0931	440.5	15	320	
	5	36	Fri	147.875	0.0958	441.5	16	321	
	6	37	Sat	-146.875	0.0986	442.5	17	322	6-New Moon $15^h\ 56^m$ U.T.

CALENDAR, 2027

Day of Month	Day of Year	Day of Week	Days since J 2027.5	Fraction of Year since Jan. 1.0	Julian Day (at 0h U.T.)	Indian Calendar		Phases of the Moon
						Day of Month	Day of Year	
					2461	1948 Saka Era		
Feb. 7	38	Sun	-145.875	0.1013	443.5	Magha 18	323	
8	39	Mon	144.875	0.1040	444.5	19	324	
9	40	Tue	143.875	0.1068	445.5	20	325	
10	41	Wed	142.875	0.1095	446.5	21	326	
11	42	Thu	141.875	0.1123	447.5	22	327	
12	43	Fri	140.875	0.1150	448.5	23	328	
13	44	Sat	139.875	0.1177	449.5	24	329	
14	45	Sun	-138.875	0.1205	450.5	25	330	14-First Quarter
15	46	Mon	137.875	0.1232	451.5	26	331	$7^{h}\ 58^{m}$ U.T.
16	47	Tue	136.875	0.1259	452.5	27	332	
17	48	Wed	135.875	0.1287	453.5	28	333	
18	49	Thu	134.875	0.1314	454.5	29	334	
19	50	Fri	133.875	0.1342	455.5	30	335	
20	51	Sat	132.875	0.1369	456.5	Phalguna 1	336	20-Full Moon $23^{h}24^{m}$ U.T.
21	52	Sun	-131.875	0.1396	457.5	2	337	
22	53	Mon	130.875	0.1424	458.5	3	338	
23	54	Tue	129.875	0.1451	459.5	4	339	
24	55	Wed	128.875	0.1478	460.5	5	340	
25	56	Thu	127.875	0.1506	461.5	6	341	
26	57	Fri	126.875	0.1533	462.5	7	342	
27	58	Sat	125.875	0.1561	463.5	8	343	
28	59	Sun	-124.875	0.1588	464.5	9	344	28-Last Quarter
Mar. 1	60	Mon	123.875	0.1615	465.5	10	345	$5^{h}\ 16^{m}$ U.T.
2	61	Tue	122.875	0.1643	466.5	11	346	
3	62	Wed	121.875	0.1670	467.5	12	347	
4	63	Thu	120.875	0.1698	468.5	13	348	
5	64	Fri	119.875	0.1725	469.5	14	349	
6	65	Sat	118.875	0.1752	470.5	15	350	
7	66	Sun	-117.875	0.1780	471.5	16	351	
8	67	Mon	116.875	0.1807	472.5	17	352	8-New Moon
9	68	Tue	115.875	0.1834	473.5	18	353	$9^{h}\ 29^{m}$ U.T.
10	69	Wed	114.875	0.1862	474.5	19	354	
11	70	Thu	113.875	0.1889	475.5	20	355	
12	71	Fri	112.875	0.1917	476.5	21	356	
13	72	Sat	111.875	0.1944	477.5	22	357	
14	73	Sun	-110.875	0.1971	478.5	23	358	
15	74	Mon	109.875	0.1999	479.5	24	359	15-First Quarter
16	75	Tue	108.875	0.2026	480.5	25	360	$16^{h}\ 25^{m}$ U.T.
17	76	Wed	107.875	0.2053	481.5	26	361	
18	77	Thu	106.875	0.2081	482.5	27	362	
19	78	Fri	105.875	0.2108	483.5	28	363	
20	79	Sat	-104.875	0.2136	484.5	29	364	

CALENDAR, 2027

Day of Month	Day of Year	Day of Week	Days since J 2027.5	Fraction of Year since Jan. 1.0	Julian Day (at 0h U.T.)	Indian Calendar		Phases of the Moon
						Day of Month	Day of Year	
					2461	1948 Saka Era		
Mar. 21	80	Sun	-103.875	0.2163	485.5	Phalguna 30	365	
22	81	Mon	102.875	0.2190	486.5	1949,Chaitra 1	1	22-Full Moon
23	82	Tue	101.875	0.2218	487.5	2	2	$10^h\ 44^m$ U.T.
24	83	Wed	100.875	0.2245	488.5	3	3	
25	84	Thu	99.875	0.2272	489.5	4	4	
26	85	Fri	98.875	0.2300	490.5	5	5	
27	86	Sat	97.875	0.2327	491.5	6	6	
28	87	Sun	-96.875	0.2355	492.5	7	7	
29	88	Mon	95.875	0.2382	493.5	8	8	
30	89	Tue	94.875	0.2409	494.5	9	9	30-Last Quarter
31	90	Wed	93.875	0.2437	495.5	10	10	$00^h\ 54^m$ U.T.
Apr. 1	91	Thu	92.875	0.2464	496.5	11	11	
2	92	Fri	91.875	0.2491	497.5	12	12	
3	93	Sat	90.875	0.2519	498.5	13	13	
4	94	Sun	-89.875	0.2546	499.5	14	14	
5	95	Mon	88.875	0.2574	500.5	15	15	
6	96	Tue	87.875	0.2601	501.5	16	16	6-New Moon
7	97	Wed	86.875	0.2628	502.5	17	17	$23^h\ 51^m$ U.T.
8	98	Thu	85.875	0.2656	503.5	18	18	
9	99	Fri	84.875	0.2683	504.5	19	19	
10	100	Sat	83.875	0.2711	505.5	20	20	
11	101	Sun	-82.875	0.2738	506.5	21	21	
12	102	Mon	81.875	0.2765	507.5	22	22	
13	103	Tue	80.875	0.2793	508.5	23	23	13-First Quarter
14	104	Wed	79.875	0.2820	509.5	24	24	$22^h\ 57^m$ U.T.
15	105	Thu	78.875	0.2847	510.5	25	25	
16	106	Fri	77.875	0.2875	511.5	26	26	
17	107	Sat	76.875	0.2902	512.5	27	27	
18	108	Sun	-75.875	0.2930	513.5	28	28	
19	109	Mon	74.875	0.2957	514.5	29	29	
20	110	Tue	73.875	0.2984	515.5	30	30	20-Full Moon
21	111	Wed	72.875	0.3012	516.5	Vaisakha 1	31	$22^h\ 27^m$ U.T.
22	112	Thu	71.875	0.3039	517.5	2	32	
23	113	Fri	70.875	0.3066	518.5	3	33	
24	114	Sat	69.875	0.3094	519.5	4	34	
25	115	Sun	-68.875	0.3121	520.5	5	35	
26	116	Mon	67.875	0.3149	521.5	6	36	
27	117	Tue	66.875	0.3176	522.5	7	37	
28	118	Wed	65.875	0.3203	523.5	8	38	28-Last Quarter
29	119	Thu	64.875	0.3231	524.5	9	39	$20^h\ 18^m$ U.T.
30	120	Fri	63.875	0.3258	525.5	10	40	
May 1	121	Sat	-62.875	0.3285	526.5	11	41	

CALENDAR, 2027

Day of Month	Day of Year	Day of Week	Days since J 2027.5	Fraction of Year since Jan. 1.0	Julian Day (at 0h U.T.)	Indian Calendar		Phases of the Moon
						Day of Month	Day of Year	
					2461	1949 Saka Era		
May 2	122	Sun	-61.875	0.3313	527.5	Vaisakha 12	42	
3	123	Mon	60.875	0.3340	528.5	13	43	
4	124	Tue	59.875	0.3368	529.5	14	44	
5	125	Wed	58.875	0.3395	530.5	15	45	
6	126	Thu	57.875	0.3422	531.5	16	46	6-New Moon
7	127	Fri	56.875	0.3450	532.5	17	47	$10^n\ 59^m$ U.T.
8	128	Sat	55.875	0.3477	533.5	18	48	
9	129	Sun	-54.875	0.3505	534.5	19	49	
10	130	Mon	53.875	0.3532	535.5	20	50	
11	131	Tue	52.875	0.3559	536.5	21	51	
12	132	Wed	51.875	0.3587	537.5	22	52	
13	133	Thu	50.875	0.3614	538.5	23	53	13-First Quarter
14	134	Fri	49.875	0.3641	539.5	24	54	$4^n\ 44^m$ U.T.
15	135	Sat	48.875	0.3669	540.5	25	55	
16	136	Sun	-47.875	0.3696	541.5	26	56	
17	137	Mon	46.875	0.3724	542.5	27	57	
18	138	Tue	45.875	0.3751	543.5	28	58	
19	139	Wed	44.875	0.3778	544.5	29	59	
20	140	Thu	43.875	0.3806	545.5	30	60	20-Full Moon
21	141	Fri	42.875	0.3833	546.5	31	61	$10^n 59^m$ U.T.
22	142	Sat	41.875	0.3860	547.5	Jyaistha 1	62	
23	143	Sun	-40.875	0.3888	548.5	2	63	
24	144	Mon	39.875	0.3915	549.5	3	64	
25	145	Tue	38.875	0.3943	550.5	4	65	
26	146	Wed	37.875	0.3970	551.5	5	66	
27	147	Thu	36.875	0.3997	552.5	6	67	
28	148	Fri	35.875	0.4025	553.5	7	68	28-Last Quarter
29	149	Sat	34.875	0.4052	554.5	8	69	$13^n\ 58^m$ U.T.
30	150	Sun	-33.875	0.4079	555.5	9	70	
31	151	Mon	32.875	0.4107	556.5	10	71	
June 1	152	Tue	31.875	0.4134	557.5	11	72	
2	153	Wed	30.875	0.4162	558.5	12	73	
3	154	Thu	29.875	0.4189	559.5	13	74	
4	155	Fri	28.875	0.4216	560.5	14	75	4-New Moon
5	156	Sat	27.875	0.4244	561.5	15	76	$19^h\ 40^m$ U.T.
6	157	Sun	-26.875	0.4271	562.5	16	77	
7	158	Mon	25.875	0.4299	563.5	17	78	
8	159	Tue	24.875	0.4326	564.5	18	79	
9	160	Wed	23.875	0.4353	565.5	19	80	
10	161	Thu	22.875	0.4381	566.5	20	81	
11	162	Fri	21.875	0.4408	567.5	21	82	11-First Quarter
12	163	Sat	-20.875	0.4435	568.5	22	83	$10^n\ 56^m$ U.T.

CALENDAR, 2027

Day of Month	Day of Year	Day of Week	Days since J 2027.5	Fraction of Year since Jan. 1.0	Julian Day (at 0h U.T.)	Indian Calendar		Phases of the Moon
						Day of Month	Day of Year	
					2461	1949 Saka Era		
June 13	164	Sun	-19.875	0.4463	569.5	Jyaistha 23	84	
14	165	Mon	18.875	0.4490	570.5	24	85	
15	166	Tue	17.875	0.4518	571.5	25	86	
16	167	Wed	16.875	0.4545	572.5	26	87	
17	168	Thu	15.875	0.4572	573.5	27	88	
18	169	Fri	14.875	0.4600	574.5	28	89	
19	170	Sat	13.875	0.4627	575.5	29	90	19-Full Moon $0^{n}\ 44^{m}$ U.T.
20	171	Sun	-12.875	0.4654	576.5	30	91	
21	172	Mon	11.875	0.4682	577.5	31	92	
22	173	Tue	10.875	0.4709	578.5	Ashadha 1	93	
23	174	Wed	9.875	0.4737	579.5	2	94	
24	175	Thu	8.875	0.4764	580.5	3	95	
25	176	Fri	7.875	0.4791	581.5	4	96	
26	177	Sat	6.875	0.4819	582.5	5	97	
27	178	Sun	-5.875	0.4846	583.5	6	98	27-Last Quarter
28	179	Mon	4.875	0.4873	584.5	7	99	$4^{n}\ 54^{m}$ U.T.
29	180	Tue	3.875	0.4901	585.5	8	100	
30	181	Wed	2.875	0.4928	586.5	9	101	
July 1	182	Thu	1.875	0.4956	587.5	10	102	
2	183	Fri	-0.875	0.4983	588.5	11	103	
3	184	Sat	+0.125	0.5010	589.5	12	104	
4	185	Sun	+1.125	0.5038	590.5	13	105	4-New Moon
5	186	Mon	2.125	0.5065	591.5	14	106	$3^{n}\ 02^{m}$ U.T.
6	187	Tue	3.125	0.5093	592.5	15	107	
7	188	Wed	4.125	0.5120	593.5	16	108	
8	189	Thu	5.125	0.5147	594.5	17	109	
9	190	Fri	6.125	0.5175	595.5	18	110	
10	191	Sat	7.125	0.5202	596.5	19	111	10-First Quarter $18^{n}\ 39^{m}$ U.T.
11	192	Sun	+8.125	0.5229	597.5	20	112	
12	193	Mon	9.125	0.5257	598.5	21	113	
13	194	Tue	10.125	0.5284	599.5	22	114	
14	195	Wed	11.125	0.5312	600.5	23	115	
15	196	Thu	12.125	0.5339	601.5	24	116	
16	197	Fri	13.125	0.5366	602.5	25	117	
17	198	Sat	14.125	0.5394	603.5	26	118	
18	199	Sun	+15.125	0.5421	604.5	27	119	18-Full Moon
19	200	Mon	16.125	0.5448	605.5	28	120	$15^{n}\ 45^{m}$ U.T.
20	201	Tue	17.125	0.5476	606.5	29	121	
21	202	Wed	18.125	0.5503	607.5	30	122	
22	203	Thu	19.125	0.5531	608.5	31	123	
23	204	Fri	20.125	0.5558	609.5	Sravana 1	124	
24	205	Sat	+21.125	0.5585	610.5	2	125	

CALENDAR, 2027

Day of Month	Day of Year	Day of Week	Days since J 2027.5	Fraction of Year since Jan. 1.0	Julian Day (at 0h U.T.)	Indian Calendar		Phases of the Moon
						Day of Month	Day of Year	
					2461	1949 Saka Era		
July 25	206	Sun	+22.125	0.5613	611.5	Sravana 3	126	
26	207	Mon	23.125	0.5640	612.5	4	127	26-Last Quarter
27	208	Tue	24.125	0.5667	613.5	5	128	$16^h\ 55^m$ U.T.
28	209	Wed	25.125	0.5695	614.5	6	129	
29	210	Thu	26.125	0.5722	615.5	7	130	
30	211	Fri	27.125	0.5750	616.5	8	131	
31	212	Sat	28.125	0.5777	617.5	9	132	
Aug. 1	213	Sun	+29.125	0.5804	618.5	10	133	
2	214	Mon	30.125	0.5832	619.5	11	134	2-New Moon
3	215	Tue	31.125	0.5859	620.5	12	135	$10^h\ 05^m$ U.T.
4	216	Wed	32.125	0.5887	621.5	13	136	
5	217	Thu	33.125	0.5914	622.5	14	137	
6	218	Fri	34.125	0.5941	623.5	15	138	
7	219	Sat	35.125	0.5969	624.5	16	139	
8	220	Sun	+36.125	0.5996	625.5	17	140	
9	221	Mon	37.125	0.6023	626.5	18	141	9-First Quarter
10	222	Tue	38.125	0.6051	627.5	19	142	$4^h\ 54^m$ U.T.
11	223	Wed	39.125	0.6078	628.5	20	143	
12	224	Thu	40.125	0.6106	629.5	21	144	
13	225	Fri	41.125	0.6133	630.5	22	145	
14	226	Sat	42.125	0.6160	631.5	23	146	
15	227	Sun	+43.125	0.6188	632.5	24	147	
16	228	Mon	44.125	0.6215	633.5	25	148	
17	229	Tue	45.125	0.6242	634.5	26	149	17-Full Moon
18	230	Wed	46.125	0.6270	635.5	27	150	$7^h\ 29^m$ U.T.
19	231	Thu	47.125	0.6297	636.5	28	151	
20	232	Fri	48.125	0.6325	637.5	29	152	
21	233	Sat	49.125	0.6352	638.5	30	153	
22	234	Sun	+50.125	0.6379	639.5	31	154	
23	235	Mon	51.125	0.6407	640.5	Bhadra 1	155	
24	236	Tue	52.125	0.6434	641.5	2	156	
25	237	Wed	53.125	0.6461	642.5	3	157	25-Last Quarter
26	238	Thu	54.125	0.6489	643.5	4	158	$2^h\ 27^m$ U.T.
27	239	Fri	55.125	0.6516	644.5	5	159	
28	240	Sat	56.125	0.6544	645.5	6	160	
29	241	Sun	+57.125	0.6571	646.5	7	161	
30	242	Mon	58.125	0.6598	647.5	8	162	
31	243	Tue	59.125	0.6626	648.5	9	163	31-New Moon
Sept. 1	244	Wed	60.125	0.6653	649.5	10	164	$17^h\ 41^m$ U.T.
2	245	Thu	61.125	0.6680	650.5	11	165	
3	246	Fri	62.125	0.6708	651.5	12	166	
4	247	Sat	+63.125	0.6735	652.5	13	167	

CALENDAR, 2027

Day of Month	Day of Year	Day of Week	Days since J 2027.5	Fraction of Year since Jan. 1.0	Julian Day (at 0h U.T.)	Indian Calendar		Phases of the Moon
						Day of Month	Day of Year	
					2461	1949 Saka Era		
Sept. 5	248	Sun	+64.125	0.6763	653.5	Bhadra 14	168	
6	249	Mon	65.125	0.6790	654.5	15	169	
7	250	Tue	66.125	0.6817	655.5	16	170	7-Last Quarter
8	251	Wed	67.125	0.6845	656.5	17	171	$18^n\ 31^m$ U.T.
9	252	Thu	68.125	0.6872	657.5	18	172	
10	253	Fri	69.125	0.6900	658.5	19	173	
11	254	Sat	70.125	0.6927	659.5	20	174	
12	255	Sun	+71.125	0.6954	660.5	21	175	
13	256	Mon	72.125	0.6982	661.5	22	176	
14	257	Tue	73.125	0.7009	662.5	23	177	
15	258	Wed	74.125	0.7036	663.5	24	178	15-Full Moon
16	259	Thu	75.125	0.7064	664.5	25	179	$23^n\ 03^m$ U.T.
17	260	Fri	76.125	0.7091	665.5	26	180	
18	261	Sat	77.125	0.7119	666.5	27	181	
19	262	Sun	+78.125	0.7146	667.5	28	182	
20	263	Mon	79.125	0.7173	668.5	29	183	
21	264	Tue	80.125	0.7201	669.5	30	184	
22	265	Wed	81.125	0.7228	670.5	31	185	
23	266	Thu	82.125	0.7255	671.5	Asvina 1	186	23-Last Quarter
24	267	Fri	83.125	0.7283	672.5	2	187	$10^n\ 20^m$ U.T.
25	268	Sat	84.125	0.7310	673.5	3	188	
26	269	Sun	+85.125	0.7338	674.5	4	189	
27	270	Mon	86.125	0.7365	675.5	5	190	
28	271	Tue	87.125	0.7392	676.5	6	191	
29	272	Wed	88.125	0.7420	677.5	7	192	
30	273	Thu	89.125	0.7447	678.5	8	193	30-New Moon
Oct. 1	274	Fri	90.125	0.7474	679.5	9	194	$2^h\ 36^m$ U.T.
2	275	Sat	91.125	0.7502	680.5	10	195	
3	276	Sun	+92.125	0.7529	681.5	11	196	
4	277	Mon	93.125	0.7557	682.5	12	197	
5	278	Tue	94.125	0.7584	683.5	13	198	
6	279	Wed	95.125	0.7611	684.5	14	199	
7	280	Thu	96.125	0.7639	685.5	15	200	7-First Quarter
8	281	Fri	97.125	0.7666	686.5	16	201	$11^n\ 47^m$ U.T.
9	282	Sat	98.125	0.7694	687.5	17	202	
10	283	Sun	+99.125	0.7721	688.5	18	203	
11	284	Mon	100.125	0.7748	689.5	19	204	
12	285	Tue	101.125	0.7776	690.5	20	205	
13	286	Wed	102.125	0.7803	691.5	21	206	
14	287	Thu	103.125	0.7830	692.5	22	207	
15	288	Fri	104.125	0.7858	693.5	23	208	15-Full Moon
16	289	Sat	+105.125	0.7885	694.5	24	209	$13^n\ 47^m$ U.T.

CALENDAR, 2027

Day of Month	Day of Year	Day of Week	Days since J 2027.5	Fraction of Year since Jan. 1.0	Julian Day (at 0h U.T.)	Indian Calendar		Phases of the Moon
						Day of Month	Day of Year	
					2461	1949 Saka Era		
Oct. 17	290	Sun	+106.125	0.7913	695.5	Asvina 25	210	
18	291	Mon	107.125	0.7940	696.5	26	211	
19	292	Tue	108.125	0.7967	697.5	27	212	
20	293	Wed	109.125	0.7995	698.5	28	213	
21	294	Thu	110.125	0.8022	699.5	29	214	
22	295	Fri	111.125	0.8049	700.5	30	215	22-Last Quarter
23	296	Sat	112.125	0.8077	701.5	Kartika 1	216	$17^n\ 29^m$ U.T.
24	297	Sun	+113.125	0.8104	702.5	2	217	
25	298	Mon	114.125	0.8132	703.5	3	218	
26	299	Tue	115.125	0.8159	704.5	4	219	
27	300	Wed	116.125	0.8186	705.5	5	220	
28	301	Thu	117.125	0.8214	706.5	6	221	
29	302	Fri	118.125	0.8241	707.5	7	222	29-New Moon
30	303	Sat	119.125	0.8268	708.5	8	223	$13^n\ 36^m$ U.T.
31	304	Sun	+120.125	0.8296	709.5	9	224	
Nov. 1	305	Mon	121.125	0.8323	710.5	10	225	
2	306	Tue	122.125	0.8351	711.5	11	226	
3	307	Wed	123.125	0.8378	712.5	12	227	
4	308	Thu	124.125	0.8405	713.5	13	228	
5	309	Fri	125.125	0.8433	714.5	14	229	
6	310	Sat	126.125	0.8460	715.5	15	230	6-First Quarter $8^n\ 00^m$ U.T.
7	311	Sun	+127.125	0.8488	716.5	16	231	
8	312	Mon	128.125	0.8515	717.5	17	232	
9	313	Tue	129.125	0.8542	718.5	18	233	
10	314	Wed	130.125	0.8570	719.5	19	234	
11	315	Thu	131.125	0.8597	720.5	20	235	
12	316	Fri	132.125	0.8624	721.5	21	236	
13	317	Sat	133.125	0.8652	722.5	22	237	
14	318	Sun	+134.125	0.8679	723.5	23	238	14-Full Moon
15	319	Mon	135.125	0.8707	724.5	24	239	$3^n\ 26^m$ U.T.
16	320	Tue	136.125	0.8734	725.5	25	240	
17	321	Wed	137.125	0.8761	726.5	26	241	
18	322	Thu	138.125	0.8789	727.5	27	242	
19	323	Fri	139.125	0.8816	728.5	28	243	
20	324	Sat	140.125	0.8843	729.5	29	244	
21	325	Sun	+141.125	0.8871	730.5	30	245	21-Last Quarter
22	326	Mon	142.125	0.8898	731.5	Agrahayana 1	246	$0^n\ 48^m$ U.T.
23	327	Tue	143.125	0.8926	732.5	2	247	
24	328	Wed	144.125	0.8953	733.5	3	248	
25	329	Thu	145.125	0.8980	734.5	4	249	
26	330	Fri	146.125	0.9008	735.5	5	250	
27	331	Sat	+147.125	0.9035	736.5	6	251	

CALENDAR, 2027

Day of Month	Day of Year	Day of Week	Days since J 2027.5	Fraction of Year since Jan. 1.0	Julian Day (at 0h U.T.)	Indian Calendar		Phases of the Moon
						Day of Month	Day of Year	
					2461	1949 Saka Era		
Nov. 28	332	Sun	+148.125	0.9062	737.5	Agrahayana 7	252	28-New Moon
29	333	Mon	149.125	0.9090	738.5	8	253	$3^n\ 24^m$ U.T.
30	334	Tue	150.125	0.9117	739.5	9	254	
Dec. 1	335	Wed	151.125	0.9145	740.5	10	255	
2	336	Thu	152.125	0.9172	741.5	11	256	
3	337	Fri	153.125	0.9199	742.5	12	257	
4	338	Sat	154.125	0.9227	743.5	13	258	
5	339	Sun	+155.125	0.9254	744.5	14	259	
6	340	Mon	156.125	0.9282	745.5	15	260	6-First Quarter
7	341	Tue	157.125	0.9309	746.5	16	261	$5^n\ 22^m$ U.T.
8	342	Wed	158.125	0.9336	747.5	17	262	
9	343	Thu	159.125	0.9364	748.5	18	263	
10	344	Fri	160.125	0.9391	749.5	19	264	
11	345	Sat	161.125	0.9418	750.5	20	265	
12	346	Sun	+162.125	0.9446	751.5	21	266	
13	347	Mon	163.125	0.9473	752.5	22	267	13-Full Moon
14	348	Tue	164.125	0.9501	753.5	23	268	$16^h\ 09^m$ U.T.
15	349	Wed	165.125	0.9528	754.5	24	269	
16	350	Thu	166.125	0.9555	755.5	25	270	
17	351	Fri	167.125	0.9583	756.5	26	271	
18	352	Sat	168.125	0.9610	757.5	27	272	
19	353	Sun	+169.125	0.9637	758.5	28	273	
20	354	Mon	170.125	0.9665	759.5	29	274	20-Last Quarter
21	355	Tue	171.125	0.9692	760.5	30	275	$9^n\ 11^m$ U.T.
22	356	Wed	172.125	0.9720	761.5	Pausha 1	276	
23	357	Thu	173.125	0.9747	762.5	2	277	
24	358	Fri	174.125	0.9774	763.5	3	278	
25	359	Sat	175.125	0.9802	764.5	4	279	
26	360	Sun	+176.125	0.9829	765.5	5	280	
27	361	Mon	177.125	0.9856	766.5	6	281	27-New Moon
28	362	Tue	178.125	0.9884	767.5	7	282	$20^n\ 12^m$ U.T.
29	363	Wed	179.125	0.9911	768.5	8	283	
30	364	Thu	180.125	0.9939	769.5	9	284	
31	365	Fri	181.125	0.9966	770.5	10	285	
32	1	Sat	+182.125	0.9993	771.5	11	286	

The new epoch is the middle of the Julian year, denoted by J 2027.5 (i.e. 2027, July 2.875) where the length of the Julian year is taken to be 365.25 days.

The Fraction of year is reckoned from January 1, 0^h U.T and is based on the tropical year of 365.2422 days. The Julian Day begins at noon. In order to obtain the Julian Day Number completed at noon as given in Table IX, increase the above figure by 0.5.

The Day of year of the Gregorian Calendar is reckoned from January 1, and that of the Indian Calendar from Chaitra 1.

SIDEREAL TIME, 2027

Date		Mean Greenwich Sidereal Time at 0^h U.T. (G.H.A. of the Equinox)			Equation of the Equinoxes at 0^h U.T.	Greenwich Transit of Mean Equinox (U.T. at 0^h G.M.S.T.)			Date		Mean Greenwich Sidereal Time at 0^h U.T. (G.H.A. of the Equinox)			Equation of the Equinoxes at 0^h U.T.	Greenwich Transit of Mean Equinox (U.T. at 0^h G.M.S.T.)		
		h	m	s	s	h	m	s			h	m	s	s	h	m	s
Jan.	0	6	37	44.756	+0.647	17	19	24.495	Feb.	15	9	39	06.303	+0.724	14	18	32.660
	1	6	41	41.312	0.646	17	15	28.586		16	9	43	02.859	0.731	14	14	36.750
	2	6	45	37.867	0.646	17	11	32.676		17	9	46	59.414	0.740	14	10	40.841
	3	6	49	34.423	0.649	17	07	36.767		18	9	50	55.970	0.749	14	06	44.931
	4	6	53	30.978	0.655	17	03	40.857		19	9	54	52.525	0.755	14	02	49.022
	5	6	57	27.533	0.662	16	59	44.948		20	9	58	49.080	0.756	13	58	53.112
	6	7	01	24.089	+0.670	16	55	49.038		21	10	02	45.636	+0.753	13	54	57.203
	7	7	05	20.644	0.678	16	51	53.129		22	10	06	42.191	0.746	13	51	01.293
	8	7	09	17.199	0.686	16	47	57.220		23	10	10	38.746	0.738	13	47	05.384
	9	7	13	13.755	0.692	16	44	01.310		24	10	14	35.302	0.730	13	43	09.474
	10	7	17	10.310	0.695	16	40	05.401		25	10	18	31.857	0.725	13	39	13.565
	11	7	21	06.866	0.696	16	36	09.491		26	10	22	28.413	0.722	13	35	17.655
	12	7	25	03.421	+0.694	16	32	13.582		27	10	26	24.968	+0.722	13	31	21.746
	13	7	28	59.976	0.691	16	28	17.672		28	10	30	21.523	0.724	13	27	25.837
	14	7	32	56.532	0.687	16	24	21.763	Mar.	1	10	34	18.079	0.727	13	23	29.927
	15	7	36	53.087	0.683	16	20	25.853		2	10	38	14.634	0.731	13	19	34.018
	16	7	40	49.642	0.681	16	16	29.944		3	10	42	11.189	0.734	13	15	38.108
	17	7	44	46.198	0.681	16	12	34.034		4	10	46	07.745	0.736	13	11	42.199
	18	7	48	42.753	+0.686	16	08	38.125		5	10	50	04.300	+0.736	13	07	46.289
	19	7	52	39.309	0.695	16	04	42.215		6	10	54	00.855	0.734	13	03	50.380
	20	7	56	35.864	0.706	16	00	46.306		7	10	57	57.411	0.729	12	59	54.470
	21	8	00	32.419	0.719	15	56	50.396		8	11	01	53.966	0.722	12	55	58.561
	22	8	04	28.975	0.730	15	52	54.487		9	11	05	50.522	0.713	12	52	02.651
	23	8	08	25.530	0.737	15	48	58.578		10	11	09	47.077	0.704	12	48	06.742
	24	8	12	22.085	+0.739	15	45	02.668		11	11	13	43.632	+0.696	12	44	10.832
	25	8	16	18.641	0.737	15	41	06.759		12	11	17	40.188	0.691	12	40	14.923
	26	8	20	15.196	0.732	15	37	10.849		13	11	21	36.743	0.689	12	36	19.013
	27	8	24	11.751	0.727	15	33	14.940		14	11	25	33.298	0.690	12	32	23.104
	28	8	28	08.307	0.722	15	29	19.030		15	11	29	29.854	0.695	12	28	27.195
	29	8	32	04.862	0.720	15	25	23.121		16	11	33	26.409	0.701	12	24	31.285
	30	8	36	01.418	+0.720	15	21	27.211		17	11	37	22.965	+0.708	12	20	35.376
	31	8	39	57.973	0.723	15	17	31.302		18	11	41	19.520	0.713	12	16	39.466
Feb.	1	8	43	54.528	0.728	15	13	35.392		19	11	45	16.075	0.714	12	12	43.557
	2	8	47	51.084	0.734	15	09	39.483		20	11	49	12.631	0.711	12	08	47.647
	3	8	51	47.639	0.740	15	05	43.573		21	11	53	09.186	0.704	12	04	51.738
	4	8	55	44.194	0.746	15	01	47.664		22	11	57	05.741	0.695	12	00	55.828
	5	8	59	40.750	+0.750	14	57	51.754		23	12	01	02.297	+0.686	11	56	59.919
	6	9	03	37.305	0.751	14	53	55.845		24	12	04	58.852	0.678	11	53	04.009
	7	9	07	33.861	0.750	14	49	59.935		25	12	08	55.407	0.673	11	49	08.100
	8	9	11	30.416	0.747	14	46	04.026		26	12	12	51.963	0.671	11	45	12.190
	9	9	15	26.971	0.741	14	42	08.117		27	12	16	48.518	0.672	11	41	16.281
	10	9	19	23.527	0.734	14	38	12.207		28	12	20	45.074	0.675	11	37	20.371
	11	9	23	20.082	+0.727	14	34	16.298		29	12	24	41.629	+0.678	11	33	24.462
	12	9	27	16.637	0.722	14	30	20.388		30	12	28	38.184	0.681	11	29	28.552
	13	9	31	13.193	0.719	14	26	24.479		31	12	32	34.740	0.684	11	25	32.643
	14	9	35	09.748	0.720	14	22	28.569	Apr.	1	12	36	31.295	0.684	11	21	36.734
	15	9	39	06.303	+0.724	14	18	32.660		2	12	40	27.850	+0.682	11	17	40.824

N.B.-Apparent Sidereal Time = Mean Sidereal Time + Equation of Equinoxes for the instant

SIDEREAL TIME, 2027

Date	Mean Greenwich Sidereal Time at 0^h U.T. (G.H.A. of the Equinox)	Equation of the Equinoxes at 0^h U.T.	Greenwich Transit of Mean Equinox (U.T. at 0^h G.M.S.T.)	Date	Mean Greenwich Sidereal Time at 0^h U.T. (G.H.A. of the Equinox)	Equation of the Equinoxes at 0^h U.T.	Greenwich Transit of Mean Equinox (U.T. at 0^h G.M.S.T.)
	h m s	s	h m s		h m s	s	h m s
Apr. 1	12 36 31.295	+0.684	11 21 36.734	May 17	15 37 52.842	+0.651	08 20 44.898
2	12 40 27.850	0.682	11 17 40.824	18	15 41 49.397	0.648	08 16 48.988
3	12 44 24.406	0.678	11 13 44.915	19	15 45 45.953	0.648	08 12 53.079
4	12 48 20.961	0.671	11 09 49.005	20	15 49 42.508	0.650	08 08 57.169
5	12 52 17.517	0.663	11 05 53.096	21	15 53 39.063	0.655	08 05 01.260
6	12 56 14.072	0.654	11 01 57.186	22	15 57 35.619	0.662	08 01 05.351
7	13 00 10.627	+0.646	10 58 01.277	23	16 01 32.174	+0.670	07 57 09.441
8	13 04 07.183	0.640	10 54 05.367	24	16 05 28.730	0.677	07 53 13.532
9	13 08 03.738	0.638	10 50 09.458	25	16 09 25.285	0.682	07 49 17.622
10	13 12 00.293	0.639	10 46 13.548	26	16 13 21.840	0.686	07 45 21.713
11	13 15 56.849	0.644	10 42 17.639	27	16 17 18.396	0.687	07 41 25.803
12	13 19 53.404	0.651	10 38 21.729	28	16 21 14.951	0.686	07 37 29.894
13	13 23 49.959	+0.658	10 34 25.820	29	16 25 11.506	+0.683	07 33 33.984
14	13 27 46.515	0.664	10 30 29.910	30	16 29 08.062	0.679	07 29 38.075
15	13 31 43.070	0.667	10 26 34.001	31	16 33 04.617	0.674	07 25 42.165
16	13 35 39.626	0.666	10 22 38.091	June 1	16 37 01.173	0.671	07 21 46.256
17	13 39 36.181	0.661	10 18 42.182	2	16 40 57.728	0.670	07 17 50.346
18	13 43 32.736	0.653	10 14 46.272	3	16 44 54.283	0.672	07 13 54.437
19	13 47 29.292	+0.645	10 10 50.363	4	16 48 50.839	+0.679	07 09 58.527
20	13 51 25.847	0.638	10 06 54.454	5	16 52 47.394	0.690	07 06 02.618
21	13 55 22.402	0.633	10 02 58.544	6	16 56 43.949	0.702	07 02 06.709
22	13 59 18.958	0.632	09 59 02.635	7	17 00 40.505	0.715	06 58 10.799
23	14 03 15.513	0.633	09 55 06.725	8	17 04 37.060	0.724	06 54 14.890
24	14 07 12.069	0.636	09 51 10.816	9	17 08 33.616	0.729	06 50 18.980
25	14 11 08.624	+0.641	09 47 14.906	10	17 12 30.171	+0.730	06 46 23.071
26	14 15 05.179	0.647	09 43 18.997	11	17 16 26.726	0.728	06 42 27.161
27	14 19 01.735	0.651	09 39 23.087	12	17 20 23.282	0.723	06 38 31.252
28	14 22 58.290	0.654	09 35 27.178	13	17 24 19.837	0.720	06 34 35.342
29	14 26 54.845	0.655	09 31 31.268	14	17 28 16.392	0.717	06 30 39.433
30	14 30 51.401	0.653	09 27 35.359	15	17 32 12.948	0.717	06 26 43.523
May 1	14 34 47.956	+0.649	09 23 39.449	16	17 36 09.503	+0.721	06 22 47.614
2	14 38 44.511	0.643	09 19 43.540	17	17 40 06.058	0.726	06 18 51.704
3	14 42 41.067	0.637	09 15 47.630	18	17 44 02.614	0.734	06 14 55.795
4	14 46 37.622	0.630	09 11 51.721	19	17 47 59.169	0.742	06 10 59.885
5	14 50 34.178	0.625	09 07 55.812	20	17 51 55.725	0.751	06 07 03.976
6	14 54 30.733	0.624	09 03 59.902	21	17 55 52.280	0.758	06 03 08.066
7	14 58 27.288	0.626	09 00 03.993	22	17 59 48.835	+0.763	05 59 12.157
8	15 02 23.844	+0.632	08 56 08.083	23	18 03 45.391	0.766	05 55 16.247
9	15 06 20.399	0.642	08 52 12.174	24	18 07 41.946	0.766	05 51 20.338
10	15 10 16.954	0.652	08 48 16.264	25	18 11 38.501	0.764	05 47 24.429
11	15 14 13.510	0.661	08 44 20.355	26	18 15 35.057	0.761	05 43 28.519
12	15 18 10.065	0.667	08 40 24.445	27	18 19 31.612	0.757	05 39 32.610
13	15 22 06.621	+0.669	08 36 28.536	28	18 23 28.168	+0.753	05 35 36.700
14	15 26 03.176	0.667	08 32 32.626	29	18 27 24.723	0.752	05 31 40.791
15	15 29 59.731	0.662	08 28 36.717	30	18 31 21.278	0.753	05 27 44.881
16	15 33 56.287	0.657	08 24 40.807	July 1	18 35 17.834	0.758	05 23 48.972
17	15 37 52.842	+0.651	08 20 44.898	2	18 39 14.389	+0.768	05 19 53.062

N.B.-Apparent Sidereal Time = Mean Sidereal Time + Equation of Equinoxes for the instant

SIDEREAL TIME, 2027

Date	Mean Greenwich Sidereal Time at 0^h U.T. (G.H.A. of the Equinox)			Equation of the Equinoxes at 0^h U.T.	Greenwich Transit of Mean Equinox (U.T. at 0^h G.M.S.T.)			Date	Mean Greenwich Sidereal Time at 0^h U.T. (G.H.A. of the Equinox)			Equation of the Equinoxes at 0^h U.T.	Greenwich Transit of Mean Equinox (U.T. at 0^h G.M.S.T.)		
	h	m	s	s	h	m	s		h	m	s	s	h	m	s
July 1	18	35	17.834	+0.758	05	23	48.972	Aug. 16	21	36	39.381	+0.869	02	22	57.136
2	18	39	14.389	0.768	05	19	53.062	17	21	40	35.936	0.867	02	19	01.227
3	18	43	10.944	0.780	05	15	57.153	18	21	44	32.491	0.862	02	15	05.317
4	18	47	07.500	0.793	05	12	01.243	19	21	48	29.047	0.856	02	11	09.408
5	18	51	04.055	0.804	05	08	05.334	20	21	52	25.602	0.849	02	07	13.498
6	18	55	00.610	0.811	05	04	09.424	21	21	56	22.157	0.841	02	03	17.589
7	18	58	57.166	+0.814	05	00	13.515	22	22	00	18.713	+0.835	01	59	21.679
8	19	02	53.721	0.812	04	56	17.605	23	22	04	15.268	0.830	01	55	25.770
9	19	06	50.277	0.808	04	52	21.696	24	22	08	11.824	0.829	01	51	29.860
10	19	10	46.832	0.804	04	48	25.786	25	22	12	08.379	0.831	01	47	33.951
11	19	14	43.387	0.800	04	44	29.877	26	22	16	04.934	0.836	01	43	38.041
12	19	18	39.943	0.800	04	40	33.968	27	22	20	01.490	0.844	01	39	42.132
13	19	22	36.498	+0.801	04	36	38.058	28	22	23	58.045	+0.851	01	35	46.222
14	19	26	33.053	0.806	04	32	42.149	29	22	27	54.600	0.858	01	31	50.313
15	19	30	29.609	0.813	04	28	46.239	30	22	31	51.156	0.860	01	27	54.403
16	19	34	26.164	0.820	04	24	50.330	31	22	35	47.711	0.858	01	23	58.494
17	19	38	22.720	0.828	04	20	54.420	Sept. 1	22	39	44.266	0.852	01	20	02.585
18	19	42	19.275	0.834	04	16	58.511	2	22	43	40.822	0.843	01	16	06.675
19	19	46	15.830	+0.839	04	13	02.601	3	22	47	37.377	+0.835	01	12	10.766
20	19	50	12.386	0.841	04	09	06.692	4	22	51	33.933	0.828	01	08	14.856
21	19	54	08.941	0.841	04	05	10.782	5	22	55	30.488	0.824	01	04	18.947
22	19	58	05.496	0.838	04	01	14.873	6	22	59	27.043	0.824	01	00	23.037
23	20	02	02.052	0.834	03	57	18.963	7	23	03	23.599	0.826	00	56	27.128
24	20	05	58.607	0.829	03	53	23.054	8	23	07	20.154	0.829	00	52	31.218
25	20	09	55.162	+0.824	03	49	27.144	9	23	11	16.709	+0.833	00	48	35.309
26	20	13	51.718	0.820	03	45	31.235	10	23	15	13.265	0.836	00	44	39.399
27	20	17	48.273	0.818	03	41	35.325	11	23	19	09.820	0.838	00	40	43.490
28	20	21	44.829	0.821	03	37	39.416	12	23	23	06.376	0.837	00	36	47.580
29	20	25	41.384	0.826	03	33	43.507	13	23	27	02.931	0.835	00	32	51.671
30	20	29	37.939	0.835	03	29	47.597	14	23	30	59.486	0.829	00	28	55.761
31	20	33	34.495	+0.846	03	25	51.688	15	23	34	56.042	+0.822	00	24	59.852
Aug. 1	20	37	31.050	0.857	03	21	55.778	16	23	38	52.597	0.813	00	21	03.942
2	20	41	27.605	0.864	03	17	59.869	17	23	42	49.152	0.804	00	17	08.033
3	20	45	24.161	0.867	03	14	03.959	18	23	46	45.708	0.796	00	13	12.124
4	20	49	20.716	0.865	03	10	08.050	19	23	50	42.263	0.789	00	09	16.214
5	20	53	17.272	0.860	03	06	12.140	20	23	54	38.818	0.786	00	05	20.305
6	20	57	13.827	+0.853	03	02	16.231	21	23	58	35.374	+0.786	00	01	24.395
7	21	01	10.382	0.847	02	58	20.321	22	0	02	31.929	0.789	23	53	32.576
8	21	05	06.938	0.844	02	54	24.412	23	0	06	28.485	0.794	23	49	36.667
9	21	09	03.493	0.843	02	50	28.502	24	0	10	25.040	0.800	23	45	40.757
10	21	13	00.048	0.845	02	46	32.593	25	0	14	21.595	0.805	23	41	44.848
11	21	16	56.604	0.849	02	42	36.683	26	0	18	18.151	0.808	23	37	48.938
12	21	20	53.159	+0.855	02	38	40.774	27	0	22	14.706	+0.806	23	33	53.029
13	21	24	49.714	0.860	02	34	44.864	28	0	26	11.261	0.801	23	29	57.120
14	21	28	46.270	0.865	02	30	48.955	29	0	30	07.817	0.792	23	26	01.210
15	21	32	42.825	0.868	02	26	53.045	30	0	34	04.372	0.783	23	22	05.301
16	21	36	39.381	+0.869	02	22	57.136	Oct. 1	0	38	00.928	+0.775	23	18	09.391

N.B.-Apparent Sidereal Time = Mean Sidereal Time + Equation of Equinoxes for the instant

SIDEREAL TIME, 2027

Date	Mean Greenwich Sidereal Time at 0^h U.T. (G.H.A. of the Equinox)	Equation of the Equinoxes at 0^h U.T.	Greenwich Transit of Mean Equinox (U.T. at 0^h G.M.S.T.)	Date	Mean Greenwich Sidereal Time at 0^h U.T. (G.H.A. of the Equinox)	Equation of the Equinoxes at 0^h U.T.	Greenwich Transit of Mean Equinox (U.T. at 0^h G.M.S.T.)
	h m s	s	h m s		h m s	s	h m s
Oct. 1	0 38 00.928	+0.775	23 18 09.391	Nov. 16	3 39 22.475	+0.747	20 17 17.555
2	0 41 57.483	0.769	23 14 13.482	17	3 43 19.030	0.757	20 13 21.646
3	0 45 54.038	0.767	23 10 17.572	18	3 47 15.585	0.767	20 09 25.737
4	0 49 50.594	0.768	23 06 21.663	19	3 51 12.141	0.775	20 05 29.827
5	0 53 47.149	0.771	23 02 25.753	20	3 55 08.696	0.779	20 01 33.918
6	0 57 43.704	0.775	22 58 29.844	21	3 59 05.251	0.779	19 57 38.008
7	1 01 40.260	+0.779	22 54 33.934	22	4 03 01.807	+0.776	19 53 42.099
8	1 05 36.815	0.782	22 50 38.025	23	4 06 58.362	0.771	19 49 46.189
9	1 09 33.370	0.782	22 46 42.115	24	4 10 54.917	0.766	19 45 50.280
10	1 13 29.926	0.780	22 42 46.206	25	4 14 51.473	0.763	19 41 54.370
11	1 17 26.481	0.776	22 38 50.296	26	4 18 48.028	0.763	19 37 58.461
12	1 21 23.037	0.770	22 34 54.387	27	4 22 44.584	0.766	19 34 02.551
13	1 25 19.592	+0.762	22 30 58.477	28	4 26 41.139	+0.772	19 30 06.642
14	1 29 16.147	0.753	22 27 02.568	29	4 30 37.694	0.780	19 26 10.732
15	1 33 12.703	0.745	22 23 06.658	30	4 34 34.250	0.789	19 22 14.823
16	1 37 09.258	0.739	22 19 10.749	Dec. 1	4 38 30.805	0.797	19 18 18.913
17	1 41 05.813	0.735	22 15 14.840	2	4 42 27.360	0.804	19 14 23.004
18	1 45 02.369	0.735	22 11 18.930	3	4 46 23.916	0.808	19 10 27.094
19	1 48 58.924	+0.739	22 07 23.021	4	4 50 20.471	+0.810	19 06 31.185
20	1 52 55.480	0.745	22 03 27.111	5	4 54 17.027	0.810	19 02 35.275
21	1 56 52.035	0.752	21 59 31.202	6	4 58 13.582	0.808	18 58 39.366
22	2 00 48.590	0.759	21 55 35.292	7	5 02 10.137	0.804	18 54 43.457
23	2 04 45.146	0.763	21 51 39.383	8	5 06 06.693	0.800	18 50 47.547
24	2 08 41.701	0.763	21 47 43.473	9	5 10 03.248	0.797	18 46 51.638
25	2 12 38.256	+0.760	21 43 47.564	10	5 13 59.803	+0.796	18 42 55.728
26	2 16 34.812	0.754	21 39 51.654	11	5 17 56.359	0.799	18 38 59.819
27	2 20 31.367	0.746	21 35 55.745	12	5 21 52.914	0.805	18 35 03.909
28	2 24 27.923	0.739	21 31 59.835	13	5 25 49.469	0.814	18 31 08.000
29	2 28 24.478	0.734	21 28 03.926	14	5 29 46.025	0.826	18 27 12.090
30	2 32 21.033	0.732	21 24 08.016	15	5 33 42.580	0.839	18 23 16.181
31	2 36 17.589	+0.734	21 20 12.107	16	5 37 39.136	+0.850	18 19 20.271
Nov. 1	2 40 14.144	0.739	21 16 16.198	17	5 41 35.691	0.857	18 15 24.362
2	2 44 10.699	0.744	21 12 20.288	18	5 45 32.246	0.860	18 11 28.452
3	2 48 07.255	0.751	21 08 24.379	19	5 49 28.802	0.859	18 07 32.543
4	2 52 03.810	0.756	21 04 28.469	20	5 53 25.357	0.856	18 03 36.633
5	2 56 00.365	0.759	21 00 32.560	21	5 57 21.912	0.853	17 59 40.724
6	2 59 56.921	+0.760	20 56 36.650	22	6 01 18.468	+0.850	17 55 44.815
7	3 03 53.476	0.759	20 52 40.741	23	6 05 15.023	0.851	17 51 48.905
8	3 07 50.032	0.756	20 48 44.831	24	6 09 11.579	0.854	17 47 52.996
9	3 11 46.587	0.751	20 44 48.922	25	6 13 08.134	0.860	17 43 57.086
10	3 15 43.142	0.744	20 40 53.012	26	6 17 04.689	0.868	17 40 01.177
11	3 19 39.698	0.739	20 36 57.103	27	6 21 01.245	0.878	17 36 05.267
12	3 23 36.253	+0.734	20 33 01.193	28	6 24 57.800	+0.887	17 32 09.358
13	3 27 32.808	0.732	20 29 05.284	29	6 28 54.355	0.895	17 28 13.448
14	3 31 29.364	0.734	20 25 09.374	30	6 32 50.911	0.901	17 24 17.539
15	3 35 25.919	0.739	20 21 13.465	31	6 36 47.466	0.904	17 20 21.629
16	3 39 22.475	+0.747	20 17 17.555	32	6 40 44.021	+0.905	17 16 25.720

N.B.-Apparent Sidereal Time = Mean Sidereal Time + Equation of Equinoxes for the instant

SUN, 2027
MEAN LONGITUDE AND ANOMALY

Date	Horizonta Parallax	Mean Longitude			Mean Anomaly	Date	Horizonta Parallax	Mean Longitude			Mean Anomaly
	"	°	′	"	°		"	°	′	"	°
Jan. 1	8.94	280	25	40.408	357.026	July 10	8.65	107	42	03.202	184.290
11	8.94	290	17	03.713	6.882	20	8.65	117	33	26.507	194.146
21	8.94	300	08	27.018	16.738	30	8.66	127	24	49.812	204.002
31	8.93	309	59	50.323	26.594	Aug. 9	8.67	137	16	13.117	213.858
Feb. 10	8.91	319	51	13.628	36.450	19	8.69	147	07	36.422	223.714
20	8.90	329	42	36.933	46.306	29	8.71	156	58	59.727	233.570
Mar. 2	8.87	339	34	00.238	56.162	Sept. 8	8.73	166	50	23.032	243.426
12	8.85	349	25	23.543	66.018	18	8.75	176	41	46.337	253.282
22	8.83	359	16	46.848	75.874	28	8.77	186	33	09.642	263.138
Apr. 1	8.80	9	08	10.153	85.730	Oct. 8	8.80	196	24	32.947	272.994
11	8.78	18	59	33.458	95.586	18	8.82	206	15	56.252	282.850
21	8.75	28	50	56.763	105.442	28	8.85	216	07	19.557	292.706
May 1	8.73	38	42	20.068	115.298	Nov. 7	8.87	225	58	42.862	302.562
11	8.71	48	33	43.373	125.154	17	8.89	235	50	06.167	312.418
21	8.69	58	25	06.678	135.010	27	8.91	245	41	29.472	322.274
31	8.67	68	16	29.983	144.866	Dec. 7	8.93	255	32	52.777	332.130
June 10	8.66	78	07	53.288	154.722	17	8.94	265	24	16.082	341.986
20	8.65	87	59	16.592	164.578	27	8.94	275	15	39.387	351.842
30	8.65	97	50	39.897	174.434	37	8.94	285	07	02.692	1.698
July 10	8.65	107	42	03.202	184.290	47	8.94	294	58	25.997	11.554

SUN, 2027

FOR 0^h TERRESTRIAL TIME

Date		Geometric Longitude* (Mean Equinox of date)			Latitude (Ecliptic of date)	Apparent Longitude (True equinox of date)			Aberration	Prec. in Long. (J 2027.5 of date)	Nut. in Long.	Nut. in Obliquity	True Obliquity (23° 26')
		°	'	"	"	°	'	"	"	"	"	"	"
Jan.	0	279	18	11.36	-0.22	279	18	01.15	20.84	-25.62	+10.58	+6.87	15.63
	1	280	19	20.55	0.29	280	19	10.31	20.84	25.48	10.55	6.84	15.60
	2	281	20	30.09	0.36	281	20	19.86	20.84	25.34	10.56	6.80	15.56
	3	282	21	39.99	0.36	282	21	29.81	20.84	25.20	10.61	6.75	15.51
	4	283	22	50.14	0.36	283	22	40.04	20.84	25.06	10.70	6.72	15.47
	5	284	24	00.47	0.32	284	23	50.50	20.84	24.92	10.82	6.70	15.45
	6	285	25	10.93	-0.29	285	25	01.09	20.84	-24.78	+10.96	+6.69	15.44
	7	286	26	21.35	0.22	286	26	11.65	20.84	24.64	11.09	6.70	15.46
	8	287	27	31.76	-0.11	287	27	22.18	20.84	24.50	11.22	6.73	15.49
	9	288	28	42.01	+0.00	288	28	32.52	20.84	24.37	11.31	6.78	15.53
	10	289	29	51.97	0.14	289	29	42.54	20.84	24.23	11.37	6.83	15.58
	11	290	31	01.65	0.25	290	30	52.24	20.84	24.09	11.38	6.88	15.63
	12	291	32	10.90	+0.40	291	32	01.46	20.84	-23.95	+11.35	+6.93	15.68
	13	292	33	19.65	0.50	292	33	10.15	20.84	23.81	11.30	6.96	15.71
	14	293	34	27.86	0.61	293	34	18.30	20.84	23.67	11.23	6.97	15.72
	15	294	35	35.39	0.68	294	35	25.76	20.84	23.53	11.16	6.96	15.71
	16	295	36	42.24	0.76	295	36	32.58	20.84	23.39	11.13	6.94	15.68
	17	296	37	48.36	0.79	296	37	38.71	20.83	23.25	11.14	6.89	15.63
	18	297	38	53.70	+0.79	297	38	44.12	20.83	-23.11	+11.22	+6.85	15.59
	19	298	39	58.17	0.76	298	39	48.74	20.83	22.97	11.36	6.81	15.55
	20	299	41	01.88	0.68	299	40	52.64	20.83	22.83	11.55	6.80	15.54
	21	300	42	04.78	0.58	300	41	55.75	20.83	22.69	11.76	6.82	15.56
	22	301	43	06.95	0.43	301	42	58.10	20.83	22.55	11.94	6.88	15.61
	23	302	44	08.35	0.29	302	43	59.63	20.82	22.42	12.05	6.95	15.68
	24	303	45	09.12	+0.14	303	45	00.43	20.82	-22.28	+12.09	+7.03	15.76
	25	304	46	09.27	+0.00	304	46	00.55	20.82	22.14	12.05	7.09	15.82
	26	305	47	08.83	-0.14	305	47	00.02	20.82	22.00	11.97	7.12	15.85
	27	306	48	07.81	0.25	306	47	58.92	20.82	21.86	11.88	7.13	15.85
	28	307	49	06.23	0.36	307	48	57.28	20.81	21.72	11.81	7.11	15.84
	29	308	50	04.05	0.40	308	49	55.06	20.81	21.58	11.77	7.08	15.81
	30	309	51	01.24	-0.43	309	50	52.26	20.81	-21.44	+11.78	+7.05	15.77
	31	310	51	57.75	0.47	310	51	48.82	20.80	21.30	11.83	7.02	15.74
Feb.	1	311	52	53.54	0.43	311	52	44.69	20.80	21.16	11.90	7.00	15.72
	2	312	53	48.56	0.40	312	53	39.80	20.80	21.02	12.00	7.00	15.72
	3	313	54	42.70	0.32	313	54	34.06	20.80	20.88	12.10	7.02	15.74
	4	314	55	35.96	0.22	314	55	27.41	20.79	20.74	12.19	7.06	15.77
	5	315	56	28.24	-0.11	315	56	19.75	20.79	-20.60	+12.25	+7.11	15.82
	6	316	57	19.47	+0.04	316	57	11.02	20.79	20.47	12.28	7.16	15.88
	7	317	58	09.53	0.14	317	58	01.06	20.78	20.33	12.27	7.23	15.94
	8	318	58	58.40	0.29	318	58	49.87	20.78	20.19	12.21	7.28	15.99
	9	319	59	45.93	0.40	319	59	37.32	20.78	20.05	12.12	7.32	16.03
	10	321	00	32.12	0.50	321	00	23.40	20.77	19.91	12.01	7.34	16.05
	11	322	01	16.83	+0.61	322	01	08.00	20.77	-19.77	+11.89	+7.34	16.05
	12	323	01	59.97	0.65	323	01	51.06	20.76	19.63	11.80	7.33	16.03
	13	324	02	41.56	0.68	324	02	32.60	20.76	19.49	11.76	7.29	16.00
	14	325	03	21.44	0.72	325	03	12.49	20.76	19.35	11.77	7.25	15.95
	15	326	03	59.63	+0.68	326	03	50.76	20.75	-19.21	+11.84	+7.21	15.92

*To obtain the geometric longitude referred to the mean equinox of J 2000.0, add -23' 03".003 and subtract precession from J 2027.5.

SUN, 2027

FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Semi Diameter		Ephemeris Transit		
		h	m	s	°	'	"		'	"	h	m	s
Jan.	0	18	40	28.82	-23	06	41.84	0.983 3553	16	15.89	12	02	57.81
	1	18	44	53.98	23	02	11.62	0.983 3433	16	15.90	12	03	26.28
	2	18	49	18.86	22	57	13.74	0.983 3362	16	15.91	12	03	54.46
	3	18	53	43.42	22	51	48.34	0.983 3335	16	15.91	12	04	22.31
	4	18	58	07.65	22	45	55.60	0.983 3352	16	15.91	12	04	49.79
	5	19	02	31.49	22	39	35.68	0.983 3410	16	15.90	12	05	16.88
	6	19	06	54.92	-22	32	48.79	0.983 3509	16	15.89	12	05	43.53
	7	19	11	17.91	22	25	35.13	0.983 3648	16	15.88	12	06	09.73
	8	19	15	40.42	22	17	54.92	0.983 3826	16	15.86	12	06	35.44
	9	19	20	02.43	22	09	48.39	0.983 4042	16	15.84	12	07	00.62
	10	19	24	23.90	22	01	15.79	0.983 4297	16	15.81	12	07	25.26
	11	19	28	44.80	21	52	17.37	0.983 4592	16	15.79	12	07	49.32
	12	19	33	05.12	-21	42	53.40	0.983 4927	16	15.75	12	08	12.78
	13	19	37	24.81	21	33	04.16	0.983 5304	16	15.71	12	08	35.61
	14	19	41	43.87	21	22	49.94	0.983 5724	16	15.67	12	08	57.79
	15	19	46	02.27	21	12	11.04	0.983 6189	16	15.63	12	09	19.31
	16	19	50	19.99	21	01	07.77	0.983 6701	16	15.58	12	09	40.12
	17	19	54	37.01	20	49	40.46	0.983 7264	16	15.52	12	10	00.24
	18	19	58	53.32	-20	37	49.43	0.983 7880	16	15.46	12	10	19.62
	19	20	03	08.91	20	25	35.03	0.983 8553	16	15.39	12	10	38.27
	20	20	07	23.75	20	12	57.60	0.983 9284	16	15.32	12	10	56.17
	21	20	11	37.85	19	59	57.49	0.984 0078	16	15.24	12	11	13.32
	22	20	15	51.18	19	46	35.03	0.984 0935	16	15.16	12	11	29.70
	23	20	20	03.74	19	32	50.55	0.984 1857	16	15.06	12	11	45.31
	24	20	24	15.52	-19	18	44.37	0.984 2844	16	14.97	12	12	00.14
	25	20	28	26.53	19	04	16.83	0.984 3893	16	14.86	12	12	14.20
	26	20	32	36.75	18	49	28.25	0.984 5002	16	14.75	12	12	27.48
	27	20	36	46.19	18	34	18.98	0.984 6168	16	14.64	12	12	39.97
	28	20	40	54.85	18	18	49.38	0.984 7388	16	14.52	12	12	51.68
	29	20	45	02.72	18	03	00.00	0.984 8659	16	14.39	12	13	02.59
	30	20	49	09.79	-17	46	50.72	0.984 9976	16	14.26	12	13	12.71
	31	20	53	16.08	17	30	22.46	0.985 1338	16	14.13	12	13	22.03
Feb.	1	20	57	21.57	17	13	35.45	0.985 2742	16	13.99	12	13	30.55
	2	21	01	26.25	16	56	30.10	0.985 4184	16	13.85	12	13	38.27
	3	21	05	30.14	16	39	06.83	0.985 5662	16	13.70	12	13	45.18
	4	21	09	33.22	16	21	26.06	0.985 7176	16	13.55	12	13	51.29
	5	21	13	35.49	-16	03	28.23	0.985 8722	16	13.40	12	13	56.60
	6	21	17	36.96	15	45	13.75	0.986 0299	16	13.24	12	14	01.10
	7	21	21	37.63	15	26	43.06	0.986 1906	16	13.08	12	14	04.80
	8	21	25	37.49	15	07	56.59	0.986 3543	16	12.92	12	14	07.70
	9	21	29	36.55	14	48	54.76	0.986 5208	16	12.76	12	14	09.81
	10	21	33	34.81	14	29	38.02	0.986 6903	16	12.59	12	14	11.12
	11	21	37	32.29	-14	10	06.80	0.986 8628	16	12.42	12	14	11.65
	12	21	41	28.98	13	50	21.52	0.987 0384	16	12.25	12	14	11.40
	13	21	45	24.90	13	30	22.63	0.987 2172	16	12.07	12	14	10.37
	14	21	49	20.06	13	10	10.56	0.987 3995	16	11.89	12	14	08.58
	15	21	53	14.46	-12	49	45.74	0.987 5854	16	11.71	12	14	06.04

SUN, 2027

FOR 0^h TERRESTRIAL TIME

Date		Geometric Longitude* (Mean Equinox of date)			Latitude (Ecliptic of date)	Apparent Longitude (True equinox of date)			Aberration	Prec. in Long. (J 2027.5 of date)	Nut. in Long.	Nut. in Obliquity	True Obliquity (23° 26')
		°	'	"	"	°	'	"	"	"	"	"	"
Feb.	15	326	03	59.63	+0.68	326	03	50.76	20.75	-19.21	+11.84	+7.21	15.92
	16	327	04	36.08	0.61	327	04	27.34	20.75	19.07	11.96	7.20	15.90
	17	328	05	10.74	0.54	328	05	02.15	20.75	18.93	12.10	7.21	15.91
	18	329	05	43.68	0.40	329	05	35.23	20.74	18.79	12.24	7.25	15.95
	19	330	06	14.87	0.25	330	06	06.52	20.74	18.65	12.34	7.31	16.01
	20	331	06	44.36	+0.11	331	06	36.04	20.73	18.51	12.36	7.39	16.08
	21	332	07	12.23	-0.04	332	07	03.86	20.73	-18.38	+12.31	+7.45	16.15
	22	333	07	38.51	0.18	333	07	30.04	20.72	18.24	12.20	7.50	16.19
	23	334	08	03.26	0.29	334	07	54.66	20.72	18.10	12.07	7.51	16.20
	24	335	08	26.53	0.40	335	08	17.81	20.71	17.96	11.94	7.50	16.19
	25	336	08	48.33	0.47	336	08	39.52	20.71	17.82	11.85	7.47	16.16
	26	337	09	08.71	0.54	337	08	59.86	20.70	17.68	11.80	7.43	16.11
	27	338	09	27.65	-0.54	338	09	18.79	20.70	-17.54	+11.80	+7.39	16.07
	28	339	09	45.18	0.54	339	09	36.36	20.69	17.40	11.83	7.36	16.04
Mar.	1	340	10	01.21	0.50	340	09	52.45	20.69	17.26	11.89	7.35	16.03
	2	341	10	15.76	0.43	341	10	07.07	20.68	17.12	11.95	7.35	16.03
	3	342	10	28.76	0.32	342	10	20.14	20.68	16.98	12.01	7.37	16.05
	4	343	10	40.24	0.25	343	10	31.66	20.67	16.84	12.04	7.41	16.09
	5	344	10	50.07	-0.11	344	10	41.48	20.67	-16.70	+12.04	+7.46	16.14
	6	345	10	58.27	+0.00	345	10	49.66	20.66	16.56	12.00	7.51	16.19
	7	346	11	04.72	0.14	346	10	56.03	20.66	16.42	11.92	7.55	16.23
	8	347	11	09.40	0.25	347	11	00.60	20.65	16.29	11.80	7.59	16.27
	9	348	11	12.24	0.36	348	11	03.30	20.65	16.15	11.66	7.61	16.28
	10	349	11	13.18	0.47	349	11	04.09	20.64	16.01	11.51	7.60	16.27
	11	350	11	12.11	+0.54	350	11	02.90	20.64	-15.87	+11.38	+7.57	16.24
	12	351	11	08.96	0.58	351	10	59.66	20.63	15.73	11.29	7.53	16.20
	13	352	11	03.69	0.58	352	10	54.37	20.62	15.59	11.26	7.47	16.14
	14	353	10	56.25	0.58	353	10	46.96	20.62	15.45	11.28	7.42	16.09
	15	354	10	46.55	0.50	354	10	37.34	20.61	15.31	11.36	7.39	16.05
	16	355	10	34.63	0.43	355	10	25.54	20.61	15.17	11.47	7.37	16.04
	17	356	10	20.37	+0.32	356	10	11.39	20.60	-15.03	+11.58	+7.39	16.05
	18	357	10	03.83	0.22	357	09	54.94	20.60	14.89	11.65	7.43	16.09
	19	358	09	45.05	+0.07	358	09	36.18	20.59	14.75	11.67	7.48	16.15
	20	359	09	24.04	-0.07	359	09	15.12	20.59	14.61	11.62	7.54	16.20
	21	0	09	00.81	0.22	0	08	51.79	20.58	14.47	11.51	7.57	16.23
	22	1	08	35.50	0.36	1	08	26.34	20.57	14.33	11.37	7.59	16.24
	23	2	08	08.14	-0.47	2	07	58.84	20.57	-14.20	+11.22	+7.57	16.22
	24	3	07	38.78	0.54	3	07	29.35	20.56	14.06	11.09	7.52	16.18
	25	4	07	07.50	0.61	4	06	58.00	20.56	13.92	11.01	7.47	16.12
	26	5	06	34.37	0.61	5	06	24.84	20.55	13.78	10.97	7.41	16.06
	27	6	05	59.40	0.61	6	05	49.88	20.55	13.64	10.99	7.36	16.01
	28	7	05	22.59	0.58	7	05	13.13	20.54	13.50	11.03	7.32	15.97
	29	8	04	44.01	-0.54	8	04	34.61	20.53	-13.36	+11.09	+7.30	15.95
	30	9	04	03.67	0.47	9	03	54.32	20.53	13.22	11.14	7.30	15.94
	31	10	03	21.54	0.36	10	03	12.24	20.52	13.08	11.18	7.31	15.96
Apr.	1	11	02	37.60	0.25	11	02	28.32	20.52	12.94	11.19	7.34	15.98
	2	12	01	51.87	-0.11	12	01	42.56	20.51	-12.80	+11.16	+7.37	16.01

*To obtain the geometric longitude referred to the mean equinox of J 2000.0, add -23' 03".003 and subtract precession from J 2027.5.

SUN, 2027
FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Semi Diameter		Ephemeris Transit		
		h	m	s	º	'	"		'	"	h	m	s
Feb.	15	21	53	14.46	-12	49	45.74	0.987 5854	16	11.71	12	14	06.04
	16	21	57	08.11	12	29	08.59	0.987 7753	16	11.52	12	14	02.76
	17	22	01	01.04	12	08	19.55	0.987 9694	16	11.33	12	13	58.75
	18	22	04	53.24	11	47	19.03	0.988 1680	16	11.14	12	13	54.03
	19	22	08	44.74	11	26	07.43	0.988 3714	16	10.94	12	13	48.61
	20	22	12	35.54	11	04	45.13	0.988 5796	16	10.73	12	13	42.52
	21	22	16	25.67	-10	43	12.52	0.988 7928	16	10.52	12	13	35.77
	22	22	20	15.16	10	21	29.94	0.989 0109	16	10.31	12	13	28.38
	23	22	24	04.01	9	59	37.76	0.989 2338	16	10.09	12	13	20.37
	24	22	27	52.25	9	37	36.35	0.989 4612	16	09.87	12	13	11.76
	25	22	31	39.91	9	15	26.09	0.989 6929	16	09.64	12	13	02.58
	26	22	35	27.00	8	53	07.35	0.989 9284	16	09.41	12	12	52.83
	27	22	39	13.54	-8	30	40.54	0.990 1675	16	09.17	12	12	42.54
	28	22	42	59.54	8	08	06.05	0.990 4098	16	08.94	12	12	31.73
Mar.	1	22	46	45.03	7	45	24.30	0.990 6550	16	08.70	12	12	20.41
	2	22	50	30.03	7	22	35.69	0.990 9028	16	08.46	12	12	08.60
	3	22	54	14.54	6	59	40.63	0.991 1529	16	08.21	12	11	56.31
	4	22	57	58.58	6	36	39.53	0.991 4049	16	07.96	12	11	43.57
	5	23	01	42.17	-6	13	32.80	0.991 6587	16	07.72	12	11	30.39
	6	23	05	25.33	5	50	20.85	0.991 9139	16	07.47	12	11	16.78
	7	23	09	08.08	5	27	04.09	0.992 1704	16	07.22	12	11	02.77
	8	23	12	50.42	5	03	42.92	0.992 4280	16	06.97	12	10	48.37
	9	23	16	32.38	4	40	17.77	0.992 6865	16	06.71	12	10	33.60
	10	23	20	13.97	4	16	49.01	0.992 9459	16	06.46	12	10	18.47
	11	23	23	55.22	-3	53	17.07	0.993 2060	16	06.21	12	10	03.00
	12	23	27	36.13	3	29	42.34	0.993 4669	16	05.96	12	09	47.21
	13	23	31	16.74	3	06	05.22	0.993 7287	16	05.70	12	09	31.11
	14	23	34	57.05	2	42	26.11	0.993 9915	16	05.45	12	09	14.73
	15	23	38	37.08	2	18	45.40	0.994 2555	16	05.19	12	08	58.07
	16	23	42	16.86	1	55	03.47	0.994 5209	16	04.93	12	08	41.16
	17	23	45	56.40	-1	31	20.72	0.994 7880	16	04.67	12	08	24.03
	18	23	49	35.71	1	07	37.51	0.995 0570	16	04.41	12	08	06.68
	19	23	53	14.82	0	43	54.21	0.995 3282	16	04.15	12	07	49.15
	20	23	56	53.76	-0	20	11.15	0.995 6018	16	03.88	12	07	31.46
	21	0	00	32.53	+0	03	31.32	0.995 8779	16	03.62	12	07	13.62
	22	0	04	11.18	0	27	12.90	0.996 1566	16	03.35	12	06	55.67
	23	0	07	49.73	+0	50	53.27	0.996 4379	16	03.08	12	06	37.64
	24	0	11	28.20	1	14	32.11	0.996 7216	16	02.80	12	06	19.53
	25	0	15	06.62	1	38	09.10	0.997 0075	16	02.53	12	06	01.39
	26	0	18	45.02	2	01	43.90	0.997 2954	16	02.25	12	05	43.23
	27	0	22	23.41	2	25	16.18	0.997 5850	16	01.97	12	05	25.07
	28	0	26	01.81	2	48	45.59	0.997 8759	16	01.69	12	05	06.94
	29	0	29	40.26	+3	12	11.77	0.998 1678	16	01.41	12	04	48.85
	30	0	33	18.76	3	35	34.37	0.998 4605	16	01.12	12	04	30.83
	31	0	36	57.33	3	58	53.01	0.998 7536	16	00.84	12	04	12.90
Apr.	1	0	40	36.00	4	22	07.35	0.999 0467	16	00.56	12	03	55.07
	2	0	44	14.78	+4	45	17.02	0.999 3395	16	00.28	12	03	37.37

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FOR 0^h TERRESTRIAL TIME

Date		Geometric Longitude* (Mean Equinox of date)			Latitude (Ecliptic of date)	Apparent Longitude (True equinox of date)			Aberration	Prec. in Long. (J 2027.5 of date)	Nut. in Long.	Nut. in Obliquity	True Obliquity (23° 26')
		°	'	"	"	°	'	"	"	"	"	"	"
Apr.	1	11	02	37.60	-0.25	11	02	28.32	20.52	-12.94	+11.19	+7.34	15.98
	2	12	01	51.87	-0.11	12	01	42.56	20.51	12.80	11.16	7.37	16.01
	3	13	01	04.34	+0.00	13	00	54.97	20.50	12.66	11.09	7.40	16.04
	4	14	00	14.98	0.11	14	00	05.51	20.50	12.52	10.98	7.42	16.06
	5	14	59	23.70	0.25	14	59	14.10	20.49	12.38	10.84	7.43	16.07
	6	15	58	30.52	0.32	15	58	20.78	20.49	12.25	10.70	7.41	16.05
	7	16	57	35.36	+0.40	16	57	25.49	20.48	-12.11	+10.57	+7.37	16.01
	8	17	56	38.17	0.47	17	56	28.21	20.47	11.97	10.47	7.31	15.95
	9	18	55	38.88	0.47	18	55	28.88	20.47	11.83	10.43	7.24	15.87
	10	19	54	37.44	0.47	19	54	27.47	20.46	11.69	10.45	7.17	15.80
	11	20	53	33.81	0.40	20	53	23.93	20.46	11.55	10.53	7.11	15.74
	12	21	52	27.92	0.32	21	52	18.16	20.45	11.41	10.64	7.07	15.71
	13	22	51	19.72	+0.25	22	51	10.08	20.44	-11.27	+10.76	+7.07	15.70
	14	23	50	09.24	+0.11	23	49	59.70	20.44	11.13	10.86	7.09	15.71
	15	24	48	56.43	-0.00	24	48	46.94	20.43	10.99	10.90	7.12	15.75
	16	25	47	41.35	0.14	25	47	31.85	20.43	10.85	10.88	7.16	15.78
	17	26	46	23.98	0.29	26	46	14.41	20.42	10.71	10.80	7.18	15.81
	18	27	45	04.43	0.40	27	44	54.74	20.42	10.57	10.68	7.18	15.81
	19	28	43	42.77	-0.54	28	43	32.95	20.41	-10.43	+10.55	+7.16	15.78
	20	29	42	19.00	0.61	29	42	09.07	20.41	10.29	10.43	7.11	15.73
	21	30	40	53.25	0.68	30	40	43.25	20.40	10.16	10.36	7.05	15.66
	22	31	39	25.61	0.72	31	39	15.59	20.39	10.02	10.33	6.97	15.59
	23	32	37	56.12	0.72	32	37	46.13	20.39	9.88	10.35	6.90	15.52
	24	33	36	24.87	0.76	33	36	14.94	20.38	9.74	10.41	6.84	15.46
	25	34	34	51.90	-0.79	34	34	42.06	20.38	-9.60	+10.49	+6.81	15.42
	26	35	33	17.13	0.94	35	33	07.38	20.37	9.46	10.57	6.79	15.40
	27	36	31	40.50	0.76	36	31	30.83	20.37	9.32	10.65	6.78	15.39
	28	37	30	02.60	0.47	37	29	52.98	20.36	9.18	10.69	6.79	15.40
	29	38	28	23.19	0.29	38	28	13.58	20.36	9.04	10.71	6.81	15.42
	30	39	26	42.23	-0.11	39	26	32.60	20.35	8.90	10.68	6.83	15.44
May	1	40	24	59.69	+0.00	40	24	50.00	20.35	-8.76	+10.62	+6.85	15.46
	2	41	23	15.63	0.14	41	23	05.86	20.34	8.62	10.52	6.85	15.46
	3	42	21	30.04	0.22	42	21	20.16	20.33	8.48	10.41	6.83	15.44
	4	43	19	42.90	0.29	43	19	32.92	20.33	8.34	10.30	6.79	15.39
	5	44	17	54.18	0.36	44	17	44.12	20.32	8.20	10.22	6.73	15.33
	6	45	16	03.86	0.40	45	15	53.78	20.32	8.06	10.20	6.65	15.25
	7	46	14	11.86	+0.36	46	14	01.82	20.31	-7.93	+10.24	+6.57	15.17
	8	47	12	18.17	0.32	47	12	08.24	20.31	7.79	10.34	6.50	15.10
	9	48	10	22.71	0.25	48	10	12.94	20.31	7.65	10.49	6.45	15.05
	10	49	08	25.46	0.18	49	08	15.86	20.30	7.51	10.66	6.43	15.02
	11	50	06	26.33	+0.07	50	06	16.88	20.30	7.37	10.80	6.44	15.03
	12	51	04	25.38	-0.07	51	04	16.03	20.29	7.23	10.90	6.47	15.06
	13	52	02	22.51	-0.22	52	02	13.20	20.29	-7.09	+10.93	+6.50	15.09
	14	53	00	17.79	0.32	53	00	08.46	20.28	6.95	10.90	6.52	15.11
	15	53	58	11.25	0.47	53	58	01.85	20.28	6.81	10.83	6.53	15.12
	16	54	56	02.93	0.58	54	55	53.44	20.27	6.67	10.73	6.51	15.10
	17	55	53	52.91	-0.65	55	53	43.33	20.27	-6.53	+10.65	+6.47	15.05

*To obtain the geometric longitude referred to the mean equinox of J 2000.0, add -23' 03".003 and subtract precession from J 2027.5.

SUN, 2027

FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Semi Diameter		Ephemeris Transit		
		h	m	s	°	'	"		'	"	h	m	s
Apr.	1	0	40	36.00	+4	22	07.35	0.999 0467	16	00.56	12	03	55.07
	2	0	44	14.78	4	45	17.02	0.999 3395	16	00.28	12	03	37.37
	3	0	47	53.70	5	08	21.65	0.999 6319	16	00.00	12	03	19.81
	4	0	51	32.76	5	31	20.88	0.999 9233	15	59.72	12	03	02.40
	5	0	55	11.98	5	54	14.33	1.000 2137	15	59.44	12	02	45.18
	6	0	58	51.39	6	17	01.65	1.000 5027	15	59.16	12	02	28.14
	7	1	02	31.00	+6	39	42.48	1.000 7902	15	58.89	12	02	11.31
	8	1	06	10.82	7	02	16.44	1.001 0759	15	58.61	12	01	54.69
	9	1	09	50.87	7	24	43.17	1.001 3599	15	58.34	12	01	38.31
	10	1	13	31.16	7	47	02.32	1.001 6421	15	58.07	12	01	22.18
	11	1	17	11.72	8	09	13.51	1.001 9225	15	57.80	12	01	06.31
	12	1	20	52.54	8	31	16.40	1.002 2014	15	57.54	12	00	50.71
	13	1	24	33.64	+8	53	10.61	1.002 4789	15	57.27	12	00	35.39
	14	1	28	15.03	9	14	55.80	1.002 7553	15	57.01	12	00	20.39
	15	1	31	56.74	9	36	31.63	1.003 0308	15	56.75	12	00	05.69
	16	1	35	38.76	9	57	57.75	1.003 3057	15	56.48	11	59	51.34
	17	1	39	21.12	10	19	13.84	1.003 5802	15	56.22	11	59	37.33
	18	1	43	03.85	10	40	19.61	1.003 8545	15	55.96	11	59	23.69
	19	1	46	46.94	+11	01	14.74	1.004 1288	15	55.70	11	59	10.44
	20	1	50	30.44	11	21	58.95	1.004 4031	15	55.44	11	58	57.59
	21	1	54	14.35	11	42	31.94	1.004 6774	15	55.18	11	58	45.16
	22	1	57	58.69	12	02	53.41	1.004 9517	15	54.92	11	58	33.18
	23	2	01	43.49	12	23	03.05	1.005 2258	15	54.66	11	58	21.65
	24	2	05	28.75	12	43	00.53	1.005 4994	15	54.40	11	58	10.59
	25	2	09	14.49	+13	02	45.51	1.005 7724	15	54.14	11	58	00.01
	26	2	13	00.71	13	22	17.53	1.006 0445	15	53.88	11	57	49.91
	27	2	16	47.41	13	41	36.68	1.006 3154	15	53.62	11	57	40.31
	28	2	20	34.65	14	00	42.60	1.006 5848	15	53.37	11	57	31.26
	29	2	24	22.41	14	19	34.64	1.006 8524	15	53.11	11	57	22.73
	30	2	28	10.71	14	38	12.54	1.007 1179	15	52.86	11	57	14.74
May	1	2	31	59.54	+14	56	35.98	1.007 3810	15	52.61	11	57	07.30
	2	2	35	48.92	15	14	44.64	1.007 6413	15	52.37	11	57	00.41
	3	2	39	38.86	15	32	38.20	1.007 8986	15	52.12	11	56	54.08
	4	2	43	29.36	15	50	16.32	1.008 1526	15	51.88	11	56	48.30
	5	2	47	20.42	16	07	38.69	1.008 4029	15	51.65	11	56	43.10
	6	2	51	12.05	16	24	44.98	1.008 6494	15	51.42	11	56	38.46
	7	2	55	04.26	+16	41	34.87	1.008 8919	15	51.19	11	56	34.38
	8	2	58	57.02	16	58	08.03	1.009 1302	15	50.96	11	56	30.87
	9	3	02	50.36	17	14	24.17	1.009 3644	15	50.74	11	56	27.92
	10	3	06	44.25	17	30	22.94	1.009 5946	15	50.52	11	56	25.52
	11	3	10	38.70	17	46	04.05	1.009 8208	15	50.31	11	56	23.68
	12	3	14	33.70	18	01	27.19	1.010 0435	15	50.10	11	56	22.39
	13	3	18	29.24	+18	16	32.04	1.010 2627	15	49.90	11	56	21.66
	14	3	22	25.34	18	31	18.34	1.010 4788	15	49.69	11	56	21.47
	15	3	26	21.97	18	45	45.80	1.010 6922	15	49.49	11	56	21.83
	16	3	30	19.16	18	59	54.17	1.010 9029	15	49.29	11	56	22.73
	17	3	34	16.89	+19	13	43.19	1.011 1113	15	49.10	11	56	24.19

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FOR 0^h TERRESTRIAL TIME

Date		Geometric Longitude* (Mean Equinox of date)			Latitude (Ecliptic of date)	Apparent Longitude (True equinox of date)			Aberration	Prec. in Long. (J 2027.5 of date)	Nut. in Long.	Nut. in Obliquity	True Obliquity (23° 26')
		°	'	"	"	°	'	"	"	"	"	"	"
May	17	55	53	52.91	-0.65	55	53	43.33	20.27	-6.53	+10.65	+6.47	15.05
	18	56	51	41.23	0.68	56	51	31.61	20.27	6.39	10.60	6.40	14.99
	19	57	49	27.97	0.72	57	49	18.34	20.26	6.25	10.59	6.33	14.91
	20	58	47	13.21	0.72	58	47	03.62	20.26	6.11	10.63	6.26	14.84
	21	59	44	57.08	0.72	59	44	47.58	20.25	5.97	10.71	6.20	14.78
	22	60	42	39.58	0.65	60	42	30.20	20.25	5.84	10.83	6.16	14.74
	23	61	40	20.86	-0.58	61	40	11.60	20.25	-5.70	+10.95	+6.13	14.71
	24	62	38	00.95	0.47	62	37	51.82	20.24	5.56	11.06	6.13	14.70
	25	63	35	39.91	0.36	63	35	30.88	20.24	5.42	11.16	6.14	14.71
	26	64	33	17.83	0.25	64	33	08.86	20.23	5.28	11.22	6.16	14.73
	27	65	30	54.78	-0.14	65	30	45.83	20.23	5.14	11.24	6.18	14.76
	28	66	28	30.72	0.00	66	28	21.76	20.23	5.00	11.22	6.20	14.78
	29	67	26	05.79	+0.11	67	25	56.78	20.22	-4.86	+11.17	+6.22	14.79
	30	68	23	39.95	0.22	68	23	30.88	20.22	4.72	11.10	6.21	14.78
	31	69	21	13.29	0.29	69	21	04.14	20.22	4.58	11.02	6.18	14.75
June	1	70	18	45.78	0.32	70	18	36.58	20.21	4.44	10.96	6.14	14.70
	2	71	16	17.40	0.36	71	16	08.18	20.21	4.30	10.95	6.07	14.64
	3	72	13	48.17	0.36	72	13	39.00	20.21	4.16	10.99	6.00	14.56
	4	73	11	18.08	+0.32	73	11	09.02	20.20	-4.02	+11.11	+5.93	14.49
	5	74	08	47.06	0.25	74	08	38.18	20.20	3.88	11.28	5.88	14.44
	6	75	06	15.08	0.18	75	06	06.41	20.20	3.75	11.49	5.85	14.41
	7	76	03	42.09	+0.07	76	03	33.62	20.20	3.61	11.68	5.86	14.42
	8	77	01	08.04	-0.07	77	00	59.72	20.19	3.47	11.84	5.90	14.46
	9	77	58	32.86	-0.22	77	58	24.64	20.19	3.33	11.92	5.94	14.50
	10	78	55	56.60	-0.32	78	55	48.40	20.19	-3.19	+11.94	+5.98	14.54
	11	79	53	19.25	0.47	79	53	11.00	20.19	3.05	11.90	6.01	14.56
	12	80	50	40.81	0.58	80	50	32.50	20.19	2.91	11.83	6.00	14.56
	13	81	48	01.28	0.65	81	47	52.91	20.18	2.77	11.76	5.98	14.53
	14	82	45	20.79	0.72	82	45	12.38	20.18	2.63	11.73	5.93	14.48
	15	83	42	39.40	0.76	83	42	31.00	20.18	2.49	11.73	5.87	14.42
	16	84	39	57.13	-0.76	84	39	48.78	20.18	-2.35	+11.78	+5.82	14.36
	17	85	37	14.06	0.72	85	37	05.81	20.18	2.21	11.88	5.77	14.31
	18	86	34	30.32	0.68	86	34	22.19	20.17	2.07	12.00	5.73	14.28
	19	87	31	45.95	0.58	87	31	37.96	20.17	1.93	12.14	5.72	14.26
	20	88	29	01.07	0.50	88	28	53.22	20.17	1.79	12.27	5.72	14.26
	21	89	26	15.71	0.40	89	26	07.98	20.17	1.65	12.39	5.74	14.28
	22	90	23	29.99	-0.25	90	23	22.34	20.17	-1.52	+12.47	+5.77	14.31
	23	91	20	43.99	-0.14	91	20	36.38	20.17	1.38	12.52	5.81	14.35
	24	92	17	57.73	0.00	92	17	50.14	20.17	1.24	12.53	5.85	14.39
	25	93	15	11.33	+0.11	93	15	03.71	20.16	1.10	12.50	5.88	14.42
	26	94	12	24.85	0.22	94	12	17.17	20.16	0.96	12.44	5.90	14.43
	27	95	09	38.31	0.29	95	09	30.56	20.16	0.82	12.37	5.89	14.43
	28	96	06	51.76	+0.36	96	06	43.96	20.16	-0.68	+12.32	+5.87	14.40
	29	97	04	05.25	0.40	97	03	57.42	20.16	0.54	12.29	5.83	14.36
	30	98	01	18.76	0.40	98	01	10.96	20.16	0.40	12.31	5.77	14.30
July	1	98	58	32.39	0.40	98	58	24.67	20.16	0.26	12.40	5.72	14.24
	2	99	55	46.06	+0.32	99	55	38.50	20.16	-0.12	+12.55	+5.67	14.20

*To obtain the geometric longitude referred to the mean equinox of J 2000.0, add -23' 03".003 and subtract precession from J 2027.5.

SUN, 2027
FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Semi Diameter		Ephemeris Transit		
		h	m	s	°	'	"		'	"	h	m	s
May	17	3	34	16.89	+19	13	43.19	1.011 1113	15	49.10	11	56	24.19
	18	3	38	15.17	19	27	12.62	1.011 3175	15	48.91	11	56	26.19
	19	3	42	14.00	19	40	22.22	1.011 5215	15	48.71	11	56	28.73
	20	3	46	13.38	19	53	11.76	1.011 7235	15	48.52	11	56	31.82
	21	3	50	13.29	20	05	41.00	1.011 9234	15	48.34	11	56	35.45
	22	3	54	13.75	20	17	49.70	1.012 1210	15	48.15	11	56	39.61
	23	3	58	14.74	+20	29	37.60	1.012 3164	15	47.97	11	56	44.30
	24	4	02	16.26	20	41	04.49	1.012 5092	15	47.79	11	56	49.51
	25	4	06	18.29	20	52	10.11	1.012 6993	15	47.61	11	56	55.24
	26	4	10	20.84	21	02	54.22	1.012 8865	15	47.44	11	57	01.48
	27	4	14	23.89	21	13	16.60	1.013 0706	15	47.26	11	57	08.22
	28	4	18	27.42	21	23	17.01	1.013 2512	15	47.09	11	57	15.44
	29	4	22	31.44	+21	32	55.23	1.013 4281	15	46.93	11	57	23.14
	30	4	26	35.92	21	42	11.04	1.013 6011	15	46.77	11	57	31.30
	31	4	30	40.86	21	51	04.24	1.013 7697	15	46.61	11	57	39.91
June	1	4	34	46.23	21	59	34.62	1.013 9337	15	46.46	11	57	48.95
	2	4	38	52.03	22	07	41.99	1.014 0928	15	46.31	11	57	58.39
	3	4	42	58.24	22	15	26.18	1.014 2467	15	46.17	11	58	08.23
	4	4	47	04.83	+22	22	47.03	1.014 3950	15	46.03	11	58	18.44
	5	4	51	11.78	22	29	44.36	1.014 5378	15	45.89	11	58	29.00
	6	4	55	19.06	22	36	18.04	1.014 6747	15	45.77	11	58	39.88
	7	4	59	26.66	22	42	27.91	1.014 8059	15	45.64	11	58	51.05
	8	5	03	34.53	22	48	13.84	1.014 9315	15	45.53	11	59	02.49
	9	5	07	42.66	22	53	35.69	1.015 0516	15	45.41	11	59	14.18
	10	5	11	51.02	+22	58	33.34	1.015 1665	15	45.31	11	59	26.09
	11	5	15	59.58	23	03	06.68	1.015 2766	15	45.21	11	59	38.20
	12	5	20	08.33	23	07	15.63	1.015 3821	15	45.11	11	59	50.49
	13	5	24	17.26	23	11	00.12	1.015 4834	15	45.01	12	00	02.94
	14	5	28	26.33	23	14	20.07	1.015 5807	15	44.92	12	00	15.53
	15	5	32	35.53	23	17	15.45	1.015 6743	15	44.84	12	00	28.23
	16	5	36	44.84	+23	19	46.21	1.015 7642	15	44.75	12	00	41.03
	17	5	40	54.24	23	21	52.31	1.015 8508	15	44.67	12	00	53.91
	18	5	45	03.72	23	23	33.72	1.015 9339	15	44.59	12	01	06.85
	19	5	49	13.24	23	24	50.41	1.016 0138	15	44.52	12	01	19.83
	20	5	53	22.79	23	25	42.36	1.016 0903	15	44.45	12	01	32.83
	21	5	57	32.35	23	26	09.56	1.016 1634	15	44.38	12	01	45.82
	22	6	01	41.90	+23	26	11.98	1.016 2330	15	44.32	12	01	58.80
	23	6	05	51.41	23	25	49.63	1.016 2990	15	44.25	12	02	11.73
	24	6	10	00.86	23	25	02.51	1.016 3613	15	44.20	12	02	24.59
	25	6	14	10.24	23	23	50.63	1.016 4196	15	44.14	12	02	37.37
	26	6	18	19.52	23	22	14.01	1.016 4737	15	44.09	12	02	50.05
	27	6	22	28.68	23	20	12.69	1.016 5234	15	44.05	12	03	02.59
	28	6	26	37.71	+23	17	46.71	1.016 5684	15	44.00	12	03	14.99
	29	6	30	46.57	23	14	56.12	1.016 6085	15	43.97	12	03	27.21
	30	6	34	55.25	23	11	41.00	1.016 6433	15	43.93	12	03	39.24
July	1	6	39	03.73	23	08	01.44	1.016 6726	15	43.91	12	03	51.04
	2	6	43	11.98	+23	03	57.54	1.016 6960	15	43.89	12	04	02.60

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FOR 0^h TERRESTRIAL TIME

Date		Geometric Longitude* (Mean Equinox of date)			Latitude (Ecliptic of date)	Apparent Longitude (True equinox of date)			Aberration	Prec. in Long. (J 2027.5 of date)	Nut. in Long.	Nut. in Obliquity	True Obliquity (23° 26')
		°	'	"	"	°	'	"	"	"	"	"	"
July	1	98	58	32.39	+0.40	98	58	24.67	20.16	-0.26	+12.40	+5.72	14.24
	2	99	55	46.06	0.32	99	55	38.50	20.16	-0.12	12.55	5.67	14.20
	3	100	52	59.79	0.25	100	52	52.43	20.16	+0.02	12.75	5.65	14.18
	4	101	50	13.54	+0.14	101	50	06.40	20.16	0.16	12.97	5.67	14.19
	5	102	47	27.22	-0.00	102	47	20.26	20.16	0.30	13.15	5.71	14.23
	6	103	44	40.82	-0.14	103	44	33.97	20.16	0.44	13.27	5.77	14.29
	7	104	41	54.28	-0.29	104	41	47.47	20.16	+0.57	+13.31	+5.83	14.35
	8	105	39	07.59	0.40	105	39	00.76	20.16	0.71	13.28	5.88	14.40
	9	106	36	20.73	0.54	106	36	13.82	20.16	0.85	13.21	5.90	14.42
	10	107	33	33.65	0.61	107	33	26.68	20.16	0.99	13.14	5.90	14.41
	11	108	30	46.45	0.68	108	30	39.42	20.16	1.13	13.09	5.87	14.38
	12	109	27	59.10	0.72	109	27	52.06	20.16	1.27	13.07	5.83	14.34
	13	110	25	11.70	-0.72	110	25	04.69	20.16	+1.41	+13.10	+5.78	14.30
	14	111	22	24.30	0.72	111	22	17.36	20.16	1.55	13.18	5.75	14.26
	15	112	19	36.94	0.65	112	19	30.11	20.16	1.69	13.28	5.72	14.24
	16	113	16	49.71	0.58	113	16	43.00	20.16	1.83	13.41	5.72	14.23
	17	114	14	02.73	0.50	114	13	56.14	20.17	1.97	13.53	5.73	14.24
	18	115	11	15.98	0.40	115	11	09.49	20.17	2.11	13.64	5.77	14.27
	19	116	08	29.62	-0.25	116	08	23.21	20.17	+2.25	+13.71	+5.81	14.32
	20	117	05	43.73	0.14	117	05	37.36	20.17	2.39	13.75	5.87	14.37
	21	118	02	58.31	-0.00	118	02	51.94	20.17	2.53	13.75	5.92	14.42
	22	119	00	13.55	+0.11	119	00	07.13	20.17	2.67	13.71	5.96	14.47
	23	119	57	29.42	0.22	119	57	22.93	20.17	2.80	13.64	6.00	14.50
	24	120	54	46.07	0.32	120	54	39.49	20.18	2.94	13.55	6.01	14.51
	25	121	52	03.55	+0.40	121	51	56.88	20.18	+3.08	+13.47	+6.01	14.50
	26	122	49	21.86	0.43	122	49	15.13	20.18	3.22	13.40	5.98	14.48
	27	123	46	41.15	0.47	123	46	34.39	20.18	3.36	13.38	5.95	14.44
	28	124	44	01.35	0.47	124	43	54.62	20.18	3.50	13.42	5.91	14.40
	29	125	41	22.56	0.40	125	41	15.94	20.18	3.64	13.51	5.87	14.36
	30	126	38	44.81	0.32	126	38	38.33	20.19	3.78	13.66	5.85	14.34
	31	127	36	08.07	+0.22	127	36	01.76	20.19	+3.92	+13.84	+5.86	14.35
Aug.	1	128	33	32.27	+0.11	128	33	26.14	20.19	4.06	14.01	5.90	14.39
	2	129	30	57.46	-0.04	129	30	51.44	20.19	4.20	14.13	5.97	14.46
	3	130	28	23.56	0.18	130	28	17.58	20.20	4.34	14.18	6.04	14.53
	4	131	25	50.48	0.32	131	25	44.47	20.20	4.48	14.15	6.11	14.59
	5	132	23	18.18	0.43	132	23	12.08	20.20	4.62	14.06	6.15	14.64
	6	133	20	46.62	-0.54	133	20	40.42	20.20	+4.76	+13.95	+6.16	14.65
	7	134	18	15.85	0.61	134	18	09.54	20.21	4.90	13.86	6.15	14.63
	8	135	15	45.75	0.65	135	15	39.38	20.21	5.03	13.80	6.12	14.60
	9	136	13	16.44	0.68	136	13	10.06	20.21	5.17	13.79	6.08	14.56
	10	137	10	47.91	0.65	137	10	41.56	20.22	5.31	13.82	6.04	14.52
	11	138	08	20.17	0.61	138	08	13.88	20.22	5.45	13.89	6.02	14.50
	12	139	05	53.32	-0.54	139	05	47.11	20.22	+5.59	+13.97	+6.02	14.49
	13	140	03	27.36	0.47	140	03	21.24	20.23	5.73	14.06	6.03	14.51
	14	141	01	02.39	0.36	141	00	56.34	20.23	5.87	14.14	6.07	14.54
	15	141	58	38.49	0.22	141	58	32.48	20.23	6.01	14.19	6.11	14.58
	16	142	56	15.66	-0.11	142	56	09.67	20.24	+6.15	+14.20	+6.17	14.64

*To obtain the geometric longitude referred to the mean equinox of J 2000.0, add -23' 03".003 and subtract precession from J 2027.5.

SUN, 2027

FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Semi Diameter		Ephemeris Transit		
		h	m	s	°	'	"		'	"	h	m	s
July	1	6	39	03.73	+23	08	01.44	1.016 6726	15	43.91	12	03	51.04
	2	6	43	11.98	23	03	57.54	1.016 6960	15	43.89	12	04	02.60
	3	6	47	19.97	22	59	29.42	1.016 7132	15	43.87	12	04	13.89
	4	6	51	27.68	22	54	37.21	1.016 7242	15	43.86	12	04	24.87
	5	6	55	35.08	22	49	21.05	1.016 7288	15	43.86	12	04	35.54
	6	6	59	42.13	22	43	41.08	1.016 7270	15	43.86	12	04	45.85
	7	7	03	48.81	+22	37	37.43	1.016 7189	15	43.86	12	04	55.79
	8	7	07	55.11	22	31	10.27	1.016 7049	15	43.88	12	05	05.32
	9	7	12	00.99	22	24	19.75	1.016 6852	15	43.90	12	05	14.44
	10	7	16	06.45	22	17	06.06	1.016 6601	15	43.92	12	05	23.13
	11	7	20	11.46	22	09	29.36	1.016 6300	15	43.95	12	05	31.36
	12	7	24	16.01	22	01	29.87	1.016 5953	15	43.98	12	05	39.12
	13	7	28	20.10	+21	53	07.76	1.016 5561	15	44.02	12	05	46.40
	14	7	32	23.70	21	44	23.26	1.016 5128	15	44.06	12	05	53.19
	15	7	36	26.80	21	35	16.55	1.016 4656	15	44.10	12	05	59.48
	16	7	40	29.39	21	25	47.86	1.016 4147	15	44.15	12	06	05.25
	17	7	44	31.46	21	15	57.38	1.016 3602	15	44.20	12	06	10.49
	18	7	48	33.01	21	05	45.32	1.016 3021	15	44.25	12	06	15.21
	19	7	52	34.01	+20	55	11.90	1.016 2406	15	44.31	12	06	19.38
	20	7	56	34.47	20	44	17.34	1.016 1757	15	44.37	12	06	23.01
	21	8	00	34.38	20	33	01.84	1.016 1074	15	44.43	12	06	26.08
	22	8	04	33.73	20	21	25.62	1.016 0355	15	44.50	12	06	28.59
	23	8	08	32.52	20	09	28.92	1.015 9601	15	44.57	12	06	30.54
	24	8	12	30.74	19	57	11.96	1.015 8809	15	44.64	12	06	31.93
	25	8	16	28.39	+19	44	34.97	1.015 7979	15	44.72	12	06	32.74
	26	8	20	25.46	19	31	38.20	1.015 7108	15	44.80	12	06	32.97
	27	8	24	21.97	19	18	21.91	1.015 6193	15	44.89	12	06	32.63
	28	8	28	17.89	19	04	46.35	1.015 5234	15	44.98	12	06	31.70
	29	8	32	13.24	18	50	51.80	1.015 4225	15	45.07	12	06	30.19
	30	8	36	08.00	18	36	38.55	1.015 3166	15	45.17	12	06	28.09
	31	8	40	02.18	+18	22	06.90	1.015 2051	15	45.27	12	06	25.40
Aug.	1	8	43	55.75	18	07	17.15	1.015 0881	15	45.38	12	06	22.11
	2	8	47	48.72	17	52	09.63	1.014 9651	15	45.50	12	06	18.21
	3	8	51	41.09	17	36	44.65	1.014 8362	15	45.62	12	06	13.71
	4	8	55	32.83	17	21	02.51	1.014 7014	15	45.74	12	06	08.59
	5	8	59	23.96	17	05	03.54	1.014 5610	15	45.87	12	06	02.86
	6	9	03	14.47	+16	48	48.03	1.014 4150	15	46.01	12	05	56.52
	7	9	07	04.37	16	32	16.32	1.014 2639	15	46.15	12	05	49.56
	8	9	10	53.66	16	15	28.70	1.014 1080	15	46.29	12	05	41.99
	9	9	14	42.35	15	58	25.51	1.013 9478	15	46.44	12	05	33.82
	10	9	18	30.43	15	41	07.05	1.013 7834	15	46.60	12	05	25.05
	11	9	22	17.93	15	23	33.64	1.013 6152	15	46.75	12	05	15.69
	12	9	26	04.84	+15	05	45.58	1.013 4436	15	46.91	12	05	05.75
	13	9	29	51.18	14	47	43.18	1.013 2688	15	47.08	12	04	55.24
	14	9	33	36.94	14	29	26.74	1.013 0910	15	47.24	12	04	44.17
	15	9	37	22.16	14	10	56.56	1.012 9104	15	47.41	12	04	32.55
	16	9	41	06.82	+13	52	12.93	1.012 7271	15	47.58	12	04	20.39

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FOR 0^h TERRESTRIAL TIME

Date		Geometric Longitude* (Mean Equinox of date)			Latitude (Ecliptic of date)	Apparent Longitude (True equinox of date)			Aberration	Prec. in Long. (J 2027.5 of date)	Nut. in Long.	Nut. in Obliquity	True Obliquity (23° 26')
		°	'	"	"	°	'	"	"	"	"	"	"
Aug.	16	142	56	15.66	-0.11	142	56	09.67	20.24	+6.15	+14.20	+6.17	14.64
	17	143	53	54.04	+0.04	143	53	48.01	20.24	6.29	14.17	6.22	14.69
	18	144	51	33.68	0.14	144	51	27.58	20.25	6.43	14.10	6.27	14.74
	19	145	49	14.64	0.25	145	49	08.44	20.25	6.57	14.00	6.31	14.78
	20	146	46	57.03	0.36	146	46	50.70	20.25	6.71	13.88	6.33	14.80
	21	147	44	40.90	0.43	147	44	34.44	20.26	6.85	13.75	6.33	14.80
	22	148	42	26.30	+0.50	148	42	19.73	20.26	+6.99	+13.65	+6.32	14.78
	23	149	40	13.35	0.54	149	40	06.71	20.26	7.13	13.57	6.28	14.74
	24	150	38	02.05	0.54	150	37	55.38	20.27	7.26	13.55	6.24	14.70
	25	151	35	52.50	0.50	151	35	45.85	20.27	7.40	13.58	6.20	14.66
	26	152	33	44.72	0.43	152	33	38.16	20.28	7.54	13.67	6.18	14.64
	27	153	31	38.71	0.36	153	31	32.27	20.28	7.68	13.79	6.18	14.63
	28	154	29	34.53	+0.22	154	29	28.21	20.29	+7.82	+13.92	+6.20	14.66
	29	155	27	32.14	+0.11	155	27	25.92	20.29	7.96	14.02	6.25	14.71
	30	156	25	31.51	-0.04	156	25	25.32	20.29	8.10	14.06	6.32	14.77
	31	157	23	32.60	0.18	157	23	26.38	20.30	8.24	14.03	6.39	14.84
Sept.	1	158	21	35.35	0.32	158	21	29.02	20.30	8.38	13.93	6.44	14.89
	2	159	19	39.72	0.43	159	19	33.24	20.31	8.52	13.79	6.46	14.91
	3	160	17	45.63	-0.50	160	17	39.01	20.31	+8.66	+13.65	+6.45	14.89
	4	161	15	53.03	0.58	161	15	46.30	20.32	8.80	13.54	6.41	14.86
	5	162	14	01.93	0.58	162	13	55.13	20.32	8.94	13.48	6.36	14.81
	6	163	12	12.25	0.58	163	12	05.44	20.33	9.08	13.47	6.32	14.76
	7	164	10	24.01	0.54	164	10	17.22	20.33	9.22	13.50	6.28	14.72
	8	165	08	37.26	0.50	165	08	30.52	20.34	9.36	13.55	6.26	14.70
	9	166	06	51.97	-0.40	166	06	45.29	20.34	+9.49	+13.62	+6.26	14.70
	10	167	05	08.21	0.29	167	05	01.57	20.35	9.63	13.67	6.28	14.72
	11	168	03	25.98	0.18	168	03	19.37	20.36	9.77	13.70	6.31	14.75
	12	169	01	45.33	-0.07	169	01	38.71	20.36	9.91	13.69	6.36	14.79
	13	170	00	06.35	+0.07	169	59	59.68	20.37	10.05	13.65	6.40	14.84
	14	170	58	29.06	0.18	170	58	22.30	20.37	10.19	13.56	6.44	14.88
	15	171	56	53.50	+0.32	171	56	46.61	20.38	+10.33	+13.44	+6.47	14.90
	16	172	55	19.76	0.43	172	55	12.72	20.38	10.47	13.29	6.49	14.92
	17	173	53	47.90	0.50	173	53	40.70	20.39	10.61	13.14	6.48	14.91
	18	174	52	18.01	0.58	174	52	10.67	20.39	10.75	13.01	6.45	14.88
	19	175	50	50.10	0.61	175	50	42.65	20.40	10.89	12.90	6.41	14.84
	20	176	49	24.26	0.61	176	49	16.75	20.40	11.03	12.85	6.36	14.78
	21	177	48	00.57	+0.58	177	47	53.05	20.41	+11.17	+12.85	+6.30	14.73
	22	178	46	39.09	0.50	178	46	31.62	20.42	11.31	12.90	6.26	14.68
	23	179	45	19.81	0.43	179	45	12.42	20.42	11.45	12.98	6.24	14.66
	24	180	44	02.78	0.32	180	43	55.49	20.43	11.59	13.09	6.24	14.66
	25	181	42	48.08	0.22	181	42	40.86	20.43	11.72	13.17	6.27	14.69
	26	182	41	35.61	+0.07	182	41	28.43	20.44	11.86	13.21	6.31	14.73
	27	183	40	25.44	-0.07	183	40	18.23	20.44	+12.00	+13.18	+6.36	14.78
	28	184	39	17.46	0.18	184	39	10.15	20.45	12.14	13.09	6.40	14.82
	29	185	38	11.65	0.29	185	38	04.20	20.45	12.28	12.95	6.42	14.83
	30	186	37	07.91	0.40	186	37	00.30	20.46	12.42	12.80	6.40	14.82
Oct.	1	187	36	06.24	-0.47	187	35	58.49	20.47	+12.56	+12.67	+6.36	14.77

*To obtain the geometric longitude referred to the mean equinox of J 2000.0, add -23' 03".003 and subtract precession from J 2027.5.

SUN, 2027
FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Semi Diameter		Ephemeris Transit		
		h	m	s	º	'	"		'	"	h	m	s
Aug.	16	9	41	06.82	+13	52	12.93	1.012 7271	15	47.58	12	04	20.39
	17	9	44	50.96	13	33	16.15	1.012 5414	15	47.76	12	04	07.71
	18	9	48	34.57	13	14	06.49	1.012 3532	15	47.93	12	03	54.52
	19	9	52	17.68	12	54	44.26	1.012 1627	15	48.11	12	03	40.84
	20	9	56	00.30	12	35	09.73	1.011 9698	15	48.29	12	03	26.67
	21	9	59	42.44	12	15	23.20	1.011 7746	15	48.48	12	03	12.04
	22	10	03	24.13	+11	55	24.94	1.011 5768	15	48.66	12	02	56.95
	23	10	07	05.37	11	35	15.27	1.011 3765	15	48.85	12	02	41.43
	24	10	10	46.20	11	14	54.48	1.011 1735	15	49.04	12	02	25.49
	25	10	14	26.61	10	54	22.87	1.010 9675	15	49.23	12	02	09.15
	26	10	18	06.63	10	33	40.76	1.010 7584	15	49.43	12	01	52.42
	27	10	21	46.26	10	12	48.48	1.010 5458	15	49.63	12	01	35.31
	28	10	25	25.54	+9	51	46.37	1.010 3295	15	49.83	12	01	17.84
	29	10	29	04.45	9	30	34.77	1.010 1092	15	50.04	12	01	00.03
	30	10	32	43.02	9	09	14.04	1.009 8847	15	50.25	12	00	41.87
	31	10	36	21.25	8	47	44.52	1.009 6558	15	50.47	12	00	23.40
Sept.	1	10	39	59.16	8	26	06.57	1.009 4225	15	50.69	12	00	04.60
	2	10	43	36.76	8	04	20.54	1.009 1848	15	50.91	11	59	45.51
	3	10	47	14.06	+7	42	26.77	1.008 9429	15	51.14	11	59	26.13
	4	10	50	51.09	7	20	25.61	1.008 6970	15	51.37	11	59	06.48
	5	10	54	27.85	6	58	17.39	1.008 4475	15	51.61	11	58	46.56
	6	10	58	04.36	6	36	02.46	1.008 1948	15	51.84	11	58	26.41
	7	11	01	40.64	6	13	41.17	1.007 9391	15	52.09	11	58	06.03
	8	11	05	16.71	5	51	13.83	1.007 6808	15	52.33	11	57	45.44
	9	11	08	52.58	+5	28	40.78	1.007 4204	15	52.58	11	57	24.67
	10	11	12	28.27	5	06	02.34	1.007 1580	15	52.82	11	57	03.72
	11	11	16	03.80	4	43	18.84	1.006 8940	15	53.07	11	56	42.63
	12	11	19	39.20	4	20	30.58	1.006 6287	15	53.33	11	56	21.41
	13	11	23	14.47	3	57	37.87	1.006 3622	15	53.58	11	56	00.09
	14	11	26	49.65	3	34	41.04	1.006 0949	15	53.83	11	55	38.68
	15	11	30	24.75	+3	11	40.37	1.005 8268	15	54.09	11	55	17.21
	16	11	33	59.80	2	48	36.17	1.005 5583	15	54.34	11	54	55.70
	17	11	37	34.82	2	25	28.75	1.005 2893	15	54.60	11	54	34.18
	18	11	41	09.84	2	02	18.39	1.005 0200	15	54.85	11	54	12.66
	19	11	44	44.88	1	39	05.41	1.004 7503	15	55.11	11	53	51.18
	20	11	48	19.96	1	15	50.11	1.004 4803	15	55.36	11	53	29.74
	21	11	51	55.12	+0	52	32.79	1.004 2098	15	55.62	11	53	08.39
	22	11	55	30.36	0	29	13.79	1.003 9387	15	55.88	11	52	47.14
	23	11	59	05.72	+0	05	53.43	1.003 6668	15	56.14	11	52	26.00
	24	12	02	41.21	-0	17	27.94	1.003 3940	15	56.40	11	52	05.01
	25	12	06	16.86	0	40	49.97	1.003 1199	15	56.66	11	51	44.19
	26	12	09	52.68	-1	04	12.29	1.002 8443	15	56.92	11	51	23.54
	27	12	13	28.68	-1	27	34.54	1.002 5668	15	57.19	11	51	03.10
	28	12	17	04.90	1	50	56.34	1.002 2875	15	57.45	11	50	42.88
	29	12	20	41.33	2	14	17.32	1.002 0060	15	57.72	11	50	22.89
	30	12	24	18.01	2	37	37.11	1.001 7223	15	57.99	11	50	03.16
Oct.	1	12	27	54.96	-3	00	55.32	1.001 4365	15	58.27	11	49	43.69

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FOR 0^h TERRESTRIAL TIME

Date		Geometric Longitude* (Mean Equinox of date)			Latitude (Ecliptic of date)	Apparent Longitude (True equinox of date)			Aberration	Prec. in Long. (J 2027.5 of date)	Nut. in Long.	Nut. in Obliquity	True Obliquity (23° 26')
		°	'	"	"	°	'	"	"	"	"	"	"
Oct.	1	187	36	06.24	-0.47	187	35	58.49	20.47	+12.56	+12.67	+6.36	14.77
	2	188	35	06.47	0.50	188	34	58.62	20.47	12.70	12.58	6.30	14.71
	3	189	34	08.62	0.50	189	34	00.73	20.48	12.84	12.55	6.23	14.64
	4	190	33	12.63	0.47	190	33	04.75	20.48	12.98	12.56	6.17	14.58
	5	191	32	18.40	0.43	191	32	10.57	20.49	13.12	12.61	6.13	14.54
	6	192	31	26.00	0.36	192	31	18.23	20.50	13.26	12.68	6.11	14.51
	7	193	30	35.37	-0.25	193	30	27.65	20.50	+13.40	+12.74	+6.10	14.50
	8	194	29	46.48	0.14	194	29	38.80	20.51	13.54	12.78	6.11	14.52
	9	195	28	59.39	-0.00	195	28	51.71	20.51	13.68	12.79	6.14	14.54
	10	196	28	14.06	+0.11	196	28	06.35	20.52	13.82	12.76	6.16	14.56
	11	197	27	30.58	0.25	197	27	22.79	20.53	13.96	12.69	6.19	14.59
	12	198	26	48.89	0.36	198	26	40.99	20.53	14.09	12.58	6.21	14.60
	13	199	26	09.07	+0.47	199	26	01.03	20.54	+14.23	+12.45	+6.21	14.60
	14	200	25	31.17	0.54	200	25	22.98	20.54	14.37	12.31	6.19	14.58
	15	201	24	55.20	0.61	201	24	46.87	20.55	14.51	12.18	6.15	14.54
	16	202	24	21.25	0.65	202	24	12.82	20.56	14.65	12.08	6.09	14.49
	17	203	23	49.30	0.65	203	23	40.81	20.56	14.79	12.02	6.03	14.42
	18	204	23	19.50	0.61	204	23	11.00	20.57	14.93	12.02	5.95	14.34
	19	205	22	51.87	+0.58	205	22	43.43	20.57	+15.07	+12.08	+5.89	14.28
	20	206	22	26.44	0.50	206	22	18.08	20.58	15.21	12.18	5.85	14.23
	21	207	22	03.29	0.40	207	21	55.04	20.58	15.35	12.30	5.83	14.21
	22	208	21	42.41	0.25	208	21	34.27	20.59	15.49	12.40	5.83	14.22
	23	209	21	23.81	0.14	209	21	15.73	20.60	15.63	12.47	5.86	14.24
	24	210	21	07.57	+0.00	210	20	59.50	20.60	15.77	12.48	5.89	14.27
	25	211	20	53.59	-0.11	211	20	45.46	20.61	+15.91	+12.43	+5.92	14.30
	26	212	20	41.85	0.25	212	20	33.61	20.61	16.05	12.32	5.93	14.31
	27	213	20	32.30	0.32	213	20	23.93	20.62	16.19	12.20	5.91	14.28
	28	214	20	24.90	0.40	214	20	16.40	20.62	16.32	12.08	5.86	14.24
	29	215	20	19.55	0.43	215	20	10.97	20.63	16.46	12.00	5.79	14.17
	30	216	20	16.13	0.47	216	20	07.51	20.63	16.60	11.98	5.71	14.09
	31	217	20	14.63	-0.43	217	20	06.04	20.64	+16.74	+12.00	+5.64	14.01
Nov.	1	218	20	14.92	0.40	218	20	06.40	20.64	16.88	12.08	5.57	13.95
	2	219	20	16.95	0.32	219	20	08.52	20.65	17.02	12.17	5.53	13.90
	3	220	20	20.67	0.22	220	20	12.34	20.66	17.16	12.27	5.51	13.88
	4	221	20	26.03	-0.11	221	20	17.77	20.66	17.30	12.36	5.50	13.87
	5	222	20	33.00	+0.00	222	20	24.79	20.67	17.44	12.41	5.51	13.88
	6	223	20	41.52	+0.14	223	20	33.32	20.67	+17.58	+12.43	+5.53	13.89
	7	224	20	51.59	0.25	224	20	43.37	20.68	17.72	12.41	5.55	13.91
	8	225	21	03.17	0.40	225	20	54.89	20.68	17.86	12.36	5.56	13.92
	9	226	21	16.29	0.47	226	21	07.92	20.69	18.00	12.27	5.56	13.92
	10	227	21	30.94	0.58	227	21	22.46	20.69	18.14	12.17	5.54	13.90
	11	228	21	47.10	0.65	228	21	38.52	20.70	18.28	12.08	5.50	13.86
	12	229	22	04.78	+0.68	229	21	56.12	20.70	+18.42	+12.00	+5.44	13.80
	13	230	22	24.07	0.68	230	22	15.38	20.71	18.56	11.97	5.37	13.72
	14	231	22	44.93	0.65	231	22	36.26	20.71	18.69	12.00	5.29	13.64
	15	232	23	07.46	0.61	232	22	58.87	20.72	18.83	12.08	5.22	13.57
	16	233	23	31.66	+0.50	233	23	23.21	20.72	+18.97	+12.22	+5.16	13.51

*To obtain the geometric longitude referred to the mean equinox of J 2000.0, add -23' 03".003 and subtract precession from J 2027.5.

SUN, 2027
FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Semi Diameter		Ephemeris Transit		
		h	m	s	°	'	"		'	"	h	m	s
Oct.	1	12	27	54.96	-3	00	55.32	1.001 4365	15	58.27	11	49	43.69
	2	12	31	32.17	3	24	11.59	1.001 1487	15	58.54	11	49	24.51
	3	12	35	09.69	3	47	25.54	1.000 8592	15	58.82	11	49	05.62
	4	12	38	47.52	4	10	36.80	1.000 5683	15	59.10	11	48	47.05
	5	12	42	25.67	4	33	44.99	1.000 2763	15	59.38	11	48	28.82
	6	12	46	04.17	4	56	49.75	0.999 9834	15	59.66	11	48	10.94
	7	12	49	43.04	-5	19	50.69	0.999 6902	15	59.94	11	47	53.44
	8	12	53	22.28	5	42	47.46	0.999 3968	16	00.22	11	47	36.33
	9	12	57	01.93	6	05	39.70	0.999 1037	16	00.51	11	47	19.62
	10	13	00	41.99	6	28	27.05	0.998 8111	16	00.79	11	47	03.35
	11	13	04	22.50	6	51	09.14	0.998 5194	16	01.07	11	46	47.54
	12	13	08	03.47	7	13	45.63	0.998 2288	16	01.35	11	46	32.19
	13	13	11	44.92	-7	36	16.17	0.997 9395	16	01.63	11	46	17.34
	14	13	15	26.87	7	58	40.39	0.997 6519	16	01.90	11	46	03.01
	15	13	19	09.35	8	20	57.97	0.997 3662	16	02.18	11	45	49.21
	16	13	22	52.38	8	43	08.54	0.997 0824	16	02.45	11	45	35.96
	17	13	26	35.98	9	05	11.76	0.996 8008	16	02.72	11	45	23.30
	18	13	30	20.17	9	27	07.28	0.996 5214	16	02.99	11	45	11.24
	19	13	34	04.98	-9	48	54.73	0.996 2441	16	03.26	11	44	59.79
	20	13	37	50.42	10	10	33.76	0.995 9690	16	03.53	11	44	48.99
	21	13	41	36.51	10	32	03.97	0.995 6958	16	03.79	11	44	38.85
	22	13	45	23.27	10	53	24.97	0.995 4244	16	04.06	11	44	29.38
	23	13	49	10.72	11	14	36.37	0.995 1545	16	04.32	11	44	20.61
	24	13	52	58.86	11	35	37.74	0.994 8859	16	04.58	11	44	12.55
	25	13	56	47.72	-11	56	28.67	0.994 6183	16	04.84	11	44	05.21
	26	14	00	37.30	12	17	08.74	0.994 3515	16	05.10	11	43	58.60
	27	14	04	27.63	12	37	37.53	0.994 0853	16	05.35	11	43	52.74
	28	14	08	18.70	12	57	54.63	0.993 8195	16	05.61	11	43	47.64
	29	14	12	10.54	13	18	00.00	0.993 5542	16	05.87	11	43	43.30
	30	14	16	03.14	13	37	52.06	0.993 2892	16	06.13	11	43	39.72
	31	14	19	56.52	-13	57	31.55	0.993 0248	16	06.39	11	43	36.93
Nov.	1	14	23	50.68	14	16	57.67	0.992 7611	16	06.64	11	43	34.91
	2	14	27	45.63	14	36	10.00	0.992 4983	16	06.90	11	43	33.68
	3	14	31	41.37	14	55	08.12	0.992 2368	16	07.15	11	43	33.25
	4	14	35	37.90	15	13	51.61	0.991 9767	16	07.41	11	43	33.62
	5	14	39	35.24	15	32	20.07	0.991 7185	16	07.66	11	43	34.79
	6	14	43	33.38	-15	50	33.08	0.991 4624	16	07.91	11	43	36.77
	7	14	47	32.34	16	08	30.24	0.991 2087	16	08.16	11	43	39.57
	8	14	51	32.11	16	26	11.16	0.990 9577	16	08.40	11	43	43.19
	9	14	55	32.70	16	43	35.44	0.990 7098	16	08.64	11	43	47.64
	10	14	59	34.12	17	00	42.69	0.990 4653	16	08.88	11	43	52.92
	11	15	03	36.38	17	17	32.53	0.990 2244	16	09.12	11	43	59.03
	12	15	07	39.47	-17	34	04.58	0.989 9874	16	09.35	11	44	05.99
	13	15	11	43.40	17	50	18.47	0.989 7545	16	09.58	11	44	13.78
	14	15	15	48.19	18	06	13.84	0.989 5261	16	09.80	11	44	22.42
	15	15	19	53.82	18	21	50.31	0.989 3021	16	10.02	11	44	31.91
	16	15	24	00.30	-18	37	07.51	0.989 0828	16	10.24	11	44	42.25

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FOR 0^h TERRESTRIAL TIME

Date	Geometric Longitude* (Mean Equinox of date)			Latitude (Ecliptic of date)	Apparent Longitude (True equinox of date)			Aberration	Prec. in Long. (J 2027.5 of date)	Nut. in Long.	Nut. in Obliquity	True Obliquity (23° 26')
	°	'	"	"	°	'	"	"	"	"	"	"
Nov. 16	233	23	31.66	+0.50	233	23	23.21	20.72	+18.97	+12.22	+5.16	13.51
17	234	23	57.60	0.43	234	23	49.31	20.73	19.11	12.38	5.13	13.48
18	235	24	25.35	0.29	235	24	17.21	20.73	19.25	12.54	5.13	13.48
19	236	24	54.89	0.14	236	24	46.87	20.73	19.39	12.67	5.15	13.49
20	237	25	26.26	+0.04	237	25	18.30	20.74	19.53	12.73	5.18	13.52
21	238	25	59.45	-0.11	238	25	51.49	20.74	19.67	12.73	5.21	13.55
22	239	26	34.46	-0.22	239	26	26.45	20.75	+19.81	+12.68	+5.22	13.56
23	240	27	11.27	0.32	240	27	03.17	20.75	19.95	12.61	5.21	13.55
24	241	27	49.76	0.40	241	27	41.58	20.76	20.09	12.53	5.17	13.51
25	242	28	29.92	0.43	242	28	21.68	20.76	20.23	12.48	5.11	13.45
26	243	29	11.69	0.47	243	29	03.44	20.76	20.37	12.47	5.03	13.37
27	244	29	54.91	0.43	244	29	46.72	20.77	20.51	12.53	4.96	13.30
28	245	30	39.56	-0.40	245	30	31.46	20.77	+20.65	+12.62	+4.90	13.23
29	246	31	25.48	0.32	246	31	17.51	20.77	20.79	12.76	4.85	13.18
30	247	32	12.68	0.22	247	32	04.85	20.78	20.93	12.90	4.82	13.16
Dec. 1	248	33	00.97	-0.11	248	32	53.27	20.78	21.06	13.03	4.82	13.15
2	249	33	50.33	+0.00	249	33	42.73	20.78	21.20	13.14	4.83	13.16
3	250	34	40.69	0.14	250	34	33.17	20.79	21.34	13.22	4.85	13.18
4	251	35	32.00	+0.25	251	35	24.50	20.79	+21.48	+13.25	+4.88	13.21
5	252	36	24.17	0.36	252	36	16.67	20.79	21.62	13.24	4.90	13.23
6	253	37	17.21	0.47	253	37	09.66	20.80	21.76	13.20	4.91	13.24
7	254	38	10.98	0.58	254	38	03.37	20.80	21.90	13.15	4.91	13.23
8	255	39	05.55	0.65	255	38	57.88	20.80	22.04	13.08	4.88	13.21
9	256	40	00.83	0.68	256	39	53.10	20.81	22.18	13.04	4.84	13.16
10	257	40	56.82	+0.68	257	40	49.08	20.81	+22.32	+13.02	+4.79	13.11
11	258	41	53.56	0.68	258	41	45.85	20.81	22.46	13.06	4.72	13.04
12	259	42	50.96	0.61	259	42	43.34	20.82	22.60	13.16	4.66	12.97
13	260	43	49.12	0.54	260	43	41.66	20.82	22.74	13.31	4.60	12.92
14	261	44	48.07	0.43	261	44	40.81	20.82	22.88	13.51	4.57	12.89
15	262	45	47.81	0.32	262	45	40.75	20.82	23.02	13.72	4.58	12.89
16	263	46	48.44	+0.18	263	46	41.56	20.82	+23.16	+13.89	+4.61	12.92
17	264	47	49.92	+0.04	264	47	43.15	20.83	23.30	14.01	4.65	12.96
18	265	48	52.33	-0.11	265	48	45.61	20.83	23.43	14.06	4.70	13.01
19	266	49	55.67	0.25	266	49	48.94	20.83	23.57	14.05	4.73	13.04
20	267	50	59.91	0.36	267	50	53.12	20.83	23.71	14.00	4.74	13.05
21	268	52	05.09	0.43	268	51	58.25	20.83	23.85	13.94	4.72	13.03
22	269	53	11.08	-0.50	269	53	04.20	20.83	+23.99	+13.90	+4.68	12.99
23	270	54	17.86	0.50	270	54	10.98	20.83	24.13	13.91	4.63	12.93
24	271	55	25.34	0.50	271	55	18.52	20.84	24.27	13.96	4.57	12.87
25	272	56	33.46	0.47	272	56	26.74	20.84	24.41	14.06	4.52	12.82
26	273	57	42.16	0.40	273	57	35.57	20.84	24.55	14.20	4.49	12.79
27	274	58	51.27	0.29	274	58	44.83	20.84	24.69	14.35	4.47	12.77
28	276	00	00.75	-0.18	275	59	54.46	20.84	+24.83	+14.50	+4.48	12.78
29	277	01	10.49	-0.07	277	01	04.33	20.84	24.97	14.63	4.51	12.80
30	278	02	20.42	+0.07	278	02	14.35	20.84	25.11	14.73	4.54	12.84
31	279	03	30.46	0.18	279	03	24.44	20.84	25.25	14.78	4.59	12.88
32	280	04	40.50	+0.32	280	04	34.50	20.84	+25.39	+14.79	+4.63	12.92

*To obtain the geometric longitude referred to the mean equinox of J 2000.0, add -23' 03".003 and subtract precession from J 2027.5.

SUN, 2027

FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Semi Diameter		Ephemeris Transit		
		h	m	s	º	'	"		'	"	h	m	s
Nov.	16	15	24	00.30	-18	37	07.51	0.989 0828	16	10.24	11	44	42.25
	17	15	28	07.64	18	52	05.08	0.988 8681	16	10.45	11	44	53.43
	18	15	32	15.82	19	06	42.63	0.988 6578	16	10.65	11	45	05.47
	19	15	36	24.85	19	21	00.00	0.988 4520	16	10.86	11	45	18.35
	20	15	40	34.72	19	34	56.13	0.988 2502	16	11.05	11	45	32.08
	21	15	44	45.43	19	48	31.30	0.988 0523	16	11.25	11	45	46.64
	22	15	48	56.96	-20	01	44.90	0.987 8580	16	11.44	11	46	02.02
	23	15	53	09.31	20	14	36.56	0.987 6670	16	11.63	11	46	18.23
	24	15	57	22.47	20	27	05.91	0.987 4791	16	11.81	11	46	35.23
	25	16	01	36.43	20	39	12.59	0.987 2941	16	12.00	11	46	53.02
	26	16	05	51.16	20	50	56.26	0.987 1117	16	12.17	11	47	11.57
	27	16	10	06.65	21	02	16.58	0.986 9320	16	12.35	11	47	30.88
	28	16	14	22.89	-21	13	13.21	0.986 7548	16	12.53	11	47	50.91
	29	16	18	39.84	21	23	45.84	0.986 5803	16	12.70	11	48	11.64
	30	16	22	57.48	21	33	54.15	0.986 4086	16	12.87	11	48	33.06
Dec.	1	16	27	15.80	21	43	37.83	0.986 2397	16	13.03	11	48	55.14
	2	16	31	34.75	21	52	56.58	0.986 0740	16	13.20	11	49	17.85
	3	16	35	54.33	22	01	50.12	0.985 9115	16	13.36	11	49	41.17
	4	16	40	14.50	-22	10	18.18	0.985 7527	16	13.51	11	50	05.08
	5	16	44	35.24	22	18	20.49	0.985 5976	16	13.67	11	50	29.54
	6	16	48	56.53	22	25	56.81	0.985 4466	16	13.82	11	50	54.54
	7	16	53	18.33	22	33	06.91	0.985 3000	16	13.96	11	51	20.05
	8	16	57	40.63	22	39	50.57	0.985 1579	16	14.10	11	51	46.04
	9	17	02	03.40	22	46	07.58	0.985 0209	16	14.24	11	52	12.48
	10	17	06	26.61	-22	51	57.76	0.984 8890	16	14.37	11	52	39.35
	11	17	10	50.23	22	57	20.93	0.984 7626	16	14.49	11	53	06.62
	12	17	15	14.25	23	02	16.92	0.984 6421	16	14.61	11	53	34.27
	13	17	19	38.64	23	06	45.60	0.984 5275	16	14.73	11	54	02.27
	14	17	24	03.36	23	10	46.82	0.984 4191	16	14.83	11	54	30.59
	15	17	28	28.39	23	14	20.46	0.984 3169	16	14.93	11	54	59.20
	16	17	32	53.70	-23	17	26.36	0.984 2210	16	15.03	11	55	28.09
	17	17	37	19.26	23	20	04.42	0.984 1313	16	15.12	11	55	57.21
	18	17	41	45.04	23	22	14.50	0.984 0474	16	15.20	11	56	26.55
	19	17	46	11.02	23	23	56.51	0.983 9692	16	15.28	11	56	56.06
	20	17	50	37.15	23	25	10.35	0.983 8964	16	15.35	11	57	25.73
	21	17	55	03.42	23	25	55.96	0.983 8286	16	15.42	11	57	55.51
	22	17	59	29.79	-23	26	13.29	0.983 7655	16	15.48	11	58	25.37
	23	18	03	56.22	23	26	02.34	0.983 7069	16	15.54	11	58	55.27
	24	18	08	22.67	23	25	23.08	0.983 6525	16	15.59	11	59	25.17
	25	18	12	49.12	23	24	15.54	0.983 6021	16	15.64	11	59	55.05
	26	18	17	15.52	23	22	39.76	0.983 5556	16	15.69	12	00	24.85
	27	18	21	41.83	23	20	35.77	0.983 5129	16	15.73	12	00	54.55
	28	18	26	08.01	-23	18	03.64	0.983 4740	16	15.77	12	01	24.10
	29	18	30	34.02	23	15	03.44	0.983 4388	16	15.81	12	01	53.46
	30	18	34	59.83	23	11	35.26	0.983 4075	16	15.84	12	02	22.60
	31	18	39	25.40	23	07	39.21	0.983 3802	16	15.86	12	02	51.49
	32	18	43	50.69	-23	03	15.41	0.983 3569	16	15.89	12	03	20.09

SUN, 2027

EQUATORIAL RECTANGULAR CO-ORDINATES FOR 0^h TERRESTRIAL TIME
MEAN EQUATOR AND EQUINOX OF J 2027.5 AND J 2000.0

Date		$X_{2027.5}$	$X_{2000.0}$	$Y_{2027.5}$	$Y_{2000.0}$	$Z_{2027.5}$	$Z_{2000.0}$
Jan.	0	+0.153 6090	+0.152 5767	-0.891 3107	-0.891 3076	-0.385 9497	-0.386 3661
	1	0.170 8588	0.169 8296	0.888 6687	0.888 6656	0.384 7589	0.385 2214
	2	0.188 0569	0.187 0312	0.885 7495	0.885 7465	0.383 4480	0.383 9564
	3	0.205 1977	0.204 1758	0.882 5540	0.882 5509	0.382 0172	0.382 5714
	4	0.222 2757	0.221 2578	0.879 0827	0.879 0797	0.380 4670	0.381 0668
	5	0.239 2852	0.238 2717	0.875 3368	0.875 3338	0.378 7977	0.379 4429
	6	+0.256 2207	+0.255 2119	-0.871 3172	-0.871 3142	-0.377 0098	-0.377 7003
	7	0.273 0765	0.272 0728	0.867 0251	0.867 0222	0.375 1040	0.375 8395
	8	0.289 8472	0.288 8489	0.862 4619	0.862 4590	0.373 0808	0.373 8610
	9	0.306 5273	0.305 5346	0.857 6291	0.857 6263	0.370 9408	0.371 7656
	10	0.323 1112	0.322 1245	0.852 5284	0.852 5255	0.368 6849	0.369 5540
	11	0.339 5937	0.338 6132	0.847 1613	0.847 1585	0.366 3138	0.367 2269
	12	+0.355 9692	+0.354 9953	-0.841 5300	-0.841 5272	-0.363 8285	-0.364 7853
	13	0.372 2326	0.371 2656	0.835 6363	0.835 6335	0.361 2297	0.362 2299
	14	0.388 3788	0.387 4190	0.829 4823	0.829 4796	0.358 5186	0.359 5619
	15	0.404 4025	0.403 4502	0.823 0705	0.823 0677	0.355 6961	0.356 7822
	16	0.420 2990	0.419 3545	0.816 4030	0.816 4003	0.352 7632	0.353 8917
	17	0.436 0633	0.435 1268	0.809 4823	0.809 4796	0.349 7211	0.350 8917
	18	+0.451 6908	+0.450 7627	-0.802 3110	-0.802 3084	-0.346 5709	-0.347 7832
	19	0.467 1768	0.466 2574	0.794 8916	0.794 8890	0.343 3137	0.344 5674
	20	0.482 5171	0.481 6066	0.787 2267	0.787 2242	0.339 9507	0.341 2453
	21	0.497 7073	0.496 8060	0.779 3189	0.779 3164	0.336 4829	0.337 8180
	22	0.512 7432	0.511 8514	0.771 1708	0.771 1683	0.332 9115	0.334 2867
	23	0.527 6207	0.526 7387	0.762 7848	0.762 7823	0.329 2375	0.330 6524
	24	+0.542 3356	+0.541 4636	-0.754 1633	-0.754 1609	-0.325 4619	-0.326 9161
	25	0.556 8838	0.556 0221	0.745 3089	0.745 3065	0.321 5857	0.323 0787
	26	0.571 2609	0.570 4098	0.736 2238	0.736 2215	0.317 6100	0.319 1413
	27	0.585 4625	0.584 6223	0.726 9107	0.726 9084	0.313 5358	0.315 1050
	28	0.599 4844	0.598 6553	0.717 3721	0.717 3699	0.309 3641	0.310 9708
	29	0.613 3221	0.612 5043	0.707 6108	0.707 6086	0.305 0963	0.306 7399
	30	+0.626 9711	+0.626 1649	-0.697 6295	-0.697 6273	-0.300 7335	-0.302 4135
	31	0.640 4271	0.639 6328	0.687 4312	0.687 4291	0.296 2770	0.297 9929
Feb.	1	0.653 6857	0.652 9035	0.677 0191	0.677 0170	0.291 7282	0.293 4794
	2	0.666 7425	0.665 9727	0.666 3963	0.666 3943	0.287 0884	0.288 8744
	3	0.679 5934	0.678 8362	0.655 5661	0.655 5641	0.282 3592	0.284 1795
	4	0.692 2342	0.691 4897	0.644 5319	0.644 5300	0.277 5420	0.279 3960
	5	+0.704 6606	+0.703 9293	-0.633 2974	-0.633 2955	-0.272 6384	-0.274 5256
	6	0.716 8688	0.716 1507	0.621 8661	0.621 8643	0.267 6501	0.269 5698
	7	0.728 8548	0.728 1502	0.610 2418	0.610 2400	0.262 5787	0.264 5303
	8	0.740 6147	0.739 9239	0.598 4284	0.598 4266	0.257 4259	0.259 4088
	9	0.752 1449	0.751 4680	0.586 4298	0.586 4281	0.252 1935	0.254 2071
	10	0.763 4418	0.762 7791	0.574 2501	0.574 2484	0.246 8832	0.248 9270
	11	+0.774 5019	+0.773 8536	-0.561 8934	-0.561 8918	-0.241 4970	-0.243 5703
	12	0.785 3221	0.784 6883	0.549 3640	0.549 3624	0.236 0367	0.238 1387
	13	0.795 8990	0.795 2800	0.536 6660	0.536 6645	0.230 5041	0.232 6343
	14	0.806 2299	0.805 6258	0.523 8039	0.523 8025	0.224 9011	0.227 0589
	15	+0.816 3119	+0.815 7229	-0.510 7819	-0.510 7805	-0.219 2297	-0.221 4144

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EQUATORIAL RECTANGULAR CO-ORDINATES FOR 0^h TERRESTRIAL TIME
MEAN EQUATOR AND EQUINOX OF J 2027.5 AND J 2000.0

Date		$X_{2027.5}$	$X_{2000.0}$	$Y_{2027.5}$	$Y_{2000.0}$	$Z_{2027.5}$	$Z_{2000.0}$
Feb.	15	+0.816 3119	+0.815 7229	-0.510 7819	-0.510 7805	-0.219 2297	-0.221 4144
	16	0.826 1423	0.825 5687	0.497 6044	0.497 6031	0.213 4918	0.215 7026
	17	0.835 7188	0.835 1606	0.484 2757	0.484 2744	0.207 6891	0.209 9254
	18	0.845 0389	0.844 4964	0.470 7999	0.470 7987	0.201 8235	0.204 0846
	19	0.854 1005	0.853 5737	0.457 1814	0.457 1803	0.195 8968	0.198 1821
	20	0.862 9012	0.862 3905	0.443 4242	0.443 4231	0.189 9108	0.192 2195
	21	+0.871 4391	+0.870 9445	-0.429 5324	-0.429 5313	-0.183 8671	-0.186 1985
	22	0.879 7119	0.879 2335	0.415 5099	0.415 5088	0.177 7674	0.180 1208
	23	0.887 7173	0.887 2554	0.401 3607	0.401 3597	0.171 6135	0.173 9882
	24	0.895 4531	0.895 0078	0.387 0888	0.387 0879	0.165 4069	0.167 8022
	25	0.902 9171	0.902 4884	0.372 6984	0.372 6975	0.159 1496	0.161 5647
	26	0.910 1069	0.909 6951	0.358 1935	0.358 1927	0.152 8432	0.155 2775
	27	+0.917 0203	+0.916 6254	-0.343 5785	-0.343 5777	-0.146 4897	-0.148 9423
	28	0.923 6551	0.923 2773	0.328 8576	0.328 8569	0.140 0909	0.142 5611
Mar.	1	0.930 0092	0.929 6486	0.314 0353	0.314 0347	0.133 6487	0.136 1358
	2	0.936 0806	0.935 7373	0.299 1162	0.299 1157	0.127 1651	0.129 6684
	3	0.941 8672	0.941 5414	0.284 1048	0.284 1043	0.120 6422	0.123 1609
	4	0.947 3673	0.947 0590	0.269 0058	0.269 0053	0.114 0820	0.116 6152
	5	+0.952 5792	+0.952 2884	-0.253 8238	-0.253 8234	-0.107 4866	-0.110 0336
	6	0.957 5010	0.957 2280	0.238 5637	0.238 5634	0.100 8580	0.103 4181
	7	0.962 1315	0.961 8762	0.223 2304	0.223 2301	0.094 1984	0.096 7708
	8	0.966 4691	0.966 2318	0.207 8287	0.207 8285	0.087 5100	0.090 0939
	9	0.970 5127	0.970 2933	0.192 3637	0.192 3635	0.080 7950	0.083 3895
	10	0.974 2612	0.974 0597	0.176 8403	0.176 8402	0.074 0556	0.076 6600
	11	+0.977 7135	+0.977 5301	-0.161 2636	-0.161 2636	-0.067 2940	-0.069 9075
	12	0.980 8691	0.980 7038	0.145 6387	0.145 6387	0.060 5124	0.063 1343
	13	0.983 7272	0.983 5801	0.129 9706	0.129 9707	0.053 7130	0.056 3425
	14	0.986 2876	0.986 1587	0.114 2645	0.114 2646	0.046 8981	0.049 5343
	15	0.988 5500	0.988 4394	0.098 5252	0.098 5254	0.040 0698	0.042 7119
	16	0.990 5144	0.990 4220	0.082 7577	0.082 7580	0.033 2303	0.035 8775
	17	+0.992 1807	+0.992 1066	-0.066 9670	-0.066 9672	-0.026 3815	-0.029 0332
	18	0.993 5492	0.993 4935	0.051 1576	0.051 1580	0.019 5257	0.022 1808
	19	0.994 6202	0.994 5828	0.035 3344	0.035 3348	0.012 6646	0.015 3225
	20	0.995 3939	0.995 3748	0.019 5017	0.019 5022	-0.005 8003	0.008 4602
	21	0.995 8706	0.995 8699	-0.003 6642	-0.003 6647	+0.001 0653	-0.001 5957
	22	0.996 0506	0.996 0683	+0.012 1739	+0.012 1733	0.007 9305	+0.005 2691
	23	+0.995 9343	+0.995 9703	+0.028 0081	+0.028 0075	+0.014 7933	+0.012 1323
	24	0.995 5218	0.995 5761	0.043 8342	0.043 8335	0.021 6519	0.018 9921
	25	0.994 8133	0.994 8860	0.059 6477	0.059 6469	0.028 5044	0.025 8466
	26	0.993 8092	0.993 9001	0.075 4442	0.075 4434	0.035 3489	0.032 6939
	27	0.992 5096	0.992 6188	0.091 2192	0.091 2184	0.042 1835	0.039 5321
	28	0.990 9150	0.991 0424	0.106 9683	0.106 9674	0.049 0062	0.046 3591
	29	+0.989 0256	+0.989 1713	+0.122 6868	+0.122 6858	+0.055 8150	+0.053 1730
	30	0.986 8421	0.987 0060	0.138 3701	0.138 3691	0.062 6078	0.059 9719
	31	0.984 3650	0.984 5470	0.154 0137	0.154 0126	0.069 3828	0.066 7535
Apr.	1	0.981 5950	0.981 7951	0.169 6127	0.169 6116	0.076 1377	0.073 5160
	2	+0.978 5330	+0.978 7510	+0.185 1625	+0.185 1614	+0.082 8706	+0.080 2571

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EQUATORIAL RECTANGULAR CO-ORDINATES FOR 0^h TERRESTRIAL TIME
MEAN EQUATOR AND EQUINOX OF J 2027.5 AND J 2000.0

Date		$X_{2027.5}$	$X_{2000.0}$	$Y_{2027.5}$	$Y_{2000.0}$	$Z_{2027.5}$	$Z_{2000.0}$
Apr.	1	+0.981 5950	+0.981 7951	+0.169 6127	+0.169 6116	+0.076 1377	+0.073 5160
	2	0.978 5330	0.978 7510	0.185 1625	0.185 1614	0.082 8706	0.080 2571
	3	0.975 1798	0.975 4157	0.200 6585	0.200 6573	0.089 5794	0.086 9750
	4	0.971 5364	0.971 7902	0.216 0958	0.216 0945	0.096 2619	0.093 6673
	5	0.967 6040	0.967 8757	0.231 4696	0.231 4683	0.102 9161	0.100 3322
	6	0.963 3839	0.963 6733	0.246 7753	0.246 7739	0.109 5399	0.106 9674
	7	+0.958 8776	+0.959 1846	+0.262 0080	+0.262 0066	+0.116 1313	+0.113 5708
	8	0.954 0866	0.954 4112	0.277 1630	0.277 1615	0.122 6880	0.120 1405
	9	0.949 0128	0.949 3548	0.292 2355	0.292 2340	0.129 2081	0.126 6742
	10	0.943 6581	0.944 0174	0.307 2209	0.307 2193	0.135 6894	0.133 1700
	11	0.938 0245	0.938 4011	0.322 1145	0.322 1129	0.142 1301	0.139 6258
	12	0.932 1145	0.932 5082	0.336 9119	0.336 9102	0.148 5282	0.146 0398
	13	+0.925 9303	+0.926 3411	+0.351 6087	+0.351 6069	+0.154 8818	+0.152 4100
	14	0.919 4745	0.919 9021	0.366 2006	0.366 1988	0.161 1892	0.158 7347
	15	0.912 7496	0.913 1939	0.380 6836	0.380 6817	0.167 4485	0.165 0121
	16	0.905 7581	0.906 2191	0.395 0537	0.395 0518	0.173 6581	0.171 2405
	17	0.898 5026	0.898 9801	0.409 3070	0.409 3051	0.179 8165	0.177 4184
	18	0.890 9857	0.891 4795	0.423 4398	0.423 4379	0.185 9220	0.183 5440
	19	+0.883 2099	+0.883 7199	+0.437 4485	+0.437 4465	+0.191 9730	+0.189 6160
	20	0.875 1777	0.875 7038	0.451 3294	0.451 3273	0.197 9681	0.195 6326
	21	0.866 8914	0.867 4334	0.465 0789	0.465 0768	0.203 9057	0.201 5924
	22	0.858 3537	0.858 9114	0.478 6934	0.478 6913	0.209 7843	0.207 4939
	23	0.849 5668	0.850 1402	0.492 1693	0.492 1671	0.215 6023	0.213 3355
	24	0.840 5334	0.841 1221	0.505 5030	0.505 5008	0.221 3581	0.219 1155
	25	+0.831 2557	+0.831 8597	+0.518 6909	+0.518 6886	+0.227 0502	+0.224 8325
	26	0.821 7366	0.822 3556	0.531 7292	0.531 7269	0.232 6770	0.230 4848
	27	0.811 9785	0.812 6125	0.544 6143	0.544 6120	0.238 2368	0.236 0708
	28	0.801 9842	0.802 6329	0.557 3426	0.557 3402	0.243 7281	0.241 5889
	29	0.791 7566	0.792 4198	0.569 9104	0.569 9080	0.249 1492	0.247 0374
	30	0.781 2984	0.781 9760	0.582 3140	0.582 3115	0.254 4986	0.252 4148
May	1	+0.770 6128	+0.771 3045	+0.594 5498	+0.594 5473	+0.259 7746	+0.257 7194
	2	0.759 7027	0.760 4083	0.606 6142	0.606 6116	0.264 9756	0.262 9497
	3	0.748 5714	0.749 2907	0.618 5034	0.618 5008	0.270 1001	0.268 1040
	4	0.737 2221	0.737 9550	0.630 2140	0.630 2114	0.275 1464	0.273 1807
	5	0.725 6583	0.726 4045	0.641 7423	0.641 7396	0.280 1131	0.278 1783
	6	0.713 8836	0.714 6429	0.653 0848	0.653 0821	0.284 9984	0.283 0953
	7	+0.701 9017	+0.702 6739	+0.664 2381	+0.664 2354	+0.289 8011	+0.287 9300
	8	0.689 7164	0.690 5013	0.675 1987	0.675 1960	0.294 5195	0.292 6810
	9	0.677 3319	0.678 1292	0.685 9635	0.685 9607	0.299 1523	0.297 3470
	10	0.664 7523	0.665 5618	0.696 5293	0.696 5264	0.303 6982	0.301 9266
	11	0.651 9817	0.652 8031	0.706 8932	0.706 8903	0.308 1560	0.306 4186
	12	0.639 0243	0.639 8575	0.717 0524	0.717 0495	0.312 5245	0.310 8218
	13	+0.625 8845	+0.626 7292	+0.727 0044	+0.727 0015	+0.316 8027	+0.315 1351
	14	0.612 5664	0.613 4223	0.736 7467	0.736 7437	0.320 9894	0.319 3575
	15	0.599 0742	0.599 9411	0.746 2769	0.746 2739	0.325 0839	0.323 4881
	16	0.585 4120	0.586 2896	0.755 5928	0.755 5898	0.329 0851	0.327 5259
	17	+0.571 5837	+0.572 4718	+0.764 6923	+0.764 6893	+0.332 9921	+0.331 4699

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EQUATORIAL RECTANGULAR CO-ORDINATES FOR 0^h TERRESTRIAL TIME
MEAN EQUATOR AND EQUINOX OF J 2027.5 AND J 2000.0

Date		$X_{2027.5}$	$X_{2000.0}$	$Y_{2027.5}$	$Y_{2000.0}$	$Z_{2027.5}$	$Z_{2000.0}$
May	17	+0.571 5837	+0.572 4718	+0.764 6923	+0.764 6893	+0.332 9921	+0.331 4699
	18	0.557 5935	0.558 4918	0.773 5732	0.773 5702	0.336 8041	0.335 3194
	19	0.543 4452	0.544 3535	0.782 2335	0.782 2304	0.340 5202	0.339 0733
	20	0.529 1427	0.530 0608	0.790 6709	0.790 6678	0.344 1395	0.342 7308
	21	0.514 6900	0.515 6175	0.798 8836	0.798 8804	0.347 6610	0.346 2911
	22	0.500 0909	0.501 0277	0.806 8693	0.806 8662	0.351 0840	0.349 7531
	23	+0.485 3495	+0.486 2952	+0.814 6261	+0.814 6229	+0.354 4074	+0.353 1160
	24	0.470 4695	0.471 4239	0.822 1519	0.822 1487	0.357 6305	0.356 3788
	25	0.455 4552	0.456 4180	0.829 4446	0.829 4414	0.360 7522	0.359 5407
	26	0.440 3105	0.441 2814	0.836 5022	0.836 4990	0.363 7717	0.362 6008
	27	0.425 0395	0.426 0182	0.843 3228	0.843 3195	0.366 6881	0.365 5580
	28	0.409 6464	0.410 6327	0.849 9042	0.849 9010	0.369 5006	0.368 4117
	29	+0.394 1355	+0.395 1291	+0.856 2446	+0.856 2413	+0.372 2082	+0.371 1608
	30	0.378 5111	0.379 5117	0.862 3420	0.862 3388	0.374 8102	0.373 8045
	31	0.362 7776	0.363 7849	0.868 1946	0.868 1913	0.377 3056	0.376 3420
June	1	0.346 9394	0.347 9532	0.873 8005	0.873 7972	0.379 6936	0.378 7724
	2	0.331 0012	0.332 0212	0.879 1579	0.879 1546	0.381 9736	0.381 0950
	3	0.314 9677	0.315 9935	0.884 2650	0.884 2617	0.384 1446	0.383 3089
	4	+0.298 8436	+0.299 8750	+0.889 1202	+0.889 1169	+0.386 2060	+0.385 4134
	5	0.282 6340	0.283 6706	0.893 7219	0.893 7186	0.388 1572	0.387 4079
	6	0.266 3438	0.267 3854	0.898 0689	0.898 0655	0.389 9975	0.389 2918
	7	0.249 9783	0.251 0246	0.902 1597	0.902 1564	0.391 7266	0.391 0646
	8	0.233 5424	0.234 5931	0.905 9936	0.905 9902	0.393 3439	0.392 7259
	9	0.217 0414	0.218 0962	0.909 5696	0.909 5662	0.394 8492	0.394 2754
	10	+0.200 4803	+0.201 5389	+0.912 8870	+0.912 8836	+0.396 2424	+0.395 7128
	11	0.183 8640	0.184 9261	0.915 9454	0.915 9420	0.397 5231	0.397 0379
	12	0.167 1974	0.168 2626	0.918 7443	0.918 7409	0.398 6914	0.398 2507
	13	0.150 4853	0.151 5534	0.921 2834	0.921 2800	0.399 7470	0.399 3510
	14	0.133 7322	0.134 8029	0.923 5624	0.923 5590	0.400 6899	0.400 3387
	15	0.116 9429	0.118 0159	0.925 5810	0.925 5777	0.401 5200	0.401 2137
	16	+0.100 1218	+0.101 1968	+0.927 3391	+0.927 3358	+0.402 2372	+0.401 9758
	17	0.083 2735	0.084 3501	0.928 8364	0.928 8331	0.402 8414	0.402 6251
	18	0.066 4024	0.067 4803	0.930 0727	0.930 0694	0.403 3326	0.403 1614
	19	0.049 5129	0.050 5919	0.931 0479	0.931 0445	0.403 7107	0.403 5846
	20	0.032 6095	0.033 6894	0.931 7617	0.931 7583	0.403 9756	0.403 8947
	21	+0.015 6968	+0.016 7770	0.932 2140	0.932 2107	0.404 1271	0.404 0914
	22	-0.001 2210	-0.000 1405	+0.932 4047	+0.932 4013	+0.404 1653	+0.404 1748
	23	0.018 1392	0.017 0589	0.932 3336	0.932 3303	0.404 0901	0.404 1448
	24	0.035 0533	0.033 9734	0.932 0007	0.931 9974	0.403 9013	0.404 0012
	25	0.051 9588	0.050 8797	0.931 4058	0.931 4025	0.403 5991	0.403 7441
	26	0.068 8510	0.067 7730	0.930 5491	0.930 5458	0.403 1832	0.403 3734
	27	0.085 7254	0.084 6487	0.929 4304	0.929 4271	0.402 6538	0.402 8890
	28	-0.102 5771	-0.101 5021	+0.928 0499	+0.928 0466	+0.402 0108	+0.402 2911
	29	0.119 4016	0.118 3285	0.926 4076	0.926 4044	0.401 2543	0.401 5795
	30	0.136 1938	0.135 1230	0.924 5038	0.924 5006	0.400 3843	0.400 7544
July	1	0.152 9490	0.151 8808	0.922 3387	0.922 3355	0.399 4009	0.399 8158
	2	-0.169 6621	-0.168 5967	+0.919 9125	+0.919 9093	+0.398 3044	+0.398 7639

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EQUATORIAL RECTANGULAR CO-ORDINATES FOR 0^h TERRESTRIAL TIME
MEAN EQUATOR AND EQUINOX OF J 2027.5 AND J 2000.0

Date		$X_{2027.5}$	$X_{2000.0}$	$Y_{2027.5}$	$Y_{2000.0}$	$Z_{2027.5}$	$Z_{2000.0}$
July	1	-0.152 9490	-0.151 8808	+0.922 3387	+0.922 3355	+0.399 4009	+0.399 8158
	2	0.169 6621	0.168 5967	0.919 9125	0.919 9093	0.398 3044	0.398 7639
	3	0.186 3281	0.185 2659	0.917 2259	0.917 2227	0.397 0949	0.397 5989
	4	0.202 9417	0.201 8830	0.914 2793	0.914 2762	0.395 7728	0.396 3212
	5	0.219 4980	0.218 4430	0.911 0737	0.911 0705	0.394 3384	0.394 9310
	6	0.235 9916	0.234 9407	0.907 6100	0.907 6069	0.392 7923	0.393 4289
	7	-0.252 4176	-0.251 3711	+0.903 8894	+0.903 8864	+0.391 1350	+0.391 8155
	8	0.268 7710	0.267 7291	0.899 9134	0.899 9103	0.389 3672	0.390 0914
	9	0.285 0470	0.284 0101	0.895 6834	0.895 6803	0.387 4896	0.388 2572
	10	0.301 2410	0.300 2094	0.891 2009	0.891 1979	0.385 5029	0.386 3138
	11	0.317 3485	0.316 3224	0.886 4677	0.886 4647	0.383 4079	0.384 2618
	12	0.333 3651	0.332 3449	0.881 4852	0.881 4823	0.381 2052	0.382 1019
	13	-0.349 2865	-0.348 2723	+0.876 2553	+0.876 2524	+0.378 8957	+0.379 8349
	14	0.365 1083	0.364 1006	0.870 7795	0.870 7766	0.376 4801	0.377 4615
	15	0.380 8266	0.379 8255	0.865 0596	0.865 0567	0.373 9590	0.374 9824
	16	0.396 4370	0.395 4429	0.859 0973	0.859 0944	0.371 3333	0.372 3983
	17	0.411 9356	0.410 9488	0.852 8941	0.852 8913	0.368 6036	0.369 7100
	18	0.427 3183	0.426 3389	0.846 4520	0.846 4492	0.365 7707	0.366 9182
	19	-0.442 5809	-0.441 6093	+0.839 7724	+0.839 7697	+0.362 8353	+0.364 0235
	20	0.457 7195	0.456 7560	0.832 8573	0.832 8546	0.359 7981	0.361 0267
	21	0.472 7299	0.471 7748	0.825 7084	0.825 7057	0.356 6599	0.357 9286
	22	0.487 6083	0.486 6617	0.818 3273	0.818 3247	0.353 4215	0.354 7298
	23	0.502 3504	0.501 4127	0.810 7160	0.810 7134	0.350 0835	0.351 4312
	24	0.516 9522	0.516 0237	0.802 8763	0.802 8738	0.346 6468	0.348 0335
	25	-0.531 4097	-0.530 4906	+0.794 8101	+0.794 8075	+0.343 1122	+0.344 5374
	26	0.545 7187	0.544 8092	0.786 5192	0.786 5167	0.339 4804	0.340 9439
	27	0.559 8750	0.558 9755	0.778 0057	0.778 0032	0.335 7524	0.337 2536
	28	0.573 8745	0.572 9851	0.769 2716	0.769 2692	0.331 9290	0.333 4676
	29	0.587 7130	0.586 8340	0.760 3190	0.760 3166	0.328 0112	0.329 5867
	30	0.601 3861	0.600 5178	0.751 1501	0.751 1478	0.323 9999	0.325 6119
	31	-0.614 8895	-0.614 0321	+0.741 7673	+0.741 7650	+0.319 8962	+0.321 5442
Aug.	1	0.628 2190	0.627 3728	0.732 1731	0.732 1708	0.315 7012	0.317 3847
	2	0.641 3701	0.640 5353	0.722 3701	0.722 3679	0.311 4161	0.313 1347
	3	0.654 3387	0.653 5155	0.712 3612	0.712 3590	0.307 0422	0.308 7954
	4	0.667 1206	0.666 3093	0.702 1495	0.702 1474	0.302 5809	0.304 3682
	5	0.679 7119	0.678 9127	0.691 7381	0.691 7360	0.298 0337	0.299 8545
	6	-0.692 1088	-0.691 3220	+0.681 1304	+0.681 1283	+0.293 4019	+0.295 2558
	7	0.704 3077	0.703 5335	0.670 3295	0.670 3275	0.288 6871	0.290 5735
	8	0.716 3053	0.715 5438	0.659 3390	0.659 3370	0.283 8908	0.285 8092
	9	0.728 0982	0.727 3497	0.648 1621	0.648 1602	0.279 0144	0.280 9643
	10	0.739 6832	0.738 9479	0.636 8021	0.636 8003	0.274 0594	0.276 0401
	11	0.751 0573	0.750 3354	0.625 2625	0.625 2607	0.269 0272	0.271 0383
	12	-0.762 2174	-0.761 5091	+0.613 5465	+0.613 5447	+0.263 9193	+0.265 9601
	13	0.773 1606	0.772 4661	0.601 6573	0.601 6556	0.258 7370	0.260 8070
	14	0.783 8839	0.783 2035	0.589 5984	0.589 5967	0.253 4818	0.255 5803
	15	0.794 3846	0.793 7184	0.577 3730	0.577 3714	0.248 1551	0.250 2816
	16	-0.804 6597	-0.804 0079	+0.564 9844	+0.564 9828	+0.242 7583	+0.244 9122

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EQUATORIAL RECTANGULAR CO-ORDINATES FOR 0^h TERRESTRIAL TIME
MEAN EQUATOR AND EQUINOX OF J 2027.5 AND J 2000.0

Date		$X_{2027.5}$	$X_{2000.0}$	$Y_{2027.5}$	$Y_{2000.0}$	$Z_{2027.5}$	$Z_{2000.0}$
Aug.	16	-0.804 6597	-0.804 0079	+0.564 9844	+0.564 9828	+0.242 7583	+0.244 9122
	17	0.814 7066	0.814 0693	0.552 4359	0.552 4343	0.237 2928	0.239 4735
	18	0.824 5223	0.823 8998	0.539 7308	0.539 7293	0.231 7601	0.233 9668
	19	0.834 1042	0.833 4966	0.526 8724	0.526 8710	0.226 1614	0.228 3937
	20	0.843 4495	0.842 8570	0.513 8641	0.513 8627	0.220 4983	0.222 7555
	21	0.852 5555	0.851 9783	0.500 7092	0.500 7079	0.214 7722	0.217 0536
	22	-0.861 4195	-0.860 8577	+0.487 4111	+0.487 4099	+0.208 9846	+0.211 2896
	23	0.870 0387	0.869 4925	0.473 9732	0.473 9720	0.203 1368	0.205 4648
	24	0.878 4103	0.877 8800	0.460 3990	0.460 3978	0.197 2305	0.199 5807
	25	0.886 5317	0.886 0173	0.446 6920	0.446 6909	0.191 2671	0.193 6389
	26	0.894 4001	0.893 9017	0.432 8558	0.432 8547	0.185 2481	0.187 6409
	27	0.902 0126	0.901 5304	0.418 8940	0.418 8930	0.179 1754	0.181 5884
	28	-0.909 3666	-0.908 9007	+0.404 8106	+0.404 8096	+0.173 0504	+0.175 4830
	29	0.916 4593	0.916 0099	0.390 6094	0.390 6085	0.166 8750	0.169 3264
	30	0.923 2880	0.922 8552	0.376 2946	0.376 2937	0.160 6510	0.163 1206
	31	0.929 8502	0.929 4342	0.361 8703	0.361 8695	0.154 3803	0.156 8673
Sept.	1	0.936 1435	0.935 7444	0.347 3411	0.347 3404	0.148 0648	0.150 5686
	2	0.942 1657	0.941 7836	0.332 7113	0.332 7107	0.141 7066	0.144 2264
	3	-0.947 9149	-0.947 5498	+0.317 9857	+0.317 9850	+0.135 3077	+0.137 8427
	4	0.953 3892	0.953 0413	0.303 1686	0.303 1680	0.128 8700	0.131 4196
	5	0.958 5870	0.958 2564	0.288 2648	0.288 2643	0.122 3957	0.124 9590
	6	0.963 5070	0.963 1938	0.273 2787	0.273 2782	0.115 8866	0.118 4629
	7	0.968 1478	0.967 8520	0.258 2148	0.258 2143	0.109 3446	0.111 9333
	8	0.972 5081	0.972 2299	0.243 0775	0.243 0771	0.102 7718	0.105 3720
	9	-0.976 5868	-0.976 3263	+0.227 8713	+0.227 8710	+0.096 1699	+0.098 7809
	10	0.980 3829	0.980 1401	0.212 6005	0.212 6002	0.089 5409	0.092 1620
	11	0.983 8954	0.983 6703	0.197 2694	0.197 2692	0.082 8866	0.085 5169
	12	0.987 1232	0.986 9160	0.181 8824	0.181 8823	0.076 2089	0.078 8477
	13	0.990 0655	0.989 8762	0.166 4437	0.166 4437	0.069 5095	0.072 1561
	14	0.992 7215	0.992 5501	0.150 9577	0.150 9577	0.062 7904	0.065 4440
	15	-0.995 0903	-0.994 9369	+0.135 4285	+0.135 4285	+0.056 0532	+0.058 7131
	16	0.997 1712	0.997 0359	0.119 8604	0.119 8605	0.049 2999	0.051 9652
	17	0.998 9634	0.998 8461	0.104 2577	0.104 2578	0.042 5323	0.045 2023
	18	1.000 4662	1.000 3670	0.088 6245	0.088 6247	0.035 7521	0.038 4260
	19	1.001 6788	1.001 5978	0.072 9650	0.072 9653	0.028 9611	0.031 6382
	20	1.002 6006	1.002 5378	0.057 2836	0.057 2839	0.022 1613	0.024 8407
	21	-1.003 2309	-1.003 1863	+0.041 5845	+0.041 5849	+0.015 3544	+0.018 0353
	22	1.003 5689	1.003 5425	0.025 8721	0.025 8725	0.008 5423	0.011 2241
	23	1.003 6140	1.003 6058	+0.010 1506	+0.010 1511	+0.001 7270	+0.004 4087
	24	1.003 3656	1.003 3756	-0.005 5753	-0.005 5748	-0.005 0897	-0.002 4086
	25	1.002 8230	1.002 8513	0.021 3012	0.021 3006	0.011 9056	0.009 2261
	26	1.001 9858	1.002 0323	0.037 0223	0.037 0217	0.018 7187	0.016 0416
	27	-1.000 8535	-1.000 9182	-0.052 7339	-0.052 7332	-0.025 5269	-0.022 8529
	28	0.999 4260	0.999 5088	0.068 4311	0.068 4304	0.032 3280	0.029 6580
	29	0.997 7030	0.997 8040	0.084 1090	0.084 1081	0.039 1199	0.036 4545
	30	0.995 6848	0.995 8039	0.099 7624	0.099 7615	0.045 9003	0.043 2404
Oct.	1	-0.993 3716	-0.993 5089	-0.115 3863	-0.115 3854	-0.052 6670	-0.050 0134

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EQUATORIAL RECTANGULAR CO-ORDINATES FOR 0^h TERRESTRIAL TIME
MEAN EQUATOR AND EQUINOX OF J 2027.5 AND J 2000.0

Date		$X_{2027.5}$	$X_{2000.0}$	$Y_{2027.5}$	$Y_{2000.0}$	$Z_{2027.5}$	$Z_{2000.0}$
Oct.	1	-0.993 3716	-0.993 5089	-0.115 3863	-0.115 3854	-0.052 6670	-0.050 0134
	2	0.990 7642	0.990 9195	0.130 9758	0.130 9749	0.059 4178	0.056 7713
	3	0.987 8631	0.988 0364	0.146 5259	0.146 5249	0.066 1506	0.063 5119
	4	0.984 6693	0.984 8606	0.162 0317	0.162 0306	0.072 8632	0.070 2332
	5	0.981 1838	0.981 3930	0.177 4883	0.177 4872	0.079 5536	0.076 9330
	6	0.977 4078	0.977 6348	0.192 8911	0.192 8899	0.086 2198	0.083 6094
	7	-0.973 3425	-0.973 5872	-0.208 2355	-0.208 2343	-0.092 8597	-0.090 2603
	8	0.968 9890	0.969 2515	0.223 5168	0.223 5155	0.099 4715	0.096 8838
	9	0.964 3488	0.964 6289	0.238 7306	0.238 7293	0.106 0532	0.103 4780
	10	0.959 4233	0.959 7209	0.253 8724	0.253 8710	0.112 6030	0.110 0410
	11	0.954 2139	0.954 5289	0.268 9379	0.268 9364	0.119 1188	0.116 5709
	12	0.948 7221	0.949 0544	0.283 9225	0.283 9210	0.125 5990	0.123 0658
	13	-0.942 9494	-0.943 2990	-0.298 8222	-0.298 8206	-0.132 0416	-0.129 5240
	14	0.936 8975	0.937 2643	0.313 6326	0.313 6309	0.138 4448	0.135 9435
	15	0.930 5680	0.930 9518	0.328 3495	0.328 3478	0.144 8070	0.142 3226
	16	0.923 9625	0.924 3632	0.342 9688	0.342 9670	0.151 1262	0.148 6596
	17	0.917 0825	0.917 5000	0.357 4863	0.357 4845	0.157 4007	0.154 9526
	18	0.909 9299	0.910 3641	0.371 8979	0.371 8961	0.163 6288	0.161 1999
	19	-0.902 5061	-0.902 9568	-0.386 1995	-0.386 1977	-0.169 8086	-0.167 3996
	20	0.894 8129	0.895 2801	0.400 3869	0.400 3850	0.175 9383	0.173 5500
	21	0.886 8520	0.887 3354	0.414 4559	0.414 4540	0.182 0161	0.179 6492
	22	0.878 6251	0.879 1247	0.428 4022	0.428 4002	0.188 0401	0.185 6952
	23	0.870 1341	0.870 6496	0.442 2215	0.442 2195	0.194 0084	0.191 6863
	24	0.861 3808	0.861 9122	0.455 9094	0.455 9073	0.199 9191	0.197 6204
	25	-0.852 3674	-0.852 9144	-0.469 4614	-0.469 4593	-0.205 7701	-0.203 4957
	26	0.843 0961	0.843 6587	0.482 8731	0.482 8709	0.211 5595	0.209 3100
	27	0.833 5693	0.834 1472	0.496 1399	0.496 1377	0.217 2854	0.215 0614
	28	0.823 7897	0.824 3828	0.509 2573	0.509 2551	0.222 9457	0.220 7479
	29	0.813 7600	0.814 3681	0.522 2209	0.522 2186	0.228 5385	0.226 3675
	30	0.803 4833	0.804 1062	0.535 0262	0.535 0239	0.234 0619	0.231 9185
	31	-0.792 9628	-0.793 6002	-0.547 6690	-0.547 6667	-0.239 5140	-0.237 3988
Nov.	1	0.782 2016	0.782 8535	0.560 1452	0.560 1428	0.244 8930	0.242 8067
	2	0.771 2033	0.771 8694	0.572 4506	0.572 4481	0.250 1974	0.248 1405
	3	0.759 9713	0.760 6514	0.584 5813	0.584 5789	0.255 4252	0.253 3984
	4	0.748 5092	0.749 2032	0.596 5336	0.596 5311	0.260 5750	0.258 5790
	5	0.736 8207	0.737 5282	0.608 3038	0.608 3012	0.265 6452	0.263 6805
	6	-0.724 9093	-0.725 6301	-0.619 8881	-0.619 8855	-0.270 6343	-0.268 7014
	7	0.712 7787	0.713 5127	0.631 2832	0.631 2806	0.275 5407	0.273 6404
	8	0.700 4327	0.701 1797	0.642 4856	0.642 4830	0.280 3631	0.278 4958
	9	0.687 8751	0.688 6348	0.653 4920	0.653 4893	0.285 1000	0.283 2663
	10	0.675 1096	0.675 8818	0.664 2991	0.664 2964	0.289 7501	0.287 9506
	11	0.662 1401	0.662 9245	0.674 9039	0.674 9011	0.294 3120	0.292 5472
	12	-0.648 9704	-0.649 7668	-0.685 3031	-0.685 3003	-0.298 7845	-0.297 0550
	13	0.635 6042	0.636 4124	0.695 4938	0.695 4910	0.303 1662	0.301 4724
	14	0.622 0454	0.622 8650	0.705 4731	0.705 4703	0.307 4559	0.305 7984
	15	0.608 2977	0.609 1286	0.715 2381	0.715 2352	0.311 6523	0.310 0317
	16	-0.594 3648	-0.595 2068	-0.724 7858	-0.724 7830	-0.315 7542	-0.314 1709

SUN, 2027

EQUATORIAL RECTANGULAR CO-ORDINATES FOR 0^h TERRESTRIAL TIME
MEAN EQUATOR AND EQUINOX OF J 2027.5 AND J 2000.0

Date		$X_{2027.5}$	$X_{2000.0}$	$Y_{2027.5}$	$Y_{2000.0}$	$Z_{2027.5}$	$Z_{2000.0}$
Nov.	16	-0.594 3648	-0.595 2068	-0.724 7858	-0.724 7830	-0.315 7542	-0.314 1709
	17	0.580 2506	0.581 1034	0.734 1135	0.734 1105	0.319 7604	0.318 2148
	18	0.565 9589	0.566 8221	0.743 2180	0.743 2150	0.323 6695	0.322 1622
	19	0.551 4933	0.552 3668	0.752 0965	0.752 0935	0.327 4802	0.326 0116
	20	0.536 8579	0.537 7413	0.760 7460	0.760 7430	0.331 1912	0.329 7617
	21	0.522 0567	0.522 9498	0.769 1635	0.769 1605	0.334 8011	0.333 4113
	22	-0.507 0938	-0.507 9964	-0.777 3459	-0.777 3428	-0.338 3087	-0.336 9589
	23	0.491 9736	0.492 8854	0.785 2902	0.785 2872	0.341 7125	0.340 4031
	24	0.476 7006	0.477 6212	0.792 9935	0.792 9905	0.345 0113	0.343 7428
	25	0.461 2794	0.462 2086	0.800 4530	0.800 4499	0.348 2039	0.346 9766
	26	0.445 7148	0.446 6523	0.807 6657	0.807 6626	0.351 2889	0.350 1034
	27	0.430 0117	0.430 9572	0.814 6291	0.814 6260	0.354 2654	0.353 1218
	28	-0.414 1752	-0.415 1285	-0.821 3407	-0.821 3375	-0.357 1322	-0.356 0310
	29	0.398 2105	0.399 1711	0.827 7980	0.827 7948	0.359 8883	0.358 8298
	30	0.382 1226	0.383 0904	0.833 9989	0.833 9957	0.362 5328	0.361 5173
Dec.	1	0.365 9170	0.366 8916	0.839 9412	0.839 9380	0.365 0648	0.364 0927
	2	0.349 5987	0.350 5798	0.845 6231	0.845 6199	0.367 4836	0.366 5551
	3	0.333 1732	0.334 1605	0.851 0427	0.851 0395	0.369 7884	0.368 9038
	4	-0.316 6456	-0.317 6389	-0.856 1985	-0.856 1952	-0.371 9786	-0.371 1382
	5	0.300 0213	0.301 0202	0.861 0887	0.861 0855	0.374 0534	0.373 2575
	6	0.283 3056	0.284 3098	0.865 7122	0.865 7089	0.376 0124	0.375 2612
	7	0.266 5037	0.267 5128	0.870 0674	0.870 0642	0.377 8550	0.377 1487
	8	0.249 6208	0.250 6347	0.874 1533	0.874 1501	0.379 5808	0.378 9196
	9	0.232 6623	0.233 6805	0.877 9688	0.877 9655	0.381 1892	0.380 5734
	10	-0.215 6332	-0.216 6554	-0.881 5127	-0.881 5095	-0.382 6800	-0.382 1097
	11	0.198 5387	0.199 5647	0.884 7844	0.884 7811	0.384 0527	0.383 5280
	12	0.181 3839	0.182 4133	0.887 7829	0.887 7796	0.385 3069	0.384 8282
	13	0.164 1738	0.165 2063	0.890 5075	0.890 5042	0.386 4425	0.386 0097
	14	0.146 9134	0.147 9487	0.892 9574	0.892 9541	0.387 4590	0.387 0724
	15	0.129 6075	0.130 6452	0.895 1320	0.895 1287	0.388 3561	0.388 0158
	16	-0.112 2611	-0.113 3010	-0.897 0304	-0.897 0272	-0.389 1335	-0.388 8396
	17	0.094 8791	0.095 9208	0.898 6520	0.898 6487	0.389 7909	0.389 5433
	18	0.077 4664	0.078 5096	0.899 9959	0.899 9926	0.390 3277	0.390 1267
	19	0.060 0282	0.061 0726	0.901 0613	0.901 0580	0.390 7437	0.390 5893
	20	0.042 5697	0.043 6149	0.901 8475	0.901 8442	0.391 0385	0.390 9307
	21	0.025 0963	0.026 1420	0.902 3537	0.902 3505	0.391 2118	0.391 1507
	22	-0.007 6133	-0.008 6592	-0.902 5795	-0.902 5762	-0.391 2633	-0.391 2490
	23	+0.009 8736	+0.008 8278	0.902 5242	0.902 5210	0.391 1928	0.391 2252
	24	0.027 3588	0.026 3135	0.902 1876	0.902 1844	0.391 0002	0.391 0794
	25	0.044 8367	0.043 7921	0.901 5695	0.901 5663	0.390 6855	0.390 8113
	26	0.062 3014	0.061 2579	0.900 6698	0.900 6667	0.390 2486	0.390 4211
	27	0.079 7472	0.078 7052	0.899 4887	0.899 4856	0.389 6896	0.389 9087
	28	+0.097 1684	+0.096 1281	-0.898 0265	-0.898 0233	-0.389 0088	-0.389 2744
	29	0.114 5591	0.113 5209	0.896 2835	0.896 2803	0.388 2062	0.388 5183
	30	0.131 9137	0.130 8779	0.894 2603	0.894 2572	0.387 2823	0.387 6408
	31	0.149 2264	0.148 1934	0.891 9578	0.891 9547	0.386 2374	0.386 6421
	32	+0.166 4917	+0.165 4617	-0.889 3767	-0.889 3736	-0.385 0719	-0.385 5227

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EPHEMERIS FOR PHYSICAL OBSERVATIONS
FOR 0^h TERRESTRIAL TIME

Date		Position Angle of Axis P	Heliographic Latitude B_0	Heliographic Longitude L_0	Date		Position Angle of Axis P	Heliographic Latitude B_0	Heliographic Longitude L_0
		°	°	°			°	°	°
Jan.	0	+2.66	-2.85	174.72	Feb.	15	-17.28	-6.81	289.01
	1	2.18	2.97	161.55		16	17.62	6.85	275.85
	2	1.69	3.08	148.38		17	17.95	6.89	262.68
	3	1.21	3.20	135.21		18	18.27	6.93	249.51
	4	0.73	3.32	122.04		19	18.59	6.97	236.34
	5	+0.24	3.43	108.87		20	18.90	7.00	223.17
	6	-0.24	-3.54	95.70		21	-19.20	-7.04	210.00
	7	0.73	3.65	82.53		22	19.50	7.07	196.83
	8	1.21	3.76	69.36		23	19.79	7.09	183.66
	9	1.69	3.87	56.19		24	20.08	7.12	170.49
	10	2.17	3.98	43.02		25	20.36	7.14	157.32
	11	2.64	4.09	29.86		26	20.64	7.16	144.15
	12	-3.12	-4.20	16.69		27	-20.91	-7.18	130.98
	13	3.60	4.30	3.52		28	21.17	7.20	117.81
	14	4.07	4.40	350.35	Mar.	1	21.43	7.21	104.63
	15	4.54	4.51	337.18		2	21.68	7.23	91.46
	16	5.00	4.61	324.02		3	21.92	7.23	78.29
	17	5.47	4.70	310.85		4	22.16	7.24	65.12
	18	-5.93	-4.80	297.68		5	-22.39	-7.25	51.94
	19	6.39	4.90	284.51		6	22.62	7.25	38.77
	20	6.85	4.99	271.35		7	22.84	7.25	25.59
	21	7.30	5.08	258.18		8	23.05	7.25	12.42
	22	7.75	5.18	245.01		9	23.25	7.25	359.24
	23	8.20	5.26	231.85		10	23.45	7.24	346.07
	24	-8.64	-5.35	218.68		11	-23.65	-7.23	332.89
	25	9.08	5.44	205.51		12	23.83	7.22	319.71
	26	9.52	5.52	192.34		13	24.01	7.21	306.53
	27	9.95	5.60	179.18		14	24.18	7.20	293.36
	28	10.38	5.69	166.01		15	24.35	7.18	280.18
	29	10.80	5.76	152.84		16	24.51	7.16	267.00
	30	-11.22	-5.84	139.68		17	-24.66	-7.14	253.82
	31	11.63	5.92	126.51		18	24.81	7.12	240.63
Feb.	1	12.04	5.99	113.35		19	24.95	7.09	227.45
	2	12.45	6.06	100.18		20	25.08	7.06	214.27
	3	12.85	6.13	87.01		21	25.20	7.03	201.09
	4	13.25	6.20	73.85		22	25.32	7.00	187.90
	5	-13.64	-6.27	60.68		23	-25.43	-6.97	174.72
	6	14.03	6.33	47.52		24	25.54	6.93	161.53
	7	14.41	6.39	34.35		25	25.63	6.90	148.34
	8	14.79	6.45	21.18		26	25.72	6.86	135.16
	9	15.16	6.51	8.02		27	25.81	6.81	121.97
	10	15.53	6.56	354.85		28	25.88	6.77	108.78
	11	-15.89	-6.62	341.68		29	-25.95	-6.72	95.59
	12	16.25	6.67	328.52		30	26.01	6.68	82.40
	13	16.60	6.72	315.35		31	26.07	6.63	69.21
	14	16.94	6.77	302.18	Apr.	1	26.12	6.57	56.02
	15	-17.28	-6.81	289.01		2	-26.16	-6.52	42.83

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Date		Position Angle of Axis P	Heliographic Latitude B_0	Heliographic Longitude L_0	Date		Position Angle of Axis P	Heliographic Latitude B_0	Heliographic Longitude L_0
		°	°	°			°	°	°
Apr.	1	-26.12	-6.57	56.02	May	17	-20.47	-2.50	168.36
	2	26.16	6.52	42.83		18	20.18	2.39	155.13
	3	26.19	6.46	29.63		19	19.89	2.27	141.91
	4	26.22	6.41	16.44		20	19.59	2.16	128.68
	5	26.24	6.35	3.24		21	19.28	2.04	115.45
	6	26.25	6.29	350.05		22	18.97	1.92	102.22
	7	-26.25	-6.22	336.85		23	-18.65	-1.80	88.99
	8	26.25	6.16	323.66		24	18.32	1.69	75.76
	9	26.24	6.09	310.46		25	17.99	1.57	62.53
	10	26.22	6.02	297.26		26	17.66	1.45	49.30
	11	26.20	5.95	284.06		27	17.31	1.33	36.07
	12	26.17	5.88	270.86		28	16.97	1.21	22.84
	13	-26.13	-5.81	257.66		29	-16.61	-1.09	9.60
	14	26.08	5.73	244.46		30	16.26	0.97	356.37
	15	26.03	5.65	231.26		31	15.89	0.85	343.14
	16	25.96	5.58	218.05	June	1	15.52	0.73	329.91
	17	25.90	5.50	204.85		2	15.15	0.61	316.67
	18	25.82	5.41	191.64		3	14.77	0.49	303.44
	19	-25.74	-5.33	178.44		4	-14.39	-0.37	290.21
	20	25.65	5.25	165.23		5	14.00	0.25	276.97
	21	25.55	5.16	152.02		6	13.61	0.13	263.74
	22	25.44	5.07	138.81		7	13.21	-0.01	250.50
	23	25.33	4.98	125.60		8	12.81	+0.11	237.27
	24	25.21	4.89	112.39		9	12.41	0.23	224.03
	25	-25.08	-4.80	99.18		10	-12.00	+0.35	210.80
	26	24.95	4.71	85.97		11	11.59	0.48	197.56
	27	24.81	4.61	72.76		12	11.17	0.60	184.32
	28	24.66	4.52	59.54		13	10.75	0.72	171.09
	29	24.50	4.42	46.33		14	10.33	0.84	157.85
	30	24.34	4.32	33.11		15	9.91	0.96	144.62
May	1	-24.16	-4.22	19.90		16	-9.48	+1.07	131.38
	2	23.99	4.12	6.68		17	9.05	1.19	118.14
	3	23.80	4.02	353.47		18	8.62	1.31	104.90
	4	23.61	3.92	340.25		19	8.18	1.43	91.67
	5	23.41	3.82	327.03		20	7.74	1.55	78.43
	6	23.20	3.71	313.81		21	7.30	1.67	65.19
	7	-22.99	-3.61	300.59		22	-6.86	+1.78	51.96
	8	22.77	3.50	287.37		23	6.42	1.90	38.72
	9	22.54	3.39	274.15		24	5.97	2.02	25.48
	10	22.30	3.28	260.93		25	5.52	2.13	12.24
	11	22.06	3.17	247.71		26	5.08	2.25	359.01
	12	21.81	3.06	234.49		27	4.63	2.36	345.77
	13	-21.56	-2.95	221.26		28	-4.18	+2.47	332.53
	14	21.30	2.84	208.04		29	3.72	2.59	319.30
	15	21.03	2.73	194.81		30	3.27	2.70	306.06
	16	20.75	2.61	181.59	July	1	2.82	2.81	292.82
	17	-20.47	-2.50	168.36		2	-2.37	+2.92	279.59

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EPHEMERIS FOR PHYSICAL OBSERVATIONS
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Date	Position Angle of Axis P	Heliographic Latitude B_0	Heliographic Longitude L_0	Date	Position Angle of Axis P	Heliographic Latitude B_0	Heliographic Longitude L_0
	°	°	°		°	°	°
July 1	-2.82	+2.81	292.82	Aug. 16	+16.21	+6.66	44.30
2	2.37	2.92	279.59	17	16.55	6.71	31.08
3	1.91	3.03	266.35	18	16.88	6.76	17.86
4	1.46	3.14	253.12	19	17.20	6.80	4.65
5	1.01	3.25	239.88	20	17.52	6.84	351.43
6	0.55	3.36	226.65	21	17.83	6.88	338.21
7	-0.10	+3.46	213.41	22	+18.14	+6.92	325.00
8	+0.35	3.57	200.18	23	18.45	6.95	311.78
9	0.80	3.67	186.94	24	18.75	6.99	298.57
10	1.25	3.78	173.71	25	19.04	7.02	285.36
11	1.70	3.88	160.47	26	19.33	7.05	272.14
12	2.15	3.98	147.24	27	19.62	7.08	258.93
13	+2.60	+4.08	134.01	28	+19.90	+7.10	245.72
14	3.04	4.18	120.77	29	20.17	7.13	232.51
15	3.49	4.28	107.54	30	20.44	7.15	219.30
16	3.93	4.37	94.31	31	20.70	7.17	206.09
17	4.37	4.47	81.07	Sept. 1	20.96	7.19	192.88
18	4.81	4.56	67.84	2	21.21	7.20	179.67
19	+5.25	+4.66	54.61	3	+21.46	+7.21	166.46
20	5.68	4.75	41.38	4	21.70	7.23	153.25
21	6.11	4.84	28.15	5	21.94	7.24	140.04
22	6.54	4.93	14.91	6	22.17	7.24	126.84
23	6.97	5.02	1.68	7	22.39	7.25	113.63
24	7.39	5.10	348.45	8	22.61	7.25	100.42
25	+7.82	+5.19	335.22	9	+22.82	+7.25	87.22
26	8.23	5.27	322.00	10	23.03	7.25	74.01
27	8.65	5.35	308.77	11	23.23	7.25	60.81
28	9.06	5.43	295.54	12	23.42	7.24	47.60
29	9.47	5.51	282.31	13	23.61	7.24	34.40
30	9.88	5.59	269.08	14	23.79	7.23	21.19
31	+10.28	+5.67	255.86	15	+23.97	+7.21	7.99
Aug. 1	10.68	5.74	242.63	16	24.14	7.20	354.79
2	11.08	5.82	229.41	17	24.30	7.19	341.59
3	11.47	5.89	216.18	18	24.46	7.17	328.38
4	11.86	5.96	202.96	19	24.61	7.15	315.18
5	12.25	6.03	189.73	20	24.76	7.13	301.98
6	+12.63	+6.09	176.51	21	+24.90	+7.10	288.78
7	13.01	6.16	163.29	22	25.03	7.08	275.58
8	13.38	6.22	150.06	23	25.15	7.05	262.38
9	13.75	6.28	136.84	24	25.27	7.02	249.18
10	14.11	6.34	123.62	25	25.38	6.98	235.98
11	14.47	6.40	110.40	26	25.49	6.95	222.79
12	+14.83	+6.46	97.18	27	+25.59	+6.91	209.59
13	15.18	6.51	83.96	28	25.68	6.87	196.39
14	15.53	6.56	70.74	29	25.77	6.83	183.20
15	15.87	6.61	57.52	30	25.85	6.79	170.00
16	+16.21	+6.66	44.30	Oct. 1	+25.92	+6.75	156.80

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Date		Position Angle of Axis P	Heliographic Latitude B_0	Heliographic Longitude L_0	Date		Position Angle of Axis P	Heliographic Latitude B_0	Heliographic Longitude L_0
		°	°	°			°	°	°
Oct.	1	+25.92	+6.75	156.80	Nov.	16	+21.19	+2.80	270.12
	2	25.98	6.70	143.61		17	20.90	2.68	256.93
	3	26.04	6.65	130.41		18	20.61	2.56	243.75
	4	26.09	6.60	117.22		19	20.32	2.44	230.57
	5	26.14	6.55	104.02		20	20.01	2.32	217.39
	6	26.17	6.49	90.83		21	19.70	2.20	204.20
	7	+26.20	+6.44	77.64		22	+19.38	+2.08	191.02
	8	26.23	6.38	64.44		23	19.05	1.95	177.84
	9	26.24	6.32	51.25		24	18.72	1.83	164.66
	10	26.25	6.25	38.06		25	18.38	1.71	151.48
	11	26.25	6.19	24.86		26	18.03	1.58	138.30
	12	26.25	6.12	11.67		27	17.68	1.46	125.12
	13	+26.23	+6.06	358.48		28	+17.32	+1.33	111.94
	14	26.21	5.99	345.29		29	16.95	1.21	98.76
	15	26.18	5.91	332.10		30	16.58	1.08	85.58
	16	26.14	5.84	318.90	Dec.	1	16.20	0.95	72.40
	17	26.10	5.77	305.71		2	15.81	0.83	59.23
	18	26.05	5.69	292.52		3	15.42	0.70	46.05
	19	+25.99	+5.61	279.33		4	+15.02	+0.57	32.87
	20	25.92	5.53	266.14		5	14.62	0.44	19.69
	21	25.85	5.45	252.95		6	14.21	0.32	6.51
	22	25.77	5.36	239.76		7	13.80	0.19	353.34
	23	25.68	5.28	226.57		8	13.38	+0.06	340.16
	24	25.58	5.19	213.39		9	12.96	-0.07	326.98
	25	+25.48	+5.10	200.20		10	+12.53	-0.20	313.80
	26	25.36	5.01	187.01		11	12.10	0.32	300.63
	27	25.24	4.92	173.82		12	11.66	0.45	287.45
	28	25.11	4.83	160.63		13	11.22	0.58	274.27
	29	24.98	4.73	147.45		14	10.78	0.71	261.10
	30	24.83	4.63	134.26		15	10.33	0.84	247.92
	31	+24.68	+4.54	121.07		16	+9.88	-0.96	234.75
Nov.	1	24.52	4.44	107.89		17	9.42	1.09	221.57
	2	24.35	4.34	94.70		18	8.96	1.22	208.40
	3	24.18	4.23	81.52		19	8.50	1.34	195.22
	4	23.99	4.13	68.33		20	8.03	1.47	182.05
	5	23.80	4.03	55.14		21	7.57	1.60	168.88
	6	+23.60	+3.92	41.96		22	+7.10	-1.72	155.70
	7	23.40	3.81	28.77		23	6.62	1.84	142.53
	8	23.18	3.70	15.59		24	6.15	1.97	129.36
	9	22.96	3.59	2.40		25	5.67	2.09	116.18
	10	22.73	3.48	349.22		26	5.19	2.22	103.01
	11	22.49	3.37	336.04		27	4.71	2.34	89.84
	12	+22.25	+3.26	322.85		28	+4.23	-2.46	76.67
	13	21.99	3.14	309.67		29	3.75	2.58	63.50
	14	21.73	3.03	296.48		30	3.26	2.70	50.33
	15	21.46	2.91	283.30		31	2.78	2.82	37.16
	16	+21.19	+2.80	270.12		32	+2.30	-2.94	23.98

MOON, 2027

UNIVERSAL TIME

PHASES OF THE MOON

Lunation	New Moon	d	h	m	First Quarter	d	h	m	Full Moon	d	h	m	Last Quarter	d	h	m
1286	Dec.’26	9	00	52	Dec.’26	17	05	43	Dec.’26	24	01	28	Dec.’26	30	18	59
1287	Jan.’27	7	20	24	Jan.’27	15	20	34	Jan.’27	22	12	17	Jan.’27	29	10	55
1288	Feb.	6	15	56	Feb.	14	07	58	Feb.	20	23	24	Feb.	28	05	16
1289	Mar.	8	09	29	Mar.	15	16	25	Mar.	22	10	44	Mar.	30	00	54
1290	Apr.	6	23	51	Apr.	13	22	57	Apr.	20	22	27	Apr.	28	20	18
1291	May	6	10	59	May	13	04	44	May	20	10	59	May	28	13	58
1292	June	4	19	40	June	11	10	56	June	19	00	44	June	27	04	54
1293	July	4	03	02	July	10	18	39	July	18	15	45	July	26	16	55
1294	Aug.	2	10	05	Aug.	9	04	54	Aug.	17	07	29	Aug.	25	02	27
1295	Aug.	31	17	41	Sept.	7	18	31	Sept.	15	23	03	Sept.	23	10	20
1296	Sept.	30	02	36	Oct.	7	11	47	Oct.	15	13	47	Oct.	22	17	29
1297	Oct.	29	13	36	Nov.	6	08	00	Nov.	14	03	26	Nov.	21	00	48
1298	Nov.	28	03	24	Dec.	6	05	22	Dec.	13	16	09	Dec.	20	09	11
1299	Dec.	27	20	12	Jan.’28	5	01	40	Jan.’28	12	04	03	Jan.’28	18	19	26

MOON AT PERIGEE

	d	h		d	h		d	h
Dec.’26	24	09	May	9	20	Sept.	27	20
Jan.’27	21	22	June	6	15	Oct.	25	06
Feb.	19	08	July	4	21	Nov.	19	00
Mar.	19	04	Aug.	2	06	Dec.’27	16	02
Apr.	14	01	Aug.	30	16	Jan.’28	13	08

MOON AT APOGEE

	d	h		d	h		d	h
Dec.’26	11	07	Apr.	27	21	Sept.	12	00
Jan.’27	7	08	May	25	15	Oct.	9	16
Feb.	3	14	June	22	05	Nov.	6	12
Mar.	3	06	July	19	12	Dec.’27	4	09
Mar.	31	02	Aug.	15	14	Jan.’28	1	04

MOON, 2027
MEAN EQUATOR, ORBIT, LONGITUDE AND ELONGATION

Date		Mean Equator			Orbit Perigee			Node			Mean Longitude			Mean Elongation
		i	Δ	Ω'	Γ'			Ω			☾			D
		°	°	°	°	'	"	°	'	"	°	'	"	°
Jan.	1	22.236	140.485	2.558	101	57	30.0	+322	50	28.1	197	21	01.3	276.922
	11	22.246	139.924	2.592	103	04	20.5	322	18	41.8	329	06	51.6	38.830
	21	22.256	139.363	2.626	104	11	11.0	321	46	55.5	100	52	41.8	160.737
	31	22.266	138.802	2.661	105	18	01.5	321	15	09.1	232	38	32.1	282.645
Feb.	10	22.276	138.241	2.695	106	24	52.1	320	43	22.8	4	24	22.4	44.552
	20	22.286	137.680	2.729	107	31	42.6	320	11	36.5	136	10	12.7	166.460
Mar.	2	22.297	137.120	2.763	108	38	33.1	+319	39	50.1	267	56	02.9	288.367
	12	22.307	136.559	2.797	109	45	23.6	319	08	03.8	39	41	53.2	50.275
	22	22.318	135.998	2.831	110	52	14.1	318	36	17.5	171	27	43.5	172.182
Apr.	1	22.329	135.437	2.865	111	59	04.7	318	04	31.1	303	13	33.7	294.090
	11	22.340	134.877	2.898	113	05	55.2	317	32	44.8	74	59	24.0	55.997
	21	22.351	134.316	2.932	114	12	45.7	317	00	58.5	206	45	14.3	177.905
May	1	22.362	133.756	2.966	115	19	36.2	+316	29	12.1	338	31	04.6	299.812
	11	22.374	133.195	2.999	116	26	26.8	315	57	25.8	110	16	54.8	61.720
	21	22.385	132.635	3.033	117	33	17.3	315	25	39.5	242	02	45.1	183.627
	31	22.397	132.075	3.067	118	40	07.8	314	53	53.1	13	48	35.4	305.535
June	10	22.409	131.514	3.100	119	46	58.3	314	22	06.8	145	34	25.7	67.442
	20	22.421	130.954	3.133	120	53	48.8	313	50	20.5	277	20	15.9	189.350
	30	22.433	130.394	3.167	122	00	39.4	+313	18	34.1	49	06	06.2	311.257
July	10	22.445	129.834	3.200	123	07	29.9	312	46	47.8	180	51	56.5	73.165
	20	22.457	129.274	3.233	124	14	20.4	312	15	01.5	312	37	46.7	195.072
	30	22.470	128.714	3.266	125	21	10.9	311	43	15.1	84	23	37.0	316.980
Aug.	9	22.482	128.154	3.299	126	28	01.4	311	11	28.8	216	09	27.3	78.887
	19	22.495	127.594	3.332	127	34	52.0	310	39	42.4	347	55	17.6	200.795
	29	22.508	127.034	3.365	128	41	42.5	+310	07	56.1	119	41	07.8	322.702
Sept.	8	22.521	126.475	3.398	129	48	33.0	309	36	09.8	251	26	58.1	84.610
	18	22.534	125.915	3.431	130	55	23.5	309	04	23.4	23	12	48.4	206.517
	28	22.548	125.355	3.464	132	02	14.1	308	32	37.1	154	58	38.6	328.425
Oct.	8	22.561	124.796	3.496	133	09	04.6	308	00	50.8	286	44	28.9	90.332
	18	22.575	124.236	3.529	134	15	55.1	307	29	04.4	58	30	19.2	212.240
	28	22.589	123.677	3.562	135	22	45.6	+306	57	18.1	190	16	09.5	334.147
Nov.	7	22.602	123.117	3.594	136	29	36.1	306	25	31.8	322	01	59.7	96.055
	17	22.616	122.558	3.627	137	36	26.7	305	53	45.4	93	47	50.0	217.962
	27	22.631	121.999	3.659	138	43	17.2	305	21	59.1	225	33	40.3	339.870
Dec.	7	22.645	121.439	3.692	139	50	07.7	304	50	12.8	357	19	30.6	101.777
	17	22.659	120.880	3.724	140	56	58.2	304	18	26.4	129	05	20.8	223.685
	27	22.674	120.321	3.756	142	03	48.7	+303	46	40.1	260	51	11.1	345.592
	37	22.689	119.762	3.788	143	10	39.3	303	14	53.8	32	37	01.4	107.500
	47	22.704	119.203	3.820	144	17	29.8	+302	43	07.4	164	22	51.6	229.407

MOON, 2027

FOR 0^h AND 12^h TERRESTRIAL TIME

Date		Apparent Longitude			Apparent Latitude			True Geocentric Distance (A. U.)	Semi Diameter	
		°	'	"	°	'	"	(X 10^{-3})	'	"
Jan.	0.0	191	47	37.8	-3	59	02.4	2.5813	15	28.03
	0.5	198	14	21.0	4	19	42.9	2.5997	15	21.46
	1.0	204	36	13.7	4	36	54.0	2.6170	15	15.38
	1.5	210	53	43.9	4	50	31.6	2.6330	15	09.80
	2.0	217	07	19.6	5	00	33.5	2.6477	15	04.76
	2.5	223	17	28.0	5	06	59.8	2.6610	15	00.25
	3.0	229	24	34.8	-5	09	51.8	2.6728	14	56.28
	3.5	235	29	04.2	5	09	12.5	2.6831	14	52.82
	4.0	241	31	18.6	5	05	06.3	2.6920	14	49.88
	4.5	247	31	38.7	4	57	38.8	2.6995	14	47.41
	5.0	253	30	23.0	4	46	57.3	2.7056	14	45.39
	5.5	259	27	48.8	4	33	09.9	2.7104	14	43.81
	6.0	265	24	11.5	-4	16	26.6	2.7140	14	42.64
	6.5	271	19	45.6	3	56	58.2	2.7165	14	41.85
	7.0	277	14	44.7	3	34	57.2	2.7178	14	41.44
	7.5	283	09	22.0	3	10	37.1	2.7179	14	41.37
	8.0	289	03	50.4	2	44	12.6	2.7171	14	41.66
	8.5	294	58	23.2	2	15	59.7	2.7151	14	42.28
	9.0	300	53	14.4	-1	46	15.0	2.7122	14	43.25
	9.5	306	48	39.0	1	15	16.3	2.7081	14	44.57
	10.0	312	44	53.3	0	43	22.0	2.7030	14	46.25
	10.5	318	42	15.1	-0	10	51.0	2.6967	14	48.30
	11.0	324	41	04.1	+0	21	57.1	2.6893	14	50.75
	11.5	330	41	41.9	0	54	42.2	2.6807	14	53.61
	12.0	336	44	31.8	+1	27	04.0	2.6709	14	56.90
	12.5	342	49	59.3	1	58	41.7	2.6598	15	00.64
	13.0	348	58	31.2	2	29	14.1	2.6474	15	04.85
	13.5	355	10	36.0	2	58	19.7	2.6338	15	09.53
	14.0	1	26	42.9	3	25	36.6	2.6189	15	14.69
	14.5	7	47	21.4	3	50	42.7	2.6029	15	20.32
	15.0	14	13	00.7	+4	13	15.3	2.5859	15	26.39
	15.5	20	44	08.5	4	32	51.9	2.5679	15	32.86
	16.0	27	21	10.0	4	49	09.8	2.5493	15	39.70
	16.5	34	04	26.5	5	01	46.8	2.5301	15	46.81
	17.0	40	54	14.4	5	10	21.7	2.5108	15	54.10
	17.5	47	50	43.0	5	14	35.1	2.4916	16	01.45
	18.0	54	53	53.8	+5	14	10.1	2.4729	16	08.72
	18.5	62	03	38.4	5	08	53.5	2.4551	16	15.74
	19.0	69	19	38.1	4	58	37.3	2.4386	16	22.34
	19.5	76	41	22.7	4	43	19.3	2.4238	16	28.33
	20.0	84	08	10.5	4	23	05.0	2.4112	16	33.51
	20.5	91	39	09.1	3	58	07.8	2.4010	16	37.71
	21.0	99	13	16.3	+3	28	49.8	2.3937	16	40.78
	21.5	106	49	22.7	2	55	41.4	2.3894	16	42.57
	22.0	114	26	13.5	2	19	20.9	2.3883	16	43.01
	22.5	122	02	32.3	1	40	32.6	2.3906	16	42.06
	23.0	129	37	03.6	+1	00	04.9	2.3961	16	39.74

MOON, 2027

FOR 0^h AND 12^h TERRESTRIAL TIME

Date		Apparent Longitude			Apparent Latitude			True Geocentric Distance (A. U.)	Semi Diameter	
		°	'	"	°	'	"	(X 10^{-3})	'	"
Jan.	23.0	129	37	03.6	+1	00	04.9	2.3961	16	39.74
	23.5	137	08	36.2	+0	18	48.3	2.4048	16	36.13
	24.0	144	36	06.0	-0	22	26.9	2.4165	16	31.34
	24.5	151	58	37.4	1	02	53.1	2.4307	16	25.52
	25.0	159	15	25.4	1	41	47.1	2.4473	16	18.86
	25.5	166	25	56.0	2	18	30.8	2.4657	16	11.56
	26.0	173	29	46.3	-2	52	32.7	2.4855	16	03.81
	26.5	180	26	44.2	3	23	27.4	2.5062	15	55.82
	27.0	187	16	47.3	3	50	55.9	2.5275	15	47.77
	27.5	194	00	01.9	4	14	44.7	2.5489	15	39.83
	28.0	200	36	41.8	4	34	45.2	2.5700	15	32.13
	28.5	207	07	06.7	4	50	53.1	2.5903	15	24.79
	29.0	213	31	41.2	-5	03	07.3	2.6097	15	17.92
	29.5	219	50	53.4	5	11	29.6	2.6279	15	11.59
	30.0	226	05	13.9	5	16	03.8	2.6445	15	05.84
	30.5	232	15	14.7	5	16	55.1	2.6596	15	00.72
	31.0	238	21	28.6	5	14	10.2	2.6729	14	56.24
	31.5	244	24	28.4	5	07	56.8	2.6843	14	52.42
Feb.	1.0	250	24	46.0	-4	58	23.2	2.6939	14	49.24
	1.5	256	22	52.8	4	45	38.7	2.7017	14	46.69
	2.0	262	19	18.6	4	29	53.1	2.7076	14	44.75
	2.5	268	14	31.4	4	11	17.3	2.7118	14	43.38
	3.0	274	08	57.8	3	50	02.7	2.7143	14	42.57
	3.5	280	03	02.4	3	26	22.0	2.7152	14	42.27
	4.0	285	57	07.8	-3	00	28.6	2.7147	14	42.44
	4.5	291	51	34.9	2	32	37.1	2.7128	14	43.04
	5.0	297	46	42.9	2	03	03.4	2.7097	14	44.05
	5.5	303	42	49.3	1	32	04.4	2.7055	14	45.43
	6.0	309	40	10.2	0	59	58.3	2.7003	14	47.14
	6.5	315	39	00.4	-0	27	04.1	2.6942	14	49.16
	7.0	321	39	33.9	+0	06	17.9	2.6872	14	51.46
	7.5	327	42	03.8	0	39	46.5	2.6795	14	54.03
	8.0	333	46	42.8	1	13	00.0	2.6710	14	56.86
	8.5	339	53	43.5	1	45	35.9	2.6619	14	59.94
	9.0	346	03	18.4	2	17	11.7	2.6521	15	03.26
	9.5	352	15	40.2	2	47	24.3	2.6417	15	06.83
	10.0	358	31	02.0	+3	15	51.0	2.6306	15	10.65
	10.5	4	49	37.2	3	42	09.4	2.6189	15	14.72
	11.0	11	11	39.8	4	05	57.4	2.6065	15	19.05
	11.5	17	37	23.7	4	26	53.7	2.5936	15	23.64
	12.0	24	07	03.1	4	44	37.9	2.5801	15	28.48
	12.5	30	40	51.9	4	58	51.0	2.5660	15	33.56
	13.0	37	19	03.0	+5	09	15.1	2.5515	15	38.87
	13.5	44	01	48.2	5	15	34.5	2.5367	15	44.36
	14.0	50	49	16.8	5	17	35.5	2.5216	15	49.99
	14.5	57	41	35.5	5	15	07.3	2.5066	15	55.70
	15.0	64	38	47.1	+5	08	02.3	2.4917	16	01.40

MOON, 2027

FOR 0^h AND 12^h TERRESTRIAL TIME

Date		Apparent Longitude			Apparent Latitude			True Geocentric Distance (A. U.)	Semi Diameter	
		°	'	"	°	'	"	(X 10^{-3})	'	"
Feb.	15.0	64	38	47.1	+5	08	02.3	2.4917	16	01.40
	15.5	71	40	49.6	4	56	17.1	2.4773	16	06.99
	16.0	78	47	35.5	4	39	52.7	2.4636	16	12.36
	16.5	85	58	50.9	4	18	55.9	2.4509	16	17.39
	17.0	93	14	14.7	3	53	39.1	2.4396	16	21.93
	17.5	100	33	18.8	3	24	21.5	2.4299	16	25.83
	18.0	107	55	27.4	+2	51	28.7	2.4222	16	28.97
	18.5	115	19	57.9	2	15	32.7	2.4168	16	31.21
	19.0	122	46	01.5	1	37	11.7	2.4138	16	32.44
	19.5	130	12	44.2	0	57	08.2	2.4134	16	32.58
	20.0	137	39	09.0	+0	16	08.3	2.4159	16	31.59
	20.5	145	04	17.0	-0	25	00.3	2.4211	16	29.46
	21.0	152	27	10.1	-1	05	30.3	2.4290	16	26.22
	21.5	159	46	52.8	1	44	36.7	2.4396	16	21.95
	22.0	167	02	33.9	2	21	38.2	2.4525	16	16.77
	22.5	174	13	28.8	2	55	58.9	2.4676	16	10.80
	23.0	181	19	00.1	3	27	08.7	2.4844	16	04.21
	23.5	188	18	39.3	3	54	44.4	2.5027	15	57.17
	24.0	195	12	06.5	-4	18	29.0	2.5220	15	49.85
	24.5	201	59	10.9	4	38	11.5	2.5419	15	42.42
	25.0	208	39	50.1	4	53	46.6	2.5620	15	35.03
	25.5	215	14	10.1	5	05	13.2	2.5819	15	27.83
	26.0	221	42	23.8	5	12	34.5	2.6012	15	20.95
	26.5	228	04	50.5	5	15	56.3	2.6195	15	14.49
	27.0	234	21	54.5	-5	15	26.7	2.6367	15	08.54
	27.5	240	34	04.5	5	11	15.2	2.6524	15	03.17
	28.0	246	41	52.5	5	03	32.8	2.6663	14	58.43
	28.5	252	45	52.8	4	52	30.7	2.6785	14	54.37
Mar.	1.0	258	46	41.1	4	38	21.0	2.6886	14	51.00
	1.5	264	44	54.2	4	21	15.8	2.6967	14	48.33
	2.0	270	41	08.9	-4	01	27.7	2.7027	14	46.36
	2.5	276	36	01.6	3	39	09.6	2.7066	14	45.07
	3.0	282	30	08.1	3	14	34.6	2.7085	14	44.45
	3.5	288	24	02.7	2	47	56.5	2.7084	14	44.46
	4.0	294	18	18.1	2	19	29.9	2.7066	14	45.08
	4.5	300	13	25.2	1	49	30.0	2.7030	14	46.25
	5.0	306	09	52.4	-1	18	13.1	2.6979	14	47.93
	5.5	312	08	05.8	0	45	56.8	2.6914	14	50.06
	6.0	318	08	28.7	-0	12	59.7	2.6837	14	52.61
	6.5	324	11	21.6	+0	20	18.3	2.6750	14	55.51
	7.0	330	17	01.9	0	53	35.9	2.6655	14	58.70
	7.5	336	25	44.0	1	26	30.8	2.6554	15	02.14
	8.0	342	37	39.5	+1	58	39.6	2.6447	15	05.78
	8.5	348	52	56.5	2	29	38.4	2.6337	15	09.56
	9.0	355	11	40.8	2	59	02.6	2.6225	15	13.45
	9.5	1	33	55.3	3	26	27.8	2.6112	15	17.41
	10.0	7	59	40.5	+3	51	29.9	2.5999	15	21.40

MOON, 2027

FOR 0^h AND 12^h TERRESTRIAL TIME

Date		Apparent Longitude			Apparent Latitude			True Geocentric Distance (A. U.)	Semi Diameter	
		°	'	"	°	'	"	(X 10^{-3})	'	"
Mar.	10.0	7	59	40.5	+3	51	29.9	2.5999	15	21.40
	10.5	14	28	54.9	4	13	45.7	2.5886	15	25.41
	11.0	21	01	35.5	4	32	53.4	2.5775	15	29.41
	11.5	27	37	37.9	4	48	32.9	2.5665	15	33.39
	12.0	34	16	56.9	5	00	26.7	2.5556	15	37.35
	12.5	40	59	26.7	5	08	19.5	2.5450	15	41.26
	13.0	47	45	01.5	+5	11	59.6	2.5346	15	45.14
	13.5	54	33	35.3	5	11	18.3	2.5244	15	48.95
	14.0	61	25	02.3	5	06	10.8	2.5144	15	52.71
	14.5	68	19	16.9	4	56	36.0	2.5048	15	56.37
	15.0	75	16	13.3	4	42	37.1	2.4955	15	59.92
	15.5	82	15	45.2	4	24	21.7	2.4867	16	03.32
	16.0	89	17	45.6	+4	02	01.4	2.4785	16	06.53
	16.5	96	22	06.2	3	35	53.0	2.4709	16	09.48
	17.0	103	28	36.6	3	06	17.2	2.4643	16	12.11
	17.5	110	37	03.9	2	33	39.6	2.4586	16	14.35
	18.0	117	47	11.8	1	58	29.9	2.4541	16	16.11
	18.5	124	58	40.7	1	21	21.8	2.4511	16	17.33
	19.0	132	11	06.8	+0	42	52.2	2.4496	16	17.93
	19.5	139	24	02.3	0	03	40.4	2.4498	16	17.84
	20.0	146	36	55.3	+0	35	32.8	2.4519	16	17.00
	20.5	153	49	10.7	-1	14	06.0	2.4559	16	15.40
	21.0	161	00	10.7	1	51	19.3	2.4619	16	13.02
	21.5	168	09	15.8	2	26	34.6	2.4699	16	09.88
	22.0	175	15	46.4	-2	59	17.5	2.4798	16	06.01
	22.5	182	19	03.8	3	28	58.0	2.4915	16	01.48
	23.0	189	18	32.1	3	55	11.2	2.5048	15	56.39
	23.5	196	13	39.2	4	17	38.2	2.5194	15	50.82
	24.0	203	03	58.2	4	36	05.4	2.5352	15	44.90
	24.5	209	49	08.4	4	50	25.1	2.5518	15	38.76
	25.0	216	28	55.8	-5	00	34.6	2.5689	15	32.51
	25.5	223	03	13.5	5	06	35.7	2.5861	15	26.30
	26.0	229	32	01.8	5	08	34.1	2.6032	15	20.23
	26.5	235	55	28.0	5	06	38.2	2.6197	15	14.43
	27.0	242	13	45.5	5	00	59.1	2.6354	15	08.98
	27.5	248	27	13.8	4	51	49.2	2.6500	15	03.99
	28.0	254	36	17.7	-4	39	22.2	2.6631	14	59.52
	28.5	260	41	25.9	4	23	52.3	2.6747	14	55.63
	29.0	266	43	11.2	4	05	34.0	2.6844	14	52.39
	29.5	272	42	08.9	3	44	42.1	2.6922	14	49.81
	30.0	278	38	56.5	3	21	31.1	2.6978	14	47.94
	30.5	284	34	13.1	2	56	15.8	2.7014	14	46.78
	31.0	290	28	38.3	-2	29	10.9	2.7027	14	46.33
	31.5	296	22	52.2	2	00	31.5	2.7020	14	46.59
Apr.	1.0	302	17	34.4	1	30	32.7	2.6991	14	47.54
	1.5	308	13	23.5	0	59	30.7	2.6942	14	49.14
	2.0	314	10	56.5	-0	27	42.0	2.6875	14	51.37

MOON, 2027

FOR 0^h AND 12^h TERRESTRIAL TIME

Date		Apparent Longitude			Apparent Latitude			True Geocentric Distance (A. U.)	Semi Diameter	
		°	'	"	°	'	"	(X 10^{-3})	'	"
Apr.	1.0	302	17	34.4	-1	30	32.7	2.6991	14	47.54
	1.5	308	13	23.5	0	59	30.7	2.6942	14	49.14
	2.0	314	10	56.5	-0	27	42.0	2.6875	14	51.37
	2.5	320	10	48.7	+0	04	35.8	2.6790	14	54.17
	3.0	326	13	32.4	0	37	03.7	2.6691	14	57.50
	3.5	332	19	36.8	1	09	21.8	2.6579	15	01.28
	4.0	338	29	27.3	+1	41	08.6	2.6457	15	05.45
	4.5	344	43	25.1	2	12	01.6	2.6326	15	09.94
	5.0	351	01	46.4	2	41	36.8	2.6191	15	14.65
	5.5	357	24	42.2	3	09	29.7	2.6052	15	19.52
	6.0	3	52	17.9	3	35	15.0	2.5913	15	24.45
	6.5	10	24	33.2	3	58	27.7	2.5776	15	29.36
	7.0	17	01	22.1	+4	18	43.1	2.5643	15	34.17
	7.5	23	42	33.0	4	35	38.3	2.5517	15	38.81
	8.0	30	27	49.4	4	48	52.3	2.5397	15	43.22
	8.5	37	16	50.5	4	58	07.0	2.5287	15	47.34
	9.0	44	09	12.4	5	03	08.0	2.5186	15	51.12
	9.5	51	04	28.5	5	03	45.1	2.5096	15	54.54
	10.0	58	02	11.4	+4	59	52.9	2.5016	15	57.58
	10.5	65	01	53.8	4	51	30.8	2.4947	16	00.23
	11.0	72	03	09.3	4	38	43.4	2.4889	16	02.49
	11.5	79	05	33.7	4	21	40.3	2.4840	16	04.38
	12.0	86	08	45.5	4	00	36.0	2.4801	16	05.89
	12.5	93	12	26.3	3	35	49.2	2.4771	16	07.05
	13.0	100	16	20.6	+3	07	42.9	2.4750	16	07.87
	13.5	107	20	16.1	2	36	43.3	2.4738	16	08.37
	14.0	114	24	02.9	2	03	19.8	2.4733	16	08.55
	14.5	121	27	32.8	1	28	04.1	2.4737	16	08.40
	15.0	128	30	38.8	+0	51	29.7	2.4749	16	07.94
	15.5	135	33	13.9	-0	14	11.5	2.4769	16	07.14
	16.0	142	35	10.6	-0	23	15.0	2.4799	16	05.99
	16.5	149	36	19.6	1	00	14.4	2.4837	16	04.48
	17.0	156	36	30.0	1	36	11.9	2.4886	16	02.60
	17.5	163	35	28.1	2	10	34.0	2.4945	16	00.32
	18.0	170	32	57.7	2	42	49.1	2.5015	15	57.65
	18.5	177	28	40.3	3	12	28.8	2.5095	15	54.58
	19.0	184	22	15.2	-3	39	07.6	2.5186	15	51.12
	19.5	191	13	20.3	4	02	24.2	2.5288	15	47.30
	20.0	198	01	32.9	4	22	01.6	2.5399	15	43.14
	20.5	204	46	30.9	4	37	47.2	2.5520	15	38.70
	21.0	211	27	53.6	4	49	33.3	2.5647	15	34.03
	21.5	218	05	22.9	4	57	16.5	2.5781	15	29.19
	22.0	224	38	44.3	-5	00	57.8	2.5918	15	24.27
	22.5	231	07	47.3	5	00	41.9	2.6057	15	19.34
	23.0	237	32	26.6	4	56	36.8	2.6195	15	14.48
	23.5	243	52	42.1	4	48	53.2	2.6331	15	09.79
	24.0	250	08	39.0	-4	37	44.1	2.6460	15	05.34

MOON, 2027

FOR 0^h AND 12^h TERRESTRIAL TIME

Date		Apparent Longitude			Apparent Latitude			True Geocentric Distance (A. U.)	Semi Diameter	
		°	'	"	°	'	"	(X 10^{-3})	'	"
Apr.	24.0	250	08	39.0	-4	37	44.1	2.6460	15	05.34
	24.5	256	20	28.1	4	23	23.9	2.6581	15	01.21
	25.0	262	28	25.5	4	06	07.9	2.6692	14	57.48
	25.5	268	32	51.9	3	46	12.3	2.6789	14	54.21
	26.0	274	34	12.9	3	23	53.5	2.6872	14	51.47
	26.5	280	32	57.6	2	59	28.0	2.6937	14	49.30
	27.0	286	29	38.9	-2	33	12.0	2.6984	14	47.77
	27.5	292	24	52.5	2	05	21.9	2.7011	14	46.89
	28.0	298	19	16.3	1	36	13.7	2.7016	14	46.69
	28.5	304	13	30.2	1	06	03.7	2.7001	14	47.20
	29.0	310	08	14.9	0	35	08.0	2.6964	14	48.41
	29.5	316	04	12.1	-0	03	43.3	2.6906	14	50.32
	30.0	322	02	03.0	+0	27	53.4	2.6828	14	52.93
	30.5	328	02	28.3	0	59	24.3	2.6730	14	56.19
May	1.0	334	06	07.2	1	30	30.5	2.6615	15	00.08
	1.5	340	13	36.5	2	00	52.3	2.6483	15	04.54
	2.0	346	25	29.9	2	30	08.6	2.6339	15	09.51
	2.5	352	42	17.2	2	57	57.2	2.6183	15	14.92
	3.0	359	04	22.8	+3	23	54.6	2.6020	15	20.67
	3.5	5	32	05.6	3	47	36.7	2.5851	15	26.66
	4.0	12	05	37.1	4	08	38.9	2.5681	15	32.79
	4.5	18	45	01.5	4	26	36.5	2.5513	15	38.93
	5.0	25	30	14.4	4	41	05.9	2.5350	15	44.97
	5.5	32	21	03.0	4	51	45.2	2.5195	15	50.78
	6.0	39	17	05.9	+4	58	15.4	2.5052	15	56.23
	6.5	46	17	53.7	5	00	21.0	2.4922	16	01.23
	7.0	53	22	50.0	4	57	51.8	2.4807	16	05.66
	7.5	60	31	12.8	4	50	42.7	2.4710	16	09.44
	8.0	67	42	16.3	4	38	55.1	2.4632	16	12.53
	8.5	74	55	12.7	4	22	36.9	2.4573	16	14.87
	9.0	82	09	14.4	+4	02	02.4	2.4533	16	16.45
	9.5	89	23	36.3	3	37	31.7	2.4512	16	17.30
	10.0	96	37	36.6	3	09	30.6	2.4509	16	17.42
	10.5	103	50	39.0	2	38	28.8	2.4522	16	16.88
	11.0	111	02	12.9	2	04	59.7	2.4551	16	15.74
	11.5	118	11	54.0	1	29	38.7	2.4593	16	14.05
	12.0	125	19	24.2	+0	53	02.6	2.4648	16	11.91
	12.5	132	24	30.7	+0	15	48.2	2.4712	16	09.37
	13.0	139	27	05.9	-0	21	28.2	2.4785	16	06.51
	13.5	146	27	05.7	0	58	11.6	2.4866	16	03.39
	14.0	153	24	28.9	1	33	48.7	2.4952	16	00.05
	14.5	160	19	15.7	2	07	48.7	2.5043	15	56.55
	15.0	167	11	27.3	-2	39	43.1	2.5139	15	52.92
	15.5	174	01	04.4	3	09	06.5	2.5238	15	49.18
	16.0	180	48	07.1	3	35	36.5	2.5340	15	45.35
	16.5	187	32	34.0	3	58	53.7	2.5445	15	41.46
	17.0	194	14	22.2	-4	18	42.7	2.5552	15	37.51

MOON, 2027

FOR 0^h AND 12^h TERRESTRIAL TIME

Date		Apparent Longitude			Apparent Latitude			True Geocentric Distance (A. U.)	Semi Diameter	
		°	'	"	°	'	"	(X 10^{-3})	'	"
May	17.0	194	14	22.2	-4	18	42.7	2.5552	15	37.51
	17.5	200	53	27.5	4	34	51.1	2.5661	15	33.51
	18.0	207	29	44.0	4	47	10.3	2.5773	15	29.48
	18.5	214	03	05.1	4	55	35.4	2.5886	15	25.43
	19.0	220	33	23.7	5	00	04.9	2.6000	15	21.37
	19.5	227	00	33.0	5	00	40.8	2.6114	15	17.34
	20.0	233	24	27.0	-4	57	28.2	2.6228	15	13.36
	20.5	239	45	01.4	4	50	35.1	2.6340	15	09.46
	21.0	246	02	13.9	4	40	12.1	2.6450	15	05.69
	21.5	252	16	05.0	4	26	31.9	2.6555	15	02.09
	22.0	258	26	38.7	4	09	48.9	2.6655	14	58.70
	22.5	264	34	02.1	3	50	19.1	2.6748	14	55.58
	23.0	270	38	26.3	-3	28	19.0	2.6832	14	52.77
	23.5	276	40	06.2	3	04	06.1	2.6906	14	50.34
	24.0	282	39	20.5	2	37	58.1	2.6967	14	48.33
	24.5	288	36	31.6	2	10	12.6	2.7013	14	46.79
	25.0	294	32	05.6	1	41	07.4	2.7045	14	45.77
	25.5	300	26	31.7	1	11	00.1	2.7059	14	45.31
	26.0	306	20	22.0	-0	40	07.9	2.7054	14	45.45
	26.5	312	14	11.4	-0	08	48.3	2.7031	14	46.23
	27.0	318	08	36.8	+0	22	41.7	2.6987	14	47.66
	27.5	324	04	17.1	0	54	04.6	2.6923	14	49.77
	28.0	330	01	52.2	1	25	02.8	2.6839	14	52.55
	28.5	336	02	02.8	1	55	18.4	2.6735	14	56.02
	29.0	342	05	29.5	+2	24	32.5	2.6612	15	00.15
	29.5	348	12	52.0	2	52	25.7	2.6472	15	04.93
	30.0	354	24	48.5	3	18	37.7	2.6316	15	10.30
	30.5	0	41	54.6	3	42	47.2	2.6146	15	16.22
	31.0	7	04	41.7	4	04	32.1	2.5965	15	22.60
	31.5	13	33	36.8	4	23	29.6	2.5776	15	29.36
June	1.0	20	09	00.0	+4	39	16.8	2.5582	15	36.39
	1.5	26	51	04.1	4	51	31.1	2.5388	15	43.57
	2.0	33	39	53.3	4	59	51.0	2.5196	15	50.75
	2.5	40	35	21.7	5	03	57.1	2.5011	15	57.78
	3.0	47	37	13.3	5	03	33.1	2.4837	16	04.50
	3.5	54	45	01.1	4	58	27.5	2.4677	16	10.74
	4.0	61	58	08.2	+4	48	33.9	2.4535	16	16.35
	4.5	69	15	48.2	4	33	52.9	2.4415	16	21.19
	5.0	76	37	07.1	4	14	32.2	2.4317	16	25.12
	5.5	84	01	05.1	3	50	47.4	2.4245	16	28.06
	6.0	91	26	39.8	3	23	01.5	2.4199	16	29.94
	6.5	98	52	48.0	2	51	44.2	2.4179	16	30.74
	7.0	106	18	29.1	+2	17	31.2	2.4186	16	30.47
	7.5	113	42	46.8	1	41	02.3	2.4217	16	29.18
	8.0	121	04	51.4	1	03	00.0	2.4272	16	26.95
	8.5	128	24	00.8	+0	24	07.6	2.4348	16	23.88
	9.0	135	39	41.2	-0	14	52.1	2.4442	16	20.09

MOON, 2027

FOR 0^h AND 12^h TERRESTRIAL TIME

Date		Apparent Longitude			Apparent Latitude			True Geocentric Distance (A. U.)	Semi Diameter	
		°	'	"	°	'	"	(X 10^{-3})	'	"
June	9.0	135	39	41.2	-0	14	52.1	2.4442	16	20.09
	9.5	142	51	27.0	0	53	18.3	2.4551	16	15.72
	10.0	149	59	00.9	1	30	33.1	2.4674	16	10.89
	10.5	157	02	12.4	2	06	02.4	2.4805	16	05.73
	11.0	164	00	57.5	2	39	16.1	2.4944	16	00.36
	11.5	170	55	16.8	3	09	48.3	2.5087	15	54.88
	12.0	177	45	15.0	-3	37	17.4	2.5232	15	49.39
	12.5	184	30	59.6	4	01	25.9	2.5378	15	43.95
	13.0	191	12	39.6	4	22	00.1	2.5522	15	38.62
	13.5	197	50	25.0	4	38	50.0	2.5663	15	33.46
	14.0	204	24	26.1	4	51	48.9	2.5800	15	28.49
	14.5	210	54	52.9	5	00	53.3	2.5933	15	23.73
	15.0	217	21	54.7	-5	06	02.5	2.6061	15	19.21
	15.5	223	45	40.1	5	07	18.8	2.6183	15	14.91
	16.0	230	06	16.9	5	04	46.7	2.6300	15	10.86
	16.5	236	23	52.4	4	58	33.3	2.6410	15	07.05
	17.0	242	38	33.4	4	48	47.7	2.6515	15	03.47
	17.5	248	50	26.4	4	35	41.1	2.6613	15	00.15
	18.0	254	59	38.4	-4	19	26.5	2.6704	14	57.07
	18.5	261	06	16.8	4	00	18.2	2.6788	14	54.26
	19.0	267	10	29.9	3	38	32.0	2.6864	14	51.71
	19.5	273	12	27.5	3	14	24.7	2.6932	14	49.46
	20.0	279	12	20.9	2	48	13.9	2.6991	14	47.51
	20.5	285	10	23.4	2	20	17.8	2.7041	14	45.90
	21.0	291	06	50.4	-1	50	54.8	2.7079	14	44.65
	21.5	297	01	59.7	1	20	23.7	2.7105	14	43.80
	22.0	302	56	11.5	0	49	03.2	2.7118	14	43.37
	22.5	308	49	48.7	-0	17	12.0	2.7117	14	43.41
	23.0	314	43	16.2	+0	14	51.5	2.7100	14	43.94
	23.5	320	37	02.0	0	46	49.0	2.7068	14	45.00
	24.0	326	31	35.8	+1	18	22.1	2.7019	14	46.62
	24.5	332	27	29.7	1	49	12.9	2.6951	14	48.83
	25.0	338	25	17.6	2	19	03.0	2.6866	14	51.64
	25.5	344	25	34.7	2	47	34.2	2.6763	14	55.08
	26.0	350	28	57.4	3	14	28.1	2.6642	14	59.15
	26.5	356	36	02.3	3	39	25.5	2.6504	15	03.85
	27.0	2	47	26.0	+4	02	07.4	2.6349	15	09.16
	27.5	9	03	43.9	4	22	14.0	2.6179	15	15.04
	28.0	15	25	29.4	4	39	25.3	2.5997	15	21.47
	28.5	21	53	12.8	4	53	21.0	2.5804	15	28.37
	29.0	28	27	20.0	5	03	41.4	2.5603	15	35.65
	29.5	35	08	11.2	5	10	07.1	2.5397	15	43.22
	30.0	41	55	59.7	+5	12	20.5	2.5191	15	50.94
	30.5	48	50	49.9	5	10	06.1	2.4988	15	58.67
July	1.0	55	52	37.1	5	03	12.1	2.4792	16	06.24
	1.5	63	01	05.6	4	51	31.2	2.4608	16	13.48
	2.0	70	15	48.8	+4	35	01.7	2.4439	16	20.19

MOON, 2027

FOR 0^h AND 12^h TERRESTRIAL TIME

Date		Apparent Longitude			Apparent Latitude			True Geocentric Distance (A. U.)	Semi Diameter	
		°	'	"	°	'	"	(X 10^{-3})	'	"
July	1.0	55	52	37.1	+5	03	12.1	2.4792	16	06.24
	1.5	63	01	05.6	4	51	31.2	2.4608	16	13.48
	2.0	70	15	48.8	4	35	01.7	2.4439	16	20.19
	2.5	77	36	09.0	4	13	49.2	2.4291	16	26.19
	3.0	85	01	18.0	3	48	06.9	2.4166	16	31.30
	3.5	92	30	18.5	3	18	16.1	2.4067	16	35.36
	4.0	100	02	06.0	+2	44	46.1	2.3997	16	38.24
	4.5	107	35	31.4	2	08	13.7	2.3958	16	39.87
	5.0	115	09	23.7	1	29	21.7	2.3951	16	40.19
	5.5	122	42	32.6	0	48	57.0	2.3974	16	39.22
	6.0	130	13	51.8	+0	07	48.8	2.4027	16	37.00
	6.5	137	42	20.5	-0	33	13.8	2.4109	16	33.64
	7.0	145	07	06.1	-1	13	23.6	2.4215	16	29.27
	7.5	152	27	24.6	1	51	57.1	2.4344	16	24.04
	8.0	159	42	41.7	2	28	16.0	2.4491	16	18.12
	8.5	166	52	32.6	3	01	47.3	2.4653	16	11.69
	9.0	173	56	41.5	3	32	04.5	2.4826	16	04.93
	9.5	180	55	01.0	3	58	46.8	2.5006	15	57.98
	10.0	187	47	30.9	-4	21	39.0	2.5190	15	51.00
	10.5	194	34	17.0	4	40	31.1	2.5374	15	44.10
	11.0	201	15	30.2	4	55	17.6	2.5555	15	37.39
	11.5	207	51	25.2	5	05	56.6	2.5732	15	30.96
	12.0	214	22	19.2	5	12	29.8	2.5902	15	24.86
	12.5	220	48	31.7	5	15	01.3	2.6063	15	19.14
	13.0	227	10	23.0	-5	13	37.6	2.6214	15	13.84
	13.5	233	28	13.8	5	08	27.1	2.6355	15	08.96
	14.0	239	42	24.9	4	59	39.6	2.6484	15	04.52
	14.5	245	53	16.7	4	47	26.8	2.6602	15	00.52
	15.0	252	01	08.9	4	32	01.1	2.6707	14	56.95
	15.5	258	06	20.4	4	13	36.5	2.6802	14	53.79
	16.0	264	09	09.3	-3	52	27.7	2.6885	14	51.04
	16.5	270	09	53.1	3	28	50.5	2.6956	14	48.68
	17.0	276	08	48.4	3	03	01.5	2.7016	14	46.70
	17.5	282	06	11.5	2	35	18.1	2.7066	14	45.08
	18.0	288	02	18.4	2	05	58.2	2.7104	14	43.83
	18.5	293	57	25.0	1	35	20.4	2.7132	14	42.93
	19.0	299	51	47.5	-1	03	43.6	2.7148	14	42.39
	19.5	305	45	42.4	-0	31	27.1	2.7154	14	42.21
	20.0	311	39	27.1	+0	01	09.9	2.7148	14	42.40
	20.5	317	33	19.7	0	33	47.7	2.7130	14	42.97
	21.0	323	27	39.6	1	06	07.2	2.7100	14	43.95
	21.5	329	22	47.4	1	37	48.9	2.7058	14	45.35
	22.0	335	19	05.0	+2	08	33.7	2.7001	14	47.18
	22.5	341	16	55.9	2	38	02.9	2.6932	14	49.49
	23.0	347	16	44.9	3	05	57.7	2.6847	14	52.28
	23.5	353	18	58.3	3	31	59.7	2.6749	14	55.57
	24.0	359	24	03.5	+3	55	50.7	2.6635	14	59.39

MOON, 2027

FOR 0^h AND 12^h TERRESTRIAL TIME

Date		Apparent Longitude			Apparent Latitude			True Geocentric Distance (A. U.)	Semi Diameter	
		°	'	"	°	'	"	(X 10^{-3})	'	"
July	24.0	359	24	03.5	+3	55	50.7	2.6635	14	59.39
	24.5	5	32	28.8	4	17	12.8	2.6507	15	03.73
	25.0	11	44	43.1	4	35	48.3	2.6365	15	08.61
	25.5	18	01	15.6	4	51	19.6	2.6209	15	14.02
	26.0	24	22	34.7	5	03	29.8	2.6040	15	19.93
	26.5	30	49	07.6	5	12	02.5	2.5861	15	26.31
	27.0	37	21	19.4	+5	16	42.2	2.5673	15	33.11
	27.5	43	59	31.9	5	17	14.7	2.5477	15	40.25
	28.0	50	44	02.6	5	13	28.0	2.5278	15	47.66
	28.5	57	35	03.4	5	05	12.4	2.5079	15	55.20
	29.0	64	32	39.3	4	52	22.1	2.4882	16	02.75
	29.5	71	36	47.5	4	34	55.5	2.4692	16	10.14
	30.0	78	47	15.9	+4	12	56.8	2.4514	16	17.21
	30.5	86	03	42.7	3	46	36.3	2.4350	16	23.77
	31.0	93	25	35.7	3	16	11.9	2.4206	16	29.62
	31.5	100	52	12.8	2	42	08.8	2.4086	16	34.59
Aug.	1.0	108	22	42.3	2	05	00.0	2.3991	16	38.50
	1.5	115	56	04.2	1	25	25.2	2.3926	16	41.21
	2.0	123	31	12.4	+0	44	10.2	2.3893	16	42.61
	2.5	131	06	56.5	+0	02	04.5	2.3892	16	42.66
	3.0	138	42	04.8	-0	40	00.2	2.3923	16	41.35
	3.5	146	15	26.6	1	21	12.7	2.3986	16	38.71
	4.0	153	45	55.3	2	00	44.6	2.4079	16	34.85
	4.5	161	12	30.5	2	37	51.7	2.4200	16	29.90
	5.0	168	34	19.9	-3	11	56.4	2.4344	16	24.02
	5.5	175	50	40.5	3	42	27.6	2.4509	16	17.40
	6.0	183	00	59.5	4	09	02.1	2.4690	16	10.23
	6.5	190	04	54.2	4	31	23.6	2.4883	16	02.70
	7.0	197	02	12.0	4	49	22.5	2.5084	15	55.00
	7.5	203	52	49.6	5	02	55.1	2.5288	15	47.29
	8.0	210	36	51.6	-5	12	02.8	2.5492	15	39.71
	8.5	217	14	30.1	5	16	50.7	2.5692	15	32.38
	9.0	223	46	02.5	5	17	27.3	2.5886	15	25.42
	9.5	230	11	51.1	5	14	03.3	2.6070	15	18.90
	10.0	236	32	21.8	5	06	51.1	2.6242	15	12.87
	10.5	242	48	02.5	4	56	04.2	2.6401	15	07.38
	11.0	248	59	22.8	-4	41	57.2	2.6545	15	02.45
	11.5	255	06	53.1	4	24	45.0	2.6674	14	58.09
	12.0	261	11	03.8	4	04	43.3	2.6786	14	54.31
	12.5	267	12	24.6	3	42	07.9	2.6883	14	51.09
	13.0	273	11	24.7	3	17	15.0	2.6964	14	48.42
	13.5	279	08	32.0	2	50	21.3	2.7029	14	46.28
	14.0	285	04	12.8	-2	21	43.9	2.7079	14	44.65
	14.5	290	58	52.2	1	51	40.3	2.7114	14	43.49
	15.0	296	52	53.6	1	20	28.4	2.7136	14	42.78
	15.5	302	46	38.9	0	48	26.7	2.7145	14	42.50
	16.0	308	40	28.5	-0	15	54.1	2.7141	14	42.61

MOON, 2027

FOR 0^h AND 12^h TERRESTRIAL TIME

Date		Apparent Longitude			Apparent Latitude			True Geocentric Distance (A. U.)	Semi Diameter	
		°	'	"	°	'	"	(X 10^{-3})	'	"
Aug.	16.0	308	40	28.5	-0	15	54.1	2.7141	14	42.61
	16.5	314	34	41.5	+0	16	50.2	2.7126	14	43.11
	17.0	320	29	35.7	0	49	26.5	2.7100	14	43.97
	17.5	326	25	28.1	1	21	35.1	2.7063	14	45.17
	18.0	332	22	34.6	1	52	55.9	2.7016	14	46.71
	18.5	338	21	10.7	2	23	09.1	2.6959	14	48.58
	19.0	344	21	31.6	+2	51	54.9	2.6892	14	50.79
	19.5	350	23	52.3	3	18	54.0	2.6816	14	53.33
	20.0	356	28	27.9	3	43	47.4	2.6730	14	56.21
	20.5	2	35	33.9	4	06	16.8	2.6634	14	59.44
	21.0	8	45	26.2	4	26	04.7	2.6528	15	03.02
	21.5	14	58	21.1	4	42	54.4	2.6412	15	06.98
	22.0	21	14	35.6	+4	56	30.2	2.6287	15	11.30
	22.5	27	34	27.1	5	06	37.8	2.6152	15	16.00
	23.0	33	58	13.2	5	13	04.1	2.6008	15	21.07
	23.5	40	26	11.6	5	15	37.7	2.5856	15	26.50
	24.0	46	58	39.4	5	14	08.7	2.5696	15	32.26
	24.5	53	35	53.1	5	08	29.9	2.5530	15	38.32
	25.0	60	18	07.2	+4	58	36.2	2.5360	15	44.61
	25.5	67	05	33.8	4	44	25.8	2.5188	15	51.07
	26.0	73	58	21.9	4	26	00.7	2.5016	15	57.61
	26.5	80	56	35.7	4	03	26.7	2.4847	16	04.12
	27.0	88	00	14.4	3	36	54.9	2.4684	16	10.47
	27.5	95	09	10.4	3	06	41.6	2.4531	16	16.51
	28.0	102	23	08.7	+2	33	09.1	2.4392	16	22.10
	28.5	109	41	46.5	1	56	45.8	2.4270	16	27.05
	29.0	117	04	31.9	1	18	06.2	2.4168	16	31.22
	29.5	124	30	44.7	+0	37	50.1	2.4089	16	34.45
	30.0	131	59	36.4	-0	03	17.9	2.4037	16	36.61
	30.5	139	30	11.2	0	44	30.4	2.4013	16	37.60
	31.0	147	01	27.5	-1	24	58.2	2.4019	16	37.36
	31.5	154	32	20.2	2	03	53.3	2.4055	16	35.87
Sept.	1.0	162	01	42.7	2	40	30.1	2.4120	16	33.16
	1.5	169	28	29.5	3	14	07.8	2.4214	16	29.30
	2.0	176	51	38.9	3	44	11.7	2.4335	16	24.40
	2.5	184	10	15.4	4	10	14.5	2.4479	16	18.60
	3.0	191	23	31.4	-4	31	56.3	2.4643	16	12.07
	3.5	198	30	48.8	4	49	05.1	2.4824	16	05.00
	4.0	205	31	39.5	5	01	35.8	2.5017	15	57.56
	4.5	212	25	46.3	5	09	29.8	2.5218	15	49.94
	5.0	219	13	01.8	5	12	53.5	2.5422	15	42.29
	5.5	225	53	28.3	5	11	57.4	2.5627	15	34.78
	6.0	232	27	16.6	-5	06	55.2	2.5827	15	27.54
	6.5	238	54	44.8	4	58	02.6	2.6019	15	20.67
	7.0	245	16	16.9	4	45	36.5	2.6201	15	14.28
	7.5	251	32	21.9	4	29	54.8	2.6370	15	08.42
	8.0	257	43	32.3	-4	11	15.2	2.6524	15	03.15

MOON, 2027

FOR 0^h AND 12^h TERRESTRIAL TIME

Date		Apparent Longitude			Apparent Latitude			True Geocentric Distance (A. U.)	Semi Diameter	
		°	'	"	°	'	"	(X 10^{-3})	'	"
Sept.	8.0	257	43	32.3	-4	11	15.2	2.6524	15	03.15
	8.5	263	50	23.1	3	49	55.9	2.6661	14	58.52
	9.0	269	53	30.8	3	26	14.5	2.6780	14	54.53
	9.5	275	53	32.8	3	00	28.6	2.6880	14	51.20
	10.0	281	51	06.3	2	32	55.6	2.6961	14	48.53
	10.5	287	46	47.9	2	03	52.7	2.7022	14	46.50
	11.0	293	41	13.0	-1	33	37.1	2.7065	14	45.09
	11.5	299	34	55.7	1	02	26.2	2.7090	14	44.27
	12.0	305	28	27.9	-0	30	37.6	2.7098	14	44.02
	12.5	311	22	19.4	+0	01	30.7	2.7090	14	44.29
	13.0	317	16	57.8	0	33	40.2	2.7067	14	45.05
	13.5	323	12	47.8	1	05	32.1	2.7030	14	46.26
	14.0	329	10	11.6	+1	36	47.1	2.6981	14	47.87
	14.5	335	09	28.6	2	07	05.4	2.6921	14	49.84
	15.0	341	10	55.6	2	36	07.1	2.6851	14	52.15
	15.5	347	14	46.6	3	03	32.2	2.6773	14	54.74
	16.0	353	21	13.1	3	29	00.6	2.6688	14	57.59
	16.5	359	30	24.3	3	52	12.8	2.6597	15	00.68
	17.0	5	42	27.3	+4	12	50.1	2.6500	15	03.97
	17.5	11	57	27.7	4	30	34.5	2.6399	15	07.44
	18.0	18	15	29.4	4	45	09.6	2.6293	15	11.09
	18.5	24	36	35.5	4	56	20.4	2.6183	15	14.91
	19.0	31	00	48.5	5	03	54.1	2.6070	15	18.87
	19.5	37	28	10.9	5	07	39.9	2.5954	15	22.99
	20.0	43	58	45.1	+5	07	29.6	2.5835	15	27.25
	20.5	50	32	34.1	5	03	17.7	2.5713	15	31.65
	21.0	57	09	41.3	4	55	01.4	2.5588	15	36.18
	21.5	63	50	10.9	4	42	41.3	2.5462	15	40.82
	22.0	70	34	07.5	4	26	21.2	2.5335	15	45.55
	22.5	77	21	36.0	4	06	08.3	2.5207	15	50.34
	23.0	84	12	41.0	+3	42	13.5	2.5080	15	55.14
	23.5	91	07	26.2	3	14	51.8	2.4956	15	59.91
	24.0	98	05	53.7	2	44	21.9	2.4836	16	04.56
	24.5	105	08	03.0	2	11	07.1	2.4721	16	09.01
	25.0	112	13	49.9	1	35	34.5	2.4616	16	13.17
	25.5	119	23	05.9	0	58	15.5	2.4521	16	16.93
	26.0	126	35	36.8	+0	19	45.2	2.4440	16	20.19
	26.5	133	51	01.9	-0	19	18.0	2.4374	16	22.82
	27.0	141	08	53.9	0	58	13.1	2.4327	16	24.71
	27.5	148	28	38.3	1	36	18.0	2.4301	16	25.79
	28.0	155	49	33.8	2	12	50.2	2.4296	16	25.96
	28.5	163	10	53.2	2	47	08.7	2.4316	16	25.17
	29.0	170	31	44.4	-3	18	35.7	2.4359	16	23.41
	29.5	177	51	12.7	3	46	37.5	2.4427	16	20.68
	30.0	185	08	22.3	4	10	46.1	2.4519	16	17.03
	30.5	192	22	18.9	4	30	40.0	2.4632	16	12.53
Oct.	1.0	199	32	12.1	-4	46	04.8	2.4766	16	07.28

MOON, 2027

FOR 0^h AND 12^h TERRESTRIAL TIME

Date		Apparent Longitude			Apparent Latitude			True Geocentric Distance (A. U.)	Semi Diameter	
		°	'	"	°	'	"	(X 10^{-3})	'	"
Oct.	1.0	199	32	12.1	-4	46	04.8	2.4766	16	07.28
	1.5	206	37	17.1	4	56	53.1	2.4917	16	01.41
	2.0	213	36	56.7	5	03	04.3	2.5082	15	55.07
	2.5	220	30	42.5	5	04	43.4	2.5259	15	48.40
	3.0	227	18	15.4	5	02	00.9	2.5442	15	41.55
	3.5	233	59	26.0	4	55	10.8	2.5630	15	34.67
	4.0	240	34	14.0	-4	44	30.5	2.5817	15	27.90
	4.5	247	02	48.0	4	30	18.9	2.6000	15	21.37
	5.0	253	25	24.3	4	12	56.2	2.6175	15	15.18
	5.5	259	42	25.9	3	52	43.1	2.6341	15	09.44
	6.0	265	54	21.3	3	30	00.0	2.6493	15	04.21
	6.5	272	01	43.5	3	05	06.9	2.6629	14	59.58
	7.0	278	05	09.1	-2	38	23.5	2.6748	14	55.59
	7.5	284	05	16.9	2	10	08.5	2.6848	14	52.26
	8.0	290	02	47.2	1	40	40.1	2.6927	14	49.63
	8.5	295	58	21.4	1	10	16.1	2.6986	14	47.69
	9.0	301	52	40.4	0	39	13.6	2.7023	14	46.46
	9.5	307	46	24.9	-0	07	49.9	2.7040	14	45.91
	10.0	313	40	14.1	+0	23	37.8	2.7037	14	46.03
	10.5	319	34	45.7	0	54	52.4	2.7014	14	46.79
	11.0	325	30	35.0	1	25	36.0	2.6972	14	48.14
	11.5	331	28	14.6	1	55	30.5	2.6915	14	50.05
	12.0	337	28	14.1	2	24	17.5	2.6842	14	52.46
	12.5	343	30	59.2	2	51	37.9	2.6756	14	55.31
	13.0	349	36	51.9	+3	17	12.1	2.6660	14	58.56
	13.5	355	46	10.0	3	40	40.7	2.6554	15	02.13
	14.0	1	59	06.7	4	01	44.0	2.6442	15	05.96
	14.5	8	15	50.7	4	20	02.9	2.6325	15	09.99
	15.0	14	36	26.1	4	35	19.2	2.6205	15	14.16
	15.5	21	00	52.5	4	47	15.9	2.6084	15	18.39
	16.0	27	29	05.7	+4	55	38.0	2.5964	15	22.65
	16.5	34	00	57.6	5	00	12.8	2.5845	15	26.87
	17.0	40	36	17.6	5	00	50.5	2.5730	15	31.02
	17.5	47	14	52.5	4	57	24.6	2.5619	15	35.06
	18.0	53	56	28.0	4	49	52.4	2.5513	15	38.96
	18.5	60	40	49.4	4	38	15.0	2.5411	15	42.70
	19.0	67	27	42.3	+4	22	37.6	2.5315	15	46.27
	19.5	74	16	53.3	4	03	09.8	2.5225	15	49.66
	20.0	81	08	10.9	3	40	04.9	2.5140	15	52.87
	20.5	88	01	25.4	3	13	40.1	2.5061	15	55.88
	21.0	94	56	29.4	2	44	16.5	2.4987	15	58.70
	21.5	101	53	17.4	2	12	18.3	2.4919	16	01.32
	22.0	108	51	45.6	+1	38	12.7	2.4857	16	03.72
	22.5	115	51	50.9	1	02	29.7	2.4801	16	05.89
	23.0	122	53	30.9	+0	25	41.5	2.4752	16	07.79
	23.5	129	56	41.9	-0	11	38.1	2.4711	16	09.41
	24.0	137	01	18.8	-0	48	53.8	2.4679	16	10.69

MOON, 2027

FOR 0^h AND 12^h TERRESTRIAL TIME

Date		Apparent Longitude			Apparent Latitude			True Geocentric Distance (A. U.)	Semi Diameter	
		°	'	"	°	'	"	(X 10^{-3})	'	"
Oct.	24.0	137	01	18.8	-0	48	53.8	2.4679	16	10.69
	24.5	144	07	13.5	1	25	29.4	2.4656	16	11.58
	25.0	151	14	14.3	2	00	49.2	2.4644	16	12.05
	25.5	158	22	05.0	2	34	17.6	2.4645	16	12.03
	26.0	165	30	24.7	3	05	21.0	2.4659	16	11.48
	26.5	172	38	47.4	3	33	28.0	2.4687	16	10.36
	27.0	179	46	42.5	-3	58	10.9	2.4731	16	08.64
	27.5	186	53	35.3	4	19	05.9	2.4791	16	06.30
	28.0	193	58	48.3	4	35	54.4	2.4866	16	03.36
	28.5	201	01	42.5	4	48	23.2	2.4958	15	59.82
	29.0	208	01	39.0	4	56	24.9	2.5065	15	55.73
	29.5	214	58	00.8	4	59	58.0	2.5186	15	51.15
	30.0	221	50	14.4	-4	59	06.5	2.5319	15	46.15
	30.5	228	37	51.1	4	53	59.4	2.5462	15	40.83
	31.0	235	20	28.4	4	44	49.9	2.5613	15	35.28
	31.5	241	57	50.9	4	31	54.7	2.5769	15	29.61
Nov.	1.0	248	29	50.4	4	15	33.2	2.5928	15	23.93
	1.5	254	56	26.4	3	56	06.5	2.6085	15	18.35
	2.0	261	17	45.7	-3	33	56.6	2.6239	15	12.97
	2.5	267	34	01.9	3	09	25.7	2.6385	15	07.90
	3.0	273	45	34.8	2	42	56.1	2.6522	15	03.21
	3.5	279	52	49.9	2	14	49.1	2.6647	14	58.99
	4.0	285	56	17.2	1	45	25.6	2.6756	14	55.32
	4.5	291	56	30.8	1	15	05.3	2.6849	14	52.24
	5.0	297	54	07.7	-0	44	07.2	2.6922	14	49.80
	5.5	303	49	47.4	-0	12	49.4	2.6975	14	48.04
	6.0	309	44	10.8	+0	18	30.7	2.7008	14	46.99
	6.5	315	38	00.0	0	49	36.1	2.7018	14	46.65
	7.0	321	31	57.2	1	20	10.1	2.7006	14	47.03
	7.5	327	26	44.3	1	49	56.0	2.6973	14	48.12
	8.0	333	23	02.2	+2	18	37.0	2.6919	14	49.90
	8.5	339	21	30.1	2	45	56.2	2.6845	14	52.35
	9.0	345	22	45.0	3	11	35.9	2.6753	14	55.42
	9.5	351	27	20.6	3	35	18.4	2.6645	14	59.07
	10.0	357	35	47.3	3	56	45.3	2.6522	15	03.22
	10.5	3	48	30.8	4	15	38.1	2.6388	15	07.82
	11.0	10	05	51.9	+4	31	38.5	2.6244	15	12.77
	11.5	16	28	05.4	4	44	28.3	2.6095	15	18.00
	12.0	22	55	20.2	4	53	50.4	2.5942	15	23.40
	12.5	29	27	38.3	4	59	29.3	2.5789	15	28.88
	13.0	36	04	55.1	5	01	11.8	2.5639	15	34.33
	13.5	42	46	59.5	4	58	47.4	2.5494	15	39.64
	14.0	49	33	33.9	+4	52	09.5	2.5357	15	44.73
	14.5	56	24	15.5	4	41	16.1	2.5229	15	49.50
	15.0	63	18	36.8	4	26	09.7	2.5114	15	53.88
	15.5	70	16	07.1	4	06	58.3	2.5011	15	57.79
	16.0	77	16	13.9	+3	43	55.4	2.4923	16	01.19

MOON, 2027

FOR 0^h AND 12^h TERRESTRIAL TIME

Date		Apparent Longitude			Apparent Latitude			True Geocentric Distance (A. U.)	Semi Diameter	
		°	'	"	°	'	"	(X 10^{-3})	'	"
Nov.	16.0	77	16	13.9	+3	43	55.4	2.4923	16	01.19
	16.5	84	18	24.2	3	17	19.4	2.4849	16	04.05
	17.0	91	22	06.1	2	47	33.8	2.4790	16	06.35
	17.5	98	26	49.6	2	15	06.3	2.4745	16	08.09
	18.0	105	32	07.9	1	40	28.1	2.4714	16	09.30
	18.5	112	37	37.9	1	04	13.0	2.4696	16	10.01
	19.0	119	43	00.4	+0	26	56.6	2.4690	16	10.24
	19.5	126	48	00.1	-0	10	44.7	2.4695	16	10.03
	20.0	133	52	25.3	0	48	14.2	2.4710	16	09.44
	20.5	140	56	07.1	1	24	56.3	2.4734	16	08.50
	21.0	147	58	58.6	2	00	16.3	2.4766	16	07.25
	21.5	155	00	54.2	2	33	41.7	2.4806	16	05.72
	22.0	162	01	48.6	-3	04	42.2	2.4852	16	03.92
	22.5	169	01	35.7	3	32	50.3	2.4905	16	01.88
	23.0	176	00	08.3	3	57	41.9	2.4964	15	59.60
	23.5	182	57	17.1	4	18	56.3	2.5030	15	57.08
	24.0	189	52	50.7	4	36	16.5	2.5102	15	54.33
	24.5	196	46	35.5	4	49	29.9	2.5181	15	51.33
	25.0	203	38	15.4	-4	58	28.1	2.5267	15	48.10
	25.5	210	27	32.9	5	03	07.2	2.5359	15	44.63
	26.0	217	14	09.5	5	03	27.7	2.5459	15	40.94
	26.5	223	57	46.2	4	59	34.4	2.5565	15	37.03
	27.0	230	38	04.8	4	51	36.3	2.5677	15	32.93
	27.5	237	14	48.8	4	39	45.9	2.5795	15	28.68
	28.0	243	47	43.8	-4	24	19.1	2.5917	15	24.32
	28.5	250	16	38.9	4	05	34.3	2.6041	15	19.89
	29.0	256	41	27.4	3	43	52.1	2.6167	15	15.46
	29.5	263	02	06.6	3	19	34.2	2.6293	15	11.09
	30.0	269	18	38.7	2	53	03.3	2.6416	15	06.85
	30.5	275	31	10.8	2	24	42.4	2.6534	15	02.81
Dec.	1.0	281	39	55.0	-1	54	54.3	2.6645	14	59.04
	1.5	287	45	07.7	1	24	01.2	2.6747	14	55.62
	2.0	293	47	10.2	0	52	24.5	2.6838	14	52.60
	2.5	299	46	27.5	-0	20	24.7	2.6915	14	50.05
	3.0	305	43	28.3	+0	11	38.7	2.6976	14	48.03
	3.5	311	38	44.7	0	43	27.1	2.7020	14	46.59
	4.0	317	32	51.4	+1	14	42.8	2.7044	14	45.78
	4.5	323	26	25.3	1	45	08.9	2.7049	14	45.62
	5.0	329	20	05.2	2	14	29.0	2.7033	14	46.16
	5.5	335	14	31.0	2	42	27.0	2.6995	14	47.41
	6.0	341	10	23.2	3	08	47.1	2.6935	14	49.37
	6.5	347	08	22.6	3	33	13.3	2.6854	14	52.05
	7.0	353	09	09.2	+3	55	29.7	2.6753	14	55.42
	7.5	359	13	21.7	4	15	20.0	2.6632	14	59.48
	8.0	5	21	37.0	4	32	27.7	2.6494	15	04.17
	8.5	11	34	28.7	4	46	36.4	2.6341	15	09.44
	9.0	17	52	26.8	+4	57	29.5	2.6174	15	15.23

MOON, 2027

FOR 0^h AND 12^h TERRESTRIAL TIME

Date	Apparent Longitude			Apparent Latitude			True Geocentric Distance (A. U.)	Semi Diameter	
	°	'	"	°	'	"	(X 10^{-3})	'	"
Dec. 9.0	17	52	26.8	+4	57	29.5	2.6174	15	15.23
9.5	24	15	56.4	5	04	51.1	2.5998	15	21.44
10.0	30	45	16.8	5	08	25.9	2.5814	15	27.98
10.5	37	20	40.5	5	08	00.7	2.5628	15	34.73
11.0	44	02	12.6	5	03	24.1	2.5442	15	41.56
11.5	50	49	49.6	4	54	28.3	2.5261	15	48.33
12.0	57	43	19.9	+4	41	09.6	2.5087	15	54.89
12.5	64	42	22.8	4	23	29.2	2.4925	16	01.09
13.0	71	46	29.7	4	01	34.2	2.4778	16	06.80
13.5	78	55	04.3	3	35	38.2	2.4649	16	11.86
14.0	86	07	24.3	3	06	01.0	2.4540	16	16.17
14.5	93	22	42.6	2	33	09.3	2.4453	16	19.63
15.0	100	40	09.7	+1	57	35.4	2.4390	16	22.18
15.5	107	58	54.8	1	19	56.4	2.4350	16	23.78
16.0	115	18	08.4	0	40	53.1	2.4334	16	24.43
16.5	122	37	03.9	+0	01	08.5	2.4341	16	24.17
17.0	129	54	58.6	-0	38	33.8	2.4368	16	23.04
17.5	137	11	15.2	1	17	31.3	2.4416	16	21.14
18.0	144	25	21.8	-1	55	03.6	2.4480	16	18.56
18.5	151	36	52.9	2	30	33.4	2.4559	16	15.41
19.0	158	45	28.5	3	03	27.6	2.4651	16	11.78
19.5	165	50	53.9	3	33	17.6	2.4752	16	07.80
20.0	172	52	59.2	3	59	39.5	2.4861	16	03.56
20.5	179	51	38.5	4	22	14.2	2.4976	15	59.15
21.0	186	46	48.7	-4	40	47.2	2.5094	15	54.64
21.5	193	38	29.3	4	55	08.5	2.5214	15	50.09
22.0	200	26	41.0	5	05	12.3	2.5334	15	45.56
22.5	207	11	25.8	5	10	56.8	2.5455	15	41.08
23.0	213	52	45.8	5	12	23.5	2.5575	15	36.67
23.5	220	30	43.3	5	09	37.7	2.5694	15	32.35
24.0	227	05	20.5	-5	02	47.5	2.5810	15	28.13
24.5	233	36	39.2	4	52	04.1	2.5925	15	24.01
25.0	240	04	41.2	4	37	40.9	2.6038	15	19.99
25.5	246	29	28.0	4	19	53.9	2.6149	15	16.09
26.0	252	51	01.8	3	59	00.9	2.6258	15	12.30
26.5	259	09	24.8	3	35	21.5	2.6364	15	08.64
27.0	265	24	40.4	-3	09	16.3	2.6467	15	05.10
27.5	271	36	53.1	2	41	07.1	2.6566	15	01.72
28.0	277	46	08.9	2	11	16.2	2.6661	14	58.52
28.5	283	52	35.6	1	40	06.1	2.6750	14	55.51
29.0	289	56	23.3	1	07	59.1	2.6833	14	52.75
29.5	295	57	44.3	0	35	17.3	2.6908	14	50.26
30.0	301	56	53.3	-0	02	22.1	2.6974	14	48.09
30.5	307	54	07.8	+0	30	25.9	2.7029	14	46.29
31.0	313	49	47.7	1	02	46.9	2.7071	14	44.89
31.5	319	44	15.7	1	34	22.1	2.7100	14	43.95
32.0	325	37	57.0	+2	04	53.7	2.7114	14	43.50

MOON, 2027

FOR 0^h AND 12^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			Horizontal Parallax	
		h	m	s	°	'	"	'	"
Jan.	0.0	12	37	05.51	-8	19	42.07	56	47.00
	0.5	13	00	34.66	11	09	01.20	56	22.91
	1.0	13	24	11.47	13	49	14.64	56	00.56
	1.5	13	48	02.40	16	19	01.27	55	40.09
	2.0	14	12	12.76	18	37	02.31	55	21.57
	2.5	14	36	46.55	20	42	00.68	55	05.02
	3.0	15	01	46.24	-22	32	41.12	54	50.44
	3.5	15	27	12.56	24	07	51.45	54	37.76
	4.0	15	53	04.34	25	26	24.56	54	26.93
	4.5	16	19	18.47	26	27	21.23	54	17.87
	5.0	16	45	49.98	27	09	53.30	54	10.48
	5.5	17	12	32.33	27	33	26.85	54	04.67
	6.0	17	39	17.88	-27	37	44.85	54	00.37
	6.5	18	05	58.45	27	22	48.84	53	57.48
	7.0	18	32	26.04	26	48	59.30	53	55.95
	7.5	18	58	33.45	25	56	54.67	53	55.72
	8.0	19	24	14.78	24	47	29.12	53	56.76
	8.5	19	49	25.82	23	21	49.53	53	59.05
	9.0	20	14	04.20	-21	41	12.02	54	02.61
	9.5	20	38	09.35	19	46	58.61	54	07.45
	10.0	21	01	42.44	17	40	34.18	54	13.61
	10.5	21	24	46.10	15	23	24.20	54	21.15
	11.0	21	47	24.28	12	56	53.13	54	30.14
	11.5	22	09	41.93	10	22	23.54	54	40.64
	12.0	22	31	44.93	-7	41	16.00	54	52.72
	12.5	22	53	39.83	4	54	49.64	55	06.46
	13.0	23	15	33.85	-2	04	23.16	55	21.91
	13.5	23	37	34.72	+0	48	43.46	55	39.10
	14.0	23	59	50.69	3	43	06.96	55	58.04
	14.5	0	22	30.44	6	37	18.24	56	18.69
	15.0	0	45	43.02	+9	29	39.53	56	40.98
	15.5	1	09	37.70	12	18	21.35	57	04.77
	16.0	1	34	23.74	15	01	19.43	57	29.85
	16.5	2	00	10.01	17	36	12.03	57	55.96
	17.0	2	27	04.36	20	00	18.32	58	22.72
	17.5	2	55	12.80	22	10	38.52	58	49.71
	18.0	3	24	38.48	+24	03	57.00	59	16.40
	18.5	3	55	20.44	25	36	49.46	59	42.19
	19.0	4	27	12.60	26	45	54.80	60	06.42
	19.5	5	00	03.11	27	28	11.53	60	28.40
	20.0	5	33	34.62	27	41	16.87	60	47.44
	20.5	6	07	25.65	27	23	44.98	61	02.87
	21.0	6	41	12.92	+26	35	20.17	61	14.11
	21.5	7	14	34.17	25	17	01.38	61	20.69
	22.0	7	47	10.69	23	30	56.88	61	22.30
	22.5	8	18	49.02	21	20	10.85	61	18.82
	23.0	8	49	21.51	+18	48	25.34	61	10.32

MOON, 2027
FOR 0^h AND 12^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			Horizontal Parallax	
		h	m	s	º	'	"	'	"
Jan.	23.0	8	49	21.51	+18	48	25.34	61	10.32
	23.5	9	18	45.90	15	59	41.69	60	57.05
	24.0	9	47	04.37	12	58	04.38	60	39.45
	24.5	10	14	22.34	9	47	28.75	60	18.09
	25.0	10	40	47.36	6	31	33.06	59	53.64
	25.5	11	06	28.16	+3	13	34.23	59	26.83
	26.0	11	31	33.97	-0	03	33.36	58	58.39
	26.5	11	56	14.06	3	17	17.12	58	29.06
	27.0	12	20	37.38	6	25	24.08	57	59.51
	27.5	12	44	52.34	9	25	58.03	57	30.33
	28.0	13	09	06.66	12	17	16.53	57	02.06
	28.5	13	33	27.17	14	57	47.97	56	35.14
	29.0	13	57	59.68	-17	26	09.12	56	09.91
	29.5	14	22	48.81	19	41	03.29	55	46.64
	30.0	14	47	57.80	21	41	19.27	55	25.55
	30.5	15	13	28.34	23	25	51.05	55	06.74
	31.0	15	39	20.41	24	53	38.54	54	50.31
	31.5	16	05	32.21	26	03	48.86	54	36.26
Feb.	1.0	16	32	00.22	-26	55	38.36	54	24.59
	1.5	16	58	39.36	27	28	34.84	54	15.23
	2.0	17	25	23.34	27	42	19.69	54	08.10
	2.5	17	52	05.11	27	36	49.54	54	03.10
	3.0	18	18	37.47	27	12	17.12	54	00.11
	3.5	18	44	53.59	26	29	11.17	53	58.99
	4.0	19	10	47.58	-25	28	15.31	53	59.62
	4.5	19	36	14.85	24	10	26.15	54	01.85
	5.0	20	01	12.35	22	36	50.93	54	05.55
	5.5	20	25	38.69	20	48	44.96	54	10.60
	6.0	20	49	34.05	18	47	29.09	54	16.88
	6.5	21	13	00.07	16	34	27.72	54	24.29
	7.0	21	35	59.69	-14	11	07.06	54	32.75
	7.5	21	58	36.90	11	38	54.06	54	42.19
	8.0	22	20	56.61	8	59	15.81	54	52.58
	8.5	22	43	04.45	6	13	39.38	55	03.88
	9.0	23	05	06.68	3	23	32.19	55	16.08
	9.5	23	27	10.07	-0	30	22.67	55	29.18
	10.0	23	49	21.84	+2	24	18.66	55	43.20
	10.5	0	11	49.59	5	18	57.81	55	58.15
	11.0	0	34	41.21	8	11	55.66	56	14.04
	11.5	0	58	04.79	11	01	26.13	56	30.89
	12.0	1	22	08.47	13	45	34.22	56	48.66
	12.5	1	47	00.10	16	22	14.23	57	07.33
	13.0	2	12	46.95	+18	49	08.41	57	26.80
	13.5	2	39	35.07	21	03	46.59	57	46.97
	14.0	3	07	28.66	23	03	27.28	58	07.64
	14.5	3	36	29.16	24	45	21.16	58	28.59
	15.0	4	06	34.45	+26	06	37.36	58	49.52

MOON, 2027

FOR 0^h AND 12^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			Horizontal Parallax	
		h	m	s	°	'	"	'	"
Feb.	15.0	4	06	34.45	+26	06	37.36	58	49.52
	15.5	4	37	38.18	27	04	32.93	59	10.06
	16.0	5	09	29.49	27	36	45.05	59	29.79
	16.5	5	41	53.48	27	41	24.49	59	48.24
	17.0	6	14	32.41	27	17	28.01	60	04.91
	17.5	6	47	07.46	26	24	47.18	60	19.25
	18.0	7	19	20.89	+25	04	11.50	60	30.77
	18.5	7	50	57.79	23	17	25.26	60	38.98
	19.0	8	21	47.33	21	06	59.18	60	43.50
	19.5	8	51	43.24	18	35	58.72	60	44.02
	20.0	9	20	43.54	15	47	51.56	60	40.37
	20.5	9	48	49.89	12	46	15.90	60	32.55
	21.0	10	16	06.74	+9	34	50.75	60	20.66
	21.5	10	42	40.43	6	17	08.56	60	05.00
	22.0	11	08	38.46	+2	56	30.14	59	45.96
	22.5	11	34	08.90	-0	23	58.46	59	24.06
	23.0	11	59	19.93	3	41	27.38	58	59.87
	23.5	12	24	19.46	6	53	23.26	58	34.01
	24.0	12	49	14.93	-9	57	28.59	58	07.13
	24.5	13	14	13.03	12	51	40.54	57	39.83
	25.0	13	39	19.53	15	34	09.65	57	12.71
	25.5	14	04	39.09	18	03	18.43	56	46.28
	26.0	14	30	15.07	20	17	40.40	56	21.01
	26.5	14	56	09.31	22	15	59.44	55	57.29
	27.0	15	22	22.08	-23	57	09.78	55	35.44
	27.5	15	48	51.93	25	20	16.51	55	15.74
	28.0	16	15	35.77	26	24	36.46	54	58.35
	28.5	16	42	29.04	27	09	39.39	54	43.43
Mar.	1.0	17	09	26.02	27	35	09.04	54	31.05
	1.5	17	36	20.24	27	41	03.86	54	21.25
	2.0	18	03	05.03	-27	27	37.15	54	14.01
	2.5	18	29	34.03	26	55	16.51	54	09.29
	3.0	18	55	41.68	26	04	42.54	54	07.01
	3.5	19	21	23.60	24	56	47.08	54	07.07
	4.0	19	46	36.83	23	32	31.15	54	09.32
	4.5	20	11	19.92	21	53	02.80	54	13.61
	5.0	20	35	32.91	-19	59	35.24	54	19.77
	5.5	20	59	17.23	17	53	25.37	54	27.63
	6.0	21	22	35.53	15	35	52.69	54	36.97
	6.5	21	45	31.47	13	08	18.72	54	47.61
	7.0	22	08	09.63	10	32	06.83	54	59.34
	7.5	22	30	35.24	7	48	42.46	55	11.97
	8.0	22	52	54.15	-4	59	33.59	55	25.32
	8.5	23	15	12.68	-2	06	11.48	55	39.21
	9.0	23	37	37.55	+0	49	48.51	55	53.48
	9.5	0	00	15.77	3	46	45.93	56	08.01
	10.0	0	23	14.61	+6	42	54.16	56	22.67

MOON, 2027
FOR 0^h AND 12^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			Horizontal Parallax	
		h	m	s	º	'	"	'	"
Mar.	10.0	0	23	14.61	+6	42	54.16	56	22.67
	10.5	0	46	41.42	9	36	19.46	56	37.39
	11.0	1	10	43.53	12	24	59.98	56	52.08
	11.5	1	35	27.93	15	06	45.10	57	06.71
	12.0	2	01	01.01	17	39	15.21	57	21.22
	12.5	2	27	28.03	20	00	02.34	57	35.61
	13.0	2	54	52.58	+22	06	31.90	57	49.82
	13.5	3	23	15.91	23	56	06.09	58	03.84
	14.0	3	52	36.28	25	26	09.30	58	17.62
	14.5	4	22	48.41	26	34	15.53	58	31.07
	15.0	4	53	43.38	27	18	17.49	58	44.11
	15.5	5	25	08.85	27	36	36.33	58	56.60
	16.0	5	56	50.04	+27	28	10.52	59	08.36
	16.5	6	28	31.05	26	52	42.14	59	19.20
	17.0	6	59	56.48	25	50	39.26	59	28.86
	17.5	7	30	53.01	24	23	14.10	59	37.07
	18.0	8	01	10.43	22	32	17.43	59	43.56
	18.5	8	30	42.28	20	20	10.69	59	48.03
	19.0	8	59	25.77	+17	49	37.35	59	50.22
	19.5	9	27	21.46	15	03	34.74	59	49.88
	20.0	9	54	32.57	12	05	07.24	59	46.83
	20.5	10	21	04.31	8	57	20.89	59	40.95
	21.0	10	47	03.21	5	43	19.56	59	32.22
	21.5	11	12	36.62	+2	26	02.13	59	20.67
	22.0	11	37	52.16	-0	51	39.34	59	06.47
	22.5	12	02	57.48	4	07	00.90	58	49.85
	23.0	12	27	59.85	7	17	27.60	58	31.13
	23.5	12	53	06.01	10	20	34.07	58	10.69
	24.0	13	18	21.86	13	14	05.06	57	48.96
	24.5	13	43	52.25	15	55	55.84	57	26.40
	25.0	14	09	40.74	-18	24	12.83	57	03.48
	25.5	14	35	49.42	20	37	14.32	56	40.66
	26.0	15	02	18.66	22	33	31.51	56	18.39
	26.5	15	29	07.05	24	11	49.80	55	57.07
	27.0	15	56	11.39	25	31	10.13	55	37.08
	27.5	16	23	26.84	26	30	50.35	55	18.74
	28.0	16	50	47.26	-27	10	26.22	55	02.32
	28.5	17	18	05.64	27	29	51.75	54	48.07
	29.0	17	45	14.69	27	29	18.80	54	36.15
	29.5	18	12	07.45	27	09	15.66	54	26.71
	30.0	18	38	37.79	26	30	24.92	54	19.83
	30.5	19	04	40.90	25	33	40.74	54	15.56
	31.0	19	30	13.47	-24	20	05.90	54	13.92
	31.5	19	55	13.87	22	50	49.01	54	14.87
Apr.	1.0	20	19	42.09	21	07	02.13	54	18.34
	1.5	20	43	39.58	19	09	58.99	54	24.24
	2.0	21	07	09.09	-17	00	53.97	54	32.42

MOON, 2027

FOR 0^h AND 12^h TERRESTRIAL TIME

Date	Apparent Right Ascension			Apparent Declination			Horizontal Parallax	
	h	m	s	°	'	"	'	"
Apr. 1.0	20	19	42.09	-21	07	02.13	54	18.34
1.5	20	43	39.58	19	09	58.99	54	24.24
2.0	21	07	09.09	17	00	53.97	54	32.42
2.5	21	30	14.48	14	41	01.66	54	42.71
3.0	21	53	00.47	12	11	37.11	54	54.92
3.5	22	15	32.52	9	33	56.58	55	08.81
4.0	22	37	56.68	-6	49	18.64	55	24.13
4.5	23	00	19.45	3	59	05.59	55	40.59
5.0	23	22	47.74	-1	04	45.09	55	57.90
5.5	23	45	28.74	+1	52	08.22	56	15.77
6.0	0	08	29.89	4	49	51.07	56	33.86
6.5	0	31	58.73	7	46	30.05	56	51.89
7.0	0	56	02.74	+10	40	00.47	57	09.56
7.5	1	20	49.10	13	28	05.60	57	26.60
8.0	1	46	24.35	16	08	16.78	57	42.78
8.5	2	12	53.91	18	37	54.53	57	57.90
9.0	2	40	21.46	20	54	11.17	58	11.80
9.5	3	08	48.30	22	54	15.31	58	24.36
10.0	3	38	12.61	+24	35	18.39	58	35.52
10.5	4	08	28.94	25	54	43.35	58	45.25
11.0	4	39	28.00	26	50	14.73	58	53.56
11.5	5	10	57.01	27	20	08.94	59	00.46
12.0	5	42	40.60	27	23	23.18	59	06.02
12.5	6	14	22.29	26	59	40.94	59	10.29
13.0	6	45	46.17	+26	09	33.05	59	13.31
13.5	7	16	38.50	24	54	14.03	59	15.13
14.0	7	46	48.85	23	15	34.74	59	15.77
14.5	8	16	10.66	21	15	53.01	59	15.25
15.0	8	44	41.20	18	57	44.11	59	13.53
15.5	9	12	21.14	16	23	52.46	59	10.60
16.0	9	39	13.93	+13	37	05.32	59	06.39
16.5	10	05	25.02	10	40	08.56	59	00.86
17.0	10	31	01.23	7	35	44.23	58	53.93
17.5	10	56	10.20	4	26	29.54	58	45.58
18.0	11	20	59.95	+1	14	56.63	58	35.77
18.5	11	45	38.55	-1	56	27.11	58	24.49
19.0	12	10	13.80	-5	05	18.71	58	11.79
19.5	12	34	53.07	8	09	19.28	57	57.76
20.0	12	59	43.00	11	06	14.12	57	42.50
20.5	13	24	49.32	13	53	53.04	57	26.19
21.0	13	50	16.55	16	30	11.36	57	09.03
21.5	14	16	07.76	18	53	11.31	56	51.28
22.0	14	42	24.33	-21	01	04.10	56	33.21
22.5	15	09	05.69	22	52	12.38	56	15.11
23.0	15	36	09.27	24	25	13.11	55	57.28
23.5	16	03	30.49	25	39	00.45	55	40.05
24.0	16	31	03.00	-26	32	48.28	55	23.70

MOON, 2027
FOR 0^h AND 12^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			Horizontal Parallax	
		h	m	s	º	'	"	'	"
Apr.	24.0	16	31	03.00	-26	32	48.28	55	23.70
	24.5	16	58	39.17	27	06	11.99	55	08.54
	25.0	17	26	10.62	27	19	09.04	54	54.84
	25.5	17	53	28.97	27	11	58.17	54	42.84
	26.0	18	20	26.53	26	45	17.21	54	32.78
	26.5	18	46	56.88	25	59	59.80	54	24.84
	27.0	19	12	55.28	-24	57	11.44	54	19.19
	27.5	19	38	18.87	23	38	05.47	54	15.95
	28.0	20	03	06.70	22	03	59.34	54	15.24
	28.5	20	27	19.59	20	16	11.68	54	17.09
	29.0	20	50	59.92	18	16	00.17	54	21.54
	29.5	21	14	11.38	16	04	40.38	54	28.57
	30.0	21	36	58.73	-13	43	25.53	54	38.13
	30.5	21	59	27.58	11	13	26.96	54	50.12
May	1.0	22	21	44.20	8	35	55.22	55	04.40
	1.5	22	43	55.42	5	52	01.75	55	20.78
	2.0	23	06	08.51	3	03	00.85	55	39.03
	2.5	23	28	31.15	-0	10	12.05	55	58.87
	3.0	23	51	11.28	+2	44	57.41	56	19.98
	3.5	0	14	17.11	5	40	50.04	56	41.98
	4.0	0	37	56.94	8	35	35.54	57	04.48
	4.5	1	02	19.00	11	27	08.73	57	27.04
	5.0	1	27	31.12	14	13	07.97	57	49.21
	5.5	1	53	40.29	16	50	54.77	58	10.53
	6.0	2	20	52.03	+19	17	35.03	58	30.56
	6.5	2	49	09.65	21	30	02.53	58	48.90
	7.0	3	18	33.32	23	25	05.33	59	05.17
	7.5	3	48	59.26	24	59	35.34	59	19.07
	8.0	4	20	19.17	26	10	40.70	59	30.39
	8.5	4	52	20.22	26	55	59.85	59	38.99
	9.0	5	24	45.76	+27	13	54.88	59	44.81
	9.5	5	57	16.85	27	03	41.62	59	47.90
	10.0	6	29	34.29	26	25	33.97	59	48.36
	10.5	7	01	20.72	25	20	41.40	59	46.38
	11.0	7	32	22.33	23	51	00.39	59	42.18
	11.5	8	02	29.79	21	59	02.08	59	36.00
	12.0	8	31	38.43	+19	47	38.85	59	28.12
	12.5	8	59	47.82	17	19	52.26	59	18.81
	13.0	9	27	00.96	14	38	43.72	59	08.30
	13.5	9	53	23.37	11	47	08.33	58	56.83
	14.0	10	19	02.29	8	47	51.57	58	44.58
	14.5	10	44	05.96	5	43	28.30	58	31.73
	15.0	11	08	43.12	+2	36	23.19	58	18.39
	15.5	11	33	02.62	-0	31	07.88	58	04.66
	16.0	11	57	13.10	3	36	56.02	57	50.62
	16.5	12	21	22.82	6	38	57.55	57	36.33
	17.0	12	45	39.43	-9	35	12.47	57	21.82

MOON, 2027

FOR 0^h AND 12^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			Horizontal Parallax	
		h	m	s	°	'	"	'	"
May	17.0	12	45	39.43	-9	35	12.47	57	21.82
	17.5	13	10	09.78	12	23	43.41	57	07.14
	18.0	13	34	59.68	15	02	35.17	56	52.34
	18.5	14	00	13.67	17	29	55.13	56	37.46
	19.0	14	25	54.73	19	43	54.37	56	22.58
	19.5	14	52	04.00	21	42	49.85	56	07.78
	20.0	15	18	40.55	-23	25	07.26	55	53.16
	20.5	15	45	41.30	24	49	24.61	55	38.85
	21.0	16	13	01.03	25	54	35.89	55	25.01
	21.5	16	40	32.66	26	39	54.63	55	11.77
	22.0	17	08	07.77	27	04	56.45	54	59.33
	22.5	17	35	37.26	27	09	40.31	54	47.87
	23.0	18	02	52.10	-26	54	28.00	54	37.57
	23.5	18	29	44.14	26	20	01.99	54	28.64
	24.0	18	56	06.68	25	27	21.87	54	21.25
	24.5	19	21	54.87	24	17	39.93	54	15.60
	25.0	19	47	05.95	22	52	16.66	54	11.86
	25.5	20	11	39.16	21	12	36.44	54	10.18
	26.0	20	35	35.63	-19	20	04.15	54	10.70
	26.5	20	58	58.08	17	16	02.68	54	13.54
	27.0	21	21	50.58	15	01	51.44	54	18.80
	27.5	21	44	18.24	12	38	45.91	54	26.53
	28.0	22	06	27.05	10	07	57.95	54	36.76
	28.5	22	28	23.66	7	30	36.82	54	49.49
	29.0	22	50	15.27	-4	47	50.76	55	04.67
	29.5	23	12	09.56	-2	00	49.14	55	22.20
	30.0	23	34	14.60	+0	49	15.17	55	41.92
	30.5	23	56	38.85	3	41	02.93	56	03.64
	31.0	0	19	31.06	6	33	05.53	56	27.08
	31.5	0	43	00.18	9	23	41.88	56	51.91
June	1.0	1	07	15.16	+12	10	55.32	57	17.73
	1.5	1	32	24.66	14	52	31.08	57	44.07
	2.0	1	58	36.59	17	25	54.65	58	10.43
	2.5	2	25	57.35	19	48	11.81	58	36.24
	3.0	2	54	31.03	21	56	11.24	59	00.90
	3.5	3	24	18.28	23	46	30.70	59	23.83
	4.0	3	55	15.31	+25	15	47.28	59	44.43
	4.5	4	27	13.15	26	20	51.87	60	02.19
	5.0	4	59	57.49	26	59	06.31	60	16.64
	5.5	5	33	09.52	27	08	40.65	60	27.43
	6.0	6	06	27.75	26	48	46.72	60	34.34
	6.5	6	39	30.39	25	59	44.50	60	37.28
	7.0	7	11	57.94	+24	42	59.73	60	36.29
	7.5	7	43	35.14	23	00	53.44	60	31.55
	8.0	8	14	12.01	20	56	26.36	60	23.35
	8.5	8	43	43.93	18	33	02.01	60	12.08
	9.0	9	12	10.99	+15	54	11.47	59	58.17

MOON, 2027
FOR 0^h AND 12^h TERRESTRIAL TIME

Date	Apparent Right Ascension			Apparent Declination			Horizontal Parallax	
	h	m	s	°	'	"	'	"
June 9.0	9	12	10.99	+15	54	11.47	59	58.17
9.5	9	39	36.99	13	03	21.78	59	42.11
10.0	10	06	08.36	10	03	48.34	59	24.38
10.5	10	31	53.18	6	58	31.04	59	05.44
11.0	10	57	00.46	3	50	13.16	58	45.72
11.5	11	21	39.57	+0	41	22.24	58	25.61
12.0	11	45	59.83	-2	25	47.89	58	05.43
12.5	12	10	10.26	5	29	14.58	57	45.46
13.0	12	34	19.33	8	27	03.70	57	25.92
13.5	12	58	34.84	11	17	27.30	57	06.96
14.0	13	23	03.64	13	58	41.68	56	48.71
14.5	13	47	51.51	16	29	06.24	56	31.24
15.0	14	13	02.86	-18	47	03.14	56	14.62
15.5	14	38	40.46	20	50	57.88	55	58.86
16.0	15	04	45.24	22	39	20.93	55	43.97
16.5	15	31	16.05	24	10	50.32	55	29.97
17.0	15	58	09.59	25	24	14.88	55	16.86
17.5	16	25	20.47	26	18	37.90	55	04.65
18.0	16	52	41.55	-26	53	20.60	54	53.36
18.5	17	20	04.45	27	08	04.83	54	43.02
19.0	17	47	20.19	27	02	54.50	54	33.68
19.5	18	14	19.98	26	38	15.36	54	25.40
20.0	18	40	55.95	25	54	53.11	54	18.26
20.5	19	07	01.69	24	53	50.24	54	12.34
21.0	19	32	32.66	-23	36	21.87	54	07.76
21.5	19	57	26.33	22	03	51.43	54	04.63
22.0	20	21	42.12	20	17	46.58	54	03.06
22.5	20	45	21.26	18	19	35.80	54	03.19
23.0	21	08	26.55	16	10	45.80	54	05.15
23.5	21	31	02.02	13	52	39.93	54	09.04
24.0	21	53	12.76	-11	26	37.45	54	14.99
24.5	22	15	04.67	8	53	53.57	54	23.09
25.0	22	36	44.29	6	15	40.17	54	33.43
25.5	22	58	18.74	3	33	07.10	54	46.05
26.0	23	19	55.55	-0	47	23.94	55	00.99
26.5	23	41	42.73	+2	00	17.88	55	18.23
27.0	0	03	48.63	+4	48	42.48	55	37.72
27.5	0	26	21.97	7	36	26.70	55	59.34
28.0	0	49	31.71	10	21	57.08	56	22.93
28.5	1	13	26.90	13	03	26.67	56	48.25
29.0	1	38	16.42	15	38	52.13	57	14.99
29.5	2	04	08.52	18	05	51.40	57	42.78
30.0	2	31	10.22	+20	21	42.77	58	11.13
30.5	2	59	26.38	22	23	26.04	58	39.52
July 1.0	3	28	58.70	24	07	46.98	59	07.32
1.5	3	59	44.62	25	31	25.96	59	33.89
2.0	4	31	36.41	+26	31	11.07	59	58.53

MOON, 2027

FOR 0^h AND 12^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			Horizontal Parallax	
		h	m	s	°	'	"	'	"
July	1.0	3	28	58.70	+24	07	46.98	59	07.32
	1.5	3	59	44.62	25	31	25.96	59	33.89
	2.0	4	31	36.41	26	31	11.07	59	58.53
	2.5	5	04	20.85	27	04	15.10	60	20.56
	3.0	5	37	39.86	27	08	33.91	60	39.31
	3.5	6	11	12.03	26	43	02.60	60	54.22
	4.0	6	44	35.09	+25	47	45.57	61	04.82
	4.5	7	17	28.52	24	23	57.75	61	10.78
	5.0	7	49	35.72	22	33	56.82	61	11.96
	5.5	8	20	45.36	20	20	48.69	61	08.38
	6.0	8	50	51.62	17	48	10.00	61	00.24
	6.5	9	19	53.64	14	59	51.08	60	47.90
	7.0	9	47	54.56	+11	59	41.90	60	31.85
	7.5	10	15	00.38	8	51	21.94	60	12.65
	8.0	10	41	18.95	5	38	14.16	59	50.93
	8.5	11	06	59.14	+2	23	22.23	59	27.33
	9.0	11	32	10.21	-0	50	29.74	59	02.49
	9.5	11	57	01.39	4	00	55.77	58	36.99
	10.0	12	21	41.56	-7	05	45.66	58	11.35
	10.5	12	46	19.00	10	03	02.29	57	46.02
	11.0	13	11	01.21	12	50	58.90	57	21.40
	11.5	13	35	54.67	15	27	56.82	56	57.77
	12.0	14	01	04.68	17	52	23.81	56	35.37
	12.5	14	26	35.09	20	02	53.19	56	14.38
	13.0	14	52	28.10	-21	58	03.94	55	54.91
	13.5	15	18	44.05	23	36	41.73	55	37.01
	14.0	15	45	21.29	24	57	40.80	55	20.71
	14.5	16	12	16.19	26	00	06.55	55	06.02
	15.0	16	39	23.27	26	43	18.36	54	52.90
	15.5	17	06	35.61	27	06	52.25	54	41.32
	16.0	17	33	45.34	-27	10	42.88	54	31.21
	16.5	18	00	44.26	26	55	04.37	54	22.55
	17.0	18	27	24.59	26	20	29.87	54	15.27
	17.5	18	53	39.51	25	27	49.80	54	09.34
	18.0	19	19	23.65	24	18	09.04	54	04.73
	18.5	19	44	33.39	22	52	43.47	54	01.43
	19.0	20	09	06.91	-21	12	56.38	53	59.44
	19.5	20	33	04.17	19	20	15.11	53	58.77
	20.0	20	56	26.69	17	16	08.22	53	59.47
	20.5	21	19	17.37	15	02	03.35	54	01.59
	21.0	21	41	40.22	12	39	25.77	54	05.17
	21.5	22	03	40.17	10	09	37.71	54	10.30
	22.0	22	25	22.85	-7	33	58.24	54	17.05
	22.5	22	46	54.50	4	53	43.76	54	25.51
	23.0	23	08	21.84	-2	10	08.86	54	35.75
	23.5	23	29	51.99	+0	35	32.29	54	47.85
	24.0	23	51	32.48	+3	22	04.32	55	01.86

MOON, 2027
FOR 0^h AND 12^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			Horizontal Parallax	
		h	m	s	°	'	"	'	"
July	24.0	23	51	32.48	+3	22	04.32	55	01.86
	24.5	0	13	31.16	6	08	08.57	55	17.81
	25.0	0	35	56.16	8	52	20.89	55	35.73
	25.5	0	58	55.83	11	33	09.09	55	55.57
	26.0	1	22	38.58	14	08	50.41	56	17.27
	26.5	1	47	12.58	16	37	29.07	56	40.70
	27.0	2	12	45.47	+18	56	54.28	57	05.66
	27.5	2	39	23.68	21	04	39.37	57	31.90
	28.0	3	07	11.79	22	58	02.52	57	59.08
	28.5	3	36	11.56	24	34	10.08	58	26.77
	29.0	4	06	21.03	25	50	03.30	58	54.49
	29.5	4	37	33.79	26	42	48.73	59	21.64
	30.0	5	09	38.60	+27	09	52.00	59	47.60
	30.5	5	42	19.86	27	09	13.37	60	11.67
	31.0	6	15	18.87	26	39	42.38	60	33.17
	31.5	6	48	15.73	25	41	08.41	60	51.40
Aug.	1.0	7	20	51.68	24	14	24.73	61	05.74
	1.5	7	52	51.01	22	21	25.05	61	15.69
	2.0	8	24	02.42	+20	04	53.82	61	20.86
	2.5	8	54	19.46	17	28	12.59	61	21.04
	3.0	9	23	40.27	14	35	05.24	61	16.21
	3.5	9	52	06.80	11	29	24.51	61	06.54
	4.0	10	19	43.91	8	15	00.83	60	52.36
	4.5	10	46	38.37	4	55	34.34	60	34.18
	5.0	11	12	58.12	+1	34	29.73	60	12.60
	5.5	11	38	51.62	-1	45	06.42	59	48.29
	6.0	12	04	27.36	5	00	26.29	59	21.96
	6.5	12	29	53.47	8	09	00.25	58	54.32
	7.0	12	55	17.51	11	08	35.23	58	26.04
	7.5	13	20	46.14	13	57	12.92	57	57.72
	8.0	13	46	24.94	-16	33	07.90	57	29.89
	8.5	14	12	18.19	18	54	46.09	57	03.01
	9.0	14	38	28.61	21	00	43.89	56	37.44
	9.5	15	04	57.25	22	49	47.98	56	13.48
	10.0	15	31	43.29	24	20	55.87	55	51.35
	10.5	15	58	44.09	25	33	17.06	55	31.19
	11.0	16	25	55.27	-26	26	14.70	55	13.09
	11.5	16	53	11.01	26	59	27.14	54	57.09
	12.0	17	20	24.48	27	12	49.26	54	43.21
	12.5	17	47	28.40	27	06	33.07	54	31.40
	13.0	18	14	15.62	26	41	07.39	54	21.60
	13.5	18	40	39.71	25	57	16.58	54	13.74
	14.0	19	06	35.38	-24	55	58.44	54	07.74
	14.5	19	31	58.83	23	38	21.57	54	03.48
	15.0	19	56	47.87	22	05	42.51	54	00.88
	15.5	20	21	01.91	20	19	23.04	53	59.84
	16.0	20	44	41.87	-18	20	47.78	54	00.27

MOON, 2027

FOR 0^h AND 12^h TERRESTRIAL TIME

Date	Apparent Right Ascension			Apparent Declination			Horizontal Parallax	
	h	m	s	º	'	"	'	"
Aug. 16.0	20	44	41.87	-18	20	47.78	54	00.27
16.5	21	07	49.97	16	11	22.31	54	02.09
17.0	21	30	29.53	13	52	31.84	54	05.23
17.5	21	52	44.79	11	25	40.42	54	09.65
18.0	22	14	40.70	8	52	10.62	54	15.31
18.5	22	36	22.80	6	13	23.62	54	22.19
19.0	22	57	57.07	-3	30	39.68	54	30.28
19.5	23	19	29.91	-0	45	18.84	54	39.61
20.0	23	41	08.03	+2	01	18.02	54	50.18
20.5	0	02	58.40	4	47	47.99	55	02.03
21.0	0	25	08.24	7	32	44.67	55	15.20
21.5	0	47	44.93	10	14	36.59	55	29.71
22.0	1	10	55.87	+12	51	45.54	55	45.60
22.5	1	34	48.34	15	22	24.95	56	02.86
23.0	1	59	29.22	17	44	38.46	56	21.47
23.5	2	25	04.60	19	56	19.10	56	41.40
24.0	2	51	39.28	21	55	09.36	57	02.55
24.5	3	19	16.15	23	38	42.78	57	24.78
25.0	3	47	55.49	+25	04	27.53	57	47.89
25.5	4	17	34.32	26	09	52.33	58	11.62
26.0	4	48	05.99	26	52	35.01	58	35.64
26.5	5	19	20.14	27	10	32.83	58	59.54
27.0	5	51	03.23	27	02	13.73	59	22.84
27.5	6	22	59.65	26	26	46.28	59	45.03
28.0	6	54	53.31	+25	24	06.82	60	05.52
28.5	7	26	29.25	23	55	02.09	60	23.71
29.0	7	57	35.13	22	01	07.18	60	39.02
29.5	8	28	02.13	19	44	39.42	60	50.88
30.0	8	57	45.29	17	08	29.68	60	58.81
30.5	9	26	43.36	14	15	52.64	61	02.45
31.0	9	54	58.18	+11	10	17.32	61	01.58
31.5	10	22	34.04	7	55	18.72	60	56.11
Sept. 1.0	10	49	36.94	4	34	30.91	60	46.15
1.5	11	16	13.87	+1	11	21.58	60	31.97
2.0	11	42	32.36	-2	10	51.84	60	13.97
2.5	12	08	39.92	-5	29	04.95	59	52.69
3.0	12	34	43.74	-8	40	27.92	59	28.73
3.5	13	00	50.31	11	42	26.37	59	02.75
4.0	13	27	05.19	14	32	41.57	58	35.44
4.5	13	53	32.65	17	09	10.41	58	07.45
5.0	14	20	15.53	19	30	05.34	57	39.39
5.5	14	47	14.96	21	33	54.49	57	11.82
6.0	15	14	30.24	-23	19	22.07	56	45.22
6.5	15	41	58.83	24	45	29.08	56	20.01
7.0	16	09	36.45	25	51	34.11	55	56.52
7.5	16	37	17.39	26	37	14.06	55	35.01
8.0	17	04	54.89	-27	02	24.47	55	15.68

MOON, 2027
FOR 0^h AND 12^h TERRESTRIAL TIME

Date	Apparent Right Ascension			Apparent Declination			Horizontal Parallax	
	h	m	s	°	'	"	'	"
Sept. 8.0	17	04	54.89	-27	02	24.47	55	15.68
8.5	17	32	21.77	27	07	19.17	54	58.66
9.0	17	59	30.97	26	52	29.06	54	44.02
9.5	18	26	16.13	26	18	40.16	54	31.80
10.0	18	52	32.06	25	26	51.03	54	21.99
10.5	19	18	15.02	24	18	09.86	54	14.53
11.0	19	43	22.86	-22	53	51.53	54	09.35
11.5	20	07	55.03	21	15	15.07	54	06.36
12.0	20	31	52.45	19	23	41.48	54	05.43
12.5	20	55	17.33	17	20	32.30	54	06.43
13.0	21	18	12.94	15	07	08.63	54	09.21
13.5	21	40	43.43	12	44	50.76	54	13.64
14.0	22	02	53.64	-10	14	58.29	54	19.55
14.5	22	24	48.94	7	38	50.51	54	26.81
15.0	22	46	35.14	4	57	47.09	54	35.27
15.5	23	08	18.34	-2	13	08.94	54	44.79
16.0	23	30	04.95	+0	33	40.82	54	55.27
16.5	23	52	01.55	3	21	15.78	55	06.59
17.0	0	14	14.88	+6	08	05.17	55	18.67
17.5	0	36	51.76	8	52	32.80	55	31.43
18.0	0	59	58.95	11	32	56.00	55	44.84
18.5	1	23	43.01	14	07	24.82	55	58.83
19.0	1	48	10.06	16	34	01.45	56	13.40
19.5	2	13	25.44	18	50	40.23	56	28.51
20.0	2	39	33.32	+20	55	08.42	56	44.15
20.5	3	06	36.15	22	45	08.07	57	00.30
21.0	3	34	34.18	24	18	19.39	57	16.93
21.5	4	03	24.92	25	32	25.68	57	33.97
22.0	4	33	02.83	26	25	19.91	57	51.34
22.5	5	03	19.35	26	55	12.50	58	08.93
23.0	5	34	03.22	+27	00	39.31	58	26.57
23.5	6	05	01.41	26	40	48.79	58	44.06
24.0	6	36	00.27	25	55	27.02	59	01.13
24.5	7	06	46.82	24	44	59.66	59	17.48
25.0	7	37	10.04	23	10	30.80	59	32.76
25.5	8	07	01.64	21	13	38.94	59	46.57
26.0	8	36	16.54	+18	56	31.36	59	58.51
26.5	9	04	52.84	16	21	37.77	60	08.16
27.0	9	32	51.50	13	31	44.22	60	15.14
27.5	10	00	15.84	10	29	47.81	60	19.08
28.0	10	27	10.94	7	18	52.23	60	19.70
28.5	10	53	43.10	4	02	04.25	60	16.82
29.0	11	19	59.30	+0	42	30.75	60	10.34
29.5	11	46	06.81	-2	36	43.75	60	00.32
30.0	12	12	12.78	5	52	39.38	59	46.91
30.5	12	38	23.85	9	02	23.01	59	30.38
Oct. 1.0	13	04	45.89	-12	03	10.29	59	11.12

MOON, 2027

FOR 0^h AND 12^h TERRESTRIAL TIME

Date	Apparent Right Ascension			Apparent Declination			Horizontal Parallax	
	h	m	s	°	'	"	'	"
Oct. 1.0	13	04	45.89	-12	03	10.29	59	11.12
1.5	13	31	23.64	14	52	27.76	58	49.59
2.0	13	58	20.37	17	27	54.90	58	26.30
2.5	14	25	37.63	19	47	26.43	58	01.81
3.0	14	53	15.01	21	49	14.54	57	36.66
3.5	15	21	10.02	23	31	51.23	57	11.40
4.0	15	49	18.14	-24	54	10.41	56	46.54
4.5	16	17	33.09	25	55	29.49	56	22.55
5.0	16	45	47.27	26	35	30.12	55	59.83
5.5	17	13	52.42	26	54	17.79	55	38.75
6.0	17	41	40.29	26	52	20.14	55	19.58
6.5	18	09	03.33	26	30	24.07	55	02.57
7.0	18	35	55.31	-25	49	31.91	54	47.90
7.5	19	02	11.66	24	50	57.24	54	35.69
8.0	19	27	49.64	23	36	00.72	54	26.02
8.5	19	52	48.40	22	06	06.40	54	18.92
9.0	20	17	08.74	20	22	38.90	54	14.39
9.5	20	40	52.95	18	27	01.36	54	12.39
10.0	21	04	04.54	-16	20	34.42	54	12.82
10.5	21	26	47.94	14	04	35.88	54	15.59
11.0	21	49	08.32	11	40	21.07	54	20.56
11.5	22	11	11.42	9	09	03.69	54	27.56
12.0	22	33	03.37	6	31	57.03	54	36.41
12.5	22	54	50.61	3	50	15.37	54	46.90
13.0	23	16	39.85	-1	05	15.62	54	58.82
13.5	23	38	37.93	+1	41	41.11	55	11.93
14.0	0	00	51.85	4	29	07.86	55	26.00
14.5	0	23	28.65	7	15	30.32	55	40.79
15.0	0	46	35.27	9	59	05.53	55	56.08
15.5	1	10	18.44	12	38	00.87	56	11.64
16.0	1	34	44.42	+15	10	13.65	56	27.26
16.5	1	59	58.65	17	33	31.34	56	42.76
17.0	2	26	05.33	19	45	32.87	56	58.00
17.5	2	53	06.89	21	43	51.27	57	12.83
18.0	3	21	03.47	23	25	57.85	57	27.15
18.5	3	49	52.35	24	49	28.18	57	40.89
19.0	4	19	27.71	+25	52	09.46	57	54.00
19.5	4	49	40.56	26	32	08.96	58	06.44
20.0	5	20	19.20	26	48	02.23	58	18.21
20.5	5	51	10.13	26	38	59.85	58	29.27
21.0	6	21	59.30	26	04	51.49	58	39.62
21.5	6	52	33.42	25	06	06.46	58	49.23
22.0	7	22	41.28	+23	43	50.71	58	58.05
22.5	7	52	14.52	21	59	41.31	59	06.01
23.0	8	21	08.11	19	55	39.35	59	13.01
23.5	8	49	20.26	17	34	02.91	59	18.94
24.0	9	16	52.10	+14	57	20.85	59	23.63

MOON, 2027
FOR 0^h AND 12^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			Horizontal Parallax	
		h	m	s	º	'	"	'	"
Oct.	24.0	9	16	52.10	+14	57	20.85	59	23.63
	24.5	9	43	47.16	12	08	08.10	59	26.92
	25.0	10	10	10.76	9	09	02.46	59	28.62
	25.5	10	36	09.51	6	02	42.72	59	28.55
	26.0	11	01	50.76	+2	51	47.82	59	26.54
	26.5	11	27	22.28	-0	21	03.56	59	22.43
	27.0	11	52	51.81	-3	33	13.10	59	16.11
	27.5	12	18	26.82	6	42	03.16	59	07.54
	28.0	12	44	14.19	9	44	57.37	58	56.73
	28.5	13	10	19.84	12	39	21.88	58	43.74
	29.0	13	36	48.46	15	22	47.22	58	28.72
	29.5	14	03	43.10	17	52	50.89	58	11.90
	30.0	14	31	04.84	-20	07	20.74	57	53.56
	30.5	14	58	52.52	22	04	18.91	57	34.01
	31.0	15	27	02.62	23	42	06.07	57	13.64
	31.5	15	55	29.27	24	59	25.59	56	52.82
Nov.	1.0	16	24	04.62	25	55	26.90	56	31.97
	1.5	16	52	39.43	26	29	47.57	56	11.48
	2.0	17	21	03.80	-26	42	33.49	55	51.74
	2.5	17	49	08.11	26	34	17.07	55	33.10
	3.0	18	16	43.81	26	05	53.53	55	15.89
	3.5	18	43	44.03	25	18	35.89	55	00.41
	4.0	19	10	04.04	24	13	49.39	54	46.91
	4.5	19	35	41.31	22	53	06.05	54	35.60
	5.0	20	00	35.45	-21	17	59.95	54	26.65
	5.5	20	24	47.97	19	30	03.65	54	20.19
	6.0	20	48	21.94	17	30	45.79	54	16.32
	6.5	21	11	21.68	15	21	29.93	54	15.08
	7.0	21	33	52.48	13	03	34.25	54	16.47
	7.5	21	56	00.32	10	38	12.20	54	20.48
	8.0	22	17	51.68	-8	06	33.65	54	27.03
	8.5	22	39	33.47	5	29	46.52	54	36.02
	9.0	23	01	12.84	2	48	58.73	54	47.29
	9.5	23	22	57.21	-0	05	20.36	55	00.67
	10.0	23	44	54.15	+2	39	54.05	55	15.93
	10.5	0	07	11.38	5	25	23.17	55	32.81
	11.0	0	29	56.64	+8	09	36.55	55	51.00
	11.5	0	53	17.62	10	50	52.57	56	10.20
	12.0	1	17	21.67	13	27	16.70	56	30.03
	12.5	1	42	15.56	15	56	40.50	56	50.14
	13.0	2	08	05.03	18	16	41.73	57	10.14
	13.5	2	34	54.19	20	24	45.90	57	29.66
	14.0	3	02	44.88	+22	18	10.01	57	48.34
	14.5	3	31	35.94	23	54	08.61	58	05.86
	15.0	4	01	22.67	25	10	02.38	58	21.91
	15.5	4	31	56.50	26	03	28.76	58	36.28
	16.0	5	03	05.21	+26	32	33.44	58	48.76

MOON, 2027

FOR 0^h AND 12^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			Horizontal Parallax	
		h	m	s	°	'	"	'	"
Nov.	16.0	5	03	05.21	+26	32	33.44	58	48.76
	16.5	5	34	33.76	26	36	00.77	58	59.25
	17.0	6	06	05.66	26	13	21.22	59	07.70
	17.5	6	37	24.63	25	24	54.06	59	14.12
	18.0	7	08	16.31	24	11	44.92	59	18.56
	18.5	7	38	29.49	22	35	38.75	59	21.14
	19.0	8	07	56.81	+20	38	50.09	59	21.98
	19.5	8	36	34.85	18	23	52.64	59	21.24
	20.0	9	04	23.79	15	53	29.77	59	19.07
	20.5	9	31	26.76	13	10	27.22	59	15.62
	21.0	9	57	49.09	10	17	28.09	59	11.03
	21.5	10	23	37.70	7	17	10.12	59	05.39
	22.0	10	49	00.45	+4	12	04.80	58	58.80
	22.5	11	14	05.74	+1	04	37.68	58	51.29
	23.0	11	39	02.10	-2	02	50.55	58	42.92
	23.5	12	03	57.90	5	08	02.69	58	33.67
	24.0	12	29	01.08	8	08	43.70	58	23.56
	24.5	12	54	18.89	11	02	39.84	58	12.58
	25.0	13	19	57.60	-13	47	38.41	58	00.71
	25.5	13	46	02.13	16	21	28.31	57	47.98
	26.0	14	12	35.77	18	42	01.77	57	34.41
	26.5	14	39	39.74	20	47	17.10	57	20.06
	27.0	15	07	12.95	22	35	22.55	57	05.02
	27.5	15	35	11.77	24	04	40.95	56	49.41
	28.0	16	03	30.12	-25	13	54.67	56	33.38
	28.5	16	31	59.77	26	02	10.18	56	17.13
	29.0	17	00	30.90	26	29	01.37	56	00.87
	29.5	17	28	52.98	26	34	31.01	55	44.83
	30.0	17	56	55.68	26	19	09.85	55	29.26
	30.5	18	24	29.77	25	43	53.49	55	14.43
Dec.	1.0	18	51	27.80	-24	49	57.45	55	00.59
	1.5	19	17	44.59	23	38	51.38	54	48.01
	2.0	19	43	17.28	22	12	13.05	54	36.92
	2.5	20	08	05.33	20	31	43.07	54	27.56
	3.0	20	32	10.19	18	39	00.65	54	20.15
	3.5	20	55	34.98	16	35	40.64	54	14.87
	4.0	21	18	24.15	-14	23	11.84	54	11.88
	4.5	21	40	43.15	12	02	56.42	54	11.32
	5.0	22	02	38.16	9	36	10.24	54	13.29
	5.5	22	24	15.92	7	04	03.85	54	17.86
	6.0	22	45	43.60	4	27	44.04	54	25.07
	6.5	23	07	08.66	-1	48	15.78	54	34.90
	7.0	23	28	38.85	+0	53	15.57	54	47.31
	7.5	23	50	22.16	3	35	41.72	55	02.19
	8.0	0	12	26.75	6	17	48.85	55	19.42
	8.5	0	35	00.95	8	58	14.82	55	38.78
	9.0	0	58	13.06	+11	35	26.46	56	00.02

MOON, 2027

FOR 0^h AND 12^h TERRESTRIAL TIME

Date	Apparent Right Ascension			Apparent Declination			Horizontal Parallax	
	h	m	s	°	'	"	'	"
Dec. 9.0	0	58	13.06	+11	35	26.46	56	00.02
9.5	1	22	11.21	14	07	37.01	56	22.83
10.0	1	47	03.04	16	32	44.18	56	46.84
10.5	2	12	55.20	18	48	29.08	57	11.62
11.0	2	39	52.75	20	52	16.83	57	36.69
11.5	3	07	58.36	22	41	19.43	58	01.54
12.0	3	37	11.47	+24	12	41.67	58	25.63
12.5	4	07	27.49	25	23	30.34	58	48.41
13.0	4	38	37.40	26	11	06.69	59	09.35
13.5	5	10	27.82	26	33	20.61	59	27.94
14.0	5	42	41.91	26	28	44.48	59	43.76
14.5	6	15	00.96	25	56	43.79	59	56.47
15.0	6	47	06.40	+24	57	41.97	60	05.82
15.5	7	18	41.83	23	32	58.38	60	11.69
16.0	7	49	34.50	21	44	40.18	60	14.09
16.5	8	19	36.17	19	35	30.05	60	13.12
17.0	8	48	43.10	17	08	32.74	60	09.00
17.5	9	16	55.61	14	27	02.61	60	02.02
18.0	9	44	17.23	+11	34	13.70	59	52.55
18.5	10	10	53.88	8	33	12.98	59	40.96
19.0	10	36	53.05	5	26	56.37	59	27.66
19.5	11	02	23.15	+2	18	07.31	59	13.05
20.0	11	27	33.00	-0	50	43.05	58	57.48
20.5	11	52	31.46	3	57	14.48	58	41.27
21.0	12	17	27.11	-6	59	15.78	58	24.71
21.5	12	42	27.97	9	54	42.71	58	08.02
22.0	13	07	41.31	12	41	36.25	57	51.38
22.5	13	33	13.32	15	18	01.33	57	34.92
23.0	13	59	08.83	17	42	06.47	57	18.73
23.5	14	25	31.02	19	52	04.30	57	02.87
24.0	14	52	21.05	-21	46	13.29	56	47.37
24.5	15	19	37.86	23	23	00.62	56	32.25
25.0	15	47	18.02	24	41	05.82	56	17.51
25.5	16	15	15.79	25	39	25.03	56	03.18
26.0	16	43	23.41	26	17	15.03	55	49.27
26.5	17	11	31.71	26	34	16.48	55	35.81
27.0	17	39	30.84	-26	30	35.56	55	22.84
27.5	18	07	11.13	26	06	43.68	55	10.42
28.0	18	34	23.92	25	23	35.24	54	58.65
28.5	19	01	02.20	24	22	23.69	54	47.63
29.0	19	27	00.98	23	04	36.58	54	37.49
29.5	19	52	17.49	21	31	50.36	54	28.36
30.0	20	16	51.07	-19	45	45.48	54	20.39
30.5	20	40	42.97	17	48	02.34	54	13.76
31.0	21	03	56.01	15	40	18.27	54	08.63
31.5	21	26	34.32	13	24	05.56	54	05.16
32.0	21	48	42.97	-11	00	50.49	54	03.54

MOON, 2027
AT EPHEMERIS TRANSIT

Date	Age (at 0^h)		Ephemeris Transit (TT)			Geocentric Declination		Date	Age (at 0^h)		Ephemeris Transit (TT)			Geocentric Declination	
	d		d	h	m	°	'		d		d	h	m	°	'
Jan. 0	21.96	U	0	06	10.5	-09	48.2	Jan. 23		L	23	13	11.0	+15	42.4
0		L	0	18	32.7	12	37.9	24	16.15	U	24	01	38.2	12	32.5
1	22.96	U	1	06	55.1	15	17.2	24		L	24	14	04.3	09	14.0
1		L	1	19	17.9	17	44.7	25	17.15	U	25	02	29.5	05	50.5
2	23.96	U	2	07	41.1	19	58.9	25		L	25	14	53.8	+02	25.8
2		L	2	20	04.6	21	58.2	26	18.15	U	26	03	17.6	-00	57.2
3	24.96	U	3	08	28.7	-23	41.6	26		L	26	15	40.9	-04	15.7
3		L	3	20	53.3	25	07.7	27	19.15	U	27	04	04.0	07	27.5
4	25.96	U	4	09	18.3	26	15.2	27		L	27	16	27.0	10	30.7
4		L	4	21	43.7	27	03.3	28	20.15	U	28	04	50.0	13	23.3
5	26.96	U	5	10	09.2	27	31.1	28		L	28	17	13.2	16	03.9
5		L	5	22	34.9	27	38.2	29	21.15	U	29	05	36.6	18	31.0
6	27.96	U	6	11	00.5	-27	24.8	29		L	29	18	00.3	-20	43.1
6		L	6	23	25.9	26	51.0	30	22.15	U	30	06	24.5	22	39.2
7	28.96	U	7	11	50.9	25	57.7	30		L	30	18	49.0	24	17.8
8	0.15	L	8	00	15.4	24	45.8	31	23.15	U	31	07	13.9	25	38.1
8		U	8	12	39.4	23	16.7	31		L	31	19	39.2	26	39.0
9	1.15	L	9	01	02.7	21	31.8	Feb. 1	24.15	U	1	08	04.6	27	19.9
9		U	9	13	25.5	-19	32.6	1		L	1	20	30.3	-27	40.3
10	2.15	L	10	01	47.7	17	20.7	2	25.15	U	2	08	55.9	27	40.1
10		U	10	14	09.4	14	57.7	2		L	2	21	21.4	27	19.3
11	3.15	L	11	02	30.6	12	25.2	3	26.15	U	3	09	46.6	26	38.6
11		U	11	14	51.4	09	44.6	3		L	3	22	11.4	25	38.6
12	4.15	L	12	03	12.1	06	57.3	4	27.15	U	4	10	35.8	24	20.4
12		U	12	15	32.6	-04	04.9	4		L	4	22	59.6	-22	45.3
13	5.15	L	13	03	53.1	-01	08.6	5	28.15	U	5	11	22.8	20	54.7
13		U	13	16	13.8	+01	50.1	5		L	5	23	45.5	18	50.1
14	6.15	L	14	04	34.8	04	49.7	6	29.15	U	6	12	07.6	16	33.0
14		U	14	16	56.3	07	48.6	7	0.34	L	7	00	29.3	14	05.1
15	7.15	L	15	05	18.5	10	44.9	7		U	7	12	50.5	11	27.9
15		U	15	17	41.5	+13	36.5	8	1.34	L	8	01	11.5	-08	43.1
16	8.15	L	16	06	05.6	16	21.1	8		U	8	13	32.2	05	52.1
16		U	16	18	30.8	18	55.9	9	2.34	L	9	01	52.8	-02	56.6
17	9.15	L	17	06	57.4	21	17.7	9		U	9	14	13.5	+00	02.0
17		U	17	19	25.3	23	22.9	10	3.34	L	10	02	34.4	03	01.8
18	10.15	L	18	07	54.8	25	07.6	10		U	10	14	55.6	06	01.4
18		U	18	20	25.5	+26	28.0	11	4.34	L	11	03	17.2	+08	58.8
19	11.15	L	19	08	57.5	27	20.1	11		U	11	15	39.5	11	52.1
19		U	19	21	30.3	27	41.0	12	5.34	L	12	04	02.5	14	39.3
20	12.15	L	20	10	03.6	27	28.6	12		U	12	16	26.5	17	17.9
20		U	20	22	37.0	26	42.5	13	6.34	L	13	04	51.6	19	45.3
21	13.15	L	21	11	09.8	25	23.5	13		U	13	17	17.7	21	58.6
21		U	21	23	41.9	+23	33.9	14	7.34	L	14	05	45.2	+23	54.7
22	14.15	L	22	12	12.8	21	17.8	14		U	14	18	13.8	25	30.3
23	15.15	U	23	00	42.6	18	38.9	15	8.34	L	15	06	43.7	26	42.1
23		L	23	13	11.0	+15	42.4	15		U	15	19	14.4	+27	27.1

MOON, 2027
AT EPHEMERIS TRANSIT

Date	Age (at 0^h)		Ephemeris Transit (TT)			Geocentric Declination		Date	Age (at 0^h)		Ephemeris Transit (TT)			Geocentric Declination	
	d		d	h	m	°	'		d		d	h	m	°	'
Feb. 15		U	15	19	14.4	+27	27.1	Mar. 11	2.60	L	11	02	00.8	+12	52.7
16	9.34	L	16	07	46.0	27	42.9	11		U	11	14	24.5	15	38.2
16		U	16	20	18.0	27	27.9	12	3.60	L	12	02	49.1	18	13.5
17	10.34	L	17	08	50.0	26	41.5	12		U	12	15	14.6	20	35.7
17		U	17	21	21.7	25	24.2	13	4.60	L	13	03	41.3	22	42.1
18	11.34	L	18	09	52.8	23	38.1	13		U	13	16	09.0	24	29.5
18		U	18	22	23.0	+21	25.8	14	5.60	L	14	04	37.8	+25	55.1
19	12.34	L	19	10	52.2	18	51.0	14		U	14	17	07.5	26	56.1
19		U	19	23	20.4	15	57.5	15	6.60	L	15	05	37.9	27	30.1
20	13.34	L	20	11	47.6	12	49.5	15		U	15	18	08.8	27	35.6
21	14.34	U	21	00	13.8	09	31.1	16	7.60	L	16	06	39.8	27	11.8
21		L	21	12	39.3	06	06.3	16		U	16	19	10.7	26	18.7
22	15.34	U	22	01	04.0	+02	38.6	17	8.60	L	17	07	41.1	+24	57.5
22		L	22	13	28.3	-00	48.4	17		U	17	20	10.8	23	10.0
23	16.34	U	23	01	52.3	04	11.8	18	9.60	L	18	08	39.7	20	58.9
23		L	23	14	16.1	07	28.8	18		U	18	21	07.8	18	27.2
24	17.34	U	24	02	39.8	10	37.1	19	10.60	L	19	09	34.9	15	38.2
24		L	24	15	03.6	13	34.3	19		U	19	22	01.2	12	35.3
25	18.34	U	25	03	27.5	-16	18.6	20	11.60	L	20	10	26.7	+09	22.1
25		L	25	15	51.7	18	48.2	20		U	20	22	51.6	06	01.9
26	19.34	U	26	04	16.3	21	01.7	21	12.60	L	21	11	16.1	+02	38.1
26		L	26	16	41.1	22	57.6	21		U	21	23	40.1	-00	46.2
27	20.34	U	27	05	06.3	24	34.8	22	13.60	L	22	12	04.0	04	08.1
27		L	27	17	31.8	25	52.3	23	14.60	U	23	00	27.8	07	24.7
28	21.34	U	28	05	57.6	-26	49.4	23		L	23	12	51.8	-10	33.4
28		L	28	18	23.4	27	25.7	24	15.60	U	24	01	15.8	13	31.7
Mar. 1	22.34	U	1	06	49.3	27	40.9	24		L	24	13	40.2	16	17.4
1		L	1	19	15.0	27	35.2	25	16.60	U	25	02	04.9	18	48.4
2	23.34	U	2	07	40.5	27	09.1	25		L	25	14	30.0	21	02.9
2		L	2	20	05.6	26	23.1	26	17.60	U	26	02	55.5	22	59.2
3	24.34	U	3	08	30.3	-25	18.3	26		L	26	15	21.3	-24	35.9
3		L	3	20	54.5	23	55.7	27	18.60	U	27	03	47.3	25	52.2
4	25.34	U	4	09	18.1	22	16.7	27		L	27	16	13.6	26	47.1
4		L	4	21	41.2	20	22.5	28	19.60	U	28	04	39.9	27	20.4
5	26.34	U	5	10	03.8	18	14.6	28		L	28	17	06.1	27	32.1
5		L	5	22	25.8	15	54.5	29	20.60	U	29	05	32.0	27	22.5
6	27.34	U	6	10	47.5	-13	23.6	29		L	29	17	57.6	-26	52.3
6		L	6	23	08.8	10	43.5	30	21.60	U	30	06	22.8	26	02.4
7	28.34	U	7	11	29.8	07	55.7	30		L	30	18	47.4	24	54.1
7		L	7	23	50.8	05	01.8	31	22.60	U	31	07	11.5	23	28.4
8	29.34	U	8	12	11.7	-02	03.3	31		L	31	19	34.9	21	46.9
9	0.60	L	9	00	32.8	+00	57.9	Apr. 1	23.60	U	1	07	57.8	19	50.8
9		U	9	12	54.1	+04	00.0	1		L	1	20	20.2	-17	41.5
10	1.60	L	10	01	15.8	07	01.3	2	24.60	U	2	08	42.0	15	20.5
10		U	10	13	38.0	09	59.6	2		L	2	21	03.5	12	49.0
11	2.60	L	11	02	00.8	+12	52.7	3	25.60	U	3	09	24.8	-10	08.6

MOON, 2027
AT EPHEMERIS TRANSIT

Date		Age (at 0^h)		Ephemeris Transit (TT)			Geocentric Declination		Date		Age (at 0^h)		Ephemeris Transit (TT)			Geocentric Declination	
		d		d	h	m	°	'			d		d	h	m	°	'
Apr.	1	23.60	U	1	07	57.8	-19	50.8	Apr.	24		L	24	14	55.7	-27	11.2
	1		L	1	20	20.2	17	41.5		25	18.01	U	25	03	22.1	27	19.2
	2	24.60	U	2	08	42.0	15	20.5		25		L	25	15	48.3	27	05.6
	2		L	2	21	03.5	12	49.0		26	19.01	U	26	04	14.0	26	31.4
	3	25.60	U	3	09	24.8	10	08.6		26		L	26	16	39.2	25	37.7
	3		L	3	21	45.8	07	20.5		27	20.01	U	27	05	03.8	24	25.7
	4	26.60	U	4	10	06.8	-04	26.1		27		L	27	17	27.7	-22	57.1
	4		L	4	22	27.9	-01	27.2		28	21.01	U	28	05	51.0	21	13.1
	5	27.60	U	5	10	49.2	+01	34.7		28		L	28	18	13.7	19	15.3
	5		L	5	23	10.9	04	37.7		29	22.01	U	29	06	35.8	17	05.1
	6	28.60	U	6	11	33.0	07	39.9		29		L	29	18	57.4	14	43.9
	6		L	6	23	55.8	10	39.0		30	23.01	U	30	07	18.7	12	13.0
	7	0.01	U	7	12	19.4	+13	32.5		30		L	30	19	39.6	-09	33.7
	8	1.01	L	8	00	43.8	16	17.7	May	1	24.01	U	1	08	00.5	06	47.2
	8		U	8	13	09.3	18	51.6		1		L	1	20	21.3	03	54.8
	9	2.01	L	9	01	35.8	21	11.2		2	25.01	U	2	08	42.2	-00	58.0
	9		U	9	14	03.4	23	13.0		2		L	2	21	03.4	+02	01.9
	10	3.01	L	10	02	32.1	24	54.0		3	26.01	U	3	09	25.1	05	03.0
	10		U	10	15	01.7	+26	11.0		3		L	3	21	47.3	+08	03.6
	11	4.01	L	11	03	32.1	27	01.8		4	27.01	U	4	10	10.3	11	01.3
	11		U	11	16	02.9	27	24.2		4		L	4	22	34.2	13	53.7
	12	5.01	L	12	04	34.0	27	17.5		5	28.01	U	5	10	59.1	16	37.9
	12		U	12	17	04.9	26	41.6		5		L	5	23	25.2	19	10.8
	13	6.01	L	13	05	35.3	25	37.5		6	29.01	U	6	11	52.4	21	28.7
	13		U	13	18	05.1	+24	07.0		7	0.54	L	7	00	20.9	+23	28.1
	14	7.01	L	14	06	34.0	22	12.6		7		U	7	12	50.5	25	05.3
	14		U	14	19	02.0	19	57.0		8	1.54	L	8	01	21.2	26	17.1
	15	8.01	L	15	07	29.1	17	23.5		8		U	8	13	52.6	27	00.6
	15		U	15	19	55.2	14	35.1		9	2.54	L	9	02	24.4	27	14.1
	16	9.01	L	16	08	20.5	11	35.0		9		U	9	14	56.3	26	56.9
	16		U	16	20	45.1	+08	26.2		10	3.54	L	10	03	27.8	+26	09.5
	17	10.01	L	17	09	09.1	05	11.7		10		U	10	15	58.7	24	53.7
	17		U	17	21	32.8	+01	54.2		11	4.54	L	11	04	28.6	23	11.7
	18	11.01	L	18	09	56.3	-01	23.7		11		U	11	16	57.6	21	07.0
	18		U	18	22	19.6	04	39.2		12	5.54	L	12	05	25.4	18	42.7
	19	12.01	L	19	10	43.0	07	49.9		12		U	12	17	52.1	16	02.6
	19		U	19	23	06.6	-10	53.4		13	6.54	L	13	06	17.8	+13	09.8
	20	13.01	L	20	11	30.5	13	47.2		13		U	13	18	42.7	10	07.7
	20		U	20	23	54.7	16	29.1		14	7.54	L	14	07	06.8	06	59.0
	21	14.01	L	21	12	19.4	18	56.8		14		U	14	19	30.3	03	46.6
	22	15.01	U	22	00	44.6	21	08.5		15	8.54	L	15	07	53.5	+00	33.0
	22		L	22	13	10.2	23	02.1		15		U	15	20	16.4	-02	39.6
	23	16.01	U	23	01	36.3	-24	36.2		16	9.54	L	16	08	39.3	-05	48.7
	23		L	23	14	02.6	25	49.6		16		U	16	21	02.3	08	52.4
	24	17.01	U	24	02	29.1	26	41.4		17	10.54	L	17	09	25.5	11	48.3
	24		L	24	14	55.7	-27	11.2		17		U	17	21	49.0	-14	34.5

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Date	Age (at 0^h)		Ephemeris Transit (TT)			Geocentric Declination		Date	Age (at 0^h)		Ephemeris Transit (TT)			Geocentric Declination	
	d		d	h	m	°	'		d		d	h	m	°	'
May 17		U	17	21	49.0	-14	34.5	June 10	5.18	L	10	05	03.8	+08	46.2
18	11.54	L	18	10	13.0	17	08.8	10		U	10	17	28.1	05	32.9
18		U	18	22	37.4	19	29.3	11	6.18	L	11	05	51.7	+02	17.9
19	12.54	L	19	11	02.4	21	33.9	11		U	11	18	15.0	-00	56.5
19		U	19	23	27.8	23	20.9	12	7.18	L	12	06	37.9	04	07.8
20	13.54	L	20	11	53.8	24	48.7	12		U	12	19	00.8	07	14.0
21	14.54	U	21	00	20.1	-25	56.1	13	8.18	L	13	07	23.8	-10	13.1
21		L	21	12	46.6	26	42.1	13		U	13	19	46.9	13	03.2
22	15.54	U	22	01	13.1	27	06.3	14	9.18	L	14	08	10.3	15	42.4
22		L	22	13	39.5	27	08.8	14		U	14	20	34.2	18	09.0
23	16.54	U	23	02	05.7	26	49.8	15	10.18	L	15	08	58.5	20	21.1
23		L	23	14	31.4	26	10.5	15		U	15	21	23.3	22	17.1
24	17.54	U	24	02	56.5	-25	11.8	16	11.18	L	16	09	48.6	-23	55.4
24		L	24	15	21.0	23	55.4	16		U	16	22	14.4	25	14.6
25	18.54	U	25	03	44.8	22	22.6	17	12.18	L	17	10	40.5	26	13.6
25		L	25	16	07.9	20	35.3	17		U	17	23	06.7	26	51.5
26	19.54	U	26	04	30.3	18	34.8	18	13.18	L	18	11	33.1	27	07.9
26		L	26	16	52.2	16	22.7	18		U	18	23	59.3	27	02.9
27	20.54	U	27	05	13.5	-14	00.6	19	14.18	L	19	12	25.2	-26	37.1
27		L	27	17	34.4	11	29.6	20	15.18	U	20	00	50.7	25	51.2
28	21.54	U	28	05	55.1	08	51.1	20		L	20	13	15.6	24	46.5
28		L	28	18	15.6	06	06.3	21	16.18	U	21	01	39.9	23	24.4
29	22.54	U	29	06	36.0	03	16.4	21		L	21	14	03.4	21	46.6
29		L	29	18	56.6	-00	22.7	22	17.18	U	22	02	26.3	19	54.7
30	23.54	U	30	07	17.5	+02	33.5	22		L	22	14	48.5	-17	50.4
30		L	30	19	38.8	05	30.8	23	18.18	U	23	03	10.2	15	35.1
31	24.54	U	31	08	00.8	08	27.3	23		L	23	15	31.3	13	10.6
31		L	31	20	23.5	11	21.1	24	19.18	U	24	03	52.0	10	38.1
June 1	25.54	U	1	08	47.2	14	09.9	24		L	24	16	12.3	07	59.0
1		L	1	21	12.0	16	51.0	25	20.18	U	25	04	32.5	05	14.6
2	26.54	U	2	09	38.0	+19	21.1	25		L	25	16	52.7	-02	26.1
2		L	2	22	05.3	21	36.9	26	21.18	U	26	05	13.0	+00	25.3
3	27.54	U	3	10	34.0	23	34.3	26		L	26	17	33.5	03	18.3
3		L	3	23	04.1	25	09.7	27	22.18	U	27	05	54.4	06	11.5
4	28.54	U	4	11	35.3	26	19.0	27		L	27	18	15.9	09	03.3
5	0.18	L	5	00	07.4	26	59.3	28	23.18	U	28	06	38.1	11	51.9
5		U	5	12	40.0	+27	08.3	28		L	28	19	01.3	+14	35.3
6	1.18	L	6	01	12.7	26	45.1	29	24.18	U	29	07	25.6	17	11.0
6		U	6	13	45.1	25	50.3	29		L	29	19	51.1	19	36.2
7	2.18	L	7	02	16.8	24	25.5	30	25.18	U	30	08	17.9	21	47.5
7		U	7	14	47.6	22	33.9	30		L	30	20	46.2	23	41.6
8	3.18	L	8	03	17.1	20	18.9	July 1	26.18	U	1	09	15.8	25	14.3
8		U	8	15	45.5	+17	44.9	1		L	1	21	46.7	+26	22.0
9	4.18	L	9	04	12.6	14	55.5	2	27.18	U	2	10	18.6	27	01.2
9		U	9	16	38.7	11	54.7	2		L	2	22	51.3	27	09.4
10	5.18	L	10	05	03.8	+08	46.2	3	28.18	U	3	11	24.3	+26	45.0

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Date		Age (at 0^h)		Ephemeris Transit (TT)			Geocentric Declination		Date		Age (at 0^h)		Ephemeris Transit (TT)			Geocentric Declination	
		d		d	h	m	°	'			d		d	h	m	°	'
July	1	26.18	U	1	09	15.8	+25	14.3	July	24		L	24	16	12.7	+07	06.1
	1		L	1	21	46.7	26	22.0		25	20.87	U	25	04	34.0	09	54.0
	2	27.18	U	2	10	18.6	27	01.2		25		L	25	16	55.9	12	37.9
	2		L	2	22	51.3	27	09.4		26	21.87	U	26	05	18.7	15	15.6
	3	28.18	U	3	11	24.3	26	45.0		26		L	26	17	42.5	17	45.1
	3		L	3	23	57.1	25	48.0		27	22.87	U	27	06	07.4	20	03.7
	4	29.18	U	4	12	29.5	+24	20.0		27		L	27	18	33.6	+22	08.6
	5	0.87	L	5	01	00.9	22	23.6		28	23.87	U	28	07	01.1	23	56.5
	5		U	5	13	31.3	20	02.6		28		L	28	19	30.0	25	24.1
	6	1.87	L	6	02	00.4	17	21.0		29	24.87	U	29	08	00.0	26	27.9
	6		U	6	14	28.3	14	23.6		29		L	29	20	31.1	27	04.7
	7	2.87	L	7	02	55.2	11	14.5		30	25.87	U	30	09	03.0	27	12.0
	7		U	7	15	21.0	+07	57.8		30		L	30	21	35.3	+26	48.0
	8	3.87	L	8	03	46.0	04	37.1		31	26.87	U	31	10	07.7	25	52.2
	8		U	8	16	10.3	+01	15.7		31		L	31	22	39.8	24	25.4
	9	4.87	L	9	04	34.1	-02	03.5	Aug.	1	27.87	U	1	11	11.2	22	29.9
	9		U	9	16	57.7	05	18.2		1		L	1	23	41.7	20	08.6
	10	5.87	L	10	05	21.1	08	25.9		2	28.87	U	2	12	11.3	17	25.7
	10		U	10	17	44.5	-11	24.7		3	0.58	L	3	00	39.7	+14	25.1
	11	6.87	L	11	06	08.0	14	12.7		3		U	3	13	07.2	11	11.6
	11		U	11	18	31.8	16	48.2		4	1.58	L	4	01	33.7	07	49.3
	12	7.87	L	12	06	56.0	19	09.6		4		U	4	13	59.4	04	22.3
	12		U	12	19	20.5	21	15.3		5	2.58	L	5	02	24.6	+00	54.2
	13	8.87	L	13	07	45.5	23	03.8		5		U	5	14	49.2	-02	31.5
	13		U	13	20	10.9	-24	33.9		6	3.58	L	6	03	13.6	-05	51.9
	14	9.87	L	14	08	36.7	25	44.4		6		U	6	15	37.8	09	04.4
	14		U	14	21	02.7	26	34.5		7	4.58	L	7	04	02.1	12	06.6
	15	10.87	L	15	09	28.8	27	03.6		7		U	7	16	26.4	14	56.5
	15		U	15	21	54.9	27	11.5		8	5.58	L	8	04	51.0	17	32.2
	16	11.87	L	16	10	20.9	26	58.4		8		U	8	17	15.8	19	52.0
	16		U	16	22	46.5	-26	24.9		9	6.58	L	9	05	41.0	-21	54.6
	17	12.87	L	17	11	11.7	25	31.9		9		U	9	18	06.5	23	38.5
	17		U	17	23	36.3	24	20.7		10	7.58	L	10	06	32.3	25	02.7
	18	13.87	L	18	12	00.2	22	52.7		10		U	10	18	58.4	26	06.4
	19	14.87	U	19	00	23.6	21	09.4		11	8.58	L	11	07	24.5	26	49.1
	19		L	19	12	46.2	19	12.6		11		U	11	19	50.7	27	10.4
	20	15.87	U	20	01	08.2	-17	03.8		12	9.58	L	12	08	16.8	-27	10.6
	20		L	20	13	29.7	14	44.7		12		U	12	20	42.6	26	50.0
	21	16.87	U	21	01	50.6	12	16.8		13	10.58	L	13	09	08.0	26	09.4
	21		L	21	14	11.2	09	41.7		13		U	13	21	32.9	25	09.9
	22	17.87	U	22	02	31.4	07	00.6		14	11.58	L	14	09	57.2	23	52.7
	22		L	22	14	51.5	04	15.0		14		U	14	22	21.0	22	19.3
	23	18.87	U	23	03	11.5	-01	26.2		15	12.58	L	15	10	44.0	-20	31.2
	23		L	23	15	31.6	+01	24.5		15		U	15	23	06.4	18	30.0
	24	19.87	U	24	03	52.0	04	15.7		16	13.58	L	16	11	28.3	16	17.3
	24		L	24	16	12.7	+07	06.1		16		U	16	23	49.6	-13	54.6

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Date	Age (at 0^h)		Ephemeris Transit (TT)			Geocentric Declination		Date	Age (at 0^h)		Ephemeris Transit (TT)			Geocentric Declination	
	d		d	h	m	°	'		d		d	h	m	°	'
Aug. 16		U	16	23	49.6	-13	54.6	Sept. 9	8.26	L	9	07	02.8	-26	34.9
17	14.58	L	17	12	10.5	11	23.5	9		U	9	19	28.2	25	48.5
18	15.58	U	18	00	31.0	08	45.4	10	9.26	L	10	07	52.9	24	43.6
18		L	18	12	51.3	06	01.9	10		U	10	20	17.1	23	21.6
19	16.58	U	19	01	11.4	03	14.4	11	10.26	L	11	08	40.6	21	43.9
19		L	19	13	31.5	-00	24.2	11		U	11	21	03.4	19	52.2
20	17.58	U	20	01	51.8	+02	27.2	12	11.26	L	12	09	25.6	-17	47.9
20		L	20	14	12.3	05	18.3	12		U	12	21	47.3	15	32.4
21	18.58	U	21	02	33.1	08	07.5	13	12.26	L	13	10	08.5	13	07.4
21		L	21	14	54.5	10	53.2	13		U	13	22	29.4	10	34.2
22	19.58	U	22	03	16.5	13	33.6	14	13.26	L	14	10	49.9	07	54.3
22		L	22	15	39.4	16	06.7	14		U	14	23	10.3	05	09.0
23	20.58	U	23	04	03.1	+18	30.4	15	14.26	L	15	11	30.6	-02	19.9
23		L	23	16	27.9	20	42.2	15		U	15	23	50.9	+00	31.6
24	21.58	U	24	04	53.8	22	39.4	16	15.26	L	16	12	11.5	03	23.9
24		L	24	17	20.9	24	19.3	17	16.26	U	17	00	32.3	06	15.5
25	22.58	U	25	05	49.1	25	38.8	17		L	17	12	53.6	09	04.7
25		L	25	18	18.3	26	35.2	18	17.26	U	18	01	15.5	11	49.4
26	23.58	U	26	06	48.5	+27	05.9	18		L	18	13	38.0	+14	27.9
26		L	26	19	19.3	27	08.6	19	18.26	U	19	02	01.3	16	57.8
27	24.58	U	27	07	50.5	26	42.1	19		L	19	14	25.6	19	16.9
27		L	27	20	21.7	25	45.9	20	19.26	U	20	02	50.8	21	22.6
28	25.58	U	28	08	52.8	24	20.7	20		L	20	15	17.0	23	12.4
28		L	28	21	23.3	22	27.9	21	20.26	U	21	03	44.2	24	43.5
29	26.58	U	29	09	53.1	+20	10.3	21		L	21	16	12.5	+25	53.5
29		L	29	22	22.1	17	30.8	22	21.26	U	22	04	41.5	26	39.8
30	27.58	U	30	10	50.3	14	33.3	22		L	22	17	11.2	27	00.6
30		L	30	23	17.6	11	21.5	23	22.26	U	23	05	41.2	26	54.4
31	28.58	U	31	11	44.3	07	59.7	23		L	23	18	11.5	26	20.6
Sept. 1	0.26	L	1	00	10.3	04	31.6	24	23.26	U	24	06	41.6	25	19.2
1		U	1	12	35.8	+01	01.3	24		L	24	19	11.4	+23	51.2
2	1.26	L	2	01	01.0	-02	27.8	25	24.26	U	25	07	40.7	21	58.2
2		U	2	13	25.9	05	52.3	25		L	25	20	09.2	19	42.6
3	2.26	L	3	01	50.9	09	09.2	26	25.26	U	26	08	37.1	17	06.9
3		U	3	14	15.8	12	15.5	26		L	26	21	04.3	14	14.4
4	3.26	L	4	02	41.0	15	08.9	27	26.26	U	27	09	30.8	11	08.4
4		U	4	15	06.4	-17	47.2	27		L	27	21	56.8	+07	52.1
5	4.26	L	5	03	32.1	20	08.4	28	27.26	U	28	10	22.3	04	29.0
5		U	5	15	58.1	22	10.9	28		L	28	22	47.5	+01	02.7
6	5.26	L	6	04	24.4	23	53.3	29	28.26	U	29	11	12.5	-02	23.6
6		U	6	16	50.9	25	14.6	29		L	29	23	37.4	05	46.6
7	6.26	L	7	05	17.5	26	14.2	30	29.26	U	30	12	02.5	09	03.0
7		U	7	17	44.1	-26	51.8	Oct. 1	0.89	L	1	00	27.7	-12	09.9
8	7.26	L	8	06	10.7	27	07.4	1		U	1	12	53.3	15	04.5
8		U	8	18	36.9	27	01.5	2	1.89	L	2	01	19.2	17	44.1
9	8.26	L	9	07	02.8	-26	34.9	2		U	2	13	45.4	-20	06.4

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Date		Age (at 0^h)		Ephemeris Transit (TT)			Geocentric Declination		Date		Age (at 0^h)		Ephemeris Transit (TT)			Geocentric Declination	
		d		d	h	m	°	'			d		d	h	m	°	'
Oct.	1	0.89	L	1	00	27.7	-12	09.9	Oct.	24	23.89	U	24	07	23.6	+13	14.4
	1		U	1	12	53.3	15	04.5		24		L	24	19	49.1	10	12.4
	2	1.89	L	2	01	19.2	17	44.1		25	24.89	U	25	08	14.1	07	01.8
	2		U	2	13	45.4	20	06.4		25		L	25	20	38.7	03	45.5
	3	2.89	L	3	02	12.1	22	09.5		26	25.89	U	26	09	03.1	+00	26.4
	3		U	3	14	39.0	23	51.8		26		L	26	21	27.4	-02	52.7
	4	3.89	L	4	03	06.2	-25	12.1		27	26.89	U	27	09	51.8	-06	08.8
	4		U	4	15	33.5	26	09.6		27		L	27	22	16.4	09	19.1
	5	4.89	L	5	04	00.7	26	44.1		28	27.89	U	28	10	41.3	12	20.8
	5		U	5	16	27.7	26	56.0		28		L	28	23	06.6	15	11.1
	6	5.89	L	6	04	54.3	26	45.7		29	28.89	U	29	11	32.4	17	47.3
	6		U	6	17	20.4	26	14.5		29		L	29	23	58.7	20	07.1
	7	6.89	L	7	05	45.9	-25	23.5		30	0.43	U	30	12	25.4	-22	08.1
	7		U	7	18	10.8	24	14.3		31	1.43	L	31	00	52.6	23	48.5
	8	7.89	L	8	06	34.9	22	48.5		31		U	31	13	20.1	25	06.7
	8		U	8	18	58.3	21	07.6	Nov.	1	2.43	L	1	01	47.7	26	02.0
	9	8.89	L	9	07	21.0	19	13.2		1		U	1	14	15.3	26	33.8
	9		U	9	19	43.1	17	06.9		2	3.43	L	2	02	42.7	26	42.5
	10	9.89	L	10	08	04.6	-14	50.0		2		U	2	15	09.7	-26	28.7
	10		U	10	20	25.7	12	24.1		3	4.43	L	3	03	36.1	25	53.6
	11	10.89	L	11	08	46.4	09	50.4		3		U	3	16	01.8	24	58.7
	11		U	11	21	06.9	07	10.2		4	5.43	L	4	04	26.8	23	45.7
	12	11.89	L	12	09	27.3	04	24.9		4		U	4	16	51.0	22	16.3
	12		U	12	21	47.7	-01	35.8		5	6.43	L	5	05	14.4	20	32.4
	13	12.89	L	13	10	08.2	+01	15.7		5		U	5	17	37.0	-18	35.6
	13		U	13	22	29.0	04	08.0		6	7.43	L	6	05	59.0	16	27.5
	14	13.89	L	14	10	50.2	06	59.5		6		U	6	18	20.4	14	09.6
	14		U	14	23	11.9	09	48.3		7	8.43	L	7	06	41.3	11	43.4
	15	14.89	L	15	11	34.3	12	32.5		7		U	7	19	01.8	09	10.0
	15		U	15	23	57.5	15	09.7		8	9.43	L	8	07	22.2	06	30.8
	16	15.89	L	16	12	21.6	+17	37.6		8		U	8	19	42.4	-03	46.9
	17	16.89	U	17	00	46.6	19	53.6		9	10.43	L	9	08	02.7	-00	59.5
	17		L	17	13	12.6	21	54.9		9		U	9	20	23.2	+01	50.1
	18	17.89	U	18	01	39.7	23	38.7		10	11.43	L	10	08	44.0	04	40.4
	18		L	18	14	07.7	25	02.1		10		U	10	21	05.2	07	30.0
	19	18.89	U	19	02	36.5	26	02.8		11	12.43	L	11	09	27.1	10	17.0
	19		L	19	15	06.1	+26	38.6		11		U	11	21	49.7	+12	59.4
	20	19.89	U	20	03	36.0	26	48.0		12	13.43	L	12	10	13.2	15	35.1
	20		L	20	16	06.1	26	30.1		12		U	12	22	37.8	18	01.3
	21	20.89	U	21	04	36.1	25	45.2		13	14.43	L	13	11	03.4	20	15.2
	21		L	21	17	05.7	24	34.0		13		U	13	23	30.2	22	13.8
	22	21.89	U	22	05	34.7	22	58.1		14	15.43	L	14	11	58.1	23	53.9
	22		L	22	18	03.1	+20	59.5		15	16.43	U	15	00	27.0	+25	12.5
	23	22.89	U	23	06	30.7	18	40.9		15		L	15	12	56.8	26	06.6
	23		L	23	18	57.5	16	04.9		16	17.43	U	16	01	27.2	26	34.4
	24	23.89	U	24	07	23.6	+13	14.4		16		L	16	13	58.0	+26	34.1

MOON, 2027
AT EPHEMERIS TRANSIT

Date	Age (at 0^h)		Ephemeris Transit (TT)			Geocentric Declination		Date	Age (at 0^h)		Ephemeris Transit (TT)			Geocentric Declination	
	d		d	h	m	°	'		d		d	h	m	°	'
Nov. 16		L	16	13	58.0	+26	34.1	Dec. 9		U	9	20	26.2	+15	50.5
17	18.43	U	17	02	28.8	26	05.4	10	11.86	L	10	08	50.6	18	13.8
17		L	17	14	59.3	25	09.0	10		U	10	21	16.2	20	25.3
18	19.43	U	18	03	29.2	23	46.1	11	12.86	L	11	09	43.0	22	21.8
18		L	18	15	58.4	21	59.2	11		U	11	22	11.1	24	00.1
19	20.43	U	19	04	26.7	19	50.8	12	13.86	L	12	10	40.4	25	16.7
19		L	19	16	54.0	+17	24.2	12		U	12	23	10.8	+26	08.6
20	21.43	U	20	05	20.5	14	42.3	13	14.86	L	13	11	41.9	26	33.0
20		L	20	17	46.1	11	48.4	14	15.86	U	14	00	13.5	26	28.4
21	22.43	U	21	06	11.1	08	45.3	14		L	14	12	45.1	25	53.8
21		L	21	18	35.5	05	35.9	15	16.86	U	15	01	16.5	24	49.9
22	23.43	U	22	06	59.5	+02	23.0	15		L	15	13	47.3	23	18.3
22		L	22	19	23.3	-00	50.9	16	17.86	U	16	02	17.3	+21	21.6
23	24.43	U	23	07	47.0	04	03.4	16		L	16	14	46.3	19	03.1
23		L	23	20	10.8	07	11.8	17	18.86	U	17	03	14.3	16	26.3
24	25.43	U	24	08	34.8	10	13.9	17		L	17	15	41.2	13	35.0
24		L	24	20	59.2	13	07.2	18	19.86	U	18	04	07.3	10	32.8
25	26.43	U	25	09	24.0	15	49.2	18		L	18	16	32.6	07	23.2
25		L	25	21	49.3	-18	17.6	19	20.86	U	19	04	57.2	+04	09.2
26	27.43	U	26	10	15.2	20	30.1	19		L	19	17	21.3	+00	53.7
26		L	26	22	41.7	22	24.5	20	21.86	U	20	05	45.2	-02	20.6
27	28.43	U	27	11	08.6	23	58.9	20		L	20	18	08.9	05	31.2
27		L	27	23	35.9	25	11.9	21	22.86	U	21	06	32.7	08	35.9
28	29.43	U	28	12	03.4	26	02.3	21		L	21	18	56.6	11	32.4
29	0.86	L	29	00	30.9	-26	29.7	22	23.86	U	22	07	20.8	-14	18.7
29		U	29	12	58.3	26	34.1	22		L	22	19	45.4	16	52.7
30	1.86	L	30	01	25.3	26	16.0	23	24.86	U	23	08	10.5	19	12.3
30		U	30	13	51.8	25	36.7	23		L	23	20	36.1	21	15.6
Dec. 1	2.86	L	1	02	17.6	24	37.7	24	25.86	U	24	09	02.1	23	00.8
1		U	1	14	42.6	23	20.6	24		L	24	21	28.7	24	26.3
2	3.86	L	2	03	06.8	-21	47.4	25	26.86	U	25	09	55.6	-25	30.8
2		U	2	15	30.2	20	00.0	25		L	25	22	22.7	26	13.3
3	4.86	L	3	03	52.8	18	00.2	26	27.86	U	26	10	49.8	26	33.5
3		U	3	16	14.7	15	49.8	26		L	26	23	16.8	26	31.4
4	5.86	L	4	04	35.9	13	30.3	27	28.86	U	27	11	43.5	26	07.5
4		U	4	16	56.7	11	03.2	28	0.16	L	28	00	09.7	25	22.9
5	6.86	L	5	05	17.1	-08	29.8	28		U	28	12	35.2	-24	19.0
5		U	5	17	37.2	05	51.3	29	1.16	L	29	01	00.0	22	57.4
6	7.86	L	6	05	57.2	03	08.9	29		U	29	13	24.1	21	20.1
6		U	6	18	17.2	-00	23.8	30	2.16	L	30	01	47.3	19	28.9
7	8.86	L	7	06	37.4	+02	22.9	30		U	30	14	09.8	17	25.7
7		U	7	18	57.9	05	09.9	31	3.16	L	31	02	31.5	15	12.3
8	9.86	L	8	07	18.9	+07	55.9	31		U	31	14	52.7	-12	50.3
8		U	8	19	40.5	10	39.3	32	4.16	L	32	03	13.4	10	21.3
9	10.86	L	9	08	02.9	13	18.2	32		U	32	15	33.6	07	46.8
9		U	9	20	26.2	+15	50.5	33	5.16	L	33	03	53.6	-05	07.9

MOON, 2027
EPHEMERIS FOR PHYSICAL OBSERVATIONS
FOR 0^h TERRESTRIAL TIME

Date 0^h TT		The Earth's Selenographic		The Sun's Selenographic		Position Angle of Axis	Position Angle of Bright Limb	Fraction Illuminated
		Long.	Lat.	Colong.	Lat.			
		°	°	°	°	°	°	
Jan.	0	+7.540	+5.189	174.71	-1.03	22	113	0.480
	1	7.186	6.017	186.87	1.02	21	111	0.378
	2	6.553	6.539	199.04	1.01	19	107	0.284
	3	5.696	6.749	211.21	0.99	16	102	0.201
	4	4.664	6.655	223.39	0.98	12	96	0.130
	5	3.499	6.270	235.57	0.97	8	89	0.073
	6	+2.236	+5.617	247.76	-0.96	3	81	0.032
	7	+0.907	4.725	259.95	0.94	358	66	0.007
	8	-0.461	3.633	272.13	0.93	353	321	0.001
	9	1.835	2.384	284.32	0.91	349	265	0.012
	10	3.182	+1.028	296.51	0.88	345	255	0.041
	11	4.457	-0.382	308.69	0.86	342	250	0.087
	12	-5.609	-1.788	320.88	-0.83	340	247	0.149
	13	6.579	3.134	333.05	0.81	338	245	0.225
	14	7.300	4.356	345.22	0.78	338	245	0.313
	15	7.704	5.391	357.39	0.75	338	246	0.411
	16	7.728	6.175	9.55	0.71	339	249	0.516
	17	7.322	6.642	21.70	0.68	342	253	0.624
	18	-6.465	-6.733	33.84	-0.64	345	258	0.729
	19	5.174	6.406	45.98	0.61	351	265	0.825
	20	3.514	5.646	58.11	0.57	357	273	0.906
	21	-1.598	4.482	70.24	0.53	3	283	0.965
	22	+0.427	2.988	82.37	0.50	9	298	0.996
	23	2.399	-1.283	94.49	0.46	14	97	0.996
	24	+4.166	+0.494	106.62	-0.43	18	110	0.967
	25	5.608	2.204	118.75	0.39	21	114	0.912
	26	6.646	3.731	130.88	0.36	22	116	0.837
	27	7.246	4.994	143.02	0.34	22	116	0.747
	28	7.412	5.944	155.17	0.31	22	114	0.649
	29	7.177	6.561	167.32	0.29	20	111	0.547
	30	+6.592	+6.845	179.48	-0.27	17	107	0.447
	31	5.720	6.809	191.65	0.25	14	102	0.352
Feb.	1	4.627	6.472	203.82	0.24	9	96	0.263
	2	3.380	5.860	216.00	0.22	4	90	0.184
	3	2.038	5.004	228.18	0.20	359	84	0.117
	4	+0.657	3.938	240.37	0.19	354	78	0.064
	5	-0.712	+2.702	252.56	-0.17	350	72	0.025
	6	2.027	+1.345	264.75	0.15	346	67	0.004
	7	3.249	-0.081	276.95	0.12	343	250	0.001
	8	4.341	1.518	289.14	0.10	340	244	0.017
	9	5.270	2.900	301.33	0.07	339	243	0.051
	10	6.001	4.165	313.52	0.04	338	242	0.105
	11	-6.502	-5.246	325.71	-0.01	338	243	0.175
	12	6.741	6.081	337.89	+0.02	339	245	0.260
	13	6.689	6.613	350.07	0.05	341	249	0.358
	14	6.325	6.794	2.24	0.09	344	254	0.465
	15	-5.638	-6.588	14.40	+0.12	349	260	0.576

MOON, 2027
EPHEMERIS FOR PHYSICAL OBSERVATIONS
FOR 0^h TERRESTRIAL TIME

Date 0^h TT	The Earth's Selenographic		The Sun's Selenographic		Position Angle of Axis	Position Angle of Bright Limb	Fraction Illuminated
	Long.	Lat.	Colong.	Lat.			
	°	°	°	°	°	°	
Feb. 15	-5.638	-6.588	14.40	+0.12	349	260	0.576
16	4.637	5.981	26.56	0.16	354	267	0.685
17	3.355	4.984	38.71	0.20	0	274	0.788
18	1.851	3.644	50.85	0.24	6	281	0.876
19	-0.211	2.044	62.99	0.28	12	286	0.944
20	+1.460	-0.299	75.13	0.32	16	289	0.986
21	+3.045	+1.459	87.26	+0.36	19	184	1.000
22	4.427	3.097	99.40	0.40	21	122	0.985
23	5.511	4.508	111.54	0.43	22	120	0.944
24	6.224	5.613	123.68	0.46	22	118	0.882
25	6.531	6.372	135.83	0.49	21	115	0.804
26	6.429	6.775	147.98	0.51	18	111	0.715
27	+5.947	+6.834	160.14	+0.53	15	106	0.620
28	5.135	6.574	172.30	0.55	11	100	0.523
Mar. 1	4.062	6.027	184.48	0.57	6	94	0.427
2	2.803	5.227	196.66	0.58	1	88	0.335
3	1.440	4.213	208.84	0.60	356	83	0.249
4	+0.050	3.023	221.04	0.61	351	78	0.172
5	-1.294	+1.700	233.23	+0.63	347	74	0.107
6	2.528	+0.293	245.43	0.64	344	72	0.055
7	3.597	-1.143	257.64	0.66	341	73	0.019
8	4.459	2.546	269.84	0.68	339	91	0.002
9	5.088	3.847	282.05	0.70	338	224	0.004
10	5.470	4.977	294.26	0.72	338	235	0.028
11	-5.602	-5.868	306.46	+0.74	338	240	0.072
12	5.496	6.459	318.66	0.76	340	245	0.137
13	5.169	6.703	330.86	0.79	343	250	0.219
14	4.641	6.571	343.05	0.82	348	256	0.316
15	3.933	6.055	355.24	0.85	353	263	0.424
16	3.067	5.171	7.42	0.88	359	270	0.537
17	-2.064	-3.960	19.59	+0.92	5	277	0.650
18	-0.951	2.491	31.76	0.95	10	283	0.755
19	+0.238	-0.854	43.92	0.98	15	287	0.848
20	1.453	+0.842	56.08	1.02	18	289	0.922
21	2.630	2.478	68.23	1.05	21	287	0.972
22	3.694	3.946	80.38	1.08	22	267	0.997
23	+4.562	+5.151	92.53	+1.11	22	142	0.995
24	5.159	6.031	104.68	1.14	21	125	0.969
25	5.428	6.556	116.84	1.16	19	118	0.921
26	5.339	6.722	129.00	1.18	16	111	0.856
27	4.892	6.551	141.17	1.19	12	105	0.778
28	4.117	6.076	153.34	1.21	8	99	0.692
29	+3.069	+5.338	165.52	+1.22	2	92	0.599
30	1.822	4.378	177.70	1.22	357	86	0.505
31	+0.461	3.240	189.89	1.23	353	81	0.411
Apr. 1	-0.925	1.966	202.09	1.24	348	76	0.320
2	-2.243	+0.603	214.29	+1.24	345	73	0.235

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		Long.	Lat.	Colong.	Lat.			
		°	°	°	°	°	°	
Apr.	1	-0.925	+1.966	202.09	+1.24	348	76	0.320
	2	2.243	+0.603	214.29	1.24	345	73	0.235
	3	3.410	-0.801	226.50	1.25	342	71	0.158
	4	4.352	2.189	238.71	1.25	340	70	0.094
	5	5.012	3.499	250.93	1.26	338	73	0.044
	6	5.354	4.660	263.15	1.27	338	83	0.012
	7	-5.370	-5.601	275.38	+1.28	338	158	0.001
	8	5.082	6.251	287.60	1.29	340	228	0.014
	9	4.534	6.556	299.82	1.30	342	242	0.050
	10	3.789	6.480	312.04	1.31	346	250	0.109
	11	2.917	6.014	324.26	1.33	351	258	0.188
	12	1.981	5.180	336.47	1.35	357	266	0.285
	13	-1.030	-4.025	348.67	+1.36	3	274	0.392
	14	-0.096	2.623	0.87	1.39	9	280	0.506
	15	+0.807	-1.060	13.06	1.41	14	285	0.620
	16	1.669	+0.565	25.25	1.43	17	289	0.726
	17	2.482	2.150	37.42	1.45	20	290	0.821
	18	3.224	3.597	49.60	1.47	22	290	0.898
	19	+3.864	+4.820	61.77	+1.50	22	285	0.955
	20	4.354	5.751	73.94	1.51	22	272	0.988
	21	4.643	6.348	86.11	1.53	20	191	0.998
	22	4.682	6.594	98.28	1.54	18	128	0.985
	23	4.435	6.496	110.45	1.55	14	114	0.952
	24	3.890	6.082	122.62	1.55	9	105	0.901
	25	+3.060	+5.392	134.80	+1.56	4	97	0.835
	26	1.983	4.470	146.99	1.56	359	90	0.758
	27	+0.720	3.366	159.18	1.55	354	84	0.672
	28	-0.652	2.126	171.38	1.55	350	79	0.581
	29	2.042	+0.796	183.58	1.54	346	74	0.487
	30	3.355	-0.575	195.79	1.54	343	71	0.392
May	1	-4.494	-1.938	208.00	+1.53	340	69	0.300
	2	5.371	3.236	220.22	1.52	339	69	0.214
	3	5.910	4.408	232.45	1.51	338	70	0.137
	4	6.060	5.384	244.68	1.51	338	74	0.074
	5	5.806	6.093	256.92	1.50	339	82	0.028
	6	5.167	6.469	269.15	1.50	341	111	0.005
	7	-4.209	-6.462	281.39	+1.50	345	220	0.006
	8	3.027	6.051	293.63	1.49	350	248	0.033
	9	1.732	5.248	305.86	1.49	356	261	0.087
	10	-0.432	4.105	318.10	1.49	2	270	0.163
	11	+0.786	2.701	330.32	1.50	8	278	0.258
	12	1.866	1.136	342.54	1.50	13	284	0.365
	13	+2.782	+0.486	354.76	+1.51	17	288	0.479
	14	3.528	2.062	6.97	1.52	20	291	0.591
	15	4.112	3.498	19.17	1.52	22	292	0.698
	16	4.539	4.719	31.37	1.53	22	291	0.793
	17	+4.810	+5.662	43.56	+1.54	22	288	0.873

MOON, 2027
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Date 0^h TT		The Earth's Selenographic		The Sun's Selenographic		Position Angle of Axis	Position Angle of Bright Limb	Fraction Illuminated
		Long.	Lat.	Colong.	Lat.			
		°	°	°	°	°	°	
May	17	+4.810	+5.662	43.56	+1.54	22	288	0.873
	18	4.914	6.286	55.75	1.54	21	283	0.935
	19	4.832	6.572	67.93	1.55	19	273	0.976
	20	4.541	6.520	80.11	1.55	15	242	0.996
	21	4.024	6.149	92.30	1.54	11	137	0.995
	22	3.273	5.491	104.48	1.54	6	108	0.975
	23	+2.299	+4.592	116.67	+1.53	1	96	0.937
	24	+1.129	3.499	128.86	1.52	356	88	0.883
	25	-0.189	2.266	141.06	1.50	351	81	0.816
	26	1.590	+0.941	153.26	1.49	347	76	0.737
	27	2.996	-0.424	165.46	1.47	344	72	0.650
	28	4.316	1.780	177.67	1.45	341	69	0.557
	29	-5.457	-3.075	189.89	+1.43	339	68	0.461
	30	6.324	4.255	202.12	1.41	338	68	0.363
	31	6.834	5.259	214.35	1.39	338	69	0.269
June	1	6.922	6.022	226.58	1.37	338	71	0.181
	2	6.553	6.478	238.82	1.35	340	76	0.106
	3	5.735	6.568	251.07	1.33	343	84	0.047
	4	-4.525	-6.252	263.32	+1.32	348	101	0.011
	5	3.025	5.520	275.56	1.30	353	204	0.002
	6	-1.367	4.409	287.81	1.29	360	259	0.021
	7	+0.309	2.992	300.06	1.27	6	273	0.069
	8	1.876	-1.379	312.31	1.26	11	282	0.141
	9	3.243	+0.309	324.54	1.25	16	287	0.234
	10	+4.354	+1.952	336.78	+1.24	19	291	0.339
	11	5.185	3.447	349.00	1.23	21	293	0.450
	12	5.738	4.712	1.22	1.23	22	293	0.561
	13	6.027	5.690	13.44	1.22	22	292	0.667
	14	6.070	6.346	25.65	1.22	21	289	0.762
	15	5.884	6.663	37.85	1.21	19	285	0.844
	16	+5.483	+6.645	50.05	+1.20	16	279	0.911
	17	4.875	6.307	62.25	1.19	12	270	0.959
	18	4.071	5.678	74.44	1.17	7	256	0.988
	19	3.083	4.797	86.63	1.16	2	187	0.999
	20	1.931	3.713	98.83	1.14	357	100	0.991
	21	+0.643	2.476	111.02	1.12	352	86	0.965
	22	-0.740	+1.140	123.22	+1.10	348	78	0.922
	23	2.165	-0.242	135.42	1.07	345	73	0.864
	24	3.569	1.616	147.63	1.04	342	69	0.793
	25	4.877	2.931	159.83	1.02	340	67	0.711
	26	6.008	4.134	172.05	0.99	338	66	0.620
	27	6.878	5.172	184.27	0.96	338	66	0.522
	28	-7.407	-5.986	196.50	+0.93	338	68	0.421
	29	7.525	6.521	208.73	0.90	339	71	0.319
	30	7.187	6.717	220.97	0.88	342	75	0.223
July	1	6.380	6.529	233.21	0.85	346	81	0.137
	2	-5.138	-5.929	245.46	+0.82	351	89	0.067

MOON, 2027
EPHEMERIS FOR PHYSICAL OBSERVATIONS
FOR 0^h TERRESTRIAL TIME

Date 0^h TT	The Earth's Selenographic		The Sun's Selenographic		Position Angle of Axis	Position Angle of Bright Limb	Fraction Illuminated
	Long.	Lat.	Colong.	Lat.			
	°	°	°	°	°	°	
July 1	-6.380	-6.529	233.21	+0.85	346	81	0.137
2	5.138	5.929	245.46	0.82	351	89	0.067
3	3.541	4.922	257.71	0.79	357	101	0.020
4	-1.709	3.560	269.97	0.77	3	151	0.001
5	+0.211	1.936	282.22	0.74	9	274	0.012
6	2.072	-0.179	294.47	0.72	14	285	0.053
7	+3.744	+1.574	306.72	+0.70	18	291	0.120
8	5.132	3.192	318.97	0.68	21	294	0.208
9	6.176	4.574	331.21	0.66	22	295	0.309
10	6.853	5.650	343.44	0.64	23	294	0.417
11	7.166	6.383	355.66	0.62	22	292	0.525
12	7.136	6.761	7.88	0.61	20	289	0.629
13	+6.797	+6.792	20.10	+0.59	17	284	0.725
14	6.187	6.496	32.31	0.57	13	279	0.810
15	5.345	5.904	44.51	0.56	9	273	0.881
16	4.312	5.054	56.71	0.53	4	266	0.936
17	3.125	3.991	68.91	0.51	359	258	0.975
18	1.823	2.763	81.10	0.49	354	246	0.996
19	+0.443	+1.424	93.30	+0.46	349	94	0.999
20	-0.973	+0.027	105.49	0.44	345	74	0.984
21	2.380	-1.373	117.69	0.41	342	69	0.952
22	3.728	2.719	129.89	0.38	340	66	0.903
23	4.961	3.957	142.09	0.35	338	64	0.839
24	6.021	5.035	154.30	0.31	338	64	0.762
25	-6.843	-5.899	166.51	+0.28	338	65	0.673
26	7.364	6.500	178.72	0.25	339	67	0.574
27	7.527	6.788	190.94	0.22	341	71	0.470
28	7.286	6.721	203.17	0.19	344	76	0.364
29	6.618	6.268	215.41	0.16	348	82	0.261
30	5.529	5.420	227.65	0.12	354	89	0.166
31	-4.064	-4.199	239.89	+0.09	0	96	0.087
Aug. 1	2.307	2.666	252.14	0.06	7	104	0.031
2	-0.376	-0.928	264.39	+0.03	12	111	0.003
3	+1.588	+0.883	276.64	0.00	16	293	0.005
4	3.441	2.621	288.89	-0.02	20	296	0.038
5	5.052	4.153	301.14	0.05	22	297	0.097
6	+6.321	+5.383	313.38	-0.08	23	297	0.178
7	7.185	6.252	325.62	0.10	22	295	0.273
8	7.618	6.740	337.85	0.12	21	292	0.375
9	7.633	6.855	350.07	0.14	18	288	0.480
10	7.263	6.625	2.29	0.16	14	283	0.582
11	6.562	6.086	14.50	0.18	10	277	0.679
12	+5.593	+5.281	26.71	-0.21	5	271	0.766
13	4.420	4.256	38.91	0.23	360	266	0.842
14	3.108	3.059	51.11	0.25	355	260	0.905
15	1.716	1.739	63.30	0.28	350	256	0.953
16	+0.300	+0.348	75.49	-0.30	346	254	0.985

MOON, 2027
EPHEMERIS FOR PHYSICAL OBSERVATIONS
FOR 0^h TERRESTRIAL TIME

Date 0^h TT		The Earth's Selenographic		The Sun's Selenographic		Position Angle of Axis	Position Angle of Bright Limb	Fraction Illuminated
		Long.	Lat.	Colong.	Lat.			
		°	°	°	°	°	°	
Aug.	16	+0.300	+0.348	75.49	-0.30	346	254	0.985
	17	-1.092	-1.059	87.68	0.33	343	265	0.999
	18	2.416	2.425	99.86	0.35	341	55	0.995
	19	3.630	3.694	112.05	0.38	339	59	0.974
	20	4.699	4.810	124.24	0.41	338	60	0.934
	21	5.585	5.720	136.43	0.44	337	62	0.877
	22	-6.254	-6.373	148.63	-0.47	338	64	0.804
	23	6.671	6.726	160.83	0.50	340	67	0.717
	24	6.803	6.744	173.03	0.52	343	72	0.619
	25	6.621	6.402	185.24	0.55	347	77	0.513
	26	6.102	5.693	197.46	0.58	352	84	0.403
	27	5.240	4.628	209.68	0.61	358	91	0.294
	28	-4.046	-3.248	221.91	-0.64	4	97	0.194
	29	2.561	-1.627	234.14	0.67	10	103	0.109
	30	-0.858	+0.129	246.38	0.70	15	106	0.045
	31	+0.958	1.888	258.62	0.72	18	102	0.008
Sept.	1	2.760	3.514	270.86	0.75	21	328	0.002
	2	4.409	4.884	283.10	0.78	22	305	0.024
	3	+5.778	+5.909	295.34	-0.80	23	301	0.074
	4	6.767	6.542	307.57	0.82	21	297	0.144
	5	7.317	6.778	319.80	0.84	19	292	0.230
	6	7.415	6.640	332.02	0.86	16	287	0.325
	7	7.084	6.171	344.24	0.88	11	281	0.424
	8	6.378	5.421	356.45	0.90	6	275	0.524
	9	+5.368	+4.442	8.65	-0.92	1	269	0.620
	10	4.139	3.285	20.85	0.94	356	264	0.710
	11	2.773	2.000	33.04	0.96	352	259	0.792
	12	+1.352	+0.637	45.23	0.98	347	255	0.863
	13	-0.050	-0.753	57.41	1.00	344	253	0.921
	14	1.370	2.115	69.59	1.01	341	254	0.964
	15	-2.557	-3.396	81.76	-1.03	339	261	0.991
	16	3.572	4.536	93.94	1.05	338	344	0.999
	17	4.389	5.479	106.11	1.07	337	47	0.988
	18	4.996	6.173	118.28	1.09	338	56	0.958
	19	5.387	6.572	130.46	1.11	339	62	0.908
	20	5.562	6.641	142.63	1.13	342	67	0.839
	21	-5.522	-6.362	154.82	-1.15	346	73	0.755
	22	5.266	5.731	167.00	1.17	351	80	0.657
	23	4.790	4.766	179.20	1.18	356	87	0.549
	24	4.087	3.505	191.39	1.20	2	94	0.437
	25	3.156	2.010	203.60	1.22	8	100	0.326
	26	2.005	-0.365	215.81	1.24	13	105	0.222
	27	-0.664	+1.325	228.03	-1.26	17	108	0.132
	28	+0.808	2.940	240.25	1.28	20	107	0.063
	29	2.321	4.362	252.47	1.30	22	101	0.018
	30	3.761	5.488	264.70	1.32	23	43	0.002
Oct.	1	+5.007	+6.247	276.92	-1.34	22	314	0.013

MOON, 2027
EPHEMERIS FOR PHYSICAL OBSERVATIONS
FOR 0^h TERRESTRIAL TIME

Date 0^h TT		The Earth's Selenographic		The Sun's Selenographic		Position Angle of Axis	Position Angle of Bright Limb	Fraction Illuminated
		Long.	Lat.	Colong.	Lat.			
		°	°	°	°	°	°	
Oct.	1	+5.007	+6.247	276.92	-1.34	22	314	0.013
	2	5.945	6.608	289.15	1.35	20	301	0.049
	3	6.495	6.576	301.37	1.37	17	293	0.107
	4	6.617	6.187	313.58	1.38	13	286	0.181
	5	6.312	5.494	325.79	1.39	8	280	0.266
	6	5.622	4.555	338.00	1.40	3	273	0.359
	7	+4.615	+3.429	350.20	-1.41	358	267	0.454
	8	3.377	2.172	2.39	1.42	353	261	0.550
	9	2.002	+0.836	14.57	1.43	349	257	0.642
	10	+0.584	-0.529	26.75	1.44	345	254	0.730
	11	-0.784	1.875	38.92	1.45	342	252	0.809
	12	2.023	3.149	51.09	1.46	340	251	0.878
	13	-3.068	-4.297	63.25	-1.46	338	253	0.933
	14	3.871	5.262	75.41	1.47	337	258	0.973
	15	4.409	5.990	87.57	1.48	338	281	0.995
	16	4.679	6.428	99.72	1.48	339	25	0.996
	17	4.701	6.537	111.88	1.49	341	56	0.976
	18	4.507	6.294	124.03	1.49	345	67	0.934
	19	-4.137	-5.696	136.19	-1.49	349	75	0.871
	20	3.627	4.765	148.36	1.50	355	83	0.789
	21	3.005	3.547	160.52	1.50	1	91	0.692
	22	2.282	2.107	172.69	1.50	7	98	0.584
	23	1.463	-0.528	184.87	1.51	12	103	0.470
	24	0.546	+1.095	197.06	1.51	16	107	0.358
	25	+0.462	+2.661	209.25	-1.52	19	110	0.252
	26	1.538	4.065	221.45	1.53	21	110	0.159
	27	2.635	5.215	233.65	1.53	23	108	0.085
	28	3.680	6.036	245.86	1.54	22	101	0.033
	29	4.584	6.482	258.07	1.54	21	77	0.006
	30	5.255	6.540	270.28	1.55	19	330	0.004
	31	+5.616	+6.228	282.48	-1.55	15	299	0.026
Nov.	1	5.618	5.589	294.69	1.56	10	287	0.069
	2	5.247	4.681	306.89	1.56	5	278	0.130
	3	4.527	3.570	319.09	1.56	360	270	0.203
	4	3.508	2.319	331.28	1.56	355	264	0.287
	5	2.266	+0.985	343.47	1.55	350	259	0.377
	6	+0.890	-0.378	355.65	-1.55	346	255	0.470
	7	-0.522	1.720	7.82	1.55	343	252	0.564
	8	1.872	2.992	19.99	1.54	340	250	0.656
	9	3.067	4.147	32.15	1.54	339	249	0.743
	10	4.027	5.132	44.30	1.53	338	250	0.823
	11	4.689	5.895	56.45	1.52	337	252	0.892
	12	-5.014	-6.383	68.60	-1.51	338	258	0.946
	13	4.996	6.547	80.74	1.50	340	269	0.983
	14	4.660	6.355	92.88	1.49	343	323	0.998
	15	4.057	5.792	105.01	1.47	348	57	0.990
	16	-3.259	-4.877	117.15	-1.46	353	76	0.956

MOON, 2027
EPHEMERIS FOR PHYSICAL OBSERVATIONS
FOR 0^h TERRESTRIAL TIME

Date 0^h TT	The Earth's Selenographic		The Sun's Selenographic		Position Angle of		Fraction Illuminated
					Axis	Bright Limb	
	Long.	Lat.	Colong.	Lat.			
	°	°	°	°	°	°	
Nov. 16	-3.259	-4.877	117.15	-1.46	353	76	0.956
17	2.342	3.653	129.29	1.44	359	87	0.899
18	1.373	2.196	141.44	1.43	5	95	0.821
19	-0.402	-0.599	153.59	1.42	11	102	0.726
20	+0.541	+1.035	165.74	1.40	15	107	0.618
21	1.442	2.603	177.90	1.39	19	110	0.505
22	+2.295	+4.007	190.07	-1.38	21	112	0.392
23	3.090	5.165	202.25	1.37	22	112	0.286
24	3.809	6.010	214.43	1.37	23	110	0.191
25	4.420	6.500	226.62	1.36	22	106	0.113
26	4.878	6.615	238.81	1.35	20	99	0.054
27	5.135	6.364	251.00	1.35	16	87	0.016
28	+5.144	+5.777	263.20	-1.34	12	32	0.002
29	4.874	4.904	275.39	1.33	7	296	0.009
30	4.312	3.805	287.59	1.32	2	277	0.036
Dec. 1	3.471	2.546	299.78	1.31	356	268	0.082
2	2.386	+1.193	311.96	1.29	352	261	0.142
3	+1.114	-0.195	324.15	1.28	347	256	0.215
4	-0.272	-1.563	336.33	-1.27	344	252	0.297
5	1.689	2.861	348.50	1.25	341	249	0.387
6	3.044	4.042	0.66	1.23	339	248	0.480
7	4.244	5.060	12.82	1.21	338	247	0.575
8	5.203	5.868	24.98	1.19	337	248	0.669
9	5.842	6.419	37.12	1.17	338	250	0.759
10	-6.105	-6.665	49.26	-1.15	339	254	0.841
11	5.962	6.565	61.40	1.12	342	259	0.910
12	5.422	6.091	73.53	1.10	346	268	0.962
13	4.527	5.241	85.66	1.07	351	286	0.993
14	3.354	4.045	97.79	1.04	357	53	0.998
15	2.003	2.570	109.91	1.01	3	89	0.976
16	-0.580	-0.914	122.04	-0.98	9	99	0.927
17	+0.818	+0.804	134.17	0.95	14	106	0.853
18	2.114	2.459	146.31	0.93	18	110	0.761
19	3.251	3.943	158.45	0.90	21	113	0.656
20	4.197	5.164	170.61	0.88	22	114	0.544
21	4.933	6.061	182.76	0.86	23	113	0.433
22	+5.451	+6.598	194.93	-0.84	22	111	0.326
23	5.746	6.761	207.10	0.82	20	107	0.230
24	5.814	6.561	219.28	0.80	17	102	0.147
25	5.654	6.025	231.46	0.78	13	95	0.082
26	5.263	5.195	243.64	0.76	9	87	0.035
27	4.645	4.125	255.83	0.74	3	74	0.008
28	+3.809	+2.876	268.02	-0.73	358	318	0.001
29	2.775	1.513	280.21	0.71	353	266	0.013
30	1.573	+0.098	292.40	0.69	349	257	0.043
31	+0.243	-1.307	304.58	0.67	345	252	0.090
32	-1.160	-2.647	316.76	-0.64	342	248	0.151

MERCURY, 2027

HELIOCENTRIC POSITIONS FOR 0^h TERRESTRIAL TIME
MEAN EQUINOX AND ECLIPTIC OF DATE

Date		Heliocentric Longitude			Heliocentric Latitude			Radius Vector	Date		Heliocentric Longitude			Heliocentric Latitude			Radius Vector
		°	'	"	°	'	"				°	'	"	°	'	"	
Jan.	0	276	10	50.3	-5	10	45.0	0.460 5259	Feb.	15	130	19	37.0	+6	55	56.5	0.329 4937
	1	279	01	30.8	5	24	24.2	0.458 5450		16	135	49	00.2	6	59	49.1	0.334 2653
	2	281	53	53.9	5	37	22.7	0.456 2946		17	141	08	53.0	6	59	56.0	0.339 3258
	3	284	48	13.1	5	49	37.9	0.453 7777		18	146	19	06.1	6	56	36.5	0.344 6244
	4	287	44	42.7	6	01	07.2	0.450 9979		19	151	19	39.2	6	50	11.0	0.350 1119
	5	290	43	37.1	6	11	47.6	0.447 9592		20	156	10	38.7	6	41	00.0	0.355 7418
	6	293	45	11.5	-6	21	35.9	0.444 6664		21	160	52	17.4	+6	29	23.7	0.361 4706
	7	296	49	41.3	6	30	28.4	0.441 1248		22	165	24	52.1	6	15	41.1	0.367 2576
	8	299	57	22.9	6	38	21.3	0.437 3405		23	169	48	43.5	6	00	10.1	0.373 0656
	9	303	08	33.0	6	45	10.0	0.433 3208		24	174	04	14.6	5	43	07.1	0.378 8605
	10	306	23	29.1	6	50	50.0	0.429 0734		25	178	11	49.9	5	24	47.1	0.384 6115
	11	309	42	29.5	6	55	16.1	0.424 6077		26	182	11	55.0	5	05	23.2	0.390 2905
	12	313	05	53.1	-6	58	22.5	0.419 9337		27	186	04	55.8	+4	45	07.4	0.395 8723
	13	316	33	59.4	7	00	03.1	0.415 0633		28	189	51	18.3	4	24	10.0	0.401 3345
	14	320	07	08.9	7	00	11.5	0.410 0096	Mar.	1	193	31	27.9	4	02	40.3	0.406 6567
	15	323	45	42.5	6	58	40.4	0.404 7874		2	197	05	49.5	3	40	46.2	0.411 8210
	16	327	30	01.8	6	55	22.4	0.399 4134		3	200	34	47.4	3	18	34.6	0.416 8113
	17	331	20	28.8	6	50	09.6	0.393 9064		4	203	58	44.9	2	56	11.6	0.421 6135
	18	335	17	25.9	-6	42	53.5	0.388 2874		5	207	18	04.3	+2	33	42.3	0.426 2149
	19	339	21	15.8	6	33	25.9	0.382 5799		6	210	33	07.1	2	11	11.1	0.430 6043
	20	343	32	20.7	6	21	37.9	0.376 8100		7	213	44	13.8	1	48	42.0	0.434 7719
	21	347	51	02.7	6	07	21.1	0.371 0067		8	216	51	44.1	1	26	18.2	0.438 7090
	22	352	17	42.7	5	50	27.6	0.365 2021		9	219	55	56.4	1	04	02.6	0.442 4080
	23	356	52	40.4	5	30	49.8	0.359 4313		10	222	57	08.9	0	41	57.6	0.445 8621
	24	1	36	13.3	-5	08	21.8	0.353 7328		11	225	55	38.5	+0	20	05.5	0.449 0654
	25	6	28	35.9	4	42	59.0	0.348 1482		12	228	51	41.5	-0	01	32.1	0.452 0128
	26	11	29	59.3	4	14	39.4	0.342 7222		13	231	45	33.7	0	22	53.3	0.454 6998
	27	16	40	29.7	3	43	23.9	0.337 5023		14	234	37	30.2	0	43	56.7	0.457 1225
	28	22	00	07.4	3	09	17.2	0.332 5383		15	237	27	45.4	1	04	41.1	0.459 2776
	29	27	28	46.1	2	32	28.5	0.327 8816		16	240	16	33.3	1	25	05.2	0.461 1623
	30	33	06	11.1	-1	53	11.9	0.323 5847		17	243	04	07.7	-1	45	07.9	0.462 7742
	31	38	51	59.0	-1	11	47.3	0.319 6993		18	245	50	41.7	2	04	48.1	0.464 1114
Feb.	1	44	45	36.0	+0	28	40.4	0.316 2759		19	248	36	28.4	2	24	04.8	0.465 1721
	2	50	46	18.3	0	15	37.4	0.313 3613		20	251	21	40.2	2	42	56.9	0.465 9552
	3	56	53	10.9	1	00	29.7	0.310 9979		21	254	06	29.8	3	01	23.5	0.466 4599
	4	63	05	09.0	1	45	15.7	0.309 2215		22	256	51	09.4	3	19	23.5	0.466 6854
	5	69	20	58.0	+2	29	12.4	0.308 0599		23	259	35	51.3	-3	36	55.6	0.466 6317
	6	75	39	15.8	3	11	35.8	0.307 5317		24	262	20	47.7	3	53	58.8	0.466 2986
	7	81	58	34.6	3	51	43.4	0.307 6457		25	265	06	10.8	4	10	31.7	0.465 6867
	8	88	17	23.7	4	28	56.0	0.308 3999		26	267	52	12.9	4	26	33.0	0.464 7966
	9	94	34	12.2	5	02	40.1	0.309 7820		27	270	39	06.2	4	42	01.1	0.463 6293
	10	100	47	32.5	5	32	28.6	0.311 7702		28	273	27	03.5	4	56	54.4	0.462 1863
	11	106	56	02.3	+5	58	02.4	0.314 3334		29	276	16	17.3	-5	11	11.0	0.460 4691
	12	112	58	28.0	6	19	10.3	0.317 4334		30	279	07	00.8	5	24	49.0	0.458 4801
	13	118	53	45.5	6	35	48.7	0.321 0262		31	281	59	27.3	5	37	46.1	0.456 2216
	14	124	41	02.2	6	48	01.0	0.325 0633	Apr.	1	284	53	50.4	5	50	00.0	0.453 6968
	15	130	19	37.0	+6	55	56.5	0.329 4937		2	287	50	24.3	-6	01	27.8	0.450 9092

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MEAN EQUINOX AND ECLIPTIC OF DATE

Date	Heliocentric Longitude			Heliocentric Latitude			Radius Vector	Date	Heliocentric Longitude			Heliocentric Latitude			Radius Vector
	°	'	"	°	'	"			°	'	"	°	'	"	
Apr. 1	284	53	50.4	-5	50	00.0	0.453 6968	May 17	146	28	29.3	+6	56	27.4	0.344 7873
2	287	50	24.3	6	01	27.8	0.450 9092	18	151	28	45.0	6	49	56.5	0.350 2795
3	290	49	23.3	6	12	06.6	0.447 8628	19	156	19	27.6	6	40	40.9	0.355 9127
4	293	51	02.9	6	21	53.2	0.444 5625	20	161	00	49.6	6	29	00.4	0.361 6434
5	296	55	38.3	6	30	43.9	0.441 0135	21	165	33	08.4	6	15	14.3	0.367 4313
6	300	03	26.0	6	38	34.8	0.437 2222	22	169	56	44.6	5	59	40.2	0.373 2392
7	303	14	42.7	-6	45	21.5	0.433 1956	23	174	12	01.1	+5	42	34.7	0.379 0330
8	306	29	46.0	6	50	59.3	0.428 9417	24	178	19	22.6	5	24	12.5	0.384 7820
9	309	48	54.1	6	55	23.0	0.424 4697	25	182	19	14.7	5	04	46.8	0.390 4582
10	313	12	25.9	6	58	26.8	0.419 7898	26	186	12	03.4	4	44	29.6	0.396 0366
11	316	40	41.2	7	00	04.7	0.414 9139	27	189	58	14.4	4	23	31.1	0.401 4947
12	320	14	00.2	7	00	10.0	0.409 8550	28	193	38	13.4	4	02	00.5	0.406 8122
13	323	52	43.9	-6	58	35.8	0.404 6282	29	197	12	25.1	+3	40	05.7	0.411 9714
14	327	37	13.9	6	55	14.3	0.399 2502	30	200	41	13.8	3	17	53.7	0.416 9562
15	331	27	52.3	6	49	57.8	0.393 7397	31	204	05	02.8	2	55	30.4	0.421 7524
16	335	25	01.5	6	42	37.8	0.388 1179	June 1	207	24	14.3	2	33	00.9	0.426 3475
17	339	29	04.0	6	33	06.0	0.382 4084	2	210	39	09.9	2	10	29.8	0.430 7303
18	343	40	22.3	6	21	13.5	0.376 6373	3	213	50	10.0	1	48	00.7	0.434 8911
19	347	59	18.3	-6	06	52.1	0.370 8337	4	216	57	34.2	+1	25	37.1	0.438 8211
20	352	26	12.8	5	49	53.5	0.365 0299	5	220	01	41.1	1	03	21.8	0.442 5128
21	357	01	25.6	5	30	10.7	0.359 2610	6	223	02	48.5	0	41	17.1	0.445 9594
22	1	45	14.0	5	07	37.4	0.353 5655	7	226	01	13.6	+0	19	25.4	0.449 1551
23	6	37	52.6	4	42	09.2	0.347 9853	8	228	57	12.7	-0	02	11.7	0.452 0947
24	11	39	32.1	4	13	44.3	0.342 5650	9	231	51	01.3	0	23	32.4	0.454 7738
25	16	50	18.6	-3	42	23.5	0.337 3523	10	234	42	54.7	-0	44	35.3	0.457 1886
26	22	10	12.4	3	08	11.8	0.332 3969	11	237	33	07.2	1	05	19.1	0.459 3357
27	27	39	06.8	2	31	18.4	0.327 7506	12	240	21	52.9	1	25	42.6	0.461 2123
28	33	16	47.0	1	51	57.6	0.323 4654	13	243	09	25.4	1	45	44.6	0.462 8160
29	39	02	49.0	-1	10	29.6	0.319 5933	14	245	55	57.9	2	05	24.1	0.464 1449
30	44	56	39.1	+0	27	20.2	0.316 1846	15	248	41	43.4	2	24	40.1	0.465 1974
May 1	50	57	32.8	+0	16	59.2	0.313 2861	16	251	26	54.5	-2	43	31.5	0.465 9722
2	57	04	35.1	1	01	51.8	0.310 9399	17	254	11	43.7	3	01	57.2	0.466 4686
3	63	16	40.7	1	46	36.9	0.309 1816	18	256	56	23.3	3	19	56.3	0.466 6858
4	69	32	34.9	2	30	31.3	0.308 0387	19	259	41	05.6	3	37	27.6	0.466 6237
5	75	50	55.3	3	12	51.1	0.307 5297	20	262	26	02.7	3	54	29.9	0.466 2824
6	82	10	14.1	3	52	53.8	0.307 6628	21	265	11	26.9	4	11	01.8	0.465 6622
7	88	29	00.4	+4	30	00.6	0.308 4359	22	267	57	30.4	-4	27	02.1	0.464 7638
8	94	45	43.5	5	03	37.8	0.309 8364	23	270	44	25.6	4	42	29.2	0.463 5883
9	100	58	55.8	5	33	18.8	0.311 8420	24	273	32	25.0	4	57	21.4	0.462 1370
10	107	07	15.4	5	58	44.7	0.314 4217	25	276	21	41.4	5	11	36.8	0.460 4117
11	113	09	28.7	6	19	44.4	0.317 5369	26	279	12	27.9	5	25	13.6	0.458 4146
12	119	04	32.3	6	36	14.6	0.321 1434	27	282	04	57.8	5	38	09.5	0.456 1481
13	124	51	33.7	+6	48	19.0	0.325 1928	28	284	59	24.6	-5	50	21.9	0.453 6154
14	130	29	52.1	6	56	06.9	0.329 6339	29	287	56	02.7	6	01	48.2	0.450 8200
15	135	58	58.3	6	59	52.4	0.334 4146	30	290	55	06.5	6	12	25.5	0.447 7660
16	141	18	33.6	6	59	52.8	0.339 4827	July 1	293	56	51.0	6	22	10.4	0.444 4581
17	146	28	29.3	+6	56	27.4	0.344 7873	2	297	01	32.1	-6	30	59.4	0.440 9018

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HELIOCENTRIC POSITIONS FOR 0^h TERRESTRIAL TIME

MEAN EQUINOX AND ECLIPTIC OF DATE

Date		Heliocentric Longitude			Heliocentric Latitude			Radius Vector	Date		Heliocentric Longitude			Heliocentric Latitude			Radius Vector
		°	'	"	°	'	"				°	'	"	°	'	"	
July	1	293	56	51.0	-6	22	10.4	0.444 4581	Aug.	16	161	09	28.3	+6	28	36.9	0.361 8180
	2	297	01	32.1	6	30	59.4	0.440 9018		17	165	41	30.9	6	14	47.1	0.367 6071
	3	300	09	25.9	6	38	48.4	0.437 1034		18	170	04	51.6	5	59	10.0	0.373 4150
	4	303	20	49.2	6	45	33.0	0.433 0698		19	174	19	53.3	5	42	02.0	0.379 2080
	5	306	35	59.7	6	51	08.6	0.428 8092		20	178	27	00.8	5	23	37.6	0.384 9552
	6	309	55	15.5	6	55	29.9	0.424 3308		21	182	26	39.7	5	04	10.2	0.390 6289
	7	313	18	55.6	-6	58	31.1	0.419 6449		22	186	19	15.9	+4	43	51.5	0.396 2041
	8	316	47	19.7	7	00	06.3	0.414 7632		23	190	05	15.3	4	22	51.9	0.401 6582
	9	320	20	48.2	7	00	08.7	0.409 6991		24	193	45	03.3	4	01	20.4	0.406 9713
	10	323	59	42.1	6	58	31.3	0.404 4675		25	197	19	04.9	3	39	25.0	0.412 1254
	11	327	44	22.9	6	55	06.4	0.399 0852		26	200	47	44.1	3	17	12.6	0.417 1047
	12	331	35	12.8	6	49	46.2	0.393 5710		27	204	11	24.3	2	54	49.0	0.421 8951
	13	335	32	34.2	-6	42	22.4	0.387 9463		28	207	30	27.7	+2	32	19.4	0.426 4839
	14	339	36	49.5	6	32	46.3	0.382 2345		29	210	45	15.9	2	09	48.2	0.430 8602
	15	343	48	21.4	6	20	49.4	0.376 4619		30	213	56	09.1	1	47	19.3	0.435 0141
	16	348	07	31.5	6	06	23.3	0.370 6579		31	217	03	26.9	1	24	55.9	0.438 9371
	17	352	34	40.9	5	49	19.9	0.364 8546	Sept.	1	220	07	28.1	1	02	40.8	0.442 6214
	18	357	10	09.0	5	29	31.9	0.359 0873		2	223	08	30.3	0	40	36.5	0.446 0605
	19	1	54	13.2	-5	06	53.2	0.353 3947		3	226	06	50.7	+0	18	45.2	0.449 2485
	20	6	47	08.0	4	41	19.7	0.347 8186		4	229	02	45.5	-0	02	51.4	0.452 1803
	21	11	49	04.0	4	12	49.4	0.342 4039		5	231	56	30.4	0	24	11.6	0.454 8514
	22	17	00	07.1	3	41	23.3	0.337 1982		6	234	48	20.4	0	45	14.0	0.457 2581
	23	22	20	17.4	3	07	06.5	0.332 2515		7	237	38	30.1	1	05	57.1	0.459 3970
	24	27	49	27.9	2	30	08.4	0.327 6152		8	240	27	13.3	1	26	19.9	0.461 2653
	25	33	27	23.7	-1	50	43.4	0.323 3418		9	243	14	43.7	-1	46	21.3	0.462 8607
	26	39	13	40.4	-1	09	11.9	0.319 4830		10	246	01	14.6	2	06	00.1	0.464 1811
	27	45	07	44.0	+0	25	59.9	0.316 0890		11	248	46	58.9	2	25	15.3	0.465 2251
	28	51	08	49.8	0	18	21.1	0.313 2066		12	251	32	09.1	2	44	05.9	0.465 9914
	29	57	16	02.3	1	03	14.0	0.310 8777		13	254	16	57.8	3	02	30.9	0.466 4792
	30	63	28	16.0	1	47	58.2	0.309 1376		14	257	01	37.3	3	20	29.2	0.466 6879
	31	69	44	15.9	+2	31	50.4	0.308 0136		15	259	46	19.8	-3	37	59.6	0.466 6172
Aug.	1	76	02	39.5	3	14	06.7	0.307 5240		16	262	31	17.6	3	55	00.9	0.466 2673
	2	82	21	58.6	3	54	04.6	0.307 6765		17	265	16	42.7	4	11	31.9	0.465 6385
	3	88	40	42.6	4	31	05.4	0.308 4688		18	268	02	47.6	4	27	31.2	0.464 7315
	4	94	57	20.6	5	04	35.8	0.309 8881		19	270	49	44.6	4	42	57.2	0.463 5475
	5	101	10	25.2	5	34	09.3	0.311 9115		20	273	37	46.2	4	57	48.3	0.462 0877
	6	107	18	34.8	+5	59	27.2	0.314 5080		21	276	27	05.2	-5	12	02.6	0.460 3540
	7	113	20	36.1	6	20	18.6	0.317 6388		22	279	17	54.6	5	25	38.2	0.458 3484
	8	119	15	25.8	6	36	40.7	0.321 2594		23	282	10	27.8	5	38	32.7	0.456 0737
	9	125	02	12.0	6	48	37.0	0.325 3214		24	285	04	58.5	5	50	43.8	0.453 5327
	10	130	40	14.1	6	56	17.3	0.329 7736		25	288	01	40.8	6	02	08.7	0.450 7292
	11	136	09	03.3	6	59	55.7	0.334 5637		26	291	00	49.3	6	12	44.4	0.447 6672
	12	141	28	21.2	+6	59	49.5	0.339 6398		27	294	02	39.1	-6	22	27.7	0.444 3514
	13	146	37	59.3	6	56	18.0	0.344 9509		28	297	07	25.9	6	31	14.8	0.440 7875
	14	151	37	57.5	6	49	41.8	0.350 4480		29	300	15	25.9	6	39	01.9	0.436 9815
	15	156	28	22.9	6	40	21.5	0.356 0849		30	303	26	56.0	6	45	44.5	0.432 9407
	16	161	09	28.3	+6	28	36.9	0.361 8180	Oct.	1	306	42	13.7	-6	51	17.9	0.428 6731

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HELIOCENTRIC POSITIONS FOR 0^h TERRESTRIAL TIME
MEAN EQUINOX AND ECLIPTIC OF DATE

Date		Heliocentric Longitude			Heliocentric Latitude			Radius Vector	Date		Heliocentric Longitude			Heliocentric Latitude			Radius Vector
		°	'	"	°	'	"				°	'	"	°	'	"	
Oct.	1	306	42	13.7	-6	51	17.9	0.428 6731	Nov.	16	178	34	44.0	+5	23	02.3	0.385 1339
	2	310	01	37.4	6	55	36.8	0.424 1880		17	182	34	09.3	5	03	33.2	0.390 8049
	3	313	25	26.1	6	58	35.5	0.419 4957		18	186	26	32.7	4	43	13.1	0.396 3766
	4	316	53	59.4	7	00	07.9	0.414 6081		19	190	12	20.0	4	22	12.4	0.401 8266
	5	320	27	37.6	7	00	07.4	0.409 5384		20	193	51	56.9	4	00	40.1	0.407 1350
	6	324	06	41.9	6	58	26.7	0.404 3017		21	197	25	48.0	3	38	44.1	0.412 2839
	7	327	51	33.9	-6	54	58.4	0.398 9149		22	200	54	17.5	+3	16	31.2	0.417 2576
	8	331	42	35.7	6	49	34.6	0.393 3969		23	204	17	48.7	2	54	07.3	0.422 0418
	9	335	40	09.6	6	42	06.7	0.387 7689		24	207	36	43.8	2	31	37.6	0.426 6241
	10	339	44	38.3	6	32	26.4	0.382 0546		25	210	51	24.3	2	09	06.5	0.430 9936
	11	343	56	24.2	6	20	25.1	0.376 2806		26	214	02	10.5	1	46	37.7	0.435 1404
	12	348	15	48.9	6	05	54.2	0.370 4759		27	217	09	21.9	1	24	14.5	0.439 0560
	13	352	43	13.7	-5	48	45.8	0.364 6730		28	220	13	17.2	+1	01	59.7	0.442 7328
	14	357	18	57.7	5	28	52.6	0.358 9073		29	223	14	14.1	0	39	55.8	0.446 1641
	15	2	03	18.4	5	06	08.6	0.353 2176		30	226	12	29.7	+0	18	04.9	0.449 3442
	16	6	56	30.0	4	40	29.6	0.347 6458	Dec.	1	229	08	20.2	-0	03	31.2	0.452 2679
	17	11	58	43.1	4	11	53.7	0.342 2367		2	232	02	01.3	0	24	50.9	0.454 9308
	18	17	10	03.5	3	40	22.3	0.337 0382		3	234	53	47.9	0	45	52.7	0.457 3292
	19	22	30	31.0	-3	06	00.3	0.332 1003		4	237	43	54.6	-1	06	35.2	0.459 4596
	20	27	59	58.4	2	28	57.3	0.327 4745		5	240	32	35.4	1	26	57.4	0.461 3195
	21	33	38	10.3	1	49	28.0	0.323 2131		6	243	20	03.8	1	46	58.1	0.462 9063
	22	39	24	42.4	-1	07	53.0	0.319 3681		7	246	06	33.0	2	06	36.1	0.464 2181
	23	45	19	00.1	+0	24	38.2	0.315 9894		8	248	52	15.9	2	25	50.6	0.465 2535
	24	51	20	18.5	0	19	44.3	0.313 1236		9	251	37	25.3	2	44	40.5	0.466 0111
	25	57	27	41.7	+1	04	37.7	0.310 8126		10	254	22	13.5	-3	03	04.7	0.466 4902
	26	63	40	03.8	1	49	21.0	0.309 0914		11	257	06	52.9	3	21	02.1	0.466 6901
	27	69	56	09.7	2	33	10.9	0.307 9871		12	259	51	35.7	3	38	31.6	0.466 6107
	28	76	14	36.6	3	15	23.5	0.307 5175		13	262	36	34.2	3	55	32.0	0.466 2521
	29	82	33	56.2	3	55	16.5	0.307 6902		14	265	22	00.4	4	12	02.1	0.465 6146
	30	88	52	37.8	4	32	11.3	0.308 5024		15	268	08	06.7	4	28	00.4	0.464 6990
	31	95	09	10.6	+5	05	34.7	0.309 9410		16	270	55	05.5	-4	43	25.3	0.463 5063
Nov.	1	101	22	07.3	5	35	00.5	0.311 9831		17	273	43	09.3	4	58	15.3	0.462 0380
	2	107	30	06.6	6	00	10.2	0.314 5969		18	276	32	30.9	5	12	28.5	0.460 2957
	3	113	31	55.4	6	20	53.3	0.317 7439		19	279	23	23.3	5	26	02.8	0.458 2817
	4	119	26	30.8	6	37	07.0	0.321 3792		20	282	15	60.0	5	38	56.0	0.455 9986
	5	125	13	01.2	6	48	55.3	0.325 4543		21	285	10	34.6	5	51	05.7	0.453 4495
	6	130	50	46.5	+6	56	27.8	0.329 9179		22	288	07	21.2	-6	02	29.2	0.450 6378
	7	136	19	18.0	6	59	58.9	0.334 7179		23	291	06	34.5	6	13	03.3	0.447 5678
	8	141	38	17.9	6	59	46.0	0.339 8022		24	294	08	29.6	6	22	44.9	0.444 2443
	9	146	47	37.8	6	56	08.6	0.345 1199		25	297	13	22.1	6	31	30.3	0.440 6727
	10	151	47	18.0	6	49	27.0	0.350 6221		26	300	21	28.4	6	39	15.4	0.436 8593
	11	156	37	25.7	6	40	01.7	0.356 2627		27	303	33	05.3	6	45	56.0	0.432 8113
	12	161	18	13.8	+6	28	13.0	0.361 9982		28	306	48	30.4	-6	51	27.1	0.428 5368
	13	165	49	59.8	6	14	19.7	0.367 7885		29	310	08	02.1	6	55	43.6	0.424 0450
	14	170	13	04.4	5	58	39.6	0.373 5965		30	313	31	59.3	6	58	39.8	0.419 3465
	15	174	27	50.9	5	41	28.8	0.379 3886		31	317	00	41.8	7	00	09.4	0.414 4530
	16	178	34	44.0	+5	23	02.3	0.385 1339		32	320	34	29.9	-7	00	05.9	0.409 3779

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		°	'	"	°	'	"			°	'	"	°	'	"
Jan.	0	278	17	59.1	-1	39	04.9	Feb.	15	333	35	10.7	+3	21	13.1
	1	279	54	02.5	1	43	06.3		16	332	40	10.8	3	30	03.0
	2	281	30	25.6	1	46	52.0		17	331	39	19.5	3	36	44.7
	3	283	07	08.9	1	50	21.0		18	330	34	18.2	3	41	09.9
	4	284	44	13.2	1	53	32.7		19	329	26	53.6	3	43	14.6
	5	286	21	39.1	1	56	26.2		20	328	18	53.2	3	42	59.6
	6	287	59	27.1	-1	59	00.8		21	327	12	00.0	+3	40	29.4
	7	289	37	37.5	2	01	15.6		22	326	07	47.7	3	35	52.7
	8	291	16	10.4	2	03	09.6		23	325	07	37.8	3	29	21.0
	9	292	55	05.9	2	04	41.9		24	324	12	37.3	3	21	07.9
	10	294	34	23.6	2	05	51.5		25	323	23	37.7	3	11	27.8
	11	296	14	03.0	2	06	37.1		26	322	41	16.0	3	00	35.6
	12	297	54	03.2	-2	06	57.8		27	322	05	55.4	+2	48	45.6
	13	299	34	22.9	2	06	52.2		28	321	37	47.2	2	36	11.3
	14	301	15	00.3	2	06	19.2	Mar.	1	321	16	53.2	2	23	04.8
	15	302	55	53.2	2	05	17.3		2	321	03	07.2	2	09	36.7
	16	304	36	58.4	2	03	45.1		3	320	56	17.2	1	55	56.3
	17	306	18	12.4	2	01	41.2		4	320	56	07.5	1	42	11.5
	18	307	59	30.2	-1	59	04.0		5	321	02	19.1	+1	28	28.8
	19	309	40	46.2	1	55	51.8		6	321	14	31.8	1	14	53.7
	20	311	21	53.4	1	52	03.1		7	321	32	24.8	1	01	30.4
	21	313	02	43.1	1	47	35.9		8	321	55	37.0	0	48	22.6
	22	314	43	05.2	1	42	28.7		9	322	23	48.0	0	35	33.2
	23	316	22	47.7	1	36	39.7		10	322	56	38.2	0	23	04.3
	24	318	01	36.1	-1	30	07.0		11	323	33	49.0	+0	10	57.7
	25	319	39	13.9	1	22	49.1		12	324	15	03.0	-0	00	45.3
	26	321	15	21.5	1	14	44.4		13	325	00	04.0	0	12	03.6
	27	322	49	36.5	1	05	51.5		14	325	48	36.9	0	22	56.3
	28	324	21	32.8	0	56	09.2		15	326	40	28.2	0	33	23.0
	29	325	50	41.3	0	45	36.9		16	327	35	25.1	0	43	23.1
	30	327	16	28.7	-0	34	14.1		17	328	33	16.3	-0	52	56.3
	31	328	38	18.6	0	22	01.1		18	329	33	51.3	1	02	02.4
Feb.	1	329	55	30.6	-0	08	58.9		19	330	37	00.8	1	10	41.2
	2	331	07	21.5	+0	04	50.8		20	331	42	36.3	1	18	52.5
	3	332	13	05.5	0	19	24.9		21	332	50	30.3	1	26	36.3
	4	333	11	55.1	0	34	39.4		22	334	00	35.9	1	33	52.4
	5	334	03	02.7	+0	50	28.9		23	335	12	47.0	-1	40	40.9
	6	334	45	41.4	1	06	46.3		24	336	26	58.2	1	47	01.6
	7	335	19	07.9	1	23	22.9		25	337	43	04.7	1	52	54.4
	8	335	42	43.5	1	40	08.2		26	339	01	02.2	1	58	19.4
	9	335	55	57.7	1	56	49.9		27	340	20	46.8	2	03	16.5
	10	335	58	29.5	2	13	14.0		28	341	42	15.2	2	07	45.5
	11	335	50	11.1	+2	29	04.9		29	343	05	24.3	-2	11	46.5
	12	335	31	09.4	2	44	05.6		30	344	30	11.7	2	15	19.2
	13	335	01	48.0	2	57	58.7		31	345	56	35.2	2	18	23.6
	14	334	22	48.5	3	10	26.8	Apr.	1	347	24	33.0	2	20	59.6
	15	333	35	10.7	+3	21	13.1		2	348	54	03.4	-2	23	07.1

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		°	'	"	°	'	"			°	'	"	°	'	"
Apr.	1	347	24	33.0	-2	20	59.6	May	17	74	39	01.3	+2	14	29.9
	2	348	54	03.4	2	23	07.1		18	76	16	28.5	2	17	17.9
	3	350	25	05.4	2	24	45.8		19	77	50	34.9	2	19	15.7
	4	351	57	37.9	2	25	55.7		20	79	21	16.8	2	20	22.6
	5	353	31	40.3	2	26	36.6		21	80	48	31.4	2	20	38.1
	6	355	07	12.1	2	26	48.3		22	82	12	15.6	2	20	01.7
	7	356	44	13.0	-2	26	30.6		23	83	32	26.8	+2	18	33.1
	8	358	22	43.1	2	25	43.4		24	84	49	02.0	2	16	12.0
	9	0	02	42.4	2	24	26.5		25	86	01	58.4	2	12	58.2
	10	1	44	11.2	2	22	39.8		26	87	11	12.7	2	08	51.8
	11	3	27	09.8	2	20	23.0		27	88	16	41.7	2	03	52.7
	12	5	11	38.8	2	17	36.1		28	89	18	21.6	1	58	01.0
	13	6	57	38.6	-2	14	18.9		29	90	16	08.6	+1	51	16.9
	14	8	45	09.7	2	10	31.4		30	91	09	58.5	1	43	40.7
	15	10	34	12.9	2	06	13.5		31	91	59	46.9	1	35	12.9
	16	12	24	48.4	2	01	25.3	June	1	92	45	29.3	1	25	53.9
	17	14	16	56.8	1	56	07.0		2	93	27	00.9	1	15	44.7
	18	16	10	38.2	1	50	18.6		3	94	04	17.1	1	04	46.3
	19	18	05	52.5	-1	44	00.5		4	94	37	13.1	+0	52	59.8
	20	20	02	39.4	1	37	13.1		5	95	05	44.7	0	40	26.9
	21	22	00	57.8	1	29	57.2		6	95	29	47.7	0	27	09.6
	22	24	00	46.3	1	22	13.3		7	95	49	18.8	+0	13	10.3
	23	26	02	02.3	1	14	02.5		8	96	04	15.4	-0	01	28.1
	24	28	04	42.7	1	05	26.2		9	96	14	36.2	0	16	42.2
	25	30	08	43.0	-0	56	25.7		10	96	20	21.2	-0	32	27.9
	26	32	13	57.9	0	47	02.9		11	96	21	32.4	0	48	40.5
	27	34	20	20.2	0	37	19.9		12	96	18	13.8	1	05	14.7
	28	36	27	41.7	0	27	19.4		13	96	10	31.8	1	22	04.3
	29	38	35	52.8	0	17	04.3		14	95	58	35.5	1	39	02.7
	30	40	44	41.1	-0	06	37.1		15	95	42	37.1	1	56	02.3
May	1	42	53	54.1	+0	03	57.7		16	95	22	51.8	-2	12	55.0
	2	45	03	17.1	0	14	36.5		17	94	59	38.2	2	29	32.5
	3	47	12	34.1	0	25	15.1		18	94	33	18.3	2	45	45.7
	4	49	21	28.3	0	35	49.0		19	94	04	17.0	3	01	25.6
	5	51	29	42.1	0	46	13.7		20	93	33	02.7	3	16	23.1
	6	53	36	57.6	0	56	24.7		21	93	00	05.9	3	30	29.2
	7	55	42	56.8	+1	06	17.3		22	92	25	59.9	-3	43	35.7
	8	57	47	22.5	1	15	47.1		23	91	51	19.0	3	55	34.8
	9	59	49	58.1	1	24	49.9		24	91	16	38.9	4	06	19.7
	10	61	50	28.2	1	33	21.9		25	90	42	35.3	4	15	44.6
	11	63	48	38.8	1	41	19.5		26	90	09	43.4	4	23	44.9
	12	65	44	17.5	1	48	39.4		27	89	38	37.3	4	30	17.5
	13	67	37	13.4	+1	55	19.0		28	89	09	49.2	-4	35	20.2
	14	69	27	17.0	2	01	15.7		29	88	43	48.9	4	38	52.3
	15	71	14	20.4	2	06	27.5		30	88	21	03.7	4	40	54.2
	16	72	58	17.0	2	10	52.7	July	1	88	01	57.5	4	41	27.6
	17	74	39	01.3	+2	14	29.9		2	87	46	51.2	-4	40	34.8

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		°	'	"	°	'	"			°	'	"	°	'	"
July	1	88	01	57.5	-4	41	27.6	Aug.	16	147	40	16.6	+1	43	14.1
	2	87	46	51.2	4	40	34.8		17	149	37	04.8	1	41	11.7
	3	87	36	02.7	4	38	19.0		18	151	32	32.7	1	38	36.6
	4	87	29	46.4	4	34	44.2		19	153	26	38.6	1	35	30.9
	5	87	28	13.9	4	29	54.7		20	155	19	21.5	1	31	56.5
	6	87	31	34.3	4	23	55.2		21	157	10	40.9	1	27	55.2
	7	87	39	54.2	-4	16	50.5		22	159	00	36.8	+1	23	28.8
	8	87	53	18.1	4	08	45.6		23	160	49	09.4	1	18	39.1
	9	88	11	48.8	3	59	45.7		24	162	36	19.1	1	13	27.5
	10	88	35	27.8	3	49	55.5		25	164	22	06.8	1	07	55.8
	11	89	04	15.0	3	39	20.2		26	166	06	33.1	1	02	05.3
	12	89	38	09.7	3	28	04.4		27	167	49	38.9	0	55	57.6
	13	90	17	10.0	-3	16	12.8		28	169	31	25.0	+0	49	33.8
	14	91	01	13.8	3	03	49.9		29	171	11	52.3	0	42	55.4
	15	91	50	18.3	2	51	00.3		30	172	51	01.5	0	36	03.4
	16	92	44	20.2	2	37	48.0		31	174	28	53.5	0	28	59.2
	17	93	43	16.2	2	24	17.4	Sept.	1	176	05	28.7	0	21	43.8
	18	94	47	02.3	2	10	32.6		2	177	40	47.9	0	14	18.3
	19	95	55	34.4	-1	56	37.7		3	179	14	51.4	+0	06	43.7
	20	97	08	48.0	1	42	36.6		4	180	47	39.5	-0	00	59.0
	21	98	26	37.9	1	28	33.5		5	182	19	12.4	0	08	48.8
	22	99	48	58.3	1	14	32.5		6	183	49	30.0	0	16	44.8
	23	101	15	42.6	1	00	37.7		7	185	18	32.0	0	24	46.0
	24	102	46	43.1	0	46	53.3		8	186	46	17.9	0	32	51.6
	25	104	21	51.0	-0	33	23.4		9	188	12	47.1	-0	41	00.8
	26	106	00	56.0	0	20	12.3		10	189	37	58.5	0	49	12.5
	27	107	43	46.2	-0	07	24.1		11	191	01	50.9	0	57	26.0
	28	109	30	08.1	+0	04	57.0		12	192	24	22.7	1	05	40.4
	29	111	19	46.5	0	16	47.1		13	193	45	32.0	1	13	54.8
	30	113	12	24.6	0	28	02.3		14	195	05	16.6	1	22	08.3
	31	115	07	43.8	+0	38	39.3		15	196	23	33.8	-1	30	19.9
Aug.	1	117	05	24.6	0	48	34.8		16	197	40	20.4	1	38	28.8
	2	119	05	06.4	0	57	46.1		17	198	55	33.0	1	46	33.8
	3	121	06	28.1	1	06	11.1		18	200	09	07.4	1	54	34.0
	4	123	09	08.7	1	13	47.9		19	201	20	58.8	2	02	28.3
	5	125	12	47.6	1	20	35.6		20	202	31	01.9	2	10	15.4
	6	127	17	05.0	+1	26	33.3		21	203	39	10.4	-2	17	54.1
	7	129	21	42.1	1	31	41.2		22	204	45	17.5	2	25	23.0
	8	131	26	21.9	1	35	59.4		23	205	49	15.1	2	32	40.7
	9	133	30	48.8	1	39	28.8		24	206	50	54.5	2	39	45.4
	10	135	34	49.1	1	42	10.6		25	207	50	05.6	2	46	35.4
	11	137	38	10.7	1	44	06.2		26	208	46	37.2	2	53	08.6
	12	139	40	43.5	+1	45	17.3		27	209	40	16.8	-2	59	22.9
	13	141	42	18.9	1	45	45.6		28	210	30	50.3	3	05	15.9
	14	143	42	49.7	1	45	33.1		29	211	18	02.4	3	10	44.6
	15	145	42	10.4	1	44	42.0		30	212	01	35.8	3	15	46.2
	16	147	40	16.6	+1	43	14.1	Oct.	1	212	41	11.6	-3	20	17.0

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		°	'	"	°	'	"			°	'	"	°	'	"
Oct.	1	212	41	11.6	-3	20	17.0	Nov.	16	218	51	54.0	+1	39	24.5
	2	213	16	29.2	3	24	13.3		17	220	24	46.1	1	33	32.3
	3	213	47	06.0	3	27	30.7		18	221	58	13.4	1	27	25.5
	4	214	12	37.9	3	30	04.4		19	223	32	07.7	1	21	06.4
	5	214	32	39.2	3	31	49.1		20	225	06	22.2	1	14	37.1
	6	214	46	42.8	3	32	38.7		21	226	40	51.4	1	07	59.3
	7	214	54	21.3	-3	32	26.8		22	228	15	30.7	+1	01	14.7
	8	214	55	07.2	3	31	06.5		23	229	50	16.3	0	54	24.8
	9	214	48	34.3	3	28	30.4		24	231	25	05.4	0	47	31.0
	10	214	34	19.2	3	24	30.8		25	232	59	55.6	0	40	34.4
	11	214	12	03.3	3	19	00.2		26	234	34	45.1	0	33	36.3
	12	213	41	35.1	3	11	51.6		27	236	09	32.4	0	26	37.7
	13	213	02	52.9	-3	02	58.9		28	237	44	16.5	+0	19	39.5
	14	212	16	08.4	2	52	17.8		29	239	18	56.9	0	12	42.6
	15	211	21	48.9	2	39	46.4		30	240	53	33.0	+0	05	47.9
	16	210	20	40.9	2	25	26.1	Dec.	1	242	28	04.9	-0	01	03.9
	17	209	13	51.1	2	09	22.6		2	244	02	32.4	0	07	52.1
	18	208	02	46.8	1	51	45.9		3	245	36	55.8	0	14	35.9
	19	206	49	14.2	-1	32	50.9		4	247	11	15.7	-0	21	14.8
	20	205	35	14.2	1	12	56.8		5	248	45	32.4	0	27	47.9
	21	204	22	56.4	0	52	26.2		6	250	19	46.6	0	34	14.9
	22	203	14	31.6	0	31	43.9		7	251	53	59.1	0	40	34.9
	23	202	12	03.8	-0	11	15.0		8	253	28	10.6	0	46	47.6
	24	201	17	23.1	+0	08	36.5		9	255	02	22.1	0	52	52.1
	25	200	31	59.8	+0	27	29.4		10	256	36	34.3	-0	58	48.1
	26	199	57	00.8	0	45	06.3		11	258	10	48.4	1	04	34.9
	27	199	33	08.6	1	01	13.7		12	259	45	05.2	1	10	11.9
	28	199	20	42.2	1	15	42.8		13	261	19	25.7	1	15	38.5
	29	199	19	39.5	1	28	28.6		14	262	53	50.7	1	20	54.0
	30	199	29	40.8	1	39	29.5		15	264	28	21.1	1	25	58.0
	31	199	50	13.0	+1	48	47.0		16	266	02	57.9	-1	30	49.7
Nov.	1	200	20	33.1	1	56	24.4		17	267	37	41.9	1	35	28.4
	2	200	59	52.4	2	02	27.0		18	269	12	33.9	1	39	53.6
	3	201	47	18.9	2	07	00.8		19	270	47	34.5	1	44	04.4
	4	202	42	00.3	2	10	12.3		20	272	22	44.5	1	48	00.2
	5	203	43	05.5	2	12	08.6		21	273	58	04.3	1	51	40.0
	6	204	49	46.1	+2	12	56.4		22	275	33	34.4	-1	55	03.2
	7	206	01	17.2	2	12	42.5		23	277	09	14.9	1	58	08.9
	8	207	16	57.8	2	11	33.1		24	278	45	05.9	2	00	56.1
	9	208	36	11.1	2	09	34.2		25	280	21	07.1	2	03	23.8
	10	209	58	24.4	2	06	51.4		26	281	57	18.0	2	05	31.1
	11	211	23	08.9	2	03	29.7		27	283	33	38.0	2	07	16.9
	12	212	49	59.6	+1	59	33.7		28	285	10	05.7	-2	08	40.0
	13	214	18	34.8	1	55	07.5		29	286	46	39.6	2	09	39.2
	14	215	48	35.8	1	50	15.1		30	288	23	17.7	2	10	13.2
	15	217	19	46.8	1	44	59.7		31	289	59	57.4	2	10	20.6
	16	218	51	54.0	+1	39	24.5		32	291	36	35.3	-2	10	00.0

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RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
Jan.	0	18	36	35.50	-24	49	33.1	1.442 136	6.10	2.33	12	00	23
	1	18	43	38.81	24	46	54.8	1.440 417	6.11	2.33	12	03	31
	2	18	50	43.08	24	42	49.4	1.438 116	6.12	2.34	12	06	40
	3	18	57	48.18	24	37	16.0	1.435 225	6.13	2.34	12	09	49
	4	19	04	53.99	24	30	13.9	1.431 735	6.14	2.35	12	12	59
	5	19	12	00.36	24	21	42.0	1.427 634	6.16	2.35	12	16	09
	6	19	19	07.15	-24	11	39.7	1.422 911	6.18	2.36	12	19	20
	7	19	26	14.19	24	00	06.2	1.417 550	6.20	2.37	12	22	31
	8	19	33	21.32	23	47	00.8	1.411 539	6.23	2.38	12	25	42
	9	19	40	28.36	23	32	23.1	1.404 859	6.26	2.39	12	28	53
	10	19	47	35.11	23	16	12.5	1.397 493	6.29	2.40	12	32	03
	11	19	54	41.36	22	58	28.9	1.389 422	6.33	2.42	12	35	13
	12	20	01	46.88	-22	39	11.8	1.380 624	6.37	2.43	12	38	22
	13	20	08	51.43	22	18	21.5	1.371 077	6.41	2.45	12	41	30
	14	20	15	54.71	21	55	58.0	1.360 759	6.46	2.47	12	44	36
	15	20	22	56.44	21	32	01.8	1.349 644	6.52	2.49	12	47	41
	16	20	29	56.26	21	06	33.6	1.337 708	6.57	2.51	12	50	43
	17	20	36	53.78	20	39	34.3	1.324 922	6.64	2.54	12	53	43
	18	20	43	48.59	-20	11	05.6	1.311 262	6.71	2.56	12	56	40
	19	20	50	40.18	19	41	09.2	1.296 701	6.78	2.59	12	59	33
	20	20	57	28.00	19	09	47.5	1.281 213	6.86	2.62	13	02	23
	21	21	04	11.40	18	37	03.7	1.264 773	6.95	2.66	13	05	07
	22	21	10	49.66	18	03	01.5	1.247 359	7.05	2.69	13	07	46
	23	21	17	21.95	17	27	45.5	1.228 954	7.16	2.73	13	10	18
	24	21	23	47.32	-16	51	21.6	1.209 543	7.27	2.78	13	12	43
	25	21	30	04.68	16	13	56.3	1.189 119	7.40	2.83	13	14	59
	26	21	36	12.82	15	35	37.9	1.167 684	7.53	2.88	13	17	05
	27	21	42	10.34	14	56	36.1	1.145 249	7.68	2.93	13	19	00
	28	21	47	55.67	14	17	02.0	1.121 840	7.84	3.00	13	20	41
	29	21	53	27.05	13	37	08.8	1.097 497	8.01	3.06	13	22	07
	30	21	58	42.55	-12	57	11.6	1.072 279	8.20	3.13	13	23	17
	31	22	03	40.01	12	17	27.5	1.046 265	8.41	3.21	13	24	06
Feb.	1	22	08	17.12	11	38	15.6	1.019 558	8.63	3.30	13	24	35
	2	22	12	31.42	10	59	57.1	0.992 285	8.86	3.39	13	24	38
	3	22	16	20.31	10	22	55.2	0.964 598	9.12	3.48	13	24	15
	4	22	19	41.14	9	47	34.4	0.936 673	9.39	3.59	13	23	23
	5	22	22	31.28	-9	14	20.8	0.908 712	9.68	3.70	13	21	58
	6	22	24	48.21	8	43	41.0	0.880 938	9.98	3.81	13	19	59
	7	22	26	29.62	8	16	01.7	0.853 588	10.30	3.94	13	17	24
	8	22	27	33.57	7	51	48.6	0.826 915	10.63	4.06	13	14	11
	9	22	27	58.58	7	31	25.8	0.801 176	10.98	4.19	13	10	18
	10	22	27	43.84	7	15	14.6	0.776 628	11.32	4.33	13	05	46
	11	22	26	49.33	-7	03	31.9	0.753 518	11.67	4.46	13	00	35
	12	22	25	15.91	6	56	29.9	0.732 081	12.01	4.59	12	54	46
	13	22	23	05.51	6	54	14.1	0.712 527	12.34	4.72	12	48	22
	14	22	20	21.08	6	56	43.1	0.695 036	12.65	4.83	12	41	26
	15	22	17	06.66	-7	03	47.7	0.679 755	12.94	4.94	12	34	04

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Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
Feb.	15	22	17	06.66	-7	03	47.7	0.679 755	12.94	4.94	12	34	04
	16	22	13	27.24	7	15	10.7	0.666 791	13.19	5.04	12	26	20
	17	22	09	28.61	7	30	27.6	0.656 208	13.40	5.12	12	18	20
	18	22	05	17.14	7	49	07.5	0.648 026	13.57	5.18	12	10	11
	19	22	00	59.47	8	10	34.6	0.642 225	13.69	5.23	12	01	59
	20	21	56	42.21	8	34	10.2	0.638 742	13.77	5.26	11	53	50
	21	21	52	31.63	-8	59	14.7	0.637 482	13.80	5.27	11	45	51
	22	21	48	33.43	9	25	09.5	0.638 319	13.78	5.26	11	38	07
	23	21	44	52.52	9	51	18.6	0.641 108	13.72	5.24	11	30	41
	24	21	41	32.91	10	17	10.1	0.645 687	13.62	5.20	11	23	38
	25	21	38	37.67	10	42	16.4	0.651 886	13.49	5.15	11	17	01
	26	21	36	08.97	11	06	14.9	0.659 535	13.33	5.09	11	10	50
	27	21	34	08.13	-11	28	47.7	0.668 466	13.16	5.03	11	05	07
	28	21	32	35.76	11	49	41.2	0.678 518	12.96	4.95	10	59	52
Mar.	1	21	31	31.86	12	08	45.3	0.689 540	12.75	4.87	10	55	06
	2	21	30	55.93	12	25	53.4	0.701 391	12.54	4.79	10	50	46
	3	21	30	47.13	12	41	01.3	0.713 945	12.32	4.71	10	46	53
	4	21	31	04.36	12	54	06.8	0.727 085	12.10	4.62	10	43	26
	5	21	31	46.31	-13	05	09.2	0.740 709	11.87	4.54	10	40	22
	6	21	32	51.62	13	14	09.0	0.754 726	11.65	4.45	10	37	41
	7	21	34	18.83	13	21	07.6	0.769 056	11.43	4.37	10	35	21
	8	21	36	06.51	13	26	06.9	0.783 628	11.22	4.29	10	33	21
	9	21	38	13.24	13	29	08.9	0.798 382	11.01	4.21	10	31	39
	10	21	40	37.67	13	30	16.3	0.813 265	10.81	4.13	10	30	15
	11	21	43	18.49	-13	29	31.6	0.828 232	10.62	4.06	10	29	06
	12	21	46	14.48	13	26	57.4	0.843 242	10.43	3.98	10	28	12
	13	21	49	24.50	13	22	36.2	0.858 264	10.25	3.91	10	27	31
	14	21	52	47.48	13	16	30.8	0.873 269	10.07	3.85	10	27	03
	15	21	56	22.44	13	08	43.4	0.888 232	9.90	3.78	10	26	46
	16	22	00	08.46	12	59	16.4	0.903 134	9.74	3.72	10	26	40
	17	22	04	04.73	-12	48	12.2	0.917 957	9.58	3.66	10	26	44
	18	22	08	10.47	12	35	32.8	0.932 687	9.43	3.60	10	26	57
	19	22	12	25.01	12	21	20.4	0.947 311	9.28	3.55	10	27	19
	20	22	16	47.72	12	05	36.7	0.961 820	9.14	3.49	10	27	48
	21	22	21	18.03	11	48	23.7	0.976 203	9.01	3.44	10	28	25
	22	22	25	55.44	11	29	43.1	0.990 455	8.88	3.39	10	29	09
	23	22	30	39.50	-11	09	36.5	1.004 568	8.75	3.34	10	29	59
	24	22	35	29.80	10	48	05.5	1.018 537	8.63	3.30	10	30	56
	25	22	40	25.98	10	25	11.8	1.032 356	8.52	3.25	10	31	58
	26	22	45	27.73	10	00	56.6	1.046 021	8.41	3.21	10	33	05
	27	22	50	34.77	9	35	21.6	1.059 527	8.30	3.17	10	34	18
	28	22	55	46.85	9	08	28.1	1.072 870	8.20	3.13	10	35	36
	29	23	01	03.76	-8	40	17.3	1.086 046	8.10	3.09	10	36	58
	30	23	06	25.33	8	10	50.7	1.099 050	8.00	3.06	10	38	26
	31	23	11	51.42	7	40	09.6	1.111 876	7.91	3.02	10	39	57
Apr.	1	23	17	21.91	7	08	15.1	1.124 519	7.82	2.99	10	41	33
	2	23	22	56.73	-6	35	08.4	1.136 974	7.73	2.96	10	43	13

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RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

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		h	m	s	°	'	"		"	"	h	m	s
Apr.	1	23	17	21.91	-7	08	15.1	1.124 519	7.82	2.99	10	41	33
	2	23	22	56.73	6	35	08.4	1.136 974	7.73	2.96	10	43	13
	3	23	28	35.80	6	00	51.0	1.149 232	7.65	2.92	10	44	58
	4	23	34	19.12	5	25	23.8	1.161 285	7.57	2.89	10	46	47
	5	23	40	06.66	4	48	48.2	1.173 125	7.50	2.86	10	48	40
	6	23	45	58.44	4	11	05.4	1.184 740	7.42	2.84	10	50	37
	7	23	51	54.53	-3	32	16.6	1.196 118	7.35	2.81	10	52	39
	8	23	57	54.97	2	52	23.2	1.207 244	7.28	2.78	10	54	45
	9	0	03	59.85	2	11	26.6	1.218 103	7.22	2.76	10	56	56
	10	0	10	09.29	1	29	28.0	1.228 675	7.16	2.73	10	59	11
	11	0	16	23.41	0	46	29.1	1.238 941	7.10	2.71	11	01	31
	12	0	22	42.35	-0	02	31.5	1.248 876	7.04	2.69	11	03	56
	13	0	29	06.27	+0	42	23.0	1.258 454	6.99	2.67	11	06	26
	14	0	35	35.35	1	28	12.4	1.267 644	6.94	2.65	11	09	01
	15	0	42	09.77	2	14	54.7	1.276 413	6.89	2.63	11	11	42
	16	0	48	49.75	3	02	27.4	1.284 724	6.85	2.62	11	14	28
	17	0	55	35.48	3	50	47.9	1.292 534	6.80	2.60	11	17	20
	18	1	02	27.20	4	39	53.1	1.299 797	6.77	2.59	11	20	19
	19	1	09	25.10	+5	29	39.7	1.306 464	6.73	2.57	11	23	23
	20	1	16	29.39	6	20	03.7	1.312 478	6.70	2.56	11	26	35
	21	1	23	40.28	7	11	00.7	1.317 780	6.67	2.55	11	29	53
	22	1	30	57.93	8	02	25.9	1.322 307	6.65	2.54	11	33	18
	23	1	38	22.46	8	54	13.4	1.325 992	6.63	2.53	11	36	49
	24	1	45	53.99	9	46	16.9	1.328 762	6.62	2.53	11	40	28
	25	1	53	32.53	+10	38	29.1	1.330 547	6.61	2.53	11	44	14
	26	2	01	18.07	11	30	42.1	1.331 272	6.61	2.52	11	48	07
	27	2	09	10.47	12	22	47.0	1.330 865	6.61	2.52	11	52	07
	28	2	17	09.52	13	14	33.9	1.329 256	6.62	2.53	11	56	14
	29	2	25	14.92	14	05	52.2	1.326 383	6.63	2.53	12	00	26
	30	2	33	26.18	14	56	31.2	1.322 187	6.65	2.54	12	04	44
May	1	2	41	42.75	+15	46	18.3	1.316 624	6.68	2.55	12	09	08
	2	2	50	03.92	16	35	01.6	1.309 662	6.71	2.57	12	13	35
	3	2	58	28.86	17	22	28.5	1.301 283	6.76	2.58	12	18	06
	4	3	06	56.60	18	08	26.7	1.291 489	6.81	2.60	12	22	39
	5	3	15	26.07	18	52	44.3	1.280 299	6.87	2.62	12	27	13
	6	3	23	56.11	19	35	10.1	1.267 752	6.94	2.65	12	31	47
	7	3	32	25.49	+20	15	33.8	1.253 905	7.01	2.68	12	36	20
	8	3	40	52.95	20	53	46.4	1.238 832	7.10	2.71	12	40	50
	9	3	49	17.20	21	29	40.3	1.222 622	7.19	2.75	12	45	17
	10	3	57	36.97	22	03	09.4	1.205 375	7.30	2.79	12	49	38
	11	4	05	51.04	22	34	09.3	1.187 199	7.41	2.83	12	53	52
	12	4	13	58.21	23	02	37.1	1.168 208	7.53	2.88	12	58	00
	13	4	21	57.40	+23	28	31.4	1.148 519	7.66	2.93	13	01	58
	14	4	29	47.57	23	51	52.2	1.128 246	7.79	2.98	13	05	47
	15	4	37	27.78	24	12	40.9	1.107 501	7.94	3.03	13	09	25
	16	4	44	57.16	24	30	59.8	1.086 390	8.09	3.09	13	12	52
	17	4	52	14.93	+24	46	52.2	1.065 015	8.26	3.15	13	16	07

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RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
May	17	4	52	14.93	+24	46	52.2	1.065 015	8.26	3.15	13	16	07
	18	4	59	20.37	25	00	22.2	1.043 468	8.43	3.22	13	19	10
	19	5	06	12.84	25	11	34.3	1.021 835	8.61	3.29	13	21	58
	20	5	12	51.75	25	20	33.6	1.000 193	8.79	3.36	13	24	33
	21	5	19	16.55	25	27	25.7	0.978 614	8.99	3.43	13	26	53
	22	5	25	26.72	25	32	16.0	0.957 161	9.19	3.51	13	28	59
	23	5	31	21.80	+25	35	10.5	0.935 891	9.40	3.59	13	30	49
	24	5	37	01.34	25	36	14.9	0.914 856	9.61	3.67	13	32	23
	25	5	42	24.91	25	35	35.1	0.894 100	9.84	3.76	13	33	41
	26	5	47	32.10	25	33	17.0	0.873 667	10.07	3.85	13	34	42
	27	5	52	22.50	25	29	26.4	0.853 593	10.30	3.94	13	35	26
	28	5	56	55.72	25	24	09.1	0.833 913	10.55	4.03	13	35	53
	29	6	01	11.38	+25	17	30.7	0.814 659	10.79	4.12	13	36	02
	30	6	05	09.10	25	09	36.7	0.795 861	11.05	4.22	13	35	53
	31	6	08	48.52	25	00	32.7	0.777 547	11.31	4.32	13	35	25
June	1	6	12	09.27	24	50	24.0	0.759 745	11.58	4.42	13	34	39
	2	6	15	11.01	24	39	15.8	0.742 480	11.84	4.53	13	33	33
	3	6	17	53.42	24	27	13.4	0.725 780	12.12	4.63	13	32	08
	4	6	20	16.21	+24	14	21.9	0.709 670	12.39	4.73	13	30	23
	5	6	22	19.11	24	00	46.3	0.694 178	12.67	4.84	13	28	18
	6	6	24	01.91	23	46	31.7	0.679 331	12.95	4.95	13	25	54
	7	6	25	24.44	23	31	43.0	0.665 158	13.22	5.05	13	23	08
	8	6	26	26.65	23	16	25.3	0.651 687	13.49	5.16	13	20	03
	9	6	27	08.53	23	00	43.4	0.638 949	13.76	5.26	13	16	38
	10	6	27	30.23	+22	44	42.5	0.626 976	14.03	5.36	13	12	53
	11	6	27	32.02	22	28	27.6	0.615 801	14.28	5.46	13	08	48
	12	6	27	14.32	22	12	03.9	0.605 455	14.52	5.55	13	04	24
	13	6	26	37.74	21	55	36.9	0.595 974	14.76	5.64	12	59	42
	14	6	25	43.07	21	39	12.0	0.587 392	14.97	5.72	12	54	42
	15	6	24	31.31	21	22	55.0	0.579 740	15.17	5.80	12	49	26
	16	6	23	03.66	+21	06	51.9	0.573 054	15.35	5.86	12	43	56
	17	6	21	21.58	20	51	08.8	0.567 364	15.50	5.92	12	38	11
	18	6	19	26.69	20	35	52.0	0.562 700	15.63	5.97	12	32	15
	19	6	17	20.87	20	21	08.1	0.559 090	15.73	6.01	12	26	10
	20	6	15	06.14	20	07	03.7	0.556 558	15.80	6.04	12	19	56
	21	6	12	44.73	19	53	45.6	0.555 127	15.84	6.05	12	13	37
	22	6	10	18.97	+19	41	20.2	0.554 812	15.85	6.06	12	07	16
	23	6	07	51.26	19	29	54.0	0.555 627	15.83	6.05	12	00	53
	24	6	05	24.07	19	19	33.2	0.557 581	15.77	6.03	11	54	32
	25	6	02	59.86	19	10	23.2	0.560 677	15.68	5.99	11	48	15
	26	6	00	41.03	19	02	29.1	0.564 915	15.57	5.95	11	42	05
	27	5	58	29.88	18	55	55.3	0.570 289	15.42	5.89	11	36	03
	28	5	56	28.59	+18	50	45.0	0.576 791	15.25	5.83	11	30	12
	29	5	54	39.18	18	47	00.9	0.584 407	15.05	5.75	11	24	34
	30	5	53	03.46	18	44	44.3	0.593 119	14.83	5.66	11	19	10
July	1	5	51	43.08	18	43	55.8	0.602 908	14.59	5.57	11	14	02
	2	5	50	39.45	+18	44	34.7	0.613 751	14.33	5.47	11	09	11

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RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
July	1	5	51	43.08	+18	43	55.8	0.602 908	14.59	5.57	11	14	02
	2	5	50	39.45	18	44	34.7	0.613 751	14.33	5.47	11	09	11
	3	5	49	53.78	18	46	39.4	0.625 623	14.06	5.37	11	04	38
	4	5	49	27.10	18	50	07.5	0.638 497	13.77	5.26	11	00	25
	5	5	49	20.23	18	54	55.3	0.652 346	13.48	5.15	10	56	31
	6	5	49	33.84	19	00	58.5	0.667 140	13.18	5.04	10	52	58
	7	5	50	08.47	+19	08	12.0	0.682 849	12.88	4.92	10	49	46
	8	5	51	04.50	19	16	29.9	0.699 441	12.57	4.80	10	46	56
	9	5	52	22.23	19	25	45.8	0.716 885	12.27	4.69	10	44	27
	10	5	54	01.86	19	35	52.6	0.735 145	11.96	4.57	10	42	20
	11	5	56	03.50	19	46	42.8	0.754 187	11.66	4.46	10	40	35
	12	5	58	27.23	19	58	08.2	0.773 973	11.36	4.34	10	39	12
	13	6	01	13.03	+20	10	00.4	0.794 463	11.07	4.23	10	38	11
	14	6	04	20.89	20	22	10.5	0.815 614	10.78	4.12	10	37	32
	15	6	07	50.71	20	34	28.9	0.837 379	10.50	4.01	10	37	15
	16	6	11	42.38	20	46	46.1	0.859 708	10.23	3.91	10	37	20
	17	6	15	55.75	20	58	51.7	0.882 544	9.96	3.81	10	37	47
	18	6	20	30.62	21	10	35.3	0.905 825	9.71	3.71	10	38	34
	19	6	25	26.76	+21	21	45.9	0.929 483	9.46	3.61	10	39	43
	20	6	30	43.86	21	32	12.4	0.953 442	9.22	3.52	10	41	13
	21	6	36	21.55	21	41	43.2	0.977 618	9.00	3.44	10	43	03
	22	6	42	19.38	21	50	06.7	1.001 919	8.78	3.35	10	45	14
	23	6	48	36.79	21	57	11.0	1.026 244	8.57	3.27	10	47	43
	24	6	55	13.09	22	02	44.4	1.050 484	8.37	3.20	10	50	32
	25	7	02	07.48	+22	06	35.3	1.074 523	8.18	3.13	10	53	38
	26	7	09	19.00	22	08	32.6	1.098 237	8.01	3.06	10	57	01
	27	7	16	46.52	22	08	25.7	1.121 498	7.84	3.00	11	00	39
	28	7	24	28.77	22	06	05.1	1.144 174	7.69	2.94	11	04	32
	29	7	32	24.29	22	01	22.3	1.166 136	7.54	2.88	11	08	37
	30	7	40	31.51	21	54	10.4	1.187 256	7.41	2.83	11	12	53
	31	7	48	48.69	+21	44	23.8	1.207 415	7.28	2.78	11	17	19
Aug.	1	7	57	14.04	21	31	59.2	1.226 503	7.17	2.74	11	21	52
	2	8	05	45.68	21	16	55.0	1.244 424	7.07	2.70	11	26	30
	3	8	14	21.74	20	59	11.6	1.261 098	6.97	2.66	11	31	12
	4	8	23	00.38	20	38	51.3	1.276 466	6.89	2.63	11	35	55
	5	8	31	39.82	20	15	58.2	1.290 484	6.81	2.60	11	40	39
	6	8	40	18.42	+19	50	38.2	1.303 130	6.75	2.58	11	45	21
	7	8	48	54.68	19	22	58.3	1.314 400	6.69	2.56	11	50	00
	8	8	57	27.25	18	53	06.6	1.324 304	6.64	2.54	11	54	35
	9	9	05	54.98	18	21	12.0	1.332 871	6.60	2.52	11	59	04
	10	9	14	16.88	17	47	24.0	1.340 138	6.56	2.51	12	03	27
	11	9	22	32.16	17	11	52.2	1.346 153	6.53	2.50	12	07	43
	12	9	30	40.18	+16	34	46.2	1.350 970	6.51	2.49	12	11	51
	13	9	38	40.47	15	56	15.5	1.354 650	6.49	2.48	12	15	51
	14	9	46	32.70	15	16	29.4	1.357 253	6.48	2.48	12	19	43
	15	9	54	16.64	14	35	36.4	1.358 843	6.47	2.47	12	23	27
	16	10	01	52.21	+13	53	45.1	1.359 481	6.47	2.47	12	27	02

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RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date	Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
	h	m	s	°	'	"		"	"	h	m	s
Aug. 16	10	01	52.21	+13	53	45.1	1.359 481	6.47	2.47	12	27	02
17	10	09	19.37	13	11	03.1	1.359 228	6.47	2.47	12	30	29
18	10	16	38.19	12	27	37.7	1.358 141	6.48	2.47	12	33	47
19	10	23	48.77	11	43	35.7	1.356 276	6.48	2.48	12	36	58
20	10	30	51.27	10	59	03.2	1.353 683	6.50	2.48	12	39	60
21	10	37	45.89	10	14	06.0	1.350 411	6.51	2.49	12	42	54
22	10	44	32.84	+9	28	49.3	1.346 503	6.53	2.50	12	45	41
23	10	51	12.36	8	43	18.0	1.341 999	6.55	2.50	12	48	20
24	10	57	44.69	7	57	36.5	1.336 937	6.58	2.51	12	50	53
25	11	04	10.08	7	11	48.9	1.331 350	6.61	2.52	12	53	18
26	11	10	28.78	6	25	59.0	1.325 266	6.64	2.54	12	55	37
27	11	16	41.04	5	40	10.3	1.318 714	6.67	2.55	12	57	49
28	11	22	47.09	+4	54	26.0	1.311 716	6.70	2.56	12	59	56
29	11	28	47.16	4	08	49.0	1.304 294	6.74	2.58	13	01	56
30	11	34	41.47	3	23	22.3	1.296 467	6.78	2.59	13	03	51
31	11	40	30.23	2	38	08.4	1.288 250	6.83	2.61	13	05	41
Sept. 1	11	46	13.62	1	53	09.8	1.279 659	6.87	2.63	13	07	25
2	11	51	51.84	1	08	28.8	1.270 706	6.92	2.64	13	09	04
3	11	57	25.03	+0	24	07.7	1.261 401	6.97	2.66	13	10	38
4	12	02	53.34	-0	19	51.5	1.251 755	7.03	2.68	13	12	07
5	12	08	16.92	1	03	26.6	1.241 775	7.08	2.71	13	13	32
6	12	13	35.85	1	46	35.7	1.231 468	7.14	2.73	13	14	52
7	12	18	50.24	2	29	16.9	1.220 841	7.20	2.75	13	16	07
8	12	24	00.15	3	11	28.1	1.209 898	7.27	2.78	13	17	18
9	12	29	05.63	-3	53	07.6	1.198 643	7.34	2.80	13	18	24
10	12	34	06.71	4	34	13.3	1.187 080	7.41	2.83	13	19	27
11	12	39	03.37	5	14	43.2	1.175 211	7.48	2.86	13	20	24
12	12	43	55.61	5	54	35.6	1.163 038	7.56	2.89	13	21	17
13	12	48	43.36	6	33	48.2	1.150 564	7.64	2.92	13	22	06
14	12	53	26.55	7	12	18.9	1.137 790	7.73	2.95	13	22	50
15	12	58	05.05	-7	50	05.7	1.124 717	7.82	2.99	13	23	30
16	13	02	38.73	8	27	06.1	1.111 348	7.91	3.02	13	24	04
17	13	07	07.40	9	03	17.7	1.097 683	8.01	3.06	13	24	33
18	13	11	30.83	9	38	38.0	1.083 726	8.11	3.10	13	24	57
19	13	15	48.75	10	13	04.2	1.069 478	8.22	3.14	13	25	15
20	13	20	00.84	10	46	33.2	1.054 943	8.34	3.19	13	25	27
21	13	24	06.72	-11	19	01.9	1.040 125	8.45	3.23	13	25	33
22	13	28	05.97	11	50	26.7	1.025 030	8.58	3.28	13	25	32
23	13	31	58.08	12	20	43.8	1.009 664	8.71	3.33	13	25	23
24	13	35	42.48	12	49	48.9	0.994 037	8.85	3.38	13	25	06
25	13	39	18.53	13	17	37.5	0.978 159	8.99	3.44	13	24	41
26	13	42	45.49	13	44	04.4	0.962 044	9.14	3.49	13	24	06
27	13	46	02.55	-14	09	04.0	0.945 709	9.30	3.55	13	23	20
28	13	49	08.78	14	32	29.9	0.929 174	9.46	3.62	13	22	24
29	13	52	03.17	14	54	15.4	0.912 466	9.64	3.68	13	21	14
30	13	54	44.59	15	14	12.5	0.895 614	9.82	3.75	13	19	52
Oct. 1	13	57	11.78	-15	32	12.9	0.878 657	10.01	3.82	13	18	14

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Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
Oct.	1	13	57	11.78	-15	32	12.9	0.878 657	10.01	3.82	13	18	14
	2	13	59	23.41	15	48	07.1	0.861 637	10.21	3.90	13	16	20
	3	14	01	18.01	16	01	44.5	0.844 609	10.41	3.98	13	14	08
	4	14	02	54.02	16	12	53.7	0.827 634	10.63	4.06	13	11	37
	5	14	04	09.78	16	21	22.1	0.810 788	10.85	4.14	13	08	45
	6	14	05	03.62	16	26	55.9	0.794 156	11.07	4.23	13	05	30
	7	14	05	33.81	-16	29	20.5	0.777 839	11.31	4.32	13	01	50
	8	14	05	38.70	16	28	20.6	0.761 953	11.54	4.41	12	57	45
	9	14	05	16.76	16	23	40.3	0.746 633	11.78	4.50	12	53	12
	10	14	04	26.69	16	15	04.2	0.732 029	12.01	4.59	12	48	11
	11	14	03	07.55	16	02	17.8	0.718 312	12.24	4.68	12	42	41
	12	14	01	18.90	15	45	09.1	0.705 671	12.46	4.76	12	36	42
	13	13	59	00.98	-15	23	29.5	0.694 310	12.67	4.84	12	30	14
	14	13	56	14.90	14	57	16.4	0.684 449	12.85	4.91	12	23	20
	15	13	53	02.75	14	26	34.8	0.676 316	13.00	4.97	12	16	01
	16	13	49	27.77	13	51	39.2	0.670 141	13.12	5.01	12	08	22
	17	13	45	34.39	13	12	55.9	0.666 148	13.20	5.04	12	00	28
	18	13	41	28.16	12	31	03.2	0.664 541	13.23	5.06	11	52	24
	19	13	37	15.62	-11	46	52.1	0.665 496	13.21	5.05	11	44	17
	20	13	33	04.03	11	01	24.0	0.669 148	13.14	5.02	11	36	15
	21	13	29	00.96	10	15	48.2	0.675 578	13.02	4.97	11	28	25
	22	13	25	13.89	9	31	17.7	0.684 808	12.84	4.91	11	20	53
	23	13	21	49.77	8	49	04.1	0.696 795	12.62	4.82	11	13	48
	24	13	18	54.64	8	10	13.4	0.711 434	12.36	4.72	11	07	13
	25	13	16	33.33	-7	35	41.7	0.728 560	12.07	4.61	11	01	13
	26	13	14	49.35	7	06	12.8	0.747 955	11.76	4.49	10	55	52
	27	13	13	44.78	6	42	16.8	0.769 363	11.43	4.37	10	51	10
	28	13	13	20.43	6	24	10.3	0.792 498	11.10	4.24	10	47	07
	29	13	13	35.93	6	11	57.5	0.817 059	10.76	4.11	10	43	44
	30	13	14	29.98	6	05	32.2	0.842 740	10.44	3.99	10	40	59
	31	13	16	00.54	-6	04	39.6	0.869 241	10.12	3.87	10	38	48
Nov.	1	13	18	05.10	6	08	59.1	0.896 280	9.81	3.75	10	37	11
	2	13	20	40.83	6	18	05.5	0.923 592	9.52	3.64	10	36	03
	3	13	23	44.77	6	31	31.6	0.950 941	9.25	3.53	10	35	22
	4	13	27	13.95	6	48	49.0	0.978 119	8.99	3.44	10	35	04
	5	13	31	05.53	7	09	29.8	1.004 947	8.75	3.34	10	35	08
	6	13	35	16.83	-7	33	06.8	1.031 277	8.53	3.26	10	35	31
	7	13	39	45.37	7	59	14.3	1.056 985	8.32	3.18	10	36	10
	8	13	44	28.92	8	27	28.7	1.081 974	8.13	3.11	10	37	03
	9	13	49	25.50	8	57	28.2	1.106 170	7.95	3.04	10	38	08
	10	13	54	33.36	9	28	53.1	1.129 518	7.79	2.97	10	39	24
	11	13	59	50.97	10	01	25.9	1.151 978	7.63	2.92	10	40	49
	12	14	05	17.01	-10	34	50.7	1.173 527	7.49	2.86	10	42	22
	13	14	10	50.37	11	08	53.7	1.194 152	7.36	2.81	10	44	02
	14	14	16	30.09	11	43	22.5	1.213 848	7.24	2.77	10	45	48
	15	14	22	15.35	12	18	06.4	1.232 620	7.13	2.73	10	47	39
	16	14	28	05.47	-12	52	55.7	1.250 477	7.03	2.69	10	49	35

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RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date	Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
	h	m	s	°	'	"		"	"	h	m	s
Nov. 16	14	28	05.47	-12	52	55.7	1.250 477	7.03	2.69	10	49	35
17	14	33	59.89	13	27	42.1	1.267 431	6.94	2.65	10	51	35
18	14	39	58.13	14	02	18.2	1.283 500	6.85	2.62	10	53	38
19	14	45	59.80	14	36	37.4	1.298 702	6.77	2.59	10	55	45
20	14	52	04.58	15	10	34.1	1.313 056	6.70	2.56	10	57	55
21	14	58	12.20	15	44	03.0	1.326 584	6.63	2.53	11	00	07
22	15	04	22.46	-16	16	59.7	1.339 306	6.57	2.51	11	02	22
23	15	10	35.19	16	49	20.1	1.351 243	6.51	2.49	11	04	40
24	15	16	50.24	17	21	00.7	1.362 416	6.45	2.47	11	06	59
25	15	23	07.53	17	51	58.3	1.372 844	6.41	2.45	11	09	21
26	15	29	26.95	18	22	09.8	1.382 546	6.36	2.43	11	11	46
27	15	35	48.45	18	51	32.6	1.391 541	6.32	2.41	11	14	12
28	15	42	11.98	-19	20	04.4	1.399 846	6.28	2.40	11	16	40
29	15	48	37.49	19	47	42.8	1.407 476	6.25	2.39	11	19	10
30	15	55	04.96	20	14	25.7	1.414 447	6.22	2.38	11	21	42
Dec. 1	16	01	34.36	20	40	11.3	1.420 772	6.19	2.36	11	24	16
2	16	08	05.68	21	04	57.6	1.426 466	6.16	2.36	11	26	52
3	16	14	38.90	21	28	42.9	1.431 538	6.14	2.35	11	29	30
4	16	21	14.00	-21	51	25.5	1.436 001	6.12	2.34	11	32	10
5	16	27	50.98	22	13	03.8	1.439 862	6.11	2.33	11	34	51
6	16	34	29.82	22	33	36.3	1.443 131	6.09	2.33	11	37	35
7	16	41	10.50	22	53	01.5	1.445 813	6.08	2.32	11	40	20
8	16	47	53.01	23	11	17.9	1.447 917	6.07	2.32	11	43	07
9	16	54	37.33	23	28	24.1	1.449 445	6.07	2.32	11	45	56
10	17	01	23.43	-23	44	18.7	1.450 402	6.06	2.32	11	48	47
11	17	08	11.27	23	59	00.4	1.450 791	6.06	2.32	11	51	39
12	17	15	00.82	24	12	27.8	1.450 612	6.06	2.32	11	54	34
13	17	21	52.03	24	24	39.5	1.449 867	6.07	2.32	11	57	29
14	17	28	44.83	24	35	34.2	1.448 555	6.07	2.32	12	00	27
15	17	35	39.17	24	45	10.7	1.446 673	6.08	2.32	12	03	26
16	17	42	34.96	-24	53	27.7	1.444 219	6.09	2.33	12	06	26
17	17	49	32.12	25	00	23.9	1.441 188	6.10	2.33	12	09	28
18	17	56	30.56	25	05	58.0	1.437 575	6.12	2.34	12	12	30
19	18	03	30.17	25	10	08.8	1.433 373	6.14	2.34	12	15	34
20	18	10	30.83	25	12	55.1	1.428 573	6.16	2.35	12	18	39
21	18	17	32.41	25	14	15.7	1.423 168	6.18	2.36	12	21	45
22	18	24	34.76	-25	14	09.6	1.417 147	6.21	2.37	12	24	52
23	18	31	37.72	25	12	35.7	1.410 497	6.23	2.38	12	27	59
24	18	38	41.10	25	09	33.0	1.403 207	6.27	2.39	12	31	06
25	18	45	44.71	25	05	00.7	1.395 263	6.30	2.41	12	34	14
26	18	52	48.32	24	58	57.8	1.386 650	6.34	2.42	12	37	21
27	18	59	51.67	24	51	23.7	1.377 352	6.38	2.44	12	40	28
28	19	06	54.51	-24	42	17.7	1.367 351	6.43	2.46	12	43	34
29	19	13	56.52	24	31	39.5	1.356 630	6.48	2.48	12	46	40
30	19	20	57.38	24	19	28.7	1.345 170	6.54	2.50	12	49	43
31	19	27	56.71	24	05	45.1	1.332 950	6.60	2.52	12	52	46
32	19	34	54.11	-23	50	29.1	1.319 950	6.66	2.55	12	55	46

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Date	Heliocentric Longitude	Heliocentric Latitude	Radius Vector	Date	Heliocentric Longitude	Heliocentric Latitude	Radius Vector
	° ' "	° ' "			° ' "	° ' "	
Jan. 1	141 51 24.6	+3 04 33.3	0.718 5311	Apr. 3	289 24 53.8	-1 49 30.7	0.727 8151
3	145 06 27.8	3 09 08.6	0.718 5856	5	292 34 38.4	1 58 49.4	0.727 9120
5	148 21 30.5	3 13 07.4	0.718 6552	7	295 44 22.4	2 07 46.3	0.727 9947
7	151 36 32.2	3 16 28.9	0.718 7396	9	298 54 06.1	2 16 19.8	0.728 0631
9	154 51 32.1	3 19 12.6	0.718 8385	11	302 03 50.1	2 24 28.3	0.728 1168
11	158 06 29.5	3 21 17.9	0.718 9517	13	305 13 35.0	2 32 10.4	0.728 1557
13	161 21 23.6	+3 22 44.4	0.719 0786	15	308 23 21.0	-2 39 24.6	0.728 1798
15	164 36 13.9	3 23 31.9	0.719 2190	17	311 33 08.6	2 46 09.8	0.728 1889
17	167 50 59.5	3 23 40.2	0.719 3724	19	314 42 58.3	2 52 24.6	0.728 1830
19	171 05 40.0	3 23 09.5	0.719 5383	21	317 52 50.3	2 58 07.9	0.728 1621
21	174 20 14.5	3 21 59.8	0.719 7160	23	321 02 45.2	3 03 18.7	0.728 1263
23	177 34 42.4	3 20 11.5	0.719 9052	25	324 12 43.1	3 07 56.0	0.728 0757
25	180 49 03.2	+3 17 45.0	0.720 1051	27	327 22 44.4	-3 11 59.1	0.728 0105
27	184 03 16.3	3 14 40.7	0.720 3151	29	330 32 49.4	3 15 27.0	0.727 9309
29	187 17 21.1	3 10 59.3	0.720 5345	May 1	333 42 58.3	3 18 19.2	0.727 8370
31	190 31 17.2	3 06 41.8	0.720 7627	3	336 53 11.3	3 20 35.2	0.727 7292
Feb. 2	193 45 04.1	3 01 48.8	0.720 9989	5	340 03 28.7	3 22 14.4	0.727 6078
4	196 58 41.4	2 56 21.5	0.721 2423	7	343 13 50.7	3 23 16.5	0.727 4731
6	200 12 08.8	+2 50 21.0	0.721 4921	9	346 24 17.3	-3 23 41.3	0.727 3257
8	203 25 26.0	2 43 48.5	0.721 7476	11	349 34 48.9	3 23 28.7	0.727 1658
10	206 38 32.7	2 36 45.2	0.722 0080	13	352 45 25.4	3 22 38.7	0.726 9941
12	209 51 28.7	2 29 12.7	0.722 2724	15	355 56 07.0	3 21 11.4	0.726 8110
14	213 04 13.9	2 21 12.4	0.722 5400	17	359 06 54.0	3 19 06.9	0.726 6170
16	216 16 48.2	2 12 45.9	0.722 8099	19	2 17 46.2	3 16 25.6	0.726 4129
18	219 29 11.7	+2 03 54.8	0.723 0814	21	5 28 44.0	-3 13 08.0	0.726 1991
20	222 41 24.3	1 54 40.9	0.723 3535	23	8 39 47.2	3 09 14.5	0.725 9763
22	225 53 26.1	1 45 06.0	0.723 6254	25	11 50 56.1	3 04 45.9	0.725 7453
24	229 05 17.3	1 35 11.8	0.723 8962	27	15 02 10.7	2 59 42.9	0.725 5067
26	232 16 58.0	1 25 00.4	0.724 1651	29	18 13 31.2	2 54 06.3	0.725 2612
28	235 28 28.6	1 14 33.5	0.724 4313	31	21 24 57.5	2 47 57.3	0.725 0097
Mar. 2	238 39 49.2	+1 03 53.3	0.724 6939	June 2	24 36 29.7	-2 41 16.7	0.724 7528
4	241 51 00.2	0 53 01.7	0.724 9522	4	27 48 08.0	2 34 05.8	0.724 4914
6	245 02 02.0	0 42 00.7	0.725 2053	6	30 59 52.4	2 26 25.9	0.724 2263
8	248 12 55.1	0 30 52.4	0.725 4525	8	34 11 43.1	2 18 18.3	0.723 9583
10	251 23 39.7	0 19 38.8	0.725 6929	10	37 23 40.0	2 09 44.6	0.723 6882
12	254 34 16.5	+0 08 22.1	0.725 9259	12	40 35 43.4	2 00 46.2	0.723 4169
14	257 44 45.8	-0 02 55.8	0.726 1507	14	43 47 53.3	-1 51 24.8	0.723 1452
16	260 55 08.3	0 14 12.7	0.726 3667	16	47 00 09.7	1 41 42.1	0.722 8740
18	264 05 24.5	0 25 26.6	0.726 5733	18	50 12 32.8	1 31 39.8	0.722 6041
20	267 15 34.9	0 36 35.4	0.726 7696	20	53 25 02.7	1 21 19.9	0.722 3363
22	270 25 40.0	0 47 37.2	0.726 9553	22	56 37 39.5	1 10 44.2	0.722 0716
24	273 35 40.6	0 58 30.0	0.727 1297	24	59 50 23.1	0 59 54.7	0.721 8107
26	276 45 37.1	-1 09 11.7	0.727 2922	26	63 03 13.8	-0 48 53.5	0.721 5544
28	279 55 30.0	1 19 40.5	0.727 4425	28	66 16 11.6	0 37 42.6	0.721 3036
30	283 05 20.1	1 29 54.5	0.727 5800	30	69 29 16.5	0 26 24.1	0.721 0592
Apr. 1	286 15 07.8	1 39 51.8	0.727 7043	July 2	72 42 28.5	0 15 00.1	0.720 8217
3	289 24 53.8	-1 49 30.7	0.727 8151	4	75 55 47.8	-0 03 32.8	0.720 5921

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Date	Heliocentric Longitude	Heliocentric Latitude	Radius Vector	Date	Heliocentric Longitude	Heliocentric Latitude	Radius Vector
	° ' "	° ' "			° ' "	° ' "	
July 2	72 42 28.5	-0 15 00.1	0.720 8217	Oct. 2	221 34 41.2	+1 57 56.8	0.723 2661
4	75 55 47.8	-0 03 32.8	0.720 5921	4	224 46 46.5	1 48 29.0	0.723 5381
6	79 09 14.1	+0 07 55.6	0.720 3710	6	227 58 41.2	1 38 41.4	0.723 8093
8	82 22 47.7	0 19 22.9	0.720 1592	8	231 10 25.3	1 28 35.7	0.724 0789
10	85 36 28.4	0 30 46.9	0.719 9573	10	234 21 59.2	1 18 14.1	0.724 3461
12	88 50 16.1	0 42 05.4	0.719 7659	12	237 33 23.1	1 07 38.3	0.724 6100
14	92 04 10.8	+0 53 16.2	0.719 5858	14	240 44 37.2	+0 56 50.5	0.724 8698
16	95 18 12.2	1 04 17.2	0.719 4175	16	243 55 42.0	0 45 52.5	0.725 1247
18	98 32 20.3	1 15 06.1	0.719 2614	18	247 06 37.8	0 34 46.6	0.725 3739
20	101 46 34.9	1 25 41.0	0.719 1183	20	250 17 25.2	0 23 34.6	0.725 6166
22	105 00 55.6	1 35 59.7	0.718 9884	22	253 28 04.4	0 12 18.7	0.725 8522
24	108 15 22.2	1 46 00.2	0.718 8722	24	256 38 36.1	+0 01 01.1	0.726 0798
26	111 29 54.5	+1 55 40.6	0.718 7701	26	259 49 00.7	-0 10 16.4	0.726 2988
28	114 44 32.0	2 04 58.9	0.718 6825	28	262 59 18.9	0 21 31.6	0.726 5085
30	117 59 14.4	2 13 53.3	0.718 6095	30	266 09 31.0	0 32 42.4	0.726 7083
Aug. 1	121 14 01.1	2 22 22.0	0.718 5516	Nov. 1	269 19 37.8	0 43 46.9	0.726 8976
3	124 28 51.9	2 30 23.5	0.718 5087	3	272 29 39.7	0 54 43.0	0.727 0758
5	127 43 46.2	2 37 56.0	0.718 4812	5	275 39 37.3	1 05 28.8	0.727 2423
7	130 58 43.3	+2 44 58.1	0.718 4690	7	278 49 31.3	-1 16 02.3	0.727 3967
9	134 13 42.8	2 51 28.4	0.718 4723	9	281 59 22.1	1 26 21.7	0.727 5385
11	137 28 44.1	2 57 25.8	0.718 4909	11	285 09 10.4	1 36 25.0	0.727 6672
13	140 43 46.6	3 02 48.8	0.718 5250	13	288 18 56.8	1 46 10.6	0.727 7825
15	143 58 49.5	3 07 36.7	0.718 5742	15	291 28 41.7	1 55 36.5	0.727 8840
17	147 13 52.2	3 11 48.3	0.718 6386	17	294 38 25.7	2 04 41.2	0.727 9714
19	150 28 54.1	+3 15 22.9	0.718 7178	19	297 48 09.4	-2 13 23.1	0.728 0445
21	153 43 54.4	3 18 19.8	0.718 8116	21	300 57 53.1	2 21 40.5	0.728 1031
23	156 58 52.5	3 20 38.5	0.718 9198	23	304 07 37.5	2 29 31.9	0.728 1469
25	160 13 47.5	3 22 18.6	0.719 0419	25	307 17 22.9	2 36 56.1	0.728 1758
27	163 28 39.0	3 23 19.7	0.719 1776	27	310 27 09.9	2 43 51.5	0.728 1898
29	166 43 26.1	3 23 41.8	0.719 3265	29	313 36 58.7	2 50 17.1	0.728 1887
31	169 58 08.2	+3 23 24.6	0.719 4879	Dec. 1	316 46 49.8	-2 56 11.5	0.728 1727
Sept. 2	173 12 44.5	3 22 28.5	0.719 6615	3	319 56 43.6	3 01 33.8	0.728 1418
4	176 27 14.6	3 20 53.7	0.719 8467	5	323 06 40.4	3 06 23.0	0.728 0960
6	179 41 37.7	3 18 40.4	0.720 0428	7	326 16 40.5	3 10 38.1	0.728 0355
8	182 55 53.3	3 15 49.2	0.720 2493	9	329 26 44.1	3 14 18.4	0.727 9604
10	186 10 00.9	3 12 20.7	0.720 4654	11	332 36 51.6	3 17 23.1	0.727 8711
12	189 23 59.8	+3 08 15.7	0.720 6905	13	335 47 03.2	-3 19 51.8	0.727 7677
14	192 37 49.8	3 03 35.0	0.720 9239	15	338 57 19.1	3 21 43.9	0.727 6506
16	195 51 30.3	2 58 19.6	0.721 1648	17	342 07 39.4	3 22 59.0	0.727 5202
18	199 05 00.9	2 52 30.5	0.721 4124	19	345 18 04.4	3 23 36.9	0.727 3768
20	202 18 21.5	2 46 09.0	0.721 6659	21	348 28 34.3	3 23 37.4	0.727 2208
22	205 31 31.7	2 39 16.4	0.721 9246	23	351 39 09.1	3 23 00.5	0.727 0528
24	208 44 31.2	+2 31 53.9	0.722 1876	25	354 49 49.1	-3 21 46.2	0.726 8732
26	211 57 20.0	2 24 03.1	0.722 4541	27	358 00 34.3	3 19 54.6	0.726 6825
28	215 09 58.0	2 15 45.6	0.722 7233	29	1 11 24.8	3 17 26.2	0.726 4815
30	218 22 25.0	2 07 02.9	0.722 9942	31	4 22 20.7	3 14 21.2	0.726 2706
Oct. 2	221 34 41.2	+1 57 56.8	0.723 2661	33	7 33 22.2	-3 10 40.2	0.726 0506

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Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude			Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude		
		°	'	"	°	'	"			°	'	"	°	'	"
Jan.	0	232	29	35.6	+3	22	32.3	Feb.	15	283	11	22.9	+1	40	11.7
	1	233	29	21.7	3	22	57.3		16	284	21	29.1	1	36	23.6
	2	234	29	34.7	3	23	12.1		17	285	31	41.0	1	32	34.3
	3	235	30	13.7	3	23	16.9		18	286	41	58.2	1	28	44.1
	4	236	31	17.5	3	23	12.1		19	287	52	20.7	1	24	53.0
	5	237	32	45.2	3	22	57.7		20	289	02	48.3	1	21	01.2
	6	238	34	35.9	+3	22	34.2		21	290	13	21.0	+1	17	08.8
	7	239	36	48.7	3	22	01.6		22	291	23	58.7	1	13	16.2
	8	240	39	22.8	3	21	20.2		23	292	34	41.3	1	09	23.4
	9	241	42	17.3	3	20	30.3		24	293	45	28.7	1	05	30.5
	10	242	45	31.5	3	19	32.0		25	294	56	20.7	1	01	37.7
	11	243	49	04.7	3	18	25.5		26	296	07	17.3	0	57	45.3
	12	244	52	56.1	+3	17	11.1		27	297	18	18.3	+0	53	53.2
	13	245	57	05.2	3	15	48.9		28	298	29	23.6	0	50	01.8
	14	247	01	31.3	3	14	19.2	Mar.	1	299	40	32.9	0	46	11.0
	15	248	06	13.9	3	12	42.1		2	300	51	46.1	0	42	21.1
	16	249	11	12.6	3	10	57.9		3	302	03	03.0	0	38	32.1
	17	250	16	26.7	3	09	06.8		4	303	14	23.5	0	34	44.3
	18	251	21	55.9	+3	07	08.9		5	304	25	47.3	+0	30	57.6
	19	252	27	39.7	3	05	04.5		6	305	37	14.4	0	27	12.4
	20	253	33	37.7	3	02	53.8		7	306	48	44.6	0	23	28.6
	21	254	39	49.5	3	00	37.0		8	308	00	17.8	0	19	46.4
	22	255	46	14.7	2	58	14.2		9	309	11	53.7	0	16	05.9
	23	256	52	52.9	2	55	45.8		10	310	23	32.4	0	12	27.2
	24	257	59	43.7	+2	53	11.9		11	311	35	13.8	+0	08	50.5
	25	259	06	46.7	2	50	32.7		12	312	46	57.6	0	05	15.9
	26	260	14	01.7	2	47	48.4		13	313	58	44.0	+0	01	43.4
	27	261	21	28.1	2	44	59.4		14	315	10	32.7	-0	01	46.8
	28	262	29	05.7	2	42	05.6		15	316	22	23.6	0	05	14.6
	29	263	36	54.1	2	39	07.4		16	317	34	16.8	0	08	39.9
	30	264	44	52.9	+2	36	05.0		17	318	46	12.2	-0	12	02.6
	31	265	53	01.6	2	32	58.4		18	319	58	09.6	0	15	22.6
Feb.	1	267	01	20.0	2	29	48.0		19	321	10	09.0	0	18	39.8
	2	268	09	47.5	2	26	33.9		20	322	22	10.5	0	21	54.0
	3	269	18	24.0	2	23	16.3		21	323	34	14.0	0	25	05.2
	4	270	27	09.0	2	19	55.3		22	324	46	19.5	0	28	13.3
	5	271	36	02.1	+2	16	31.1		23	325	58	27.0	-0	31	18.2
	6	272	45	03.2	2	13	03.9		24	327	10	36.6	0	34	19.7
	7	273	54	11.7	2	09	33.9		25	328	22	48.2	0	37	17.9
	8	275	03	27.6	2	06	01.2		26	329	35	01.8	0	40	12.6
	9	276	12	50.5	2	02	26.0		27	330	47	17.3	0	43	03.7
	10	277	22	20.1	1	58	48.5		28	331	59	34.7	0	45	51.1
	11	278	31	56.3	+1	55	08.8		29	333	11	53.9	-0	48	34.9
	12	279	41	38.8	1	51	27.1		30	334	24	14.8	0	51	14.9
	13	280	51	27.5	1	47	43.6		31	335	36	37.3	0	53	51.1
	14	282	01	22.3	1	43	58.4	Apr.	1	336	49	01.3	0	56	23.4
	15	283	11	22.9	+1	40	11.7		2	338	01	26.8	-0	58	51.7

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Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude			Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude		
		º	'	"	º	'	"			º	'	"	º	'	"
Apr.	1	336	49	01.3	-0	56	23.4	May	17	32	34	50.5	-1	34	16.5
	2	338	01	26.8	0	58	51.7		18	33	47	46.9	1	33	23.5
	3	339	13	53.6	1	01	16.0		19	35	00	43.8	1	32	26.6
	4	340	26	21.7	1	03	36.3		20	36	13	41.2	1	31	25.9
	5	341	38	51.0	1	05	52.5		21	37	26	39.1	1	30	21.5
	6	342	51	21.4	1	08	04.5		22	38	39	37.6	1	29	13.4
	7	344	03	53.0	-1	10	12.3		23	39	52	36.6	-1	28	01.6
	8	345	16	25.6	1	12	15.9		24	41	05	36.2	1	26	46.3
	9	346	28	59.1	1	14	15.2		25	42	18	36.4	1	25	27.6
	10	347	41	33.6	1	16	10.2		26	43	31	37.2	1	24	05.4
	11	348	54	08.9	1	18	00.9		27	44	44	38.6	1	22	39.9
	12	350	06	45.0	1	19	47.1		28	45	57	40.6	1	21	11.2
	13	351	19	21.9	-1	21	29.0		29	47	10	43.2	-1	19	39.3
	14	352	31	59.4	1	23	06.3		30	48	23	46.4	1	18	04.3
	15	353	44	37.5	1	24	39.2		31	49	36	50.2	1	16	26.3
	16	354	57	16.3	1	26	07.6	June	1	50	49	54.7	1	14	45.3
	17	356	09	55.7	1	27	31.4		2	52	02	59.8	1	13	01.6
	18	357	22	35.8	1	28	50.6		3	53	16	05.6	1	11	15.1
	19	358	35	16.7	-1	30	05.2		4	54	29	12.1	-1	09	25.9
	20	359	47	58.3	1	31	15.2		5	55	42	19.1	1	07	34.1
	21	1	00	40.8	1	32	20.6		6	56	55	26.6	1	05	39.8
	22	2	13	24.1	1	33	21.4		7	58	08	34.6	1	03	43.1
	23	3	26	08.2	1	34	17.5		8	59	21	43.0	1	01	44.0
	24	4	38	53.2	1	35	09.0		9	60	34	51.8	0	59	42.7
	25	5	51	39.1	-1	35	55.9		10	61	48	00.9	-0	57	39.3
	26	7	04	25.7	1	36	38.1		11	63	01	10.4	0	55	33.7
	27	8	17	13.1	1	37	15.8		12	64	14	20.3	0	53	26.2
	28	9	30	01.2	1	37	48.8		13	65	27	30.7	0	51	16.7
	29	10	42	50.0	1	38	17.3		14	66	40	41.7	0	49	05.4
	30	11	55	39.5	1	38	41.1		15	67	53	53.3	0	46	52.4
May	1	13	08	29.6	-1	39	00.5		16	69	07	05.6	-0	44	37.8
	2	14	21	20.3	1	39	15.3		17	70	20	18.5	0	42	21.7
	3	15	34	11.6	1	39	25.6		18	71	33	32.2	0	40	04.1
	4	16	47	03.4	1	39	31.5		19	72	46	46.7	0	37	45.2
	5	17	59	55.7	1	39	32.9		20	74	00	02.0	0	35	25.1
	6	19	12	48.6	1	39	30.0		21	75	13	18.0	0	33	03.8
	7	20	25	41.9	-1	39	22.6		22	76	26	34.9	-0	30	41.5
	8	21	38	35.6	1	39	10.9		23	77	39	52.7	0	28	18.3
	9	22	51	29.7	1	38	54.9		24	78	53	11.4	0	25	54.3
	10	24	04	24.1	1	38	34.7		25	80	06	31.0	0	23	29.5
	11	25	17	18.7	1	38	10.2		26	81	19	51.5	0	21	04.2
	12	26	30	13.4	1	37	41.5		27	82	33	13.1	0	18	38.3
	13	27	43	08.4	-1	37	08.6		28	83	46	35.6	-0	16	12.1
	14	28	56	03.5	1	36	31.7		29	84	59	59.2	0	13	45.5
	15	30	08	58.9	1	35	50.6		30	86	13	23.9	0	11	18.8
	16	31	21	54.5	1	35	05.5	July	1	87	26	49.7	0	08	51.9
	17	32	34	50.5	-1	34	16.5		2	88	40	16.6	-0	06	25.1

VENUS, 2027

GEOCENTRIC LONGITUDE AND LATITUDE FOR 0^h TERRESTRIAL TIME

Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude			Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude		
		°	'	"	°	'	"			°	'	"	°	'	"
July	1	87	26	49.7	-0	08	51.9	Aug.	16	144	02	08.5	+1	18	46.8
	2	88	40	16.6	0	06	25.1		17	145	16	19.6	1	19	38.6
	3	89	53	44.5	0	03	58.4		18	146	30	31.5	1	20	26.7
	4	91	07	13.3	-0	01	31.9		19	147	44	44.3	1	21	11.2
	5	92	20	43.1	+0	00	54.4		20	148	58	57.8	1	21	51.9
	6	93	34	13.6	0	03	20.2		21	150	13	12.3	1	22	28.9
	7	94	47	44.9	+0	05	45.5		22	151	27	27.7	+1	23	02.1
	8	96	01	17.0	0	08	10.3		23	152	41	44.0	1	23	31.6
	9	97	14	49.8	0	10	34.4		24	153	56	01.3	1	23	57.2
	10	98	28	23.5	0	12	57.7		25	155	10	19.5	1	24	18.9
	11	99	41	58.0	0	15	20.2		26	156	24	38.6	1	24	36.8
	12	100	55	33.4	0	17	41.7		27	157	38	58.7	1	24	50.8
	13	102	09	09.7	+0	20	02.1		28	158	53	19.7	+1	25	00.9
	14	103	22	47.0	0	22	21.4		29	160	07	41.4	1	25	07.1
	15	104	36	25.2	0	24	39.5		30	161	22	03.9	1	25	09.4
	16	105	50	04.4	0	26	56.2		31	162	36	27.1	1	25	07.8
	17	107	03	44.5	0	29	11.5	Sept.	1	163	50	50.8	1	25	02.3
	18	108	17	25.7	0	31	25.2		2	165	05	15.1	1	24	52.9
	19	109	31	07.9	+0	33	37.3		3	166	19	40.0	+1	24	39.6
	20	110	44	51.1	0	35	47.7		4	167	34	05.4	1	24	22.4
	21	111	58	35.3	0	37	56.3		5	168	48	31.3	1	24	01.4
	22	113	12	20.7	0	40	03.0		6	170	02	57.6	1	23	36.5
	23	114	26	07.2	0	42	07.7		7	171	17	24.3	1	23	07.7
	24	115	39	54.8	0	44	10.3		8	172	31	51.4	1	22	35.1
	25	116	53	43.7	+0	46	10.7		9	173	46	18.8	+1	21	58.6
	26	118	07	33.7	0	48	08.9		10	175	00	46.5	1	21	18.4
	27	119	21	25.0	0	50	04.8		11	176	15	14.4	1	20	34.3
	28	120	35	17.6	0	51	58.2		12	177	29	42.6	1	19	46.5
	29	121	49	11.4	0	53	49.2		13	178	44	11.1	1	18	54.9
	30	123	03	06.5	0	55	37.6		14	179	58	39.7	1	17	59.5
	31	124	17	02.8	+0	57	23.4		15	181	13	08.6	+1	17	00.5
Aug.	1	125	31	00.2	0	59	06.5		16	182	27	37.8	1	15	57.8
	2	126	44	58.6	1	00	46.8		17	183	42	07.3	1	14	51.5
	3	127	58	58.0	1	02	24.2		18	184	56	37.1	1	13	41.6
	4	129	12	58.3	1	03	58.8		19	186	11	07.2	1	12	28.1
	5	130	26	59.5	1	05	30.4		20	187	25	37.7	1	11	11.1
	6	131	41	01.5	+1	06	59.0		21	188	40	08.6	+1	09	50.6
	7	132	55	04.5	1	08	24.6		22	189	54	39.9	1	08	26.7
	8	134	09	08.2	1	09	47.0		23	191	09	11.7	1	06	59.4
	9	135	23	12.9	1	11	06.2		24	192	23	43.8	1	05	28.9
	10	136	37	18.4	1	12	22.2		25	193	38	16.2	1	03	55.0
	11	137	51	24.7	1	13	34.9		26	194	52	49.0	1	02	18.0
	12	139	05	31.9	+1	14	44.2		27	196	07	22.0	+1	00	37.9
	13	140	19	39.9	1	15	50.1		28	197	21	55.3	0	58	54.7
	14	141	33	48.6	1	16	52.5		29	198	36	28.7	0	57	08.5
	15	142	47	58.2	1	17	51.4		30	199	51	02.4	0	55	19.5
	16	144	02	08.5	+1	18	46.8	Oct.	1	201	05	36.2	+0	53	27.5

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GEOCENTRIC LONGITUDE AND LATITUDE FOR 0^h TERRESTRIAL TIME

Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude			Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude		
		°	'	"	°	'	"			°	'	"	°	'	"
Oct.	1	201	05	36.2	+0	53	27.5	Nov.	16	258	13	25.2	-0	58	29.4
	2	202	20	10.1	0	51	32.8		17	259	27	49.4	1	00	51.5
	3	203	34	44.1	0	49	35.4		18	260	42	13.3	1	03	11.7
	4	204	49	18.2	0	47	35.4		19	261	56	36.6	1	05	30.0
	5	206	03	52.2	0	45	32.9		20	263	10	59.6	1	07	46.1
	6	207	18	26.2	0	43	27.8		21	264	25	22.1	1	10	00.1
	7	208	33	00.0	+0	41	20.4		22	265	39	44.1	-1	12	11.6
	8	209	47	33.7	0	39	10.6		23	266	54	05.8	1	14	20.8
	9	211	02	07.2	0	36	58.6		24	268	08	27.0	1	16	27.4
	10	212	16	40.4	0	34	44.5		25	269	22	47.9	1	18	31.3
	11	213	31	13.5	0	32	28.2		26	270	37	08.3	1	20	32.5
	12	214	45	46.3	0	30	10.0		27	271	51	28.3	1	22	30.9
	13	216	00	18.9	+0	27	49.9		28	273	05	47.7	-1	24	26.3
	14	217	14	51.3	0	25	27.9		29	274	20	06.5	1	26	18.6
	15	218	29	23.6	0	23	04.3		30	275	34	24.6	1	28	07.9
	16	219	43	55.7	0	20	39.0	Dec.	1	276	48	41.9	1	29	53.8
	17	220	58	27.8	0	18	12.1		2	278	02	58.4	1	31	36.5
	18	222	12	59.8	0	15	43.8		3	279	17	13.9	1	33	15.8
	19	223	27	31.8	+0	13	14.2		4	280	31	28.3	-1	34	51.5
	20	224	42	03.7	0	10	43.3		5	281	45	41.6	1	36	23.7
	21	225	56	35.7	0	08	11.3		6	282	59	53.8	1	37	52.2
	22	227	11	07.7	0	05	38.2		7	284	14	04.8	1	39	17.0
	23	228	25	39.6	0	03	04.2		8	285	28	14.6	1	40	37.9
	24	229	40	11.5	+0	00	29.4		9	286	42	23.0	1	41	54.9
	25	230	54	43.4	-0	02	06.1		10	287	56	30.1	-1	43	07.9
	26	232	09	15.2	0	04	42.3		11	289	10	35.9	1	44	16.8
	27	233	23	47.0	0	07	18.9		12	290	24	40.3	1	45	21.6
	28	234	38	18.8	0	09	55.9		13	291	38	43.2	1	46	22.2
	29	235	52	50.5	0	12	33.2		14	292	52	44.7	1	47	18.4
	30	237	07	22.1	0	15	10.7		15	294	06	44.6	1	48	10.3
	31	238	21	53.7	-0	17	48.2		16	295	20	43.0	-1	48	57.7
Nov.	1	239	36	25.0	0	20	25.7		17	296	34	39.8	1	49	40.5
	2	240	50	56.2	0	23	03.0		18	297	48	35.0	1	50	18.8
	3	242	05	27.0	0	25	40.0		19	299	02	28.5	1	50	52.3
	4	243	19	57.4	0	28	16.7		20	300	16	20.5	1	51	21.2
	5	244	34	27.4	0	30	52.9		21	301	30	10.8	1	51	45.2
	6	245	48	57.0	-0	33	28.6		22	302	43	59.5	-1	52	04.4
	7	247	03	26.1	0	36	03.5		23	303	57	46.6	1	52	18.6
	8	248	17	54.7	0	38	37.7		24	305	11	31.9	1	52	27.9
	9	249	32	22.7	0	41	10.9		25	306	25	15.4	1	52	32.2
	10	250	46	50.2	0	43	43.2		26	307	38	57.0	1	52	31.4
	11	252	01	17.3	0	46	14.3		27	308	52	36.6	1	52	25.5
	12	253	15	43.8	-0	48	44.2		28	310	06	14.1	-1	52	14.4
	13	254	30	09.8	0	51	12.8		29	311	19	49.2	1	51	58.2
	14	255	44	35.4	0	53	39.9		30	312	33	22.0	1	51	36.9
	15	256	59	00.5	0	56	05.5		31	313	46	52.3	1	51	10.2
	16	258	13	25.2	-0	58	29.4		32	315	00	19.8	-1	50	38.4

VENUS, 2027

RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
Jan.	0	15	23	54.79	-15	07	36.8	0.645 832	13.62	12.91	8	46	10
	1	15	27	54.85	15	22	00.9	0.653 429	13.46	12.76	8	46	15
	2	15	31	57.15	15	36	21.7	0.661 028	13.30	12.62	8	46	21
	3	15	36	01.64	15	50	37.9	0.668 629	13.15	12.47	8	46	30
	4	15	40	08.30	16	04	48.4	0.676 230	13.00	12.33	8	46	41
	5	15	44	17.06	16	18	52.0	0.683 831	12.86	12.20	8	46	54
	6	15	48	27.90	-16	32	47.6	0.691 431	12.72	12.06	8	47	09
	7	15	52	40.76	16	46	34.1	0.699 029	12.58	11.93	8	47	26
	8	15	56	55.61	17	00	10.3	0.706 625	12.45	11.80	8	47	45
	9	16	01	12.42	17	13	35.2	0.714 217	12.31	11.68	8	48	06
	10	16	05	31.13	17	26	47.8	0.721 806	12.18	11.55	8	48	29
	11	16	09	51.72	17	39	46.9	0.729 391	12.06	11.43	8	48	53
	12	16	14	14.14	-17	52	31.8	0.736 971	11.93	11.32	8	49	20
	13	16	18	38.37	18	05	01.2	0.744 546	11.81	11.20	8	49	48
	14	16	23	04.37	18	17	14.3	0.752 116	11.69	11.09	8	50	18
	15	16	27	32.11	18	29	10.2	0.759 680	11.58	10.98	8	50	50
	16	16	32	01.55	18	40	48.0	0.767 238	11.46	10.87	8	51	24
	17	16	36	32.67	18	52	06.6	0.774 789	11.35	10.76	8	51	59
	18	16	41	05.43	-19	03	05.4	0.782 334	11.24	10.66	8	52	36
	19	16	45	39.80	19	13	43.5	0.789 872	11.13	10.56	8	53	14
	20	16	50	15.74	19	23	59.9	0.797 402	11.03	10.46	8	53	54
	21	16	54	53.22	19	33	53.9	0.804 924	10.93	10.36	8	54	36
	22	16	59	32.21	19	43	24.8	0.812 437	10.82	10.27	8	55	19
	23	17	04	12.66	19	52	31.5	0.819 942	10.73	10.17	8	56	03
	24	17	08	54.53	-20	01	13.5	0.827 436	10.63	10.08	8	56	49
	25	17	13	37.80	20	09	29.9	0.834 920	10.53	9.99	8	57	36
	26	17	18	22.40	20	17	19.9	0.842 392	10.44	9.90	8	58	25
	27	17	23	08.31	20	24	42.8	0.849 851	10.35	9.81	8	59	15
	28	17	27	55.47	20	31	38.1	0.857 298	10.26	9.73	9	00	06
	29	17	32	43.84	20	38	04.9	0.864 730	10.17	9.64	9	00	58
	30	17	37	33.36	-20	44	02.8	0.872 149	10.08	9.56	9	01	51
	31	17	42	23.97	20	49	31.1	0.879 553	10.00	9.48	9	02	46
Feb.	1	17	47	15.63	20	54	29.2	0.886 941	9.92	9.40	9	03	41
	2	17	52	08.28	20	58	56.7	0.894 314	9.83	9.33	9	04	38
	3	17	57	01.86	21	02	53.1	0.901 671	9.75	9.25	9	05	35
	4	18	01	56.31	21	06	17.8	0.909 011	9.67	9.17	9	06	34
	5	18	06	51.58	-21	09	10.5	0.916 335	9.60	9.10	9	07	33
	6	18	11	47.61	21	11	30.7	0.923 642	9.52	9.03	9	08	32
	7	18	16	44.33	21	13	18.0	0.930 932	9.45	8.96	9	09	33
	8	18	21	41.70	21	14	32.2	0.938 204	9.37	8.89	9	10	34
	9	18	26	39.66	21	15	12.9	0.945 459	9.30	8.82	9	11	36
	10	18	31	38.15	21	15	19.8	0.952 697	9.23	8.75	9	12	38
	11	18	36	37.11	-21	14	52.7	0.959 918	9.16	8.69	9	13	40
	12	18	41	36.49	21	13	51.3	0.967 121	9.09	8.62	9	14	43
	13	18	46	36.24	21	12	15.5	0.974 307	9.03	8.56	9	15	47
	14	18	51	36.31	21	10	05.1	0.981 475	8.96	8.50	9	16	50
	15	18	56	36.64	-21	07	20.0	0.988 626	8.90	8.44	9	17	54

VENUS, 2027

RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
Feb.	15	18	56	36.64	-21	07	20.0	0.988 626	8.90	8.44	9	17	54
	16	19	01	37.17	21	04	00.1	0.995 759	8.83	8.38	9	18	58
	17	19	06	37.87	21	00	05.3	1.002 875	8.77	8.32	9	20	03
	18	19	11	38.68	20	55	35.6	1.009 974	8.71	8.26	9	21	07
	19	19	16	39.55	20	50	31.0	1.017 055	8.65	8.20	9	22	11
	20	19	21	40.42	20	44	51.4	1.024 118	8.59	8.14	9	23	16
	21	19	26	41.26	-20	38	36.8	1.031 163	8.53	8.09	9	24	20
	22	19	31	42.02	20	31	47.3	1.038 189	8.47	8.03	9	25	24
	23	19	36	42.65	20	24	22.9	1.045 195	8.41	7.98	9	26	28
	24	19	41	43.11	20	16	23.8	1.052 182	8.36	7.93	9	27	32
	25	19	46	43.35	20	07	50.0	1.059 149	8.30	7.87	9	28	36
	26	19	51	43.33	19	58	41.9	1.066 094	8.25	7.82	9	29	39
	27	19	56	43.01	-19	48	59.5	1.073 019	8.20	7.77	9	30	42
	28	20	01	42.34	19	38	43.2	1.079 921	8.14	7.72	9	31	45
Mar.	1	20	06	41.28	19	27	53.2	1.086 802	8.09	7.67	9	32	47
	2	20	11	39.79	19	16	29.9	1.093 659	8.04	7.63	9	33	49
	3	20	16	37.81	19	04	33.4	1.100 494	7.99	7.58	9	34	50
	4	20	21	35.33	18	52	04.2	1.107 306	7.94	7.53	9	35	51
	5	20	26	32.30	-18	39	02.7	1.114 095	7.89	7.49	9	36	51
	6	20	31	28.68	18	25	29.2	1.120 860	7.85	7.44	9	37	51
	7	20	36	24.45	18	11	24.1	1.127 601	7.80	7.40	9	38	50
	8	20	41	19.58	17	56	47.9	1.134 319	7.75	7.35	9	39	48
	9	20	46	14.03	17	41	41.0	1.141 012	7.71	7.31	9	40	46
	10	20	51	07.79	17	26	03.8	1.147 681	7.66	7.27	9	41	43
	11	20	56	00.84	-17	09	56.9	1.154 326	7.62	7.22	9	42	39
	12	21	00	53.15	16	53	20.7	1.160 947	7.57	7.18	9	43	35
	13	21	05	44.71	16	36	15.8	1.167 544	7.53	7.14	9	44	29
	14	21	10	35.52	16	18	42.6	1.174 118	7.49	7.10	9	45	23
	15	21	15	25.54	16	00	41.8	1.180 667	7.45	7.06	9	46	17
	16	21	20	14.78	15	42	13.7	1.187 193	7.41	7.02	9	47	09
	17	21	25	03.23	-15	23	19.1	1.193 695	7.37	6.99	9	48	01
	18	21	29	50.88	15	03	58.4	1.200 174	7.33	6.95	9	48	51
	19	21	34	37.73	14	44	12.2	1.206 629	7.29	6.91	9	49	41
	20	21	39	23.78	14	24	01.1	1.213 060	7.25	6.88	9	50	31
	21	21	44	09.02	14	03	25.5	1.219 467	7.21	6.84	9	51	19
	22	21	48	53.48	13	42	26.1	1.225 851	7.17	6.80	9	52	07
	23	21	53	37.16	-13	21	03.4	1.232 209	7.14	6.77	9	52	53
	24	21	58	20.06	12	59	18.0	1.238 543	7.10	6.73	9	53	39
	25	22	03	02.19	12	37	10.6	1.244 850	7.06	6.70	9	54	25
	26	22	07	43.57	12	14	41.6	1.251 132	7.03	6.67	9	55	09
	27	22	12	24.21	11	51	51.9	1.257 387	6.99	6.63	9	55	53
	28	22	17	04.11	11	28	41.9	1.263 616	6.96	6.60	9	56	36
	29	22	21	43.29	-11	05	12.5	1.269 816	6.93	6.57	9	57	18
	30	22	26	21.76	10	41	24.1	1.275 989	6.89	6.54	9	58	00
	31	22	30	59.52	10	17	17.5	1.282 133	6.86	6.50	9	58	41
Apr.	1	22	35	36.61	9	52	53.4	1.288 249	6.83	6.47	9	59	21
	2	22	40	13.03	-9	28	12.3	1.294 335	6.79	6.44	10	00	01

VENUS, 2027

RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
Apr.	1	22	35	36.61	-9	52	53.4	1.288 249	6.83	6.47	9	59	21
	2	22	40	13.03	9	28	12.3	1.294 335	6.79	6.44	10	00	01
	3	22	44	48.81	9	03	15.0	1.300 392	6.76	6.41	10	00	40
	4	22	49	23.95	8	38	02.2	1.306 419	6.73	6.38	10	01	18
	5	22	53	58.49	8	12	34.5	1.312 415	6.70	6.35	10	01	56
	6	22	58	32.44	7	46	52.6	1.318 381	6.67	6.33	10	02	33
	7	23	03	05.82	-7	20	57.2	1.324 317	6.64	6.30	10	03	10
	8	23	07	38.68	6	54	48.9	1.330 221	6.61	6.27	10	03	46
	9	23	12	11.01	6	28	28.4	1.336 095	6.58	6.24	10	04	22
	10	23	16	42.87	6	01	56.4	1.341 938	6.55	6.21	10	04	57
	11	23	21	14.26	5	35	13.6	1.347 749	6.53	6.19	10	05	31
	12	23	25	45.23	5	08	20.6	1.353 530	6.50	6.16	10	06	06
	13	23	30	15.78	-4	41	18.1	1.359 279	6.47	6.14	10	06	39
	14	23	34	45.97	4	14	06.8	1.364 998	6.44	6.11	10	07	13
	15	23	39	15.81	3	46	47.4	1.370 686	6.42	6.08	10	07	46
	16	23	43	45.34	3	19	20.5	1.376 343	6.39	6.06	10	08	19
	17	23	48	14.59	2	51	46.7	1.381 969	6.36	6.03	10	08	52
	18	23	52	43.61	2	24	06.6	1.387 563	6.34	6.01	10	09	24
	19	23	57	12.42	-1	56	21.0	1.393 127	6.31	5.99	10	09	56
	20	0	01	41.08	1	28	30.4	1.398 658	6.29	5.96	10	10	28
	21	0	06	09.60	1	00	35.6	1.404 157	6.26	5.94	10	11	00
	22	0	10	38.05	0	32	37.0	1.409 624	6.24	5.92	10	11	32
	23	0	15	06.44	-0	04	35.4	1.415 057	6.21	5.89	10	12	04
	24	0	19	34.82	+0	23	28.5	1.420 457	6.19	5.87	10	12	36
	25	0	24	03.22	+0	51	34.1	1.425 823	6.17	5.85	10	13	08
	26	0	28	31.68	1	19	40.7	1.431 153	6.14	5.83	10	13	39
	27	0	33	00.23	1	47	47.6	1.436 449	6.12	5.81	10	14	12
	28	0	37	28.91	2	15	54.1	1.441 708	6.10	5.78	10	14	44
	29	0	41	57.75	2	43	59.5	1.446 931	6.08	5.76	10	15	16
	30	0	46	26.79	3	12	03.2	1.452 117	6.06	5.74	10	15	49
May	1	0	50	56.06	+3	40	04.5	1.457 265	6.03	5.72	10	16	22
	2	0	55	25.60	4	08	02.7	1.462 376	6.01	5.70	10	16	55
	3	0	59	55.45	4	35	57.0	1.467 448	5.99	5.68	10	17	28
	4	1	04	25.63	5	03	46.9	1.472 481	5.97	5.66	10	18	02
	5	1	08	56.19	5	31	31.5	1.477 474	5.95	5.64	10	18	36
	6	1	13	27.16	5	59	10.3	1.482 428	5.93	5.63	10	19	11
	7	1	17	58.58	+6	26	42.5	1.487 342	5.91	5.61	10	19	46
	8	1	22	30.46	6	54	07.3	1.492 215	5.89	5.59	10	20	21
	9	1	27	02.86	7	21	24.3	1.497 048	5.87	5.57	10	20	57
	10	1	31	35.79	7	48	32.5	1.501 840	5.86	5.55	10	21	34
	11	1	36	09.29	8	15	31.3	1.506 592	5.84	5.54	10	22	11
	12	1	40	43.38	8	42	20.1	1.511 303	5.82	5.52	10	22	49
	13	1	45	18.11	+9	08	58.0	1.515 973	5.80	5.50	10	23	28
	14	1	49	53.49	9	35	24.5	1.520 602	5.78	5.48	10	24	07
	15	1	54	29.58	10	01	38.8	1.525 191	5.77	5.47	10	24	47
	16	1	59	06.39	10	27	40.3	1.529 739	5.75	5.45	10	25	27
	17	2	03	43.97	+10	53	28.3	1.534 246	5.73	5.44	10	26	09

VENUS, 2027

RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	º	'	"		"	"	h	m	s
May	17	2	03	43.97	+10	53	28.3	1.534 246	5.73	5.44	10	26	09
	18	2	08	22.34	11	19	02.1	1.538 712	5.72	5.42	10	26	51
	19	2	13	01.54	11	44	21.0	1.543 135	5.70	5.40	10	27	34
	20	2	17	41.61	12	09	24.3	1.547 517	5.68	5.39	10	28	18
	21	2	22	22.55	12	34	11.4	1.551 856	5.67	5.37	10	29	03
	22	2	27	04.42	12	58	41.6	1.556 152	5.65	5.36	10	29	48
	23	2	31	47.21	+13	22	54.1	1.560 405	5.64	5.34	10	30	35
	24	2	36	30.97	13	46	48.2	1.564 614	5.62	5.33	10	31	23
	25	2	41	15.71	14	10	23.2	1.568 778	5.61	5.32	10	32	11
	26	2	46	01.46	14	33	38.3	1.572 896	5.59	5.30	10	33	01
	27	2	50	48.22	14	56	33.0	1.576 969	5.58	5.29	10	33	52
	28	2	55	36.02	15	19	06.4	1.580 996	5.56	5.28	10	34	43
	29	3	00	24.88	+15	41	17.8	1.584 976	5.55	5.26	10	35	36
	30	3	05	14.81	16	03	06.4	1.588 909	5.53	5.25	10	36	30
	31	3	10	05.82	16	24	31.7	1.592 793	5.52	5.24	10	37	25
June	1	3	14	57.93	16	45	32.9	1.596 630	5.51	5.22	10	38	21
	2	3	19	51.13	17	06	09.2	1.600 417	5.49	5.21	10	39	18
	3	3	24	45.45	17	26	20.0	1.604 154	5.48	5.20	10	40	17
	4	3	29	40.88	+17	46	04.6	1.607 841	5.47	5.19	10	41	16
	5	3	34	37.42	18	05	22.3	1.611 478	5.46	5.18	10	42	16
	6	3	39	35.07	18	24	12.4	1.615 065	5.45	5.16	10	43	18
	7	3	44	33.81	18	42	34.2	1.618 600	5.43	5.15	10	44	21
	8	3	49	33.65	19	00	27.0	1.622 085	5.42	5.14	10	45	25
	9	3	54	34.58	19	17	50.2	1.625 519	5.41	5.13	10	46	29
	10	3	59	36.57	+19	34	43.1	1.628 902	5.40	5.12	10	47	35
	11	4	04	39.64	19	51	05.0	1.632 234	5.39	5.11	10	48	42
	12	4	09	43.76	20	06	55.5	1.635 515	5.38	5.10	10	49	51
	13	4	14	48.93	20	22	13.7	1.638 745	5.37	5.09	10	51	00
	14	4	19	55.13	20	36	59.2	1.641 925	5.36	5.08	10	52	10
	15	4	25	02.34	20	51	11.4	1.645 053	5.35	5.07	10	53	21
	16	4	30	10.56	+21	04	49.6	1.648 131	5.34	5.06	10	54	33
	17	4	35	19.75	21	17	53.5	1.651 157	5.33	5.05	10	55	46
	18	4	40	29.89	21	30	22.3	1.654 131	5.32	5.04	10	57	00
	19	4	45	40.95	21	42	15.6	1.657 053	5.31	5.03	10	58	15
	20	4	50	52.91	21	53	32.8	1.659 924	5.30	5.02	10	59	31
	21	4	56	05.73	22	04	13.5	1.662 741	5.29	5.02	11	00	48
	22	5	01	19.38	+22	14	17.2	1.665 506	5.28	5.01	11	02	05
	23	5	06	33.82	22	23	43.4	1.668 218	5.27	5.00	11	03	24
	24	5	11	49.02	22	32	31.6	1.670 876	5.26	4.99	11	04	43
	25	5	17	04.94	22	40	41.4	1.673 480	5.26	4.98	11	06	03
	26	5	22	21.53	22	48	12.5	1.676 029	5.25	4.98	11	07	23
	27	5	27	38.76	22	55	04.4	1.678 523	5.24	4.97	11	08	44
	28	5	32	56.57	+23	01	16.7	1.680 962	5.23	4.96	11	10	06
	29	5	38	14.92	23	06	49.3	1.683 345	5.22	4.95	11	11	28
	30	5	43	33.76	23	11	41.7	1.685 671	5.22	4.95	11	12	50
July	1	5	48	53.05	23	15	53.7	1.687 941	5.21	4.94	11	14	13
	2	5	54	12.72	+23	19	25.1	1.690 154	5.20	4.93	11	15	37

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RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	′	″		″	″	h	m	s
July	1	5	48	53.05	+23	15	53.7	1.687 941	5.21	4.94	11	14	13
	2	5	54	12.72	23	19	25.1	1.690 154	5.20	4.93	11	15	37
	3	5	59	32.73	23	22	15.7	1.692 308	5.20	4.93	11	17	00
	4	6	04	53.00	23	24	25.3	1.694 406	5.19	4.92	11	18	24
	5	6	10	13.49	23	25	53.7	1.696 445	5.18	4.92	11	19	48
	6	6	15	34.13	23	26	40.9	1.698 426	5.18	4.91	11	21	13
	7	6	20	54.86	+23	26	46.7	1.700 348	5.17	4.90	11	22	37
	8	6	26	15.62	23	26	11.1	1.702 213	5.17	4.90	11	24	01
	9	6	31	36.36	23	24	54.1	1.704 021	5.16	4.89	11	25	25
	10	6	36	57.02	23	22	55.5	1.705 771	5.16	4.89	11	26	49
	11	6	42	17.55	23	20	15.6	1.707 463	5.15	4.88	11	28	13
	12	6	47	37.90	23	16	54.3	1.709 099	5.15	4.88	11	29	37
	13	6	52	58.01	+23	12	51.8	1.710 677	5.14	4.88	11	31	01
	14	6	58	17.84	23	08	08.1	1.712 199	5.14	4.87	11	32	24
	15	7	03	37.32	23	02	43.4	1.713 664	5.13	4.87	11	33	47
	16	7	08	56.41	22	56	38.0	1.715 072	5.13	4.86	11	35	09
	17	7	14	15.06	22	49	51.9	1.716 424	5.12	4.86	11	36	31
	18	7	19	33.22	22	42	25.5	1.717 719	5.12	4.86	11	37	52
	19	7	24	50.83	+22	34	18.9	1.718 958	5.12	4.85	11	39	13
	20	7	30	07.86	22	25	32.5	1.720 139	5.11	4.85	11	40	34
	21	7	35	24.26	22	16	06.6	1.721 264	5.11	4.85	11	41	53
	22	7	40	39.99	22	06	01.4	1.722 332	5.11	4.84	11	43	12
	23	7	45	55.01	21	55	17.3	1.723 343	5.10	4.84	11	44	30
	24	7	51	09.28	21	43	54.7	1.724 297	5.10	4.84	11	45	48
	25	7	56	22.76	+21	31	54.0	1.725 193	5.10	4.83	11	47	04
	26	8	01	35.43	21	19	15.7	1.726 032	5.10	4.83	11	48	20
	27	8	06	47.24	21	06	00.0	1.726 813	5.09	4.83	11	49	35
	28	8	11	58.18	20	52	07.6	1.727 536	5.09	4.83	11	50	49
	29	8	17	08.21	20	37	38.9	1.728 201	5.09	4.83	11	52	02
	30	8	22	17.30	20	22	34.5	1.728 807	5.09	4.82	11	53	14
	31	8	27	25.42	+20	06	54.8	1.729 355	5.09	4.82	11	54	25
Aug.	1	8	32	32.55	19	50	40.5	1.729 844	5.08	4.82	11	55	35
	2	8	37	38.67	19	33	52.2	1.730 273	5.08	4.82	11	56	44
	3	8	42	43.75	19	16	30.4	1.730 644	5.08	4.82	11	57	52
	4	8	47	47.77	18	58	35.7	1.730 956	5.08	4.82	11	58	59
	5	8	52	50.71	18	40	08.8	1.731 209	5.08	4.82	12	00	05
	6	8	57	52.58	+18	21	10.2	1.731 404	5.08	4.82	12	01	10
	7	9	02	53.36	18	01	40.6	1.731 541	5.08	4.82	12	02	14
	8	9	07	53.04	17	41	40.7	1.731 620	5.08	4.82	12	03	17
	9	9	12	51.63	17	21	11.1	1.731 643	5.08	4.82	12	04	18
	10	9	17	49.12	17	00	12.5	1.731 609	5.08	4.82	12	05	18
	11	9	22	45.51	16	38	45.5	1.731 518	5.08	4.82	12	06	18
	12	9	27	40.81	+16	16	50.9	1.731 372	5.08	4.82	12	07	16
	13	9	32	35.03	15	54	29.2	1.731 170	5.08	4.82	12	08	13
	14	9	37	28.16	15	31	41.3	1.730 914	5.08	4.82	12	09	09
	15	9	42	20.22	15	08	27.7	1.730 602	5.08	4.82	12	10	04
	16	9	47	11.22	+14	44	49.3	1.730 236	5.08	4.82	12	10	58

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RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date	Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
	h	m	s	°	'	"		"	"	h	m	s
Aug. 16	9	47	11.22	+14	44	49.3	1.730 236	5.08	4.82	12	10	58
17	9	52	01.17	14	20	46.6	1.729 816	5.08	4.82	12	11	51
18	9	56	50.10	13	56	20.4	1.729 341	5.09	4.82	12	12	43
19	10	01	38.02	13	31	31.3	1.728 813	5.09	4.82	12	13	34
20	10	06	24.95	13	06	20.2	1.728 231	5.09	4.83	12	14	24
21	10	11	10.92	12	40	47.6	1.727 596	5.09	4.83	12	15	13
22	10	15	55.94	+12	14	54.3	1.726 907	5.09	4.83	12	16	01
23	10	20	40.05	11	48	40.9	1.726 166	5.09	4.83	12	16	48
24	10	25	23.27	11	22	08.3	1.725 370	5.10	4.83	12	17	34
25	10	30	05.63	10	55	17.0	1.724 522	5.10	4.84	12	18	20
26	10	34	47.15	10	28	07.9	1.723 621	5.10	4.84	12	19	04
27	10	39	27.87	10	00	41.7	1.722 666	5.10	4.84	12	19	48
28	10	44	07.82	+9	32	59.0	1.721 657	5.11	4.84	12	20	31
29	10	48	47.01	9	05	00.7	1.720 596	5.11	4.85	12	21	13
30	10	53	25.48	8	36	47.6	1.719 481	5.11	4.85	12	21	55
31	10	58	03.26	8	08	20.3	1.718 312	5.12	4.85	12	22	36
Sept. 1	11	02	40.37	7	39	39.5	1.717 090	5.12	4.86	12	23	16
2	11	07	16.86	7	10	46.2	1.715 815	5.13	4.86	12	23	56
3	11	11	52.76	+6	41	40.9	1.714 488	5.13	4.86	12	24	35
4	11	16	28.10	6	12	24.4	1.713 108	5.13	4.87	12	25	13
5	11	21	02.92	5	42	57.4	1.711 676	5.14	4.87	12	25	51
6	11	25	37.27	5	13	20.7	1.710 193	5.14	4.88	12	26	29
7	11	30	11.16	4	43	35.1	1.708 660	5.15	4.88	12	27	06
8	11	34	44.65	4	13	41.2	1.707 076	5.15	4.89	12	27	43
9	11	39	17.76	+3	43	39.8	1.705 443	5.16	4.89	12	28	19
10	11	43	50.55	3	13	31.6	1.703 760	5.16	4.90	12	28	55
11	11	48	23.04	2	43	17.3	1.702 029	5.17	4.90	12	29	31
12	11	52	55.29	2	12	57.7	1.700 250	5.17	4.91	12	30	07
13	11	57	27.32	1	42	33.5	1.698 424	5.18	4.91	12	30	42
14	12	01	59.19	1	12	05.3	1.696 550	5.18	4.92	12	31	17
15	12	06	30.94	+0	41	34.0	1.694 630	5.19	4.92	12	31	52
16	12	11	02.61	+0	11	00.2	1.692 664	5.20	4.93	12	32	28
17	12	15	34.24	-0	19	35.4	1.690 651	5.20	4.93	12	33	03
18	12	20	05.89	0	50	12.0	1.688 594	5.21	4.94	12	33	38
19	12	24	37.59	1	20	49.0	1.686 491	5.21	4.95	12	34	13
20	12	29	09.40	-1	51	25.6	1.684 343	5.22	4.95	12	34	48
21	12	33	41.35	-2	22	01.1	1.682 150	5.23	4.96	12	35	24
22	12	38	13.50	2	52	34.9	1.679 913	5.23	4.96	12	36	00
23	12	42	45.88	3	23	06.0	1.677 632	5.24	4.97	12	36	36
24	12	47	18.53	3	53	33.9	1.675 305	5.25	4.98	12	37	12
25	12	51	51.51	4	23	57.8	1.672 935	5.26	4.99	12	37	48
26	12	56	24.84	4	54	16.9	1.670 520	5.26	4.99	12	38	25
27	13	00	58.57	-5	24	30.4	1.668 061	5.27	5.00	12	39	03
28	13	05	32.74	5	54	37.6	1.665 557	5.28	5.01	12	39	41
29	13	10	07.39	6	24	37.7	1.663 009	5.29	5.02	12	40	19
30	13	14	42.57	6	54	29.9	1.660 416	5.30	5.02	12	40	58
Oct. 1	13	19	18.30	-7	24	13.5	1.657 779	5.30	5.03	12	41	38

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RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
Oct.	1	13	19	18.30	-7	24	13.5	1.657 779	5.30	5.03	12	41	38
	2	13	23	54.64	7	53	47.8	1.655 099	5.31	5.04	12	42	18
	3	13	28	31.61	8	23	11.9	1.652 375	5.32	5.05	12	42	58
	4	13	33	09.26	8	52	25.1	1.649 608	5.33	5.06	12	43	40
	5	13	37	47.61	9	21	26.5	1.646 799	5.34	5.06	12	44	22
	6	13	42	26.71	9	50	15.5	1.643 947	5.35	5.07	12	45	05
	7	13	47	06.58	-10	18	51.2	1.641 054	5.36	5.08	12	45	49
	8	13	51	47.27	10	47	12.9	1.638 120	5.37	5.09	12	46	34
	9	13	56	28.80	11	15	19.8	1.635 145	5.38	5.10	12	47	19
	10	14	01	11.21	11	43	11.0	1.632 131	5.39	5.11	12	48	05
	11	14	05	54.53	12	10	45.9	1.629 077	5.40	5.12	12	48	53
	12	14	10	38.79	12	38	03.6	1.625 983	5.41	5.13	12	49	41
	13	14	15	24.02	-13	05	03.3	1.622 852	5.42	5.14	12	50	30
	14	14	20	10.26	13	31	44.4	1.619 682	5.43	5.15	12	51	20
	15	14	24	57.54	13	58	05.9	1.616 475	5.44	5.16	12	52	12
	16	14	29	45.87	14	24	07.2	1.613 230	5.45	5.17	12	53	04
	17	14	34	35.30	14	49	47.4	1.609 949	5.46	5.18	12	53	58
	18	14	39	25.85	15	15	05.8	1.606 631	5.47	5.19	12	54	52
	19	14	44	17.54	-15	40	01.6	1.603 277	5.49	5.20	12	55	48
	20	14	49	10.39	16	04	34.0	1.599 887	5.50	5.21	12	56	45
	21	14	54	04.42	16	28	42.3	1.596 460	5.51	5.22	12	57	43
	22	14	58	59.65	16	52	25.6	1.592 998	5.52	5.24	12	58	43
	23	15	03	56.09	17	15	43.1	1.589 500	5.53	5.25	12	59	43
	24	15	08	53.75	17	38	34.0	1.585 967	5.54	5.26	13	00	45
	25	15	13	52.65	-18	00	57.6	1.582 397	5.56	5.27	13	01	48
	26	15	18	52.79	18	22	53.0	1.578 791	5.57	5.28	13	02	52
	27	15	23	54.17	18	44	19.5	1.575 149	5.58	5.29	13	03	58
	28	15	28	56.80	19	05	16.2	1.571 470	5.60	5.31	13	05	05
	29	15	34	00.69	19	25	42.5	1.567 755	5.61	5.32	13	06	13
	30	15	39	05.82	19	45	37.5	1.564 005	5.62	5.33	13	07	22
	31	15	44	12.18	-20	05	00.5	1.560 217	5.64	5.35	13	08	33
Nov.	1	15	49	19.77	20	23	50.7	1.556 395	5.65	5.36	13	09	44
	2	15	54	28.58	20	42	07.5	1.552 536	5.66	5.37	13	10	57
	3	15	59	38.57	20	59	50.0	1.548 642	5.68	5.39	13	12	11
	4	16	04	49.74	21	16	57.6	1.544 713	5.69	5.40	13	13	27
	5	16	10	02.06	21	33	29.6	1.540 749	5.71	5.41	13	14	43
	6	16	15	15.51	-21	49	25.4	1.536 751	5.72	5.43	13	16	01
	7	16	20	30.06	22	04	44.1	1.532 720	5.74	5.44	13	17	19
	8	16	25	45.68	22	19	25.3	1.528 654	5.75	5.46	13	18	39
	9	16	31	02.33	22	33	28.2	1.524 556	5.77	5.47	13	19	60
	10	16	36	20.00	22	46	52.3	1.520 424	5.78	5.49	13	21	22
	11	16	41	38.64	22	59	37.0	1.516 260	5.80	5.50	13	22	44
	12	16	46	58.22	-23	11	41.7	1.512 065	5.82	5.52	13	24	08
	13	16	52	18.69	23	23	05.9	1.507 837	5.83	5.53	13	25	32
	14	16	57	40.01	23	33	49.1	1.503 579	5.85	5.55	13	26	58
	15	17	03	02.14	23	43	50.9	1.499 290	5.87	5.56	13	28	24
	16	17	08	25.03	-23	53	10.7	1.494 970	5.88	5.58	13	29	51

VENUS, 2027

RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	º	'	"		"	"	h	m	s
Nov.	16	sssssss	08	25.03	-23	53	10.7	1.494 970	5.88	5.58	13	29	51
	17	17	13	48.63	24	01	48.2	1.490 620	5.90	5.59	13	31	18
	18	17	19	12.88	24	09	42.9	1.486 239	5.92	5.61	13	32	46
	19	17	24	37.74	24	16	54.5	1.481 829	5.93	5.63	13	34	15
	20	17	30	03.14	24	23	22.6	1.477 388	5.95	5.65	13	35	44
	21	17	35	29.02	24	29	06.8	1.472 916	5.97	5.66	13	37	14
	22	17	40	55.33	-24	34	06.8	1.468 415	5.99	5.68	13	38	44
	23	17	46	22.00	24	38	22.4	1.463 882	6.01	5.70	13	40	14
	24	17	51	48.98	24	41	53.4	1.459 319	6.03	5.71	13	41	45
	25	17	57	16.19	24	44	39.5	1.454 725	6.05	5.73	13	43	16
	26	18	02	43.57	24	46	40.7	1.450 099	6.06	5.75	13	44	47
	27	18	08	11.06	24	47	56.7	1.445 442	6.08	5.77	13	46	18
	28	18	13	38.57	-24	48	27.6	1.440 754	6.10	5.79	13	47	49
	29	18	19	06.04	24	48	13.3	1.436 034	6.12	5.81	13	49	20
	30	18	24	33.39	24	47	13.7	1.431 282	6.14	5.83	13	50	51
Dec.	1	18	30	00.56	24	45	29.1	1.426 499	6.16	5.85	13	52	21
	2	18	35	27.46	24	42	59.3	1.421 685	6.19	5.87	13	53	51
	3	18	40	54.03	24	39	44.5	1.416 839	6.21	5.89	13	55	21
	4	18	46	20.19	-24	35	44.8	1.411 962	6.23	5.91	13	56	51
	5	18	51	45.89	24	31	00.5	1.407 055	6.25	5.93	13	58	20
	6	18	57	11.04	24	25	31.7	1.402 117	6.27	5.95	13	59	48
	7	19	02	35.58	24	19	18.6	1.397 148	6.29	5.97	14	01	16
	8	19	07	59.46	24	12	21.6	1.392 149	6.32	5.99	14	02	43
	9	19	13	22.61	24	04	40.9	1.387 120	6.34	6.01	14	04	09
	10	19	18	44.98	-23	56	16.9	1.382 062	6.36	6.03	14	05	34
	11	19	24	06.49	23	47	10.0	1.376 975	6.39	6.06	14	06	59
	12	19	29	27.11	23	37	20.6	1.371 858	6.41	6.08	14	08	22
	13	19	34	46.78	23	26	49.1	1.366 713	6.43	6.10	14	09	45
	14	19	40	05.44	23	15	35.9	1.361 540	6.46	6.13	14	11	07
	15	19	45	23.05	23	03	41.6	1.356 339	6.48	6.15	14	12	27
	16	19	50	39.57	-22	51	06.7	1.351 110	6.51	6.17	14	13	46
	17	19	55	54.95	22	37	51.6	1.345 853	6.53	6.20	14	15	05
	18	20	01	09.15	22	23	56.9	1.340 569	6.56	6.22	14	16	22
	19	20	06	22.14	22	09	23.2	1.335 256	6.59	6.25	14	17	37
	20	20	11	33.89	21	54	11.0	1.329 916	6.61	6.27	14	18	52
	21	20	16	44.36	21	38	20.8	1.324 548	6.64	6.30	14	20	05
	22	20	21	53.54	-21	21	53.5	1.319 151	6.67	6.32	14	21	17
	23	20	27	01.39	21	04	49.5	1.313 725	6.69	6.35	14	22	28
	24	20	32	07.89	20	47	09.5	1.308 270	6.72	6.37	14	23	37
	25	20	37	13.03	20	28	54.3	1.302 786	6.75	6.40	14	24	45
	26	20	42	16.77	20	10	04.6	1.297 273	6.78	6.43	14	25	51
	27	20	47	19.09	19	50	41.0	1.291 729	6.81	6.46	14	26	56
	28	20	52	19.99	-19	30	44.4	1.286 156	6.84	6.48	14	27	59
	29	20	57	19.45	19	10	15.4	1.280 553	6.87	6.51	14	29	01
	30	21	02	17.44	18	49	14.9	1.274 920	6.90	6.54	14	30	02
	31	21	07	13.98	18	27	43.6	1.269 257	6.93	6.57	14	31	01
	32	21	12	09.04	-18	05	42.3	1.263 564	6.96	6.60	14	31	59

MARS, 2027

HELIOCENTRIC POSITIONS FOR 0^h TERRESTRIAL TIME
MEAN EQUINOX AND ECLIPTIC OF DATE

Date	Heliocentric Longitude	Heliocentric Latitude	Radius Vector	Date	Heliocentric Longitude	Heliocentric Latitude	Radius Vector
	° ' "	° ' "			° ' "	° ' "	
Jan. 1	128 52 06.9	+1 48 58.1	1.646 6850	Apr. 3	169 16 32.1	+1 36 34.8	1.661 9199
3	129 45 42.9	1 49 16.9	1.647 8809	5	170 09 12.0	1 35 43.9	1.661 3262
5	130 39 14.3	1 49 34.1	1.649 0405	7	171 01 54.2	1 34 51.6	1.660 6937
7	131 32 41.2	1 49 49.7	1.650 1636	9	171 54 38.8	1 33 58.0	1.660 0223
9	132 26 03.9	1 50 03.6	1.651 2499	11	172 47 26.0	1 33 02.9	1.659 3123
11	133 19 22.5	1 50 16.0	1.652 2993	13	173 40 16.0	1 32 06.5	1.658 5637
13	134 12 37.1	+1 50 26.8	1.653 3115	15	174 33 08.8	+1 31 08.8	1.657 7767
15	135 05 47.8	1 50 36.0	1.654 2863	17	175 26 04.7	1 30 09.7	1.656 9514
17	135 58 54.9	1 50 43.5	1.655 2235	19	176 19 03.8	1 29 09.2	1.656 0880
19	136 51 58.4	1 50 49.5	1.656 1231	21	177 12 06.1	1 28 07.4	1.655 1867
21	137 44 58.6	1 50 53.9	1.656 9847	23	178 05 12.0	1 27 04.3	1.654 2476
23	138 37 55.6	1 50 56.7	1.657 8082	25	178 58 21.6	1 25 59.9	1.653 2710
25	139 30 49.4	+1 50 58.0	1.658 5935	27	179 51 34.8	+1 24 54.1	1.652 2569
27	140 23 40.4	1 50 57.6	1.659 3404	29	180 44 52.1	1 23 47.1	1.651 2057
29	141 16 28.5	1 50 55.7	1.660 0488	May 1	181 38 13.5	1 22 38.7	1.650 1174
31	142 09 14.0	1 50 52.2	1.660 7185	3	182 31 39.0	1 21 29.0	1.648 9923
Feb. 2	143 01 57.1	1 50 47.2	1.661 3495	5	183 25 09.0	1 20 18.1	1.647 8307
4	143 54 37.8	1 50 40.7	1.661 9415	7	184 18 43.5	1 19 05.9	1.646 6327
6	144 47 16.3	+1 50 32.5	1.662 4945	9	185 12 22.8	+1 17 52.5	1.645 3987
8	145 39 52.8	1 50 22.8	1.663 0085	11	186 06 06.8	1 16 37.8	1.644 1287
10	146 32 27.4	1 50 11.6	1.663 4832	13	186 59 55.9	1 15 21.8	1.642 8232
12	147 25 00.3	1 49 58.8	1.663 9185	15	187 53 50.0	1 14 04.6	1.641 4823
14	148 17 31.5	1 49 44.5	1.664 3145	17	188 47 49.6	1 12 46.2	1.640 1063
16	149 10 01.4	1 49 28.7	1.664 6711	19	189 41 54.5	1 11 26.6	1.638 6956
18	150 02 29.9	+1 49 11.3	1.664 9881	21	190 36 05.1	+1 10 05.8	1.637 2503
20	150 54 57.3	1 48 52.5	1.665 2655	23	191 30 21.4	1 08 43.8	1.635 7708
22	151 47 23.7	1 48 32.1	1.665 5033	25	192 24 43.6	1 07 20.6	1.634 2574
24	152 39 49.3	1 48 10.2	1.665 7014	27	193 19 11.9	1 05 56.2	1.632 7105
26	153 32 14.1	1 47 46.8	1.665 8598	29	194 13 46.5	1 04 30.7	1.631 1302
28	154 24 38.4	1 47 21.9	1.665 9784	31	195 08 27.3	1 03 04.1	1.629 5170
Mar. 2	155 17 02.3	+1 46 55.5	1.666 0573	June 2	196 03 14.7	+1 01 36.2	1.627 8713
4	156 09 26.0	1 46 27.6	1.666 0963	4	196 58 08.7	1 00 07.4	1.626 1933
6	157 01 49.5	1 45 58.3	1.666 0956	6	197 53 09.6	0 58 37.3	1.624 4834
8	157 54 13.2	1 45 27.4	1.666 0551	8	198 48 17.4	0 57 06.2	1.622 7420
10	158 46 36.9	1 44 55.1	1.665 9748	10	199 43 32.3	0 55 34.0	1.620 9694
12	159 39 01.1	1 44 21.4	1.665 8547	12	200 38 54.5	0 54 00.7	1.619 1662
14	160 31 25.7	+1 43 46.1	1.665 6948	14	201 34 24.2	+0 52 26.4	1.617 3325
16	161 23 51.0	1 43 09.4	1.665 4953	16	202 30 01.4	0 50 51.1	1.615 4690
18	162 16 17.1	1 42 31.3	1.665 2560	18	203 25 46.3	0 49 14.7	1.613 5759
20	163 08 44.1	1 41 51.7	1.664 9771	20	204 21 39.1	0 47 37.3	1.611 6538
22	164 01 12.2	1 41 10.7	1.664 6586	22	205 17 39.9	0 45 58.9	1.609 7030
24	164 53 41.5	1 40 28.3	1.664 3006	24	206 13 48.9	0 44 19.5	1.607 7240
26	165 46 12.3	+1 39 44.4	1.663 9031	26	207 10 06.2	+0 42 39.2	1.605 7172
28	166 38 44.5	1 38 59.1	1.663 4662	28	208 06 31.9	0 40 58.0	1.603 6832
30	167 31 18.5	1 38 12.4	1.662 9899	30	209 03 06.3	0 39 15.8	1.601 6224
Apr. 1	168 23 54.3	1 37 24.3	1.662 4745	July 2	209 59 49.4	0 37 32.7	1.599 5352
3	169 16 32.1	+1 36 34.8	1.661 9199	4	210 56 41.5	+0 35 48.7	1.597 4223

MARS, 2027

HELIOCENTRIC POSITIONS FOR 0^h TERRESTRIAL TIME
MEAN EQUINOX AND ECLIPTIC OF DATE

Date	Heliocentric Longitude			Heliocentric Latitude			Radius Vector	Date	Heliocentric Longitude			Heliocentric Latitude			Radius Vector
	°	'	"	°	'	"			°	'	"	°	'	"	
July 2	209	59	49.4	+0	37	32.7	1.599 5352	Oct. 2	256	45	10.8	-0	50	22.1	1.485 8444
4	210	56	41.5	0	35	48.7	1.597 4223	4	257	51	07.0	0	52	15.4	1.483 2722
6	211	53	42.6	0	34	03.9	1.595 2841	6	258	57	16.9	0	54	07.9	1.480 7098
8	212	50	52.9	0	32	18.2	1.593 1211	8	260	03	40.7	0	55	59.6	1.478 1582
10	213	48	12.5	0	30	31.7	1.590 9338	10	261	10	18.3	0	57	50.4	1.475 6183
12	214	45	41.7	0	28	44.4	1.588 7229	12	262	17	09.7	0	59	40.2	1.473 0912
14	215	43	20.4	+0	26	56.2	1.586 4888	14	263	24	14.9	-1	01	29.1	1.470 5779
16	216	41	09.0	0	25	07.4	1.584 2321	16	264	31	34.0	1	03	16.9	1.468 0793
18	217	39	07.4	0	23	17.8	1.581 9534	18	265	39	06.8	1	05	03.7	1.465 5965
20	218	37	15.9	0	21	27.5	1.579 6532	20	266	46	53.5	1	06	49.3	1.463 1306
22	219	35	34.6	0	19	36.4	1.577 3323	22	267	54	53.9	1	08	33.6	1.460 6824
24	220	34	03.7	0	17	44.7	1.574 9911	24	269	03	08.0	1	10	16.8	1.458 2531
26	221	32	43.1	+0	15	52.4	1.572 6303	26	270	11	35.8	-1	11	58.5	1.455 8436
28	222	31	33.2	0	13	59.5	1.570 2506	28	271	20	17.3	1	13	38.9	1.453 4550
30	223	30	34.1	0	12	05.9	1.567 8525	30	272	29	12.4	1	15	17.9	1.451 0883
Aug. 1	224	29	45.8	0	10	11.8	1.565 4367	Nov. 1	273	38	21.0	1	16	55.4	1.448 7446
3	225	29	08.5	0	08	17.2	1.563 0039	3	274	47	43.0	1	18	31.3	1.446 4248
5	226	28	42.4	0	06	22.0	1.560 5548	5	275	57	18.5	1	20	05.5	1.444 1300
7	227	28	27.5	+0	04	26.4	1.558 0900	7	277	07	07.2	-1	21	38.1	1.441 8612
9	228	28	24.1	0	02	30.3	1.555 6102	9	278	17	09.2	1	23	09.0	1.439 6194
11	229	28	32.1	+0	00	33.9	1.553 1162	11	279	27	24.3	1	24	38.0	1.437 4056
13	230	28	51.8	-0	01	23.0	1.550 6086	13	280	37	52.3	1	26	05.2	1.435 2209
15	231	29	23.2	0	03	20.3	1.548 0882	15	281	48	33.3	1	27	30.5	1.433 0663
17	232	30	06.5	0	05	17.8	1.545 5558	17	282	59	27.1	1	28	53.8	1.430 9427
19	233	31	01.8	-0	07	15.7	1.543 0121	19	284	10	33.5	-1	30	15.1	1.428 8511
21	234	32	09.1	0	09	13.8	1.540 4578	21	285	21	52.4	1	31	34.3	1.426 7926
23	235	33	28.8	0	11	12.1	1.537 8937	23	286	33	23.6	1	32	51.4	1.424 7682
25	236	35	00.7	0	13	10.6	1.535 3206	25	287	45	07.0	1	34	06.2	1.422 7787
27	237	36	45.1	0	15	09.2	1.532 7393	27	288	57	02.5	1	35	18.8	1.420 8253
29	238	38	42.0	0	17	07.9	1.530 1507	29	290	09	09.8	1	36	29.1	1.418 9087
31	239	40	51.5	-0	19	06.7	1.527 5554	Dec. 1	291	21	28.8	-1	37	37.0	1.417 0300
Sept. 2	240	43	13.8	0	21	05.6	1.524 9545	3	292	33	59.2	1	38	42.5	1.415 1902
4	241	45	48.9	0	23	04.4	1.522 3486	5	293	46	41.0	1	39	45.5	1.413 3900
6	242	48	36.9	0	25	03.1	1.519 7386	7	294	59	33.8	1	40	45.9	1.411 6305
8	243	51	37.9	0	27	01.8	1.517 1255	9	296	12	37.5	1	41	43.9	1.409 9125
10	244	54	52.0	0	29	00.4	1.514 5100	11	297	25	51.8	1	42	39.1	1.408 2369
12	245	58	19.2	-0	30	58.7	1.511 8931	13	298	39	16.6	-1	43	31.7	1.406 6046
14	247	01	59.8	0	32	56.9	1.509 2757	15	299	52	51.5	1	44	21.6	1.405 0164
16	248	05	53.6	0	34	54.7	1.506 6585	17	301	06	36.2	1	45	08.7	1.403 4731
18	249	10	00.8	0	36	52.3	1.504 0427	19	302	20	30.7	1	45	53.1	1.401 9756
20	250	14	21.5	0	38	49.4	1.501 4289	21	303	34	34.6	1	46	34.5	1.400 5247
22	251	18	55.6	0	40	46.2	1.498 8183	23	304	48	47.5	1	47	13.1	1.399 1210
24	252	23	43.3	-0	42	42.5	1.496 2117	25	306	03	09.4	-1	47	48.7	1.397 7654
26	253	28	44.7	0	44	38.3	1.493 6100	27	307	17	39.7	1	48	21.4	1.396 4587
28	254	33	59.7	0	46	33.6	1.491 0143	29	308	32	18.4	1	48	51.1	1.395 2014
30	255	39	28.4	0	48	28.2	1.488 4255	31	309	47	05.0	1	49	17.7	1.393 9942
Oct. 2	256	45	10.8	-0	50	22.1	1.485 8444	33	311	01	59.2	-1	49	41.3	1.392 8380

MARS, 2027

GEOCENTRIC LONGITUDE AND LATITUDE FOR 0^h TERRESTRIAL TIME

Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude			Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude		
		°	′	″	°	′	″			°	′	″	°	′	″
Jan.	0	159	45	03.7	+3	14	20.3	Feb.	15	152	36	39.8	+4	28	15.3
	1	159	52	15.2	3	16	24.3		16	152	13	10.3	4	28	21.2
	2	159	58	46.8	3	18	28.9		17	151	49	31.1	4	28	20.7
	3	160	04	37.7	3	20	34.0		18	151	25	44.7	4	28	13.7
	4	160	09	47.2	3	22	39.6		19	151	01	53.7	4	28	00.3
	5	160	14	14.6	3	24	45.5		20	150	38	00.8	4	27	40.4
	6	160	17	59.2	+3	26	51.8		21	150	14	08.6	+4	27	14.2
	7	160	21	00.4	3	28	58.3		22	149	50	19.7	4	26	41.6
	8	160	23	17.6	3	31	04.9		23	149	26	36.7	4	26	02.7
	9	160	24	50.2	3	33	11.5		24	149	03	02.3	4	25	17.6
	10	160	25	37.7	3	35	18.1		25	148	39	38.9	4	24	26.4
	11	160	25	39.6	3	37	24.5		26	148	16	29.3	4	23	29.2
	12	160	24	55.5	+3	39	30.6		27	147	53	36.0	+4	22	26.2
	13	160	23	24.9	3	41	36.2		28	147	31	01.4	4	21	17.4
	14	160	21	07.6	3	43	41.3	Mar.	1	147	08	47.9	4	20	03.0
	15	160	18	03.3	3	45	45.7		2	146	46	57.9	4	18	43.2
	16	160	14	11.8	3	47	49.3		3	146	25	33.7	4	17	18.2
	17	160	09	32.8	3	49	51.8		4	146	04	37.5	4	15	48.0
	18	160	04	06.2	+3	51	53.2		5	145	44	11.4	+4	14	13.0
	19	159	57	52.0	3	53	53.3		6	145	24	17.3	4	12	33.3
	20	159	50	50.0	3	55	51.9		7	145	04	57.2	4	10	49.2
	21	159	43	00.3	3	57	48.9		8	144	46	12.9	4	09	00.8
	22	159	34	22.8	3	59	44.1		9	144	28	06.0	4	07	08.3
	23	159	24	57.4	4	01	37.4		10	144	10	38.1	4	05	12.1
	24	159	14	44.4	+4	03	28.5		11	143	53	50.7	+4	03	12.3
	25	159	03	43.8	4	05	17.3		12	143	37	45.0	4	01	09.1
	26	158	51	56.1	4	07	03.6		13	143	22	22.2	3	59	02.9
	27	158	39	21.5	4	08	47.2		14	143	07	43.2	3	56	53.8
	28	158	26	00.7	4	10	27.9		15	142	53	48.9	3	54	42.1
	29	158	11	54.2	4	12	05.5		16	142	40	40.1	3	52	27.9
	30	157	57	02.8	+4	13	39.7		17	142	28	17.1	+3	50	11.6
	31	157	41	27.5	4	15	10.4		18	142	16	40.4	3	47	53.4
Feb.	1	157	25	09.2	4	16	37.2		19	142	05	50.4	3	45	33.4
	2	157	08	09.2	4	18	00.1		20	141	55	47.1	3	43	11.9
	3	156	50	28.6	4	19	18.7		21	141	46	30.8	3	40	49.1
	4	156	32	08.9	4	20	32.8		22	141	38	01.3	3	38	25.2
	5	156	13	11.8	+4	21	42.2		23	141	30	18.9	+3	36	00.3
	6	155	53	38.9	4	22	46.7		24	141	23	23.3	3	33	34.7
	7	155	33	32.1	4	23	46.1		25	141	17	14.5	3	31	08.5
	8	155	12	53.3	4	24	40.1		26	141	11	52.3	3	28	41.8
	9	154	51	44.8	4	25	28.7		27	141	07	16.5	3	26	14.8
	10	154	30	08.7	4	26	11.5		28	141	03	26.9	3	23	47.6
	11	154	08	07.3	+4	26	48.5		29	141	00	23.1	+3	21	20.3
	12	153	45	43.2	4	27	19.5		30	140	58	04.9	3	18	53.0
	13	153	22	58.9	4	27	44.4		31	140	56	31.8	3	16	25.9
	14	152	59	56.9	4	28	03.0	Apr.	1	140	55	43.5	3	13	59.1
	15	152	36	39.8	+4	28	15.3		2	140	55	39.5	+3	11	32.6

MARS, 2027

GEOCENTRIC LONGITUDE AND LATITUDE FOR 0^h TERRESTRIAL TIME

Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude			Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude		
		°	'	"	°	'	"			°	'	"	°	'	"
Apr.	1	140	55	43.5	+3	13	59.1	May	17	150	53	50.9	+1	38	57.0
	2	140	55	39.5	3	11	32.6		18	151	16	58.0	1	37	19.7
	3	140	56	19.4	3	09	06.5		19	151	40	22.9	1	35	43.3
	4	140	57	42.7	3	06	41.0		20	152	04	05.3	1	34	07.9
	5	140	59	49.0	3	04	16.0		21	152	28	04.9	1	32	33.6
	6	141	02	37.7	3	01	51.6		22	152	52	21.3	1	31	00.2
	7	141	06	08.3	+2	59	28.0		23	153	16	54.1	+1	29	27.8
	8	141	10	20.2	2	57	05.2		24	153	41	43.0	1	27	56.3
	9	141	15	12.9	2	54	43.2		25	154	06	47.8	1	26	25.7
	10	141	20	45.8	2	52	22.1		26	154	32	08.2	1	24	56.0
	11	141	26	58.1	2	50	01.9		27	154	57	43.8	1	23	27.2
	12	141	33	49.2	2	47	42.7		28	155	23	34.5	1	21	59.3
	13	141	41	18.3	+2	45	24.6		29	155	49	40.0	+1	20	32.2
	14	141	49	24.6	2	43	07.5		30	156	16	00.1	1	19	05.9
	15	141	58	07.3	2	40	51.6		31	156	42	34.5	1	17	40.5
	16	142	07	25.7	2	38	36.8	June	1	157	09	23.1	1	16	15.8
	17	142	17	19.0	2	36	23.2		2	157	36	25.7	1	14	51.9
	18	142	27	46.5	2	34	10.7		3	158	03	42.1	1	13	28.8
	19	142	38	47.4	+2	31	59.6		4	158	31	12.1	+1	12	06.4
	20	142	50	21.1	2	29	49.6		5	158	58	55.4	1	10	44.8
	21	143	02	26.9	2	27	40.9		6	159	26	51.9	1	09	23.9
	22	143	15	04.2	2	25	33.5		7	159	55	01.2	1	08	03.7
	23	143	28	12.2	2	23	27.3		8	160	23	23.0	1	06	44.2
	24	143	41	50.4	2	21	22.4		9	160	51	57.1	1	05	25.5
	25	143	55	58.1	+2	19	18.8		10	161	20	43.1	+1	04	07.5
	26	144	10	34.8	2	17	16.4		11	161	49	40.9	1	02	50.2
	27	144	25	39.8	2	15	15.2		12	162	18	50.3	1	01	33.6
	28	144	41	12.7	2	13	15.3		13	162	48	10.9	1	00	17.6
	29	144	57	12.9	2	11	16.6		14	163	17	42.7	0	59	02.4
	30	145	13	39.8	2	09	19.1		15	163	47	25.3	0	57	47.8
May	1	145	30	33.0	+2	07	22.8		16	164	17	18.7	+0	56	33.9
	2	145	47	52.0	2	05	27.7		17	164	47	22.6	0	55	20.6
	3	146	05	36.2	2	03	33.8		18	165	17	36.8	0	54	08.0
	4	146	23	45.3	2	01	41.1		19	165	48	01.3	0	52	56.0
	5	146	42	18.8	1	59	49.5		20	166	18	35.7	0	51	44.6
	6	147	01	16.3	1	57	59.0		21	166	49	19.9	0	50	33.7
	7	147	20	37.3	+1	56	09.7		22	167	20	13.9	+0	49	23.5
	8	147	40	21.4	1	54	21.5		23	167	51	17.5	0	48	13.9
	9	148	00	28.0	1	52	34.4		24	168	22	30.5	0	47	04.8
	10	148	20	56.6	1	50	48.4		25	168	53	53.0	0	45	56.2
	11	148	41	46.7	1	49	03.6		26	169	25	24.7	0	44	48.2
	12	149	02	57.8	1	47	19.8		27	169	57	05.6	0	43	40.7
	13	149	24	29.4	+1	45	37.1		28	170	28	55.7	+0	42	33.7
	14	149	46	20.9	1	43	55.5		29	171	00	54.9	0	41	27.2
	15	150	08	32.0	1	42	14.9		30	171	33	03.1	0	40	21.2
	16	150	31	02.1	1	40	35.5	July	1	172	05	20.2	0	39	15.7
	17	150	53	50.9	+1	38	57.0		2	172	37	46.2	+0	38	10.6

MARS, 2027

GEOCENTRIC LONGITUDE AND LATITUDE FOR 0^h TERRESTRIAL TIME

Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude			Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude		
		°	'	"	°	'	"			°	'	"	°	'	"
July	1	172	05	20.2	+0	39	15.7	Aug.	16	199	03	48.0	-0	03	34.6
	2	172	37	46.2	0	38	10.6		17	199	41	28.8	0	04	22.4
	3	173	10	21.0	0	37	06.1		18	200	19	15.0	0	05	09.9
	4	173	43	04.5	0	36	01.9		19	200	57	06.8	0	05	57.1
	5	174	15	56.4	0	34	58.3		20	201	35	04.1	0	06	44.0
	6	174	48	56.6	0	33	55.1		21	202	13	07.0	0	07	30.6
	7	175	22	05.1	+0	32	52.4		22	202	51	15.4	-0	08	17.0
	8	175	55	21.5	0	31	50.1		23	203	29	29.4	0	09	03.1
	9	176	28	45.9	0	30	48.3		24	204	07	48.9	0	09	48.9
	10	177	02	18.1	0	29	47.0		25	204	46	14.1	0	10	34.5
	11	177	35	58.0	0	28	46.1		26	205	24	44.9	0	11	19.8
	12	178	09	45.6	0	27	45.7		27	206	03	21.3	0	12	04.8
	13	178	43	40.6	+0	26	45.7		28	206	42	03.2	-0	12	49.5
	14	179	17	43.0	0	25	46.1		29	207	20	50.7	0	13	34.0
	15	179	51	52.8	0	24	47.0		30	207	59	43.6	0	14	18.2
	16	180	26	09.7	0	23	48.3		31	208	38	42.0	0	15	02.1
	17	181	00	33.6	0	22	50.0	Sept.	1	209	17	45.8	0	15	45.8
	18	181	35	04.7	0	21	52.1		2	209	56	54.9	0	16	29.2
	19	182	09	42.6	+0	20	54.6		3	210	36	09.4	-0	17	12.2
	20	182	44	27.4	0	19	57.5		4	211	15	29.2	0	17	55.0
	21	183	19	19.0	0	19	00.8		5	211	54	54.3	0	18	37.5
	22	183	54	17.5	0	18	04.5		6	212	34	24.6	0	19	19.7
	23	184	29	22.6	0	17	08.5		7	213	14	00.1	0	20	01.6
	24	185	04	34.5	0	16	12.9		8	213	53	40.7	0	20	43.3
	25	185	39	53.2	+0	15	17.6		9	214	33	26.3	-0	21	24.6
	26	186	15	18.5	0	14	22.7		10	215	13	16.8	0	22	05.7
	27	186	50	50.6	0	13	28.1		11	215	53	12.3	0	22	46.5
	28	187	26	29.4	0	12	33.8		12	216	33	12.7	0	23	27.0
	29	188	02	14.9	0	11	39.9		13	217	13	18.0	0	24	07.2
	30	188	38	07.1	0	10	46.3		14	217	53	28.1	0	24	47.2
	31	189	14	05.8	+0	09	53.0		15	218	33	43.1	-0	25	26.9
Aug.	1	189	50	11.2	0	09	00.1		16	219	14	02.9	0	26	06.3
	2	190	26	23.0	0	08	07.5		17	219	54	27.6	0	26	45.5
	3	191	02	41.1	0	07	15.2		18	220	34	57.2	0	27	24.4
	4	191	39	05.6	0	06	23.2		19	221	15	31.7	0	28	03.1
	5	192	15	36.3	0	05	31.6		20	221	56	11.2	0	28	41.5
	6	192	52	13.2	+0	04	40.3		21	222	36	55.5	-0	29	19.6
	7	193	28	56.2	0	03	49.3		22	223	17	44.9	0	29	57.5
	8	194	05	45.3	0	02	58.7		23	223	58	39.2	0	30	35.1
	9	194	42	40.3	0	02	08.4		24	224	39	38.5	0	31	12.4
	10	195	19	41.3	0	01	18.5		25	225	20	42.7	0	31	49.5
	11	195	56	48.2	+0	00	28.8		26	226	01	51.9	0	32	26.3
	12	196	34	00.8	-0	00	20.5		27	226	43	05.9	-0	33	02.8
	13	197	11	19.2	0	01	09.5		28	227	24	24.7	0	33	39.1
	14	197	48	43.2	0	01	58.1		29	228	05	48.5	0	34	15.0
	15	198	26	12.8	0	02	46.5		30	228	47	17.0	0	34	50.7
	16	199	03	48.0	-0	03	34.6	Oct.	1	229	28	50.4	-0	35	26.1

MARS, 2027

GEOCENTRIC LONGITUDE AND LATITUDE FOR 0^h TERRESTRIAL TIME

Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude			Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude		
		°	'	"	°	'	"			°	'	"	°	'	"
Oct.	1	229	28	50.4	-0	35	26.1	Nov.	16	262	39	08.0	-0	57	07.8
	2	230	10	28.7	0	36	01.2		17	263	23	57.9	0	57	28.5
	3	230	52	11.6	0	36	35.9		18	264	08	51.3	0	57	48.8
	4	231	33	59.3	0	37	10.4		19	264	53	48.3	0	58	08.8
	5	232	15	51.7	0	37	44.6		20	265	38	48.9	0	58	28.5
	6	232	57	48.6	0	38	18.5		21	266	23	53.0	0	58	47.8
	7	233	39	50.0	-0	38	52.2		22	267	09	00.6	-0	59	06.7
	8	234	21	55.9	0	39	25.5		23	267	54	11.8	0	59	25.3
	9	235	04	06.2	0	39	58.5		24	268	39	26.5	0	59	43.4
	10	235	46	20.9	0	40	31.2		25	269	24	44.8	1	00	01.2
	11	236	28	39.9	0	41	03.7		26	270	10	06.5	1	00	18.7
	12	237	11	03.2	0	41	35.9		27	270	55	31.7	1	00	35.7
	13	237	53	30.9	-0	42	07.7		28	271	41	00.2	-1	00	52.3
	14	238	36	02.9	0	42	39.3		29	272	26	32.1	1	01	08.6
	15	239	18	39.3	0	43	10.6		30	273	12	07.2	1	01	24.5
	16	240	01	20.0	0	43	41.6	Dec.	1	273	57	45.5	1	01	40.0
	17	240	44	05.0	0	44	12.4		2	274	43	26.8	1	01	55.1
	18	241	26	54.5	0	44	42.8		3	275	29	11.1	1	02	09.8
	19	242	09	48.4	-0	45	13.0		4	276	14	58.4	-1	02	24.2
	20	242	52	46.6	0	45	42.8		5	277	00	48.5	1	02	38.2
	21	243	35	49.2	0	46	12.4		6	277	46	41.5	1	02	51.8
	22	244	18	56.2	0	46	41.7		7	278	32	37.2	1	03	05.0
	23	245	02	07.5	0	47	10.6		8	279	18	35.7	1	03	17.8
	24	245	45	23.2	0	47	39.3		9	280	04	37.0	1	03	30.3
	25	246	28	43.1	-0	48	07.6		10	280	50	40.9	-1	03	42.4
	26	247	12	07.4	0	48	35.7		11	281	36	47.6	1	03	54.1
	27	247	55	35.9	0	49	03.4		12	282	22	56.9	1	04	05.4
	28	248	39	08.8	0	49	30.7		13	283	09	08.9	1	04	16.3
	29	249	22	45.9	0	49	57.8		14	283	55	23.5	1	04	26.9
	30	250	06	27.3	0	50	24.5		15	284	41	40.6	1	04	37.0
	31	250	50	13.0	-0	50	50.9		16	285	28	00.3	-1	04	46.8
Nov.	1	251	34	02.7	0	51	16.9		17	286	14	22.4	1	04	56.1
	2	252	17	56.5	0	51	42.6		18	287	00	47.1	1	05	05.1
	3	253	01	54.3	0	52	08.0		19	287	47	14.1	1	05	13.6
	4	253	45	56.0	0	52	33.0		20	288	33	43.7	1	05	21.7
	5	254	30	01.6	0	52	57.8		21	289	20	15.7	1	05	29.4
	6	255	14	10.9	-0	53	22.1		22	290	06	50.2	-1	05	36.7
	7	255	58	24.1	0	53	46.2		23	290	53	27.1	1	05	43.5
	8	256	42	40.9	0	54	09.9		24	291	40	06.4	1	05	49.9
	9	257	27	01.5	0	54	33.3		25	292	26	48.0	1	05	55.9
	10	258	11	25.7	0	54	56.4		26	293	13	31.9	1	06	01.5
	11	258	55	53.6	0	55	19.1		27	294	00	18.0	1	06	06.7
	12	259	40	25.2	-0	55	41.5		28	294	47	06.1	-1	06	11.4
	13	260	25	00.4	0	56	03.6		29	295	33	56.3	1	06	15.7
	14	261	09	39.3	0	56	25.3		30	296	20	48.3	1	06	19.6
	15	261	54	21.8	0	56	46.7		31	297	07	42.2	1	06	23.1
	16	262	39	08.0	-0	57	07.8		32	297	54	37.9	-1	06	26.2

MARS, 2027

RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
Jan.	0	10	50	10.36	+10	54	39.0	0.921 823	9.54	5.08	4	11	49
	1	10	50	40.62	10	53	49.9	0.913 865	9.62	5.12	4	08	23
	2	10	51	08.38	10	53	16.3	0.905 973	9.71	5.17	4	04	54
	3	10	51	33.60	10	52	58.6	0.898 147	9.79	5.21	4	01	23
	4	10	51	56.24	10	52	57.1	0.890 393	9.88	5.26	3	57	49
	5	10	52	16.25	10	53	11.8	0.882 714	9.96	5.30	3	54	13
	6	10	52	33.59	+10	53	43.0	0.875 113	10.05	5.35	3	50	33
	7	10	52	48.22	10	54	30.9	0.867 595	10.14	5.39	3	46	52
	8	10	53	00.10	10	55	35.7	0.860 163	10.22	5.44	3	43	07
	9	10	53	09.18	10	56	57.5	0.852 821	10.31	5.49	3	39	20
	10	10	53	15.44	10	58	36.4	0.845 574	10.40	5.53	3	35	30
	11	10	53	18.83	11	00	32.6	0.838 424	10.49	5.58	3	31	37
	12	10	53	19.34	+11	02	45.9	0.831 376	10.58	5.63	3	27	41
	13	10	53	16.93	11	05	16.6	0.824 434	10.67	5.68	3	23	42
	14	10	53	11.57	11	08	04.5	0.817 602	10.76	5.72	3	19	41
	15	10	53	03.24	11	11	09.7	0.810 884	10.85	5.77	3	15	36
	16	10	52	51.93	11	14	32.1	0.804 284	10.93	5.82	3	11	28
	17	10	52	37.62	11	18	11.5	0.797 805	11.02	5.87	3	07	18
	18	10	52	20.29	+11	22	08.0	0.791 452	11.11	5.91	3	03	04
	19	10	51	59.93	11	26	21.4	0.785 228	11.20	5.96	2	58	48
	20	10	51	36.53	11	30	51.5	0.779 138	11.29	6.01	2	54	28
	21	10	51	10.08	11	35	38.3	0.773 184	11.37	6.05	2	50	06
	22	10	50	40.57	11	40	41.4	0.767 371	11.46	6.10	2	45	40
	23	10	50	08.00	11	46	00.7	0.761 703	11.55	6.14	2	41	11
	24	10	49	32.35	+11	51	36.0	0.756 183	11.63	6.19	2	36	40
	25	10	48	53.64	11	57	27.0	0.750 816	11.71	6.23	2	32	05
	26	10	48	11.88	12	03	33.3	0.745 606	11.79	6.28	2	27	27
	27	10	47	27.07	12	09	54.5	0.740 557	11.88	6.32	2	22	47
	28	10	46	39.25	12	16	30.2	0.735 674	11.95	6.36	2	18	03
	29	10	45	48.44	12	23	19.9	0.730 961	12.03	6.40	2	13	16
	30	10	44	54.68	+12	30	23.1	0.726 423	12.11	6.44	2	08	27
	31	10	43	58.02	12	37	39.0	0.722 064	12.18	6.48	2	03	34
Feb.	1	10	42	58.50	12	45	07.1	0.717 889	12.25	6.52	1	58	39
	2	10	41	56.20	12	52	46.6	0.713 901	12.32	6.56	1	53	41
	3	10	40	51.17	13	00	36.7	0.710 105	12.38	6.59	1	48	40
	4	10	39	43.50	13	08	36.6	0.706 505	12.45	6.62	1	43	37
	5	10	38	33.28	+13	16	45.4	0.703 104	12.51	6.66	1	38	31
	6	10	37	20.61	13	25	02.2	0.699 907	12.56	6.69	1	33	22
	7	10	36	05.58	13	33	26.0	0.696 916	12.62	6.72	1	28	12
	8	10	34	48.32	13	41	55.7	0.694 135	12.67	6.74	1	22	59
	9	10	33	28.95	13	50	30.4	0.691 567	12.72	6.77	1	17	44
	10	10	32	07.60	13	59	08.9	0.689 214	12.76	6.79	1	12	27
	11	10	30	44.41	+14	07	50.1	0.687 079	12.80	6.81	1	07	09
	12	10	29	19.53	14	16	32.8	0.685 165	12.84	6.83	1	01	48
	13	10	27	53.12	14	25	16.0	0.683 472	12.87	6.85	0	56	27
	14	10	26	25.32	14	33	58.5	0.682 002	12.89	6.86	0	51	03
	15	10	24	56.30	+14	42	39.3	0.680 757	12.92	6.87	0	45	39

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RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
Feb.	15	10	24	56.30	+14	42	39.3	0.680 757	12.92	6.87	0	45	39
	16	10	23	26.24	14	51	17.1	0.679 737	12.94	6.89	0	40	14
	17	10	21	55.28	14	59	51.0	0.678 943	12.95	6.89	0	34	47
	18	10	20	23.60	15	08	19.9	0.678 376	12.96	6.90	0	29	20
	19	10	18	51.37	15	16	42.9	0.678 034	12.97	6.90	0	23	53
	20	10	17	18.74	15	24	58.9	0.677 919	12.97	6.90	0	18	25
	21	10	15	45.90	+15	33	07.0	0.678 030	12.97	6.90	0	12	57
	22	10	14	13.01	15	41	06.3	0.678 366	12.96	6.90	0	07	28
	23	10	12	40.23	15	48	55.9	0.678 928	12.95	6.89	0	02	00
	24	10	11	07.76	15	56	34.9	0.679 714	12.94	6.89	23	51	05
	25	10	09	35.75	16	04	02.5	0.680 723	12.92	6.88	23	45	39
	26	10	08	04.39	16	11	18.0	0.681 956	12.90	6.86	23	40	13
	27	10	06	33.83	+16	18	20.5	0.683 410	12.87	6.85	23	34	48
	28	10	05	04.26	16	25	09.4	0.685 083	12.84	6.83	23	29	24
Mar.	1	10	03	35.84	16	31	43.9	0.686 975	12.80	6.81	23	24	01
	2	10	02	08.72	16	38	03.6	0.689 083	12.76	6.79	23	18	40
	3	10	00	43.07	16	44	07.7	0.691 405	12.72	6.77	23	13	21
	4	9	59	19.04	16	49	55.9	0.693 938	12.67	6.74	23	08	03
	5	9	57	56.78	+16	55	27.6	0.696 680	12.62	6.72	23	02	47
	6	9	56	36.44	17	00	42.5	0.699 627	12.57	6.69	22	57	34
	7	9	55	18.13	17	05	40.1	0.702 776	12.51	6.66	22	52	22
	8	9	54	02.01	17	10	20.2	0.706 124	12.45	6.63	22	47	13
	9	9	52	48.18	17	14	42.5	0.709 667	12.39	6.59	22	42	06
	10	9	51	36.77	17	18	46.7	0.713 401	12.33	6.56	22	37	01
	11	9	50	27.87	+17	22	32.9	0.717 323	12.26	6.52	22	31	59
	12	9	49	21.59	17	26	00.8	0.721 428	12.19	6.49	22	27	00
	13	9	48	18.02	17	29	10.4	0.725 711	12.12	6.45	22	22	03
	14	9	47	17.23	17	32	01.7	0.730 168	12.04	6.41	22	17	10
	15	9	46	19.29	17	34	34.8	0.734 795	11.97	6.37	22	12	19
	16	9	45	24.25	17	36	49.8	0.739 586	11.89	6.33	22	07	31
	17	9	44	32.17	+17	38	46.9	0.744 538	11.81	6.29	22	02	46
	18	9	43	43.08	17	40	26.3	0.749 645	11.73	6.24	21	58	04
	19	9	42	57.00	17	41	48.1	0.754 904	11.65	6.20	21	53	25
	20	9	42	13.96	17	42	52.6	0.760 308	11.57	6.16	21	48	49
	21	9	41	33.98	17	43	40.1	0.765 856	11.48	6.11	21	44	16
	22	9	40	57.06	17	44	10.7	0.771 541	11.40	6.07	21	39	46
	23	9	40	23.21	+17	44	24.8	0.777 360	11.31	6.02	21	35	20
	24	9	39	52.44	17	44	22.6	0.783 310	11.23	5.97	21	30	56
	25	9	39	24.75	17	44	04.4	0.789 386	11.14	5.93	21	26	35
	26	9	39	00.12	17	43	30.4	0.795 584	11.05	5.88	21	22	17
	27	9	38	38.56	17	42	40.9	0.801 901	10.97	5.84	21	18	03
	28	9	38	20.04	17	41	36.1	0.808 334	10.88	5.79	21	13	51
	29	9	38	04.55	+17	40	16.3	0.814 877	10.79	5.74	21	09	43
	30	9	37	52.08	17	38	41.8	0.821 528	10.70	5.70	21	05	37
	31	9	37	42.59	17	36	52.8	0.828 284	10.62	5.65	21	01	34
Apr.	1	9	37	36.07	17	34	49.5	0.835 139	10.53	5.60	20	57	34
	2	9	37	32.49	+17	32	32.2	0.842 092	10.44	5.56	20	53	37

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RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
Apr.	1	9	37	36.07	+17	34	49.5	0.835 139	10.53	5.60	20	57	34
	2	9	37	32.49	17	32	32.2	0.842 092	10.44	5.56	20	53	37
	3	9	37	31.82	17	30	01.1	0.849 137	10.36	5.51	20	49	43
	4	9	37	34.03	17	27	16.4	0.856 272	10.27	5.47	20	45	52
	5	9	37	39.08	17	24	18.4	0.863 493	10.18	5.42	20	42	03
	6	9	37	46.95	17	21	07.3	0.870 796	10.10	5.37	20	38	18
	7	9	37	57.59	+17	17	43.2	0.878 177	10.01	5.33	20	34	35
	8	9	38	10.97	17	14	06.5	0.885 634	9.93	5.28	20	30	55
	9	9	38	27.05	17	10	17.3	0.893 162	9.85	5.24	20	27	17
	10	9	38	45.78	17	06	15.8	0.900 758	9.76	5.20	20	23	42
	11	9	39	07.13	17	02	02.3	0.908 418	9.68	5.15	20	20	09
	12	9	39	31.03	16	57	37.0	0.916 140	9.60	5.11	20	16	39
	13	9	39	57.45	+16	53	00.2	0.923 919	9.52	5.07	20	13	12
	14	9	40	26.31	16	48	12.1	0.931 752	9.44	5.02	20	09	46
	15	9	40	57.58	16	43	13.0	0.939 637	9.36	4.98	20	06	24
	16	9	41	31.19	16	38	03.0	0.947 570	9.28	4.94	20	03	03
	17	9	42	07.09	16	32	42.4	0.955 549	9.20	4.90	19	59	45
	18	9	42	45.23	16	27	11.4	0.963 572	9.13	4.86	19	56	29
	19	9	43	25.55	+16	21	30.1	0.971 635	9.05	4.82	19	53	15
	20	9	44	08.02	16	15	38.8	0.979 737	8.98	4.78	19	50	03
	21	9	44	52.58	16	09	37.7	0.987 875	8.90	4.74	19	46	53
	22	9	45	39.18	16	03	26.8	0.996 048	8.83	4.70	19	43	45
	23	9	46	27.78	15	57	06.3	1.004 254	8.76	4.66	19	40	39
	24	9	47	18.33	15	50	36.4	1.012 490	8.69	4.62	19	37	35
	25	9	48	10.80	+15	43	57.2	1.020 755	8.62	4.58	19	34	33
	26	9	49	05.12	15	37	08.9	1.029 048	8.55	4.55	19	31	32
	27	9	50	01.27	15	30	11.5	1.037 366	8.48	4.51	19	28	34
	28	9	50	59.20	15	23	05.2	1.045 707	8.41	4.48	19	25	37
	29	9	51	58.88	15	15	50.0	1.054 070	8.34	4.44	19	22	42
	30	9	53	00.26	15	08	26.1	1.062 453	8.28	4.40	19	19	48
May	1	9	54	03.30	+15	00	53.6	1.070 854	8.21	4.37	19	16	56
	2	9	55	07.98	14	53	12.4	1.079 271	8.15	4.34	19	14	06
	3	9	56	14.25	14	45	22.8	1.087 704	8.09	4.30	19	11	18
	4	9	57	22.09	14	37	24.7	1.096 149	8.02	4.27	19	08	30
	5	9	58	31.46	14	29	18.3	1.104 605	7.96	4.24	19	05	45
	6	9	59	42.32	14	21	03.6	1.113 070	7.90	4.20	19	03	00
	7	10	00	54.65	+14	12	40.7	1.121 543	7.84	4.17	19	00	18
	8	10	02	08.41	14	04	09.7	1.130 020	7.78	4.14	18	57	36
	9	10	03	23.56	13	55	30.8	1.138 502	7.72	4.11	18	54	56
	10	10	04	40.07	13	46	44.0	1.146 985	7.67	4.08	18	52	18
	11	10	05	57.90	13	37	49.4	1.155 468	7.61	4.05	18	49	40
	12	10	07	17.02	13	28	47.3	1.163 950	7.56	4.02	18	47	04
	13	10	08	37.38	+13	19	37.6	1.172 428	7.50	3.99	18	44	29
	14	10	09	58.95	13	10	20.5	1.180 902	7.45	3.96	18	41	55
	15	10	11	21.70	13	00	56.2	1.189 370	7.39	3.93	18	39	23
	16	10	12	45.60	12	51	24.6	1.197 831	7.34	3.91	18	36	51
	17	10	14	10.62	+12	41	45.9	1.206 284	7.29	3.88	18	34	21

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RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	º	'	"		"	"	h	m	s
May	17	10	14	10.62	+12	41	45.9	1.206 284	7.29	3.88	18	34	21
	18	10	15	36.73	12	32	00.2	1.214 729	7.24	3.85	18	31	51
	19	10	17	03.91	12	22	07.6	1.223 164	7.19	3.83	18	29	23
	20	10	18	32.12	12	12	08.1	1.231 589	7.14	3.80	18	26	56
	21	10	20	01.34	12	02	01.9	1.240 002	7.09	3.77	18	24	29
	22	10	21	31.55	11	51	49.0	1.248 404	7.04	3.75	18	22	04
	23	10	23	02.73	+11	41	29.5	1.256 794	7.00	3.72	18	19	39
	24	10	24	34.84	11	31	03.4	1.265 171	6.95	3.70	18	17	16
	25	10	26	07.88	11	20	30.8	1.273 533	6.91	3.67	18	14	53
	26	10	27	41.81	11	09	51.8	1.281 881	6.86	3.65	18	12	32
	27	10	29	16.63	10	59	06.5	1.290 214	6.82	3.63	18	10	11
	28	10	30	52.31	10	48	14.8	1.298 532	6.77	3.60	18	07	51
	29	10	32	28.84	+10	37	16.9	1.306 832	6.73	3.58	18	05	32
	30	10	34	06.20	10	26	12.7	1.315 115	6.69	3.56	18	03	13
	31	10	35	44.38	10	15	02.3	1.323 379	6.65	3.54	18	00	56
June	1	10	37	23.36	10	03	45.8	1.331 624	6.60	3.51	17	58	39
	2	10	39	03.13	9	52	23.2	1.339 849	6.56	3.49	17	56	23
	3	10	40	43.68	9	40	54.6	1.348 053	6.52	3.47	17	54	08
	4	10	42	25.00	+9	29	20.0	1.356 235	6.48	3.45	17	51	53
	5	10	44	07.06	9	17	39.4	1.364 394	6.45	3.43	17	49	40
	6	10	45	49.86	9	05	53.1	1.372 528	6.41	3.41	17	47	27
	7	10	47	33.38	8	54	01.0	1.380 637	6.37	3.39	17	45	14
	8	10	49	17.59	8	42	03.4	1.388 720	6.33	3.37	17	43	03
	9	10	51	02.48	8	30	00.2	1.396 775	6.30	3.35	17	40	52
	10	10	52	48.04	+8	17	51.6	1.404 803	6.26	3.33	17	38	41
	11	10	54	34.24	8	05	37.6	1.412 802	6.22	3.31	17	36	32
	12	10	56	21.08	7	53	18.4	1.420 771	6.19	3.29	17	34	22
	13	10	58	08.54	7	40	54.1	1.428 711	6.16	3.28	17	32	14
	14	10	59	56.61	7	28	24.7	1.436 621	6.12	3.26	17	30	06
	15	11	01	45.28	7	15	50.2	1.444 500	6.09	3.24	17	27	59
	16	11	03	34.54	+7	03	10.9	1.452 349	6.06	3.22	17	25	52
	17	11	05	24.38	6	50	26.8	1.460 167	6.02	3.21	17	23	46
	18	11	07	14.78	6	37	37.9	1.467 954	5.99	3.19	17	21	41
	19	11	09	05.74	6	24	44.3	1.475 709	5.96	3.17	17	19	35
	20	11	10	57.24	6	11	46.2	1.483 434	5.93	3.15	17	17	31
	21	11	12	49.29	5	58	43.5	1.491 127	5.90	3.14	17	15	27
	22	11	14	41.87	+5	45	36.4	1.498 788	5.87	3.12	17	13	24
	23	11	16	34.98	5	32	24.9	1.506 418	5.84	3.11	17	11	21
	24	11	18	28.61	5	19	09.1	1.514 016	5.81	3.09	17	09	18
	25	11	20	22.75	5	05	49.0	1.521 581	5.78	3.08	17	07	16
	26	11	22	17.41	4	52	24.6	1.529 114	5.75	3.06	17	05	15
	27	11	24	12.58	4	38	56.2	1.536 613	5.72	3.05	17	03	14
	28	11	26	08.26	+4	25	23.6	1.544 080	5.70	3.03	17	01	14
	29	11	28	04.45	4	11	47.0	1.551 513	5.67	3.02	16	59	14
	30	11	30	01.14	3	58	06.4	1.558 912	5.64	3.00	16	57	15
July	1	11	31	58.34	3	44	21.8	1.566 276	5.61	2.99	16	55	16
	2	11	33	56.04	+3	30	33.4	1.573 605	5.59	2.97	16	53	18

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RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	º	'	"		"	"	h	m	s
July	1	11	31	58.34	+3	44	21.8	1.566 276	5.61	2.99	16	55	16
	2	11	33	56.04	3	30	33.4	1.573 605	5.59	2.97	16	53	18
	3	11	35	54.24	3	16	41.3	1.580 898	5.56	2.96	16	51	20
	4	11	37	52.93	3	02	45.4	1.588 155	5.54	2.95	16	49	22
	5	11	39	52.11	2	48	46.0	1.595 374	5.51	2.93	16	47	25
	6	11	41	51.77	2	34	43.1	1.602 556	5.49	2.92	16	45	29
	7	11	43	51.90	+2	20	36.9	1.609 699	5.46	2.91	16	43	33
	8	11	45	52.51	2	06	27.4	1.616 803	5.44	2.89	16	41	38
	9	11	47	53.58	1	52	14.7	1.623 868	5.42	2.88	16	39	43
	10	11	49	55.11	1	37	59.0	1.630 893	5.39	2.87	16	37	48
	11	11	51	57.10	1	23	40.4	1.637 878	5.37	2.86	16	35	54
	12	11	53	59.56	1	09	18.9	1.644 824	5.35	2.85	16	34	00
	13	11	56	02.46	+0	54	54.6	1.651 729	5.32	2.83	16	32	07
	14	11	58	05.82	0	40	27.6	1.658 595	5.30	2.82	16	30	14
	15	12	00	09.63	0	25	58.1	1.665 422	5.28	2.81	16	28	22
	16	12	02	13.88	+0	11	26.2	1.672 209	5.26	2.80	16	26	30
	17	12	04	18.58	-0	03	08.2	1.678 956	5.24	2.79	16	24	39
	18	12	06	23.73	0	17	44.8	1.685 664	5.22	2.78	16	22	48
	19	12	08	29.32	-0	32	23.6	1.692 333	5.20	2.77	16	20	57
	20	12	10	35.35	0	47	04.5	1.698 962	5.18	2.75	16	19	07
	21	12	12	41.83	1	01	47.4	1.705 553	5.16	2.74	16	17	18
	22	12	14	48.76	1	16	32.3	1.712 104	5.14	2.73	16	15	28
	23	12	16	56.14	1	31	19.0	1.718 617	5.12	2.72	16	13	40
	24	12	19	03.97	1	46	07.5	1.725 090	5.10	2.71	16	11	51
	25	12	21	12.26	-2	00	57.6	1.731 525	5.08	2.70	16	10	04
	26	12	23	21.02	2	15	49.4	1.737 921	5.06	2.69	16	08	16
	27	12	25	30.24	2	30	42.8	1.744 277	5.04	2.68	16	06	29
	28	12	27	39.94	2	45	37.6	1.750 594	5.02	2.67	16	04	43
	29	12	29	50.11	3	00	33.8	1.756 871	5.01	2.66	16	02	57
	30	12	32	00.76	3	15	31.3	1.763 109	4.99	2.65	16	01	12
	31	12	34	11.89	-3	30	30.0	1.769 306	4.97	2.65	15	59	27
Aug.	1	12	36	23.50	3	45	29.7	1.775 462	4.95	2.64	15	57	42
	2	12	38	35.60	4	00	30.4	1.781 577	4.94	2.63	15	55	58
	3	12	40	48.18	4	15	31.9	1.787 651	4.92	2.62	15	54	15
	4	12	43	01.25	4	30	34.1	1.793 682	4.90	2.61	15	52	31
	5	12	45	14.80	4	45	36.9	1.799 671	4.89	2.60	15	50	49
	6	12	47	28.83	-5	00	40.1	1.805 617	4.87	2.59	15	49	07
	7	12	49	43.36	5	15	43.6	1.811 520	4.85	2.58	15	47	25
	8	12	51	58.39	5	30	47.4	1.817 380	4.84	2.58	15	45	44
	9	12	54	13.90	5	45	51.2	1.823 197	4.82	2.57	15	44	04
	10	12	56	29.91	6	00	55.1	1.828 972	4.81	2.56	15	42	23
	11	12	58	46.42	6	15	58.7	1.834 705	4.79	2.55	15	40	44
	12	13	01	03.43	-6	31	02.1	1.840 396	4.78	2.54	15	39	05
	13	13	03	20.93	6	46	05.0	1.846 044	4.76	2.54	15	37	26
	14	13	05	38.94	7	01	07.5	1.851 651	4.75	2.53	15	35	48
	15	13	07	57.45	7	16	09.3	1.857 217	4.74	2.52	15	34	10
	16	13	10	16.47	-7	31	10.3	1.862 741	4.72	2.51	15	32	33

MARS, 2027

RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
Aug.	16	13	10	16.47	-7	31	10.3	1.862 741	4.72	2.51	15	32	33
	17	13	12	36.00	7	46	10.4	1.868 225	4.71	2.51	15	30	57
	18	13	14	56.05	8	01	09.5	1.873 669	4.69	2.50	15	29	21
	19	13	17	16.62	8	16	07.5	1.879 072	4.68	2.49	15	27	45
	20	13	19	37.72	8	31	04.2	1.884 435	4.67	2.48	15	26	10
	21	13	21	59.36	8	45	59.6	1.889 758	4.65	2.48	15	24	36
	22	13	24	21.54	-9	00	53.6	1.895 041	4.64	2.47	15	23	02
	23	13	26	44.27	9	15	45.9	1.900 285	4.63	2.46	15	21	28
	24	13	29	07.56	9	30	36.7	1.905 489	4.62	2.46	15	19	56
	25	13	31	31.41	9	45	25.6	1.910 654	4.60	2.45	15	18	23
	26	13	33	55.84	10	00	12.6	1.915 780	4.59	2.44	15	16	52
	27	13	36	20.83	10	14	57.7	1.920 865	4.58	2.44	15	15	21
	28	13	38	46.41	-10	29	40.5	1.925 911	4.57	2.43	15	13	50
	29	13	41	12.58	10	44	21.0	1.930 917	4.55	2.42	15	12	20
	30	13	43	39.33	10	58	59.1	1.935 882	4.54	2.42	15	10	51
	31	13	46	06.67	11	13	34.5	1.940 807	4.53	2.41	15	09	22
Sept.	1	13	48	34.61	11	28	07.2	1.945 690	4.52	2.41	15	07	54
	2	13	51	03.14	11	42	36.9	1.950 532	4.51	2.40	15	06	26
	3	13	53	32.28	-11	57	03.5	1.955 332	4.50	2.39	15	04	59
	4	13	56	02.03	12	11	26.9	1.960 091	4.49	2.39	15	03	33
	5	13	58	32.40	12	25	47.0	1.964 809	4.48	2.38	15	02	07
	6	14	01	03.37	12	40	03.4	1.969 485	4.47	2.38	15	00	42
	7	14	03	34.96	12	54	16.2	1.974 120	4.45	2.37	14	59	18
	8	14	06	07.17	13	08	25.2	1.978 714	4.44	2.37	14	57	54
	9	14	08	39.99	-13	22	30.1	1.983 268	4.43	2.36	14	56	31
	10	14	11	13.44	13	36	30.8	1.987 781	4.42	2.35	14	55	08
	11	14	13	47.51	13	50	27.2	1.992 256	4.41	2.35	14	53	46
	12	14	16	22.21	14	04	19.2	1.996 690	4.40	2.34	14	52	25
	13	14	18	57.53	14	18	06.4	2.001 086	4.39	2.34	14	51	04
	14	14	21	33.49	14	31	48.9	2.005 443	4.39	2.33	14	49	44
	15	14	24	10.09	-14	45	26.4	2.009 762	4.38	2.33	14	48	24
	16	14	26	47.34	14	58	58.7	2.014 043	4.37	2.32	14	47	05
	17	14	29	25.23	15	12	25.8	2.018 287	4.36	2.32	14	45	47
	18	14	32	03.78	15	25	47.5	2.022 494	4.35	2.31	14	44	30
	19	14	34	42.99	15	39	03.6	2.026 664	4.34	2.31	14	43	13
	20	14	37	22.88	15	52	14.0	2.030 798	4.33	2.30	14	41	57
	21	14	40	03.43	-16	05	18.5	2.034 895	4.32	2.30	14	40	41
	22	14	42	44.67	16	18	17.0	2.038 957	4.31	2.30	14	39	26
	23	14	45	26.59	16	31	09.4	2.042 982	4.30	2.29	14	38	12
	24	14	48	09.20	16	43	55.4	2.046 971	4.30	2.29	14	36	59
	25	14	50	52.50	16	56	34.9	2.050 925	4.29	2.28	14	35	46
	26	14	53	36.48	17	09	07.7	2.054 842	4.28	2.28	14	34	34
	27	14	56	21.17	-17	21	33.6	2.058 723	4.27	2.27	14	33	22
	28	14	59	06.55	17	33	52.4	2.062 567	4.26	2.27	14	32	12
	29	15	01	52.62	17	46	03.9	2.066 375	4.26	2.26	14	31	02
	30	15	04	39.40	17	58	08.1	2.070 146	4.25	2.26	14	29	52
Oct.	1	15	07	26.89	-18	10	04.6	2.073 879	4.24	2.26	14	28	44

MARS, 2027

RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
Oct.	1	15	07	26.89	-18	10	04.6	2.073 879	4.24	2.26	14	28	44
	2	15	10	15.08	18	21	53.3	2.077 576	4.23	2.25	14	27	36
	3	15	13	03.97	18	33	34.0	2.081 236	4.23	2.25	14	26	29
	4	15	15	53.56	18	45	06.6	2.084 859	4.22	2.24	14	25	22
	5	15	18	43.86	18	56	30.8	2.088 445	4.21	2.24	14	24	16
	6	15	21	34.85	19	07	46.6	2.091 996	4.20	2.24	14	23	11
	7	15	24	26.53	-19	18	53.6	2.095 510	4.20	2.23	14	22	07
	8	15	27	18.90	19	29	51.7	2.098 989	4.19	2.23	14	21	03
	9	15	30	11.96	19	40	40.7	2.102 434	4.18	2.23	14	20	00
	10	15	33	05.71	19	51	20.5	2.105 843	4.18	2.22	14	18	58
	11	15	36	00.14	20	01	50.8	2.109 219	4.17	2.22	14	17	56
	12	15	38	55.26	20	12	11.5	2.112 561	4.16	2.22	14	16	55
	13	15	41	51.06	-20	22	22.3	2.115 871	4.16	2.21	14	15	55
	14	15	44	47.54	20	32	23.2	2.119 147	4.15	2.21	14	14	55
	15	15	47	44.70	20	42	13.9	2.122 392	4.14	2.21	14	13	56
	16	15	50	42.54	20	51	54.3	2.125 605	4.14	2.20	14	12	58
	17	15	53	41.07	21	01	24.2	2.128 786	4.13	2.20	14	12	01
	18	15	56	40.27	21	10	43.4	2.131 937	4.12	2.20	14	11	04
	19	15	59	40.16	-21	19	51.8	2.135 058	4.12	2.19	14	10	07
	20	16	02	40.72	21	28	49.3	2.138 149	4.11	2.19	14	09	12
	21	16	05	41.95	21	37	35.5	2.141 209	4.11	2.19	14	08	17
	22	16	08	43.84	21	46	10.5	2.144 240	4.10	2.18	14	07	23
	23	16	11	46.41	21	54	33.9	2.147 241	4.10	2.18	14	06	29
	24	16	14	49.62	22	02	45.6	2.150 212	4.09	2.18	14	05	36
	25	16	17	53.49	-22	10	45.4	2.153 154	4.08	2.17	14	04	44
	26	16	20	58.01	22	18	33.1	2.156 065	4.08	2.17	14	03	52
	27	16	24	03.18	22	26	08.5	2.158 947	4.07	2.17	14	03	01
	28	16	27	08.98	22	33	31.6	2.161 798	4.07	2.16	14	02	11
	29	16	30	15.41	22	40	42.0	2.164 619	4.06	2.16	14	01	21
	30	16	33	22.46	22	47	39.7	2.167 410	4.06	2.16	14	00	32
	31	16	36	30.13	-22	54	24.5	2.170 170	4.05	2.16	13	59	44
Nov.	1	16	39	38.39	23	00	56.3	2.172 901	4.05	2.15	13	58	56
	2	16	42	47.25	23	07	14.8	2.175 602	4.04	2.15	13	58	08
	3	16	45	56.68	23	13	19.9	2.178 273	4.04	2.15	13	57	22
	4	16	49	06.67	23	19	11.5	2.180 916	4.03	2.15	13	56	35
	5	16	52	17.21	23	24	49.4	2.183 530	4.03	2.14	13	55	50
	6	16	55	28.29	-23	30	13.5	2.186 116	4.02	2.14	13	55	04
	7	16	58	39.89	23	35	23.5	2.188 674	4.02	2.14	13	54	20
	8	17	01	52.01	23	40	19.5	2.191 204	4.01	2.14	13	53	36
	9	17	05	04.62	23	45	01.1	2.193 708	4.01	2.13	13	52	52
	10	17	08	17.73	23	49	28.3	2.196 186	4.00	2.13	13	52	09
	11	17	11	31.32	23	53	41.0	2.198 638	4.00	2.13	13	51	26
	12	17	14	45.38	-23	57	39.1	2.201 066	4.00	2.13	13	50	44
	13	17	17	59.89	24	01	22.3	2.203 468	3.99	2.12	13	50	02
	14	17	21	14.85	24	04	50.6	2.205 847	3.99	2.12	13	49	21
	15	17	24	30.25	24	08	04.0	2.208 202	3.98	2.12	13	48	40
	16	17	27	46.07	-24	11	02.3	2.210 534	3.98	2.12	13	48	00

MARS, 2027

RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
Nov.	16	17	27	46.07	-24	11	02.3	2.210 534	3.98	2.12	13	48	00
	17	17	31	02.29	24	13	45.3	2.212 844	3.97	2.11	13	47	20
	18	17	34	18.92	24	16	13.1	2.215 131	3.97	2.11	13	46	40
	19	17	37	35.92	24	18	25.4	2.217 396	3.97	2.11	13	46	00
	20	17	40	53.28	24	20	22.2	2.219 639	3.96	2.11	13	45	22
	21	17	44	11.00	24	22	03.4	2.221 860	3.96	2.11	13	44	43
	22	17	47	29.06	-24	23	28.9	2.224 059	3.95	2.10	13	44	05
	23	17	50	47.45	24	24	38.5	2.226 235	3.95	2.10	13	43	27
	24	17	54	06.14	24	25	32.2	2.228 390	3.95	2.10	13	42	49
	25	17	57	25.13	24	26	10.0	2.230 522	3.94	2.10	13	42	12
	26	18	00	44.41	24	26	31.6	2.232 633	3.94	2.10	13	41	34
	27	18	04	03.94	24	26	37.2	2.234 720	3.94	2.09	13	40	58
	28	18	07	23.73	-24	26	26.7	2.236 786	3.93	2.09	13	40	21
	29	18	10	43.74	24	25	59.9	2.238 830	3.93	2.09	13	39	45
	30	18	14	03.95	24	25	17.0	2.240 851	3.92	2.09	13	39	08
Dec.	1	18	17	24.35	24	24	17.7	2.242 851	3.92	2.09	13	38	32
	2	18	20	44.92	24	23	02.2	2.244 830	3.92	2.08	13	37	56
	3	18	24	05.63	24	21	30.3	2.246 788	3.91	2.08	13	37	21
	4	18	27	26.46	-24	19	42.1	2.248 725	3.91	2.08	13	36	45
	5	18	30	47.41	24	17	37.5	2.250 642	3.91	2.08	13	36	09
	6	18	34	08.44	24	15	16.5	2.252 539	3.90	2.08	13	35	34
	7	18	37	29.55	24	12	39.1	2.254 417	3.90	2.08	13	34	59
	8	18	40	50.72	24	09	45.3	2.256 276	3.90	2.07	13	34	23
	9	18	44	11.93	24	06	35.1	2.258 117	3.89	2.07	13	33	48
	10	18	47	33.16	-24	03	08.5	2.259 941	3.89	2.07	13	33	13
	11	18	50	54.40	23	59	25.5	2.261 747	3.89	2.07	13	32	37
	12	18	54	15.64	23	55	26.2	2.263 537	3.89	2.07	13	32	02
	13	18	57	36.85	23	51	10.6	2.265 310	3.88	2.07	13	31	27
	14	19	00	58.04	23	46	38.8	2.267 069	3.88	2.06	13	30	51
	15	19	04	19.16	23	41	50.7	2.268 812	3.88	2.06	13	30	16
	16	19	07	40.22	-23	36	46.4	2.270 541	3.87	2.06	13	29	40
	17	19	11	01.20	23	31	26.0	2.272 255	3.87	2.06	13	29	05
	18	19	14	22.08	23	25	49.5	2.273 955	3.87	2.06	13	28	29
	19	19	17	42.84	23	19	56.9	2.275 641	3.86	2.06	13	27	53
	20	19	21	03.49	23	13	48.2	2.277 312	3.86	2.06	13	27	17
	21	19	24	23.99	23	07	23.6	2.278 969	3.86	2.05	13	26	41
	22	19	27	44.36	-23	00	43.1	2.280 612	3.86	2.05	13	26	05
	23	19	31	04.56	22	53	46.8	2.282 240	3.85	2.05	13	25	28
	24	19	34	24.59	22	46	34.7	2.283 854	3.85	2.05	13	24	52
	25	19	37	44.43	22	39	07.0	2.285 453	3.85	2.05	13	24	15
	26	19	41	04.06	22	31	23.8	2.287 037	3.85	2.05	13	23	38
	27	19	44	23.48	22	23	25.2	2.288 607	3.84	2.04	13	23	01
	28	19	47	42.66	-22	15	11.3	2.290 162	3.84	2.04	13	22	23
	29	19	51	01.60	22	06	42.2	2.291 703	3.84	2.04	13	21	45
	30	19	54	20.26	21	57	58.0	2.293 229	3.83	2.04	13	21	07
	31	19	57	38.65	21	48	58.9	2.294 742	3.83	2.04	13	20	29
	32	20	00	56.75	-21	39	45.0	2.296 241	3.83	2.04	13	19	50

JUPITER, 2027

HELIOCENTRIC POSITIONS FOR 0^h TERRESTRIAL TIME
MEAN EQUINOX AND ECLIPTIC OF DATE

Date	Heliocentric Longitude	Heliocentric Latitude	Radius Vector
	° ′ ″	° ′ ″	
Jan. 1	138 48 14.6	+0 48 11.3	5.335 7775
3	138 57 42.9	0 48 21.4	5.336 3789
5	139 07 11.1	0 48 31.6	5.336 9793
7	139 16 39.1	0 48 41.6	5.337 5785
9	139 26 07.1	0 48 51.7	5.338 1765
11	139 35 34.9	0 49 01.8	5.338 7734
13	139 45 02.6	+0 49 11.8	5.339 3691
15	139 54 30.2	0 49 21.9	5.339 9637
17	140 03 57.6	0 49 31.8	5.340 5571
19	140 13 24.9	0 49 41.8	5.341 1493
21	140 22 52.1	0 49 51.8	5.341 7404
23	140 32 19.2	0 50 01.7	5.342 3302
25	140 41 46.1	+0 50 11.5	5.342 9189
27	140 51 12.9	0 50 21.4	5.343 5064
29	141 00 39.6	0 50 31.3	5.344 0927
31	141 10 06.2	0 50 41.1	5.344 6778
Feb. 2	141 19 32.7	0 50 50.9	5.345 2617
4	141 28 59.0	0 51 00.6	5.345 8444
6	141 38 25.2	+0 51 10.3	5.346 4259
8	141 47 51.3	0 51 20.1	5.347 0062
10	141 57 17.2	0 51 29.8	5.347 5852
12	142 06 43.1	0 51 39.4	5.348 1631
14	142 16 08.8	0 51 49.0	5.348 7397
16	142 25 34.4	0 51 58.7	5.349 3150
18	142 34 59.9	+0 52 08.3	5.349 8892
20	142 44 25.2	0 52 17.8	5.350 4621
22	142 53 50.5	0 52 27.3	5.351 0337
24	143 03 15.6	0 52 36.9	5.351 6042
26	143 12 40.5	0 52 46.4	5.352 1733
28	143 22 05.4	0 52 55.8	5.352 7412
Mar. 2	143 31 30.2	+0 53 05.2	5.353 3079
4	143 40 54.9	0 53 14.7	5.353 8733
6	143 50 19.4	0 53 24.0	5.354 4374
8	143 59 43.8	0 53 33.4	5.355 0003
10	144 09 08.0	0 53 42.7	5.355 5619
12	144 18 32.2	0 53 52.0	5.356 1222
14	144 27 56.3	+0 54 01.3	5.356 6813
16	144 37 20.2	0 54 10.5	5.357 2390
18	144 46 44.0	0 54 19.8	5.357 7955
20	144 56 07.7	0 54 29.0	5.358 3507
22	145 05 31.3	0 54 38.1	5.358 9046
24	145 14 54.7	0 54 47.3	5.359 4572
26	145 24 18.1	+0 54 56.4	5.360 0086
28	145 33 41.3	0 55 05.5	5.360 5586
30	145 43 04.4	0 55 14.6	5.361 1073
Apr. 1	145 52 27.5	0 55 23.6	5.361 6547
3	146 01 50.4	+0 55 32.6	5.362 2008
Apr. 3	146 01 50.4	+0 55 32.6	5.362 2008
5	146 11 13.1	0 55 41.6	5.362 7456
7	146 20 35.8	0 55 50.5	5.363 2890
9	146 29 58.4	0 55 59.5	5.363 8311
11	146 39 20.8	0 56 08.4	5.364 3720
13	146 48 43.1	0 56 17.3	5.364 9114
15	146 58 05.3	+0 56 26.1	5.365 4496
17	147 07 27.4	0 56 35.0	5.365 9864
19	147 16 49.4	0 56 43.8	5.366 5219
21	147 26 11.3	0 56 52.5	5.367 0560
23	147 35 33.1	0 57 01.3	5.367 5888
25	147 44 54.7	0 57 10.0	5.368 1202
27	147 54 16.3	+0 57 18.7	5.368 6503
29	148 03 37.7	0 57 27.3	5.369 1790
May 1	148 12 59.0	0 57 36.0	5.369 7064
3	148 22 20.3	0 57 44.6	5.370 2324
5	148 31 41.4	0 57 53.2	5.370 7570
7	148 41 02.4	0 58 01.7	5.371 2802
9	148 50 23.3	+0 58 10.3	5.371 8021
11	148 59 44.1	0 58 18.8	5.372 3226
13	149 09 04.7	0 58 27.2	5.372 8417
15	149 18 25.3	0 58 35.7	5.373 3594
17	149 27 45.8	0 58 44.1	5.373 8757
19	149 37 06.1	0 58 52.5	5.374 3907
21	149 46 26.4	+0 59 00.8	5.374 9042
23	149 55 46.5	0 59 09.2	5.375 4163
25	150 05 06.6	0 59 17.5	5.375 9271
27	150 14 26.5	0 59 25.8	5.376 4364
29	150 23 46.3	0 59 34.0	5.376 9443
31	150 33 06.0	0 59 42.2	5.377 4508
June 2	150 42 25.7	+0 59 50.4	5.377 9558
4	150 51 45.2	0 59 58.6	5.378 4595
6	151 01 04.6	1 00 06.7	5.378 9617
8	151 10 23.9	1 00 14.9	5.379 4625
10	151 19 43.1	1 00 22.9	5.379 9618
12	151 29 02.2	1 00 31.0	5.380 4598
14	151 38 21.2	+1 00 39.0	5.380 9562
16	151 47 40.1	1 00 47.0	5.381 4513
18	151 56 58.9	1 00 55.0	5.381 9449
20	152 06 17.6	1 01 02.9	5.382 4370
22	152 15 36.2	1 01 10.8	5.382 9277
24	152 24 54.7	1 01 18.7	5.383 4169
26	152 34 13.1	+1 01 26.6	5.383 9047
28	152 43 31.4	1 01 34.4	5.384 3910
30	152 52 49.6	1 01 42.2	5.384 8758
July 2	153 02 07.7	1 01 50.0	5.385 3592
4	153 11 25.7	+1 01 57.7	5.385 8411

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HELIOCENTRIC POSITIONS FOR 0^h TERRESTRIAL TIME
MEAN EQUINOX AND ECLIPTIC OF DATE

Date	Heliocentric Longitude	Heliocentric Latitude	Radius Vector	Date	Heliocentric Longitude	Heliocentric Latitude	Radius Vector
	° ' "	° ' "			° ' "	° ' "	
July 2	153 02 07.7	+1 01 50.0	5.385 3592	Oct. 2	160 08 18.3	+1 07 16.1	5.405 9471
4	153 11 25.7	1 01 57.7	5.385 8411	4	160 17 32.1	1 07 22.5	5.406 3578
6	153 20 43.6	1 02 05.4	5.386 3215	6	160 26 45.8	1 07 28.8	5.406 7668
8	153 30 01.4	1 02 13.1	5.386 8004	8	160 35 59.5	1 07 35.2	5.407 1742
10	153 39 19.1	1 02 20.8	5.387 2779	10	160 45 13.0	1 07 41.5	5.407 5800
12	153 48 36.7	1 02 28.4	5.387 7538	12	160 54 26.5	1 07 47.7	5.407 9841
14	153 57 54.2	+1 02 36.0	5.388 2283	14	161 03 39.9	+1 07 54.0	5.408 3867
16	154 07 11.6	1 02 43.6	5.388 7013	16	161 12 53.2	1 08 00.2	5.408 7876
18	154 16 28.9	1 02 51.1	5.389 1727	18	161 22 06.4	1 08 06.4	5.409 1869
20	154 25 46.1	1 02 58.6	5.389 6427	20	161 31 19.5	1 08 12.5	5.409 5845
22	154 35 03.2	1 03 06.1	5.390 1112	22	161 40 32.6	1 08 18.7	5.409 9805
24	154 44 20.3	1 03 13.6	5.390 5781	24	161 49 45.6	1 08 24.8	5.410 3749
26	154 53 37.2	+1 03 21.0	5.391 0436	26	161 58 58.5	+1 08 30.8	5.410 7677
28	155 02 54.0	1 03 28.4	5.391 5075	28	162 08 11.3	1 08 36.8	5.411 1588
30	155 12 10.7	1 03 35.8	5.391 9700	30	162 17 24.0	1 08 42.8	5.411 5482
Aug. 1	155 21 27.4	1 03 43.1	5.392 4309	Nov. 1	162 26 36.7	1 08 48.8	5.411 9361
3	155 30 43.9	1 03 50.4	5.392 8902	3	162 35 49.3	1 08 54.8	5.412 3222
5	155 40 00.4	1 03 57.7	5.393 3481	5	162 45 01.8	1 09 00.7	5.412 7067
7	155 49 16.7	+1 04 05.0	5.393 8044	7	162 54 14.2	+1 09 06.5	5.413 0896
9	155 58 33.0	1 04 12.2	5.394 2592	9	163 03 26.6	1 09 12.4	5.413 4708
11	156 07 49.2	1 04 19.4	5.394 7124	11	163 12 38.9	1 09 18.2	5.413 8503
13	156 17 05.3	1 04 26.5	5.395 1641	13	163 21 51.1	1 09 24.0	5.414 2282
15	156 26 21.3	1 04 33.7	5.395 6143	15	163 31 03.2	1 09 29.8	5.414 6044
17	156 35 37.2	1 04 40.8	5.396 0629	17	163 40 15.2	1 09 35.4	5.414 9790
19	156 44 53.0	+1 04 47.9	5.396 5099	19	163 49 27.2	+1 09 41.2	5.415 3519
21	156 54 08.7	1 04 54.9	5.396 9554	21	163 58 39.1	1 09 46.8	5.415 7231
23	157 03 24.3	1 05 01.9	5.397 3994	23	164 07 50.9	1 09 52.4	5.416 0926
25	157 12 39.9	1 05 08.9	5.397 8417	25	164 17 02.7	1 09 58.1	5.416 4605
27	157 21 55.3	1 05 15.9	5.398 2826	27	164 26 14.4	1 10 03.6	5.416 8267
29	157 31 10.7	1 05 22.8	5.398 7218	29	164 35 25.9	1 10 09.2	5.417 1912
31	157 40 25.9	+1 05 29.7	5.399 1595	Dec. 1	164 44 37.5	+1 10 14.7	5.417 5540
Sept. 2	157 49 41.1	1 05 36.6	5.399 5956	3	164 53 48.9	1 10 20.2	5.417 9151
4	157 58 56.2	1 05 43.4	5.400 0302	5	165 03 00.3	1 10 25.6	5.418 2746
6	158 08 11.2	1 05 50.2	5.400 4631	7	165 12 11.6	1 10 31.0	5.418 6323
8	158 17 26.1	1 05 57.0	5.400 8945	9	165 21 22.9	1 10 36.4	5.418 9884
10	158 26 41.0	1 06 03.8	5.401 3243	11	165 30 34.0	1 10 41.8	5.419 3428
12	158 35 55.7	+1 06 10.5	5.401 7525	13	165 39 45.1	+1 10 47.1	5.419 6955
14	158 45 10.3	1 06 17.2	5.402 1792	15	165 48 56.1	1 10 52.4	5.420 0465
16	158 54 24.9	1 06 23.8	5.402 6042	17	165 58 07.1	1 10 57.7	5.420 3958
18	159 03 39.4	1 06 30.5	5.403 0277	19	166 07 18.0	1 11 02.9	5.420 7433
20	159 12 53.8	1 06 37.1	5.403 4496	21	166 16 28.8	1 11 08.1	5.421 0892
22	159 22 08.1	1 06 43.7	5.403 8698	23	166 25 39.5	1 11 13.3	5.421 4334
24	159 31 22.3	+1 06 50.2	5.404 2885	25	166 34 50.2	+1 11 18.4	5.421 7759
26	159 40 36.4	1 06 56.7	5.404 7056	27	166 44 00.8	1 11 23.5	5.422 1166
28	159 49 50.5	1 07 03.2	5.405 1210	29	166 53 11.4	1 11 28.6	5.422 4557
30	159 59 04.4	1 07 09.7	5.405 5349	31	167 02 21.8	1 11 33.6	5.422 7930
Oct. 2	160 08 18.3	+1 07 16.1	5.405 9471	33	167 11 32.2	+1 11 38.6	5.423 1286

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GEOCENTRIC LONGITUDE AND LATITUDE FOR 0^h TERRESTRIAL TIME

Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude			Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude		
		°	′	″	°	′	″			°	′	″	°	′	″
Jan.	0	146	30	05.3	+0	55	34.0	Feb.	15	141	30	47.2	+1	03	36.7
	1	146	26	32.2	0	55	48.3		16	141	22	53.5	1	03	41.5
	2	146	22	48.1	0	56	02.5		17	141	15	01.7	1	03	45.9
	3	146	18	53.3	0	56	16.7		18	141	07	12.1	1	03	50.1
	4	146	14	47.8	0	56	30.8		19	140	59	25.0	1	03	54.0
	5	146	10	31.8	0	56	44.8		20	140	51	40.6	1	03	57.5
	6	146	06	05.3	+0	56	58.7		21	140	43	59.3	+1	04	00.8
	7	146	01	28.6	0	57	12.4		22	140	36	21.4	1	04	03.9
	8	145	56	41.8	0	57	26.1		23	140	28	47.2	1	04	06.6
	9	145	51	45.0	0	57	39.6		24	140	21	17.1	1	04	09.1
	10	145	46	38.5	0	57	53.0		25	140	13	51.4	1	04	11.3
	11	145	41	22.4	0	58	06.2		26	140	06	30.5	1	04	13.2
	12	145	35	56.9	+0	58	19.3		27	139	59	14.6	+1	04	14.9
	13	145	30	22.3	0	58	32.2		28	139	52	04.0	1	04	16.3
	14	145	24	38.9	0	58	45.0	Mar.	1	139	44	59.0	1	04	17.4
	15	145	18	46.8	0	58	57.6		2	139	38	00.0	1	04	18.3
	16	145	12	46.3	0	59	10.0		3	139	31	07.1	1	04	19.0
	17	145	06	37.8	0	59	22.3		4	139	24	20.7	1	04	19.3
	18	145	00	21.5	+0	59	34.3		5	139	17	41.0	+1	04	19.5
	19	144	53	57.5	0	59	46.2		6	139	11	08.3	1	04	19.3
	20	144	47	26.3	0	59	57.8		7	139	04	42.9	1	04	19.0
	21	144	40	48.0	1	00	09.2		8	138	58	25.0	1	04	18.3
	22	144	34	02.8	1	00	20.4		9	138	52	14.9	1	04	17.5
	23	144	27	11.0	1	00	31.5		10	138	46	12.8	1	04	16.4
	24	144	20	12.7	+1	00	42.2		11	138	40	19.1	+1	04	15.1
	25	144	13	08.4	1	00	52.8		12	138	34	34.0	1	04	13.5
	26	144	05	58.2	1	01	03.2		13	138	28	57.7	1	04	11.7
	27	143	58	42.6	1	01	13.3		14	138	23	30.4	1	04	09.7
	28	143	51	21.8	1	01	23.1		15	138	18	12.3	1	04	07.5
	29	143	43	56.2	1	01	32.8		16	138	13	03.6	1	04	05.0
	30	143	36	26.0	+1	01	42.2		17	138	08	04.4	+1	04	02.4
	31	143	28	51.7	1	01	51.4		18	138	03	14.7	1	03	59.5
Feb.	1	143	21	13.5	1	02	00.3		19	137	58	34.8	1	03	56.5
	2	143	13	31.8	1	02	08.9		20	137	54	04.8	1	03	53.3
	3	143	05	46.8	1	02	17.3		21	137	49	44.7	1	03	49.9
	4	142	57	59.0	1	02	25.5		22	137	45	34.8	1	03	46.4
	5	142	50	08.7	+1	02	33.4		23	137	41	35.1	+1	03	42.6
	6	142	42	16.2	1	02	41.0		24	137	37	45.8	1	03	38.8
	7	142	34	21.8	1	02	48.3		25	137	34	07.0	1	03	34.7
	8	142	26	26.1	1	02	55.4		26	137	30	38.8	1	03	30.6
	9	142	18	29.2	1	03	02.1		27	137	27	21.4	1	03	26.3
	10	142	10	31.7	1	03	08.6		28	137	24	14.7	1	03	21.8
	11	142	02	33.8	+1	03	14.8		29	137	21	18.9	+1	03	17.2
	12	141	54	36.1	1	03	20.7		30	137	18	34.0	1	03	12.5
	13	141	46	38.8	1	03	26.4		31	137	16	00.2	1	03	07.7
	14	141	38	42.4	1	03	31.7	Apr.	1	137	13	37.3	1	03	02.8
	15	141	30	47.2	+1	03	36.7		2	137	11	25.6	+1	02	57.7

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GEOCENTRIC LONGITUDE AND LATITUDE FOR 0^h TERRESTRIAL TIME

Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude			Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude		
		º	'	"	º	'	"			º	'	"	º	'	"
Apr.	1	137	13	37.3	+1	03	02.8	May	17	138	42	08.8	+0	58	23.2
	2	137	11	25.6	1	02	57.7		18	138	48	01.7	0	58	17.3
	3	137	09	25.0	1	02	52.6		19	138	54	03.4	0	58	11.5
	4	137	07	35.7	1	02	47.3		20	139	00	13.7	0	58	05.7
	5	137	05	57.6	1	02	41.9		21	139	06	32.5	0	58	00.0
	6	137	04	30.9	1	02	36.5		22	139	12	59.8	0	57	54.4
	7	137	03	15.5	+1	02	30.9		23	139	19	35.4	+0	57	48.8
	8	137	02	11.5	1	02	25.3		24	139	26	19.2	0	57	43.3
	9	137	01	19.1	1	02	19.5		25	139	33	11.0	0	57	37.8
	10	137	00	38.1	1	02	13.7		26	139	40	10.9	0	57	32.4
	11	137	00	08.6	1	02	07.8		27	139	47	18.7	0	57	27.1
	12	136	59	50.5	1	02	01.9		28	139	54	34.2	0	57	21.8
	13	136	59	43.8	+1	01	55.8		29	140	01	57.5	+0	57	16.6
	14	136	59	48.4	1	01	49.7		30	140	09	28.5	0	57	11.4
	15	137	00	04.2	1	01	43.6		31	140	17	07.0	0	57	06.3
	16	137	00	31.3	1	01	37.4	June	1	140	24	53.0	0	57	01.3
	17	137	01	09.5	1	01	31.2		2	140	32	46.5	0	56	56.3
	18	137	01	58.8	1	01	25.0		3	140	40	47.3	0	56	51.4
	19	137	02	59.2	+1	01	18.7		4	140	48	55.4	+0	56	46.5
	20	137	04	10.6	1	01	12.4		5	140	57	10.6	0	56	41.7
	21	137	05	33.1	1	01	06.0		6	141	05	33.0	0	56	37.0
	22	137	07	06.6	1	00	59.7		7	141	14	02.2	0	56	32.4
	23	137	08	51.0	1	00	53.3		8	141	22	38.1	0	56	27.8
	24	137	10	46.2	1	00	47.0		9	141	31	20.6	0	56	23.3
	25	137	12	52.2	+1	00	40.6		10	141	40	09.7	+0	56	18.9
	26	137	15	09.0	1	00	34.2		11	141	49	05.1	0	56	14.5
	27	137	17	36.4	1	00	27.8		12	141	58	06.9	0	56	10.3
	28	137	20	14.3	1	00	21.4		13	142	07	14.9	0	56	06.1
	29	137	23	02.7	1	00	15.1		14	142	16	29.0	0	56	02.0
	30	137	26	01.6	1	00	08.7		15	142	25	49.2	0	55	58.0
May	1	137	29	10.8	+1	00	02.3		16	142	35	15.4	+0	55	54.0
	2	137	32	30.3	0	59	56.0		17	142	44	47.5	0	55	50.2
	3	137	36	00.1	0	59	49.6		18	142	54	25.4	0	55	46.4
	4	137	39	40.1	0	59	43.3		19	143	04	08.9	0	55	42.7
	5	137	43	30.2	0	59	37.0		20	143	13	58.0	0	55	39.1
	6	137	47	30.4	0	59	30.7		21	143	23	52.5	0	55	35.6
	7	137	51	40.6	+0	59	24.4		22	143	33	52.5	+0	55	32.2
	8	137	56	00.8	0	59	18.1		23	143	43	57.7	0	55	28.8
	9	138	00	30.8	0	59	11.9		24	143	54	08.1	0	55	25.5
	10	138	05	10.5	0	59	05.6		25	144	04	23.6	0	55	22.4
	11	138	09	59.7	0	58	59.5		26	144	14	44.2	0	55	19.2
	12	138	14	58.3	0	58	53.3		27	144	25	09.8	0	55	16.2
	13	138	20	06.3	+0	58	47.2		28	144	35	40.4	+0	55	13.3
	14	138	25	23.4	0	58	41.1		29	144	46	15.8	0	55	10.4
	15	138	30	49.6	0	58	35.1		30	144	56	56.1	0	55	07.6
	16	138	36	24.7	0	58	29.1	July	1	145	07	41.1	0	55	04.9
	17	138	42	08.8	+0	58	23.2		2	145	18	30.7	+0	55	02.2

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GEOCENTRIC LONGITUDE AND LATITUDE FOR 0^h TERRESTRIAL TIME

Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude			Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude		
		°	'	"	°	'	"			°	'	"	°	'	"
July	1	145	07	41.1	+0	55	04.9	Aug.	16	154	22	40.5	+0	54	36.7
	2	145	18	30.7	0	55	02.2		17	154	35	34.8	0	54	38.3
	3	145	29	25.0	0	54	59.7		18	154	48	30.0	0	54	40.0
	4	145	40	23.7	0	54	57.2		19	155	01	26.1	0	54	41.8
	5	145	51	26.7	0	54	54.8		20	155	14	23.1	0	54	43.6
	6	146	02	33.9	0	54	52.5		21	155	27	20.9	0	54	45.6
	7	146	13	45.1	+0	54	50.3		22	155	40	19.5	+0	54	47.7
	8	146	25	00.4	0	54	48.2		23	155	53	18.8	0	54	49.8
	9	146	36	19.5	0	54	46.2		24	156	06	18.8	0	54	52.1
	10	146	47	42.6	0	54	44.2		25	156	19	19.4	0	54	54.4
	11	146	59	09.4	0	54	42.4		26	156	32	20.6	0	54	56.9
	12	147	10	39.9	0	54	40.6		27	156	45	22.2	0	54	59.4
	13	147	22	14.0	+0	54	39.0		28	156	58	24.3	+0	55	02.1
	14	147	33	51.8	0	54	37.4		29	157	11	26.6	0	55	04.9
	15	147	45	33.0	0	54	35.9		30	157	24	29.0	0	55	07.8
	16	147	57	17.6	0	54	34.5		31	157	37	31.4	0	55	10.9
	17	148	09	05.4	0	54	33.3	Sept.	1	157	50	33.5	0	55	13.9
	18	148	20	56.5	0	54	32.1		2	158	03	35.9	0	55	16.8
	19	148	32	50.7	+0	54	31.0		3	158	16	38.2	+0	55	20.0
	20	148	44	47.9	0	54	29.9		4	158	29	40.2	0	55	23.3
	21	148	56	48.1	0	54	29.0		5	158	42	42.1	0	55	26.8
	22	149	08	51.2	0	54	28.2		6	158	55	43.6	0	55	30.3
	23	149	20	57.2	0	54	27.4		7	159	08	44.6	0	55	34.0
	24	149	33	05.9	0	54	26.8		8	159	21	45.2	0	55	37.8
	25	149	45	17.5	+0	54	26.2		9	159	34	45.2	+0	55	41.7
	26	149	57	31.7	0	54	25.7		10	159	47	44.6	0	55	45.7
	27	150	09	48.6	0	54	25.3		11	160	00	43.2	0	55	49.8
	28	150	22	08.1	0	54	25.0		12	160	13	40.9	0	55	54.0
	29	150	34	30.1	0	54	24.7		13	160	26	37.8	0	55	58.3
	30	150	46	54.6	0	54	24.6		14	160	39	33.7	0	56	02.8
	31	150	59	21.4	+0	54	24.5		15	160	52	28.6	+0	56	07.3
Aug.	1	151	11	50.6	0	54	24.6		16	161	05	22.4	0	56	11.9
	2	151	24	21.8	0	54	24.7		17	161	18	15.1	0	56	16.7
	3	151	36	55.1	0	54	24.9		18	161	31	06.6	0	56	21.5
	4	151	49	30.3	0	54	25.2		19	161	43	56.9	0	56	26.5
	5	152	02	07.4	0	54	25.7		20	161	56	45.9	0	56	31.5
	6	152	14	46.2	+0	54	26.2		21	162	09	33.6	+0	56	36.7
	7	152	27	26.9	0	54	26.8		22	162	22	19.9	0	56	41.9
	8	152	40	09.3	0	54	27.5		23	162	35	04.7	0	56	47.3
	9	152	52	53.3	0	54	28.3		24	162	47	47.9	0	56	52.8
	10	153	05	38.8	0	54	29.2		25	163	00	29.4	0	56	58.4
	11	153	18	25.9	0	54	30.2		26	163	13	09.1	0	57	04.1
	12	153	31	14.3	+0	54	31.3		27	163	25	46.8	+0	57	09.9
	13	153	44	04.1	0	54	32.5		28	163	38	22.6	0	57	15.8
	14	153	56	55.1	0	54	33.8		29	163	50	56.3	0	57	21.8
	15	154	09	47.3	0	54	35.2		30	164	03	27.8	0	57	28.0
	16	154	22	40.5	+0	54	36.7	Oct.	1	164	15	57.1	+0	57	34.3

JUPITER, 2027

GEOCENTRIC LONGITUDE AND LATITUDE FOR 0^h TERRESTRIAL TIME

Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude			Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude		
		°	′	″	°	′	″			°	′	″	°	′	″
Oct.	1	164	15	57.1	+0	57	34.3	Nov.	16	172	45	16.3	+1	04	34.7
	2	164	28	24.1	0	57	40.7		17	172	54	20.4	1	04	46.8
	3	164	40	48.8	0	57	47.2		18	173	03	17.7	1	04	59.0
	4	164	53	11.0	0	57	53.8		19	173	12	08.2	1	05	11.3
	5	165	05	30.6	0	58	00.6		20	173	20	51.6	1	05	23.8
	6	165	17	47.6	0	58	07.5		21	173	29	28.0	1	05	36.4
	7	165	30	01.9	+0	58	14.5		22	173	37	57.2	+1	05	49.1
	8	165	42	13.3	0	58	21.6		23	173	46	19.0	1	06	01.9
	9	165	54	21.7	0	58	28.8		24	173	54	33.4	1	06	14.9
	10	166	06	27.1	0	58	36.2		25	174	02	40.3	1	06	28.0
	11	166	18	29.4	0	58	43.7		26	174	10	39.6	1	06	41.3
	12	166	30	28.5	0	58	51.2		27	174	18	31.2	1	06	54.7
	13	166	42	24.4	+0	58	59.0		28	174	26	14.9	+1	07	08.2
	14	166	54	16.9	0	59	06.8		29	174	33	50.6	1	07	21.8
	15	167	06	06.1	0	59	14.7		30	174	41	18.2	1	07	35.5
	16	167	17	51.8	0	59	22.8	Dec.	1	174	48	37.5	1	07	49.4
	17	167	29	34.1	0	59	31.0		2	174	55	48.5	1	08	03.4
	18	167	41	12.8	0	59	39.3		3	175	02	51.0	1	08	17.6
	19	167	52	47.8	+0	59	47.7		4	175	09	44.9	+1	08	31.8
	20	168	04	19.1	0	59	56.2		5	175	16	30.1	1	08	46.1
	21	168	15	46.5	1	00	04.8		6	175	23	06.5	1	09	00.6
	22	168	27	09.9	1	00	13.6		7	175	29	34.0	1	09	15.2
	23	168	38	29.2	1	00	22.5		8	175	35	52.6	1	09	29.9
	24	168	49	44.3	1	00	31.5		9	175	42	02.2	1	09	44.7
	25	169	00	55.1	+1	00	40.7		10	175	48	02.6	+1	09	59.5
	26	169	12	01.4	1	00	49.9		11	175	53	53.9	1	10	14.5
	27	169	23	03.2	1	00	59.3		12	175	59	35.9	1	10	29.6
	28	169	34	00.3	1	01	08.9		13	176	05	08.6	1	10	44.8
	29	169	44	52.9	1	01	18.5		14	176	10	31.8	1	11	00.1
	30	169	55	40.6	1	01	28.3		15	176	15	45.4	1	11	15.5
	31	170	06	23.4	+1	01	38.3		16	176	20	49.3	+1	11	30.9
Nov.	1	170	17	01.3	1	01	48.3		17	176	25	43.3	1	11	46.5
	2	170	27	34.0	1	01	58.5		18	176	30	27.3	1	12	02.1
	3	170	38	01.5	1	02	08.9		19	176	35	01.2	1	12	17.9
	4	170	48	23.6	1	02	19.3		20	176	39	25.0	1	12	33.7
	5	170	58	40.3	1	02	29.9		21	176	43	38.5	1	12	49.7
	6	171	08	51.4	+1	02	40.6		22	176	47	41.7	+1	13	05.7
	7	171	18	56.8	1	02	51.5		23	176	51	34.4	1	13	21.8
	8	171	28	56.4	1	03	02.4		24	176	55	16.7	1	13	38.0
	9	171	38	50.2	1	03	13.5		25	176	58	48.4	1	13	54.2
	10	171	48	38.1	1	03	24.8		26	177	02	09.4	1	14	10.6
	11	171	58	19.9	1	03	36.1		27	177	05	19.6	1	14	27.0
	12	172	07	55.7	+1	03	47.6		28	177	08	18.9	+1	14	43.5
	13	172	17	25.3	1	03	59.2		29	177	11	07.2	1	15	00.0
	14	172	26	48.7	1	04	10.9		30	177	13	44.5	1	15	16.6
	15	172	36	05.7	1	04	22.7		31	177	16	10.6	1	15	33.2
	16	172	45	16.3	+1	04	34.7		32	177	18	25.6	+1	15	49.9

JUPITER, 2027

RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
Jan.	0	9	56	13.44	+13	33	06.8	4.618 342	1.90	19.93	3	17	54
	1	9	56	00.03	13	34	32.9	4.606 915	1.91	19.98	3	13	44
	2	9	55	45.92	13	36	02.6	4.595 694	1.91	20.03	3	09	34
	3	9	55	31.11	13	37	35.9	4.584 684	1.92	20.08	3	05	24
	4	9	55	15.61	13	39	12.7	4.573 890	1.92	20.13	3	01	12
	5	9	54	59.42	13	40	52.9	4.563 318	1.93	20.17	2	57	00
	6	9	54	42.55	+13	42	36.6	4.552 971	1.93	20.22	2	52	47
	7	9	54	25.01	13	44	23.5	4.542 854	1.94	20.26	2	48	34
	8	9	54	06.82	13	46	13.7	4.532 972	1.94	20.31	2	44	20
	9	9	53	47.97	13	48	07.1	4.523 330	1.94	20.35	2	40	05
	10	9	53	28.48	13	50	03.5	4.513 932	1.95	20.39	2	35	50
	11	9	53	08.37	13	52	03.0	4.504 781	1.95	20.44	2	31	34
	12	9	52	47.65	+13	54	05.5	4.495 883	1.96	20.48	2	27	17
	13	9	52	26.32	13	56	10.7	4.487 241	1.96	20.52	2	23	00
	14	9	52	04.41	13	58	18.6	4.478 859	1.96	20.55	2	18	42
	15	9	51	41.94	14	00	29.2	4.470 740	1.97	20.59	2	14	24
	16	9	51	18.91	14	02	42.3	4.462 889	1.97	20.63	2	10	05
	17	9	50	55.34	14	04	57.8	4.455 308	1.97	20.66	2	05	46
	18	9	50	31.26	+14	07	15.7	4.448 000	1.98	20.70	2	01	26
	19	9	50	06.67	14	09	35.7	4.440 968	1.98	20.73	1	57	05
	20	9	49	41.60	14	11	57.9	4.434 216	1.98	20.76	1	52	45
	21	9	49	16.06	14	14	22.1	4.427 745	1.99	20.79	1	48	23
	22	9	48	50.06	14	16	48.2	4.421 558	1.99	20.82	1	44	01
	23	9	48	23.61	14	19	16.3	4.415 659	1.99	20.85	1	39	39
	24	9	47	56.74	+14	21	46.1	4.410 049	1.99	20.88	1	35	16
	25	9	47	29.45	14	24	17.5	4.404 731	2.00	20.90	1	30	53
	26	9	47	01.77	14	26	50.5	4.399 708	2.00	20.92	1	26	30
	27	9	46	33.72	14	29	24.8	4.394 982	2.00	20.95	1	22	06
	28	9	46	05.32	14	32	00.5	4.390 556	2.00	20.97	1	17	42
	29	9	45	36.58	14	34	37.3	4.386 432	2.00	20.99	1	13	17
	30	9	45	07.54	+14	37	15.2	4.382 613	2.01	21.01	1	08	53
	31	9	44	38.21	14	39	54.0	4.379 101	2.01	21.02	1	04	28
Feb.	1	9	44	08.61	14	42	33.7	4.375 897	2.01	21.04	1	00	02
	2	9	43	38.76	14	45	14.1	4.373 004	2.01	21.05	0	55	37
	3	9	43	08.69	14	47	55.1	4.370 423	2.01	21.06	0	51	11
	4	9	42	38.41	14	50	36.5	4.368 156	2.01	21.08	0	46	45
	5	9	42	07.95	+14	53	18.4	4.366 203	2.01	21.08	0	42	19
	6	9	41	37.33	14	56	00.4	4.364 567	2.01	21.09	0	37	52
	7	9	41	06.58	14	58	42.6	4.363 247	2.02	21.10	0	33	26
	8	9	40	35.70	15	01	24.7	4.362 245	2.02	21.10	0	28	59
	9	9	40	04.74	15	04	06.6	4.361 561	2.02	21.11	0	24	32
	10	9	39	33.72	15	06	48.3	4.361 196	2.02	21.11	0	20	06
	11	9	39	02.66	+15	09	29.5	4.361 148	2.02	21.11	0	15	39
	12	9	38	31.58	15	12	10.2	4.361 418	2.02	21.11	0	11	12
	13	9	38	00.52	15	14	50.2	4.362 005	2.02	21.10	0	06	45
	14	9	37	29.49	15	17	29.3	4.362 910	2.02	21.10	0	02	19
	15	9	36	58.52	+15	20	07.6	4.364 130	2.02	21.09	23	53	25

JUPITER, 2027

RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
Feb.	15	9	36	58.52	+15	20	07.6	4.364 130	2.02	21.09	23	53	25
	16	9	36	27.64	15	22	44.8	4.365 664	2.01	21.09	23	48	59
	17	9	35	56.85	15	25	21.0	4.367 512	2.01	21.08	23	44	32
	18	9	35	26.20	15	27	55.9	4.369 673	2.01	21.07	23	40	06
	19	9	34	55.68	15	30	29.5	4.372 144	2.01	21.06	23	35	40
	20	9	34	25.33	15	33	01.7	4.374 924	2.01	21.04	23	31	14
	21	9	33	55.17	+15	35	32.5	4.378 012	2.01	21.03	23	26	48
	22	9	33	25.20	15	38	01.6	4.381 406	2.01	21.01	23	22	23
	23	9	32	55.47	15	40	29.1	4.385 105	2.01	20.99	23	17	58
	24	9	32	25.98	15	42	54.7	4.389 107	2.00	20.97	23	13	33
	25	9	31	56.77	15	45	18.4	4.393 411	2.00	20.95	23	09	08
	26	9	31	27.84	15	47	40.2	4.398 014	2.00	20.93	23	04	44
	27	9	30	59.24	+15	49	59.9	4.402 915	2.00	20.91	23	00	20
	28	9	30	30.97	15	52	17.4	4.408 113	1.99	20.88	22	55	56
Mar.	1	9	30	03.05	15	54	32.7	4.413 604	1.99	20.86	22	51	33
	2	9	29	35.50	15	56	45.7	4.419 386	1.99	20.83	22	47	10
	3	9	29	08.35	15	58	56.3	4.425 457	1.99	20.80	22	42	47
	4	9	28	41.61	16	01	04.5	4.431 815	1.98	20.77	22	38	25
	5	9	28	15.29	+16	03	10.1	4.438 456	1.98	20.74	22	34	03
	6	9	27	49.42	16	05	13.1	4.445 377	1.98	20.71	22	29	42
	7	9	27	24.02	16	07	13.4	4.452 576	1.98	20.68	22	25	22
	8	9	26	59.10	16	09	11.0	4.460 048	1.97	20.64	22	21	01
	9	9	26	34.68	16	11	05.7	4.467 791	1.97	20.61	22	16	42
	10	9	26	10.78	16	12	57.5	4.475 801	1.96	20.57	22	12	22
	11	9	25	47.42	+16	14	46.3	4.484 074	1.96	20.53	22	08	04
	12	9	25	24.61	16	16	32.1	4.492 606	1.96	20.49	22	03	46
	13	9	25	02.37	16	18	14.7	4.501 392	1.95	20.45	21	59	28
	14	9	24	40.71	16	19	54.3	4.510 430	1.95	20.41	21	55	11
	15	9	24	19.66	16	21	30.6	4.519 713	1.95	20.37	21	50	55
	16	9	23	59.21	16	23	03.8	4.529 239	1.94	20.33	21	46	39
	17	9	23	39.38	+16	24	33.7	4.539 001	1.94	20.28	21	42	24
	18	9	23	20.17	16	26	00.4	4.548 997	1.93	20.24	21	38	10
	19	9	23	01.60	16	27	23.8	4.559 222	1.93	20.19	21	33	56
	20	9	22	43.68	16	28	44.0	4.569 670	1.92	20.15	21	29	43
	21	9	22	26.40	16	30	00.8	4.580 338	1.92	20.10	21	25	30
	22	9	22	09.79	16	31	14.2	4.591 222	1.92	20.05	21	21	19
	23	9	21	53.85	+16	32	24.2	4.602 318	1.91	20.00	21	17	08
	24	9	21	38.59	16	33	30.8	4.613 621	1.91	19.95	21	12	57
	25	9	21	24.02	16	34	34.0	4.625 127	1.90	19.90	21	08	47
	26	9	21	10.15	16	35	33.7	4.636 832	1.90	19.85	21	04	38
	27	9	20	56.98	16	36	29.9	4.648 732	1.89	19.80	21	00	30
	28	9	20	44.52	16	37	22.7	4.660 823	1.89	19.75	20	56	22
	29	9	20	32.78	+16	38	12.1	4.673 100	1.88	19.70	20	52	15
	30	9	20	21.76	16	38	57.9	4.685 559	1.88	19.65	20	48	09
	31	9	20	11.46	16	39	40.3	4.698 195	1.87	19.59	20	44	03
Apr.	1	9	20	01.89	16	40	19.1	4.711 005	1.87	19.54	20	39	59
	2	9	19	53.06	+16	40	54.4	4.723 982	1.86	19.49	20	35	55

JUPITER, 2027

RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
Apr.	1	9	20	01.89	+16	40	19.1	4.711 005	1.87	19.54	20	39	59
	2	9	19	53.06	16	40	54.4	4.723 982	1.86	19.49	20	35	55
	3	9	19	44.96	16	41	26.3	4.737 124	1.86	19.43	20	31	51
	4	9	19	37.60	16	41	54.5	4.750 424	1.85	19.38	20	27	49
	5	9	19	30.98	16	42	19.3	4.763 878	1.85	19.32	20	23	47
	6	9	19	25.11	16	42	40.4	4.777 482	1.84	19.27	20	19	46
	7	9	19	20.00	+16	42	58.0	4.791 230	1.84	19.21	20	15	45
	8	9	19	15.64	16	43	12.0	4.805 117	1.83	19.16	20	11	46
	9	9	19	12.04	16	43	22.4	4.819 138	1.82	19.10	20	07	47
	10	9	19	09.19	16	43	29.3	4.833 289	1.82	19.05	20	03	49
	11	9	19	07.11	16	43	32.6	4.847 564	1.81	18.99	19	59	51
	12	9	19	05.78	16	43	32.4	4.861 957	1.81	18.93	19	55	55
	13	9	19	05.21	+16	43	28.7	4.876 464	1.80	18.88	19	51	59
	14	9	19	05.39	16	43	21.5	4.891 081	1.80	18.82	19	48	04
	15	9	19	06.31	16	43	10.9	4.905 801	1.79	18.77	19	44	09
	16	9	19	07.98	16	42	56.8	4.920 620	1.79	18.71	19	40	16
	17	9	19	10.38	16	42	39.3	4.935 534	1.78	18.65	19	36	23
	18	9	19	13.51	16	42	18.4	4.950 538	1.78	18.60	19	32	31
	19	9	19	17.39	+16	41	54.0	4.965 627	1.77	18.54	19	28	39
	20	9	19	21.99	16	41	26.2	4.980 798	1.77	18.48	19	24	48
	21	9	19	27.32	16	40	55.1	4.996 047	1.76	18.43	19	20	58
	22	9	19	33.38	16	40	20.6	5.011 368	1.75	18.37	19	17	09
	23	9	19	40.16	16	39	42.7	5.026 759	1.75	18.31	19	13	21
	24	9	19	47.67	16	39	01.5	5.042 215	1.74	18.26	19	09	33
	25	9	19	55.88	+16	38	17.0	5.057 731	1.74	18.20	19	05	45
	26	9	20	04.81	16	37	29.3	5.073 304	1.73	18.15	19	01	59
	27	9	20	14.43	16	36	38.3	5.088 930	1.73	18.09	18	58	13
	28	9	20	24.76	16	35	44.0	5.104 605	1.72	18.03	18	54	28
	29	9	20	35.78	16	34	46.5	5.120 324	1.72	17.98	18	50	44
	30	9	20	47.49	16	33	45.9	5.136 083	1.71	17.92	18	47	00
May	1	9	20	59.88	+16	32	42.0	5.151 878	1.71	17.87	18	43	17
	2	9	21	12.96	16	31	34.9	5.167 705	1.70	17.81	18	39	35
	3	9	21	26.70	16	30	24.6	5.183 560	1.70	17.76	18	35	53
	4	9	21	41.12	16	29	11.1	5.199 438	1.69	17.71	18	32	12
	5	9	21	56.21	16	27	54.5	5.215 335	1.69	17.65	18	28	31
	6	9	22	11.97	16	26	34.7	5.231 247	1.68	17.60	18	24	52
	7	9	22	28.38	+16	25	11.8	5.247 169	1.68	17.54	18	21	13
	8	9	22	45.45	16	23	45.7	5.263 098	1.67	17.49	18	17	34
	9	9	23	03.16	16	22	16.6	5.279 028	1.67	17.44	18	13	56
	10	9	23	21.51	16	20	44.5	5.294 955	1.66	17.39	18	10	19
	11	9	23	40.48	16	19	09.4	5.310 876	1.66	17.33	18	06	43
	12	9	24	00.08	16	17	31.3	5.326 786	1.65	17.28	18	03	07
	13	9	24	20.28	+16	15	50.2	5.342 681	1.65	17.23	17	59	31
	14	9	24	41.08	16	14	06.3	5.358 558	1.64	17.18	17	55	56
	15	9	25	02.48	16	12	19.4	5.374 414	1.64	17.13	17	52	22
	16	9	25	24.47	16	10	29.7	5.390 243	1.63	17.08	17	48	49
	17	9	25	47.04	+16	08	37.1	5.406 045	1.63	17.03	17	45	16

JUPITER, 2027

RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
May	17	9	25	47.04	+16	08	37.1	5.406 045	1.63	17.03	17	45	16
	18	9	26	10.18	16	06	41.6	5.421 814	1.62	16.98	17	41	43
	19	9	26	33.89	16	04	43.3	5.437 549	1.62	16.93	17	38	11
	20	9	26	58.17	16	02	42.2	5.453 246	1.61	16.88	17	34	40
	21	9	27	23.00	16	00	38.3	5.468 901	1.61	16.83	17	31	09
	22	9	27	48.38	15	58	31.7	5.484 513	1.60	16.79	17	27	39
	23	9	28	14.30	+15	56	22.4	5.500 077	1.60	16.74	17	24	09
	24	9	28	40.75	15	54	10.4	5.515 591	1.59	16.69	17	20	40
	25	9	29	07.73	15	51	55.7	5.531 052	1.59	16.64	17	17	11
	26	9	29	35.23	15	49	38.4	5.546 457	1.59	16.60	17	13	43
	27	9	30	03.23	15	47	18.5	5.561 802	1.58	16.55	17	10	15
	28	9	30	31.74	15	44	55.9	5.577 085	1.58	16.51	17	06	48
	29	9	31	00.75	+15	42	30.7	5.592 303	1.57	16.46	17	03	21
	30	9	31	30.25	15	40	02.9	5.607 452	1.57	16.42	16	59	55
	31	9	32	00.23	15	37	32.5	5.622 530	1.56	16.37	16	56	29
June	1	9	32	30.70	15	34	59.6	5.637 533	1.56	16.33	16	53	04
	2	9	33	01.64	15	32	24.0	5.652 458	1.56	16.29	16	49	39
	3	9	33	33.06	15	29	45.9	5.667 301	1.55	16.24	16	46	15
	4	9	34	04.94	+15	27	05.3	5.682 061	1.55	16.20	16	42	51
	5	9	34	37.28	15	24	22.2	5.696 733	1.54	16.16	16	39	28
	6	9	35	10.07	15	21	36.7	5.711 314	1.54	16.12	16	36	05
	7	9	35	43.29	15	18	48.7	5.725 801	1.54	16.08	16	32	42
	8	9	36	16.95	15	15	58.4	5.740 191	1.53	16.04	16	29	20
	9	9	36	51.02	15	13	05.7	5.754 482	1.53	16.00	16	25	58
	10	9	37	25.51	+15	10	10.7	5.768 670	1.52	15.96	16	22	37
	11	9	38	00.40	15	07	13.4	5.782 753	1.52	15.92	16	19	16
	12	9	38	35.68	15	04	13.7	5.796 729	1.52	15.88	16	15	56
	13	9	39	11.36	15	01	11.8	5.810 595	1.51	15.84	16	12	35
	14	9	39	47.43	14	58	07.7	5.824 350	1.51	15.81	16	09	16
	15	9	40	23.88	14	55	01.2	5.837 990	1.51	15.77	16	05	56
	16	9	41	00.70	+14	51	52.6	5.851 515	1.50	15.73	16	02	37
	17	9	41	37.89	14	48	41.8	5.864 922	1.50	15.70	15	59	18
	18	9	42	15.44	14	45	28.9	5.878 209	1.50	15.66	15	56	00
	19	9	42	53.35	14	42	13.8	5.891 374	1.49	15.63	15	52	42
	20	9	43	31.60	14	38	56.6	5.904 416	1.49	15.59	15	49	25
	21	9	44	10.19	14	35	37.3	5.917 331	1.49	15.56	15	46	07
	22	9	44	49.11	+14	32	16.0	5.930 119	1.48	15.52	15	42	50
	23	9	45	28.36	14	28	52.6	5.942 777	1.48	15.49	15	39	34
	24	9	46	07.92	14	25	27.2	5.955 303	1.48	15.46	15	36	17
	25	9	46	47.81	14	21	59.7	5.967 695	1.47	15.43	15	33	01
	26	9	47	28.00	14	18	30.3	5.979 951	1.47	15.39	15	29	46
	27	9	48	08.50	14	14	58.9	5.992 069	1.47	15.36	15	26	30
	28	9	48	49.30	+14	11	25.5	6.004 047	1.46	15.33	15	23	15
	29	9	49	30.40	14	07	50.1	6.015 883	1.46	15.30	15	20	00
	30	9	50	11.79	14	04	12.7	6.027 574	1.46	15.27	15	16	46
July	1	9	50	53.47	14	00	33.4	6.039 118	1.46	15.24	15	13	31
	2	9	51	35.43	+13	56	52.2	6.050 514	1.45	15.22	15	10	17

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RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
July	1	9	50	53.47	+14	00	33.4	6.039 118	1.46	15.24	15	13	31
	2	9	51	35.43	13	56	52.2	6.050 514	1.45	15.22	15	10	17
	3	9	52	17.66	13	53	09.2	6.061 758	1.45	15.19	15	07	04
	4	9	53	00.17	13	49	24.3	6.072 849	1.45	15.16	15	03	50
	5	9	53	42.93	13	45	37.6	6.083 784	1.45	15.13	15	00	37
	6	9	54	25.95	13	41	49.2	6.094 562	1.44	15.11	14	57	24
	7	9	55	09.20	+13	37	59.0	6.105 180	1.44	15.08	14	54	11
	8	9	55	52.70	13	34	07.1	6.115 636	1.44	15.05	14	50	59
	9	9	56	36.42	13	30	13.5	6.125 931	1.44	15.03	14	47	47
	10	9	57	20.37	13	26	18.2	6.136 061	1.43	15.00	14	44	35
	11	9	58	04.54	13	22	21.3	6.146 025	1.43	14.98	14	41	23
	12	9	58	48.93	13	18	22.7	6.155 823	1.43	14.95	14	38	11
	13	9	59	33.54	+13	14	22.5	6.165 453	1.43	14.93	14	35	00
	14	10	00	18.35	13	10	20.7	6.174 914	1.42	14.91	14	31	48
	15	10	01	03.36	13	06	17.3	6.184 204	1.42	14.89	14	28	37
	16	10	01	48.57	13	02	12.5	6.193 324	1.42	14.86	14	25	27
	17	10	02	33.97	12	58	06.1	6.202 271	1.42	14.84	14	22	16
	18	10	03	19.55	12	53	58.3	6.211 044	1.42	14.82	14	19	06
	19	10	04	05.32	+12	49	49.0	6.219 643	1.41	14.80	14	15	55
	20	10	04	51.25	12	45	38.3	6.228 066	1.41	14.78	14	12	45
	21	10	05	37.35	12	41	26.1	6.236 311	1.41	14.76	14	09	35
	22	10	06	23.61	12	37	12.6	6.244 379	1.41	14.74	14	06	26
	23	10	07	10.04	12	32	57.7	6.252 267	1.41	14.72	14	03	16
	24	10	07	56.62	12	28	41.4	6.259 974	1.40	14.71	14	00	06
	25	10	08	43.35	+12	24	23.8	6.267 500	1.40	14.69	13	56	57
	26	10	09	30.24	12	20	04.8	6.274 842	1.40	14.67	13	53	48
	27	10	10	17.27	12	15	44.5	6.281 999	1.40	14.65	13	50	39
	28	10	11	04.44	12	11	22.9	6.288 971	1.40	14.64	13	47	30
	29	10	11	51.76	12	06	60.0	6.295 755	1.40	14.62	13	44	21
	30	10	12	39.20	12	02	35.8	6.302 350	1.40	14.61	13	41	13
	31	10	13	26.78	+11	58	10.5	6.308 755	1.39	14.59	13	38	04
Aug.	1	10	14	14.48	11	53	44.0	6.314 968	1.39	14.58	13	34	56
	2	10	15	02.29	11	49	16.3	6.320 987	1.39	14.56	13	31	47
	3	10	15	50.21	11	44	47.6	6.326 813	1.39	14.55	13	28	39
	4	10	16	38.22	11	40	17.8	6.332 443	1.39	14.54	13	25	31
	5	10	17	26.34	11	35	47.0	6.337 877	1.39	14.53	13	22	23
	6	10	18	14.54	+11	31	15.1	6.343 114	1.39	14.51	13	19	15
	7	10	19	02.84	11	26	42.2	6.348 154	1.39	14.50	13	16	08
	8	10	19	51.22	11	22	08.4	6.352 995	1.38	14.49	13	13	00
	9	10	20	39.68	11	17	33.5	6.357 637	1.38	14.48	13	09	52
	10	10	21	28.22	11	12	57.8	6.362 081	1.38	14.47	13	06	45
	11	10	22	16.83	11	08	21.2	6.366 325	1.38	14.46	13	03	37
	12	10	23	05.51	+11	03	43.7	6.370 369	1.38	14.45	13	00	30
	13	10	23	54.25	10	59	05.4	6.374 213	1.38	14.44	12	57	22
	14	10	24	43.04	10	54	26.3	6.377 856	1.38	14.43	12	54	15
	15	10	25	31.89	10	49	46.4	6.381 299	1.38	14.43	12	51	08
	16	10	26	20.78	+10	45	05.8	6.384 540	1.38	14.42	12	48	00

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RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	º	'	"		"	"	h	m	s
Aug.	16	10	26	20.78	+10	45	05.8	6.384 540	1.38	14.42	12	48	00
	17	10	27	09.72	10	40	24.5	6.387 580	1.38	14.41	12	44	53
	18	10	27	58.69	10	35	42.5	6.390 417	1.38	14.41	12	41	46
	19	10	28	47.70	10	30	59.8	6.393 051	1.38	14.40	12	38	39
	20	10	29	36.75	10	26	16.5	6.395 483	1.38	14.39	12	35	32
	21	10	30	25.82	10	21	32.5	6.397 710	1.37	14.39	12	32	25
	22	10	31	14.92	+10	16	47.9	6.399 734	1.37	14.38	12	29	18
	23	10	32	04.04	10	12	02.6	6.401 553	1.37	14.38	12	26	11
	24	10	32	53.19	10	07	16.8	6.403 166	1.37	14.38	12	23	04
	25	10	33	42.35	10	02	30.4	6.404 573	1.37	14.37	12	19	57
	26	10	34	31.53	9	57	43.6	6.405 773	1.37	14.37	12	16	50
	27	10	35	20.72	9	52	56.2	6.406 766	1.37	14.37	12	13	43
	28	10	36	09.92	+9	48	08.4	6.407 551	1.37	14.37	12	10	36
	29	10	36	59.11	9	43	20.2	6.408 127	1.37	14.37	12	07	29
	30	10	37	48.29	9	38	31.8	6.408 494	1.37	14.37	12	04	22
	31	10	38	37.45	9	33	43.1	6.408 651	1.37	14.36	12	01	15
Sept.	1	10	39	26.57	9	28	53.9	6.408 598	1.37	14.37	11	58	08
	2	10	40	15.68	9	24	04.4	6.408 334	1.37	14.37	11	55	01
	3	10	41	04.77	+9	19	14.6	6.407 861	1.37	14.37	11	51	54
	4	10	41	53.83	9	14	24.7	6.407 177	1.37	14.37	11	48	47
	5	10	42	42.85	9	09	34.6	6.406 284	1.37	14.37	11	45	40
	6	10	43	31.84	9	04	44.4	6.405 182	1.37	14.37	11	42	32
	7	10	44	20.78	8	59	54.1	6.403 870	1.37	14.38	11	39	25
	8	10	45	09.68	8	55	03.7	6.402 350	1.37	14.38	11	36	18
	9	10	45	58.52	+8	50	13.2	6.400 621	1.37	14.38	11	33	11
	10	10	46	47.30	8	45	22.8	6.398 685	1.37	14.39	11	30	03
	11	10	47	36.02	8	40	32.4	6.396 541	1.37	14.39	11	26	56
	12	10	48	24.66	8	35	42.1	6.394 190	1.38	14.40	11	23	48
	13	10	49	13.24	8	30	52.0	6.391 632	1.38	14.40	11	20	41
	14	10	50	01.74	8	26	01.9	6.388 868	1.38	14.41	11	17	33
	15	10	50	50.16	+8	21	12.0	6.385 897	1.38	14.42	11	14	25
	16	10	51	38.49	8	16	22.2	6.382 722	1.38	14.42	11	11	17
	17	10	52	26.74	8	11	32.7	6.379 340	1.38	14.43	11	08	09
	18	10	53	14.90	8	06	43.4	6.375 754	1.38	14.44	11	05	01
	19	10	54	02.97	8	01	54.3	6.371 963	1.38	14.45	11	01	53
	20	10	54	50.95	7	57	05.5	6.367 967	1.38	14.46	10	58	45
	21	10	55	38.83	+7	52	17.0	6.363 767	1.38	14.47	10	55	37
	22	10	56	26.60	7	47	28.9	6.359 362	1.38	14.48	10	52	28
	23	10	57	14.27	7	42	41.1	6.354 753	1.38	14.49	10	49	20
	24	10	58	01.83	7	37	53.8	6.349 941	1.38	14.50	10	46	11
	25	10	58	49.26	7	33	06.9	6.344 924	1.39	14.51	10	43	02
	26	10	59	36.58	7	28	20.6	6.339 704	1.39	14.52	10	39	53
	27	11	00	23.75	+7	23	34.8	6.334 280	1.39	14.53	10	36	44
	28	11	01	10.80	7	18	49.7	6.328 654	1.39	14.55	10	33	35
	29	11	01	57.69	7	14	05.2	6.322 826	1.39	14.56	10	30	26
	30	11	02	44.45	7	09	21.4	6.316 796	1.39	14.57	10	27	17
Oct.	1	11	03	31.05	+7	04	38.2	6.310 566	1.39	14.59	10	24	07

JUPITER, 2027

RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
Oct.	1	11	03	31.05	+7	04	38.2	6.310 566	1.39	14.59	10	24	07
	2	11	04	17.50	6	59	55.9	6.304 136	1.39	14.60	10	20	57
	3	11	05	03.79	6	55	14.2	6.297 508	1.40	14.62	10	17	47
	4	11	05	49.92	6	50	33.5	6.290 683	1.40	14.63	10	14	37
	5	11	06	35.89	6	45	53.6	6.283 662	1.40	14.65	10	11	27
	6	11	07	21.67	6	41	14.6	6.276 446	1.40	14.67	10	08	17
	7	11	08	07.28	+6	36	36.5	6.269 038	1.40	14.68	10	05	06
	8	11	08	52.70	6	31	59.5	6.261 437	1.40	14.70	10	01	55
	9	11	09	37.93	6	27	23.5	6.253 646	1.41	14.72	9	58	44
	10	11	10	22.96	6	22	48.6	6.245 666	1.41	14.74	9	55	33
	11	11	11	07.79	6	18	14.8	6.237 498	1.41	14.76	9	52	22
	12	11	11	52.41	6	13	42.2	6.229 144	1.41	14.78	9	49	10
	13	11	12	36.82	+6	09	10.7	6.220 604	1.41	14.80	9	45	58
	14	11	13	21.02	6	04	40.4	6.211 880	1.42	14.82	9	42	46
	15	11	14	05.01	6	00	11.4	6.202 974	1.42	14.84	9	39	34
	16	11	14	48.77	5	55	43.6	6.193 886	1.42	14.86	9	36	22
	17	11	15	32.31	5	51	17.2	6.184 618	1.42	14.89	9	33	09
	18	11	16	15.63	5	46	52.0	6.175 171	1.42	14.91	9	29	56
	19	11	16	58.71	+5	42	28.2	6.165 546	1.43	14.93	9	26	43
	20	11	17	41.55	5	38	05.9	6.155 744	1.43	14.96	9	23	29
	21	11	18	24.15	5	33	45.0	6.145 767	1.43	14.98	9	20	16
	22	11	19	06.49	5	29	25.6	6.135 616	1.43	15.00	9	17	02
	23	11	19	48.58	5	25	07.8	6.125 291	1.44	15.03	9	13	48
	24	11	20	30.40	5	20	51.7	6.114 794	1.44	15.06	9	10	33
	25	11	21	11.95	+5	16	37.2	6.104 128	1.44	15.08	9	07	19
	26	11	21	53.22	5	12	24.4	6.093 292	1.44	15.11	9	04	04
	27	11	22	34.21	5	08	13.4	6.082 289	1.45	15.14	9	00	49
	28	11	23	14.91	5	04	04.2	6.071 122	1.45	15.16	8	57	33
	29	11	23	55.31	4	59	56.8	6.059 791	1.45	15.19	8	54	17
	30	11	24	35.42	4	55	51.3	6.048 299	1.45	15.22	8	51	01
	31	11	25	15.23	+4	51	47.7	6.036 648	1.46	15.25	8	47	45
Nov.	1	11	25	54.72	4	47	46.1	6.024 841	1.46	15.28	8	44	28
	2	11	26	33.89	4	43	46.5	6.012 880	1.46	15.31	8	41	11
	3	11	27	12.74	4	39	49.0	6.000 768	1.47	15.34	8	37	54
	4	11	27	51.26	4	35	53.7	5.988 506	1.47	15.37	8	34	36
	5	11	28	29.44	4	32	00.5	5.976 098	1.47	15.40	8	31	18
	6	11	29	07.27	+4	28	09.6	5.963 546	1.47	15.44	8	27	59
	7	11	29	44.76	4	24	20.9	5.950 853	1.48	15.47	8	24	41
	8	11	30	21.88	4	20	34.5	5.938 020	1.48	15.50	8	21	22
	9	11	30	58.65	4	16	50.4	5.925 051	1.48	15.54	8	18	02
	10	11	31	35.04	4	13	08.7	5.911 947	1.49	15.57	8	14	42
	11	11	32	11.07	4	09	29.5	5.898 712	1.49	15.61	8	11	22
	12	11	32	46.72	+4	05	52.6	5.885 348	1.49	15.64	8	08	02
	13	11	33	22.00	4	02	18.3	5.871 858	1.50	15.68	8	04	41
	14	11	33	56.89	3	58	46.4	5.858 243	1.50	15.71	8	01	19
	15	11	34	31.38	3	55	17.1	5.844 506	1.50	15.75	7	57	58
	16	11	35	05.49	+3	51	50.5	5.830 650	1.51	15.79	7	54	35

JUPITER, 2027

RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
Nov.	16	11	35	05.49	+3	51	50.5	5.830 650	1.51	15.79	7	54	35
	17	11	35	39.19	3	48	26.4	5.816 676	1.51	15.83	7	51	13
	18	11	36	12.47	3	45	05.1	5.802 588	1.52	15.87	7	47	50
	19	11	36	45.34	3	41	46.5	5.788 388	1.52	15.90	7	44	27
	20	11	37	17.78	3	38	30.8	5.774 077	1.52	15.94	7	41	03
	21	11	37	49.78	3	35	18.0	5.759 660	1.53	15.98	7	37	39
	22	11	38	21.34	+3	32	08.1	5.745 138	1.53	16.02	7	34	14
	23	11	38	52.45	3	29	01.1	5.730 515	1.53	16.06	7	30	49
	24	11	39	23.11	3	25	57.2	5.715 794	1.54	16.11	7	27	23
	25	11	39	53.31	3	22	56.4	5.700 977	1.54	16.15	7	23	57
	26	11	40	23.04	3	19	58.6	5.686 068	1.55	16.19	7	20	31
	27	11	40	52.30	3	17	04.0	5.671 072	1.55	16.23	7	17	04
	28	11	41	21.08	+3	14	12.6	5.655 990	1.55	16.28	7	13	37
	29	11	41	49.37	3	11	24.4	5.640 828	1.56	16.32	7	10	09
	30	11	42	17.16	3	08	39.6	5.625 588	1.56	16.36	7	06	40
Dec.	1	11	42	44.45	3	05	58.1	5.610 275	1.57	16.41	7	03	11
	2	11	43	11.23	3	03	20.0	5.594 892	1.57	16.45	6	59	42
	3	11	43	37.49	3	00	45.3	5.579 443	1.58	16.50	6	56	12
	4	11	44	03.22	+2	58	14.2	5.563 932	1.58	16.55	6	52	41
	5	11	44	28.42	2	55	46.6	5.548 363	1.58	16.59	6	49	10
	6	11	44	53.09	2	53	22.6	5.532 739	1.59	16.64	6	45	39
	7	11	45	17.21	2	51	02.1	5.517 065	1.59	16.69	6	42	07
	8	11	45	40.79	2	48	45.3	5.501 344	1.60	16.73	6	38	34
	9	11	46	03.82	2	46	32.2	5.485 579	1.60	16.78	6	35	01
	10	11	46	26.29	+2	44	22.7	5.469 776	1.61	16.83	6	31	27
	11	11	46	48.20	2	42	17.0	5.453 937	1.61	16.88	6	27	53
	12	11	47	09.54	2	40	15.0	5.438 067	1.62	16.93	6	24	18
	13	11	47	30.31	2	38	16.8	5.422 169	1.62	16.98	6	20	43
	14	11	47	50.51	2	36	22.5	5.406 246	1.63	17.03	6	17	07
	15	11	48	10.12	2	34	32.1	5.390 303	1.63	17.08	6	13	30
	16	11	48	29.13	+2	32	45.5	5.374 343	1.64	17.13	6	09	53
	17	11	48	47.54	2	31	03.0	5.358 369	1.64	17.18	6	06	15
	18	11	49	05.35	2	29	24.6	5.342 387	1.65	17.23	6	02	37
	19	11	49	22.53	2	27	50.2	5.326 399	1.65	17.28	5	58	58
	20	11	49	39.10	2	26	19.9	5.310 409	1.66	17.34	5	55	19
	21	11	49	55.04	2	24	53.8	5.294 423	1.66	17.39	5	51	38
	22	11	50	10.36	+2	23	31.9	5.278 444	1.67	17.44	5	47	57
	23	11	50	25.03	2	22	14.2	5.262 478	1.67	17.49	5	44	16
	24	11	50	39.07	2	21	00.7	5.246 528	1.68	17.55	5	40	34
	25	11	50	52.46	2	19	51.5	5.230 599	1.68	17.60	5	36	51
	26	11	51	05.19	2	18	46.6	5.214 697	1.69	17.65	5	33	08
	27	11	51	17.27	2	17	46.0	5.198 827	1.69	17.71	5	29	24
	28	11	51	28.68	+2	16	49.9	5.182 992	1.70	17.76	5	25	39
	29	11	51	39.42	2	15	58.1	5.167 199	1.70	17.82	5	21	54
	30	11	51	49.49	2	15	10.9	5.151 452	1.71	17.87	5	18	08
	31	11	51	58.87	2	14	28.0	5.135 756	1.71	17.93	5	14	21
	32	11	52	07.57	+2	13	49.7	5.120 116	1.72	17.98	5	10	33

SATURN, 2027

HELIOCENTRIC POSITIONS FOR 0^h TERRESTRIAL TIME
MEAN EQUINOX AND ECLIPTIC OF DATE

Date	Heliocentric Longitude	Heliocentric Latitude	Radius Vector	Date	Heliocentric Longitude	Heliocentric Latitude	Radius Vector
	° ' "	° ' "			° ' "	° ' "	
Jan. 1	14 20 00.5	-2 27 05.0	9.406 7649	Apr. 3	17 30 32.0	-2 28 14.0	9.379 2136
3	14 24 08.3	2 27 06.8	9.406 1620	5	17 34 41.2	2 28 15.2	9.378 6192
5	14 28 16.1	2 27 08.6	9.405 5592	7	17 38 50.5	2 28 16.4	9.378 0249
7	14 32 24.0	2 27 10.3	9.404 9566	9	17 42 59.8	2 28 17.6	9.377 4308
9	14 36 31.9	2 27 12.1	9.404 3542	11	17 47 09.1	2 28 18.7	9.376 8370
11	14 40 39.9	2 27 13.8	9.403 7519	13	17 51 18.5	2 28 19.9	9.376 2433
13	14 44 47.8	-2 27 15.5	9.403 1498	15	17 55 27.9	-2 28 21.0	9.375 6499
15	14 48 55.8	2 27 17.2	9.402 5479	17	17 59 37.3	2 28 22.2	9.375 0566
17	14 53 03.8	2 27 18.9	9.401 9461	19	18 03 46.8	2 28 23.3	9.374 4636
19	14 57 11.9	2 27 20.6	9.401 3445	21	18 07 56.3	2 28 24.4	9.373 8708
21	15 01 20.0	2 27 22.3	9.400 7431	23	18 12 05.8	2 28 25.5	9.373 2781
23	15 05 28.1	2 27 23.9	9.400 1418	25	18 16 15.3	2 28 26.5	9.372 6857
25	15 09 36.3	-2 27 25.6	9.399 5408	27	18 20 24.9	-2 28 27.6	9.372 0935
27	15 13 44.4	2 27 27.2	9.398 9398	29	18 24 34.5	2 28 28.6	9.371 5014
29	15 17 52.7	2 27 28.9	9.398 3391	May 1	18 28 44.2	2 28 29.6	9.370 9096
31	15 22 00.9	2 27 30.5	9.397 7386	3	18 32 53.9	2 28 30.7	9.370 3180
Feb. 2	15 26 09.2	2 27 32.1	9.397 1382	5	18 37 03.5	2 28 31.7	9.369 7266
4	15 30 17.5	2 27 33.6	9.396 5380	7	18 41 13.3	2 28 32.7	9.369 1355
6	15 34 25.8	-2 27 35.2	9.395 9379	9	18 45 23.1	-2 28 33.6	9.368 5445
8	15 38 34.2	2 27 36.8	9.395 3381	11	18 49 32.9	2 28 34.6	9.367 9537
10	15 42 42.6	2 27 38.3	9.394 7384	13	18 53 42.7	2 28 35.6	9.367 3632
12	15 46 51.0	2 27 39.8	9.394 1389	15	18 57 52.6	2 28 36.5	9.366 7728
14	15 50 59.5	2 27 41.4	9.393 5396	17	19 02 02.5	2 28 37.5	9.366 1827
16	15 55 08.0	2 27 42.9	9.392 9405	19	19 06 12.4	2 28 38.4	9.365 5928
18	15 59 16.5	-2 27 44.4	9.392 3416	21	19 10 22.3	-2 28 39.3	9.365 0031
20	16 03 25.1	2 27 45.8	9.391 7428	23	19 14 32.3	2 28 40.2	9.364 4136
22	16 07 33.7	2 27 47.3	9.391 1443	25	19 18 42.4	2 28 41.0	9.363 8244
24	16 11 42.3	2 27 48.7	9.390 5459	27	19 22 52.4	2 28 41.9	9.363 2353
26	16 15 50.9	2 27 50.2	9.389 9477	29	19 27 02.5	2 28 42.8	9.362 6465
28	16 19 59.6	2 27 51.6	9.389 3497	31	19 31 12.6	2 28 43.6	9.362 0579
Mar. 2	16 24 08.3	-2 27 53.1	9.388 7519	June 2	19 35 22.7	-2 28 44.4	9.361 4695
4	16 28 17.1	2 27 54.4	9.388 1543	4	19 39 32.9	2 28 45.3	9.360 8814
6	16 32 25.8	2 27 55.8	9.387 5569	6	19 43 43.1	2 28 46.1	9.360 2934
8	16 36 34.6	2 27 57.2	9.386 9597	8	19 47 53.3	2 28 46.8	9.359 7057
10	16 40 43.5	2 27 58.6	9.386 3626	10	19 52 03.6	2 28 47.6	9.359 1182
12	16 44 52.3	2 27 60.0	9.385 7658	12	19 56 13.9	2 28 48.4	9.358 5310
14	16 49 01.2	-2 28 01.3	9.385 1692	14	20 00 24.3	-2 28 49.1	9.357 9439
16	16 53 10.2	2 28 02.6	9.384 5727	16	20 04 34.6	2 28 49.9	9.357 3571
18	16 57 19.1	2 28 03.9	9.383 9765	18	20 08 45.0	2 28 50.6	9.356 7705
20	17 01 28.1	2 28 05.2	9.383 3804	20	20 12 55.4	2 28 51.3	9.356 1842
22	17 05 37.1	2 28 06.5	9.382 7846	22	20 17 05.9	2 28 52.0	9.355 5980
24	17 09 46.2	2 28 07.8	9.382 1889	24	20 21 16.3	2 28 52.7	9.355 0121
26	17 13 55.3	-2 28 09.1	9.381 5935	26	20 25 26.9	-2 28 53.3	9.354 4265
28	17 18 04.4	2 28 10.3	9.380 9982	28	20 29 37.4	2 28 54.0	9.353 8410
30	17 22 13.6	2 28 11.6	9.380 4031	30	20 33 48.0	2 28 54.6	9.353 2558
Apr. 1	17 26 22.7	2 28 12.8	9.379 8083	July 2	20 37 58.6	2 28 55.3	9.352 6709
3	17 30 32.0	-2 28 14.0	9.379 2136	4	20 42 09.2	-2 28 55.9	9.352 0861

SATURN, 2027
HELIOCENTRIC POSITIONS FOR 0^h TERRESTRIAL TIME
MEAN EQUINOX AND ECLIPTIC OF DATE

Date	Heliocentric Longitude	Heliocentric Latitude	Radius Vector	Date	Heliocentric Longitude	Heliocentric Latitude	Radius Vector
	° ' "	° ' "			° ' "	° ' "	
July 2	20 37 58.6	-2 28 55.3	9.352 6709	Oct. 2	23 50 39.6	-2 29 10.1	9.326 0310
4	20 42 09.2	2 28 55.9	9.352 0861	4	23 54 51.6	2 29 10.1	9.325 4581
6	20 46 19.9	2 28 56.5	9.351 5016	6	23 59 03.7	2 29 10.1	9.324 8855
8	20 50 30.6	2 28 57.1	9.350 9173	8	24 03 15.8	2 29 10.1	9.324 3132
10	20 54 41.3	2 28 57.7	9.350 3333	10	24 07 27.9	2 29 10.1	9.323 7411
12	20 58 52.1	2 28 58.2	9.349 7495	12	24 11 40.1	2 29 10.0	9.323 1693
14	21 03 02.9	-2 28 58.8	9.349 1659	14	24 15 52.3	-2 29 10.0	9.322 5978
16	21 07 13.7	2 28 59.3	9.348 5826	16	24 20 04.5	2 29 09.9	9.322 0266
18	21 11 24.5	2 28 59.9	9.347 9995	18	24 24 16.8	2 29 09.8	9.321 4557
20	21 15 35.4	2 29 00.4	9.347 4167	20	24 28 29.1	2 29 09.7	9.320 8850
22	21 19 46.4	2 29 00.9	9.346 8341	22	24 32 41.4	2 29 09.6	9.320 3146
24	21 23 57.3	2 29 01.4	9.346 2517	24	24 36 53.7	2 29 09.5	9.319 7445
26	21 28 08.3	-2 29 01.9	9.345 6696	26	24 41 06.1	-2 29 09.4	9.319 1747
28	21 32 19.3	2 29 02.3	9.345 0878	28	24 45 18.5	2 29 09.2	9.318 6052
30	21 36 30.3	2 29 02.8	9.344 5061	30	24 49 31.0	2 29 09.0	9.318 0360
Aug. 1	21 40 41.4	2 29 03.2	9.343 9248	Nov. 1	24 53 43.4	2 29 08.8	9.317 4670
3	21 44 52.5	2 29 03.6	9.343 3436	3	24 57 55.9	2 29 08.6	9.316 8984
5	21 49 03.6	2 29 04.0	9.342 7627	5	25 02 08.5	2 29 08.5	9.316 3300
7	21 53 14.8	-2 29 04.4	9.342 1821	7	25 06 21.0	-2 29 08.3	9.315 7619
9	21 57 26.0	2 29 04.8	9.341 6017	9	25 10 33.6	2 29 08.0	9.315 1941
11	22 01 37.2	2 29 05.1	9.341 0216	11	25 14 46.2	2 29 07.8	9.314 6266
13	22 05 48.4	2 29 05.5	9.340 4418	13	25 18 58.9	2 29 07.5	9.314 0594
15	22 09 59.7	2 29 05.8	9.339 8622	15	25 23 11.6	2 29 07.2	9.313 4925
17	22 14 11.0	2 29 06.2	9.339 2828	17	25 27 24.3	2 29 07.0	9.312 9258
19	22 18 22.4	-2 29 06.5	9.338 7037	19	25 31 37.0	-2 29 06.7	9.312 3595
21	22 22 33.7	2 29 06.8	9.338 1249	21	25 35 49.8	2 29 06.4	9.311 7935
23	22 26 45.1	2 29 07.1	9.337 5463	23	25 40 02.6	2 29 06.0	9.311 2277
25	22 30 56.6	2 29 07.4	9.336 9680	25	25 44 15.4	2 29 05.7	9.310 6623
27	22 35 08.0	2 29 07.6	9.336 3899	27	25 48 28.3	2 29 05.3	9.310 0971
29	22 39 19.5	2 29 07.9	9.335 8122	29	25 52 41.2	2 29 05.0	9.309 5323
31	22 43 31.0	-2 29 08.1	9.335 2346	Dec. 1	25 56 54.1	-2 29 04.6	9.308 9677
Sept. 2	22 47 42.6	2 29 08.3	9.334 6574	3	26 01 07.0	2 29 04.2	9.308 4035
4	22 51 54.2	2 29 08.6	9.334 0804	5	26 05 20.0	2 29 03.8	9.307 8395
6	22 56 05.8	2 29 08.7	9.333 5037	7	26 09 33.0	2 29 03.4	9.307 2759
8	23 00 17.4	2 29 08.9	9.332 9272	9	26 13 46.1	2 29 02.9	9.306 7125
10	23 04 29.1	2 29 09.1	9.332 3511	11	26 17 59.2	2 29 02.5	9.306 1494
12	23 08 40.8	-2 29 09.3	9.331 7751	13	26 22 12.3	-2 29 02.0	9.305 5867
14	23 12 52.6	2 29 09.4	9.331 1995	15	26 26 25.4	2 29 01.6	9.305 0242
16	23 17 04.4	2 29 09.5	9.330 6241	17	26 30 38.6	2 29 01.1	9.304 4621
18	23 21 16.1	2 29 09.6	9.330 0490	19	26 34 51.8	2 29 00.6	9.303 9002
20	23 25 28.0	2 29 09.7	9.329 4742	21	26 39 05.0	2 29 00.1	9.303 3387
22	23 29 39.8	2 29 09.8	9.328 8996	23	26 43 18.2	2 28 59.6	9.302 7774
24	23 33 51.7	-2 29 09.9	9.328 3254	25	26 47 31.5	-2 28 59.0	9.302 2165
26	23 38 03.6	2 29 10.0	9.327 7514	27	26 51 44.8	2 28 58.4	9.301 6559
28	23 42 15.6	2 29 10.0	9.327 1776	29	26 55 58.2	2 28 57.9	9.301 0956
30	23 46 27.6	2 29 10.1	9.326 6042	31	27 00 11.5	2 28 57.3	9.300 5355
Oct. 2	23 50 39.6	-2 29 10.1	9.326 0310	33	27 04 25.0	-2 28 56.7	9.299 9758

SATURN, 2027

GEOCENTRIC LONGITUDE AND LATITUDE FOR 0^h TERRESTRIAL TIME

Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude			Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude		
		°	′	″	°	′	″			°	′	″	°	′	″
Jan.	0	8	17	42.5	-2	27	37.2	Feb.	15	11	34	34.6	-2	17	56.4
	1	8	19	55.3	2	27	22.2		16	11	40	39.2	2	17	47.1
	2	8	22	14.4	2	27	07.2		17	11	46	47.3	2	17	38.1
	3	8	24	39.8	2	26	52.3		18	11	52	58.8	2	17	29.3
	4	8	27	11.3	2	26	37.5		19	11	59	13.6	2	17	20.6
	5	8	29	49.1	2	26	22.7		20	12	05	31.6	2	17	12.1
	6	8	32	33.0	-2	26	08.0		21	12	11	52.7	-2	17	03.7
	7	8	35	22.9	2	25	53.3		22	12	18	17.0	2	16	55.6
	8	8	38	18.8	2	25	38.8		23	12	24	44.2	2	16	47.6
	9	8	41	20.7	2	25	24.3		24	12	31	14.5	2	16	39.8
	10	8	44	28.5	2	25	09.9		25	12	37	47.8	2	16	32.1
	11	8	47	42.1	2	24	55.6		26	12	44	24.0	2	16	24.7
	12	8	51	01.5	-2	24	41.4		27	12	51	03.1	-2	16	17.4
	13	8	54	26.6	2	24	27.4		28	12	57	44.9	2	16	10.3
	14	8	57	57.5	2	24	13.4	Mar.	1	13	04	29.5	2	16	03.4
	15	9	01	33.9	2	23	59.5		2	13	11	16.8	2	15	56.6
	16	9	05	16.0	2	23	45.8		3	13	18	06.5	2	15	50.1
	17	9	09	03.7	2	23	32.1		4	13	24	58.7	2	15	43.7
	18	9	12	56.8	-2	23	18.6		5	13	31	53.4	-2	15	37.5
	19	9	16	55.5	2	23	05.2		6	13	38	50.3	2	15	31.5
	20	9	20	59.5	2	22	51.9		7	13	45	49.4	2	15	25.6
	21	9	25	08.8	2	22	38.8		8	13	52	50.7	2	15	20.0
	22	9	29	23.3	2	22	25.8		9	13	59	54.1	2	15	14.5
	23	9	33	42.8	2	22	12.9		10	14	06	59.5	2	15	09.3
	24	9	38	07.4	-2	22	00.1		11	14	14	06.9	-2	15	04.2
	25	9	42	36.9	2	21	47.5		12	14	21	16.3	2	14	59.3
	26	9	47	11.4	2	21	35.0		13	14	28	27.5	2	14	54.6
	27	9	51	50.8	2	21	22.7		14	14	35	40.5	2	14	50.1
	28	9	56	35.0	2	21	10.4		15	14	42	55.2	2	14	45.8
	29	10	01	24.2	2	20	58.4		16	14	50	11.5	2	14	41.7
	30	10	06	18.1	-2	20	46.4		17	14	57	29.4	-2	14	37.8
	31	10	11	16.7	2	20	34.6		18	15	04	48.6	2	14	34.0
Feb.	1	10	16	20.1	2	20	23.0		19	15	12	09.2	2	14	30.5
	2	10	21	28.0	2	20	11.5		20	15	19	31.0	2	14	27.1
	3	10	26	40.4	2	20	00.1		21	15	26	53.9	2	14	24.0
	4	10	31	57.3	2	19	48.9		22	15	34	18.1	2	14	21.0
	5	10	37	18.5	-2	19	37.9		23	15	41	43.3	-2	14	18.2
	6	10	42	44.0	2	19	27.0		24	15	49	09.6	2	14	15.6
	7	10	48	13.7	2	19	16.2		25	15	56	37.0	2	14	13.2
	8	10	53	47.5	2	19	05.7		26	16	04	05.3	2	14	10.9
	9	10	59	25.4	2	18	55.3		27	16	11	34.6	2	14	08.9
	10	11	05	07.3	2	18	45.0		28	16	19	04.7	2	14	07.0
	11	11	10	53.1	-2	18	34.9		29	16	26	35.6	-2	14	05.4
	12	11	16	42.8	2	18	25.0		30	16	34	07.1	2	14	03.9
	13	11	22	36.3	2	18	15.3		31	16	41	39.3	2	14	02.6
	14	11	28	33.6	2	18	05.7	Apr.	1	16	49	11.9	2	14	01.5
	15	11	34	34.6	-2	17	56.4		2	16	56	45.1	-2	14	00.5

SATURN, 2027

GEOCENTRIC LONGITUDE AND LATITUDE FOR 0^h TERRESTRIAL TIME

Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude			Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude		
		°	'	"	°	'	"			°	'	"	°	'	"
Apr.	1	16	49	11.9	-2	14	01.5	May	17	22	26	41.6	-2	16	33.8
	2	16	56	45.1	2	14	00.5		18	22	33	25.1	2	16	41.4
	3	17	04	18.5	2	13	59.8		19	22	40	06.1	2	16	49.1
	4	17	11	52.3	2	13	59.3		20	22	46	44.5	2	16	57.1
	5	17	19	26.4	2	13	59.0		21	22	53	20.3	2	17	05.2
	6	17	27	00.6	2	13	58.9		22	22	59	53.4	2	17	13.5
	7	17	34	34.9	-2	13	58.9		23	23	06	23.8	-2	17	22.0
	8	17	42	09.3	2	13	59.2		24	23	12	51.3	2	17	30.6
	9	17	49	43.7	2	13	59.6		25	23	19	15.9	2	17	39.4
	10	17	57	18.2	2	14	00.1		26	23	25	37.5	2	17	48.4
	11	18	04	52.5	2	14	00.9		27	23	31	56.0	2	17	57.5
	12	18	12	26.7	2	14	01.9		28	23	38	11.4	2	18	06.8
	13	18	20	00.5	-2	14	03.1		29	23	44	23.7	-2	18	16.3
	14	18	27	34.0	2	14	04.4		30	23	50	32.7	2	18	25.9
	15	18	35	06.9	2	14	06.0		31	23	56	38.4	2	18	35.7
	16	18	42	39.3	2	14	07.8	June	1	24	02	40.9	2	18	45.7
	17	18	50	11.1	2	14	09.7		2	24	08	39.9	2	18	55.9
	18	18	57	42.2	2	14	11.8		3	24	14	35.6	2	19	06.2
	19	19	05	12.6	-2	14	14.2		4	24	20	27.7	-2	19	16.7
	20	19	12	42.2	2	14	16.7		5	24	26	16.4	2	19	27.3
	21	19	20	11.2	2	14	19.3		6	24	32	01.4	2	19	38.1
	22	19	27	39.3	2	14	22.2		7	24	37	42.6	2	19	49.1
	23	19	35	06.5	2	14	25.3		8	24	43	20.0	2	20	00.2
	24	19	42	32.8	2	14	28.5		9	24	48	53.4	2	20	11.5
	25	19	49	58.2	-2	14	31.9		10	24	54	22.9	-2	20	23.0
	26	19	57	22.4	2	14	35.5		11	24	59	48.4	2	20	34.5
	27	20	04	45.4	2	14	39.3		12	25	05	09.8	2	20	46.3
	28	20	12	07.3	2	14	43.3		13	25	10	27.1	2	20	58.2
	29	20	19	27.8	2	14	47.4		14	25	15	40.3	2	21	10.2
	30	20	26	46.9	2	14	51.8		15	25	20	49.4	2	21	22.4
May	1	20	34	04.6	-2	14	56.3		16	25	25	54.4	-2	21	34.7
	2	20	41	20.8	2	15	01.0		17	25	30	55.1	2	21	47.2
	3	20	48	35.4	2	15	05.9		18	25	35	51.5	2	21	59.8
	4	20	55	48.4	2	15	11.0		19	25	40	43.5	2	22	12.5
	5	21	02	59.8	2	15	16.3		20	25	45	31.1	2	22	25.4
	6	21	10	09.4	2	15	21.7		21	25	50	14.3	2	22	38.4
	7	21	17	17.4	-2	15	27.3		22	25	54	52.8	-2	22	51.5
	8	21	24	23.4	2	15	33.2		23	25	59	26.7	2	23	04.8
	9	21	31	27.6	2	15	39.2		24	26	03	56.0	2	23	18.2
	10	21	38	29.8	2	15	45.4		25	26	08	20.5	2	23	31.7
	11	21	45	29.8	2	15	51.8		26	26	12	40.2	2	23	45.4
	12	21	52	27.6	2	15	58.3		27	26	16	55.1	2	23	59.2
	13	21	59	23.2	-2	16	05.0		28	26	21	05.2	-2	24	13.1
	14	22	06	16.4	2	16	12.0		29	26	25	10.3	2	24	27.2
	15	22	13	07.2	2	16	19.1		30	26	29	10.5	2	24	41.3
	16	22	19	55.6	2	16	26.3	July	1	26	33	05.8	2	24	55.6
	17	22	26	41.6	-2	16	33.8		2	26	36	55.9	-2	25	10.0

SATURN, 2027

GEOCENTRIC LONGITUDE AND LATITUDE FOR 0^h TERRESTRIAL TIME

Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude			Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude		
		°	′	″	°	′	″			°	′	″	°	′	″
July	1	26	33	05.8	-2	24	55.6	Aug.	16	27	50	48.1	-2	37	04.1
	2	26	36	55.9	2	25	10.0		17	27	50	06.2	2	37	19.9
	3	26	40	41.0	2	25	24.6		18	27	49	18.0	2	37	35.6
	4	26	44	20.9	2	25	39.2		19	27	48	23.6	2	37	51.3
	5	26	47	55.4	2	25	54.0		20	27	47	23.1	2	38	06.8
	6	26	51	24.6	2	26	08.8		21	27	46	16.4	2	38	22.3
	7	26	54	48.3	-2	26	23.8		22	27	45	03.7	-2	38	37.6
	8	26	58	06.5	2	26	38.8		23	27	43	45.0	2	38	52.8
	9	27	01	19.3	2	26	54.0		24	27	42	20.2	2	39	08.0
	10	27	04	26.5	2	27	09.2		25	27	40	49.5	2	39	23.0
	11	27	07	28.2	2	27	24.6		26	27	39	12.9	2	39	37.8
	12	27	10	24.5	2	27	40.0		27	27	37	30.3	2	39	52.6
	13	27	13	15.1	-2	27	55.5		28	27	35	41.8	-2	40	07.2
	14	27	16	00.2	2	28	11.0		29	27	33	47.4	2	40	21.6
	15	27	18	39.7	2	28	26.7		30	27	31	47.1	2	40	36.0
	16	27	21	13.4	2	28	42.4		31	27	29	40.9	2	40	50.1
	17	27	23	41.5	2	28	58.1	Sept.	1	27	27	28.9	2	41	04.1
	18	27	26	03.8	2	29	14.0		2	27	25	11.3	2	41	17.8
	19	27	28	20.2	-2	29	29.9		3	27	22	48.0	-2	41	31.4
	20	27	30	30.8	2	29	45.8		4	27	20	19.2	2	41	44.8
	21	27	32	35.4	2	30	01.8		5	27	17	45.1	2	41	58.0
	22	27	34	34.1	2	30	17.9		6	27	15	05.6	2	42	11.0
	23	27	36	26.9	2	30	34.0		7	27	12	20.9	2	42	23.8
	24	27	38	13.6	2	30	50.2		8	27	09	31.0	2	42	36.4
	25	27	39	54.4	-2	31	06.4		9	27	06	35.9	-2	42	48.7
	26	27	41	29.1	2	31	22.7		10	27	03	35.9	2	43	00.8
	27	27	42	57.9	2	31	38.9		11	27	00	30.8	2	43	12.7
	28	27	44	20.5	2	31	55.3		12	26	57	20.9	2	43	24.3
	29	27	45	37.1	2	32	11.6		13	26	54	06.1	2	43	35.7
	30	27	46	47.6	2	32	28.0		14	26	50	46.6	2	43	46.9
	31	27	47	51.9	-2	32	44.4		15	26	47	22.5	-2	43	57.8
Aug.	1	27	48	50.0	2	33	00.8		16	26	43	53.9	2	44	08.4
	2	27	49	41.8	2	33	17.2		17	26	40	20.8	2	44	18.7
	3	27	50	27.2	2	33	33.6		18	26	36	43.5	2	44	28.8
	4	27	51	06.4	2	33	50.0		19	26	33	01.9	2	44	38.6
	5	27	51	39.2	2	34	06.4		20	26	29	16.4	2	44	48.2
	6	27	52	05.7	-2	34	22.7		21	26	25	26.8	-2	44	57.4
	7	27	52	25.9	2	34	39.1		22	26	21	33.4	2	45	06.3
	8	27	52	39.9	2	34	55.4		23	26	17	36.3	2	45	15.0
	9	27	52	47.7	2	35	11.6		24	26	13	35.5	2	45	23.4
	10	27	52	49.3	2	35	27.9		25	26	09	31.1	2	45	31.4
	11	27	52	44.7	2	35	44.1		26	26	05	23.3	2	45	39.1
	12	27	52	33.8	-2	36	00.2		27	26	01	12.0	-2	45	46.5
	13	27	52	16.7	2	36	16.3		28	25	56	57.5	2	45	53.6
	14	27	51	53.4	2	36	32.3		29	25	52	40.0	2	46	00.3
	15	27	51	23.9	2	36	48.2		30	25	48	19.5	2	46	06.7
	16	27	50	48.1	-2	37	04.1	Oct.	1	25	43	56.3	-2	46	12.8

SATURN, 2027

GEOCENTRIC LONGITUDE AND LATITUDE FOR 0^h TERRESTRIAL TIME

Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude			Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude		
		°	'	"	°	'	"			°	'	"	°	'	"
Oct.	1	25	43	56.3	-2	46	12.8	Nov.	16	22	16	43.0	-2	44	18.4
	2	25	39	30.5	2	46	18.5		17	22	13	02.9	2	44	07.8
	3	25	35	02.4	2	46	23.9		18	22	09	27.2	2	43	57.0
	4	25	30	32.0	2	46	28.9		19	22	05	55.9	2	43	45.8
	5	25	25	59.4	2	46	33.5		20	22	02	29.1	2	43	34.4
	6	25	21	24.9	2	46	37.8		21	21	59	07.0	2	43	22.7
	7	25	16	48.6	-2	46	41.7		22	21	55	49.6	-2	43	10.8
	8	25	12	10.6	2	46	45.3		23	21	52	37.0	2	42	58.6
	9	25	07	30.9	2	46	48.5		24	21	49	29.5	2	42	46.1
	10	25	02	49.9	2	46	51.3		25	21	46	27.1	2	42	33.4
	11	24	58	07.6	2	46	53.8		26	21	43	30.0	2	42	20.5
	12	24	53	24.2	2	46	55.9		27	21	40	38.3	2	42	07.3
	13	24	48	39.8	-2	46	57.6		28	21	37	52.1	-2	41	53.9
	14	24	43	54.6	2	46	58.9		29	21	35	11.4	2	41	40.2
	15	24	39	08.8	2	46	59.9		30	21	32	36.4	2	41	26.4
	16	24	34	22.6	2	47	00.5	Dec.	1	21	30	07.0	2	41	12.3
	17	24	29	36.0	2	47	00.8		2	21	27	43.5	2	40	58.1
	18	24	24	49.4	2	47	00.6		3	21	25	25.7	2	40	43.6
	19	24	20	02.8	-2	47	00.1		4	21	23	13.8	-2	40	29.0
	20	24	15	16.3	2	46	59.2		5	21	21	07.9	2	40	14.2
	21	24	10	30.1	2	46	58.0		6	21	19	08.0	2	39	59.2
	22	24	05	44.4	2	46	56.4		7	21	17	14.1	2	39	44.1
	23	24	00	59.2	2	46	54.4		8	21	15	26.5	2	39	28.8
	24	23	56	14.6	2	46	52.0		9	21	13	45.0	2	39	13.4
	25	23	51	30.9	-2	46	49.2		10	21	12	09.8	-2	38	57.8
	26	23	46	48.3	2	46	46.1		11	21	10	41.0	2	38	42.1
	27	23	42	06.8	2	46	42.6		12	21	09	18.6	2	38	26.2
	28	23	37	26.8	2	46	38.7		13	21	08	02.6	2	38	10.3
	29	23	32	48.4	2	46	34.5		14	21	06	53.0	2	37	54.2
	30	23	28	11.7	2	46	29.9		15	21	05	49.9	2	37	38.1
	31	23	23	37.1	-2	46	24.9		16	21	04	53.2	-2	37	21.8
Nov.	1	23	19	04.5	2	46	19.5		17	21	04	02.9	2	37	05.4
	2	23	14	34.2	2	46	13.8		18	21	03	19.1	2	36	49.0
	3	23	10	06.2	2	46	07.7		19	21	02	41.7	2	36	32.5
	4	23	05	40.8	2	46	01.3		20	21	02	10.9	2	36	15.8
	5	23	01	18.0	2	45	54.5		21	21	01	46.7	2	35	59.1
	6	22	56	58.0	-2	45	47.4		22	21	01	29.1	-2	35	42.4
	7	22	52	41.0	2	45	39.9		23	21	01	18.3	2	35	25.6
	8	22	48	27.0	2	45	32.1		24	21	01	14.1	2	35	08.7
	9	22	44	16.2	2	45	24.0		25	21	01	16.7	2	34	51.7
	10	22	40	08.8	2	45	15.6		26	21	01	26.0	2	34	34.8
	11	22	36	04.9	2	45	06.8		27	21	01	42.1	2	34	17.8
	12	22	32	04.7	-2	44	57.7		28	21	02	04.8	-2	34	00.7
	13	22	28	08.2	2	44	48.3		29	21	02	34.2	2	33	43.7
	14	22	24	15.7	2	44	38.6		30	21	03	10.4	2	33	26.6
	15	22	20	27.2	2	44	28.7		31	21	03	53.1	2	33	09.5
	16	22	16	43.0	-2	44	18.4		32	21	04	42.6	-2	32	52.4

SATURN, 2027

RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
Jan.	0	0	34	21.36	+1	01	41.7	9.372 845	0.94	7.88	17	53	45
	1	0	34	29.10	1	02	47.8	9.389 425	0.94	7.86	17	49	57
	2	0	34	37.22	1	03	56.2	9.405 997	0.93	7.85	17	46	10
	3	0	34	45.73	1	05	07.1	9.422 556	0.93	7.83	17	42	23
	4	0	34	54.63	1	06	20.3	9.439 096	0.93	7.82	17	38	36
	5	0	35	03.90	1	07	35.9	9.455 613	0.93	7.81	17	34	49
	6	0	35	13.55	+1	08	53.9	9.472 101	0.93	7.79	17	31	03
	7	0	35	23.58	1	10	14.1	9.488 556	0.93	7.78	17	27	18
	8	0	35	33.97	1	11	36.7	9.504 973	0.93	7.77	17	23	32
	9	0	35	44.73	1	13	01.4	9.521 347	0.92	7.75	17	19	47
	10	0	35	55.86	1	14	28.5	9.537 672	0.92	7.74	17	16	03
	11	0	36	07.34	1	15	57.7	9.553 944	0.92	7.73	17	12	19
	12	0	36	19.19	+1	17	29.0	9.570 159	0.92	7.71	17	08	35
	13	0	36	31.38	1	19	02.5	9.586 311	0.92	7.70	17	04	51
	14	0	36	43.93	1	20	38.2	9.602 396	0.92	7.69	17	01	08
	15	0	36	56.83	1	22	15.9	9.618 410	0.91	7.67	16	57	25
	16	0	37	10.08	1	23	55.8	9.634 347	0.91	7.66	16	53	43
	17	0	37	23.67	1	25	37.7	9.650 204	0.91	7.65	16	50	01
	18	0	37	37.60	+1	27	21.6	9.665 977	0.91	7.64	16	46	19
	19	0	37	51.87	1	29	07.5	9.681 661	0.91	7.62	16	42	37
	20	0	38	06.48	1	30	55.5	9.697 253	0.91	7.61	16	38	56
	21	0	38	21.41	1	32	45.3	9.712 749	0.91	7.60	16	35	15
	22	0	38	36.67	1	34	37.1	9.728 145	0.90	7.59	16	31	35
	23	0	38	52.24	1	36	30.7	9.743 438	0.90	7.58	16	27	55
	24	0	39	08.12	+1	38	26.2	9.758 624	0.90	7.56	16	24	15
	25	0	39	24.31	1	40	23.5	9.773 700	0.90	7.55	16	20	35
	26	0	39	40.81	1	42	22.5	9.788 662	0.90	7.54	16	16	56
	27	0	39	57.62	1	44	23.3	9.803 506	0.90	7.53	16	13	17
	28	0	40	14.72	1	46	25.9	9.818 229	0.90	7.52	16	09	38
	29	0	40	32.14	1	48	30.2	9.832 827	0.89	7.51	16	06	00
	30	0	40	49.85	+1	50	36.3	9.847 295	0.89	7.50	16	02	22
	31	0	41	07.85	1	52	44.0	9.861 631	0.89	7.49	15	58	44
Feb.	1	0	41	26.15	1	54	53.4	9.875 830	0.89	7.47	15	55	06
	2	0	41	44.73	1	57	04.5	9.889 888	0.89	7.46	15	51	29
	3	0	42	03.60	1	59	17.1	9.903 802	0.89	7.45	15	47	52
	4	0	42	22.74	2	01	31.4	9.917 568	0.89	7.44	15	44	15
	5	0	42	42.16	+2	03	47.1	9.931 183	0.89	7.43	15	40	39
	6	0	43	01.84	2	06	04.4	9.944 642	0.88	7.42	15	37	03
	7	0	43	21.79	2	08	23.1	9.957 942	0.88	7.41	15	33	27
	8	0	43	41.99	2	10	43.2	9.971 081	0.88	7.40	15	29	51
	9	0	44	02.45	2	13	04.7	9.984 054	0.88	7.39	15	26	16
	10	0	44	23.16	2	15	27.6	9.996 857	0.88	7.38	15	22	41
	11	0	44	44.12	+2	17	51.8	10.009 489	0.88	7.38	15	19	06
	12	0	45	05.33	2	20	17.4	10.021 946	0.88	7.37	15	15	31
	13	0	45	26.77	2	22	44.2	10.034 226	0.88	7.36	15	11	57
	14	0	45	48.46	2	25	12.3	10.046 324	0.88	7.35	15	08	23
	15	0	46	10.38	+2	27	41.6	10.058 239	0.87	7.34	15	04	49

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RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
Feb.	15	0	46	10.38	+2	27	41.6	10.058 239	0.87	7.34	15	04	49
	16	0	46	32.52	2	30	12.2	10.069 969	0.87	7.33	15	01	15
	17	0	46	54.89	2	32	43.9	10.081 510	0.87	7.32	14	57	41
	18	0	47	17.47	2	35	16.7	10.092 861	0.87	7.31	14	54	08
	19	0	47	40.27	2	37	50.6	10.104 020	0.87	7.31	14	50	35
	20	0	48	03.26	2	40	25.6	10.114 985	0.87	7.30	14	47	02
	21	0	48	26.46	+2	43	01.5	10.125 753	0.87	7.29	14	43	29
	22	0	48	49.85	2	45	38.4	10.136 322	0.87	7.28	14	39	57
	23	0	49	13.43	2	48	16.3	10.146 691	0.87	7.28	14	36	24
	24	0	49	37.21	2	50	55.1	10.156 858	0.87	7.27	14	32	52
	25	0	50	01.18	2	53	34.9	10.166 819	0.86	7.26	14	29	20
	26	0	50	25.34	2	56	15.6	10.176 573	0.86	7.25	14	25	49
	27	0	50	49.68	+2	58	57.2	10.186 117	0.86	7.25	14	22	17
	28	0	51	14.20	3	01	39.6	10.195 450	0.86	7.24	14	18	46
Mar.	1	0	51	38.90	3	04	22.9	10.204 569	0.86	7.23	14	15	14
	2	0	52	03.76	3	07	06.9	10.213 471	0.86	7.23	14	11	43
	3	0	52	28.79	3	09	51.8	10.222 156	0.86	7.22	14	08	12
	4	0	52	53.98	3	12	37.3	10.230 619	0.86	7.22	14	04	42
	5	0	53	19.32	+3	15	23.5	10.238 861	0.86	7.21	14	01	11
	6	0	53	44.81	3	18	10.4	10.246 877	0.86	7.20	13	57	41
	7	0	54	10.45	3	20	57.9	10.254 668	0.86	7.20	13	54	10
	8	0	54	36.23	3	23	46.0	10.262 230	0.86	7.19	13	50	40
	9	0	55	02.14	3	26	34.6	10.269 563	0.86	7.19	13	47	10
	10	0	55	28.19	3	29	23.8	10.276 664	0.86	7.18	13	43	40
	11	0	55	54.37	+3	32	13.5	10.283 532	0.86	7.18	13	40	10
	12	0	56	20.68	3	35	03.7	10.290 165	0.85	7.17	13	36	41
	13	0	56	47.11	3	37	54.3	10.296 563	0.85	7.17	13	33	11
	14	0	57	13.66	3	40	45.4	10.302 725	0.85	7.17	13	29	42
	15	0	57	40.32	3	43	36.8	10.308 649	0.85	7.16	13	26	12
	16	0	58	07.10	3	46	28.7	10.314 334	0.85	7.16	13	22	43
	17	0	58	33.97	+3	49	20.8	10.319 780	0.85	7.15	13	19	14
	18	0	59	00.94	3	52	13.3	10.324 987	0.85	7.15	13	15	45
	19	0	59	28.00	3	55	06.0	10.329 953	0.85	7.15	13	12	16
	20	0	59	55.14	3	57	58.9	10.334 679	0.85	7.14	13	08	47
	21	1	00	22.37	4	00	52.0	10.339 163	0.85	7.14	13	05	18
	22	1	00	49.68	4	03	45.3	10.343 406	0.85	7.14	13	01	50
	23	1	01	17.06	+4	06	38.7	10.347 406	0.85	7.13	12	58	21
	24	1	01	44.52	4	09	32.2	10.351 164	0.85	7.13	12	54	53
	25	1	02	12.05	4	12	25.9	10.354 678	0.85	7.13	12	51	24
	26	1	02	39.66	4	15	19.7	10.357 948	0.85	7.13	12	47	56
	27	1	03	07.32	4	18	13.6	10.360 973	0.85	7.12	12	44	27
	28	1	03	35.05	4	21	07.6	10.363 752	0.85	7.12	12	40	59
	29	1	04	02.84	+4	24	01.5	10.366 285	0.85	7.12	12	37	31
	30	1	04	30.68	4	26	55.5	10.368 571	0.85	7.12	12	34	03
	31	1	04	58.56	4	29	49.4	10.370 609	0.85	7.12	12	30	34
Apr.	1	1	05	26.49	4	32	43.3	10.372 400	0.85	7.12	12	27	06
	2	1	05	54.45	+4	35	37.0	10.373 941	0.85	7.12	12	23	38

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Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
Apr.	1	1	05	26.49	+4	32	43.3	10.372 400	0.85	7.12	12	27	06
	2	1	05	54.45	4	35	37.0	10.373 941	0.85	7.12	12	23	38
	3	1	06	22.45	4	38	30.6	10.375 234	0.85	7.12	12	20	10
	4	1	06	50.47	4	41	24.0	10.376 278	0.85	7.11	12	16	42
	5	1	07	18.52	4	44	17.2	10.377 071	0.85	7.11	12	13	14
	6	1	07	46.60	4	47	10.2	10.377 615	0.85	7.11	12	09	46
	7	1	08	14.68	+4	50	02.9	10.377 909	0.85	7.11	12	06	18
	8	1	08	42.78	4	52	55.4	10.377 953	0.85	7.11	12	02	50
	9	1	09	10.90	4	55	47.7	10.377 747	0.85	7.11	11	59	22
	10	1	09	39.02	4	58	39.6	10.377 292	0.85	7.11	11	55	54
	11	1	10	07.15	5	01	31.3	10.376 588	0.85	7.11	11	52	27
	12	1	10	35.27	5	04	22.6	10.375 635	0.85	7.11	11	48	59
	13	1	11	03.39	+5	07	13.4	10.374 435	0.85	7.12	11	45	31
	14	1	11	31.49	5	10	03.9	10.372 988	0.85	7.12	11	42	03
	15	1	11	59.57	5	12	53.9	10.371 295	0.85	7.12	11	38	35
	16	1	12	27.63	5	15	43.3	10.369 356	0.85	7.12	11	35	07
	17	1	12	55.66	5	18	32.2	10.367 174	0.85	7.12	11	31	39
	18	1	13	23.65	5	21	20.6	10.364 748	0.85	7.12	11	28	11
	19	1	13	51.61	+5	24	08.5	10.362 080	0.85	7.12	11	24	42
	20	1	14	19.54	5	26	55.7	10.359 171	0.85	7.13	11	21	14
	21	1	14	47.43	5	29	42.4	10.356 020	0.85	7.13	11	17	46
	22	1	15	15.29	5	32	28.5	10.352 630	0.85	7.13	11	14	18
	23	1	15	43.09	5	35	14.0	10.349 000	0.85	7.13	11	10	50
	24	1	16	10.85	5	37	58.8	10.345 131	0.85	7.14	11	07	21
	25	1	16	38.56	+5	40	43.0	10.341 024	0.85	7.14	11	03	53
	26	1	17	06.21	5	43	26.5	10.336 680	0.85	7.14	11	00	25
	27	1	17	33.80	5	46	09.3	10.332 099	0.85	7.14	10	56	56
	28	1	18	01.32	5	48	51.3	10.327 282	0.85	7.15	10	53	27
	29	1	18	28.77	5	51	32.6	10.322 230	0.85	7.15	10	49	59
	30	1	18	56.14	5	54	13.0	10.316 944	0.85	7.16	10	46	30
May	1	1	19	23.43	+5	56	52.6	10.311 425	0.85	7.16	10	43	01
	2	1	19	50.64	5	59	31.4	10.305 673	0.85	7.16	10	39	32
	3	1	20	17.76	6	02	09.3	10.299 690	0.85	7.17	10	36	04
	4	1	20	44.80	6	04	46.3	10.293 477	0.85	7.17	10	32	34
	5	1	21	11.74	6	07	22.3	10.287 035	0.85	7.18	10	29	05
	6	1	21	38.58	6	09	57.5	10.280 365	0.86	7.18	10	25	36
	7	1	22	05.33	+6	12	31.7	10.273 470	0.86	7.19	10	22	07
	8	1	22	31.97	6	15	04.9	10.266 350	0.86	7.19	10	18	37
	9	1	22	58.50	6	17	37.1	10.259 008	0.86	7.20	10	15	08
	10	1	23	24.92	6	20	08.4	10.251 445	0.86	7.20	10	11	38
	11	1	23	51.21	6	22	38.5	10.243 663	0.86	7.21	10	08	08
	12	1	24	17.38	6	25	07.6	10.235 666	0.86	7.21	10	04	38
	13	1	24	43.41	+6	27	35.5	10.227 453	0.86	7.22	10	01	08
	14	1	25	09.31	6	30	02.3	10.219 029	0.86	7.22	9	57	38
	15	1	25	35.06	6	32	27.9	10.210 394	0.86	7.23	9	54	08
	16	1	26	00.68	6	34	52.3	10.201 552	0.86	7.24	9	50	37
	17	1	26	26.16	+6	37	15.6	10.192 504	0.86	7.24	9	47	07

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RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
May	17	1	26	26.16	+6	37	15.6	10.192 504	0.86	7.24	9	47	07
	18	1	26	51.49	6	39	37.6	10.183 252	0.86	7.25	9	43	36
	19	1	27	16.67	6	41	58.5	10.173 798	0.86	7.26	9	40	05
	20	1	27	41.70	6	44	18.2	10.164 143	0.87	7.26	9	36	34
	21	1	28	06.58	6	46	36.6	10.154 291	0.87	7.27	9	33	03
	22	1	28	31.30	6	48	53.7	10.144 243	0.87	7.28	9	29	31
	23	1	28	55.85	+6	51	09.6	10.134 000	0.87	7.28	9	26	00
	24	1	29	20.23	6	53	24.2	10.123 564	0.87	7.29	9	22	28
	25	1	29	44.45	6	55	37.5	10.112 939	0.87	7.30	9	18	56
	26	1	30	08.48	6	57	49.4	10.102 124	0.87	7.31	9	15	24
	27	1	30	32.33	6	59	59.9	10.091 123	0.87	7.32	9	11	52
	28	1	30	56.00	7	02	09.1	10.079 937	0.87	7.32	9	08	19
	29	1	31	19.47	+7	04	16.8	10.068 569	0.87	7.33	9	04	47
	30	1	31	42.75	7	06	23.0	10.057 021	0.87	7.34	9	01	14
	31	1	32	05.84	7	08	27.8	10.045 295	0.88	7.35	8	57	41
June	1	1	32	28.73	7	10	31.1	10.033 393	0.88	7.36	8	54	08
	2	1	32	51.41	7	12	33.0	10.021 318	0.88	7.37	8	50	34
	3	1	33	13.89	7	14	33.3	10.009 072	0.88	7.38	8	47	01
	4	1	33	36.16	+7	16	32.1	9.996 658	0.88	7.38	8	43	27
	5	1	33	58.22	7	18	29.4	9.984 079	0.88	7.39	8	39	53
	6	1	34	20.06	7	20	25.1	9.971 338	0.88	7.40	8	36	18
	7	1	34	41.67	7	22	19.2	9.958 438	0.88	7.41	8	32	44
	8	1	35	03.04	7	24	11.8	9.945 382	0.88	7.42	8	29	09
	9	1	35	24.18	7	26	02.6	9.932 174	0.89	7.43	8	25	34
	10	1	35	45.08	+7	27	51.8	9.918 816	0.89	7.44	8	21	59
	11	1	36	05.73	7	29	39.3	9.905 313	0.89	7.45	8	18	23
	12	1	36	26.13	7	31	25.0	9.891 666	0.89	7.46	8	14	48
	13	1	36	46.29	7	33	09.1	9.877 881	0.89	7.47	8	11	12
	14	1	37	06.19	7	34	51.5	9.863 958	0.89	7.48	8	07	36
	15	1	37	25.85	7	36	32.2	9.849 903	0.89	7.49	8	03	59
	16	1	37	45.25	+7	38	11.1	9.835 717	0.89	7.51	8	00	23
	17	1	38	04.39	7	39	48.3	9.821 403	0.90	7.52	7	56	46
	18	1	38	23.26	7	41	23.8	9.806 966	0.90	7.53	7	53	08
	19	1	38	41.87	7	42	57.5	9.792 406	0.90	7.54	7	49	31
	20	1	39	00.21	7	44	29.5	9.777 728	0.90	7.55	7	45	53
	21	1	39	18.27	7	45	59.6	9.762 935	0.90	7.56	7	42	15
	22	1	39	36.06	+7	47	27.9	9.748 029	0.90	7.57	7	38	37
	23	1	39	53.55	7	48	54.3	9.733 014	0.90	7.58	7	34	58
	24	1	40	10.76	7	50	18.8	9.717 892	0.90	7.60	7	31	19
	25	1	40	27.68	7	51	41.5	9.702 667	0.91	7.61	7	27	40
	26	1	40	44.30	7	53	02.3	9.687 342	0.91	7.62	7	24	01
	27	1	41	00.63	7	54	21.1	9.671 921	0.91	7.63	7	20	21
	28	1	41	16.65	+7	55	38.1	9.656 405	0.91	7.64	7	16	41
	29	1	41	32.38	7	56	53.1	9.640 800	0.91	7.66	7	13	00
	30	1	41	47.80	7	58	06.1	9.625 109	0.91	7.67	7	09	20
July	1	1	42	02.91	7	59	17.2	9.609 334	0.92	7.68	7	05	39
	2	1	42	17.70	+8	00	26.3	9.593 481	0.92	7.69	7	01	58

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RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
July	1	1	42	02.91	+7	59	17.2	9.609 334	0.92	7.68	7	05	39
	2	1	42	17.70	8	00	26.3	9.593 481	0.92	7.69	7	01	58
	3	1	42	32.18	8	01	33.5	9.577 552	0.92	7.71	6	58	16
	4	1	42	46.34	8	02	38.6	9.561 552	0.92	7.72	6	54	34
	5	1	43	00.17	8	03	41.8	9.545 486	0.92	7.73	6	50	52
	6	1	43	13.66	8	04	42.8	9.529 357	0.92	7.75	6	47	09
	7	1	43	26.82	+8	05	41.8	9.513 169	0.92	7.76	6	43	26
	8	1	43	39.63	8	06	38.7	9.496 928	0.93	7.77	6	39	43
	9	1	43	52.11	8	07	33.5	9.480 636	0.93	7.79	6	35	59
	10	1	44	04.24	8	08	26.2	9.464 300	0.93	7.80	6	32	15
	11	1	44	16.03	8	09	16.9	9.447 921	0.93	7.81	6	28	31
	12	1	44	27.47	8	10	05.4	9.431 506	0.93	7.83	6	24	47
	13	1	44	38.57	+8	10	51.8	9.415 057	0.93	7.84	6	21	02
	14	1	44	49.32	8	11	36.2	9.398 578	0.94	7.85	6	17	16
	15	1	44	59.72	8	12	18.5	9.382 074	0.94	7.87	6	13	31
	16	1	45	09.76	8	12	58.7	9.365 548	0.94	7.88	6	09	45
	17	1	45	19.45	8	13	36.7	9.349 004	0.94	7.90	6	05	58
	18	1	45	28.77	8	14	12.6	9.332 447	0.94	7.91	6	02	11
	19	1	45	37.73	+8	14	46.4	9.315 879	0.94	7.92	5	58	24
	20	1	45	46.33	8	15	18.0	9.299 305	0.95	7.94	5	54	37
	21	1	45	54.55	8	15	47.5	9.282 729	0.95	7.95	5	50	49
	22	1	46	02.40	8	16	14.8	9.266 154	0.95	7.97	5	47	01
	23	1	46	09.88	8	16	39.8	9.249 586	0.95	7.98	5	43	12
	24	1	46	16.98	8	17	02.7	9.233 027	0.95	8.00	5	39	23
	25	1	46	23.71	+8	17	23.4	9.216 483	0.95	8.01	5	35	34
	26	1	46	30.05	8	17	41.9	9.199 956	0.96	8.02	5	31	44
	27	1	46	36.03	8	17	58.2	9.183 453	0.96	8.04	5	27	54
	28	1	46	41.62	8	18	12.3	9.166 976	0.96	8.05	5	24	04
	29	1	46	46.83	8	18	24.3	9.150 530	0.96	8.07	5	20	13
	30	1	46	51.65	8	18	34.0	9.134 121	0.96	8.08	5	16	22
	31	1	46	56.09	+8	18	41.5	9.117 752	0.96	8.10	5	12	30
Aug.	1	1	47	00.14	8	18	46.8	9.101 429	0.97	8.11	5	08	38
	2	1	47	03.79	8	18	49.9	9.085 156	0.97	8.13	5	04	46
	3	1	47	07.04	8	18	50.8	9.068 939	0.97	8.14	5	00	53
	4	1	47	09.89	8	18	49.4	9.052 783	0.97	8.15	4	57	00
	5	1	47	12.35	8	18	45.7	9.036 692	0.97	8.17	4	53	07
	6	1	47	14.41	+8	18	39.8	9.020 671	0.97	8.18	4	49	13
	7	1	47	16.07	8	18	31.7	9.004 725	0.98	8.20	4	45	18
	8	1	47	17.35	8	18	21.4	8.988 859	0.98	8.21	4	41	24
	9	1	47	18.23	8	18	09.0	8.973 078	0.98	8.23	4	37	28
	10	1	47	18.71	8	17	54.4	8.957 385	0.98	8.24	4	33	33
	11	1	47	18.81	8	17	37.6	8.941 785	0.98	8.26	4	29	37
	12	1	47	18.51	+8	17	18.6	8.926 283	0.99	8.27	4	25	41
	13	1	47	17.83	8	16	57.6	8.910 882	0.99	8.28	4	21	44
	14	1	47	16.74	8	16	34.3	8.895 588	0.99	8.30	4	17	47
	15	1	47	15.27	8	16	09.0	8.880 404	0.99	8.31	4	13	50
	16	1	47	13.40	+8	15	41.4	8.865 335	0.99	8.33	4	09	52

SATURN, 2027

RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
Aug.	16	1	47	13.40	+8	15	41.4	8.865 335	0.99	8.33	4	09	52
	17	1	47	11.13	8	15	11.8	8.850 385	0.99	8.34	4	05	54
	18	1	47	08.48	8	14	40.0	8.835 558	1.00	8.35	4	01	55
	19	1	47	05.43	8	14	06.1	8.820 858	1.00	8.37	3	57	56
	20	1	47	02.00	8	13	30.1	8.806 290	1.00	8.38	3	53	57
	21	1	46	58.18	8	12	52.0	8.791 859	1.00	8.40	3	49	57
	22	1	46	53.97	+8	12	11.8	8.777 568	1.00	8.41	3	45	57
	23	1	46	49.38	8	11	29.6	8.763 422	1.00	8.42	3	41	56
	24	1	46	44.42	8	10	45.3	8.749 425	1.01	8.44	3	37	55
	25	1	46	39.07	8	09	59.0	8.735 582	1.01	8.45	3	33	54
	26	1	46	33.35	8	09	10.8	8.721 898	1.01	8.46	3	29	52
	27	1	46	27.26	8	08	20.5	8.708 377	1.01	8.48	3	25	50
	28	1	46	20.79	+8	07	28.3	8.695 023	1.01	8.49	3	21	48
	29	1	46	13.94	8	06	34.1	8.681 843	1.01	8.50	3	17	45
	30	1	46	06.72	8	05	38.0	8.668 839	1.01	8.52	3	13	42
	31	1	45	59.13	8	04	39.9	8.656 018	1.02	8.53	3	09	38
Sept.	1	1	45	51.17	8	03	39.9	8.643 384	1.02	8.54	3	05	35
	2	1	45	42.85	8	02	38.0	8.630 942	1.02	8.55	3	01	30
	3	1	45	34.18	+8	01	34.2	8.618 695	1.02	8.57	2	57	26
	4	1	45	25.16	8	00	28.7	8.606 649	1.02	8.58	2	53	21
	5	1	45	15.79	7	59	21.4	8.594 808	1.02	8.59	2	49	16
	6	1	45	06.08	7	58	12.3	8.583 175	1.02	8.60	2	45	10
	7	1	44	56.05	7	57	01.6	8.571 755	1.03	8.61	2	41	04
	8	1	44	45.68	7	55	49.2	8.560 551	1.03	8.62	2	36	58
	9	1	44	34.99	+7	54	35.2	8.549 567	1.03	8.63	2	32	51
	10	1	44	23.97	7	53	19.6	8.538 806	1.03	8.65	2	28	44
	11	1	44	12.64	7	52	02.4	8.528 273	1.03	8.66	2	24	37
	12	1	44	01.00	7	50	43.7	8.517 970	1.03	8.67	2	20	30
	13	1	43	49.05	7	49	23.4	8.507 900	1.03	8.68	2	16	22
	14	1	43	36.79	7	48	01.7	8.498 069	1.03	8.69	2	12	14
	15	1	43	24.25	+7	46	38.5	8.488 477	1.04	8.70	2	08	05
	16	1	43	11.41	7	45	13.9	8.479 130	1.04	8.71	2	03	57
	17	1	42	58.30	7	43	47.9	8.470 030	1.04	8.72	1	59	48
	18	1	42	44.91	7	42	20.6	8.461 180	1.04	8.72	1	55	38
	19	1	42	31.25	7	40	52.0	8.452 584	1.04	8.73	1	51	29
	20	1	42	17.34	7	39	22.2	8.444 244	1.04	8.74	1	47	19
	21	1	42	03.17	+7	37	51.2	8.436 164	1.04	8.75	1	43	09
	22	1	41	48.75	7	36	19.0	8.428 348	1.04	8.76	1	38	59
	23	1	41	34.10	7	34	45.7	8.420 798	1.04	8.77	1	34	48
	24	1	41	19.21	7	33	11.4	8.413 517	1.05	8.77	1	30	38
	25	1	41	04.09	7	31	36.0	8.406 509	1.05	8.78	1	26	27
	26	1	40	48.75	7	29	59.6	8.399 777	1.05	8.79	1	22	15
	27	1	40	33.19	+7	28	22.3	8.393 324	1.05	8.80	1	18	04
	28	1	40	17.42	7	26	44.1	8.387 153	1.05	8.80	1	13	52
	29	1	40	01.45	7	25	05.0	8.381 267	1.05	8.81	1	09	41
	30	1	39	45.29	7	23	25.1	8.375 668	1.05	8.81	1	05	29
Oct.	1	1	39	28.96	+7	21	44.5	8.370 359	1.05	8.82	1	01	16

SATURN, 2027

RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
Oct.	1	1	39	28.96	+7	21	44.5	8.370 359	1.05	8.82	1	01	16
	2	1	39	12.46	7	20	03.2	8.365 342	1.05	8.82	0	57	04
	3	1	38	55.81	7	18	21.3	8.360 620	1.05	8.83	0	52	52
	4	1	38	39.01	7	16	38.9	8.356 194	1.05	8.83	0	48	39
	5	1	38	22.07	7	14	56.0	8.352 065	1.05	8.84	0	44	26
	6	1	38	05.00	7	13	12.7	8.348 235	1.05	8.84	0	40	13
	7	1	37	47.81	+7	11	29.0	8.344 706	1.05	8.85	0	36	00
	8	1	37	30.50	7	09	45.0	8.341 478	1.05	8.85	0	31	47
	9	1	37	13.09	7	08	00.7	8.338 554	1.05	8.85	0	27	34
	10	1	36	55.59	7	06	16.2	8.335 932	1.05	8.86	0	23	21
	11	1	36	38.00	7	04	31.5	8.333 616	1.06	8.86	0	19	07
	12	1	36	20.33	7	02	46.6	8.331 605	1.06	8.86	0	14	54
	13	1	36	02.60	+7	01	01.7	8.329 900	1.06	8.86	0	10	40
	14	1	35	44.81	6	59	16.8	8.328 501	1.06	8.86	0	06	27
	15	1	35	26.98	6	57	32.0	8.327 410	1.06	8.86	0	02	13
	16	1	35	09.12	6	55	47.2	8.326 627	1.06	8.87	23	53	46
	17	1	34	51.22	6	54	02.7	8.326 151	1.06	8.87	23	49	32
	18	1	34	33.32	6	52	18.3	8.325 984	1.06	8.87	23	45	18
	19	1	34	15.41	+6	50	34.3	8.326 126	1.06	8.87	23	41	05
	20	1	33	57.50	6	48	50.7	8.326 577	1.06	8.87	23	36	51
	21	1	33	39.61	6	47	07.4	8.327 338	1.06	8.86	23	32	37
	22	1	33	21.73	6	45	24.6	8.328 408	1.06	8.86	23	28	24
	23	1	33	03.89	6	43	42.3	8.329 788	1.06	8.86	23	24	10
	24	1	32	46.07	6	42	00.5	8.331 478	1.06	8.86	23	19	56
	25	1	32	28.31	+6	40	19.3	8.333 478	1.06	8.86	23	15	43
	26	1	32	10.60	6	38	38.8	8.335 787	1.05	8.86	23	11	29
	27	1	31	52.96	6	36	59.0	8.338 406	1.05	8.85	23	07	16
	28	1	31	35.40	6	35	20.0	8.341 332	1.05	8.85	23	03	03
	29	1	31	17.93	6	33	41.9	8.344 567	1.05	8.85	22	58	50
	30	1	31	00.57	6	32	04.7	8.348 108	1.05	8.84	22	54	37
	31	1	30	43.33	+6	30	28.6	8.351 954	1.05	8.84	22	50	24
Nov.	1	1	30	26.21	6	28	53.5	8.356 103	1.05	8.83	22	46	11
	2	1	30	09.22	6	27	19.5	8.360 555	1.05	8.83	22	41	58
	3	1	29	52.37	6	25	46.7	8.365 306	1.05	8.82	22	37	46
	4	1	29	35.68	6	24	15.1	8.370 355	1.05	8.82	22	33	33
	5	1	29	19.14	6	22	44.7	8.375 700	1.05	8.81	22	29	21
	6	1	29	02.77	+6	21	15.7	8.381 339	1.05	8.81	22	25	09
	7	1	28	46.57	6	19	47.9	8.387 269	1.05	8.80	22	20	57
	8	1	28	30.56	6	18	21.6	8.393 487	1.05	8.79	22	16	45
	9	1	28	14.75	6	16	56.8	8.399 991	1.05	8.79	22	12	34
	10	1	27	59.14	6	15	33.4	8.406 779	1.05	8.78	22	08	23
	11	1	27	43.74	6	14	11.6	8.413 848	1.05	8.77	22	04	12
	12	1	27	28.56	+6	12	51.3	8.421 195	1.04	8.77	22	00	01
	13	1	27	13.61	6	11	32.7	8.428 817	1.04	8.76	21	55	50
	14	1	26	58.90	6	10	15.8	8.436 711	1.04	8.75	21	51	40
	15	1	26	44.44	6	09	00.6	8.444 876	1.04	8.74	21	47	30
	16	1	26	30.23	+6	07	47.3	8.453 307	1.04	8.73	21	43	20

SATURN, 2027

RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
Nov.	16	1	26	30.23	+6	07	47.3	8.453 307	1.04	8.73	21	43	20
	17	1	26	16.28	6	06	35.7	8.462 002	1.04	8.72	21	39	11
	18	1	26	02.59	6	05	26.0	8.470 959	1.04	8.71	21	35	01
	19	1	25	49.17	6	04	18.1	8.480 174	1.04	8.71	21	30	52
	20	1	25	36.03	6	03	12.2	8.489 644	1.04	8.70	21	26	44
	21	1	25	23.16	6	02	08.1	8.499 366	1.03	8.69	21	22	35
	22	1	25	10.59	+6	01	06.1	8.509 338	1.03	8.68	21	18	27
	23	1	24	58.31	6	00	06.0	8.519 556	1.03	8.66	21	14	19
	24	1	24	46.34	5	59	08.0	8.530 015	1.03	8.65	21	10	12
	25	1	24	34.69	5	58	12.2	8.540 714	1.03	8.64	21	06	04
	26	1	24	23.36	5	57	18.5	8.551 647	1.03	8.63	21	01	58
	27	1	24	12.36	5	56	27.0	8.562 810	1.03	8.62	20	57	51
	28	1	24	01.69	+5	55	37.7	8.574 200	1.03	8.61	20	53	45
	29	1	23	51.37	5	54	50.7	8.585 812	1.02	8.60	20	49	39
	30	1	23	41.39	5	54	05.9	8.597 641	1.02	8.59	20	45	33
Dec.	1	1	23	31.76	5	53	23.5	8.609 683	1.02	8.57	20	41	28
	2	1	23	22.48	5	52	43.3	8.621 934	1.02	8.56	20	37	23
	3	1	23	13.56	5	52	05.5	8.634 388	1.02	8.55	20	33	19
	4	1	23	05.00	+5	51	30.1	8.647 041	1.02	8.54	20	29	15
	5	1	22	56.80	5	50	57.0	8.659 888	1.02	8.52	20	25	11
	6	1	22	48.98	5	50	26.3	8.672 924	1.01	8.51	20	21	08
	7	1	22	41.53	5	49	58.0	8.686 145	1.01	8.50	20	17	05
	8	1	22	34.46	5	49	32.1	8.699 545	1.01	8.49	20	13	02
	9	1	22	27.77	5	49	08.6	8.713 120	1.01	8.47	20	09	00
	10	1	22	21.47	+5	48	47.6	8.726 864	1.01	8.46	20	04	58
	11	1	22	15.57	5	48	29.1	8.740 774	1.01	8.45	20	00	56
	12	1	22	10.05	5	48	13.1	8.754 844	1.00	8.43	19	56	55
	13	1	22	04.93	5	47	59.6	8.769 069	1.00	8.42	19	52	55
	14	1	22	00.21	5	47	48.5	8.783 446	1.00	8.40	19	48	54
	15	1	21	55.88	5	47	40.0	8.797 969	1.00	8.39	19	44	55
	16	1	21	51.96	+5	47	34.0	8.812 633	1.00	8.38	19	40	55
	17	1	21	48.42	5	47	30.4	8.827 435	1.00	8.36	19	36	56
	18	1	21	45.29	5	47	29.4	8.842 370	0.99	8.35	19	32	57
	19	1	21	42.56	5	47	30.8	8.857 433	0.99	8.33	19	28	59
	20	1	21	40.23	5	47	34.8	8.872 620	0.99	8.32	19	25	01
	21	1	21	38.31	5	47	41.2	8.887 924	0.99	8.31	19	21	04
	22	1	21	36.80	+5	47	50.2	8.903 343	0.99	8.29	19	17	06
	23	1	21	35.70	5	48	01.7	8.918 870	0.99	8.28	19	13	10
	24	1	21	35.02	5	48	15.8	8.934 500	0.98	8.26	19	09	14
	25	1	21	34.76	5	48	32.5	8.950 229	0.98	8.25	19	05	18
	26	1	21	34.91	5	48	51.7	8.966 050	0.98	8.23	19	01	22
	27	1	21	35.48	5	49	13.5	8.981 958	0.98	8.22	18	57	27
	28	1	21	36.47	+5	49	37.7	8.997 949	0.98	8.20	18	53	33
	29	1	21	37.87	5	50	04.6	9.014 015	0.98	8.19	18	49	38
	30	1	21	39.69	5	50	33.9	9.030 153	0.97	8.17	18	45	45
	31	1	21	41.92	5	51	05.7	9.046 356	0.97	8.16	18	41	51
	32	1	21	44.56	+5	51	40.0	9.062 620	0.97	8.15	18	37	58

URANUS, 2027

HELIOCENTRIC POSITIONS FOR 0^h TERRESTRIAL TIME
MEAN EQUINOX AND ECLIPTIC OF DATE

Date	Heliocentric Longitude	Heliocentric Latitude	Radius Vector	Date	Heliocentric Longitude	Heliocentric Latitude	Radius Vector
	° ' "	° ' "			° ' "	° ' "	
Jan. 1	64 04 59.5	-0 08 06.0	19.424 5507	Apr. 3	65 08 26.8	-0 07 15.4	19.407 7118
3	64 06 22.2	0 08 05.0	19.424 1857	5	65 09 49.7	0 07 14.3	19.407 3447
5	64 07 44.9	0 08 03.9	19.423 8207	7	65 11 12.5	0 07 13.2	19.406 9776
7	64 09 07.6	0 08 02.8	19.423 4556	9	65 12 35.3	0 07 12.1	19.406 6105
9	64 10 30.3	0 08 01.7	19.423 0905	11	65 13 58.2	0 07 11.0	19.406 2433
11	64 11 53.1	0 08 00.6	19.422 7253	13	65 15 21.0	0 07 09.9	19.405 8760
13	64 13 15.8	-0 07 59.5	19.422 3601	15	65 16 43.9	-0 07 08.8	19.405 5088
15	64 14 38.5	0 07 58.4	19.421 9948	17	65 18 06.7	0 07 07.7	19.405 1415
17	64 16 01.2	0 07 57.3	19.421 6294	19	65 19 29.6	0 07 06.6	19.404 7741
19	64 17 24.0	0 07 56.2	19.421 2640	21	65 20 52.4	0 07 05.5	19.404 4067
21	64 18 46.7	0 07 55.1	19.420 8986	23	65 22 15.3	0 07 04.4	19.404 0393
23	64 20 09.4	0 07 54.0	19.420 5331	25	65 23 38.1	0 07 03.3	19.403 6718
25	64 21 32.2	-0 07 52.9	19.420 1676	27	65 25 01.0	-0 07 02.2	19.403 3043
27	64 22 54.9	0 07 51.8	19.419 8020	29	65 26 23.9	0 07 01.1	19.402 9368
29	64 24 17.7	0 07 50.7	19.419 4363	May 1	65 27 46.7	0 06 59.9	19.402 5692
31	64 25 40.4	0 07 49.6	19.419 0706	3	65 29 09.6	0 06 58.9	19.402 2015
Feb. 2	64 27 03.1	0 07 48.5	19.418 7049	5	65 30 32.5	0 06 57.7	19.401 8338
4	64 28 25.9	0 07 47.4	19.418 3391	7	65 31 55.4	0 06 56.6	19.401 4661
6	64 29 48.6	-0 07 46.3	19.417 9732	9	65 33 18.2	-0 06 55.5	19.401 0983
8	64 31 11.4	0 07 45.2	19.417 6073	11	65 34 41.1	0 06 54.4	19.400 7305
10	64 32 34.2	0 07 44.1	19.417 2414	13	65 36 04.0	0 06 53.3	19.400 3627
12	64 33 56.9	0 07 43.0	19.416 8754	15	65 37 26.9	0 06 52.2	19.399 9948
14	64 35 19.7	0 07 41.9	19.416 5094	17	65 38 49.8	0 06 51.1	19.399 6268
16	64 36 42.5	0 07 40.7	19.416 1433	19	65 40 12.7	0 06 50.0	19.399 2588
18	64 38 05.2	-0 07 39.7	19.415 7772	21	65 41 35.6	-0 06 48.9	19.398 8908
20	64 39 28.0	0 07 38.6	19.415 4110	23	65 42 58.5	0 06 47.8	19.398 5227
22	64 40 50.8	0 07 37.5	19.415 0448	25	65 44 21.4	0 06 46.7	19.398 1546
24	64 42 13.5	0 07 36.4	19.414 6785	27	65 45 44.3	0 06 45.6	19.397 7865
26	64 43 36.3	0 07 35.3	19.414 3122	29	65 47 07.2	0 06 44.5	19.397 4183
28	64 44 59.1	0 07 34.2	19.413 9459	31	65 48 30.1	0 06 43.4	19.397 0500
Mar. 2	64 46 21.9	-0 07 33.0	19.413 5795	June 2	65 49 53.0	-0 06 42.2	19.396 6818
4	64 47 44.7	0 07 32.0	19.413 2130	4	65 51 15.9	0 06 41.2	19.396 3134
6	64 49 07.5	0 07 30.8	19.412 8466	6	65 52 38.8	0 06 40.0	19.395 9451
8	64 50 30.3	0 07 29.8	19.412 4801	8	65 54 01.8	0 06 39.0	19.395 5767
10	64 51 53.1	0 07 28.6	19.412 1135	10	65 55 24.7	0 06 37.8	19.395 2082
12	64 53 15.9	0 07 27.6	19.411 7469	12	65 56 47.6	0 06 36.7	19.394 8397
14	64 54 38.7	-0 07 26.4	19.411 3803	14	65 58 10.5	-0 06 35.6	19.394 4712
16	64 56 01.5	0 07 25.4	19.411 0136	16	65 59 33.5	0 06 34.5	19.394 1026
18	64 57 24.3	0 07 24.2	19.410 6469	18	66 00 56.4	0 06 33.4	19.393 7340
20	64 58 47.1	0 07 23.1	19.410 2802	20	66 02 19.3	0 06 32.3	19.393 3653
22	65 00 09.9	0 07 22.0	19.409 9134	22	66 03 42.3	0 06 31.2	19.392 9966
24	65 01 32.7	0 07 20.9	19.409 5465	24	66 05 05.2	0 06 30.1	19.392 6278
26	65 02 55.5	-0 07 19.8	19.409 1797	26	66 06 28.2	-0 06 29.0	19.392 2590
28	65 04 18.4	0 07 18.7	19.408 8128	28	66 07 51.1	0 06 27.9	19.391 8902
30	65 05 41.2	0 07 17.6	19.408 4458	30	66 09 14.0	0 06 26.7	19.391 5213
Apr. 1	65 07 04.0	0 07 16.5	19.408 0788	July 2	66 10 37.0	0 06 25.7	19.391 1524
3	65 08 26.8	-0 07 15.4	19.407 7118	4	66 11 60.0	-0 06 24.5	19.390 7834

URANUS, 2027
HELIOCENTRIC POSITIONS FOR 0^h TERRESTRIAL TIME
MEAN EQUINOX AND ECLIPTIC OF DATE

Date	Heliocentric Longitude	Heliocentric Latitude	Radius Vector	Date	Heliocentric Longitude	Heliocentric Latitude	Radius Vector
	° ' "	° ' "			° ' "	° ' "	
July 2	66 10 37.0	-0 06 25.7	19.391 1524	Oct. 2	67 14 15.9	-0 05 34.6	19.374 1383
4	66 11 60.0	0 06 24.5	19.390 7834	4	67 15 39.0	0 05 33.4	19.373 7676
6	66 13 23.0	0 06 23.4	19.390 4144	6	67 17 02.1	0 05 32.4	19.373 3968
8	66 14 45.9	0 06 22.3	19.390 0454	8	67 18 25.2	0 05 31.2	19.373 0261
10	66 16 08.9	0 06 21.2	19.389 6763	10	67 19 48.3	0 05 30.1	19.372 6553
12	66 17 31.8	0 06 20.1	19.389 3072	12	67 21 11.3	0 05 29.0	19.372 2844
14	66 18 54.8	-0 06 19.0	19.388 9380	14	67 22 34.5	-0 05 27.9	19.371 9136
16	66 20 17.8	0 06 17.9	19.388 5688	16	67 23 57.5	0 05 26.8	19.371 5427
18	66 21 40.8	0 06 16.8	19.388 1995	18	67 25 20.6	0 05 25.7	19.371 1717
20	66 23 03.7	0 06 15.7	19.387 8302	20	67 26 43.8	0 05 24.6	19.370 8008
22	66 24 26.7	0 06 14.6	19.387 4608	22	67 28 06.9	0 05 23.4	19.370 4298
24	66 25 49.7	0 06 13.4	19.387 0914	24	67 29 30.0	0 05 22.3	19.370 0587
26	66 27 12.7	-0 06 12.4	19.386 7220	26	67 30 53.1	-0 05 21.2	19.369 6877
28	66 28 35.7	0 06 11.2	19.386 3525	28	67 32 16.2	0 05 20.1	19.369 3166
30	66 29 58.7	0 06 10.1	19.385 9830	30	67 33 39.3	0 05 19.0	19.368 9454
Aug. 1	66 31 21.7	0 06 09.0	19.385 6134	Nov. 1	67 35 02.5	0 05 17.9	19.368 5743
3	66 32 44.7	0 06 07.9	19.385 2438	3	67 36 25.6	0 05 16.8	19.368 2031
5	66 34 07.7	0 06 06.8	19.384 8742	5	67 37 48.7	0 05 15.6	19.367 8319
7	66 35 30.7	-0 06 05.7	19.384 5045	7	67 39 11.8	-0 05 14.5	19.367 4606
9	66 36 53.7	0 06 04.6	19.384 1348	9	67 40 35.0	0 05 13.4	19.367 0893
11	66 38 16.7	0 06 03.5	19.383 7650	11	67 41 58.1	0 05 12.3	19.366 7180
13	66 39 39.7	0 06 02.3	19.383 3952	13	67 43 21.3	0 05 11.2	19.366 3466
15	66 41 02.7	0 06 01.2	19.383 0253	15	67 44 44.4	0 05 10.1	19.365 9752
17	66 42 25.7	0 06 00.1	19.382 6554	17	67 46 07.5	0 05 08.9	19.365 6038
19	66 43 48.7	-0 05 59.0	19.382 2855	19	67 47 30.7	-0 05 07.8	19.365 2323
21	66 45 11.8	0 05 57.9	19.381 9156	21	67 48 53.9	0 05 06.7	19.364 8608
23	66 46 34.8	0 05 56.8	19.381 5456	23	67 50 17.0	0 05 05.6	19.364 4893
25	66 47 57.8	0 05 55.7	19.381 1755	25	67 51 40.2	0 05 04.5	19.364 1178
27	66 49 20.9	0 05 54.6	19.380 8054	27	67 53 03.3	0 05 03.4	19.363 7462
29	66 50 43.9	0 05 53.5	19.380 4353	29	67 54 26.5	0 05 02.3	19.363 3746
31	66 52 06.9	-0 05 52.3	19.380 0652	Dec. 1	67 55 49.6	-0 05 01.1	19.363 0029
Sept. 2	66 53 30.0	0 05 51.3	19.379 6950	3	67 57 12.8	0 05 00.0	19.362 6312
4	66 54 53.0	0 05 50.1	19.379 3248	5	67 58 36.0	0 04 58.9	19.362 2595
6	66 56 16.1	0 05 49.0	19.378 9545	7	67 59 59.1	0 04 57.8	19.361 8878
8	66 57 39.1	0 05 47.9	19.378 5843	9	68 01 22.3	0 04 56.7	19.361 5160
10	66 59 02.2	0 05 46.8	19.378 2139	11	68 02 45.5	0 04 55.6	19.361 1442
12	67 00 25.2	-0 05 45.7	19.377 8436	13	68 04 08.7	-0 04 54.5	19.360 7723
14	67 01 48.3	0 05 44.6	19.377 4732	15	68 05 31.9	0 04 53.3	19.360 4005
16	67 03 11.3	0 05 43.5	19.377 1028	17	68 06 55.1	0 04 52.2	19.360 0285
18	67 04 34.4	0 05 42.4	19.376 7323	19	68 08 18.3	0 04 51.1	19.359 6566
20	67 05 57.4	0 05 41.2	19.376 3619	21	68 09 41.5	0 04 50.0	19.359 2846
22	67 07 20.5	0 05 40.1	19.375 9913	23	68 11 04.6	0 04 48.9	19.358 9126
24	67 08 43.6	-0 05 39.0	19.375 6208	25	68 12 27.9	-0 04 47.8	19.358 5405
26	67 10 06.7	0 05 37.9	19.375 2502	27	68 13 51.1	0 04 46.7	19.358 1684
28	67 11 29.7	0 05 36.8	19.374 8796	29	68 15 14.3	0 04 45.5	19.357 7963
30	67 12 52.8	0 05 35.7	19.374 5090	31	68 16 37.5	0 04 44.4	19.357 4242
Oct. 2	67 14 15.9	-0 05 34.6	19.374 1383	33	68 18 00.7	-0 04 43.3	19.357 0520

URANUS, 2027

GEOCENTRIC LONGITUDE AND LATITUDE FOR 0^h TERRESTRIAL TIME

Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude			Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude		
		°	'	"	°	'	"			°	'	"	°	'	"
Jan.	0	62	19	59.0	-0	08	27.5	Feb.	15	61	42	05.3	-0	07	44.3
	1	62	18	08.3	0	08	26.6		16	61	42	27.8	0	07	43.4
	2	62	16	19.7	0	08	25.8		17	61	42	53.6	0	07	42.4
	3	62	14	33.5	0	08	24.9		18	61	43	22.6	0	07	41.4
	4	62	12	49.6	0	08	24.0		19	61	43	54.6	0	07	40.5
	5	62	11	08.1	0	08	23.1		20	61	44	29.8	0	07	39.5
	6	62	09	28.9	-0	08	22.3		21	61	45	08.0	-0	07	38.6
	7	62	07	52.2	0	08	21.4		22	61	45	49.3	0	07	37.6
	8	62	06	18.0	0	08	20.5		23	61	46	33.6	0	07	36.7
	9	62	04	46.3	0	08	19.5		24	61	47	21.1	0	07	35.7
	10	62	03	17.1	0	08	18.6		25	61	48	11.7	0	07	34.8
	11	62	01	50.5	0	08	17.7		26	61	49	05.5	0	07	33.8
	12	62	00	26.5	-0	08	16.8		27	61	50	02.4	-0	07	32.9
	13	61	59	05.1	0	08	15.9		28	61	51	02.4	0	07	31.9
	14	61	57	46.4	0	08	15.0	Mar.	1	61	52	05.4	0	07	31.0
	15	61	56	30.5	0	08	14.0		2	61	53	11.6	0	07	30.1
	16	61	55	17.4	0	08	13.1		3	61	54	20.7	0	07	29.1
	17	61	54	07.2	0	08	12.2		4	61	55	32.8	0	07	28.2
	18	61	52	59.9	-0	08	11.2		5	61	56	47.9	-0	07	27.2
	19	61	51	55.5	0	08	10.3		6	61	58	06.0	0	07	26.3
	20	61	50	54.0	0	08	09.3		7	61	59	26.9	0	07	25.4
	21	61	49	55.4	0	08	08.4		8	62	00	50.8	0	07	24.5
	22	61	48	59.8	0	08	07.5		9	62	02	17.5	0	07	23.5
	23	61	48	07.0	0	08	06.5		10	62	03	47.2	0	07	22.6
	24	61	47	17.2	-0	08	05.6		11	62	05	19.7	-0	07	21.7
	25	61	46	30.2	0	08	04.6		12	62	06	55.1	0	07	20.8
	26	61	45	46.2	0	08	03.7		13	62	08	33.4	0	07	19.9
	27	61	45	05.2	0	08	02.7		14	62	10	14.6	0	07	19.0
	28	61	44	27.4	0	08	01.8		15	62	11	58.5	0	07	18.1
	29	61	43	52.6	0	08	00.8		16	62	13	45.2	0	07	17.2
	30	61	43	20.9	-0	07	59.9		17	62	15	34.6	-0	07	16.3
	31	61	42	52.4	0	07	58.9		18	62	17	26.6	0	07	15.4
Feb.	1	61	42	27.1	0	07	57.9		19	62	19	21.3	0	07	14.5
	2	61	42	04.9	0	07	57.0		20	62	21	18.4	0	07	13.7
	3	61	41	45.9	0	07	56.0		21	62	23	18.1	0	07	12.8
	4	61	41	30.0	0	07	55.0		22	62	25	20.2	0	07	12.0
	5	61	41	17.3	-0	07	54.0		23	62	27	24.9	-0	07	11.1
	6	61	41	07.7	0	07	53.1		24	62	29	32.1	0	07	10.2
	7	61	41	01.3	0	07	52.1		25	62	31	41.8	0	07	09.4
	8	61	40	58.1	0	07	51.1		26	62	33	53.9	0	07	08.5
	9	61	40	58.0	0	07	50.1		27	62	36	08.6	0	07	07.7
	10	61	41	01.1	0	07	49.2		28	62	38	25.6	0	07	06.8
	11	61	41	07.5	-0	07	48.2		29	62	40	45.0	-0	07	06.0
	12	61	41	17.0	0	07	47.2		30	62	43	06.6	0	07	05.2
	13	61	41	29.9	0	07	46.2		31	62	45	30.6	0	07	04.3
	14	61	41	45.9	0	07	45.3	Apr.	1	62	47	56.8	0	07	03.5
	15	61	42	05.3	-0	07	44.3		2	62	50	25.1	-0	07	02.7

URANUS, 2027

GEOCENTRIC LONGITUDE AND LATITUDE FOR 0^h TERRESTRIAL TIME

Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude			Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude		
		º	'	"	º	'	"			º	'	"	º	'	"
Apr.	1	62	47	56.8	-0	07	03.5	May	17	65	09	44.4	-0	06	31.1
	2	62	50	25.1	0	07	02.7		18	65	13	13.3	0	06	30.5
	3	62	52	55.7	0	07	01.8		19	65	16	42.6	0	06	30.0
	4	62	55	28.3	0	07	01.0		20	65	20	12.3	0	06	29.4
	5	62	58	03.0	0	07	00.2		21	65	23	42.3	0	06	28.8
	6	63	00	39.8	0	06	59.4		22	65	27	12.6	0	06	28.3
	7	63	03	18.6	-0	06	58.6		23	65	30	43.2	-0	06	27.7
	8	63	05	59.5	0	06	57.8		24	65	34	13.9	0	06	27.2
	9	63	08	42.4	0	06	57.0		25	65	37	44.8	0	06	26.6
	10	63	11	27.3	0	06	56.3		26	65	41	15.9	0	06	26.1
	11	63	14	14.1	0	06	55.5		27	65	44	48.1	0	06	26.4
	12	63	17	02.9	0	06	54.7		28	65	48	16.8	0	06	25.1
	13	63	19	53.4	-0	06	54.0		29	65	51	48.0	-0	06	24.5
	14	63	22	45.7	0	06	53.2		30	65	55	18.9	0	06	24.0
	15	63	25	39.6	0	06	52.5		31	65	58	49.7	0	06	23.4
	16	63	28	35.2	0	06	51.7	June	1	66	02	20.3	0	06	22.9
	17	63	31	32.3	0	06	51.0		2	66	05	50.8	0	06	22.4
	18	63	34	31.0	0	06	50.2		3	66	09	21.1	0	06	21.9
	19	63	37	31.2	-0	06	49.5		4	66	12	51.3	-0	06	21.4
	20	63	40	33.0	0	06	48.8		5	66	16	21.2	0	06	20.9
	21	63	43	36.4	0	06	48.1		6	66	19	50.8	0	06	20.5
	22	63	46	41.2	0	06	47.3		7	66	23	19.9	0	06	20.0
	23	63	49	47.5	0	06	46.6		8	66	26	48.6	0	06	19.5
	24	63	52	55.2	0	06	45.9		9	66	30	16.8	0	06	19.0
	25	63	56	04.3	-0	06	45.2		10	66	33	44.3	-0	06	18.6
	26	63	59	14.7	0	06	44.5		11	66	37	11.3	0	06	18.1
	27	64	02	26.4	0	06	43.8		12	66	40	37.6	0	06	17.7
	28	64	05	39.2	0	06	43.1		13	66	44	03.3	0	06	17.2
	29	64	08	53.3	0	06	42.4		14	66	47	28.3	0	06	16.8
	30	64	12	08.5	0	06	41.8		15	66	50	52.7	0	06	16.4
May	1	64	15	24.7	-0	06	41.1		16	66	54	16.3	-0	06	15.9
	2	64	18	42.0	0	06	40.4		17	66	57	39.3	0	06	15.5
	3	64	22	00.4	0	06	39.8		18	67	01	01.4	0	06	15.0
	4	64	25	19.7	0	06	39.1		19	67	04	22.7	0	06	14.6
	5	64	28	40.0	0	06	38.4		20	67	07	43.1	0	06	14.2
	6	64	32	01.3	0	06	37.8		21	67	11	02.5	0	06	13.8
	7	64	35	23.6	-0	06	37.2		22	67	14	21.0	-0	06	13.4
	8	64	38	46.7	0	06	36.5		23	67	17	38.4	0	06	12.9
	9	64	42	10.7	0	06	35.9		24	67	20	54.8	0	06	12.5
	10	64	45	35.4	0	06	35.3		25	67	24	10.1	0	06	12.1
	11	64	49	00.8	0	06	34.7		26	67	27	24.2	0	06	11.7
	12	64	52	26.8	0	06	34.1		27	67	30	37.2	0	06	11.3
	13	64	55	53.3	-0	06	33.5		28	67	33	48.9	-0	06	10.9
	14	64	59	20.4	0	06	32.9		29	67	36	59.6	0	06	10.6
	15	65	02	47.9	0	06	32.3		30	67	40	08.9	0	06	10.2
	16	65	06	15.9	0	06	31.7	July	1	67	43	17.1	0	06	09.8
	17	65	09	44.4	-0	06	31.1		2	67	46	24.0	-0	06	09.4

URANUS, 2027

GEOCENTRIC LONGITUDE AND LATITUDE FOR 0^h TERRESTRIAL TIME

Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude			Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude		
		°	'	"	°	'	"			°	'	"	°	'	"
July	1	67	43	17.1	-0	06	09.8	Aug.	16	69	33	58.9	-0	05	55.9
	2	67	46	24.0	0	06	09.4		17	69	35	27.9	0	05	55.6
	3	67	49	29.5	0	06	09.1		18	69	36	54.2	0	05	55.3
	4	67	52	33.7	0	06	08.7		19	69	38	17.6	0	05	55.1
	5	67	55	36.3	0	06	08.4		20	69	39	38.3	0	05	54.8
	6	67	58	37.4	0	06	08.0		21	69	40	56.1	0	05	54.6
	7	68	01	36.8	-0	06	07.7		22	69	42	11.1	-0	05	54.3
	8	68	04	34.7	0	06	07.3		23	69	43	23.3	0	05	54.1
	9	68	07	30.8	0	06	07.0		24	69	44	32.6	0	05	53.8
	10	68	10	25.3	0	06	06.6		25	69	45	39.1	0	05	53.6
	11	68	13	18.1	0	06	06.3		26	69	46	42.8	0	05	53.3
	12	68	16	09.3	0	06	06.0		27	69	47	43.5	0	05	53.1
	13	68	18	58.7	-0	06	05.6		28	69	48	41.3	-0	05	52.8
	14	68	21	46.5	0	06	05.3		29	69	49	36.1	0	05	52.6
	15	68	24	32.4	0	06	05.0		30	69	50	27.9	0	05	52.3
	16	68	27	16.5	0	06	04.7		31	69	51	16.5	0	05	52.1
	17	68	29	58.8	0	06	04.3	Sept.	1	69	52	02.1	0	05	51.9
	18	68	32	39.1	0	06	04.0		2	69	52	44.6	0	05	51.6
	19	68	35	17.5	-0	06	03.7		3	69	53	24.1	-0	05	51.4
	20	68	37	53.8	0	06	03.4		4	69	54	00.5	0	05	51.1
	21	68	40	28.2	0	06	03.1		5	69	54	34.0	0	05	50.9
	22	68	43	00.4	0	06	02.8		6	69	55	04.4	0	05	50.6
	23	68	45	30.6	0	06	02.4		7	69	55	31.8	0	05	50.4
	24	68	47	58.7	0	06	02.1		8	69	55	56.2	0	05	50.1
	25	68	50	24.7	-0	06	01.8		9	69	56	17.5	-0	05	49.8
	26	68	52	48.5	0	06	01.5		10	69	56	35.8	0	05	49.6
	27	68	55	10.2	0	06	01.2		11	69	56	50.9	0	05	49.3
	28	68	57	29.7	0	06	01.0		12	69	57	03.0	0	05	49.1
	29	68	59	47.1	0	06	00.7		13	69	57	11.9	0	05	48.8
	30	69	02	02.2	0	06	00.4		14	69	57	17.7	0	05	48.5
	31	69	04	15.0	-0	06	00.1		15	69	57	20.5	-0	05	48.3
Aug.	1	69	06	25.5	0	05	59.8		16	69	57	20.1	0	05	48.0
	2	69	08	33.5	0	05	59.6		17	69	57	16.7	0	05	47.7
	3	69	10	39.1	0	05	59.3		18	69	57	10.2	0	05	47.4
	4	69	12	42.1	0	05	59.0		19	69	57	00.7	0	05	47.2
	5	69	14	42.6	0	05	58.8		20	69	56	48.2	0	05	46.9
	6	69	16	40.6	-0	05	58.5		21	69	56	32.6	-0	05	46.6
	7	69	18	36.0	0	05	58.2		22	69	56	14.1	0	05	46.4
	8	69	20	28.9	0	05	58.0		23	69	55	52.6	0	05	46.1
	9	69	22	19.3	0	05	57.7		24	69	55	28.0	0	05	45.8
	10	69	24	07.2	0	05	57.4		25	69	55	00.4	0	05	45.5
	11	69	25	52.5	0	05	57.2		26	69	54	29.7	0	05	45.3
	12	69	27	35.1	-0	05	56.9		27	69	53	56.0	-0	05	45.0
	13	69	29	15.1	0	05	56.7		28	69	53	19.1	0	05	44.7
	14	69	30	52.5	0	05	56.4		29	69	52	39.2	0	05	44.4
	15	69	32	27.0	0	05	56.1		30	69	51	56.3	0	05	44.1
	16	69	33	58.9	-0	05	55.9	Oct.	1	69	51	10.5	-0	05	43.8

URANUS, 2027

GEOCENTRIC LONGITUDE AND LATITUDE FOR 0^h TERRESTRIAL TIME

Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude			Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude		
		°	'	"	°	'	"			°	'	"	°	'	"
Oct.	1	69	51	10.5	-0	05	43.8	Nov.	16	68	31	43.1	-0	05	25.6
	2	69	50	21.8	0	05	43.5		17	68	29	18.0	0	05	25.1
	3	69	49	30.1	0	05	43.2		18	68	26	52.0	0	05	24.6
	4	69	48	35.7	0	05	42.9		19	68	24	25.1	0	05	24.1
	5	69	47	38.4	0	05	42.6		20	68	21	57.3	0	05	23.6
	6	69	46	38.3	0	05	42.3		21	68	19	28.8	0	05	23.1
	7	69	45	35.3	-0	05	42.0		22	68	16	59.6	-0	05	22.5
	8	69	44	29.5	0	05	41.6		23	68	14	29.7	0	05	22.0
	9	69	43	21.0	0	05	41.3		24	68	11	59.3	0	05	21.4
	10	69	42	09.6	0	05	41.0		25	68	09	28.5	0	05	20.9
	11	69	40	55.5	0	05	40.6		26	68	06	57.4	0	05	20.3
	12	69	39	38.7	0	05	40.3		27	68	04	26.0	0	05	19.7
	13	69	38	19.3	-0	05	40.0		28	68	01	54.4	-0	05	19.2
	14	69	36	57.2	0	05	39.6		29	67	59	22.7	0	05	18.6
	15	69	35	32.5	0	05	39.3		30	67	56	50.8	0	05	18.0
	16	69	34	05.3	0	05	38.9	Dec.	1	67	54	19.0	0	05	17.4
	17	69	32	35.6	0	05	38.5		2	67	51	47.2	0	05	16.8
	18	69	31	03.5	0	05	38.2		3	67	49	15.4	0	05	16.2
	19	69	29	29.0	-0	05	37.8		4	67	46	43.8	-0	05	15.6
	20	69	27	52.1	0	05	37.5		5	67	44	12.4	0	05	15.0
	21	69	26	12.9	0	05	37.1		6	67	41	41.3	0	05	14.3
	22	69	24	31.3	0	05	36.7		7	67	39	10.5	0	05	13.7
	23	69	22	47.3	0	05	36.3		8	67	36	40.3	0	05	13.1
	24	69	21	01.0	0	05	36.0		9	67	34	10.5	0	05	12.4
	25	69	19	12.4	-0	05	35.6		10	67	31	41.4	-0	05	11.8
	26	69	17	21.6	0	05	35.2		11	67	29	13.0	0	05	11.2
	27	69	15	28.6	0	05	34.8		12	67	26	45.4	0	05	10.5
	28	69	13	33.5	0	05	34.4		13	67	24	18.6	0	05	09.9
	29	69	11	36.4	0	05	34.0		14	67	21	52.7	0	05	09.2
	30	69	09	37.3	0	05	33.6		15	67	19	27.7	0	05	08.6
	31	69	07	36.4	-0	05	33.2		16	67	17	03.6	-0	05	07.9
Nov.	1	69	05	33.6	0	05	32.7		17	67	14	40.5	0	05	07.2
	2	69	03	29.0	0	05	32.3		18	67	12	18.5	0	05	06.6
	3	69	01	22.7	0	05	31.8		19	67	09	57.5	0	05	05.9
	4	68	59	14.6	0	05	31.4		20	67	07	37.7	0	05	05.2
	5	68	57	04.8	0	05	30.9		21	67	05	19.1	0	05	04.5
	6	68	54	53.3	-0	05	30.5		22	67	03	02.0	-0	05	03.8
	7	68	52	40.3	0	05	30.0		23	67	00	46.2	0	05	03.1
	8	68	50	25.8	0	05	29.6		24	66	58	32.0	0	05	02.4
	9	68	48	09.7	0	05	29.1		25	66	56	19.4	0	05	01.7
	10	68	45	52.3	0	05	28.6		26	66	54	08.4	0	05	01.0
	11	68	43	33.6	0	05	28.1		27	66	51	59.0	0	05	00.3
	12	68	41	13.7	-0	05	27.6		28	66	49	51.4	-0	04	59.6
	13	68	38	52.6	0	05	27.1		29	66	47	45.5	0	04	58.8
	14	68	36	30.4	0	05	26.6		30	66	45	41.5	0	04	58.1
	15	68	34	07.2	0	05	26.1		31	66	43	39.3	0	04	57.4
	16	68	31	43.1	-0	05	25.6		32	66	41	39.0	-0	04	56.6

URANUS, 2027

RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
Jan.	0	4	01	08.42	+20	29	17.6	18.630 142	0.47	1.88	21	19	46
	1	4	01	00.68	20	28	56.5	18.640 498	0.47	1.88	21	15	42
	2	4	00	53.10	20	28	35.9	18.651 101	0.47	1.88	21	11	39
	3	4	00	45.68	20	28	15.7	18.661 947	0.47	1.88	21	07	36
	4	4	00	38.42	20	27	56.0	18.673 032	0.47	1.88	21	03	33
	5	4	00	31.33	20	27	36.7	18.684 353	0.47	1.87	20	59	30
	6	4	00	24.40	+20	27	18.0	18.695 906	0.47	1.87	20	55	27
	7	4	00	17.64	20	26	59.7	18.707 687	0.47	1.87	20	51	25
	8	4	00	11.06	20	26	41.9	18.719 691	0.47	1.87	20	47	23
	9	4	00	04.65	20	26	24.6	18.731 914	0.47	1.87	20	43	21
	10	3	59	58.42	20	26	07.8	18.744 351	0.47	1.87	20	39	19
	11	3	59	52.37	20	25	51.5	18.756 999	0.47	1.87	20	35	17
	12	3	59	46.49	+20	25	35.7	18.769 852	0.47	1.87	20	31	15
	13	3	59	40.81	20	25	20.4	18.782 905	0.47	1.86	20	27	14
	14	3	59	35.31	20	25	05.6	18.796 154	0.47	1.86	20	23	13
	15	3	59	30.01	20	24	51.4	18.809 595	0.47	1.86	20	19	12
	16	3	59	24.90	20	24	37.7	18.823 221	0.47	1.86	20	15	11
	17	3	59	19.99	20	24	24.5	18.837 029	0.47	1.86	20	11	10
	18	3	59	15.29	+20	24	11.9	18.851 012	0.47	1.86	20	07	10
	19	3	59	10.79	20	23	59.9	18.865 168	0.47	1.86	20	03	10
	20	3	59	06.49	20	23	48.5	18.879 489	0.47	1.85	19	59	09
	21	3	59	02.40	20	23	37.8	18.893 973	0.47	1.85	19	55	10
	22	3	58	58.50	20	23	27.6	18.908 613	0.47	1.85	19	51	10
	23	3	58	54.81	20	23	18.0	18.923 406	0.46	1.85	19	47	11
	24	3	58	51.32	+20	23	09.0	18.938 348	0.46	1.85	19	43	11
	25	3	58	48.04	20	23	00.5	18.953 432	0.46	1.85	19	39	12
	26	3	58	44.96	20	22	52.7	18.968 656	0.46	1.85	19	35	14
	27	3	58	42.09	20	22	45.4	18.984 014	0.46	1.84	19	31	15
	28	3	58	39.44	20	22	38.7	18.999 502	0.46	1.84	19	27	17
	29	3	58	37.00	20	22	32.6	19.015 114	0.46	1.84	19	23	19
	30	3	58	34.78	+20	22	27.1	19.030 847	0.46	1.84	19	19	21
	31	3	58	32.78	20	22	22.3	19.046 694	0.46	1.84	19	15	23
Feb.	1	3	58	31.01	20	22	18.2	19.062 650	0.46	1.84	19	11	25
	2	3	58	29.45	20	22	14.7	19.078 711	0.46	1.84	19	07	28
	3	3	58	28.11	20	22	11.8	19.094 871	0.46	1.83	19	03	31
	4	3	58	26.99	20	22	09.6	19.111 124	0.46	1.83	18	59	34
	5	3	58	26.09	+20	22	08.0	19.127 466	0.46	1.83	18	55	37
	6	3	58	25.41	20	22	07.1	19.143 890	0.46	1.83	18	51	41
	7	3	58	24.95	20	22	06.8	19.160 392	0.46	1.83	18	47	45
	8	3	58	24.71	20	22	07.2	19.176 965	0.46	1.83	18	43	49
	9	3	58	24.69	20	22	08.2	19.193 604	0.46	1.82	18	39	53
	10	3	58	24.89	20	22	09.8	19.210 303	0.46	1.82	18	35	58
	11	3	58	25.32	+20	22	12.0	19.227 058	0.46	1.82	18	32	02
	12	3	58	25.97	20	22	14.8	19.243 861	0.46	1.82	18	28	07
	13	3	58	26.85	20	22	18.3	19.260 708	0.46	1.82	18	24	12
	14	3	58	27.96	20	22	22.5	19.277 594	0.46	1.82	18	20	18
	15	3	58	29.29	+20	22	27.3	19.294 512	0.46	1.82	18	16	23

URANUS, 2027

RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
Feb.	15	3	58	29.29	+20	22	27.3	19.294 512	0.46	1.82	18	16	23
	16	3	58	30.85	20	22	32.8	19.311 457	0.46	1.81	18	12	29
	17	3	58	32.63	20	22	38.9	19.328 425	0.45	1.81	18	08	35
	18	3	58	34.63	20	22	45.7	19.345 410	0.45	1.81	18	04	41
	19	3	58	36.85	20	22	53.1	19.362 407	0.45	1.81	18	00	48
	20	3	58	39.29	20	23	01.2	19.379 412	0.45	1.81	17	56	55
	21	3	58	41.93	+20	23	09.8	19.396 419	0.45	1.81	17	53	01
	22	3	58	44.80	20	23	19.1	19.413 425	0.45	1.80	17	49	08
	23	3	58	47.87	20	23	28.9	19.430 423	0.45	1.80	17	45	16
	24	3	58	51.17	20	23	39.4	19.447 411	0.45	1.80	17	41	23
	25	3	58	54.68	20	23	50.4	19.464 382	0.45	1.80	17	37	31
	26	3	58	58.42	20	24	02.1	19.481 332	0.45	1.80	17	33	39
	27	3	59	02.37	+20	24	14.4	19.498 256	0.45	1.80	17	29	47
	28	3	59	06.53	20	24	27.3	19.515 149	0.45	1.79	17	25	56
Mar.	1	3	59	10.92	20	24	40.8	19.532 006	0.45	1.79	17	22	04
	2	3	59	15.51	20	24	55.0	19.548 823	0.45	1.79	17	18	13
	3	3	59	20.32	20	25	09.8	19.565 593	0.45	1.79	17	14	22
	4	3	59	25.33	20	25	25.1	19.582 312	0.45	1.79	17	10	31
	5	3	59	30.55	+20	25	41.1	19.598 976	0.45	1.79	17	06	41
	6	3	59	35.98	20	25	57.6	19.615 578	0.45	1.79	17	02	50
	7	3	59	41.61	20	26	14.7	19.632 113	0.45	1.78	16	59	00
	8	3	59	47.44	20	26	32.3	19.648 578	0.45	1.78	16	55	10
	9	3	59	53.48	20	26	50.5	19.664 966	0.45	1.78	16	51	20
	10	3	59	59.72	20	27	09.3	19.681 273	0.45	1.78	16	47	31
	11	4	00	06.16	+20	27	28.5	19.697 493	0.45	1.78	16	43	42
	12	4	00	12.80	20	27	48.3	19.713 623	0.45	1.78	16	39	52
	13	4	00	19.64	20	28	08.7	19.729 656	0.45	1.77	16	36	03
	14	4	00	26.68	20	28	29.6	19.745 590	0.45	1.77	16	32	15
	15	4	00	33.92	20	28	51.0	19.761 418	0.45	1.77	16	28	26
	16	4	00	41.35	20	29	13.0	19.777 137	0.44	1.77	16	24	38
	17	4	00	48.97	+20	29	35.5	19.792 742	0.44	1.77	16	20	49
	18	4	00	56.77	20	29	58.5	19.808 230	0.44	1.77	16	17	01
	19	4	01	04.76	20	30	22.1	19.823 596	0.44	1.77	16	13	14
	20	4	01	12.92	20	30	46.1	19.838 836	0.44	1.77	16	09	26
	21	4	01	21.26	20	31	10.5	19.853 948	0.44	1.76	16	05	38
	22	4	01	29.77	20	31	35.4	19.868 927	0.44	1.76	16	01	51
	23	4	01	38.46	+20	32	00.7	19.883 770	0.44	1.76	15	58	04
	24	4	01	47.33	20	32	26.5	19.898 473	0.44	1.76	15	54	17
	25	4	01	56.37	20	32	52.7	19.913 033	0.44	1.76	15	50	30
	26	4	02	05.59	20	33	19.4	19.927 445	0.44	1.76	15	46	44
	27	4	02	14.98	20	33	46.5	19.941 706	0.44	1.76	15	42	57
	28	4	02	24.54	20	34	14.0	19.955 813	0.44	1.75	15	39	11
	29	4	02	34.26	+20	34	42.1	19.969 762	0.44	1.75	15	35	25
	30	4	02	44.14	20	35	10.5	19.983 548	0.44	1.75	15	31	39
	31	4	02	54.19	20	35	39.3	19.997 168	0.44	1.75	15	27	53
Apr.	1	4	03	04.39	20	36	08.6	20.010 619	0.44	1.75	15	24	07
	2	4	03	14.74	+20	36	38.2	20.023 896	0.44	1.75	15	20	22

URANUS, 2027

RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
Apr.	1	4	03	04.39	+20	36	08.6	20.010 619	0.44	1.75	15	24	07
	2	4	03	14.74	20	36	38.2	20.023 896	0.44	1.75	15	20	22
	3	4	03	25.25	20	37	08.2	20.036 996	0.44	1.75	15	16	36
	4	4	03	35.90	20	37	38.6	20.049 916	0.44	1.75	15	12	51
	5	4	03	46.70	20	38	09.3	20.062 651	0.44	1.75	15	09	06
	6	4	03	57.65	20	38	40.3	20.075 199	0.44	1.74	15	05	21
	7	4	04	08.75	+20	39	11.7	20.087 555	0.44	1.74	15	01	36
	8	4	04	19.98	20	39	43.4	20.099 717	0.44	1.74	14	57	52
	9	4	04	31.36	20	40	15.4	20.111 681	0.44	1.74	14	54	07
	10	4	04	42.89	20	40	47.7	20.123 443	0.44	1.74	14	50	23
	11	4	04	54.55	20	41	20.4	20.135 001	0.44	1.74	14	46	39
	12	4	05	06.34	20	41	53.4	20.146 353	0.44	1.74	14	42	55
	13	4	05	18.26	+20	42	26.7	20.157 494	0.44	1.74	14	39	11
	14	4	05	30.30	20	43	00.3	20.168 423	0.44	1.74	14	35	27
	15	4	05	42.46	20	43	34.2	20.179 138	0.44	1.74	14	31	43
	16	4	05	54.74	20	44	08.3	20.189 636	0.44	1.73	14	27	59
	17	4	06	07.12	20	44	42.7	20.199 914	0.44	1.73	14	24	16
	18	4	06	19.62	20	45	17.3	20.209 972	0.44	1.73	14	20	32
	19	4	06	32.23	+20	45	52.1	20.219 807	0.43	1.73	14	16	49
	20	4	06	44.95	20	46	27.1	20.229 416	0.43	1.73	14	13	06
	21	4	06	57.78	20	47	02.3	20.238 799	0.43	1.73	14	09	23
	22	4	07	10.71	20	47	37.7	20.247 953	0.43	1.73	14	05	40
	23	4	07	23.75	20	48	13.3	20.256 875	0.43	1.73	14	01	57
	24	4	07	36.90	20	48	49.1	20.265 565	0.43	1.73	13	58	14
	25	4	07	50.14	+20	49	25.2	20.274 020	0.43	1.73	13	54	31
	26	4	08	03.47	20	50	01.4	20.282 237	0.43	1.73	13	50	49
	27	4	08	16.89	20	50	37.8	20.290 215	0.43	1.73	13	47	06
	28	4	08	30.40	20	51	14.4	20.297 952	0.43	1.73	13	43	24
	29	4	08	44.00	20	51	51.2	20.305 446	0.43	1.72	13	39	42
	30	4	08	57.67	20	52	28.1	20.312 694	0.43	1.72	13	35	59
May	1	4	09	11.42	+20	53	05.1	20.319 696	0.43	1.72	13	32	17
	2	4	09	25.25	20	53	42.2	20.326 448	0.43	1.72	13	28	35
	3	4	09	39.15	20	54	19.4	20.332 950	0.43	1.72	13	24	53
	4	4	09	53.13	20	54	56.7	20.339 199	0.43	1.72	13	21	11
	5	4	10	07.17	20	55	34.0	20.345 194	0.43	1.72	13	17	29
	6	4	10	21.29	20	56	11.5	20.350 933	0.43	1.72	13	13	47
	7	4	10	35.48	+20	56	49.0	20.356 414	0.43	1.72	13	10	06
	8	4	10	49.73	20	57	26.7	20.361 637	0.43	1.72	13	06	24
	9	4	11	04.04	20	58	04.4	20.366 600	0.43	1.72	13	02	42
	10	4	11	18.40	20	58	42.2	20.371 301	0.43	1.72	12	59	01
	11	4	11	32.82	20	59	20.1	20.375 741	0.43	1.72	12	55	19
	12	4	11	47.28	20	59	58.0	20.379 918	0.43	1.72	12	51	38
	13	4	12	01.77	+21	00	36.0	20.383 833	0.43	1.72	12	47	56
	14	4	12	16.31	21	01	13.9	20.387 484	0.43	1.72	12	44	15
	15	4	12	30.88	21	01	51.9	20.390 871	0.43	1.72	12	40	33
	16	4	12	45.49	21	02	29.8	20.393 994	0.43	1.72	12	36	52
	17	4	13	00.13	+21	03	07.7	20.396 853	0.43	1.72	12	33	11

URANUS, 2027

RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	º	'	"		"	"	h	m	s
May	17	4	13	00.13	+21	03	07.7	20.396 853	0.43	1.72	12	33	11
	18	4	13	14.81	21	03	45.5	20.399 448	0.43	1.72	12	29	29
	19	4	13	29.51	21	04	23.4	20.401 777	0.43	1.72	12	25	48
	20	4	13	44.25	21	05	01.2	20.403 842	0.43	1.72	12	22	07
	21	4	13	59.01	21	05	39.0	20.405 641	0.43	1.72	12	18	26
	22	4	14	13.80	21	06	16.8	20.407 174	0.43	1.72	12	14	44
	23	4	14	28.60	+21	06	54.6	20.408 442	0.43	1.72	12	11	03
	24	4	14	43.42	21	07	32.3	20.409 443	0.43	1.72	12	07	22
	25	4	14	58.25	21	08	10.0	20.410 178	0.43	1.72	12	03	41
	26	4	15	13.09	21	08	47.7	20.410 646	0.43	1.72	12	00	00
	27	4	15	28.03	21	09	24.6	20.410 846	0.43	1.72	11	56	19
	28	4	15	42.70	21	10	02.4	20.410 780	0.43	1.72	11	52	37
	29	4	15	57.56	+21	10	39.9	20.410 445	0.43	1.72	11	48	56
	30	4	16	12.41	21	11	17.2	20.409 844	0.43	1.72	11	45	15
	31	4	16	27.24	21	11	54.3	20.408 974	0.43	1.72	11	41	34
June	1	4	16	42.07	21	12	31.3	20.407 837	0.43	1.72	11	37	53
	2	4	16	56.89	21	13	08.2	20.406 431	0.43	1.72	11	34	12
	3	4	17	11.70	21	13	45.0	20.404 759	0.43	1.72	11	30	30
	4	4	17	26.50	+21	14	21.6	20.402 819	0.43	1.72	11	26	49
	5	4	17	41.28	21	14	58.1	20.400 612	0.43	1.72	11	23	08
	6	4	17	56.05	21	15	34.5	20.398 138	0.43	1.72	11	19	27
	7	4	18	10.79	21	16	10.8	20.395 399	0.43	1.72	11	15	45
	8	4	18	25.49	21	16	46.9	20.392 396	0.43	1.72	11	12	04
	9	4	18	40.16	21	17	22.9	20.389 129	0.43	1.72	11	08	23
	10	4	18	54.79	+21	17	58.6	20.385 600	0.43	1.72	11	04	41
	11	4	19	09.38	21	18	34.2	20.381 809	0.43	1.72	11	01	00
	12	4	19	23.92	21	19	09.6	20.377 760	0.43	1.72	10	57	19
	13	4	19	38.43	21	19	44.7	20.373 452	0.43	1.72	10	53	37
	14	4	19	52.89	21	20	19.6	20.368 887	0.43	1.72	10	49	56
	15	4	20	07.30	21	20	54.4	20.364 067	0.43	1.72	10	46	14
	16	4	20	21.67	+21	21	28.9	20.358 993	0.43	1.72	10	42	32
	17	4	20	35.98	21	22	03.2	20.353 666	0.43	1.72	10	38	51
	18	4	20	50.25	21	22	37.4	20.348 088	0.43	1.72	10	35	09
	19	4	21	04.45	21	23	11.3	20.342 259	0.43	1.72	10	31	27
	20	4	21	18.60	21	23	45.1	20.336 182	0.43	1.72	10	27	45
	21	4	21	32.67	21	24	18.6	20.329 858	0.43	1.72	10	24	03
	22	4	21	46.69	+21	24	51.9	20.323 287	0.43	1.72	10	20	21
	23	4	22	00.62	21	25	24.9	20.316 472	0.43	1.72	10	16	39
	24	4	22	14.49	21	25	57.7	20.309 413	0.43	1.72	10	12	57
	25	4	22	28.28	21	26	30.2	20.302 113	0.43	1.72	10	09	15
	26	4	22	41.99	21	27	02.4	20.294 572	0.43	1.73	10	05	32
	27	4	22	55.62	21	27	34.4	20.286 791	0.43	1.73	10	01	50
	28	4	23	09.17	+21	28	06.1	20.278 773	0.43	1.73	9	58	08
	29	4	23	22.64	21	28	37.5	20.270 520	0.43	1.73	9	54	25
	30	4	23	36.02	21	29	08.6	20.262 032	0.43	1.73	9	50	42
July	1	4	23	49.32	21	29	39.5	20.253 311	0.43	1.73	9	47	00
	2	4	24	02.53	+21	30	10.0	20.244 360	0.43	1.73	9	43	17

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RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
July	1	4	23	49.32	+21	29	39.5	20.253 311	0.43	1.73	9	47	00
	2	4	24	02.53	21	30	10.0	20.244 360	0.43	1.73	9	43	17
	3	4	24	15.65	21	30	40.3	20.235 181	0.43	1.73	9	39	34
	4	4	24	28.67	21	31	10.4	20.225 775	0.43	1.73	9	35	51
	5	4	24	41.58	21	31	40.2	20.216 145	0.44	1.73	9	32	08
	6	4	24	54.39	21	32	09.6	20.206 294	0.44	1.73	9	28	25
	7	4	25	07.08	+21	32	38.8	20.196 224	0.44	1.73	9	24	41
	8	4	25	19.65	21	33	07.6	20.185 939	0.44	1.73	9	20	58
	9	4	25	32.12	21	33	36.0	20.175 440	0.44	1.74	9	17	14
	10	4	25	44.46	21	34	04.1	20.164 732	0.44	1.74	9	13	31
	11	4	25	56.69	21	34	31.9	20.153 817	0.44	1.74	9	09	47
	12	4	26	08.80	21	34	59.3	20.142 698	0.44	1.74	9	06	03
	13	4	26	20.79	+21	35	26.4	20.131 377	0.44	1.74	9	02	19
	14	4	26	32.66	21	35	53.2	20.119 859	0.44	1.74	8	58	35
	15	4	26	44.41	21	36	19.6	20.108 144	0.44	1.74	8	54	50
	16	4	26	56.03	21	36	45.7	20.096 237	0.44	1.74	8	51	06
	17	4	27	07.52	21	37	11.5	20.084 140	0.44	1.74	8	47	22
	18	4	27	18.87	21	37	37.0	20.071 856	0.44	1.74	8	43	37
	19	4	27	30.08	+21	38	02.1	20.059 387	0.44	1.75	8	39	52
	20	4	27	41.16	21	38	26.9	20.046 736	0.44	1.75	8	36	07
	21	4	27	52.09	21	38	51.3	20.033 907	0.44	1.75	8	32	22
	22	4	28	02.87	21	39	15.3	20.020 902	0.44	1.75	8	28	37
	23	4	28	13.51	21	39	38.9	20.007 723	0.44	1.75	8	24	51
	24	4	28	24.00	21	40	02.2	19.994 375	0.44	1.75	8	21	06
	25	4	28	34.34	+21	40	25.1	19.980 859	0.44	1.75	8	17	20
	26	4	28	44.53	21	40	47.5	19.967 179	0.44	1.75	8	13	34
	27	4	28	54.58	21	41	09.6	19.953 337	0.44	1.76	8	09	48
	28	4	29	04.47	21	41	31.3	19.939 338	0.44	1.76	8	06	02
	29	4	29	14.20	21	41	52.7	19.925 183	0.44	1.76	8	02	16
	30	4	29	23.78	21	42	13.6	19.910 877	0.44	1.76	7	58	30
	31	4	29	33.19	+21	42	34.3	19.896 423	0.44	1.76	7	54	43
Aug.	1	4	29	42.44	21	42	54.5	19.881 825	0.44	1.76	7	50	56
	2	4	29	51.52	21	43	14.4	19.867 086	0.44	1.76	7	47	09
	3	4	30	00.42	21	43	33.8	19.852 211	0.44	1.76	7	43	22
	4	4	30	09.14	21	43	52.8	19.837 204	0.44	1.77	7	39	35
	5	4	30	17.68	21	44	11.4	19.822 068	0.44	1.77	7	35	47
	6	4	30	26.05	+21	44	29.6	19.806 809	0.44	1.77	7	32	00
	7	4	30	34.24	21	44	47.3	19.791 430	0.44	1.77	7	28	12
	8	4	30	42.25	21	45	04.6	19.775 936	0.44	1.77	7	24	24
	9	4	30	50.08	21	45	21.5	19.760 331	0.45	1.77	7	20	36
	10	4	30	57.73	21	45	38.0	19.744 619	0.45	1.77	7	16	47
	11	4	31	05.20	21	45	54.1	19.728 804	0.45	1.78	7	12	59
	12	4	31	12.48	+21	46	09.8	19.712 890	0.45	1.78	7	09	10
	13	4	31	19.58	21	46	25.1	19.696 881	0.45	1.78	7	05	21
	14	4	31	26.48	21	46	40.0	19.680 781	0.45	1.78	7	01	32
	15	4	31	33.19	21	46	54.5	19.664 595	0.45	1.78	6	57	43
	16	4	31	39.71	+21	47	08.5	19.648 325	0.45	1.78	6	53	53

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Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
Aug.	16	4	31	39.71	+21	47	08.5	19.648 325	0.45	1.78	6	53	53
	17	4	31	46.03	21	47	22.1	19.631 977	0.45	1.78	6	50	04
	18	4	31	52.15	21	47	35.3	19.615 554	0.45	1.79	6	46	14
	19	4	31	58.07	21	47	48.0	19.599 060	0.45	1.79	6	42	24
	20	4	32	03.79	21	48	00.3	19.582 500	0.45	1.79	6	38	33
	21	4	32	09.31	21	48	12.2	19.565 876	0.45	1.79	6	34	43
	22	4	32	14.63	+21	48	23.5	19.549 194	0.45	1.79	6	30	52
	23	4	32	19.76	21	48	34.5	19.532 457	0.45	1.79	6	27	01
	24	4	32	24.68	21	48	45.0	19.515 670	0.45	1.79	6	23	10
	25	4	32	29.40	21	48	55.1	19.498 837	0.45	1.80	6	19	19
	26	4	32	33.92	21	49	04.7	19.481 963	0.45	1.80	6	15	28
	27	4	32	38.23	21	49	13.9	19.465 051	0.45	1.80	6	11	36
	28	4	32	42.33	+21	49	22.7	19.448 107	0.45	1.80	6	07	44
	29	4	32	46.22	21	49	31.1	19.431 135	0.45	1.80	6	03	52
	30	4	32	49.89	21	49	39.1	19.414 140	0.45	1.80	5	59	60
	31	4	32	53.35	21	49	46.6	19.397 127	0.45	1.81	5	56	07
Sept.	1	4	32	56.58	21	49	53.6	19.380 102	0.45	1.81	5	52	14
	2	4	32	59.60	21	50	00.1	19.363 069	0.45	1.81	5	48	21
	3	4	33	02.40	+21	50	06.1	19.346 034	0.45	1.81	5	44	28
	4	4	33	04.99	21	50	11.7	19.329 002	0.45	1.81	5	40	35
	5	4	33	07.36	21	50	16.9	19.311 977	0.46	1.81	5	36	41
	6	4	33	09.52	21	50	21.5	19.294 966	0.46	1.81	5	32	47
	7	4	33	11.47	21	50	25.8	19.277 972	0.46	1.82	5	28	53
	8	4	33	13.19	21	50	29.6	19.261 001	0.46	1.82	5	24	59
	9	4	33	14.71	+21	50	33.0	19.244 058	0.46	1.82	5	21	05
	10	4	33	16.00	21	50	36.0	19.227 147	0.46	1.82	5	17	10
	11	4	33	17.07	21	50	38.5	19.210 272	0.46	1.82	5	13	15
	12	4	33	17.93	21	50	40.5	19.193 439	0.46	1.82	5	09	20
	13	4	33	18.56	21	50	42.2	19.176 653	0.46	1.83	5	05	25
	14	4	33	18.97	21	50	43.3	19.159 917	0.46	1.83	5	01	29
	15	4	33	19.16	+21	50	44.0	19.143 236	0.46	1.83	4	57	33
	16	4	33	19.13	21	50	44.2	19.126 616	0.46	1.83	4	53	37
	17	4	33	18.88	21	50	44.0	19.110 060	0.46	1.83	4	49	41
	18	4	33	18.42	21	50	43.3	19.093 573	0.46	1.83	4	45	45
	19	4	33	17.74	21	50	42.1	19.077 160	0.46	1.84	4	41	48
	20	4	33	16.85	21	50	40.5	19.060 825	0.46	1.84	4	37	51
	21	4	33	15.75	+21	50	38.4	19.044 574	0.46	1.84	4	33	54
	22	4	33	14.43	21	50	35.9	19.028 410	0.46	1.84	4	29	57
	23	4	33	12.90	21	50	33.0	19.012 338	0.46	1.84	4	26	00
	24	4	33	11.15	21	50	29.7	18.996 364	0.46	1.84	4	22	02
	25	4	33	09.18	21	50	25.9	18.980 492	0.46	1.85	4	18	04
	26	4	33	07.00	21	50	21.7	18.964 728	0.46	1.85	4	14	06
	27	4	33	04.60	+21	50	17.1	18.949 077	0.46	1.85	4	10	08
	28	4	33	01.98	21	50	11.9	18.933 543	0.46	1.85	4	06	09
	29	4	32	59.14	21	50	06.4	18.918 133	0.46	1.85	4	02	10
	30	4	32	56.09	21	50	00.3	18.902 851	0.47	1.85	3	58	11
Oct.	1	4	32	52.83	+21	49	53.8	18.887 703	0.47	1.85	3	54	12

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RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
Oct.	1	4	32	52.83	+21	49	53.8	18.887 703	0.47	1.85	3	54	12
	2	4	32	49.37	21	49	46.8	18.872 693	0.47	1.86	3	50	13
	3	4	32	45.70	21	49	39.4	18.857 827	0.47	1.86	3	46	13
	4	4	32	41.83	21	49	31.6	18.843 110	0.47	1.86	3	42	13
	5	4	32	37.76	21	49	23.4	18.828 546	0.47	1.86	3	38	13
	6	4	32	33.48	21	49	14.8	18.814 140	0.47	1.86	3	34	13
	7	4	32	29.01	+21	49	05.8	18.799 896	0.47	1.86	3	30	13
	8	4	32	24.33	21	48	56.4	18.785 820	0.47	1.86	3	26	12
	9	4	32	19.46	21	48	46.6	18.771 915	0.47	1.87	3	22	11
	10	4	32	14.39	21	48	36.3	18.758 185	0.47	1.87	3	18	10
	11	4	32	09.13	21	48	25.7	18.744 635	0.47	1.87	3	14	09
	12	4	32	03.67	21	48	14.6	18.731 269	0.47	1.87	3	10	08
	13	4	31	58.02	+21	48	03.1	18.718 091	0.47	1.87	3	06	06
	14	4	31	52.19	21	47	51.2	18.705 105	0.47	1.87	3	02	05
	15	4	31	46.18	21	47	38.8	18.692 316	0.47	1.87	2	58	03
	16	4	31	39.98	21	47	26.1	18.679 726	0.47	1.87	2	54	01
	17	4	31	33.61	21	47	13.0	18.667 340	0.47	1.88	2	49	58
	18	4	31	27.07	21	46	59.5	18.655 161	0.47	1.88	2	45	56
	19	4	31	20.36	+21	46	45.6	18.643 195	0.47	1.88	2	41	53
	20	4	31	13.48	21	46	31.4	18.631 444	0.47	1.88	2	37	51
	21	4	31	06.43	21	46	16.8	18.619 913	0.47	1.88	2	33	48
	22	4	30	59.22	21	46	01.9	18.608 605	0.47	1.88	2	29	45
	23	4	30	51.84	21	45	46.6	18.597 525	0.47	1.88	2	25	41
	24	4	30	44.29	21	45	30.9	18.586 677	0.47	1.88	2	21	38
	25	4	30	36.58	+21	45	14.9	18.576 066	0.47	1.89	2	17	34
	26	4	30	28.71	21	44	58.6	18.565 694	0.47	1.89	2	13	30
	27	4	30	20.69	21	44	41.8	18.555 566	0.47	1.89	2	09	27
	28	4	30	12.52	21	44	24.7	18.545 686	0.47	1.89	2	05	23
	29	4	30	04.21	21	44	07.2	18.536 058	0.47	1.89	2	01	18
	30	4	29	55.76	21	43	49.4	18.526 686	0.47	1.89	1	57	14
	31	4	29	47.18	+21	43	31.3	18.517 573	0.47	1.89	1	53	10
Nov.	1	4	29	38.47	21	43	13.0	18.508 722	0.48	1.89	1	49	05
	2	4	29	29.63	21	42	54.3	18.500 137	0.48	1.89	1	45	00
	3	4	29	20.66	21	42	35.4	18.491 820	0.48	1.89	1	40	55
	4	4	29	11.58	21	42	16.2	18.483 775	0.48	1.89	1	36	50
	5	4	29	02.37	21	41	56.7	18.476 004	0.48	1.90	1	32	45
	6	4	28	53.05	+21	41	36.9	18.468 509	0.48	1.90	1	28	40
	7	4	28	43.61	21	41	16.9	18.461 294	0.48	1.90	1	24	35
	8	4	28	34.07	21	40	56.6	18.454 360	0.48	1.90	1	20	30
	9	4	28	24.42	21	40	36.0	18.447 709	0.48	1.90	1	16	24
	10	4	28	14.68	21	40	15.2	18.441 345	0.48	1.90	1	12	18
	11	4	28	04.84	21	39	54.1	18.435 268	0.48	1.90	1	08	13
	12	4	27	54.92	+21	39	32.8	18.429 481	0.48	1.90	1	04	07
	13	4	27	44.92	21	39	11.2	18.423 986	0.48	1.90	1	00	01
	14	4	27	34.84	21	38	49.5	18.418 784	0.48	1.90	0	55	55
	15	4	27	24.69	21	38	27.5	18.413 877	0.48	1.90	0	51	49
	16	4	27	14.48	+21	38	05.4	18.409 267	0.48	1.90	0	47	43

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RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
Nov.	16	4	27	14.48	+21	38	05.4	18.409 267	0.48	1.90	0	47	43
	17	4	27	04.19	21	37	43.2	18.404 956	0.48	1.90	0	43	37
	18	4	26	53.85	21	37	20.7	18.400 945	0.48	1.90	0	39	31
	19	4	26	43.44	21	36	58.1	18.397 236	0.48	1.90	0	35	24
	20	4	26	32.97	21	36	35.4	18.393 831	0.48	1.90	0	31	18
	21	4	26	22.45	21	36	12.5	18.390 731	0.48	1.90	0	27	12
	22	4	26	11.88	+21	35	49.4	18.387 938	0.48	1.90	0	23	05
	23	4	26	01.26	21	35	26.2	18.385 454	0.48	1.90	0	18	59
	24	4	25	50.61	21	35	02.9	18.383 280	0.48	1.90	0	14	52
	25	4	25	39.93	21	34	39.4	18.381 418	0.48	1.91	0	10	46
	26	4	25	29.23	21	34	15.8	18.379 867	0.48	1.91	0	06	39
	27	4	25	18.51	21	33	52.1	18.378 630	0.48	1.91	0	02	33
	28	4	25	07.78	+21	33	28.4	18.377 707	0.48	1.91	23	54	20
	29	4	24	57.03	21	33	04.6	18.377 098	0.48	1.91	23	50	13
	30	4	24	46.29	21	32	40.8	18.376 804	0.48	1.91	23	46	06
Dec.	1	4	24	35.54	21	32	17.0	18.376 825	0.48	1.91	23	42	00
	2	4	24	24.79	21	31	53.2	18.377 161	0.48	1.91	23	37	53
	3	4	24	14.05	21	31	29.3	18.377 810	0.48	1.91	23	33	47
	4	4	24	03.32	+21	31	05.5	18.378 774	0.48	1.91	23	29	40
	5	4	23	52.61	21	30	41.6	18.380 052	0.48	1.91	23	25	33
	6	4	23	41.91	21	30	17.7	18.381 642	0.48	1.91	23	21	27
	7	4	23	31.25	21	29	53.9	18.383 544	0.48	1.90	23	17	20
	8	4	23	20.62	21	29	30.0	18.385 757	0.48	1.90	23	13	14
	9	4	23	10.03	21	29	06.2	18.388 281	0.48	1.90	23	09	08
	10	4	22	59.48	+21	28	42.4	18.391 113	0.48	1.90	23	05	01
	11	4	22	48.98	21	28	18.7	18.394 254	0.48	1.90	23	00	55
	12	4	22	38.54	21	27	55.1	18.397 700	0.48	1.90	22	56	49
	13	4	22	28.16	21	27	31.6	18.401 452	0.48	1.90	22	52	43
	14	4	22	17.85	21	27	08.3	18.405 508	0.48	1.90	22	48	36
	15	4	22	07.60	21	26	45.1	18.409 866	0.48	1.90	22	44	30
	16	4	21	57.41	+21	26	22.0	18.414 525	0.48	1.90	22	40	24
	17	4	21	47.30	21	25	59.1	18.419 484	0.48	1.90	22	36	18
	18	4	21	37.25	21	25	36.3	18.424 741	0.48	1.90	22	32	13
	19	4	21	27.29	21	25	13.6	18.430 296	0.48	1.90	22	28	07
	20	4	21	17.41	21	24	51.1	18.436 146	0.48	1.90	22	24	01
	21	4	21	07.62	21	24	28.7	18.442 290	0.48	1.90	22	19	56
	22	4	20	57.92	+21	24	06.5	18.448 726	0.48	1.90	22	15	50
	23	4	20	48.33	21	23	44.5	18.455 453	0.48	1.90	22	11	45
	24	4	20	38.85	21	23	22.8	18.462 467	0.48	1.90	22	07	40
	25	4	20	29.48	21	23	01.2	18.469 768	0.48	1.90	22	03	35
	26	4	20	20.22	21	22	40.0	18.477 351	0.48	1.90	21	59	30
	27	4	20	11.09	21	22	19.0	18.485 215	0.48	1.89	21	55	25
	28	4	20	02.07	+21	21	58.3	18.493 357	0.48	1.89	21	51	20
	29	4	19	53.18	21	21	37.9	18.501 773	0.48	1.89	21	47	15
	30	4	19	44.42	21	21	17.7	18.510 461	0.48	1.89	21	43	11
	31	4	19	35.79	21	20	57.9	18.519 417	0.47	1.89	21	39	06
	32	4	19	27.29	+21	20	38.3	18.528 637	0.47	1.89	21	35	02

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Date	Heliocentric Longitude	Heliocentric Latitude	Radius Vector	Date	Heliocentric Longitude	Heliocentric Latitude	Radius Vector
	° ′ ″	° ′ ″			° ′ ″	° ′ ″	
Jan. 1	3 34 57.3	-1 23 00.5	29.875 9121	Apr. 3	4 08 35.0	-1 23 38.8	29.873 8045
3	3 35 41.2	1 23 01.4	29.875 8655	5	4 09 18.9	1 23 39.6	29.873 7596
5	3 36 25.0	1 23 02.2	29.875 8188	7	4 10 02.7	1 23 40.5	29.873 7147
7	3 37 08.9	1 23 03.1	29.875 7722	9	4 10 46.6	1 23 41.3	29.873 6698
9	3 37 52.7	1 23 03.9	29.875 7257	11	4 11 30.4	1 23 42.1	29.873 6250
11	3 38 36.6	1 23 04.7	29.875 6792	13	4 12 14.3	1 23 42.9	29.873 5802
13	3 39 20.5	-1 23 05.6	29.875 6327	15	4 12 58.2	-1 23 43.8	29.873 5354
15	3 40 04.3	1 23 06.4	29.875 5862	17	4 13 42.0	1 23 44.6	29.873 4907
17	3 40 48.2	1 23 07.2	29.875 5398	19	4 14 25.9	1 23 45.5	29.873 4460
19	3 41 32.1	1 23 08.0	29.875 4934	21	4 15 09.8	1 23 46.3	29.873 4013
21	3 42 15.9	1 23 08.9	29.875 4471	23	4 15 53.6	1 23 47.1	29.873 3567
23	3 42 59.8	1 23 09.7	29.875 4008	25	4 16 37.5	1 23 47.9	29.873 3121
25	3 43 43.6	-1 23 10.6	29.875 3545	27	4 17 21.3	-1 23 48.8	29.873 2675
27	3 44 27.5	1 23 11.4	29.875 3083	29	4 18 05.2	1 23 49.6	29.873 2230
29	3 45 11.4	1 23 12.2	29.875 2621	May 1	4 18 49.1	1 23 50.4	29.873 1785
31	3 45 55.3	1 23 13.1	29.875 2160	3	4 19 32.9	1 23 51.2	29.873 1340
Feb. 2	3 46 39.1	1 23 13.9	29.875 1698	5	4 20 16.8	1 23 52.0	29.873 0895
4	3 47 23.0	1 23 14.8	29.875 1238	7	4 21 00.7	1 23 52.8	29.873 0451
6	3 48 06.8	-1 23 15.6	29.875 0777	9	4 21 44.5	-1 23 53.7	29.873 0007
8	3 48 50.7	1 23 16.4	29.875 0317	11	4 22 28.4	1 23 54.5	29.872 9564
10	3 49 34.5	1 23 17.2	29.874 9858	13	4 23 12.2	1 23 55.3	29.872 9120
12	3 50 18.4	1 23 18.1	29.874 9398	15	4 23 56.1	1 23 56.1	29.872 8678
14	3 51 02.3	1 23 18.9	29.874 8939	17	4 24 40.0	1 23 57.0	29.872 8235
16	3 51 46.2	1 23 19.7	29.874 8481	19	4 25 23.8	1 23 57.8	29.872 7793
18	3 52 30.0	-1 23 20.6	29.874 8023	21	4 26 07.7	-1 23 58.6	29.872 7351
20	3 53 13.9	1 23 21.4	29.874 7565	23	4 26 51.6	1 23 59.4	29.872 6909
22	3 53 57.7	1 23 22.2	29.874 7108	25	4 27 35.4	1 24 00.3	29.872 6467
24	3 54 41.6	1 23 23.1	29.874 6651	27	4 28 19.3	1 24 01.1	29.872 6026
26	3 55 25.5	1 23 23.9	29.874 6195	29	4 29 03.1	1 24 01.9	29.872 5586
28	3 56 09.3	1 23 24.7	29.874 5739	31	4 29 47.0	1 24 02.7	29.872 5145
Mar. 2	3 56 53.2	-1 23 25.5	29.874 5283	June 2	4 30 30.9	-1 24 03.5	29.872 4705
4	3 57 37.1	1 23 26.4	29.874 4828	4	4 31 14.7	1 24 04.4	29.872 4265
6	3 58 20.9	1 23 27.2	29.874 4373	6	4 31 58.6	1 24 05.2	29.872 3826
8	3 59 04.8	1 23 28.1	29.874 3919	8	4 32 42.5	1 24 06.0	29.872 3387
10	3 59 48.6	1 23 28.9	29.874 3465	10	4 33 26.3	1 24 06.8	29.872 2948
12	4 00 32.5	1 23 29.7	29.874 3011	12	4 34 10.2	1 24 07.7	29.872 2509
14	4 01 16.4	-1 23 30.5	29.874 2558	14	4 34 54.0	-1 24 08.5	29.872 2071
16	4 02 00.2	1 23 31.4	29.874 2105	16	4 35 37.9	1 24 09.3	29.872 1633
18	4 02 44.1	1 23 32.2	29.874 1652	18	4 36 21.8	1 24 10.1	29.872 1196
20	4 03 28.0	1 23 33.0	29.874 1200	20	4 37 05.6	1 24 10.9	29.872 0758
22	4 04 11.8	1 23 33.9	29.874 0748	22	4 37 49.5	1 24 11.7	29.872 0321
24	4 04 55.7	1 23 34.7	29.874 0297	24	4 38 33.4	1 24 12.6	29.871 9885
26	4 05 39.5	-1 23 35.5	29.873 9846	26	4 39 17.2	-1 24 13.4	29.871 9448
28	4 06 23.4	1 23 36.3	29.873 9395	28	4 40 01.1	1 24 14.2	29.871 9012
30	4 07 07.3	1 23 37.2	29.873 8945	30	4 40 44.9	1 24 15.0	29.871 8577
Apr. 1	4 07 51.1	1 23 38.0	29.873 8495	July 2	4 41 28.8	1 24 15.8	29.871 8141
3	4 08 35.0	-1 23 38.8	29.873 8045	4	4 42 12.7	-1 24 16.7	29.871 7706

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Date	Heliocentric Longitude	Heliocentric Latitude	Radius Vector	Date	Heliocentric Longitude	Heliocentric Latitude	Radius Vector
	° ' "	° ' "			° ' "	° ' "	
July 2	4 41 28.8	-1 24 15.8	29.871 8141	Oct. 2	5 15 06.5	-1 24 53.2	29.869 8493
4	4 42 12.7	1 24 16.7	29.871 7706	4	5 15 50.3	1 24 54.0	29.869 8075
6	4 42 56.5	1 24 17.4	29.871 7271	6	5 16 34.2	1 24 54.8	29.869 7657
8	4 43 40.4	1 24 18.3	29.871 6837	8	5 17 18.1	1 24 55.6	29.869 7240
10	4 44 24.3	1 24 19.1	29.871 6403	10	5 18 01.9	1 24 56.4	29.869 6822
12	4 45 08.1	1 24 19.9	29.871 5969	12	5 18 45.8	1 24 57.2	29.869 6405
14	4 45 52.0	-1 24 20.7	29.871 5536	14	5 19 29.7	-1 24 58.0	29.869 5989
16	4 46 35.8	1 24 21.5	29.871 5102	16	5 20 13.5	1 24 58.8	29.869 5573
18	4 47 19.7	1 24 22.4	29.871 4670	18	5 20 57.4	1 24 59.6	29.869 5157
20	4 48 03.6	1 24 23.2	29.871 4237	20	5 21 41.2	1 25 00.4	29.869 4741
22	4 48 47.4	1 24 24.0	29.871 3805	22	5 22 25.1	1 25 01.2	29.869 4326
24	4 49 31.3	1 24 24.8	29.871 3373	24	5 23 09.0	1 25 02.1	29.869 3912
26	4 50 15.2	-1 24 25.6	29.871 2942	26	5 23 52.8	-1 25 02.8	29.869 3497
28	4 50 59.0	1 24 26.4	29.871 2510	28	5 24 36.7	1 25 03.6	29.869 3083
30	4 51 42.9	1 24 27.2	29.871 2080	30	5 25 20.6	1 25 04.5	29.869 2669
Aug. 1	4 52 26.7	1 24 28.1	29.871 1649	Nov. 1	5 26 04.4	1 25 05.2	29.869 2256
3	4 53 10.6	1 24 28.9	29.871 1219	3	5 26 48.3	1 25 06.1	29.869 1843
5	4 53 54.5	1 24 29.7	29.871 0789	5	5 27 32.1	1 25 06.9	29.869 1430
7	4 54 38.3	-1 24 30.5	29.871 0360	7	5 28 16.0	-1 25 07.7	29.869 1017
9	4 55 22.2	1 24 31.3	29.870 9931	9	5 28 59.9	1 25 08.5	29.869 0605
11	4 56 06.1	1 24 32.1	29.870 9502	11	5 29 43.7	1 25 09.3	29.869 0194
13	4 56 49.9	1 24 32.9	29.870 9074	13	5 30 27.6	1 25 10.1	29.868 9782
15	4 57 33.8	1 24 33.8	29.870 8646	15	5 31 11.5	1 25 10.9	29.868 9371
17	4 58 17.6	1 24 34.6	29.870 8219	17	5 31 55.3	1 25 11.7	29.868 8961
19	4 59 01.5	-1 24 35.4	29.870 7792	19	5 32 39.2	-1 25 12.5	29.868 8550
21	4 59 45.4	1 24 36.2	29.870 7365	21	5 33 23.0	1 25 13.3	29.868 8140
23	5 00 29.2	1 24 37.0	29.870 6939	23	5 34 06.9	1 25 14.1	29.868 7731
25	5 01 13.1	1 24 37.8	29.870 6513	25	5 34 50.8	1 25 14.9	29.868 7321
27	5 01 57.0	1 24 38.6	29.870 6087	27	5 35 34.6	1 25 15.7	29.868 6912
29	5 02 40.8	1 24 39.4	29.870 5662	29	5 36 18.5	1 25 16.5	29.868 6504
31	5 03 24.7	-1 24 40.3	29.870 5237	Dec. 1	5 37 02.4	-1 25 17.3	29.868 6095
Sept. 2	5 04 08.5	1 24 41.0	29.870 4813	3	5 37 46.2	1 25 18.1	29.868 5687
4	5 04 52.4	1 24 41.9	29.870 4389	5	5 38 30.1	1 25 18.9	29.868 5280
6	5 05 36.3	1 24 42.7	29.870 3965	7	5 39 13.9	1 25 19.7	29.868 4872
8	5 06 20.1	1 24 43.5	29.870 3542	9	5 39 57.8	1 25 20.5	29.868 4465
10	5 07 04.0	1 24 44.3	29.870 3119	11	5 40 41.7	1 25 21.3	29.868 4058
12	5 07 47.9	-1 24 45.1	29.870 2697	13	5 41 25.5	-1 25 22.1	29.868 3652
14	5 08 31.7	1 24 45.9	29.870 2275	15	5 42 09.4	1 25 22.9	29.868 3246
16	5 09 15.6	1 24 46.7	29.870 1853	17	5 42 53.3	1 25 23.7	29.868 2840
18	5 09 59.4	1 24 47.5	29.870 1432	19	5 43 37.1	1 25 24.5	29.868 2435
20	5 10 43.3	1 24 48.3	29.870 1011	21	5 44 21.0	1 25 25.3	29.868 2029
22	5 11 27.2	1 24 49.1	29.870 0590	23	5 45 04.9	1 25 26.1	29.868 1625
24	5 12 11.0	-1 24 49.9	29.870 0170	25	5 45 48.7	-1 25 26.9	29.868 1220
26	5 12 54.9	1 24 50.8	29.869 9750	27	5 46 32.6	1 25 27.7	29.868 0816
28	5 13 38.8	1 24 51.5	29.869 9331	29	5 47 16.4	1 25 28.4	29.868 0412
30	5 14 22.6	1 24 52.4	29.869 8912	31	5 48 00.3	1 25 29.2	29.868 0008
Oct. 2	5 15 06.5	-1 24 53.2	29.869 8493	33	5 48 44.2	-1 25 30.1	29.867 9605

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GEOCENTRIC LONGITUDE AND LATITUDE FOR 0^h TERRESTRIAL TIME

Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude			Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude		
		°	'	"	°	'	"			°	'	"	°	'	"
Jan.	0	1	42	26.6	-1	22	41.6	Feb.	15	2	43	23.2	-1	21	11.3
	1	1	43	05.1	1	22	39.2		16	2	45	18.3	1	21	10.1
	2	1	43	45.7	1	22	36.8		17	2	47	14.5	1	21	08.9
	3	1	44	28.3	1	22	34.4		18	2	49	11.8	1	21	07.7
	4	1	45	13.0	1	22	32.0		19	2	51	10.1	1	21	06.6
	5	1	45	59.7	1	22	29.6		20	2	53	09.4	1	21	05.5
	6	1	46	48.5	-1	22	27.2		21	2	55	09.6	-1	21	04.4
	7	1	47	39.2	1	22	24.8		22	2	57	10.6	1	21	03.4
	8	1	48	31.9	1	22	22.5		23	2	59	12.6	1	21	02.5
	9	1	49	26.6	1	22	20.2		24	3	01	15.6	1	21	01.5
	10	1	50	23.2	1	22	17.8		25	3	03	19.4	1	21	00.6
	11	1	51	21.7	1	22	15.6		26	3	05	24.2	1	20	59.8
	12	1	52	22.0	-1	22	13.3		27	3	07	29.8	-1	20	59.0
	13	1	53	24.3	1	22	11.0		28	3	09	36.3	1	20	58.2
	14	1	54	28.4	1	22	08.8	Mar.	1	3	11	43.5	1	20	57.5
	15	1	55	34.4	1	22	06.5		2	3	13	51.6	1	20	56.8
	16	1	56	42.3	1	22	04.4		3	3	16	00.3	1	20	56.2
	17	1	57	52.0	1	22	02.2		4	3	18	09.7	1	20	55.6
	18	1	59	03.7	-1	22	00.0		5	3	20	19.8	-1	20	55.0
	19	2	00	17.2	1	21	57.9		6	3	22	30.4	1	20	54.5
	20	2	01	32.5	1	21	55.8		7	3	24	41.5	1	20	54.0
	21	2	02	49.6	1	21	53.7		8	3	26	53.2	1	20	53.6
	22	2	04	08.4	1	21	51.7		9	3	29	05.4	1	20	53.2
	23	2	05	28.9	1	21	49.6		10	3	31	18.1	1	20	52.9
	24	2	06	51.0	-1	21	47.6		11	3	33	31.3	-1	20	52.6
	25	2	08	14.7	1	21	45.7		12	3	35	44.9	1	20	52.3
	26	2	09	40.0	1	21	43.7		13	3	37	59.0	1	20	52.1
	27	2	11	06.9	1	21	41.8		14	3	40	13.6	1	20	51.9
	28	2	12	35.5	1	21	39.9		15	3	42	28.5	1	20	51.8
	29	2	14	05.8	1	21	38.1		16	3	44	43.7	1	20	51.8
	30	2	15	37.6	-1	21	36.2		17	3	46	59.2	-1	20	51.7
	31	2	17	11.1	1	21	34.4		18	3	49	14.9	1	20	51.8
Feb.	1	2	18	46.1	1	21	32.6		19	3	51	30.8	1	20	51.8
	2	2	20	22.7	1	21	30.9		20	3	53	46.8	1	20	51.9
	3	2	22	00.7	1	21	29.2		21	3	56	02.8	1	20	52.1
	4	2	23	40.3	1	21	27.5		22	3	58	19.0	1	20	52.3
	5	2	25	21.2	-1	21	25.9		23	4	00	35.2	-1	20	52.6
	6	2	27	03.5	1	21	24.2		24	4	02	51.5	1	20	53.0
	7	2	28	47.2	1	21	22.7		25	4	05	07.8	1	20	53.5
	8	2	30	32.2	1	21	21.1		26	4	07	24.1	1	20	53.7
	9	2	32	18.5	1	21	19.6		27	4	09	40.5	1	20	54.0
	10	2	34	06.2	1	21	18.1		28	4	11	57.0	1	20	54.4
	11	2	35	55.0	-1	21	16.7		29	4	14	13.4	-1	20	54.9
	12	2	37	45.2	1	21	15.3		30	4	16	29.7	1	20	55.4
	13	2	39	36.6	1	21	13.9		31	4	18	45.9	1	20	56.0
	14	2	41	29.3	1	21	12.6	Apr.	1	4	21	01.8	1	20	56.7
	15	2	43	23.2	-1	21	11.3		2	4	23	17.5	-1	20	57.3

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Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude			Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude		
		°	'	"	°	'	"			°	'	"	°	'	"
Apr.	1	4	21	01.8	-1	20	56.7	May	17	5	53	43.9	-1	22	11.0
	2	4	23	17.5	1	20	57.3		18	5	55	19.9	1	22	13.4
	3	4	25	32.9	1	20	58.1		19	5	56	54.5	1	22	16.0
	4	4	27	48.0	1	20	58.8		20	5	58	27.6	1	22	18.5
	5	4	30	02.8	1	20	59.6		21	5	59	59.4	1	22	21.1
	6	4	32	17.2	1	21	00.5		22	6	01	29.6	1	22	23.7
	7	4	34	31.3	-1	21	01.4		23	6	02	58.4	-1	22	26.3
	8	4	36	45.1	1	21	02.3		24	6	04	25.7	1	22	29.0
	9	4	38	58.5	1	21	03.3		25	6	05	51.4	1	22	31.6
	10	4	41	11.4	1	21	04.4		26	6	07	15.5	1	22	34.4
	11	4	43	24.0	1	21	05.4		27	6	08	38.0	1	22	37.1
	12	4	45	36.1	1	21	06.6		28	6	09	58.8	1	22	39.8
	13	4	47	47.6	-1	21	07.7		29	6	11	18.0	-1	22	42.6
	14	4	49	58.6	1	21	08.9		30	6	12	35.5	1	22	45.4
	15	4	52	08.9	1	21	10.2		31	6	13	51.4	1	22	48.3
	16	4	54	18.4	1	21	11.5	June	1	6	15	05.7	1	22	51.1
	17	4	56	27.3	1	21	12.8		2	6	16	18.2	1	22	54.0
	18	4	58	35.5	1	21	14.2		3	6	17	29.2	1	22	56.9
	19	5	00	42.9	-1	21	15.6		4	6	18	38.5	-1	22	59.9
	20	5	02	49.6	1	21	17.1		5	6	19	46.1	1	23	02.8
	21	5	04	55.6	1	21	18.6		6	6	20	51.9	1	23	05.8
	22	5	07	00.9	1	21	20.1		7	6	21	56.0	1	23	08.8
	23	5	09	05.4	1	21	21.7		8	6	22	58.3	1	23	11.8
	24	5	11	09.1	1	21	23.3		9	6	23	58.7	1	23	14.9
	25	5	13	12.0	-1	21	25.0		10	6	24	57.2	-1	23	17.9
	26	5	15	14.0	1	21	26.7		11	6	25	53.9	1	23	21.0
	27	5	17	15.1	1	21	28.4		12	6	26	48.6	1	23	24.1
	28	5	19	15.2	1	21	30.2		13	6	27	41.6	1	23	27.2
	29	5	21	14.3	1	21	32.0		14	6	28	32.7	1	23	30.3
	30	5	23	12.4	1	21	33.9		15	6	29	22.1	1	23	33.4
May	1	5	25	09.5	-1	21	35.7		16	6	30	09.6	-1	23	36.6
	2	5	27	05.4	1	21	37.7		17	6	30	55.3	1	23	39.7
	3	5	29	00.3	1	21	39.6		18	6	31	39.1	1	23	42.9
	4	5	30	54.1	1	21	41.6		19	6	32	21.1	1	23	46.1
	5	5	32	46.8	1	21	43.7		20	6	33	01.2	1	23	49.3
	6	5	34	38.4	1	21	45.8		21	6	33	39.4	1	23	52.5
	7	5	36	28.9	-1	21	47.9		22	6	34	15.6	-1	23	55.7
	8	5	38	18.3	1	21	50.0		23	6	34	49.9	1	23	58.9
	9	5	40	06.5	1	21	52.2		24	6	35	22.2	1	24	02.1
	10	5	41	53.4	1	21	54.4		25	6	35	52.6	1	24	05.3
	11	5	43	39.0	1	21	56.7		26	6	36	21.0	1	24	08.6
	12	5	45	23.3	1	21	59.0		27	6	36	47.4	1	24	11.8
	13	5	47	06.3	-1	22	01.3		28	6	37	11.9	-1	24	15.1
	14	5	48	47.8	1	22	03.7		29	6	37	34.5	1	24	18.3
	15	5	50	27.9	1	22	06.1		30	6	37	55.2	1	24	21.6
	16	5	52	06.6	1	22	08.5	July	1	6	38	14.0	1	24	24.8
	17	5	53	43.9	-1	22	11.0		2	6	38	30.8	-1	24	28.1

NEPTUNE, 2027

GEOCENTRIC LONGITUDE AND LATITUDE FOR 0^h TERRESTRIAL TIME

Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude			Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude		
		°	′	″	°	′	″			°	′	″	°	′	″
July	1	6	38	14.0	-1	24	24.8	Aug.	16	6	18	24.3	-1	26	43.4
	2	6	38	30.8	1	24	28.1		17	6	17	18.0	1	26	45.9
	3	6	38	45.8	1	24	31.4		18	6	16	10.1	1	26	48.3
	4	6	38	58.8	1	24	34.6		19	6	15	00.9	1	26	50.7
	5	6	39	09.7	1	24	37.9		20	6	13	50.2	1	26	53.0
	6	6	39	18.7	1	24	41.2		21	6	12	38.2	1	26	55.3
	7	6	39	25.6	-1	24	44.4		22	6	11	24.9	-1	26	57.5
	8	6	39	30.4	1	24	47.7		23	6	10	10.3	1	26	59.8
	9	6	39	33.2	1	24	51.0		24	6	08	54.4	1	27	01.9
	10	6	39	34.1	1	24	54.2		25	6	07	37.4	1	27	04.1
	11	6	39	33.0	1	24	57.5		26	6	06	19.2	1	27	06.2
	12	6	39	30.1	1	25	00.7		27	6	04	59.8	1	27	08.2
	13	6	39	25.2	-1	25	03.9		28	6	03	39.2	-1	27	10.3
	14	6	39	18.4	1	25	07.2		29	6	02	17.5	1	27	12.2
	15	6	39	09.7	1	25	10.4		30	6	00	54.6	1	27	14.2
	16	6	38	59.1	1	25	13.6		31	5	59	30.5	1	27	16.0
	17	6	38	46.6	1	25	16.8	Sept.	1	5	58	05.3	1	27	17.9
	18	6	38	32.2	1	25	19.9		2	5	56	39.1	1	27	19.7
	19	6	38	15.8	-1	25	23.1		3	5	55	11.9	-1	27	21.4
	20	6	37	57.5	1	25	26.2		4	5	53	43.8	1	27	23.1
	21	6	37	37.3	1	25	29.4		5	5	52	14.8	1	27	24.7
	22	6	37	15.1	1	25	32.5		6	5	50	45.0	1	27	26.3
	23	6	36	51.0	1	25	35.6		7	5	49	14.4	1	27	27.9
	24	6	36	25.1	1	25	38.7		8	5	47	43.0	1	27	29.4
	25	6	35	57.3	-1	25	41.8		9	5	46	10.8	-1	27	30.8
	26	6	35	27.6	1	25	44.8		10	5	44	38.0	1	27	32.2
	27	6	34	56.2	1	25	47.9		11	5	43	04.4	1	27	33.5
	28	6	34	23.0	1	25	50.9		12	5	41	30.1	1	27	34.8
	29	6	33	48.0	1	25	53.9		13	5	39	55.1	1	27	36.0
	30	6	33	11.2	1	25	56.9		14	5	38	19.6	1	27	37.2
	31	6	32	32.7	-1	25	59.8		15	5	36	43.4	-1	27	38.4
Aug.	1	6	31	52.4	1	26	02.8		16	5	35	06.7	1	27	39.4
	2	6	31	10.3	1	26	05.7		17	5	33	29.5	1	27	40.5
	3	6	30	26.4	1	26	08.6		18	5	31	51.8	1	27	41.4
	4	6	29	40.6	1	26	11.4		19	5	30	13.8	1	27	42.4
	5	6	28	53.1	1	26	14.3		20	5	28	35.5	1	27	43.2
	6	6	28	03.8	-1	26	17.1		21	5	26	56.8	-1	27	44.0
	7	6	27	12.9	1	26	19.9		22	5	25	17.9	1	27	44.8
	8	6	26	20.4	1	26	22.6		23	5	23	38.8	1	27	45.5
	9	6	25	26.3	1	26	25.3		24	5	21	59.4	1	27	46.2
	10	6	24	30.6	1	26	28.0		25	5	20	19.9	1	27	46.8
	11	6	23	33.4	1	26	30.7		26	5	18	40.1	1	27	47.3
	12	6	22	34.7	-1	26	33.3		27	5	17	00.1	-1	27	47.8
	13	6	21	34.4	1	26	35.9		28	5	15	20.0	1	27	48.3
	14	6	20	32.5	1	26	38.4		29	5	13	39.9	1	27	48.7
	15	6	19	29.2	1	26	41.0		30	5	11	59.7	1	27	49.0
	16	6	18	24.3	-1	26	43.4	Oct.	1	5	10	19.6	-1	27	49.3

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GEOCENTRIC LONGITUDE AND LATITUDE FOR 0^h TERRESTRIAL TIME

Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude			Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude		
		°	′	″	°	′	″			°	′	″	°	′	″
Oct.	1	5	10	19.6	-1	27	49.3	Nov.	16	4	05	34.3	-1	27	06.1
	2	5	08	39.6	1	27	49.5		17	4	04	38.5	1	27	04.1
	3	5	06	59.8	1	27	49.6		18	4	03	44.4	1	27	02.1
	4	5	05	20.3	1	27	49.7		19	4	02	52.0	1	27	00.1
	5	5	03	41.0	1	27	49.8		20	4	02	01.3	1	26	58.0
	6	5	02	01.9	1	27	49.8		21	4	01	12.2	1	26	55.9
	7	5	00	23.2	-1	27	49.7		22	4	00	24.9	-1	26	53.8
	8	4	58	44.8	1	27	49.6		23	3	59	39.3	1	26	51.6
	9	4	57	06.7	1	27	49.4		24	3	58	55.5	1	26	49.5
	10	4	55	29.0	1	27	49.2		25	3	58	13.6	1	26	47.3
	11	4	53	51.7	1	27	48.9		26	3	57	33.6	1	26	45.0
	12	4	52	14.9	1	27	48.6		27	3	56	55.6	1	26	42.8
	13	4	50	38.5	-1	27	48.2		28	3	56	19.5	-1	26	40.5
	14	4	49	02.7	1	27	47.7		29	3	55	45.4	1	26	38.1
	15	4	47	27.5	1	27	47.2		30	3	55	13.2	1	26	35.8
	16	4	45	53.0	1	27	46.7	Dec.	1	3	54	42.9	1	26	33.4
	17	4	44	19.2	1	27	46.1		2	3	54	14.6	1	26	31.1
	18	4	42	46.2	1	27	45.5		3	3	53	48.2	1	26	28.7
	19	4	41	13.9	-1	27	44.8		4	3	53	23.8	-1	26	26.2
	20	4	39	42.5	1	27	44.0		5	3	53	01.4	1	26	23.8
	21	4	38	11.9	1	27	43.2		6	3	52	40.9	1	26	21.4
	22	4	36	42.1	1	27	42.4		7	3	52	22.4	1	26	18.9
	23	4	35	13.2	1	27	41.5		8	3	52	06.0	1	26	16.4
	24	4	33	45.2	1	27	40.5		9	3	51	51.6	1	26	13.9
	25	4	32	18.0	-1	27	39.5		10	3	51	39.3	-1	26	11.4
	26	4	30	51.8	1	27	38.5		11	3	51	29.0	1	26	08.9
	27	4	29	26.6	1	27	37.4		12	3	51	20.9	1	26	06.3
	28	4	28	02.5	1	27	36.2		13	3	51	15.0	1	26	03.8
	29	4	26	39.5	1	27	35.0		14	3	51	11.1	1	26	01.3
	30	4	25	17.7	1	27	33.8		15	3	51	09.3	1	25	58.7
	31	4	23	57.1	-1	27	32.5		16	3	51	09.5	-1	25	56.1
Nov.	1	4	22	37.8	1	27	31.2		17	3	51	11.8	1	25	53.6
	2	4	21	19.8	1	27	29.8		18	3	51	16.1	1	25	51.0
	3	4	20	03.1	1	27	28.3		19	3	51	22.3	1	25	48.4
	4	4	18	47.7	1	27	26.9		20	3	51	30.7	1	25	45.8
	5	4	17	33.6	1	27	25.3		21	3	51	41.1	1	25	43.3
	6	4	16	20.8	-1	27	23.8		22	3	51	53.7	-1	25	40.7
	7	4	15	09.4	1	27	22.2		23	3	52	08.4	1	25	38.1
	8	4	13	59.4	1	27	20.5		24	3	52	25.2	1	25	35.5
	9	4	12	50.8	1	27	18.9		25	3	52	44.2	1	25	32.9
	10	4	11	43.7	1	27	17.2		26	3	53	05.3	1	25	30.3
	11	4	10	38.1	1	27	15.4		27	3	53	28.6	1	25	27.7
	12	4	09	34.0	-1	27	13.6		28	3	53	53.9	-1	25	25.1
	13	4	08	31.6	1	27	11.8		29	3	54	21.3	1	25	22.5
	14	4	07	30.8	1	27	09.9		30	3	54	50.8	1	25	20.0
	15	4	06	31.7	1	27	08.0		31	3	55	22.2	1	25	17.4
	16	4	05	34.3	-1	27	06.1		32	3	55	55.8	-1	25	14.8

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RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
Jan.	0	0	08	27.50	-0	35	08.1	29.989 995	0.29	1.12	17	27	52
	1	0	08	29.79	0	34	50.6	30.007 179	0.29	1.12	17	23	58
	2	0	08	32.20	0	34	32.2	30.024 320	0.29	1.12	17	20	05
	3	0	08	34.74	0	34	13.1	30.041 412	0.29	1.12	17	16	11
	4	0	08	37.41	0	33	53.1	30.058 449	0.29	1.11	17	12	18
	5	0	08	40.21	0	33	32.4	30.075 427	0.29	1.11	17	08	25
	6	0	08	43.13	-0	33	10.8	30.092 339	0.29	1.11	17	04	32
	7	0	08	46.17	0	32	48.5	30.109 181	0.29	1.11	17	00	39
	8	0	08	49.33	0	32	25.4	30.125 947	0.29	1.11	16	56	47
	9	0	08	52.61	0	32	01.5	30.142 632	0.29	1.11	16	52	54
	10	0	08	56.01	0	31	36.9	30.159 230	0.29	1.11	16	49	02
	11	0	08	59.53	0	31	11.5	30.175 737	0.29	1.11	16	45	09
	12	0	09	03.16	-0	30	45.4	30.192 147	0.29	1.11	16	41	17
	13	0	09	06.90	0	30	18.6	30.208 455	0.29	1.11	16	37	25
	14	0	09	10.77	0	29	51.1	30.224 655	0.29	1.11	16	33	33
	15	0	09	14.74	0	29	22.8	30.240 745	0.29	1.11	16	29	41
	16	0	09	18.84	0	28	53.8	30.256 717	0.29	1.11	16	25	49
	17	0	09	23.05	0	28	24.1	30.272 569	0.29	1.11	16	21	58
	18	0	09	27.37	-0	27	53.7	30.288 295	0.29	1.11	16	18	06
	19	0	09	31.81	0	27	22.5	30.303 890	0.29	1.11	16	14	15
	20	0	09	36.36	0	26	50.6	30.319 352	0.29	1.10	16	10	24
	21	0	09	41.02	0	26	18.1	30.334 675	0.29	1.10	16	06	32
	22	0	09	45.79	0	25	44.9	30.349 856	0.29	1.10	16	02	41
	23	0	09	50.66	0	25	11.0	30.364 891	0.29	1.10	15	58	50
	24	0	09	55.62	-0	24	36.6	30.379 776	0.29	1.10	15	54	59
	25	0	10	00.69	0	24	01.5	30.394 507	0.29	1.10	15	51	08
	26	0	10	05.86	0	23	25.8	30.409 080	0.29	1.10	15	47	18
	27	0	10	11.12	0	22	49.5	30.423 490	0.29	1.10	15	43	27
	28	0	10	16.49	0	22	12.6	30.437 734	0.29	1.10	15	39	37
	29	0	10	21.96	0	21	35.0	30.451 807	0.29	1.10	15	35	46
	30	0	10	27.53	-0	20	56.8	30.465 706	0.29	1.10	15	31	56
	31	0	10	33.20	0	20	18.1	30.479 425	0.29	1.10	15	28	06
Feb.	1	0	10	38.96	0	19	38.7	30.492 961	0.29	1.10	15	24	16
	2	0	10	44.82	0	18	58.7	30.506 310	0.29	1.10	15	20	26
	3	0	10	50.77	0	18	18.2	30.519 468	0.29	1.10	15	16	36
	4	0	10	56.82	0	17	37.1	30.532 430	0.29	1.10	15	12	46
	5	0	11	02.95	-0	16	55.5	30.545 193	0.29	1.10	15	08	56
	6	0	11	09.16	0	16	13.3	30.557 753	0.29	1.10	15	05	06
	7	0	11	15.46	0	15	30.7	30.570 106	0.29	1.10	15	01	17
	8	0	11	21.84	0	14	47.5	30.582 248	0.29	1.10	14	57	27
	9	0	11	28.30	0	14	03.9	30.594 177	0.29	1.09	14	53	38
	10	0	11	34.85	0	13	19.8	30.605 888	0.29	1.09	14	49	48
	11	0	11	41.47	-0	12	35.2	30.617 378	0.29	1.09	14	45	59
	12	0	11	48.17	0	11	50.2	30.628 644	0.29	1.09	14	42	10
	13	0	11	54.95	0	11	04.7	30.639 684	0.29	1.09	14	38	21
	14	0	12	01.80	0	10	18.7	30.650 493	0.29	1.09	14	34	32
	15	0	12	08.74	-0	09	32.3	30.661 070	0.29	1.09	14	30	43

NEPTUNE, 2027

RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
Feb.	15	0	12	08.74	-0	09	32.3	30.661 070	0.29	1.09	14	30	43
	16	0	12	15.74	0	08	45.4	30.671 412	0.29	1.09	14	26	54
	17	0	12	22.82	0	07	58.2	30.681 517	0.29	1.09	14	23	05
	18	0	12	29.96	0	07	10.5	30.691 382	0.29	1.09	14	19	16
	19	0	12	37.17	0	06	22.5	30.701 005	0.29	1.09	14	15	28
	20	0	12	44.43	0	05	34.1	30.710 384	0.29	1.09	14	11	39
	21	0	12	51.76	-0	04	45.4	30.719 517	0.29	1.09	14	07	50
	22	0	12	59.14	0	03	56.4	30.728 403	0.29	1.09	14	04	02
	23	0	13	06.57	0	03	07.1	30.737 037	0.29	1.09	14	00	13
	24	0	13	14.07	0	02	17.4	30.745 420	0.29	1.09	13	56	25
	25	0	13	21.62	0	01	27.4	30.753 548	0.29	1.09	13	52	37
	26	0	13	29.23	-0	00	37.1	30.761 418	0.29	1.09	13	48	48
	27	0	13	36.89	+0	00	13.5	30.769 030	0.29	1.09	13	45	00
	28	0	13	44.60	0	01	04.4	30.776 380	0.29	1.09	13	41	12
Mar.	1	0	13	52.37	0	01	55.6	30.783 467	0.29	1.09	13	37	24
	2	0	14	00.18	0	02	47.1	30.790 288	0.29	1.09	13	33	36
	3	0	14	08.04	0	03	38.8	30.796 841	0.29	1.09	13	29	48
	4	0	14	15.94	0	04	30.7	30.803 125	0.29	1.09	13	25	59
	5	0	14	23.88	+0	05	22.9	30.809 138	0.29	1.09	13	22	12
	6	0	14	31.86	0	06	15.2	30.814 878	0.29	1.09	13	18	24
	7	0	14	39.87	0	07	07.7	30.820 343	0.29	1.09	13	14	36
	8	0	14	47.91	0	08	00.4	30.825 532	0.29	1.09	13	10	48
	9	0	14	55.99	0	08	53.2	30.830 444	0.29	1.09	13	06	60
	10	0	15	04.10	0	09	46.2	30.835 077	0.29	1.09	13	03	12
	11	0	15	12.23	+0	10	39.3	30.839 430	0.29	1.09	12	59	24
	12	0	15	20.40	0	11	32.6	30.843 502	0.29	1.09	12	55	37
	13	0	15	28.60	0	12	26.0	30.847 293	0.29	1.09	12	51	49
	14	0	15	36.83	0	13	19.5	30.850 802	0.29	1.09	12	48	01
	15	0	15	45.07	0	14	13.1	30.854 028	0.29	1.09	12	44	13
	16	0	15	53.35	0	15	06.9	30.856 971	0.28	1.09	12	40	26
	17	0	16	01.63	+0	16	00.6	30.859 632	0.28	1.09	12	36	38
	18	0	16	09.94	0	16	54.5	30.862 009	0.28	1.09	12	32	50
	19	0	16	18.25	0	17	48.3	30.864 104	0.28	1.09	12	29	03
	20	0	16	26.57	0	18	42.2	30.865 915	0.28	1.09	12	25	15
	21	0	16	34.90	0	19	36.0	30.867 444	0.28	1.09	12	21	28
	22	0	16	43.24	0	20	29.8	30.868 690	0.28	1.09	12	17	40
	23	0	16	51.58	+0	21	23.6	30.869 652	0.28	1.09	12	13	52
	24	0	16	59.93	0	22	17.3	30.870 332	0.28	1.09	12	10	05
	25	0	17	08.28	0	23	10.9	30.870 729	0.28	1.09	12	06	17
	26	0	17	16.62	0	24	04.7	30.870 843	0.28	1.09	12	02	29
	27	0	17	24.98	0	24	58.6	30.870 674	0.28	1.09	11	58	42
	28	0	17	33.34	0	25	52.3	30.870 222	0.28	1.09	11	54	54
	29	0	17	41.70	+0	26	46.0	30.869 486	0.28	1.09	11	51	07
	30	0	17	50.05	0	27	39.5	30.868 468	0.28	1.09	11	47	19
	31	0	17	58.40	0	28	33.0	30.867 167	0.28	1.09	11	43	31
Apr.	1	0	18	06.73	0	29	26.3	30.865 583	0.28	1.09	11	39	44
	2	0	18	15.05	+0	30	19.5	30.863 718	0.28	1.09	11	35	56

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RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
Apr.	1	0	18	06.73	+0	29	26.3	30.865 583	0.28	1.09	11	39	44
	2	0	18	15.05	0	30	19.5	30.863 718	0.28	1.09	11	35	56
	3	0	18	23.35	0	31	12.5	30.861 571	0.28	1.09	11	32	09
	4	0	18	31.64	0	32	05.4	30.859 143	0.28	1.09	11	28	21
	5	0	18	39.91	0	32	58.1	30.856 434	0.29	1.09	11	24	33
	6	0	18	48.16	0	33	50.6	30.853 446	0.29	1.09	11	20	45
	7	0	18	56.39	+0	34	42.9	30.850 180	0.29	1.09	11	16	58
	8	0	19	04.60	0	35	35.1	30.846 636	0.29	1.09	11	13	10
	9	0	19	12.78	0	36	27.0	30.842 816	0.29	1.09	11	09	22
	10	0	19	20.95	0	37	18.8	30.838 721	0.29	1.09	11	05	34
	11	0	19	29.09	0	38	10.3	30.834 353	0.29	1.09	11	01	47
	12	0	19	37.20	0	39	01.6	30.829 713	0.29	1.09	10	57	59
	13	0	19	45.28	+0	39	52.7	30.824 804	0.29	1.09	10	54	11
	14	0	19	53.32	0	40	43.4	30.819 628	0.29	1.09	10	50	23
	15	0	20	01.33	0	41	33.9	30.814 186	0.29	1.09	10	46	35
	16	0	20	09.30	0	42	24.1	30.808 480	0.29	1.09	10	42	47
	17	0	20	17.22	0	43	13.9	30.802 513	0.29	1.09	10	38	59
	18	0	20	25.10	0	44	03.4	30.796 286	0.29	1.09	10	35	11
	19	0	20	32.93	+0	44	52.6	30.789 801	0.29	1.09	10	31	23
	20	0	20	40.73	0	45	41.5	30.783 062	0.29	1.09	10	27	35
	21	0	20	48.48	0	46	30.0	30.776 068	0.29	1.09	10	23	46
	22	0	20	56.18	0	47	18.2	30.768 823	0.29	1.09	10	19	58
	23	0	21	03.85	0	48	06.0	30.761 327	0.29	1.09	10	16	10
	24	0	21	11.46	0	48	53.5	30.753 584	0.29	1.09	10	12	21
	25	0	21	19.02	+0	49	40.7	30.745 594	0.29	1.09	10	08	33
	26	0	21	26.54	0	50	27.4	30.737 361	0.29	1.09	10	04	45
	27	0	21	33.99	0	51	13.8	30.728 885	0.29	1.09	10	00	56
	28	0	21	41.39	0	51	59.7	30.720 170	0.29	1.09	9	57	07
	29	0	21	48.73	0	52	45.2	30.711 216	0.29	1.09	9	53	19
	30	0	21	56.01	0	53	30.3	30.702 028	0.29	1.09	9	49	30
May	1	0	22	03.22	+0	54	14.9	30.692 606	0.29	1.09	9	45	41
	2	0	22	10.37	0	54	59.0	30.682 953	0.29	1.09	9	41	52
	3	0	22	17.45	0	55	42.7	30.673 072	0.29	1.09	9	38	04
	4	0	22	24.47	0	56	25.9	30.662 966	0.29	1.09	9	34	15
	5	0	22	31.42	0	57	08.7	30.652 637	0.29	1.09	9	30	26
	6	0	22	38.31	0	57	50.9	30.642 088	0.29	1.09	9	26	37
	7	0	22	45.13	+0	58	32.7	30.631 323	0.29	1.09	9	22	47
	8	0	22	51.88	0	59	14.0	30.620 344	0.29	1.09	9	18	58
	9	0	22	58.56	0	59	54.8	30.609 155	0.29	1.09	9	15	09
	10	0	23	05.16	1	00	35.1	30.597 759	0.29	1.09	9	11	19
	11	0	23	11.69	1	01	14.8	30.586 161	0.29	1.10	9	07	30
	12	0	23	18.14	1	01	54.0	30.574 363	0.29	1.10	9	03	41
	13	0	23	24.50	+1	02	32.6	30.562 369	0.29	1.10	8	59	51
	14	0	23	30.77	1	03	10.6	30.550 184	0.29	1.10	8	56	01
	15	0	23	36.97	1	03	48.0	30.537 810	0.29	1.10	8	52	11
	16	0	23	43.07	1	04	24.8	30.525 251	0.29	1.10	8	48	22
	17	0	23	49.10	+1	05	01.0	30.512 510	0.29	1.10	8	44	32

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RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
May	17	0	23	49.10	+1	05	01.0	30.512 510	0.29	1.10	8	44	32
	18	0	23	55.04	1	05	36.7	30.499 592	0.29	1.10	8	40	42
	19	0	24	00.89	1	06	11.8	30.486 498	0.29	1.10	8	36	51
	20	0	24	06.66	1	06	46.3	30.473 234	0.29	1.10	8	33	01
	21	0	24	12.35	1	07	20.2	30.459 802	0.29	1.10	8	29	11
	22	0	24	17.94	1	07	53.5	30.446 205	0.29	1.10	8	25	21
	23	0	24	23.45	+1	08	26.2	30.432 447	0.29	1.10	8	21	30
	24	0	24	28.86	1	08	58.3	30.418 531	0.29	1.10	8	17	40
	25	0	24	34.18	1	09	29.7	30.404 461	0.29	1.10	8	13	49
	26	0	24	39.40	1	10	00.5	30.390 240	0.29	1.10	8	09	58
	27	0	24	44.52	1	10	30.6	30.375 873	0.29	1.10	8	06	07
	28	0	24	49.54	1	11	00.0	30.361 362	0.29	1.10	8	02	16
	29	0	24	54.46	+1	11	28.8	30.346 711	0.29	1.10	7	58	25
	30	0	24	59.29	1	11	56.9	30.331 924	0.29	1.10	7	54	34
	31	0	25	04.01	1	12	24.3	30.317 005	0.29	1.10	7	50	43
June	1	0	25	08.63	1	12	51.0	30.301 958	0.29	1.11	7	46	52
	2	0	25	13.15	1	13	17.0	30.286 787	0.29	1.11	7	43	00
	3	0	25	17.57	1	13	42.4	30.271 496	0.29	1.11	7	39	09
	4	0	25	21.89	+1	14	07.1	30.256 090	0.29	1.11	7	35	17
	5	0	25	26.10	1	14	31.1	30.240 572	0.29	1.11	7	31	25
	6	0	25	30.22	1	14	54.4	30.224 949	0.29	1.11	7	27	33
	7	0	25	34.22	1	15	17.0	30.209 224	0.29	1.11	7	23	41
	8	0	25	38.11	1	15	38.8	30.193 402	0.29	1.11	7	19	49
	9	0	25	41.89	1	15	59.9	30.177 487	0.29	1.11	7	15	57
	10	0	25	45.55	+1	16	20.2	30.161 486	0.29	1.11	7	12	05
	11	0	25	49.10	1	16	39.8	30.145 401	0.29	1.11	7	08	12
	12	0	25	52.54	1	16	58.6	30.129 238	0.29	1.11	7	04	20
	13	0	25	55.87	1	17	16.7	30.113 002	0.29	1.11	7	00	27
	14	0	25	59.08	1	17	34.0	30.096 696	0.29	1.11	6	56	34
	15	0	26	02.18	1	17	50.6	30.080 325	0.29	1.11	6	52	42
	16	0	26	05.17	+1	18	06.5	30.063 893	0.29	1.11	6	48	49
	17	0	26	08.06	1	18	21.7	30.047 405	0.29	1.11	6	44	56
	18	0	26	10.82	1	18	36.1	30.030 865	0.29	1.12	6	41	02
	19	0	26	13.48	1	18	49.8	30.014 276	0.29	1.12	6	37	09
	20	0	26	16.02	1	19	02.7	29.997 644	0.29	1.12	6	33	16
	21	0	26	18.44	1	19	14.8	29.980 972	0.29	1.12	6	29	22
	22	0	26	20.74	+1	19	26.2	29.964 265	0.29	1.12	6	25	28
	23	0	26	22.93	1	19	36.8	29.947 527	0.29	1.12	6	21	35
	24	0	26	24.99	1	19	46.6	29.930 762	0.29	1.12	6	17	41
	25	0	26	26.93	1	19	55.6	29.913 976	0.29	1.12	6	13	47
	26	0	26	28.76	1	20	03.9	29.897 171	0.29	1.12	6	09	53
	27	0	26	30.46	1	20	11.3	29.880 353	0.29	1.12	6	05	58
	28	0	26	32.05	+1	20	18.0	29.863 527	0.29	1.12	6	02	04
	29	0	26	33.52	1	20	24.0	29.846 696	0.29	1.12	5	58	10
	30	0	26	34.87	1	20	29.1	29.829 866	0.29	1.12	5	54	15
July	1	0	26	36.11	1	20	33.6	29.813 042	0.29	1.12	5	50	20
	2	0	26	37.23	+1	20	37.2	29.796 228	0.30	1.12	5	46	25

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RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
July	1	0	26	36.11	+1	20	33.6	29.813 042	0.29	1.12	5	50	20
	2	0	26	37.23	1	20	37.2	29.796 228	0.30	1.12	5	46	25
	3	0	26	38.23	1	20	40.1	29.779 429	0.30	1.12	5	42	30
	4	0	26	39.11	1	20	42.2	29.762 652	0.30	1.13	5	38	35
	5	0	26	39.87	1	20	43.6	29.745 899	0.30	1.13	5	34	40
	6	0	26	40.50	1	20	44.1	29.729 178	0.30	1.13	5	30	45
	7	0	26	41.01	+1	20	43.8	29.712 493	0.30	1.13	5	26	49
	8	0	26	41.39	1	20	42.8	29.695 849	0.30	1.13	5	22	54
	9	0	26	41.65	1	20	40.9	29.679 252	0.30	1.13	5	18	58
	10	0	26	41.79	1	20	38.2	29.662 705	0.30	1.13	5	15	02
	11	0	26	41.81	1	20	34.8	29.646 213	0.30	1.13	5	11	07
	12	0	26	41.71	1	20	30.7	29.629 782	0.30	1.13	5	07	10
	13	0	26	41.50	+1	20	25.8	29.613 415	0.30	1.13	5	03	14
	14	0	26	41.17	1	20	20.1	29.597 117	0.30	1.13	4	59	18
	15	0	26	40.72	1	20	13.8	29.580 893	0.30	1.13	4	55	22
	16	0	26	40.16	1	20	06.6	29.564 746	0.30	1.13	4	51	25
	17	0	26	39.48	1	19	58.8	29.548 682	0.30	1.13	4	47	29
	18	0	26	38.68	1	19	50.2	29.532 704	0.30	1.13	4	43	32
	19	0	26	37.76	+1	19	40.8	29.516 816	0.30	1.13	4	39	35
	20	0	26	36.72	1	19	30.7	29.501 024	0.30	1.14	4	35	38
	21	0	26	35.56	1	19	19.8	29.485 330	0.30	1.14	4	31	41
	22	0	26	34.29	1	19	08.2	29.469 741	0.30	1.14	4	27	44
	23	0	26	32.90	1	18	55.8	29.454 259	0.30	1.14	4	23	46
	24	0	26	31.39	1	18	42.7	29.438 890	0.30	1.14	4	19	49
	25	0	26	29.77	+1	18	28.9	29.423 637	0.30	1.14	4	15	51
	26	0	26	28.03	1	18	14.4	29.408 505	0.30	1.14	4	11	54
	27	0	26	26.19	1	17	59.2	29.393 499	0.30	1.14	4	07	56
	28	0	26	24.23	1	17	43.3	29.378 623	0.30	1.14	4	03	58
	29	0	26	22.17	1	17	26.7	29.363 882	0.30	1.14	4	00	00
	30	0	26	20.00	1	17	09.4	29.349 280	0.30	1.14	3	56	02
	31	0	26	17.72	+1	16	51.5	29.334 822	0.30	1.14	3	52	04
Aug.	1	0	26	15.33	1	16	32.9	29.320 513	0.30	1.14	3	48	06
	2	0	26	12.82	1	16	13.5	29.306 358	0.30	1.14	3	44	07
	3	0	26	10.21	1	15	53.5	29.292 361	0.30	1.14	3	40	09
	4	0	26	07.48	1	15	32.8	29.278 526	0.30	1.14	3	36	10
	5	0	26	04.65	1	15	11.4	29.264 859	0.30	1.14	3	32	11
	6	0	26	01.71	+1	14	49.4	29.251 364	0.30	1.15	3	28	12
	7	0	25	58.66	1	14	26.7	29.238 044	0.30	1.15	3	24	13
	8	0	25	55.52	1	14	03.5	29.224 904	0.30	1.15	3	20	14
	9	0	25	52.28	1	13	39.6	29.211 948	0.30	1.15	3	16	15
	10	0	25	48.94	1	13	15.1	29.199 178	0.30	1.15	3	12	16
	11	0	25	45.51	1	12	50.0	29.186 600	0.30	1.15	3	08	17
	12	0	25	41.98	+1	12	24.4	29.174 216	0.30	1.15	3	04	17
	13	0	25	38.35	1	11	58.2	29.162 030	0.30	1.15	3	00	18
	14	0	25	34.64	1	11	31.4	29.150 046	0.30	1.15	2	56	18
	15	0	25	30.82	1	11	04.1	29.138 266	0.30	1.15	2	52	18
	16	0	25	26.92	+1	10	36.2	29.126 695	0.30	1.15	2	48	19

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RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	º	'	"		"	"	h	m	s
Aug.	16	0	25	26.92	+1	10	36.2	29.126 695	0.30	1.15	2	48	19
	17	0	25	22.92	1	10	07.7	29.115 335	0.30	1.15	2	44	19
	18	0	25	18.83	1	09	38.7	29.104 190	0.30	1.15	2	40	19
	19	0	25	14.65	1	09	09.1	29.093 263	0.30	1.15	2	36	19
	20	0	25	10.39	1	08	39.0	29.082 558	0.30	1.15	2	32	18
	21	0	25	06.04	1	08	08.5	29.072 077	0.30	1.15	2	28	18
	22	0	25	01.61	+1	07	37.4	29.061 824	0.30	1.15	2	24	18
	23	0	24	57.10	1	07	05.9	29.051 803	0.30	1.15	2	20	18
	24	0	24	52.51	1	06	33.9	29.042 017	0.30	1.15	2	16	17
	25	0	24	47.85	1	06	01.4	29.032 468	0.30	1.15	2	12	16
	26	0	24	43.12	1	05	28.6	29.023 161	0.30	1.15	2	08	16
	27	0	24	38.31	1	04	55.3	29.014 098	0.30	1.15	2	04	15
	28	0	24	33.44	+1	04	21.6	29.005 284	0.30	1.15	2	00	14
	29	0	24	28.48	1	03	47.4	28.996 720	0.30	1.16	1	56	14
	30	0	24	23.46	1	03	12.9	28.988 412	0.30	1.16	1	52	13
	31	0	24	18.36	1	02	37.9	28.980 361	0.30	1.16	1	48	12
Sept.	1	0	24	13.20	1	02	02.6	28.972 571	0.30	1.16	1	44	11
	2	0	24	07.96	1	01	26.8	28.965 045	0.30	1.16	1	40	09
	3	0	24	02.67	+1	00	50.7	28.957 785	0.30	1.16	1	36	08
	4	0	23	57.32	1	00	14.3	28.950 793	0.30	1.16	1	32	07
	5	0	23	51.92	0	59	37.6	28.944 073	0.30	1.16	1	28	06
	6	0	23	46.46	0	59	00.6	28.937 626	0.30	1.16	1	24	04
	7	0	23	40.96	0	58	23.3	28.931 453	0.30	1.16	1	20	03
	8	0	23	35.40	0	57	45.8	28.925 558	0.30	1.16	1	16	02
	9	0	23	29.80	+0	57	08.0	28.919 941	0.30	1.16	1	12	00
	10	0	23	24.15	0	56	30.0	28.914 604	0.30	1.16	1	07	59
	11	0	23	18.46	0	55	51.7	28.909 549	0.30	1.16	1	03	57
	12	0	23	12.72	0	55	13.3	28.904 777	0.30	1.16	0	59	55
	13	0	23	06.94	0	54	34.6	28.900 290	0.30	1.16	0	55	54
	14	0	23	01.12	0	53	55.6	28.896 089	0.30	1.16	0	51	52
	15	0	22	55.27	+0	53	16.6	28.892 175	0.30	1.16	0	47	50
	16	0	22	49.37	0	52	37.3	28.888 551	0.30	1.16	0	43	49
	17	0	22	43.45	0	51	57.9	28.885 216	0.30	1.16	0	39	47
	18	0	22	37.50	0	51	18.3	28.882 172	0.30	1.16	0	35	45
	19	0	22	31.53	0	50	38.7	28.879 421	0.30	1.16	0	31	43
	20	0	22	25.53	0	49	58.9	28.876 964	0.30	1.16	0	27	41
	21	0	22	19.51	+0	49	19.1	28.874 801	0.30	1.16	0	23	39
	22	0	22	13.48	0	48	39.3	28.872 935	0.30	1.16	0	19	37
	23	0	22	07.43	0	47	59.4	28.871 366	0.30	1.16	0	15	36
	24	0	22	01.37	0	47	19.4	28.870 095	0.30	1.16	0	11	34
	25	0	21	55.29	0	46	39.5	28.869 123	0.30	1.16	0	07	32
	26	0	21	49.20	0	45	59.5	28.868 452	0.30	1.16	0	03	30
	27	0	21	43.10	+0	45	19.4	28.868 081	0.30	1.16	23	55	26
	28	0	21	36.98	0	44	39.4	28.868 013	0.30	1.16	23	51	24
	29	0	21	30.86	0	43	59.4	28.868 248	0.30	1.16	23	47	22
	30	0	21	24.74	0	43	19.4	28.868 785	0.30	1.16	23	43	20
Oct.	1	0	21	18.62	+0	42	39.5	28.869 625	0.30	1.16	23	39	18

NEPTUNE, 2027

RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
Oct.	1	0	21	18.62	+0	42	39.5	28.869 625	0.30	1.16	23	39	18
	2	0	21	12.51	0	41	59.7	28.870 768	0.30	1.16	23	35	16
	3	0	21	06.41	0	41	20.0	28.872 214	0.30	1.16	23	31	14
	4	0	21	00.32	0	40	40.5	28.873 962	0.30	1.16	23	27	12
	5	0	20	54.24	0	40	01.1	28.876 011	0.30	1.16	23	23	10
	6	0	20	48.18	0	39	21.9	28.878 361	0.30	1.16	23	19	08
	7	0	20	42.14	+0	38	42.8	28.881 011	0.30	1.16	23	15	06
	8	0	20	36.11	0	38	04.0	28.883 959	0.30	1.16	23	11	04
	9	0	20	30.11	0	37	25.3	28.887 206	0.30	1.16	23	07	02
	10	0	20	24.12	0	36	46.8	28.890 749	0.30	1.16	23	03	00
	11	0	20	18.16	0	36	08.5	28.894 588	0.30	1.16	22	58	59
	12	0	20	12.23	0	35	30.4	28.898 722	0.30	1.16	22	54	57
	13	0	20	06.32	+0	34	52.6	28.903 149	0.30	1.16	22	50	55
	14	0	20	00.45	0	34	15.1	28.907 868	0.30	1.16	22	46	53
	15	0	19	54.61	0	33	37.8	28.912 877	0.30	1.16	22	42	52
	16	0	19	48.81	0	33	00.9	28.918 175	0.30	1.16	22	38	50
	17	0	19	43.06	0	32	24.2	28.923 761	0.30	1.16	22	34	49
	18	0	19	37.35	0	31	47.9	28.929 634	0.30	1.16	22	30	47
	19	0	19	31.68	+0	31	12.0	28.935 791	0.30	1.16	22	26	46
	20	0	19	26.07	0	30	36.5	28.942 232	0.30	1.16	22	22	44
	21	0	19	20.51	0	30	01.3	28.948 955	0.30	1.16	22	18	43
	22	0	19	14.99	0	29	26.5	28.955 958	0.30	1.16	22	14	41
	23	0	19	09.53	0	28	52.1	28.963 240	0.30	1.16	22	10	40
	24	0	19	04.11	0	28	18.1	28.970 799	0.30	1.16	22	06	39
	25	0	18	58.75	+0	27	44.4	28.978 634	0.30	1.16	22	02	38
	26	0	18	53.45	0	27	11.2	28.986 741	0.30	1.16	21	58	36
	27	0	18	48.21	0	26	38.4	28.995 119	0.30	1.16	21	54	35
	28	0	18	43.03	0	26	06.1	29.003 766	0.30	1.16	21	50	34
	29	0	18	37.92	0	25	34.3	29.012 678	0.30	1.15	21	46	34
	30	0	18	32.89	0	25	03.1	29.021 854	0.30	1.15	21	42	33
	31	0	18	27.92	+0	24	32.3	29.031 289	0.30	1.15	21	38	32
Nov.	1	0	18	23.04	0	24	02.1	29.040 982	0.30	1.15	21	34	31
	2	0	18	18.23	0	23	32.4	29.050 928	0.30	1.15	21	30	31
	3	0	18	13.50	0	23	03.3	29.061 124	0.30	1.15	21	26	30
	4	0	18	08.84	0	22	34.8	29.071 566	0.30	1.15	21	22	30
	5	0	18	04.27	0	22	06.8	29.082 252	0.30	1.15	21	18	29
	6	0	17	59.77	+0	21	39.3	29.093 177	0.30	1.15	21	14	29
	7	0	17	55.36	0	21	12.5	29.104 339	0.30	1.15	21	10	29
	8	0	17	51.04	0	20	46.2	29.115 732	0.30	1.15	21	06	28
	9	0	17	46.80	0	20	20.6	29.127 355	0.30	1.15	21	02	28
	10	0	17	42.65	0	19	55.5	29.139 202	0.30	1.15	20	58	28
	11	0	17	38.59	0	19	31.1	29.151 270	0.30	1.15	20	54	29
	12	0	17	34.62	+0	19	07.4	29.163 555	0.30	1.15	20	50	29
	13	0	17	30.75	0	18	44.3	29.176 054	0.30	1.15	20	46	29
	14	0	17	26.98	0	18	21.9	29.188 763	0.30	1.15	20	42	30
	15	0	17	23.32	0	18	00.2	29.201 677	0.30	1.15	20	38	30
	16	0	17	19.75	+0	17	39.2	29.214 794	0.30	1.15	20	34	31

NEPTUNE, 2027

RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date		Apparent Right Ascension			Apparent Declination			True Distance from the Earth	Hor. Parallax	Semi Diameter	Ephemeris Transit		
		h	m	s	°	'	"		"	"	h	m	s
Nov.	16	0	17	19.75	+0	17	39.2	29.214 794	0.30	1.15	20	34	31
	17	0	17	16.29	0	17	18.9	29.228 109	0.30	1.15	20	30	31
	18	0	17	12.93	0	16	59.3	29.241 620	0.30	1.15	20	26	32
	19	0	17	09.67	0	16	40.3	29.255 321	0.30	1.15	20	22	33
	20	0	17	06.51	0	16	22.1	29.269 209	0.30	1.14	20	18	34
	21	0	17	03.45	0	16	04.6	29.283 280	0.30	1.14	20	14	35
	22	0	17	00.50	+0	15	47.7	29.297 531	0.30	1.14	20	10	37
	23	0	16	57.65	0	15	31.6	29.311 956	0.30	1.14	20	06	38
	24	0	16	54.92	0	15	16.3	29.326 551	0.30	1.14	20	02	39
	25	0	16	52.30	0	15	01.7	29.341 312	0.30	1.14	19	58	41
	26	0	16	49.79	0	14	47.9	29.356 234	0.30	1.14	19	54	43
	27	0	16	47.41	0	14	34.9	29.371 312	0.30	1.14	19	50	45
	28	0	16	45.14	+0	14	22.6	29.386 542	0.30	1.14	19	46	46
	29	0	16	42.99	0	14	11.2	29.401 917	0.30	1.14	19	42	49
	30	0	16	40.96	0	14	00.6	29.417 432	0.30	1.14	19	38	51
Dec.	1	0	16	39.04	0	13	50.7	29.433 084	0.30	1.14	19	34	53
	2	0	16	37.25	0	13	41.7	29.448 866	0.30	1.14	19	30	55
	3	0	16	35.57	0	13	33.4	29.464 772	0.30	1.14	19	26	58
	4	0	16	34.01	+0	13	26.0	29.480 799	0.30	1.14	19	23	01
	5	0	16	32.58	0	13	19.3	29.496 940	0.30	1.14	19	19	03
	6	0	16	31.26	0	13	13.4	29.513 190	0.30	1.14	19	15	06
	7	0	16	30.06	0	13	08.4	29.529 544	0.30	1.13	19	11	09
	8	0	16	28.99	0	13	04.1	29.545 997	0.30	1.13	19	07	12
	9	0	16	28.04	0	13	00.7	29.562 544	0.30	1.13	19	03	16
	10	0	16	27.22	+0	12	58.1	29.579 179	0.30	1.13	18	59	19
	11	0	16	26.53	0	12	56.4	29.595 897	0.30	1.13	18	55	22
	12	0	16	25.97	0	12	55.5	29.612 693	0.30	1.13	18	51	26
	13	0	16	25.54	0	12	55.4	29.629 563	0.30	1.13	18	47	30
	14	0	16	25.23	0	12	56.2	29.646 501	0.30	1.13	18	43	34
	15	0	16	25.06	0	12	57.9	29.663 503	0.30	1.13	18	39	38
	16	0	16	25.00	+0	13	00.3	29.680 563	0.30	1.13	18	35	42
	17	0	16	25.07	0	13	03.6	29.697 676	0.30	1.13	18	31	46
	18	0	16	25.27	0	13	07.6	29.714 839	0.30	1.13	18	27	50
	19	0	16	25.58	0	13	12.5	29.732 045	0.30	1.13	18	23	55
	20	0	16	26.02	0	13	18.2	29.749 290	0.30	1.13	18	19	60
	21	0	16	26.59	0	13	24.7	29.766 569	0.30	1.13	18	16	04
	22	0	16	27.29	+0	13	32.1	29.783 876	0.30	1.12	18	12	09
	23	0	16	28.12	0	13	40.3	29.801 205	0.30	1.12	18	08	14
	24	0	16	29.09	0	13	49.3	29.818 551	0.29	1.12	18	04	19
	25	0	16	30.18	0	13	59.2	29.835 909	0.29	1.12	18	00	25
	26	0	16	31.40	0	14	10.0	29.853 272	0.29	1.12	17	56	30
	27	0	16	32.76	0	14	21.6	29.870 636	0.29	1.12	17	52	36
	28	0	16	34.24	+0	14	34.0	29.887 995	0.29	1.12	17	48	41
	29	0	16	35.85	0	14	47.2	29.905 342	0.29	1.12	17	44	47
	30	0	16	37.58	0	15	01.3	29.922 672	0.29	1.12	17	40	53
	31	0	16	39.44	0	15	16.2	29.939 980	0.29	1.12	17	36	59
	32	0	16	41.42	+0	15	31.8	29.957 260	0.29	1.12	17	33	05

PLUTO, 2027

HELIOCENTRIC POSITIONS FOR 0^h TERRESTRIAL TIME
MEAN EQUINOX AND ECLIPTIC OF DATE

Date	Heliocentric Longitude	Heliocentric Latitude	Radius Vector	Date	Heliocentric Longitude	Heliocentric Latitude	Radius Vector
	° ' "	° ' "			° ' "	° ' "	
Jan. 1	305 00 00.4	-4 21 52.1	35.674 0747	July 5	305 50 28.2	-4 36 44.0	35.803 0929
6	305 01 22.5	4 22 16.3	35.677 5540	10	305 51 49.8	4 37 07.9	35.806 5872
11	305 02 44.6	4 22 40.5	35.681 0338	15	305 53 11.4	4 37 31.9	35.810 0820
16	305 04 06.6	4 23 04.8	35.684 5140	20	305 54 32.9	4 37 55.9	35.813 5771
21	305 05 28.7	4 23 29.0	35.687 9948	25	305 55 54.5	4 38 19.8	35.817 0726
26	305 06 50.7	4 23 53.2	35.691 4760	30	305 57 16.0	4 38 43.8	35.820 5685
31	305 08 12.7	-4 24 17.4	35.694 9576	Aug. 4	305 58 37.5	-4 39 07.7	35.824 0648
Feb. 5	305 09 34.7	4 24 41.6	35.698 4398	9	305 59 59.0	4 39 31.6	35.827 5615
10	305 10 56.7	4 25 05.8	35.701 9224	14	306 01 20.4	4 39 55.5	35.831 0586
15	305 12 18.7	4 25 29.9	35.705 4054	19	306 02 41.9	4 40 19.4	35.834 5561
20	305 13 40.6	4 25 54.1	35.708 8889	24	306 04 03.4	4 40 43.3	35.838 0540
25	305 15 02.5	4 26 18.3	35.712 3729	29	306 05 24.8	4 41 07.2	35.841 5522
Mar. 2	305 16 24.5	-4 26 42.4	35.715 8572	Sept. 3	306 06 46.2	-4 41 31.1	35.845 0509
7	305 17 46.4	4 27 06.6	35.719 3420	8	306 08 07.6	4 41 55.0	35.848 5499
12	305 19 08.3	4 27 30.7	35.722 8273	13	306 09 29.0	4 42 18.9	35.852 0493
17	305 20 30.2	4 27 54.9	35.726 3129	18	306 10 50.4	4 42 42.7	35.855 5490
22	305 21 52.1	4 28 19.0	35.729 7989	23	306 12 11.7	4 43 06.6	35.859 0492
27	305 23 13.9	4 28 43.1	35.733 2853	28	306 13 33.1	4 43 30.4	35.862 5496
Apr. 1	305 24 35.8	-4 29 07.2	35.736 7721	Oct. 3	306 14 54.4	-4 43 54.3	35.866 0504
6	305 25 57.6	4 29 31.3	35.740 2593	8	306 16 15.8	4 44 18.1	35.869 5516
11	305 27 19.4	4 29 55.4	35.743 7469	13	306 17 37.1	4 44 41.9	35.873 0530
16	305 28 41.2	4 30 19.5	35.747 2348	18	306 18 58.4	4 45 05.7	35.876 5549
21	305 30 03.0	4 30 43.6	35.750 7231	23	306 20 19.6	4 45 29.6	35.880 0570
26	305 31 24.8	4 31 07.7	35.754 2118	28	306 21 40.9	4 45 53.4	35.883 5595
May 1	305 32 46.6	-4 31 31.8	35.757 7009	Nov. 2	306 23 02.2	-4 46 17.2	35.887 0623
6	305 34 08.3	4 31 55.8	35.761 1903	7	306 24 23.4	4 46 41.0	35.890 5654
11	305 35 30.1	4 32 19.9	35.764 6801	12	306 25 44.7	4 47 04.8	35.894 0689
16	305 36 51.8	4 32 43.9	35.768 1703	17	306 27 05.9	4 47 28.5	35.897 5727
21	305 38 13.5	4 33 08.0	35.771 6608	22	306 28 27.1	4 47 52.3	35.901 0769
26	305 39 35.2	4 33 32.0	35.775 1518	27	306 29 48.3	4 48 16.0	35.904 5813
31	305 40 56.9	-4 33 56.0	35.778 6431	Dec. 2	306 31 09.5	-4 48 39.8	35.908 0861
June 5	305 42 18.5	4 34 20.0	35.782 1348	7	306 32 30.6	4 49 03.6	35.911 5912
10	305 43 40.2	4 34 44.0	35.785 6269	12	306 33 51.8	4 49 27.3	35.915 0967
15	305 45 01.8	4 35 08.0	35.789 1193	17	306 35 12.9	4 49 51.0	35.918 6024
20	305 46 23.5	4 35 32.0	35.792 6121	22	306 36 34.0	4 50 14.7	35.922 1085
25	305 47 45.1	4 35 56.0	35.796 1053	27	306 37 55.1	4 50 38.5	35.925 6149
30	305 49 06.7	-4 36 20.0	35.799 5989	32	306 39 16.2	-4 51 02.2	35.929 1216
July 5	305 50 28.2	-4 36 44.0	35.803 0929	37	306 40 37.3	-4 51 25.9	35.932 6287

N.B: Pluto is now classified as a dwarf planet as per resolution of IAU

PLUTO, 2027

GEOCENTRIC LONGITUDE AND LATITUDE FOR 0^h TERRESTRIAL TIME

Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude			Date		Apparent Geocentric Longitude			Apparent Geocentric Latitude		
		º	'	"	º	'	"			º	'	"	º	'	"
Jan.	1	304	21	06.1	-4	15	27.2	July	5	306	30	19.2	-4	44	06.2
	6	304	30	05.9	4	15	37.3		10	306	23	55.3	4	44	45.8
	11	304	39	19.2	4	15	50.4		15	306	17	17.3	4	45	22.1
	16	304	48	41.7	4	16	06.4		20	306	10	29.0	4	45	54.9
	21	304	58	11.3	4	16	25.5		25	306	03	32.8	4	46	24.3
	26	305	07	43.4	4	16	47.7		30	305	56	33.6	4	46	50.0
	31	305	17	14.9	-4	17	12.8	Aug.	4	305	49	35.0	-4	47	12.2
Feb.	5	305	26	43.4	4	17	41.1		9	305	42	40.0	4	47	30.6
	10	305	36	03.9	4	18	12.4		14	305	35	54.1	4	47	45.5
	15	305	45	13.6	4	18	46.7		19	305	29	19.5	4	47	56.9
	20	305	54	09.9	4	19	24.0		24	305	23	00.1	4	48	04.9
	25	306	02	48.1	4	20	04.2		29	305	17	00.3	4	48	09.6
Mar.	2	306	11	06.9	-4	20	47.2	Sept.	3	305	11	22.0	-4	48	11.1
	7	306	19	02.5	4	21	32.8		8	305	06	09.8	4	48	09.6
	12	306	26	31.6	4	22	21.0		13	305	01	26.4	4	48	05.3
	17	306	33	32.9	4	23	11.6		18	304	57	13.5	4	47	58.4
	22	306	40	02.7	4	24	04.4		23	304	53	34.8	4	47	49.3
	27	306	45	59.4	4	24	59.2		28	304	50	32.1	4	47	38.2
Apr.	1	306	51	21.7	-4	25	55.8	Oct.	3	304	48	06.7	-4	47	25.2
	6	306	56	06.5	4	26	54.1		8	304	46	21.8	4	47	10.8
	11	307	00	13.1	4	27	53.8		13	304	45	17.3	4	46	55.1
	16	307	03	40.3	4	28	54.7		18	304	44	54.2	4	46	38.6
	21	307	06	26.1	4	29	56.5		23	304	45	14.3	4	46	21.6
	26	307	08	31.6	4	30	58.9		28	304	46	16.4	4	46	04.3
May	1	307	09	55.2	-4	32	01.7	Nov.	2	304	48	01.9	-4	45	46.9
	6	307	10	36.3	4	33	04.6		7	304	50	30.1	4	45	30.0
	11	307	10	36.5	4	34	07.4		12	304	53	39.5	4	45	13.7
	16	307	09	54.6	4	35	09.7		17	304	57	30.3	4	44	58.3
	21	307	08	32.5	4	36	11.2		22	305	02	00.5	4	44	44.2
	26	307	06	31.5	4	37	11.7		27	305	07	08.5	4	44	31.5
	31	307	03	51.7	-4	38	10.9	Dec.	2	305	12	53.8	-4	44	20.6
June	5	307	00	35.7	4	39	08.5		7	305	19	12.7	4	44	11.7
	10	306	56	45.3	4	40	04.2		12	305	26	03.5	4	44	04.9
	15	306	52	21.7	4	40	57.8		17	305	33	24.4	4	44	00.7
	20	306	47	29.2	4	41	49.0		22	305	41	11.1	4	43	59.0
	25	306	42	09.2	4	42	37.6		27	305	49	22.5	4	44	00.0
	30	306	36	24.4	-4	43	23.4		32	305	57	54.9	-4	44	04.0
July	5	306	30	19.2	-4	44	06.2		37	306	06	44.4	-4	44	11.0

N.B : Pluto is now classified as a dwarf planet as per resolution of I.A.U

PLUTO, 2027

RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date	Apparent Right Ascension			Red. To Astrom. (J 2000.0)	Apparent Declination			Red. To Astrom. (J 2000.0)	True Distance from the Earth	Hor. Parallax	Ephemeris Transit	
	h	m	s	s	°	'	"	"		"	h	m
Jan. 1	20	31	08.27	+94.90	-23	18	09.4	-321.95	36.567 387	0.24	13	47
6	20	31	46.33	94.88	23	16	07.4	323.49	36.602 769	0.24	13	28
11	20	32	25.37	94.87	23	14	04.6	324.83	36.631 170	0.24	13	09
16	20	33	05.09	94.83	23	12	01.9	326.16	36.652 407	0.24	12	50
21	20	33	45.35	94.86	23	09	59.7	327.88	36.666 390	0.24	12	31
26	20	34	25.82	94.87	23	07	59.7	329.16	36.673 089	0.24	12	12
31	20	35	06.28	+94.86	-23	06	01.8	-330.83	36.672 485	0.24	11	53
Feb. 5	20	35	46.56	94.91	23	04	07.4	332.50	36.664 579	0.24	11	34
10	20	36	26.33	94.93	23	02	17.5	333.89	36.649 449	0.24	11	15
15	20	37	05.39	94.95	23	00	32.4	335.59	36.627 256	0.24	10	56
20	20	37	43.54	95.04	22	58	53.4	337.23	36.598 241	0.24	10	37
25	20	38	20.47	95.07	22	57	21.2	338.67	36.562 673	0.24	10	18
Mar. 2	20	38	56.08	+95.15	-22	55	56.0	-340.40	36.520 815	0.24	9	59
7	20	39	30.12	95.24	22	54	39.2	341.83	36.472 975	0.24	9	40
12	20	40	02.34	95.29	22	53	31.0	343.26	36.419 533	0.24	9	21
17	20	40	32.65	95.41	22	52	31.9	344.96	36.360 942	0.24	9	02
22	20	41	00.81	95.51	22	51	43.0	346.23	36.297 695	0.24	8	43
27	20	41	26.69	95.61	22	51	04.1	347.72	36.230 273	0.24	8	23
Apr. 1	20	41	50.20	+95.75	-22	50	35.7	-349.14	36.159 151	0.24	8	04
6	20	42	11.13	95.86	22	50	18.4	350.24	36.084 853	0.24	7	45
11	20	42	29.42	95.99	22	50	12.1	351.64	36.007 958	0.24	7	25
16	20	42	45.00	96.17	22	50	17.2	352.83	35.929 088	0.24	7	06
21	20	42	57.71	96.29	22	50	33.7	353.81	35.848 852	0.25	6	46
26	20	43	07.61	96.47	22	51	01.2	355.00	35.767 817	0.25	6	27
May 1	20	43	14.62	+96.64	-22	51	40.1	-355.81	35.686 559	0.25	6	07
6	20	43	18.67	96.78	22	52	30.0	356.60	35.605 682	0.25	5	48
11	20	43	19.86	97.00	22	53	30.4	357.56	35.525 826	0.25	5	28
16	20	43	18.12	97.17	22	54	41.5	358.00	35.447 624	0.25	5	09
21	20	43	13.55	97.35	22	56	02.0	358.65	35.371 647	0.25	4	49
26	20	43	06.27	97.56	22	57	31.8	359.11	35.298 427	0.25	4	29
31	20	42	56.25	+97.72	-22	59	10.4	-359.24	35.228 498	0.25	4	09
June 5	20	42	43.67	97.91	23	00	56.6	359.62	35.162 407	0.25	3	49
10	20	42	28.66	98.13	23	02	50.2	359.67	35.100 701	0.25	3	29
15	20	42	11.28	98.29	23	04	50.1	359.57	35.043 863	0.25	3	09
20	20	41	51.83	98.49	23	06	55.0	359.58	34.992 297	0.25	2	49
25	20	41	30.41	98.66	23	09	04.6	359.16	34.946 376	0.25	2	29
30	20	41	07.20	+98.80	-23	11	17.5	-358.76	34.906 466	0.25	2	09
July 5	20	40	42.49	99.00	23	13	32.6	358.49	34.872 921	0.25	1	49
10	20	40	16.40	99.14	23	15	49.5	357.72	34.846 054	0.25	1	29
15	20	39	49.25	99.28	23	18	06.2	357.19	34.826 074	0.25	1	09
20	20	39	21.31	99.43	23	20	22.2	356.44	34.813 123	0.25	0	49
25	20	38	52.74	99.52	23	22	36.6	355.43	34.807 319	0.25	0	29
30	20	38	23.87	+99.63	-23	24	47.7	-354.72	34.808 760	0.25	0	09
Aug. 4	20	37	54.97	99.76	23	26	55.3	353.72	34.817 514	0.25	23	45
9	20	37	26.24	99.81	23	28	58.0	352.69	34.833 562	0.25	23	24
14	20	36	58.06	99.90	23	30	54.7	351.82	34.856 784	0.25	23	04
19	20	36	30.61	+99.94	-23	32	45.0	-350.60	34.887 019	0.25	22	44

N.B: Pluto is now classified as a dwarf planet as per resolution of I A U

PLUTO, 2027

RIGHT ASCENSION AND DECLINATION FOR 0^h TERRESTRIAL TIME

Date	Apparent Right Ascension			Red. To Astrom. (J 2000.0)	Apparent Declination			Red. To Astrom. (J 2000.0)	True Distance from the Earth	Hor. Parallax	Ephemeris Transit	
	h	m	s	s	°	'	"	"		"	h	m
Aug. 19	20	36	30.61	+99.94	-23	32	45.0	-350.60	34.887 019	0.25	22	44
24	20	36	04.13	99.95	23	34	27.8	349.56	34.924 086	0.25	22	24
29	20	35	38.97	100.01	23	36	02.3	348.70	34.967 786	0.25	22	04
Sept. 3	20	35	15.26	100.01	23	37	28.3	347.49	35.017 860	0.25	21	44
8	20	34	53.31	100.00	23	38	44.5	346.68	35.073 952	0.25	21	24
13	20	34	33.33	100.00	23	39	50.9	345.72	35.135 642	0.25	21	04
18	20	34	15.44	+99.94	-23	40	47.1	-344.69	35.202 496	0.25	20	44
23	20	33	59.91	99.90	23	41	32.3	344.09	35.274 077	0.25	20	24
28	20	33	46.86	99.88	23	42	06.8	343.29	35.349 923	0.25	20	04
Oct. 3	20	33	36.41	99.78	23	42	30.1	342.66	35.429 507	0.25	19	44
8	20	33	28.77	99.74	23	42	41.9	342.28	35.512 226	0.25	19	25
13	20	33	23.95	99.65	23	42	42.7	341.68	35.597 468	0.25	19	05
18	20	33	22.03	+99.54	-23	42	32.2	-341.43	35.684 635	0.25	18	45
23	20	33	23.14	99.49	23	42	10.7	341.37	35.773 144	0.25	18	26
28	20	33	27.18	99.38	23	41	38.6	341.13	35.862 388	0.25	18	06
Nov. 2	20	33	34.28	99.29	23	40	55.5	341.37	35.951 701	0.24	17	46
7	20	33	44.39	99.22	23	40	02.4	341.51	36.040 406	0.24	17	27
12	20	33	57.40	99.09	23	38	59.7	341.69	36.127 858	0.24	17	08
17	20	34	13.33	+99.02	-23	37	47.4	-342.33	36.213 457	0.24	16	48
22	20	34	32.05	98.94	23	36	26.7	342.76	36.296 629	0.24	16	29
27	20	34	53.44	98.83	23	34	57.7	343.45	36.376 778	0.24	16	10
Dec. 2	20	35	17.47	98.78	23	33	21.0	344.34	36.453 292	0.24	15	50
7	20	35	43.90	98.69	23	31	37.8	345.03	36.525 603	0.24	15	31
12	20	36	12.58	98.60	23	29	48.3	346.10	36.593 211	0.24	15	12
17	20	36	43.41	+98.58	-23	27	53.5	-347.27	36.655 680	0.24	14	53
22	20	37	16.08	98.50	23	25	54.4	348.26	36.712 596	0.24	14	34
27	20	37	50.52	98.46	23	23	51.2	349.67	36.763 540	0.24	14	15
32	20	38	26.47	98.43	23	21	45.5	350.88	36.808 129	0.24	13	55
37	20	39	03.64	+98.36	-23	19	37.8	-352.13	36.846 059	0.24	13	36

N.B: Pluto is now classified as a dwarf planet as per resolution of I A U

MAJOR PLANETS, 2027
HELIOCENTRIC OSCULATING ORBITAL ELEMENTS
REFERRED TO THE MEAN ECLIPTIC AND EQUINOX OF J 2000.0

Date		Julian Date 246	Inclination i	Longitude Asc. Node Ω	Longitude Perihelion ϖ	Mean Distance a	Daily Motion n	Eccentricity e	Mean Longitude L
				MERCURY					
			°	°	°		°		°
Dec'26	26	1400.5	7.0034	48.297	77.499	0.387 098	4.092 35	0.205 637	264.2989
Feb'27	4	1440.5	7.0034	48.297	77.499	0.387 101	4.092 31	0.205 637	67.9924
Mar	16	1480.5	7.0034	48.297	77.499	0.387 097	4.092 37	0.205 637	231.6859
Apr	25	1520.5	7.0034	48.297	77.500	0.387 104	4.092 26	0.205 637	35.3788
Jun	4	1560.5	7.0034	48.296	77.500	0.387 095	4.092 40	0.205 637	199.0711
Jul	14	1600.5	7.0033	48.296	77.500	0.387 102	4.092 28	0.205 637	2.7657
Aug	23	1640.5	7.0033	48.296	77.500	0.387 096	4.092 38	0.205 637	166.4567
Oct	2	1680.5	7.0033	48.296	77.500	0.387 097	4.092 37	0.205 637	330.1529
Nov	11	1720.5	7.0033	48.296	77.500	0.387 100	4.092 32	0.205 637	133.8445
Dec'27	21	1760.5	7.0033	48.296	77.501	0.387 093	4.092 42	0.205 637	297.5395
Jan'28	30	1800.5	7.0033	48.296	77.501	0.387 104	4.092 26	0.205 637	101.2331
				VENUS					
Dec'26	26	1400.5	3.3944	76.605	131.565	0.723 345	1.602 09	0.006 759	131.7737
Feb'27	4	1440.5	3.3944	76.605	131.565	0.723 337	1.602 11	0.006 759	195.8562
Mar	16	1480.5	3.3944	76.604	131.565	0.723 311	1.602 20	0.006 759	259.9418
Apr	25	1520.5	3.3944	76.604	131.565	0.723 299	1.602 24	0.006 759	324.0315
Jun	4	1560.5	3.3944	76.604	131.565	0.723 324	1.602 16	0.006 759	28.1211
Jul	14	1600.5	3.3944	76.603	131.565	0.723 351	1.602 07	0.006 759	92.2059
Aug	23	1640.5	3.3944	76.603	131.565	0.723 354	1.602 06	0.006 759	156.2863
Oct	2	1680.5	3.3944	76.603	131.565	0.723 336	1.602 12	0.006 759	220.3680
Nov	11	1720.5	3.3944	76.602	131.565	0.723 307	1.602 21	0.006 759	284.4551
Dec'27	21	1760.5	3.3944	76.602	131.565	0.723 300	1.602 24	0.006 759	348.5456
Jan'28	30	1800.5	3.3944	76.602	131.565	0.723 328	1.602 15	0.006 759	52.6340
				EARTH*					
Dec'26	26	1400.5	0.0035	174.8	103.024	1.000 013	0.985 59	0.016 697	94.1346
Feb'27	4	1440.5	0.0035	174.8	103.025	0.999 999	0.985 61	0.016 697	133.5591
Mar	16	1480.5	0.0036	174.8	103.025	0.999 999	0.985 61	0.016 697	172.9843
Apr	25	1520.5	0.0036	174.8	103.025	1.000 008	0.985 60	0.016 697	212.4089
Jun	4	1560.5	0.0036	174.8	103.026	1.000 010	0.985 59	0.016 697	251.8325
Jul	14	1600.5	0.0036	174.8	103.026	1.000 000	0.985 61	0.016 697	291.2561
Aug	23	1640.5	0.0036	174.8	103.027	0.999 990	0.985 62	0.016 697	330.6804
Oct	2	1680.5	0.0036	174.8	103.027	0.999 993	0.985 62	0.016 697	10.1051
Nov	11	1720.5	0.0036	174.8	103.027	1.000 001	0.985 61	0.016 697	49.5294
Dec'27	21	1760.5	0.0037	174.8	103.028	1.000 002	0.985 61	0.016 697	88.9535
Jan'28	30	1800.5	0.0037	174.8	103.028	0.999 997	0.985 61	0.016 697	128.3781

* Values labelled for the Earth are actually for the Earth/ Moon barycenter

FORMULAS

Mean anomaly, $M = L - \varpi$
Argument of perihelion, measured from node, $\omega = \varpi - \Omega$
True anomaly, $\nu = M + (2e - e^3/4)\sin M + (5e^2/4)\sin 2M + (13\,e^3/12)\sin 3M + \ldots$ in radians
True distance, $r = a\,(1 - e^2)/(1 + e\cos\nu)$
Heliocentric rectangular co- ordinates, referred to the ecliptic of date, may be computed from:
$x = r\{\cos(\nu + \omega)\cos\Omega - \sin(\nu + \omega)\cos i\,\sin\Omega\}$
$y = r\{\cos(\nu + \omega)\sin\Omega + \sin(\nu + \omega)\cos i\,\cos\Omega\}$
$z = r\sin(\nu + \omega)\sin i$

MAJOR PLANETS, 2027
HELIOCENTRIC OSCULATING ORBITAL ELEMENTS
REFERRED TO THE MEAN ECLIPTIC AND EQUINOX OF J 2000.0

Date		Julian Date 246	Inclination i	Longitude: Asc. Node Ω	Longitude: Perihelion ϖ	Mean Distance a	Daily Motion n	Eccentricity e	Mean Longitude L
				MARS					
			°	°	°		°		°
Dec'26	26	1400.5	1.8475	49.478	336.180	1.523 78	0.523 99	0.093 425	120.0535
Feb'27	4	1440.5	1.8475	49.478	336.180	1.523 78	0.523 99	0.093 425	141.0139
Mar	16	1480.5	1.8475	49.478	336.181	1.523 78	0.523 99	0.093 425	161.9742
Apr	25	1520.5	1.8475	49.477	336.181	1.523 80	0.523 98	0.093 425	182.9340
Jun	4	1560.5	1.8475	49.477	336.182	1.523 81	0.523 97	0.093 425	203.8930
Jul	14	1600.5	1.8475	49.477	336.182	1.523 80	0.523 98	0.093 426	224.8514
Aug	23	1640.5	1.8475	49.476	336.183	1.523 76	0.524 00	0.093 426	245.8101
Oct	2	1680.5	1.8475	49.476	336.183	1.523 70	0.524 03	0.093 426	266.7698
Nov	11	1720.5	1.8475	49.476	336.184	1.523 62	0.524 07	0.093 426	287.7314
Dec'27	21	1760.5	1.8474	49.476	336.184	1.523 54	0.524 11	0.093 426	308.6951
Jan'28	30	1800.5	1.8474	49.475	336.185	1.523 47	0.524 15	0.093 426	329.6608
				JUPITER					
Dec'26	26	1400.5	1.3027	100.512	14.389	5.203 00	0.083 09	0.048 542	133.2242
Feb'27	4	1440.5	1.3027	100.512	14.390	5.202 88	0.083 09	0.048 542	136.5474
Mar	16	1480.5	1.3027	100.513	14.390	5.202 77	0.083 09	0.048 542	139.8709
Apr	25	1520.5	1.3027	100.513	14.390	5.202 65	0.083 09	0.048 542	143.1945
Jun	4	1560.5	1.3027	100.513	14.390	5.202 54	0.083 10	0.048 543	146.5184
Jul	14	1600.5	1.3027	100.513	14.391	5.202 42	0.083 10	0.048 543	149.8424
Aug	23	1640.5	1.3027	100.513	14.391	5.202 31	0.083 10	0.048 543	153.1666
Oct	2	1680.5	1.3027	100.514	14.391	5.202 20	0.083 11	0.048 543	156.4910
Nov	11	1720.5	1.3027	100.514	14.391	5.202 10	0.083 11	0.048 543	159.8156
Dec'27	21	1760.5	1.3027	100.514	14.392	5.201 99	0.083 11	0.048 544	163.1403
Jan'28	30	1800.5	1.3027	100.514	14.392	5.201 90	0.083 11	0.048 544	166.4652
				SATURN					
Dec'26	26	1400.5	2.4896	113.596	93.210	9.533 2	0.033 49	0.055 455	19.9633
Feb'27	4	1440.5	2.4896	113.596	93.211	9.533 3	0.033 49	0.055 454	21.3037
Mar	16	1480.5	2.4896	113.596	93.211	9.533 4	0.033 49	0.055 454	22.6440
Apr	25	1520.5	2.4896	113.595	93.212	9.533 6	0.033 49	0.055 453	23.9841
Jun	4	1560.5	2.4896	113.595	93.213	9.533 7	0.033 49	0.055 453	25.3241
Jul	14	1600.5	2.4896	113.595	93.213	9.533 8	0.033 49	0.055 453	26.6640
Aug	23	1640.5	2.4896	113.595	93.214	9.534 0	0.033 49	0.055 452	28.0038
Oct	2	1680.5	2.4896	113.594	93.214	9.534 2	0.033 48	0.055 452	29.3434
Nov	11	1720.5	2.4896	113.594	93.215	9.534 3	0.033 48	0.055 452	30.6830
Dec'27	21	1760.5	2.4896	113.594	93.216	9.534 5	0.033 48	0.055 451	32.0224
Jan'28	30	1800.5	2.4896	113.593	93.216	9.534 7	0.033 48	0.055 451	33.3617
				URANUS					
Nov'26	16	1360.5	0.7727	74.026	173.03	19.167 4	0.011 75	0.046 374	68.2058
Feb'27	4	1440.5	0.7727	74.026	173.03	19.166 7	0.011 75	0.046 374	69.1467
Apr	25	1520.5	0.7727	74.026	173.03	19.165 9	0.011 75	0.046 374	70.0879
Jul	14	1600.5	0.7727	74.026	173.03	19.165 1	0.011 75	0.046 374	71.0292
Oct	2	1680.5	0.7727	74.027	173.03	19.164 4	0.011 75	0.046 374	71.9707
Dec'27	21	1760.5	0.7727	74.027	173.03	19.163 6	0.011 75	0.046 374	72.9124
Mar'28	10	1840.5	0.7727	74.027	173.03	19.162 8	0.011 75	0.046 374	73.8542
				NEPTUNE					
Nov'26	16	1360.5	1.77001	131.782	48.13	30.079 3	0.005 97	0.009 457	3.7066
Feb'27	4	1440.5	1.77001	131.782	48.13	30.079 1	0.005 97	0.009 457	4.1845
Apr	25	1520.5	1.77001	131.782	48.13	30.078 9	0.005 97	0.009 457	4.6622
Jul	14	1600.5	1.77001	131.782	48.13	30.078 8	0.005 97	0.009 457	5.1398
Oct	2	1680.5	1.77002	131.782	48.13	30.078 6	0.005 97	0.009 457	5.6174
Dec'27	21	1760.5	1.77002	131.782	48.13	30.078 6	0.005 97	0.009 457	6.0949
Mar'28	10	1840.5	1.77002	131.782	48.13	30.078 6	0.005 97	0.009 457	6.5724

Distances are in astronomical units.

CENTRE OF MASS OF THE SOLAR SYSTEM, 2027

HELIOCENTRIC RECTANGULAR CO-ORDINATES
EQUATORIAL RECTANGULAR CO-ORDINATES OF THE BARYCENTRES S_4 (SUN TO MARS) AND S_9 (SUN TO PLUTO) REFERRED TO THE MEAN EQUINOX AND EQUATOR OF J 2000.0

Date		Barycentre S_4 (In units of 10^{-10} a.u)			Centre of Mass of the Solar System Barycentre S_9 (In units of 10^{-9} a.u)		
		x	y	z	X	Y	Z
Jan.	0	+07088928	+45103281	+18651106	+0711023	+4506333	+1863266
	10	06525971	44784749	18526319	0655505	4474993	1851001
	20	05972425	44457799	18397654	0600784	4442925	1838403
	30	05428560	44123100	18265424	0546878	4410166	1825490
Feb.	9	04894670	43781059	18129752	0493806	4376742	1812270
	19	04371570	43432327	17990839	0441612	4342690	1798755
Mar.	1	+03859679	+43078311	+17849304	+0390321	+4308086	+1784978
	11	03358574	42720259	17705797	0339916	4272997	1770974
	21	02867479	42359043	17560770	0290361	4237472	1756767
	31	02385539	41995201	17414550	0241618	4201542	1742376
Apr.	10	01911806	41629051	17267334	0193642	4165229	1727813
	20	01445290	41260633	17119181	0146387	4128540	1713082
	30	+00985027	+40889541	+16969980	+0099809	+4091459	+1698181
May	10	00530554	40514951	16819289	0053887	4053951	1683089
	20	+00082289	40136355	16666801	+0008646	4015995	1667793
	30	-00359584	39753861	16512566	-0035902	3977602	1652298
June	9	00795269	39367419	16356596	0079765	3938775	1636607
	19	01224853	38976757	16198766	0122943	3899505	1620715
	29	-01648279	+38581575	+16038949	-0165431	+3859783	+1604619
July	9	02065355	38181622	15876998	0207217	3819601	1588313
	19	02475865	37776688	15712791	0248287	3778954	1571793
	29	02879524	37366454	15546133	0288624	3737832	1555052
Aug.	8	03275533	36950522	15376732	0328186	3696220	1538078
	18	03662571	36529280	15204607	0366904	3654143	1520873
	28	-04040012	+36103749	+15030231	-0404745	+3611657	+1503464
Sept.	7	04407834	35674821	14854025	0441705	3568812	1485874
	17	04766256	35243207	14676316	0477793	3525650	1468121
	27	05115643	34809479	14497434	0513025	3482204	1450225
Oct.	7	05456561	34374089	14317601	0547427	3438502	1432198
	17	05789767	33937239	14136984	0581035	3394560	1414052
	27	-06116030	+33498677	+13955478	-0613886	+3350371	+1395783
Nov.	6	06435459	33057861	13772806	0645983	3305913	1377380
	16	06747784	32614869	13588981	0677311	3261196	1358846
	26	07053335	32169948	13404188	0707885	3216237	1340192
Dec.	6	07352656	31722959	13218463	0737730	3171035	1321423
	16	07646167	31273506	13031673	0766866	3125576	1302534
	26	-07934111	+30821049	+12843631	-0795304	+3079838	+1283518
	36	-08216536	+30364976	+12654089	-0823044	+3033796	+1264365

The heliocentric equatorial rectangular co-ordinates of the barycentre of the solar system referred to the mean equator and equinox of J 2027.5 are given by $\mathbf{r} = P\mathbf{r_0}$, where $\mathbf{r}$ and $\mathbf{r_0}$ are the column vectors of the co-ordinates X,Y, Z and X_0, Y_0, Z_0 referred to J 2027.5 and J 2000.0 respectively.

PART - II

STARS

LONGITUDE AND LATITUDE OF STARS, 2027.5

MEAN PLACES FOR JULY 2^{d}.875 TERRESTRIAL TIME

Cat. No. FK5	BS= HR No.	Star	Mag.	Longitude			Annual Variation	Annual Proper Motion	Latitude			Annual Variation	Annual Proper Motion
				°	'	"	"	"	°	'	"	"	"
35	280	α Sculptoris	4.31	0	52	45.80	50.62	+0.025	-32	30	46.55	+0.040	-0.007
9	74	ι Ceti	3.56	1	18	02.54	50.36	-0.028	-10	01	17.48	+0.030	-0.028
82	674	φ Eridani	3.56	1	23	27.10	51.19	+0.110	-58	59	09.33	-0.030	-0.082
902	9072	ω Piscium	4.01	2	58	05.13	50.34	+0.095	+6	21	43.67	-0.110	-0.167
22	188	β Ceti	2.04	2	58	15.23	50.72	+0.242	-20	47	00.91	0.000	-0.068
783	7957	η Cephei	3.43	5	04	07.66	51.25	+2.355	+71	46	59.57	+0.450	+0.368
156	1336	α Reticuli	3.35	7	54	32.48	52.76	+0.298	-78	02	23.30	+0.090	-0.015
869	8762	*o* Andromedae	3.62	8	09	37.61	49.88	+0.022	+43	45	03.25	+0.080	-0.017
848	8585	α Lacertae	3.77	8	31	27.22	49.88	+0.200	+53	17	27.06	+0.040	-0.070
7	39	γ Pegasi	2.83	9	32	22.00	50.19	+0.001	+12	36	02.52	+0.100	-0.011
40	334	η Ceti	3.45	12	09	13.84	50.58	+0.151	-16	07	08.31	-0.080	-0.213
803	8162	α Cephei	2.44	13	09	21.66	49.48	+0.339	+68	54	50.56	+0.040	-0.100
836	8465	ζ Cephei	3.35	14	20	27.78	49.52	+0.028	+61	08	53.77	+0.150	-0.008
1	15	α Andromedae*	2.06	14	41	29.32	50.14	+0.056	+25	40	48.23	-0.050	-0.207
47	402	θ Ceti	3.60	16	36	35.96	50.26	-0.163	-15	46	02.72	+0.010	-0.171
723	7310	δ Draconis	3.07	17	31	29.68	47.55	+0.758	+82	53	13.01	+0.090	-0.093
59	509	τ Ceti	3.50	18	11	38.09	49.13	-1.371	-24	48	11.78	+1.650	+1.463
890	8961	λ Andromedae	3.82v	18	40	01.21	49.75	-0.133	+43	46	26.19	-0.250	-0.441
1075	794	ι Eridani	4.11	19	09	40.54	51.01	+0.170	-51	42	49.20	+0.100	-0.095
71	585	ν Ceti	4.00	19	48	54.36	50.68	+0.134	-31	01	59.46	+0.120	-0.076
1033	361	ζ Piscium*	5.24	20	15	45.34	50.41	+0.112	-0	12	45.87	+0.090	-0.106
20	165	δ Andromedae	3.27	22	11	49.11	50.20	+0.092	+24	21	04.50	+0.080	-0.141
62	539	ζ Ceti	3.73	22	20	08.47	50.48	+0.025	-20	20	-00.00	+0.160	-0.051
106	897	θ Eridani p	3.25	23	39	37.82	50.81	-0.051	-53	44	17.62	+0.270	+0.038
101	841	β Fornacis	4.46	26	37	25.00	50.92	+0.212	-45	51	12.24	+0.350	+0.103
1154	2015	δ Doradus	4.35	26	55	33.22	63.12	-0.280	-88	15	06.10	+0.270	+0.030
50	437	η Piscium	3.62	27	12	00.12	50.28	+0.024	+5	22	45.88	+0.240	-0.015
33	269	μ Andromedae	3.87	29	33	32.77	50.25	+0.173	+29	39	37.72	+0.220	-0.038
42	337	β Andromedae	2.06	30	47	20.31	50.23	+0.126	+25	56	38.67	+0.100	-0.178
863	8694	ι Cephei	3.52	33	37	01.57	49.29	-0.304	+62	37	05.29	+0.270	-0.017
66	553	β Arietis*	2.64	34	21	14.87	50.30	+0.051	+8	29	18.45	+0.160	-0.138
1085	919	τ' Eridani	4.09	34	55	10.43	50.39	-0.198	-38	54	13.41	+0.310	0.001
17	153	ζ Cassiopeiae	3.66	35	26	48.64	49.96	+0.016	+44	43	19.10	+0.280	-0.018
2	21	β Cassiopeiae	2.27	35	30	03.55	50.32	+0.462	+51	12	49.21	-0.170	-0.471
809	8238	β Cephei	3.23	35	55	21.84	49.29	+0.028	+71	09	18.20	+0.300	-0.008
64	544	α Trianguli	3.41	37	14	37.23	50.12	-0.078	+16	48	04.39	+0.100	-0.223
91	779	δ Ceti	4.07	37	57	22.70	50.40	+0.013	-14	27	33.64	+0.310	-0.008
74	617	α Arietis	2.00	38	02	49.87	50.37	+0.130	+9	57	57.56	+0.110	-0.204
21	168	α Cassiopeiae	2.23	38	09	55.45	49.97	+0.036	+46	37	27.10	+0.260	-0.056
171	1465	α Doradus	3.27	38	13	27.28	51.70	+0.155	-74	34	46.56	+0.290	-0.031
104	874	η Eridani	3.89	39	08	07.41	50.46	+0.008	-24	32	45.71	+0.090	-0.233

* **No. 1 : *Alpheratz,* Uttara Bhadrapada - 2** **No. 66 : *Sheratan,* Asvini**
No. 1033 : Revati

Annual rate of Precession in longitude for the middle of the year = 50".29

LONGITUDE AND LATITUDE OF STARS, 2027.5

MEAN PLACES FOR JULY 2^{d}.875 TERRESTRIAL TIME

Cat. No. FK5	BS= HR No.	Star	Mag.	Longitude			Annual Variation	Annual Proper Motion	Latitude			Annual Variation	Annual Proper Motion
				°	'	"	"	"	°	'	"	"	"
75	622	β Trianguli	3.00	42	44	12.72	50.31	+0.134	+20	34	57.50	+0.250	-0.091
79	664	γ Trianguli	4.01	43	54	06.14	50.22	+0.028	+18	57	01.74	+0.290	-0.064
32	264	γ Cassiopeiae	var.	44	18	46.12	49.97	+0.027	+48	49	02.86	+0.330	-0.019
73	603	γ Andromed. p	2.26	44	36	30.88	50.16	+0.024	+27	48	30.42	+0.290	-0.065
107	911	α Ceti	2.53	44	42	16.56	50.33	-0.032	-12	35	00.32	+0.280	-0.072
155	1326	α Horologii	3.86	46	12	42.53	50.77	-0.072	-61	43	46.87	+0.150	-0.211
48	403	δ Cassiopeiae	2.68	48	18	51.77	50.32	+0.323	+46	24	17.23	+0.180	-0.202
127	1084	ε Eridani	3.73	48	32	42.18	49.39	-1.054	-27	42	38.58	+0.660	+0.280
100	838	41 Arietis*	3.63	48	35	15.12	50.27	+0.029	+10	27	05.67	+0.240	-0.132
135	1136	δ Eridani	3.54	51	14	53.65	50.56	+0.113	-28	40	03.77	+1.140	+0.744
121	1030	*o* Tauri	3.60	51	32	50.97	50.25	-0.084	-9	19	54.17	+0.330	-0.059
123	1038	ξ Tauri	3.74	52	17	48.79	50.39	+0.049	-8	47	45.61	+0.350	-0.052
212	1922	β Doradus	3.48v	52	31	45.74	53.29	+0.072	-85	02	28.15	+0.400	+0.007
149	1231	γ Eridani	2.95	54	15	11.47	50.49	+0.039	-33	11	59.98	+0.280	-0.123
63	542	ε Cassiopeiae	3.38	55	08	45.67	50.06	+0.024	+47	33	03.85	+0.370	-0.034
109	921	ρ Persei	var.	55	17	42.34	50.31	+0.099	+20	34	36.07	+0.260	-0.139
1129	1502	α Caeli	4.45	56	31	58.53	50.40	-0.346	-62	59	07.02	+0.380	-0.032
111	936	β Persei	var.	56	33	03.93	50.21	+0.003	+22	25	54.13	+0.410	-0.002
103	854	τ Persei	3.95	58	17	41.52	50.15	-0.003	+34	22	28.03	+0.410	-0.005
99	834	η Persei	3.76	59	05	05.64	50.15	+0.013	+37	29	05.85	+0.410	-0.019
136	1142	17 Tauri	3.70	59	47	45.74	50.29	+0.009	+4	11	33.80	+0.380	-0.049
170	1464	ν^{1} Eridani	3.82	60	16	14.93	50.47	-0.076	-51	48	50.26	+0.420	-0.002
151	1251	ν Tauri	3.91	60	18	13.53	50.35	+0.005	-14	26	54.45	+0.420	-0.004
139	1165	η Tauri*	2.87	60	22	35.47	50.29	+0.008	+4	03	13.75	+0.380	-0.049
108	915	γ Persei	2.93	60	24	16.58	50.16	-0.002	+34	32	00.48	+0.430	-0.004
893	8974	γ Cephei	3.21	60	28	34.64	50.15	+0.268	+64	40	26.69	+0.550	+0.119
150	1239	λ Tauri	3.47v	61	01	07.86	50.31	-0.009	-7	57	23.78	+0.420	-0.011
120	1017	α Persei	1.79	62	27	52.02	50.21	+0.018	+30	07	42.92	+0.400	-0.030
144	1203	ζ Persei	2.85	63	30	28.07	50.27	+0.004	+11	20	12.28	+0.430	-0.011
134	1135	ν Persei	3.77	64	12	24.13	50.22	-0.015	+22	09	25.04	+0.440	+0.002
131	1122	δ Persei	3.01	65	11	08.79	50.24	+0.021	+27	18	17.48	+0.410	-0.040
148	1228	ξ Persei	4.04	65	21	22.75	50.26	+0.002	+14	56	49.90	+0.450	+0.000
147	1220	ε Persei	2.89	66	03	41.96	50.26	+0.013	+19	07	03.83	+0.420	-0.029
159	1346	γ Tauri	3.65	66	11	27.27	50.42	+0.110	-5	43	45.19	+0.400	-0.044
162	1373	δ Tauri	3.76	67	15	20.68	50.41	+0.101	-3	57	59.24	+0.400	-0.046
164	1409	ε Tauri	3.54	68	51	00.10	50.41	+0.100	-2	33	50.90	+0.400	-0.054
168	1457	α Tauri*	0.85	70	10	25.42	50.35	+0.036	-5	27	55.36	+0.250	-0.197
1134	1543	π^{5} Orionis	3.19	72	18	46.12	50.81	+0.481	-15	22	51.74	+0.410	-0.045
186	1654	ε Leporis	3.19	72	26	26.65	50.42	+0.021	-44	57	42.12	+0.380	-0.076
179	1552	π^{3} Orionis	3.69	72	29	06.81	50.32	-0.001	-16	46	06.23	+0.460	+0.001
180	1567	π^{4} Orionis	3.72	72	52	30.84	50.33	+0.000	-20	00	05.68	+0.460	+0.000

* **No. 100 : Bharani** **No. 168 : *Aldebaran*, Rohini**

No. 139 : *Alcyone*, Krittika.

Annual rate of Precession in longitude for the middle of the year = 50".29

LONGITUDE AND LATITUDE OF STARS, 2027.5

MEAN PLACES FOR JULY 2^d.875 TERRESTRIAL TIME

Cat. No. FK5	BS= HR No.	Star	Mag.	Longitude			Annual Variation	Annual Proper Motion	Latitude			Annual Variation	Annual Proper Motion
				°	'	"	"	"	°	'	"	"	"
188	1666	β Eridani	2.79	75	39	34.05	50.22	-0.115	-27	51	31.55	+0.390	-0.071
1144	1702	μ Leporis	3.31v	75	46	45.44	50.41	+0.051	-39	02	48.33	+0.430	-0.030
695	6927	χ Draconis	3.57	76	16	04.36	44.15	+3.506	+83	34	21.63	+0.620	-0.500
181	1577	ι Aurigae	2.69	77	01	24.80	50.29	+0.001	+10	27	28.49	+0.450	-0.018
194	1713	β Orionis	0.12	77	12	50.62	50.33	+0.000	-31	07	09.23	+0.460	-0.001
195	1735	τ Orionis	3.60	78	13	53.38	50.31	-0.018	-29	50	02.94	+0.460	-0.007
1137	1612	ζ Aurigae	3.75	79	01	03.01	50.29	+0.007	+18	12	20.51	+0.450	-0.023
183	1605	ε Aurigae	var.	79	13	31.61	50.27	-0.001	+20	56	52.50	+0.460	-0.004
185	1641	η Aurigae	3.17	79	49	49.54	50.31	+0.024	+18	17	12.77	+0.400	-0.070
204	1829	β Leporis	2.84	80	03	24.37	50.32	-0.015	-43	54	41.94	+0.380	-0.088
201	1790	γ Orionis	1.64	81	19	50.24	50.30	-0.010	-16	48	45.36	+0.460	-0.013
178	1542	α Camelopardi	4.29	81	21	48.86	50.27	+0.001	+43	25	21.14	+0.470	+0.006
182	1603	β Camelopardi	4.03	81	39	06.28	50.26	-0.010	+37	26	04.20	+0.450	-0.015
207	1865	α Leporis	2.58	81	45	53.62	50.32	+0.001	-41	03	15.14	+0.470	+0.002
193	1708	α Aurigae	0.08	82	14	32.49	50.33	+0.046	+22	51	52.64	+0.040	-0.429
215	1956	α Columbae	2.64	82	33	13.63	50.34	+0.009	-57	22	18.65	+0.440	-0.027
206	1852	δ Orionis	2.23	82	46	50.63	50.31	+0.002	-22	57	07.37	+0.470	-0.002
202	1791	β Tauri	1.65	82	57	33.10	50.30	+0.013	+5	23	14.35	+0.290	-0.176
209	1899	ι Orionis	2.77	83	22	54.28	50.30	+0.000	-29	11	47.05	+0.470	+0.001
210	1903	ε Orionis	1.70	83	50	52.30	50.30	+0.001	-24	30	10.19	+0.470	-0.002
(GC)	1879	λ Orionis*	3.56	84	05	27.69	50.30	-0.001	-13	21	57.12	+0.470	-0.002
211	1910	ζ Tauri	3.00	85	10	07.69	50.30	+0.000	-2	11	31.95	+0.450	-0.021
217	1983	γ Leporis	3.60	85	13	36.66	49.86	-0.439	-45	49	02.55	+0.110	-0.359
219	1998	ζ Leporis	3.55	86	22	13.13	50.27	-0.020	-38	12	44.07	+0.470	+0.000
220	2004	κ Orionis	2.06	86	46	57.94	50.30	+0.002	-33	04	01.57	+0.470	-0.002
223	2040	β Columbae	3.12	86	48	16.43	50.41	+0.136	-59	10	22.58	+0.870	+0.400
222	2035	δ Leporis	3.81	87	33	12.72	50.58	+0.301	-44	17	54.55	-0.180	-0.653
907	424	α Ursae Mins.	2.02	88	57	09.17	50.40	+0.038	+66	06	17.10	+0.430	-0.034
224	2061	α Orionis*	var.	89	08	20.15	50.31	+0.027	-16	01	24.14	+0.480	+0.009
226	2085	η Leporis	3.71	89	17	00.96	50.22	-0.052	-37	35	56.19	+0.600	0.140
229	2120	η Columbae	3.96	89	59	43.24	50.26	+0.055	-66	15	02.71	+0.460	-0.014
227	2088	β Aurigae	1.90	90	17	39.14	50.25	-0.062	+21	30	42.39	+0.460	+0.000
225	2077	δ Aurigae	3.72	90	18	17.04	50.41	+0.095	+30	50	53.09	+0.340	-0.125
1168	2219	κ Aurigae	4.35	93	44	54.23	50.24	-0.066	+6	06	18.68	+0.200	-0.264
241	2286	μ Geminorum	2.88	95	41	11.39	50.35	+0.059	-0	49	02.80	+0.360	-0.109
244	2298	8ε Monocerotis	4.44	96	38	19.29	50.24	-0.019	-18	42	50.09	+0.470	+0.010
1173	2343	ν Geminorum	4.15	97	11	11.47	50.28	-0.007	-3	03	10.66	+0.440	-0.014
243	2294	β Canis Maj.	1.98	97	34	16.72	50.20	-0.008	-41	15	00.78	+0.460	+0.000
240	2282	ζ Canis Maj.	3.02	97	45	39.06	50.18	+0.015	-53	22	09.04	+0.460	+0.003
251	2421	γ Geminorum	1.93	99	29	20.79	50.33	+0.045	-6	44	21.58	+0.420	-0.039
254	2473	ε Geminorum	2.98	100	19	22.70	50.30	-0.005	+2	04	23.89	+0.440	-0.014

* **No. GC : *Margasiras*.** **No. 224 : *Betelgeuse*, Mag. 0.4 to 1.3 Ardra.**

Annual rate of Precession in longitude for the middle of the year = 50".29

LONGITUDE AND LATITUDE OF STARS, 2027.5

MEAN PLACES FOR JULY 2^{d}.875 TERRESTRIAL TIME

Cat. No. FK5	BS= HR No.	Star	Mag.	Longitude			Annual Variation	Annual Proper Motion	Latitude			Annual Variation	Annual Proper Motion
				°	'	"	"	"	°	'	"	"	"
261	2540	θ Geminorum	3.60	101	30	28.12	50.33	+0.003	+11	01	59.63	+0.400	-0.048
256	2484	ξ Geminorum	3.36	101	35	32.74	50.17	-0.101	-10	06	08.35	+0.250	-0.200
257	2491	α Canis Maj cg	-1.46	104	27	37.40	49.62	-0.551	-39	36	41.20	-0.810	-1.256
245	2326	α Carinae	-0.72	105	20	25.81	49.73	+0.075	-75	49	13.24	+0.470	+0.024
269	2650	ζ Geminorum	3.79v	105	22	27.40	50.29	-0.009	-2	02	07.76	+0.440	-0.002
252	2451	ν Puppis	3.17	107	31	44.83	49.90	+0.008	-66	04	15.37	+0.430	-0.006
279	2777	δ Geminorum	3.53	108	54	11.74	50.27	-0.024	-0	10	30.86	+0.410	-0.016
1180	2538	κ Canis Maj.	3.96	108	56	53.59	50.02	-0.013	-55	08	39.25	+0.430	+0.003
277	2763	λ Geminorum	3.58	109	09	45.13	50.24	-0.042	-5	37	56.16	+0.380	-0.043
282	2821	ι Geminorum	3.79	109	20	26.78	50.21	-0.109	+5	45	38.81	+0.330	-0.103
1187	2714	22 δ Monocerotis	4.15	109	46	41.36	50.22	-0.002	-21	44	30.10	+0.430	+0.005
287	2891	α Gemino. *Cg**	1.95	110	37	26.00	50.18	-0.155	+10	05	53.95	+0.300	-0.126
268	2618	ε Canis Maj.	1.50	111	08	42.48	50.04	+0.006	-51	21	25.00	+0.430	+0.003
270	2653	*o* ˆ Canis Maj.	3.02	111	23	06.82	50.07	-0.007	-46	07	37.74	+0.420	+0.002
1183	2646	σ Canis Maj.	3.47	111	56	17.75	50.04	-0.009	-50	13	21.39	+0.430	+0.004
285	2845	β Canis Min.	2.90	112	34	30.48	50.20	-0.047	-13	29	03.77	+0.370	-0.046
317	3323	*o* Ursae Maj.	3.36	113	22	49.86	50.37	-0.121	+40	14	43.75	+0.270	-0.145
295	2990	β Geminorum	1.14	113	35	43.20	49.71	-0.614	+6	41	10.12	+0.260	-0.158
273	2693	δ Canis Maj.	1.86	113	46	41.54	50.04	-0.006	-48	27	00.07	+0.420	+0.004
294	2985	κ Geminorum	3.57	114	02	59.45	50.29	-0.024	+3	04	52.45	+0.350	-0.057
291	2943	α C. Min. *cg*	0.38	116	09	54.06	49.69	-0.540	-16	01	30.52	-0.730	-1.132
263	2553	τ Puppis	2.93	118	06	21.18	49.65	+0.188	-72	51	02.51	+0.340	-0.056
293	2970	26 α Monocerotis	3.93	119	39	48.08	50.06	-0.078	-30	27	03.04	+0.360	-0.033
283	2827	η Canis Maj.	2.45	119	55	05.16	49.96	-0.008	-50	36	20.80	+0.390	+0.004
278	2773	π Puppis	2.70	120	40	52.78	49.83	-0.019	-58	31	19.30	+0.390	+0.002
335	3569	ι Ursae Maj.	3.14	123	10	56.01	50.07	-0.399	+29	34	30.88	+0.010	-0.359
341	3594	κ Ursae Maj.	3.60	124	19	19.37	50.45	-0.015	+28	58	54.61	+0.300	-0.062
312	3249	β Cancri	3.52	124	38	27.17	50.21	-0.032	-10	17	06.94	+0.310	-0.058
321	3366	η Cancri	5.33	125	47	30.09	50.27	-0.035	+1	34	25.20	+0.300	-0.054
1204	3045	ξ Puppis	3.34	126	25	24.52	49.98	-0.003	-44	56	12.44	+0.350	-0.003
368	3888	*ν* Ursae Maj.	3.80	126	39	07.72	50.32	-0.261	+42	39	10.78	+0.090	-0.269
328	3475	ι Cancri	4.02	126	43	50.28	50.34	-0.013	+10	25	43.81	+0.300	-0.047
358	3775	θ Ursae Maj.	3.17	127	38	37.23	49.70	-0.820	+34	53	31.51	-0.510	-0.863
1228	3449	γ Cancri	4.66	127	55	19.40	50.22	-0.092	+3	11	33.41	+0.280	-0.066
1194	2878	ρ Puppis	3.25	129	04	04.28	49.37	-0.262	-63	46	14.71	+0.490	+0.157
326	3461	δ Cancri*	3.94	129	06	23.41	50.34	+0.043	+0	04	40.88	+0.110	-0.225
1223	3410	δ Hydrae	4.16	130	41	15.05	50.16	-0.064	-12	23	24.84	+0.300	-0.024
433	4434	λ Draconis	3.84	130	43	18.29	50.79	-0.026	+57	14	36.30	+0.290	-0.040
1224	3418	σ Hydrae	4.44	131	35	35.59	50.20	-0.013	-14	35	58.40	+0.300	-0.022
308	3185	ρ Puppis	2.81	131	46	10.61	49.85	-0.128	-43	16	02.75	+0.350	+0.023
352	3705	α Lyncis	3.13	132	13	32.87	50.18	-0.227	+17	57	57.81	+0.270	-0.054

* **No. 287 :** ***Castor,*** **Punarvasu-2, Mag. 1.95 & 2.95.** **No. 326 : Pusya.**

Annual rate of Precession in longitude for the middle of the year = 50".29

LONGITUDE AND LATITUDE OF STARS, 2027.5

MEAN PLACES FOR JULY 2^{d}.875 TERRESTRIAL TIME

Cat. No. FK5	BS= HR No.	Star	Mag.	Longitude			Annual Variation	Annual Proper Motion	Latitude			Annual Variation	Annual Proper Motion
				°	'	"	"	"	°	'	"	"	"
1239	3627	ξ Cancri	5.14	133	35	42.63	50.33	+0.000	+5	25	34.79	+0.310	+0.005
550	5563	β Ursae Min.	2.08	133	42	44.00	51.41	-0.044	+72	59	23.16	+0.280	-0.031
337	3572	α Cancri	4.25	134	01	33.28	50.31	+0.041	-5	04	41.53	+0.290	-0.020
334	3547	ζ Hydrae	3.11	134	57	30.88	50.13	-0.101	-10	58	02.60	+0.290	-0.014
417	4301	α Ursae Maj.	1.79	135	35	03.49	50.64	-0.087	+49	40	53.51	+0.170	-0.125
329	3482	ε Hydrae m*	3.38	136	28	11.30	49.91	-0.228	-23	26	06.16	+0.180	-0.106
472	4787	κ Draconis	3.87v	136	38	42.96	50.89	-0.090	+61	45	50.93	+0.250	-0.042
306	3165	ζ Puppis	2.25	138	55	47.63	49.62	-0.057	-58	20	44.47	+0.280	+0.000
416	4295	β Ursae Maj.	2.37	139	49	20.57	50.76	+0.071	+45	08	08.25	+0.350	+0.074
383	4033	λ Ursae Maj.	3.45	139	56	04.36	50.37	-0.155	+29	53	11.84	+0.170	-0.103
347	3665	θ Hydrae	3.88	140	40	25.33	50.44	+0.224	-13	03	07.56	+0.010	-0.255
367	3873	ε Leonis	2.98	141	05	21.34	50.32	-0.040	+9	43	01.83	+0.230	-0.026
386	4069	μ Ursae Maj.	3.05	141	37	12.03	50.41	-0.101	+29	00	00.19	+0.260	-0.003
371	3905	μ Leonis	3.88	141	48	48.44	50.20	-0.188	+12	20	59.45	+0.130	-0.128
569	5735	γ Ursae Min.	3.05	141	59	35.37	51.72	-0.080	+75	14	34.62	+0.240	-0.019
262	2550	α Pictoris	3.27	144	27	33.65	45.05	-1.938	-83	02	12.73	+0.390	+0.147
365	3852	*o* Leonis	3.52	144	37	48.47	50.15	-0.122	-3	45	21.58	+0.150	-0.081
327	3468	α Pyxidis	3.68	146	52	51.20	49.80	-0.022	-48	55	16.11	+0.230	+0.006
354	3748	α Hydrae	1.98	147	39	42.93	50.10	-0.026	-22	22	50.05	+0.240	+0.026
309	3207	γ² Velorum	1.78	147	43	37.64	49.40	-0.015	-64	27	45.03	+0.220	+0.004
384	4031	ζ Leonis	3.44	147	57	01.70	50.41	+0.020	+11	52	00.11	+0.210	+0.000
1250	3845	ι Hydrae	3.91	148	01	32.72	50.26	+0.070	-14	16	33.47	+0.170	-0.044
379	3975	η Leonis	3.52	148	17	22.44	50.33	-0.001	+4	52	02.35	+0.210	-0.001
420	4335	ψ Ursae Maj.	3.01	149	11	56.86	50.54	-0.054	+35	32	20.01	+0.150	-0.055
380	3982	α Leonis*	1.35	150	12	41.68	50.06	-0.235	+0	27	56.63	+0.120	-0.082
447	4554	γ Ursae Maj.	2.44	150	51	55.67	50.87	+0.104	+47	08	36.57	+0.260	+0.065
303	3117	χ Carinae	3.47	151	06	11.73	48.99	-0.105	-70	19	30.66	+0.190	+0.001
456	4660	δ Ursae Maj.	3.31	151	27	14.70	50.96	+0.119	+51	39	31.39	+0.260	+0.074
364	3849	κ Hydrae	5.06	153	03	33.09	50.06	-0.020	-26	35	54.16	+0.150	-0.028
1243	3718	θ Pyxidis	4.72	153	26	26.39	49.93	-0.008	-39	01	59.50	+0.170	-0.012
441	4518	χ Ursae Maj.	3.71	154	02	45.36	50.51	-0.177	+41	32	41.41	+0.120	-0.048
396	4133	ρ Leonis	3.85	156	46	23.11	50.29	-0.005	+0	09	02.95	+0.150	-0.005
425	4377	ν Ursae Maj.	3.48	157	02	21.17	50.48	-0.040	+26	09	49.23	+0.160	+0.014
521	5291	α Draconis	3.65	157	50	50.57	51.21	-0.111	+66	21	46.36	+0.100	-0.037
1261	3970	ν² Hydrae	4.60	158	42	26.21	50.06	-0.045	-23	10	36.61	+0.130	+0.003
483	4905	ε Ursae Maj.	1.77	159	19	24.94	51.07	+0.150	+54	19	13.20	+0.200	+0.070
381	3994	λ Hydrae	3.61	159	44	54.67	49.94	-0.165	-22	00	51.22	-0.040	-0.159
1270	4116	δ Sextantis	5.21	160	29	23.39	50.16	-0.040	-11	20	42.21	+0.090	-0.031
345	3634	λ Velorum	2.21	161	33	59.23	49.58	-0.040	-55	52	11.85	+0.110	+0.001
422	4357	δ Leonis*	2.56	161	42	11.14	50.60	+0.188	+14	20	02.12	+0.050	-0.062
423	4359	θ Leonis	3.34	163	48	27.43	50.35	-0.025	+9	40	27.32	0.000	-0.096

* **No. 329 : Aslesa.** **No. 422 : *Zosma* , Purva Phalguni-1.**

No. 380 : *Regulus* , Magha.

Annual rate of Precession in longitude for the middle of the year = 50".29

LONGITUDE AND LATITUDE OF STARS, 2027.5

MEAN PLACES FOR JULY 2^d.875 TERRESTRIAL TIME

Cat. No. FK5	BS= HR No.	Star	Mag.	Longitude			Annual Variation	Annual Proper Motion	Latitude			Annual Variation	Annual Proper Motion
				°	'	"	"	"	°	'	"	"	"
1227	3447	*o* Velorum	3.62	165	06	35.16	49.17	-0.073	-66	16	32.78	+0.080	+0.001
389	4094	μ Hydrae	3.81	165	25	06.06	49.99	-0.093	-24	40	18.64	-0.050	-0.125
497	5054	ζ Ursae Maj. pr	2.27	166	05	27.82	51.18	+0.188	+56	22	48.07	+0.140	+0.067
1304	4527	93 Leonis*	4.53v	169	21	30.75	50.30	-0.140	+17	18	33.14	-0.020	-0.065
410	4232	ν Hydrae	3.11	170	44	55.86	50.11	+0.004	-21	47	45.94	+0.260	+0.221
444	4534	β Leonis	2.14	171	59	57.59	49.98	-0.417	+12	15	53.01	-0.280	-0.306
392	4104	α Antliae	4.25	172	49	17.66	49.85	-0.089	-37	25	39.29	0.000	-0.025
315	3307	ε Carinae	1.86	173	30	04.93	48.70	-0.093	-72	40	47.82	+0.000	-0.012
1283	4287	α Crateris	4.08	174	04	05.63	49.59	-0.512	-22	43	00.60	-0.070	-0.074
485	4915	α CVn sq	2.90	174	57	05.86	50.39	-0.302	+40	07	13.92	-0.070	-0.069
426	4382	δ Crateris	3.56	177	04	06.46	49.94	-0.206	-17	34	17.59	+0.130	+0.139
509	5191	η Ursae Maj.	1.86	177	19	16.09	50.80	-0.156	+54	23	14.10	-0.100	-0.083
445	4540	β Virginis	3.61	177	33	16.01	51.09	+0.789	+0	41	39.96	+0.020	+0.047
353	3734	κ Velorum	2.50	179	16	07.88	49.32	-0.027	-63	43	19.12	-0.030	+0.000
531	5404	θ Bootis	4.05	183	00	06.77	51.26	+0.147	+60	06	17.51	-0.520	-0.457
639	6396	ζ Draconis	3.17	183	48	04.67	55.08	-0.289	+84	45	39.24	-0.090	-0.013
361	3803	N Velorum	3.13	184	35	24.63	49.28	-0.056	-64	14	21.15	-0.100	-0.020
460	4689	η Virginis	3.89	184	41	13.05	50.27	-0.051	+2	35	19.16	-0.120	-0.042
492	4983	β Com	4.26	184	44	30.79	49.28	-1.319	+32	30	53.15	+0.350	+0.429
571	5744	ι Draconis	3.29	185	20	37.55	51.59	-0.059	+71	05	34.52	-0.080	+0.004
351	3699	ι Carinae	2.25	185	42	06.60	49.15	-0.048	-67	07	01.65	-0.100	-0.011
1326	4828	ρ Virginis	4.88	185	53	57.27	50.53	+0.116	+13	32	30.88	-0.140	-0.049
375	3940	φVelorum	3.54	186	19	28.60	49.49	-0.019	-59	57	04.40	-0.100	-0.005
434	4450	ξ Hydrae	3.54	188	22	07.20	49.82	-0.193	-31	36	01.34	-0.240	-0.131
488	4932	ε Virginis	2.83	190	19	24.31	50.16	-0.269	+16	12	11.98	-0.210	-0.090
457	4662	γ Corvi	2.59	191	06	27.64	50.02	-0.161	-14	30	08.08	-0.170	-0.045
484	4910	δ Virginis	3.38	191	50	32.86	49.95	-0.415	+8	36	38.16	-0.370	-0.232
453	4630	ε Corvi	3.00	192	02	51.98	50.06	-0.074	-19	40	28.98	-0.150	-0.018
475	4813	χ Virginis	4.66	192	32	15.49	50.21	-0.060	-3	28	10.68	-0.200	-0.052
465	4757	δ Corvi*	2.95	193	50	02.84	50.07	-0.140	-12	11	56.62	-0.360	-0.211
319	3347	β Volantis	3.77	195	32	50.68	49.13	+0.547	-75	35	13.55	-0.250	-0.082
471	4786	β Corvi	2.65	197	45	04.46	50.18	+0.026	-18	02	46.89	-0.230	-0.048
535	5435	γ Bootis	3.03	198	02	58.07	50.54	-0.268	+49	33	02.83	-0.100	+0.080
513	5235	η Bootis	2.68	199	43	23.70	50.62	+0.095	+28	04	22.42	-0.550	-0.354
281	2803	δ Volantis	3.98	199	46	59.96	47.02	-0.039	-82	28	43.35	-0.200	-0.006
501	5107	ζ Virginis	3.37	202	04	16.31	50.08	-0.284	+9	44	31.45	-0.270	-0.066
534	5429	ρ Bootis	3.58	203	10	17.70	50.49	-0.191	+42	27	02.09	-0.150	+0.066
498	5056	α Virginis*	0.98	204	13	30.90	50.26	-0.028	-2	03	23.51	-0.270	-0.041
526	5340	α Bootis*	-0.04	204	37	03.15	50.26	-0.286	+30	43	01.85	-2.490	-2.265
555	5602	β Bootis	3.50	204	38	19.69	50.83	-0.039	+54	08	56.04	-0.280	-0.044
495	5020	γ Hydrae	3.00	207	24	08.46	50.28	+0.079	-13	44	40.98	-0.260	-0.017

* **No. 1304 : Uttara Phalguni-2.** **No. 498 : *Spica* , Citra.**

No. 465 : *Algorel* , Hasta. **No. 526 : *Arcturus* , Svati.**

Annual rate of Precession in longitude for the middle of the year = 50".29

LONGITUDE AND LATITUDE OF STARS, 2027.5

MEAN PLACES FOR JULY 2^d.875 TERRESTRIAL TIME

Cat. No. FK5	BS= HR No.	Star	Mag.	Longitude			Annual Variation	Annual Proper Motion	Latitude			Annual Variation	Annual Proper Motion
				°	'	"	"	"	°	'	"	"	"
452	4621	δ Centauri	2.60	207	51	48.17	49.88	-0.033	-44	30	42.53	-0.280	-0.026
406	4199	θ Carinae	2.76	209	34	03.26	49.52	-0.046	-62	08	28.33	-0.280	-0.012
348	3685	β Carinae	1.68	212	20	25.85	48.66	-0.462	-72	14	21.19	-0.410	-0.133
496	5028	ι Centauri	2.75	213	30	33.63	49.81	-0.305	-26	01	12.52	-0.510	-0.219
563	5681	δ Bootis	3.47	213	32	47.03	50.91	+0.189	+48	57	46.07	-0.360	-0.069
525	5338	ι Virginis	4.08	214	10	58.78	50.48	+0.140	+7	11	38.96	-0.700	-0.409
523	5315	κ Virginis	4.19	214	52	40.05	50.28	-0.039	+2	54	42.13	-0.160	+0.135
436	4467	λ Centauri	3.13	214	55	25.22	49.70	-0.045	-56	47	30.60	-0.330	-0.033
455	4656	δ Crucis	2.80	216	02	42.97	49.83	-0.042	-50	25	19.69	-0.340	-0.032
468	4763	γ Crucis	1.63v	217	07	21.86	50.17	+0.257	-47	50	06.53	-0.510	-0.199
1371	5359	λ Virginis	4.52	217	20	10.33	50.28	-0.024	+0	29	18.32	-0.290	+0.023
385	4037	ω Carinae	3.32	217	49	01.36	49.41	-0.054	-67	23	06.32	-0.350	-0.033
519	5287	π Hydrae	3.27	219	00	29.55	50.31	+0.092	-13	03	10.47	-0.440	-0.115
572	5747	β Cr. Borealis	3.68	219	30	05.29	50.36	-0.286	+46	03	06.15	-0.310	+0.018
1189	2736	γ² Volantis	3.78	220	13	02.91	46.90	-0.682	-82	37	10.55	-0.360	+0.065
545	5487	μ Virginis	3.88	220	31	02.57	50.56	+0.203	+9	40	02.85	-0.600	-0.268
442	4520	λ Muscae	3.64	221	22	13.84	49.58	-0.181	-58	30	35.84	-0.390	-0.053
508	5193	μ Centauri	3.04v	221	55	08.15	50.10	-0.015	-28	58	55.50	-0.370	-0.027
481	4853	β Crucis	1.25	222	01	37.09	49.89	-0.046	-48	38	30.18	-0.390	-0.039
462	4730	α Crucis A	1.33	222	15	01.87	49.84	-0.031	-52	52	54.28	-0.380	-0.032
578	5793	α Cr.Borealis	2.23	222	41	02.12	50.80	+0.201	+44	19	14.05	-0.390	-0.044
520	5288	θ Centauri	2.06	222	41	21.64	49.85	-0.317	-22	05	15.86	-1.020	-0.672
608	6092	τ Herculis	3.89	224	46	24.00	50.91	-0.065	+65	49	38.71	-0.330	+0.032
512	5231	ζ Centauri	2.55	225	19	58.79	50.06	-0.040	-32	56	47.70	-0.430	-0.062
548	5531	α² Librae*	2.75	225	27	58.48	50.21	-0.082	+0	19	46.46	-0.460	-0.095
504	5132	ε Centauri	2.30	225	56	12.84	50.03	-0.023	-39	35	20.41	-0.390	-0.028
297	3024	ζ Volantis	3.95	226	07	52.24	48.56	-0.031	-79	23	24.46	-0.350	+0.034
391	4102	I Carinae	4.00	228	27	48.62	49.66	+0.052	-67	53	10.18	-0.410	-0.027
564	5685	β Librae	2.61	229	45	19.95	50.25	-0.089	+8	29	33.60	-0.430	-0.043
583	5867	β Serpentis	3.67	230	20	05.27	50.57	+0.093	+34	19	24.70	-0.410	-0.026
537	5440	η Centauri	2.31	230	37	55.03	50.14	-0.023	-25	30	58.83	-0.430	-0.044
474	4798	α Muscae	2.69	230	45	17.21	49.85	-0.044	-56	33	37.13	-0.430	-0.043
556	5603	σ Librae	3.29	231	04	14.61	50.20	-0.059	-7	38	52.54	-0.450	-0.062
559	5652	ι Librae	4.54	231	23	19.13	50.27	-0.024	-1	51	10.45	-0.440	-0.047
582	5854	α Serpentis	2.65	232	27	40.85	50.55	+0.134	+25	30	20.20	-0.310	+0.079
591	5933	γ Serpentis	3.85	233	10	21.56	51.23	+0.758	+35	11	01.68	-1.560	-1.164
541	5469	α Lupi	2.30	233	53	12.49	50.15	-0.016	-30	01	44.80	-0.420	-0.024
518	5267	β Centauri	0.61	234	10	27.91	50.03	-0.026	-44	08	27.44	-0.440	-0.032
469	4773	γ Muscae	3.87	234	23	55.60	49.83	-0.069	-58	52	26.67	-0.450	-0.045
588	5892	ε Serpentis	3.71	234	43	00.98	50.52	+0.121	+24	00	15.54	-0.320	+0.091
553	5576	κ Centauri	3.13	235	10	41.01	50.18	-0.011	-24	02	05.20	-0.440	-0.029

* **No. 548 : *Zuben el Genubi,* Visakha.**

Annual rate of Precession in longitude for the middle of the year = 50".29

LONGITUDE AND LATITUDE OF STARS, 2027.5
MEAN PLACES FOR JULY 2d.875 TERRESTRIAL TIME

Cat. No. FK5	BS= HR No.	Star	Mag.	Longitude			Annual Variation	Annual Proper Motion	Latitude			Annual Variation	Annual Proper Motion
				°	'	"	"	"	°	'	"	"	"
552	5571	β Lupi	2.68	235	24	31.45	50.16	-0.023	-25	02	58.77	-0.460	-0.048
577	5787	γ Librae	3.91	235	31	22.19	50.38	+0.061	+4	22	58.66	-0.390	+0.024
585	5881	μ Serpentis	3.54	236	19	23.53	50.28	-0.082	+16	14	05.00	-0.460	-0.042
487	4923	δ Muscae	3.62	236	34	27.39	50.32	+0.359	-56	46	38.96	-0.250	+0.163
566	5705	φ' Lupi	3.56	237	52	38.45	50.17	-0.067	-17	10	56.25	-0.530	-0.105
1413	5838	κ Librae	4.74	238	08	29.21	50.29	-0.013	-0	01	24.09	-0.530	-0.109
579	5794	ν Librae	3.58	238	59	35.92	50.25	-0.010	-8	30	38.44	-0.430	+0.001
1402	5695	δ Lupi	3.22	239	02	25.40	50.21	-0.008	-21	25	45.87	-0.450	-0.029
626	6220	η Herculis	3.53	239	10	32.02	50.77	+0.116	+60	17	09.93	-0.490	-0.070
609	6095	γ Herculis	3.75	239	35	57.86	50.39	-0.072	+40	00	17.11	-0.400	+0.032
538	5460	α Centauri cg	var.	239	49	26.22	45.21	-4.885	-42	36	21.79	-1.290	-0.857
401	4174	γ Chamaeleontis	4.11	240	48	05.10	49.76	-0.049	-68	05	15.99	-0.470	-0.040
558	5649	ζ Lupi	3.41	241	08	24.36	50.07	-0.099	-32	50	08.23	-0.540	-0.104
618	6148	β Herculis	2.77	241	28	33.07	50.35	-0.127	+42	41	55.79	-0.470	-0.034
613	6117	ω Herculis	4.57	241	57	39.90	50.50	+0.067	+35	09	52.85	-0.480	-0.050
603	6056	δ Ophiuchi	2.74	242	41	11.86	50.33	-0.018	+17	14	12.28	-0.580	-0.149
539	5463	α Circini	3.19	242	44	40.56	50.01	-0.104	-46	12	29.27	-0.730	-0.292
594	5953	δ Scorpii*	2.32	242	57	19.32	50.29	-0.001	-1	59	22.84	-0.470	-0.038
592	5944	π Scorpii	2.89	243	19	26.10	50.27	-0.006	-5	28	44.07	-0.470	-0.027
597	5984	β Scorpii pr	2.62	243	34	27.19	50.30	-0.002	+1	00	15.49	-0.460	-0.020
605	6075	ε Ophiuchi	3.24	243	53	42.86	50.43	+0.079	+16	26	12.36	-0.380	+0.055
459	4674	β Chamaeleontis	4.26	245	49	08.27	49.90	-0.083	-63	35	52.50	-0.480	-0.034
411	4234	δ‘ Chamaeleontis	4.45	246	02	13.93	49.89	-0.029	-67	47	40.06	-0.500	-0.048
607	6084	σ Scorpii	2.89	248	11	01.22	50.28	-0.007	-4	02	27.63	-0.470	-0.022
634	6324	ε Herculis	3.92	248	42	43.00	50.39	-0.085	+53	14	42.17	-0.430	+0.019
622	6175	ζ Ophiuchi	2.56	249	36	49.20	50.33	+0.010	+11	23	17.04	-0.420	+0.028
560	5671	γ Tr. Austrini	2.89	249	46	33.22	50.07	-0.082	-48	06	24.47	-0.510	-0.056
616	6134	α Scorpii cg*	var.	250	08	46.61	50.28	-0.006	-4	34	24.90	-0.470	-0.022
620	6165	τ Scorpii	2.82	251	50	27.59	50.28	-0.005	-6	07	26.76	-0.480	-0.023
633	6299	κ Ophiuchi	3.20	252	12	12.96	50.03	-0.339	+31	49	56.30	-0.510	-0.046
589	5897	β Tr.Australis	2.85	252	13	25.98	50.10	-0.101	-41	57	09.85	-0.900	-0.434
653	6536	β Draconis	2.79	252	21	10.80	50.62	-0.072	+75	16	27.87	-0.450	+0.011
643	6418	π Herculis	3.16	252	27	09.45	50.42	-0.051	+59	32	50.25	-0.460	+0.000
542	5470	α Apodis	3.83	254	48	46.48	50.16	-0.002	-58	14	18.92	-0.480	-0.019
641	6410	δ Herculis	3.14	255	08	54.14	50.38	-0.004	+47	40	51.13	-0.620	-0.158
628	6241	ε Scorpii	2.29	255	42	53.05	49.70	-0.588	-11	44	40.55	-0.790	-0.326
1439	6247	μ‘ Scorpii	3.08v	256	32	22.61	50.27	-0.008	-15	25	36.96	-0.490	-0.026
1435	6229	η Arae	3.76	259	17	18.83	50.31	+0.051	-36	16	48.64	-0.490	-0.023
631	6285	ζ Arae	3.13	260	12	28.00	50.25	-0.018	-33	05	43.87	-0.500	-0.038
663	6588	ι Herculis	3.80	260	16	26.80	50.39	-0.015	+69	15	43.14	-0.460	+0.005
638	6380	η Scorpii	3.33	261	07	38.64	50.34	+0.052	-20	11	21.34	-0.750	-0.284

* **No. 594 : *Dschubba,* Anuradha** **No. 616 : *Antares* , Jyestha, Mag. 0.9 to 1.8.**

Annual rate of Precession in longitude for the middle of the year = 50".29

LONGITUDE AND LATITUDE OF STARS, 2027.5

MEAN PLACES FOR JULY 2^{d}.875 TERRESTRIAL TIME

Cat. No. FK5	BS= HR No.	Star	Mag.	Longitude			Annual Variation	Annual Proper Motion	Latitude			Annual Variation	Annual Proper Motion
				°	'	"	"	"	°	'	"	"	"
625	6217	α Tr. Austr.	1.92	261	16	47.90	50.30	+0.028	-46	09	18.75	-0.500	-0.031
644	6453	θ Ophiuchi	3.27	261	46	44.55	50.30	-0.002	-1	50	50.04	-0.490	-0.020
656	6556	α Ophiuchi	2.08	262	50	03.11	50.48	+0.162	+35	49	47.77	-0.690	-0.220
611	6102	γ Apodis	3.89	263	05	09.72	50.08	-0.192	-56	00	41.41	-0.580	-0.106
649	6508	ν Scorpii	2.69	264	23	48.78	50.30	+0.000	-14	00	43.83	-0.500	-0.031
645	6461	β Arae	2.85	264	35	23.90	50.28	-0.008	-32	16	07.50	-0.500	-0.026
658	6561	ξ Serpentis	3.54	264	55	47.81	50.25	-0.040	+7	55	50.38	-0.530	-0.060
652	6527	λ Scorpii*	1.63	264	58	11.81	50.30	+0.000	-13	47	32.16	-0.500	-0.029
671	6688	ξ Draconis	3.75	265	08	36.65	50.82	+0.525	+80	16	46.34	-0.390	+0.085
651	6510	α Arae	2.95	265	19	05.76	50.26	-0.031	-26	33	53.16	-0.550	-0.072
667	6623	μ Herculis	3.42	265	36	19.19	49.84	-0.453	+51	05	39.89	-1.240	-0.761
665	6603	β Ophiuchi	2.77	265	43	13.95	50.24	-0.051	+27	56	14.39	-0.310	+0.158
648	6500	δ Arae	3.62	265	56	25.25	50.23	-0.067	-37	21	36.99	-0.570	-0.099
654	6553	θ Scorpii	1.87	265	59	01.72	50.32	+0.016	-19	38	55.44	-0.470	-0.001
660	6580	κ Scorpii	2.41	266	51	13.08	50.30	-0.005	-15	38	53.45	-0.500	-0.027
668	6629	γ Ophiuchi	3.75	267	00	59.45	50.27	-0.023	+26	06	25.28	-0.540	-0.074
666	6615	ι^{1} Scorpii	3.03	267	54	24.34	50.30	+0.000	-16	43	05.17	-0.480	-0.008
669	6630	*G* Scorpii	3.21	268	18	09.11	50.36	+0.050	-13	37	32.39	-0.430	+0.034
676	6705	γ Draconis	2.23	268	21	06.96	50.17	-0.028	+74	55	06.63	-0.490	-0.020
661	6582	η Pavonis	3.62	268	21	27.46	50.30	-0.017	-41	18	49.10	-0.520	-0.055
672	6695	θ Herculis	3.86	268	51	39.00	50.25	+0.009	+60	40	52.75	-0.470	+0.006
674	6703	ξ Herculis	3.70	269	34	50.20	50.38	+0.139	+52	40	54.91	-0.480	-0.017
673	6698	ν Ophiuchi	3.34	270	08	14.17	50.28	-0.007	+13	39	39.49	-0.580	-0.116
1471	6743	θ Arae	3.66	271	34	27.48	50.32	-0.012	-26	39	46.05	-0.480	-0.014
679	6746	γ Sagittarii	2.99	271	38	42.94	50.25	-0.056	-6	59	46.10	-0.650	-0.184
680	6771	72 Ophiuchi	3.73	272	32	37.29	50.18	-0.070	+32	59	11.07	-0.390	+0.081
681	6779	*o* Herculis	3.83	273	04	48.36	50.22	+0.002	+52	10	50.33	-0.460	+0.009
682	6812	μ Sagittarii	3.86	273	35	51.70	50.30	+0.002	+2	20	18.71	-0.460	+0.001
683	6832	η Sagittarii	3.11	274	00	39.77	50.17	-0.138	-13	22	57.72	-0.630	-0.162
687	6859	δ Sagittarii*	2.70	274	57	55.59	50.34	+0.034	-6	28	33.79	-0.490	-0.029
691	6897	α Telescopii	3.51	275	27	28.36	50.31	-0.021	-22	39	06.50	-0.520	-0.053
689	6879	ε Sagittarii	1.85	275	27	45.17	50.27	-0.045	-11	03	22.71	-0.580	-0.122
688	6869	η Serpentis	3.26	276	03	30.25	49.65	-0.615	+20	25	36.44	-1.140	-0.677
692	6913	λ Sagittarii	2.81	276	42	03.33	50.25	-0.053	-2	08	26.00	-0.640	-0.183
697	6951	θ Coronae Aust.	4.64	276	55	43.32	50.36	+0.031	-19	04	01.29	-0.480	-0.024
1482	6973	α Scuti	3.85	279	24	00.81	50.23	-0.037	+14	54	51.46	-0.760	-0.310
214	1953	γ Mensae	5.19	279	57	11.15	50.82	+1.086	-79	59	24.54	-0.760	+0.238
1487	7039	φ Sagittarii	3.17	280	33	57.66	50.36	+0.053	-3	57	27.05	-0.460	-0.004
1489	7063	β Scuti	4.22	282	45	49.96	50.24	-0.006	+18	10	56.79	-0.460	-0.016
706	7121	σ Sagittarii*	2.02	282	46	10.70	50.32	+0.008	-3	27	12.18	-0.510	-0.055
710	7150	ξ^{c} Sagittarii	3.51	283	50	07.88	50.33	+0.032	+1	39	27.75	-0.460	-0.015

* **No. 652 : *Schaula* , Mula.** **No. 706 : *Nunki* , Uttarasadha.**

No. 687 : Purvasadha-1.

Annual rate of Precession in longitude for the middle of the year = 50".29

LONGITUDE AND LATITUDE OF STARS, 2027.5

MEAN PLACES FOR JULY 2^{d}.875 TERRESTRIAL TIME

Cat. No. FK5	BS= HR No.	Star	Mag.	Longitude			Annual Variation	Annual Proper Motion	Latitude			Annual Variation	Annual Proper Motion
				°	'	"	"	"	°	'	"	"	"
1496	7234	τ Sagittarii	3.32	285	13	04.66	50.23	-0.083	-5	05	38.80	-0.690	-0.242
699	7001	α Lyrae	0.03	285	42	07.35	50.49	+0.505	+61	43	53.11	-0.180	+0.255
720	7264	π Sagittarii	2.89	286	38	09.39	50.28	-0.004	+1	26	00.37	-0.480	-0.035
717	7236	λ Aquilae	3.44	287	42	57.18	50.21	-0.029	+17	33	42.35	-0.520	-0.087
754	7665	δ Pavonis	3.56	288	00	27.08	51.62	+1.140	-44	42	49.45	-1.880	-1.446
712	7176	ε Aquilae	4.02	288	38	40.56	50.08	-0.075	+37	33	48.66	-0.490	-0.066
705	7106	β Lyrae	var.	289	15	56.85	50.02	+0.005	+55	58	51.04	-0.430	-0.003
810	8254	ν Octantis	3.76	290	04	25.33	50.40	-0.212	-57	47	03.45	-0.640	-0.217
716	7235	ζ Aquilae	2.99	290	10	44.12	50.13	-0.023	+36	10	54.14	-0.520	-0.094
713	7178	γ Lyrae	3.24	292	18	15.03	49.99	-0.003	+55	00	35.21	-0.420	+0.003
775	7913	β Pavonis	3.42	292	52	46.72	50.47	-0.055	-45	57	27.29	-0.390	+0.028
730	7377	δ Aquilae	3.36	294	01	24.13	50.48	+0.294	+24	48	51.15	-0.370	+0.039
764	7790	α Pavonis	1.94	294	12	09.85	50.44	-0.025	-36	16	17.24	-0.500	-0.087
751	7623	θ῾ Sagittarii	4.37	295	15	16.86	50.36	+0.001	-14	23	20.52	-0.430	-0.027
785	7986	β Indi	3.65	298	10	17.22	50.51	+0.008	-39	09	37.11	-0.420	-0.030
769	7869	α Indi	3.11	299	29	24.26	50.52	+0.078	-27	45	22.56	-0.340	+0.048
1508	7405	α Vulpeculae	4.44	299	53	17.09	49.81	-0.209	+45	51	17.22	-0.470	-0.076
746	7570	η Aquilae	var.	300	49	01.87	50.20	+0.010	+21	31	12.99	-0.390	-0.009
741	7525	γ Aquilae	2.72	301	19	19.29	50.15	+0.020	+31	14	26.27	-0.380	-0.005
11	98	β Hydri	2.80	301	22	48.91	53.54	+2.671	-64	48	08.94	-2.310	-1.958
1513	7488	β Sagittae	4.37	301	35	18.72	50.08	+0.003	+38	12	53.92	-0.420	-0.033
732	7417	β Cygni *p*	3.08	301	38	00.60	49.98	+0.002	+48	57	53.18	-0.380	-0.002
745	7557	α Aquilae*	0.77	302	09	53.04	50.84	+0.697	+29	18	09.40	-0.120	+0.262
749	7602	β Aquilae	3.71	302	48	22.58	50.09	-0.064	+26	39	09.39	-0.860	-0.481
743	7536	δ Sagittae	3.82	303	46	10.88	50.07	+0.011	+38	54	36.19	-0.360	+0.006
761	7754	α῝ Capricorni	3.57	304	14	34.84	50.32	+0.063	+6	55	38.27	-0.370	-0.011
762	7776	β Capricorni	3.08	304	25	54.20	50.31	+0.042	+4	35	08.89	-0.370	-0.008
756	7710	θ Aquilae	3.23	305	41	45.66	50.23	+0.041	+20	19	27.55	-0.360	-0.005
752	7635	γ Sagittae	3.47	307	25	35.54	50.13	+0.090	+39	11	15.40	-0.350	+0.006
1550	8039	γ Microscopii	4.67	308	48	58.71	50.38	+0.000	-14	40	04.34	-0.330	+0.006
841	8502	α Tucanae	2.86	310	03	25.96	50.51	-0.120	-45	24	22.80	-0.330	+0.000
146	1208	γ Hydri	3.24	310	52	14.94	52.14	+0.537	-76	45	36.15	-0.410	-0.010
781	7950	ε Aquarii	3.77	312	06	26.02	50.27	+0.024	+8	04	39.96	-0.360	-0.042
1547	7990	μ Aquarii	4.73	313	26	31.81	50.28	+0.035	+8	14	14.19	-0.350	-0.041
768	7852	ε Delphini	4.03	314	26	37.67	50.11	+0.007	+29	04	14.24	-0.330	-0.024
726	7328	κ Cygni	3.77	315	17	45.50	49.44	+0.396	+73	48	02.05	-0.220	+0.080
829	8425	α Gruis	1.74	316	17	36.63	50.59	+0.064	-32	55	01.24	-0.490	-0.191
(771)	7882	β Delphini m*	3.64	316	43	27.52	50.13	+0.070	+31	54	54.67	-0.360	-0.069
806	8204	ζ Capricorni	3.74	317	19	17.48	50.35	+0.008	-6	59	34.78	-0.270	+0.022
774	7906	α Delphini	3.77	317	45	48.54	50.12	+0.074	+33	01	11.71	-0.300	-0.022
822	8353	γ Gruis	3.01	317	48	19.60	50.55	+0.095	-23	03	10.54	-0.340	-0.058

* **No. 745 : *Altair* , Sravana.** **No. 771 : *Rotanev* , Dhanistha-1.**

Annual rate of Precession in longitude for the middle of the year = 50".29

LONGITUDE AND LATITUDE OF STARS, 2027.5

MEAN PLACES FOR JULY 2^d.875 TERRESTRIAL TIME

Cat. No. FK5	BS= HR No.	Star	Mag.	Longitude			Annual Variation	Annual Proper Motion	Latitude			Annual Variation	Annual Proper Motion
				°	'	"	"	"	°	'	"	"	"
733	7420	ι Cygni	3.79	318	20	45.90	49.43	+0.252	+71	26	58.94	-0.180	+0.104
778	7928	δ Delphini	4.43	318	29	54.17	50.02	-0.037	+31	56	28.31	-0.320	-0.035
1541	7948	γ Delphini sq	4.27	319	45	00.03	49.94	-0.110	+32	41	55.91	-0.450	-0.177
860	8675	ε Gruis	3.49	321	07	01.97	50.70	+0.077	-39	47	26.52	-0.380	-0.115
846	8556	δ^1 Gruis	3.97	321	59	19.40	50.57	+0.027	-31	20	58.34	-0.280	-0.017
812	8278	γ Capricorni	3.68	322	10	35.11	50.48	+0.172	-2	33	35.69	-0.340	-0.085
856	8636	β Gruis	2.11v	322	42	53.19	50.73	+0.145	-35	26	04.55	-0.320	-0.071
800	8131	α Equulei	3.92	323	30	01.96	50.18	+0.029	+20	07	09.02	-0.350	-0.102
808	8232	β Aquarii	2.91	323	46	44.22	50.26	+0.017	+8	36	46.84	-0.260	-0.015
819	8322	δ Capricorni	2.87	323	55	40.93	50.46	+0.149	-2	36	22.91	-0.610	-0.368
1569	8264	ξ Aquarii	4.69	324	30	11.44	50.36	+0.103	+5	57	19.32	-0.300	-0.062
765	7796	γ Cygni	2.20	325	13	15.44	49.67	+0.007	+57	07	21.43	-0.230	-0.001
780	7949	ε Cygni	2.46	328	07	53.23	50.52	+0.705	+49	25	18.48	-0.060	+0.154
815	8308	ε Pegasi	var.	332	16	04.82	50.15	+0.031	+22	05	54.11	-0.200	-0.011
849	8592	ν Aquarii	5.20	332	55	42.32	50.53	+0.154	-10	54	14.32	-0.390	-0.218
797	8115	ζ Cygni	3.20	333	25	19.90	49.85	-0.031	+43	41	34.81	-0.220	-0.051
827	8414	α Aquarii	2.96	333	58	04.83	50.23	+0.015	+11	15	28.68	-0.190	-0.016
867	8728	α PsA	1.16	334	14	51.72	50.72	+0.253	-21	08	20.83	-0.450	-0.287
777	7924	α Cygni	1.25	335	42	27.52	49.54	+0.007	+59	54	17.89	-0.160	+0.001
842	8518	γ Aquarii	3.84	337	05	55.33	50.36	+0.126	+8	14	01.37	-0.180	-0.042
834	8450	θ Pegasi	3.53	337	13	06.24	50.44	+0.278	+16	20	20.08	-0.220	-0.077
861	8679	τ Aquarii	4.01	338	58	48.33	50.32	-0.026	-5	39	56.73	-0.160	-0.030
866	8709	δ Aquarii	3.27	339	15	28.11	50.31	-0.047	-8	11	32.63	-0.140	-0.008
3	25	ε Phoenicis	3.88	340	02	07.73	50.72	+0.011	-41	57	31.28	-0.340	-0.220
850	8597	η Aquarii	4.02	340	52	34.70	50.29	+0.064	+8	21	47.46	-0.200	-0.087
792	8079	ξ Cygni	3.72	341	10	42.70	49.62	+0.014	+56	34	52.07	-0.120	-0.003
864	8698	λ Aquarii*	3.74	341	57	37.76	50.33	+0.025	-0	23	14.00	-0.070	+0.030
72	591	α Hydri	2.86	342	30	45.86	51.66	+0.420	-64	14	39.93	-0.300	-0.194
831	8430	ι Pegasi	3.76	344	47	35.09	50.32	+0.339	34	15	14.46	-0.190	-0.104
54	472	α Eridani	0.46	345	42	07.83	51.17	+0.084	-59	22	45.94	-0.170	-0.092
12	99	α Phoenicis	2.39	345	52	50.17	50.65	-0.042	-40	38	13.47	-0.520	-0.444
855	8634	ζ Pegasi	3.40	346	32	06.93	50.23	+0.072	+17	40	42.83	-0.110	-0.043
141	1175	β Reticuli	3.85	351	47	58.43	52.99	+0.797	-76	05	24.97	-0.290	-0.260
878	8852	γ Piscium	3.69	351	50	32.66	50.95	+0.713	+7	15	16.93	-0.310	-0.285
871	8781	α Pegasi	2.49	353	52	07.91	50.18	+0.043	+19	24	19.54	-0.080	-0.065
1044	440	δ Phoenicis	3.95	354	00	48.69	51.25	+0.337	-52	34	56.87	0.030	+0.035
862	8684	μ Pegasi	3.48	354	46	08.76	50.16	+0.130	+29	23	09.84	-0.100	-0.102
857	8650	η Pegasi	2.94	356	05	41.78	49.97	+0.002	+35	06	28.83	-0.020	-0.029
68	566	χ Eridani	3.70	356	38	49.36	52.32	+1.309	-57	01	08.18	-0.200	-0.210
49	429	γ Phoenicis	3.41	358	31	48.77	50.62	-0.186	-47	35	10.04	-0.140	-0.167
870	8775	β Pegasi*	2.42v	359	45	29.88	50.29	+0.270	+31	08	27.93	0.080	+0.037

* **No. 864 : Satabhisaj.** **No. 870 : *Scheat*, Purva Bhadrapada-2.**

BS = Bright Star Catalogue HR = Havard Revised Catalogue FK5 = Fifth Fundamental Catalogue

Annual rate of Precession in longitude for the middle of the year = 50".29

MEAN PLACES OF STARS, J 2027.5

FOR JULY 2^{d}.875 TERRESTRIAL TIME

(The Annual Variations are for the middle of the year)

Cat. No. FK5	BS =HR No.	Star	Mag.	Spec-tral Type	Right Ascension			Annual Variation	Annual Proper motion	Declination			Annual Variation	Annual Proper motion
					h	m	s	s	s (0.0001)	°	'	"	"	" (0.001)
1	15	α Ανδρομεδαε	2.06	B9p Hg Mn	0	09	48.9	+3.118	+104	+29	14	31.81	+19.86	-163
2	21	β Χασσιοπεια	2.27	F2 III	0	10	39.8	+3.249	+686	+59	18	04.84	19.84	-181
3	25	ε Πηοενιχισ	3.88	K0 III	0	10	47.9	+3.023	+118	-45	35	45.15	19.84	-181
7	39	γ Pegasi*	2.83	B2 IV	0	14	39.3	+3.099	+2	+15	20	10.60	19.99	-12
9	74	ι Χετι	3.56	K1 IIIb	0	20	49.7	+3.056	-9	-8	40	18.10	19.92	-36
11	98	β Ηψδρι	2.80	G1 IV	0	27	09.3	+3.047	+6613	-77	05	59.02	20.22	+324
12	99	α Πηοενιχισ	2.39	K0 III b	0	27	38.2	+2.948	+183	-42	09	25.35	+19.50	-396
17	153	ζ Χασσιοπεια	3.66	B2 IV	0	38	31.2	+3.386	+22	+54	02	52.36	19.75	-9
20	165	δ Andromedae	3.27	K3 III	0	40	48.4	+3.228	+106	+31	00	39.66	19.63	-92
21	168	α Χασσιοπεια	2.23	K0- IIIa	0	42	05.2	+3.453	+64	+56	41	15.81	19.67	-32
22	188	β Χετι*	2.04	CH-1 CN 0.	0	44	58.1	+3.008	+164	-17	50	10.03	19.69	+32
33	269	μ Ανδρομεδαε	3.87	A5 IV-V	0	58	17.4	+3.357	+130	+38	38	52.38	19.43	+33
32	264	γ Cassiopeiae*	var.	0 IVnpe(she	0	58	23.5	+3.683	+36	+60	51	53.91	+19.39	-5
35	280	α Σχυλπτορισ	4.31	B4 Vp	0	59	55.7	+2.884	+17	-29	12	33.96	19.36	+4
40	334	η Χετι	3.45	K2-III CN0.5	1	09	58.4	+3.019	+147	-10	02	13.82	18.98	-138
42	337	β Ανδρομεδαε	2.06	M0+IIIa	1	11	16.9	+3.385	+146	+35	45	56.10	18.97	-114
1033	361	ζ Πισχιυμ*	5.24	F0Vn	1	15	10.3	+3.143	+97	+7	43	11.96	18.92	-56
47	402	θ Ceti	3.60	K0 IIIb	1	25	23.9	+3.001	-53	-8	02	32.37	18.45	-218
48	403	δ Cassiopeiae	2.68	A5 IV	1	27	38.4	+3.992	+401	+60	22	37.70	+18.54	-52
49	429	γ Phoenicis	3.41	M0- IIIa	1	29	33.4	+2.597	-13	-43	10	41.24	18.32	-208
1044	440	δ Phoenicis	3.95	G9 III	1	32	23.6	+2.488	+144	-48	55	50.10	18.59	+151
50	437	η Πισχιυμ	3.62	G7 IIIa	1	32	57.6	+3.223	+19	+15	29	11.79	18.41	-6
54	472	α Εριδανι*	0.46	3Vnp(shell	1	38	44.1	+2.225	+117	-57	05	51.83	18.17	-35
52	464	51 Andromedae	3.57	K3- III	1	39	41.8	+3.724	+65	+48	45	59.11	18.06	-113
59	509	τ Χετι	3.50	G8 V	1	45	20.8	+2.789	-1189	-15	47	36.68	+18.82	+859
62	539	ζ Χετι	3.73	K0 III	1	52	49.2	+2.965	+28	-10	12	00.79	17.62	-39
64	544	α Τριανγυλι	3.41	F6 IV	1	54	39.5	+3.442	+8	+29	42	41.87	17.35	-235
66	553	β Αριετισ*	2.64	A4 V	1	56	09.9	+3.331	+68	+20	56	28.51	17.41	-111
63	542	ε Χασσιοπεια	3.38	3 IV:p(shel	1	56	24.3	+4.401	+48	+63	48	14.45	17.49	-21
68	566	χ Εριδανι	3.70	I-IVCN-0.5	1	57	01.5	+2.328	+729	-51	28	22.50	17.78	+291
72	591	α Ηψδρι	2.86	F0n III-IV	1	59	38.1	+1.889	+368	-61	26	12.43	+17.40	+26
71	585	ν Χετι	4.00	M0 IIIb	2	01	18.1	+2.827	+97	-20	56	44.34	17.27	-24
73	580	50 Cassiopeiae	2.26	A1 Va	2	05	36.0	+3.716	+40	+42	27	37.07	17.05	-52
70	603	γ Andromed.*	3.98	K3- Iib	2	05	50.6	+5.284	-99	+72	33	08.94	17.12	+23
74	617	α Αριετισ*	2.00	K2 IIIab	2	08	43.8	+3.400	+138	+23	35	28.04	16.81	-149
75	622	β Τριανγυλι	3.00	A5 IV	2	11	11.4	+3.597	+122	+35	06	57.49	16.81	-41
82	674	φ Eridani	3.56	B8 V	2	17	29.5	+2.141	+102	-51	23	09.20	+16.51	-27
79	664	γ Trianguli	4.01	A0 IV-Vn	2	18	57.5	+3.592	+38	+33	58	22.62	16.42	-51
91	779	δ Χετι	4.07	B2 IV	2	40	53.7	+3.083	+9	+0	26	44.38	+15.30	-4

* **No. 1 : *Alpheratz,* Uttara Bhadrapada - 2**
No. 2 : *Caph*
No. 7 : *Algenib,* Uttara Bhadrapada - 1
No. 21 : *Schedar* . Mag. 2.1 to 2.6
No. 22 : *Deneb Kaitos or Diphda*
No. 32 : *Cih* . Mag. 1.6 to 3.2
No. 42 : *Mirach*
No. 1033 : Revati
No. 54 : *Achernar*
No. 66 : *Sheratan,* Asvini
No. 73 : *Almach,* Mag. f. 5.1
No. 74 : *Hamal*

MEAN PLACES OF STARS, J 2027.5

FOR JULY $2^d.875$ TERRESTRIAL TIME
(The Annual Variations are for the middle of the year)

Cat. No. FK5	BS =HR No.	Star	Mag.	Spectral Type	Right Ascension h	m	s	Annual Variation s	Annual Proper motion s (0.0001)	Declination °	'	"	Annual Variation "	Annual Proper motion " (0.001)
1075	794	ι Eridani	4.11	0.5 IIIb Fe-0	2	41	45.1	+2.367	+119	-39	44	20.08	+15.22	-32
94	801	35 Arietis	4.66	B3 V	2	45	04.4	+3.541	+6	+27	49	20.90	15.05	-12
101	841	β Fornacis	4.46	8.5 III Fe-0	2	50	14.5	+2.512	+71	-32	17	30.24	14.92	+155
100	838	41 Arietis*	3.63	B8 Vn	2	51	36.6	+3.551	+50	+27	22	19.63	14.56	-118
99	834	η Persei	3.76	K3 Ib-IIa	2	52	43.5	+4.433	+20	+56	00	26.97	14.60	-14
103	854	τ Persei	3.95	5 III + A4 V	2	56	13.6	+4.303	-0	+52	52	22.53	14.40	-5
104	874	η Eridani	3.89	K1 IIIb	2	57	46.4	+2.936	+53	-8	47	24.81	+14.09	-220
106	897	θ Eridani* p	3.25	A5 IV	2	59	18.3	+2.276	-39	-40	11	44.65	14.23	+20
1085	919	τ Eridani	4.09	A4 V	3	03	36.3	+2.647	-105	-23	31	04.87	13.89	-53
107	911	α Ceti*	2.53	M1.5 IIIa	3	03	43.2	+3.145	-6	+4	11	45.37	13.86	-78
108	915	γ Persei	2.93	5 III + A2 V	3	06	48.4	+4.395	-0	+53	36	42.90	13.74	-5
109	921	ρ Persei*	var.	M4 II	3	06	57.0	+3.873	+111	+38	56	41.38	13.63	-106
907	424	α Ursae Mins.*	2.02	F5-8 Ib	3	08	14.7	+93.264	+2179	+89	22	37.72	+13.63	-21
111	936	β Persei*	var.	B8 V + F:	3	09	58.2	+3.934	+3	+41	03	34.41	13.54	-1
121	1030	ο Tauri	3.60	G6 IIIa Fe-1	3	26	17.8	+3.239	-45	+9	07	25.66	12.38	-78
120	1017	α Persei*	1.79	F5 Ib	3	26	18.1	+4.323	+25	+49	57	24.06	12.43	-25
123	1038	ξ Tauri	3.74	B9 Vn	3	28	39.8	+3.262	+40	+9	49	36.14	12.25	-39
127	1084	ε Eridani	3.73	K2 V	3	34	13.7	+2.832	-658	-9	22	00.46	11.93	+23
135	1136	δ Eridani	3.85	K0 IV	3	44	33.2	+0.775	+489	-64	43	15.55	+11.24	+74
141	1175	β Reticuli	3.54	K2 III	3	44	34.1	+2.880	-61	-9	40	19.38	11.91	+745
131	1122	δ Persei	3.01	B5 III	3	44	53.8	+4.306	+28	+47	52	22.74	11.11	-34
136	1142	17 Tauri	3.70	B6 III	3	46	30.9	+3.578	+14	+24	11	51.55	10.98	-46
146	1208	γ Hydri	3.24	M2 III	3	46	50.6	-0.848	+117	-74	09	15.02	11.11	+114
134	1135	ν Persei	3.77	F5 II	3	47	04.4	+4.104	-13	+42	39	46.59	10.98	-2
139	1165	η Tauri*	2.87	B7 IIIn	3	49	07.5	+3.582	+14	+24	11	16.68	+10.79	-46
142	1178	27 Tauri	3.63	B8 III	3	50	48.2	+3.583	+13	+24	08	07.12	10.66	-47
144	1203	ζ Persei	2.85	B1 Ib	3	55	52.1	+3.790	+4	+31	57	46.65	10.32	-10
149	1231	γ Eridani	2.95	0.5 IIIb Ca-	3	59	18.9	+2.804	+42	-13	25	55.44	09.96	-112
147	1220	ε Persei	2.89	B 0.5 IV	3	59	42.5	+4.050	+16	+40	05	14.12	10.02	-26
148	1228	ξ Persei	4.04	O 7.5 IIIf	4	00	45.4	+3.914	+2	+35	52	03.46	09.96	+0
150	1239	λ Tauri	3.47v	B3 V	4	02	12.5	+3.334	-4	+12	33	57.46	+09.84	-12
151	1251	ν Tauri	3.91	A1 Va	4	04	37.3	+3.200	+3	+6	03	48.83	09.67	-3
152	1273	48 Persei	4.04	B3 Ve	4	10	40.2	+4.386	+20	+47	46	59.46	09.17	-31
156	1336	α Reticuli	3.35	G8II-III	4	14	47.1	+0.790	+65	-62	24	20.00	08.93	+45
155	1326	α Horologii	3.86	K2 III	4	14	54.9	+1.992	+41	-42	13	40.80	08.66	-209
159	1346	γ Tauri	3.65	.5 IIIab CN	4	21	21.7	+3.425	+80	+15	41	30.39	08.34	-25
162	1373	δ Tauri	3.76	9.5 III CN 0	4	24	31.5	+3.471	+75	+17	36	16.93	+08.08	-30
1121	1393	43 Eridani	3.96	K3.5 IIIb	4	25	04.3	+2.257	+56	-33	57	16.42	08.12	+50
164	1409	ε Tauri	3.54	9.5 III CN 0	4	30	13.6	+3.514	+76	+19	14	20.62	07.61	-38
171	1465	α Doradus	3.27	A0p Si	4	34	35.6	+1.305	+60	-54	59	20.97	07.29	-4
170	1464	ν Eridani	3.82	G8.5 IIIa	4	36	37.3	+2.336	-35	-30	30	27.43	+07.12	-12

* **No. 907 : (Nb) : *Polaris,* Dhruva**
No. 100 : Bharani
No. 106 : Acamar.
No. 107 : *Menkar*
No. 109 : Mag. 3.3 to 4.0.

No. 111 : *Algol* , Mag. 2.1 to 3.4.
No. 120 : *Mirphak.*
No. 139 : *Alcyone* , Krittika.

MEAN PLACES OF STARS, J 2027.5

FOR JULY 2^{d}.875 TERRESTRIAL TIME

(The Annual Variations are for the middle of the year)

Cat. No. FK5	BS =HR No.	Star	Mag.	Spectral Type	Right Ascension			Annual Variation	Annual Proper motion	Declination			Annual Variation	Annual Proper motion
					h	m	s	s	s (0.0001)	°	'	"	"	" (0.001)
168	1457	α Tauri*	0.85	K5 III	4	37	30.1	+3.452	+44	+16	33	44.09	+06.87	-190
172	1481	53 Eridani	3.87	K1.5IIIb	4	39	26.5	+2.752	-52	-14	15	07.22	06.74	-155
1129	1502	α Caeli	4.45	F1 V	4	41	27.0	+1.937	-126	-41	48	45.61	06.66	-77
1134	1543	π^{5} Orionis	3.19	F6 V	4	51	20.1	+3.264	+313	+7	00	25.23	05.93	+10
179	1552	π^{3} Orionis	3.69	B2 III	4	52	40.4	+3.202	-1	+5	38	59.61	05.80	+1
180	1567	π^{6} Orionis	3.72	B2 III	4	55	41.2	+3.131	+0	+2	29	00.63	05.55	-0
178	1542	α Camelopardi	4.29	O9.5 Ia	4	56	48.2	+6.016	-1	+66	23	07.03	+05.46	+6
181	1577	ι Aurigae	2.69	K3 II	4	58	47.3	+3.919	+3	+33	12	24.98	05.27	-18
183	1605	ε Aurigae*	var.	A9 Ia	5	03	56.9	+4.321	-1	+43	51	39.49	04.85	-4
1137	1612	ζ Aurigae	3.8	K5II + B5 V	5	04	24.4	+4.208	+8	+41	06	46.99	04.79	-22
182	1603	β Camelopardi	4	G1 Ib-Iia	5	05	52.6	+5.369	-9	+60	28	43.43	04.67	-16
186	1654	ε Leporis	3.2	K4 III	5	06	37.6	+2.543	+18	-22	20	09.27	04.55	-74
185	1641	η Aurigae	3.2	B3 V	5	08	26.9	+4.221	+26	+41	16	07.48	+04.40	-68
188	1666	β Eridani*	2.8	A3 IVn	5	09	12.2	+2.954	-63	-5	03	10.70	04.33	-81
1144	1702	μ Leporis	3.31v	B9p Hg Mn	5	14	10.1	+2.699	+30	-16	10	29.74	03.96	-26
194	1713	β Orionis*	0.12	B8 Ia	5	15	51.7	+2.887	+0	-8	10	18.96	03.83	-1
193	1708	α Aurigae*	0.08	6 III + G2 I	5	18	43.5	+4.445	+71	+46	01	22.35	03.16	-425
195	1735	τ Orionis	3.60	B5 III	5	18	56.6	+2.917	-10	-6	49	00.30	03.56	-8
1147	1765	22 Orionis	4.73	B2 IV-V	5	23	10.6	+3.085	-0	+0	24	26.90	+03.21	-1
201	1790	γ Orionis*	1.64	B2 III	5	26	36.5	+3.223	-6	+6	22	20.13	02.90	-14
202	1791	β Tauri*	1.65	B7 III	5	28	02.0	+3.799	+17	+28	37	40.55	02.61	-175
204	1829	β Leporis	2.84	G5 II	5	29	25.5	+2.574	-3	-20	44	21.81	02.58	-89
214	1953	γ Mensae	5.19	K2 III	5	30	48.5	-2.337	+322	-76	19	11.16	02.83	+281
206	1852	δ Orionis*	2.23	O9.5 II	5	33	25.2	+3.083	+1	+0	19	02.29	02.32	-2
212	1922	β Doradus	3.48v	F7-G2 Ib	5	33	52.0	+0.529	+3	-62	28	20.24	+02.29	+9
207	1865	α Leporis*	2.58	F0 Ib	5	33	56.6	+2.649	+1	-17	48	16.23	02.28	+2
(GC)	1879	λ Orionis*	3.6	O8 IIIf	5	36	39.2	+3.309	-1	+9	57	00.78	02.04	-2
209	1899	ι Orionis	2.77	O9 III	5	36	46.8	+2.938	+0	-5	53	38.22	02.03	+1
210	1903	ε Orionis*	1.70	B0 Ia	5	37	36.6	+3.048	+1	-1	11	11.66	01.95	-2
211	1910	ζ Tauri	3.00	2 IIIpe (shel	5	39	17.4	+3.590	+0	+21	09	24.19	01.79	-21
215	1956	α Columbae*	2.64	B7 IV	5	40	38.8	+2.176	+5	-34	03	40.05	+01.66	-26
1154	2015	δ Doradus	4.35	A7 V n	5	44	49.5	+0.115	-49	-65	43	31.20	01.33	+8
217	1983	γ Leporis	3.60	F7 V	5	45	36.6	+2.504	-212	-22	26	28.51	00.89	-369
219	1998	ζ Leporis	3.55	A2 Van	5	48	12.2	+2.722	-11	-14	48	49.28	01.03	-1
220	2004	κ Orionis*	2.06	B0.5 Ia	5	49	03.7	+2.848	+1	-9	39	42.95	00.95	-2
223	2040	β Columbae	3.12	K1.5 III	5	51	55.8	+2.119	+49	-35	45	34.59	01.11	+401
222	2035	δ Leporis	3.81	II Fe 1.5 CH	5	52	30.3	+2.582	+161	-20	52	43.30	+00.01	-650
224	2061	α Orionis*	var.	M1 M2 Ia Ia	5	56	39.7	+3.251	+17	+7	24	35.41	+00.30	+9

No. 168 : *Aldebaran,* Rohini

* **No. 183 : Mag. 2.9 to 3.8.**

No. 188 : *Cursa* .

No. 194 : *Rigel.*

No. 193 : *Capella* , Brahmahridaya.

No. 201 : *Bellatrix.*

No. 202 : *El Nath* , Agni.

No. 206 : *Mintaka* .

No. 207 : *Arneb* .

No. GC : *Mrgasiras* .

No. 210 : *Alnilam.*

No. 215 : *Phakt* .

No. 220 : *Saiph* .

No. 224 : *Betelgeuse* , Mag. 0.4 to 1.3 Ard

MEAN PLACES OF STARS, J 2027.5

FOR JULY $2^d.875$ TERRESTRIAL TIME
(The Annual Variations are for the middle of the year)

Cat. No. FK5	BS =HR No.	Star	Mag.	Spec-tral Type	Right Ascension h	m	s	Annual Variation s	Annual Proper motion s (0.0001)	Declination °	'	"	Annual Variation "	Annual Proper motion " (0.001)
226	2085	η Leporis	3.71	F1 V	5	57	39.5	+2.735	-28	-14	09	52.90	+00.34	+139
229	2120	η Columbae	3.96	G8/K1 II	5	59	59.4	+1.840	+20	-42	48	54.19	-00.01	-14
227	2088	β Aurigae*	1.90	A1 IV	6	01	32.8	+4.404	-54	+44	56	49.50	00.13	+1
225	2077	δ Aurigae*	3.72	K0 III	6	01	47.6	+4.943	+92	+54	16	59.91	00.28	-126
1163	2134	1 Geminorum	4.16	G5 III-IV	6	05	47.5	+3.649	-6	+23	15	33.49	00.61	-100
1168	2219	κ Aurigae	4.35	G9 IIIb	6	17	07.8	+3.823	-57	+29	29	06.69	01.76	-262
240	2282	ζ Canis Maj.	3.02	B2.5 V	6	21	22.2	+2.306	+7	-30	04	38.24	-01.86	+3
243	2294	β Canis Maj.*	1.98	B1 II-III	6	23	54.7	+2.644	-4	-17	58	17.31	02.09	+0
245	2326	α Carinae*	-0.7	A9 II	6	24	33.8	+1.333	+25	-52	42	42.16	02.12	+21
241	2286	μ Geminorum	2.88	M3 IIIab	6	24	37.4	+3.629	+39	+22	29	48.62	02.26	-111
244	2298	8ε Monocerotis	4.4	A6 IV	6	25	13.5	+3.181	-12	+4	34	35.74	02.19	+11
1173	2343	ν Geminorum	4.2	B6 III	6	30	35.7	+3.562	-5	+20	11	31.76	02.68	-14
252	2451	ν Puppis	3.2	B8 IIIn	6	38	36.2	+1.838	+2	-43	13	17.07	-03.37	-6
251	2421	γ Geminorum*	1.9	A1 IVs	6	39	18.0	+3.465	+29	+16	22	24.12	03.46	-42
254	2473	ε Geminorum	3	G8 Ib	6	45	37.4	+3.689	-4	+25	06	04.54	03.98	-13
257	2491	α Canis Maj* c	-1.5	A0m A1 Va	6	46	21.5	+2.643	-387	-16	45	20.42	05.23	-1204
256	2484	ξGeminorum	3.4	F5 IV	6	46	49.9	+3.366	-79	+12	51	48.74	04.26	-191
262	2550	α Pictoris	3.3	A6 Vn	6	48	28.3	+0.612	-96	-61	58	16.93	03.94	+269
263	2553	τ Puppis	2.9	K1 III	6	50	37.1	+1.489	+38	-50	38	54.59	-04.46	-70
1180	2538	κ Canis Maj.	4	B1.5 Ive	6	50	52.1	+2.243	-5	-32	32	30.61	04.41	+4
261	2540	θ Geminorum	3.60	A3 III-IV	6	54	36.0	+3.949	-2	+33	55	31.17	04.78	-48
268	2618	ε Canis Maj.*	1.50	B2 II	6	59	42.4	+2.360	+3	-29	00	40.13	05.16	+3
1183	2646	σ Canis Maj.	3.5	K7 IB	7	02	48.9	+2.392	-4	-27	58	33.22	05.42	+5
270	2653	*o²* Canis Maj.	3	B3 Ia	7	04	10.4	+2.507	-3	-23	52	30.86	05.54	+3
269	2650	ζ Geminorum*	3.79v	F9 Ib (var)	7	05	44.3	+3.555	-6	+20	31	38.93	-05.67	-0
1189	2736	γ² Volantis	3.8	G9 III	7	08	30.3	-0.534	+48	-70	32	36.00	05.80	+106
273	2693	δ Canis Maj.	1.9	F8 Ia	7	09	30.6	+2.441	-2	-26	26	18.76	05.98	+4
1187	2714	22δ Monocerot	4.2	A1 III	7	13	16.7	+3.085	-1	+0	26	42.52	06.29	+5
281	2803	δ Volantis	4	F9 Ib	7	16	48.5	-0.050	-12	-68	00	27.20	06.59	+5
278	2773	π Puppis	2.70	K3 Ib	7	18	06.9	+2.121	-8	-37	08	54.10	06.69	+4
277	2763	λ Geminorum	3.58	A4 IV	7	19	40.3	+3.444	-33	+16	29	18.33	-06.86	-36
279	2777	δ Geminorum	3.53	F0 V	7	21	45.8	+3.578	-19	+21	55	45.32	07.01	-12
283	2827	η Canis Maj.	2.45	B5 Ia	7	25	11.0	+2.375	-3	-29	21	30.03	07.27	+5
282	2821	ι Geminorum	3.79	G9 IIIb	7	27	25.9	+3.718	-93	+27	44	27.32	07.55	-86
285	2845	β Canis Min.*	2.90	B8 V	7	28	38.5	+3.251	-35	+8	13	54.22	07.60	-38
1194	2878	ρ Puppis	3.25	K5 III	7	30	06.2	+1.905	-49	-43	21	30.32	07.49	+187
287	2891	α Gemino.* *cg*	1.95	Alm A2 Va	7	36	21.1	+3.819	-135	+31	49	32.80	-08.28	-98
291	2943	α C. Min.* *cg*	0.38	F5 IV-V	7	40	44.4	+3.137	-477	+5	09	08.98	09.55	-1021
297	3024	ζ Volantis	3.95	G9 III	7	41	27.8	-0.787	+67	-72	40	17.84	-08.57	+18

* **No. 225 : Prajapati.**
No. 227 : *Menkalinam* .
No. 243 : *Mirzam.*
No. 245 : *Canopus* , Agastya.
No. 251 : *Alhena* .
No. 257 : *Sirius* , Lubdhaka Mag. - 1.46.
No. 268 : *Adhara.*
No. 269 : Mekbuda Mag. 3.7 to 4.1.
No. 285 : *Gomeisa.*
No. 287 : *Castor,* Punarvasu-2, Mag. 1.95
No. 291 : *Procyon* , Mag. 0.38 & 11.3.

MEAN PLACES OF STARS, J 2027.5

FOR JULY 2^{d}.875 TERRESTRIAL TIME

(The Annual Variations are for the middle of the year)

Cat. No. FK5	BS =HR No.	Star	Mag.	Spec-tral Type	Right Ascension			Annual Variation	Annual Proper motion	Declination			Annual Variation	Annual Proper motion
					h	m	s	s	s (0.0001)	°	'	"	"	" (0.001)
293	2970	26α Monocerot	3.93	G9 III Fe-1	7	42	33.7	+2.866	-49	-9	37	01.78	-08.69	-19
294	2985	κ Geminorum	3.57	G8 III	7	46	06.3	+3.614	-24	+24	19	46.92	09.00	-52
295	2990	β Geminorum*	1.14	K0 IIIb	7	46	59.7	+3.661	-474	+27	57	26.76	09.06	-44
1204	3045	ξ Puppis	3.34	G6 Iab-Ib	7	50	27.1	+2.525	-2	-24	55	49.58	09.29	-2
301	3080	213 G. Puppis	3.73	K1/2 II + A	7	53	09.8	+2.065	-8	-40	38	53.22	09.49	+3
303	3117	χ Carinae	3.47	B3p Si	7	57	28.6	+1.524	-32	-53	03	25.42	09.81	+21
306	3165	ζ Puppis	2.25	O5 Iafn	8	04	33.1	+2.111	-24	-40	04	55.31	-10.35	+12
308	3185	ρ Puppis	2.81	F5 (Ib-II)p	8	08	43.0	+2.557	-61	-24	23	06.43	10.62	+49
309	3207	γ Velorum	1.78	WC8 + O9I	8	10	22.8	+1.850	-4	-47	25	07.79	10.79	+6
312	3249	β Cancri	3.52	K 4 III Ba 0.	8	18	00.3	+3.249	-30	+9	05	55.85	11.40	-49
315	3307	ε Carinae	1.86	B: III + B2:	8	23	04.5	+1.224	-35	-59	35	55.72	11.70	+15
319	3347	β Volantis	3.77	K2 III	8	26	01.7	+0.631	-61	-66	13	44.89	12.08	-155
316	3314	Br 1197 Hydra	3.90	A0 Va	8	27	02.0	+2.996	-44	-3	59	52.29	-12.02	-23
317	3323	*o* Ursae Maj.	3.36	G5 III	8	32	31.6	+4.924	-182	+60	37	24.32	12.48	-107
321	3366	η Cancri	5.33	K3 III	8	34	17.7	+3.459	-34	+20	20	44.80	12.54	-43
1223	3410	δ Hydrae	4.16	A1 Ivnn	8	39	06.6	+3.172	-44	+5	36	21.96	12.83	-7
1224	3418	σ Hydrae	4.44	K1 III	8	40	11.6	+3.132	-12	+3	14	35.17	12.91	-18
1227	3447	*o* Velorum	3.62	B3 IV	8	41	04.9	+1.719	-24	-53	01	14.10	12.93	+20
1226	3445	53 G. Velorum	3.84	F0 Ia	8	41	32.4	+1.994	+0	-46	44	51.75	-12.98	+3
327	3468	α Pyxidis	3.68	B1.5 III	8	44	41.9	+2.414	-9	-33	17	12.58	13.18	+11
1228	3449	γ Cancri	4.66	A1 Va	8	44	52.4	+3.461	-76	+21	22	03.71	13.24	-39
326	3461	δ Cancri*	3.94	K0 IIIb	8	46	14.6	+3.400	-13	+18	03	04.94	13.52	-228
(329)	3482	ε Hydrae* m	3.38	G5: III A:	8	48	13.7	+3.170	-155	+6	18	58.71	13.46	-40
328	3475	ι Cancri	4.02	G8 II-III	8	48	21.3	+3.615	-19	+28	39	26.57	13.48	-42
336	3571	108 G. Carinae	3.84	B7 II-III	8	55	40.1	+1.354	-28	-60	45	01.43	-13.86	+38
334	3547	ζ Hydrae	3.11	G9 IIIa	8	56	50.7	+3.167	-66	+5	50	21.21	13.96	+15
337	3572	α Cancri*	4.25	A5m	8	59	59.3	+3.274	+23	+11	44	58.51	14.20	-31
335	3569	ι Ursae Maj.	3.14	A7 Ivn	9	01	04.6	+4.073	-442	+47	55	53.92	14.46	-225
342	3614	97 G. Velorum	3.75	K2 III	9	05	06.3	+2.074	-44	-47	12	29.87	14.50	-13
341	3594	κ Ursae Maj.	3.60	A0 IIIn	9	05	29.4	+4.062	-32	+47	02	44.68	14.56	-54
345	3634	λ Velorum	2.21	K4.5 Ib	9	09	00.6	+2.212	-17	-43	32	40.94	-14.70	+13
1239	3627	ξ Cancri	5.14	IIIa Fe-0.5 C	9	10	56.1	+3.437	+1	+21	55	57.10	14.83	+5
348	3685	β Carinae	1.68	A1 III	9	13	29.4	+0.628	-311	-69	49	50.72	14.87	+109
347	3665	θ Hydrae	3.88	9.5 IV (C I	9	15	47.6	+3.118	+86	+2	11	48.20	15.42	-310
351	3699	ι Carinae	2.25	A7 Ib	9	17	49.5	+1.605	-26	-59	23	29.08	15.22	+8
1243	3718	θ Pyxidis	4.72	M0.5 III	9	22	42.7	+2.660	-8	-26	05	01.34	15.51	-8
352	3705	α Lyncis	3.13	K7 IIIab	9	22	43.4	+3.635	-179	+34	16	28.60	-15.48	+19
353	3734	κ Velorum*	2.50	B2 IV-V	9	22	58.0	+1.861	-10	-55	07	44.47	15.51	+9
354	3748	α Hydrae*	1.98	K3 II-III	9	28	56.3	+2.948	-9	-8	46	44.95	15.81	+33
361	3803	N Velorum	3.13	K5 III	9	32	03.5	+1.826	-39	-57	09	23.39	16.00	+4
355	3757	23 Ursae Maj.	3.67	F0 IV	9	33	40.0	+4.650	+160	+62	56	22.42	16.07	+27
358	3775	θ Ursae Maj.	3.17	F6 IV	9	34	40.8	+3.970	-1024	+51	33	01.08	-16.67	-529

* **No. 295 : *Pollux*, Punarvasu-1.**
No. 326 : Pusya.
No. 329 : Aslesa.
No. 337 : Acubens. (Aslesa.)
No. 353 : *Markeb*.
No. 354 : *Alphard*.

MEAN PLACES OF STARS, J 2027.5

FOR JULY $2^d.875$ TERRESTRIAL TIME

(The Annual Variations are for the middle of the year)

Cat. No. FK5	BS =HR No.	Star	Mag.	Spec-tral Type	Right Ascension			Annual Variation	Annual Proper motion	Declination			Annual Variation	Annual Proper motion
					h	m	s	s	s (0.0001)	°	'	"	"	" (0.001)
1250	3845	ι Hydrae	3.91	K2.5 III	9	41	15.6	+3.062	+32	-1	16	08.39	-16.54	-64
364	3849	κ Hydrae	5.06	B5 V	9	41	37.5	+2.878	-19	-14	27	29.74	16.52	-20
365	3852	*o* Leonis	3.52	F5 II + A5?	9	42	37.0	+3.196	-96	+9	45	57.22	16.58	-36
367	3873	ε Leonis	2.98	G1 II	9	47	24.4	+3.392	-34	+23	38	46.48	16.79	-11
368	3888	ν Ursae Maj.	3.80	F0 IV	9	52	55.3	+4.204	-379	+58	54	27.96	17.19	-150
371	3905	μ Leonis	3.88	2 III CN I C	9	54	19.3	+3.397	-160	+25	52	34.03	17.16	-56
375	3940	φVelorum	3.54	B5 Ib	9	57	49.9	+2.115	-12	-54	41	58.16	-17.26	+3
1261	3970	ν Hydrae	4.60	B8 V	10	06	27.9	+2.924	-25	-13	11	56.49	17.61	+18
379	3975	η Leonis	3.52	A0 Ib	10	08	49.7	+3.261	-1	+16	37	38.80	17.73	-0
380	3982	α Leonis*	1.35	B7 Vn	10	09	50.0	+3.188	-169	+11	49	54.19	17.76	+7
381	3994	λ Hydrae	3.61	K0 III CN 0.	10	11	55.8	+2.927	-138	-12	29	27.42	17.94	-88
385	4037	ω Carinae	3.32	B8 IIIn	10	14	23.3	+1.420	-76	-70	10	29.69	17.94	+7
382	4023	191 G.Velorum	3.85	A2 Va	10	15	53.7	+2.530	-131	-42	15	32.75	-17.96	+45
1264	4050	187 G. Carinae	3.40	K2.5 II	10	18	00.3	+2.014	-34	-61	28	13.23	18.08	+5
384	4031	ζ Leonis	3.44	F0 III	10	18	12.9	+3.324	+13	+23	16	45.17	18.10	-7
383	4033	λ Ursae Maj.	3.45	A1 IV	10	18	44.6	+3.589	-149	+42	46	33.39	18.15	-38
1268	4080	204 G.Velorum	4.83	K1 III	10	23	30.7	+2.585	-20	-41	47	21.12	18.23	+56
386	4069	μ Ursae Maj.	3.05	M0 III	10	23	57.4	+3.547	-72	+41	21	36.55	18.27	+35
391	4102	I Carinae	4.00	F2 V	10	24	56.0	+1.171	-52	-74	10	18.67	-18.37	-26
389	4094	μ Hydrae	3.81	K4 III	10	27	25.3	+2.906	-89	-16	58	39.21	18.51	-80
392	4104	α Antliae	4.25	K4.5 III	10	28	24.8	+2.755	-58	-31	12	30.95	18.45	+11
393	4114	196 G. Carinae	3.82	F0 Ib	10	28	53.6	+2.217	-17	-58	52	49.81	18.48	-0
1270	4116	δ Sextantis	5.21	B9.5 V	10	30	52.5	+3.047	-32	-2	52	50.58	18.56	-14
397	4140	203 G. Carinae	3.32	B4 Vne	10	33	00.5	+2.148	-27	-61	49	38.56	18.61	+9
396	4133	ρ Leonis	3.85	B1 Iab	10	34	15.4	+3.154	-4	+9	09	51.20	-18.66	-3
401	4174	γ Chamaeleonti	4.11	M0 III	10	35	46.2	+0.648	-144	-78	45	01.80	18.69	+14
406	4199	θ Carinae	2.76	B0.5 Vp	10	43	56.6	+2.158	-35	-64	32	20.50	18.94	+10
411	4234	δ Chamaeleont	4.45	B2.5 IV	10	46	00.2	+0.471	-201	-80	41	07.02	19.00	+8
410	4232	ν Hydrae	3.11	1.5 IIIb Hδ-0	10	50	59.0	+2.966	+66	-16	20	17.62	18.94	+200
412	4247	46 Leonis Min.	3.83	K0 III-IV	10	54	50.5	+3.336	+70	+34	03	57.37	19.51	-279
1283	4287	α Crateris	4.08	K0 III	11	01	07.0	+2.930	-324	-18	26	44.72	-19.25	+130
416	4295	β Ursae Maj.*	2.37	A1 IV-V	11	03	29.0	+3.573	+98	+56	14	03.59	19.40	+34
417	4301	α Ursae Maj.*	1.79	K0 IIIa	11	05	24.1	+3.642	-167	+61	36	06.29	19.54	-66
1289	4337	260 G. Carinae	3.91	G4 0-Ia	11	09	46.4	+2.589	-9	-59	07	27.90	19.56	-0
420	4335	ψ Ursae Maj.	3.01	K1 III	11	11	11.9	+3.345	-60	+44	20	55.53	19.62	-28
422	4357	δ Leonis*	2.56	A4 IV	11	15	34.0	+3.181	+101	+20	22	21.24	19.80	-130
423	4359	θ Leonis*	3.34	A2 IV (Kvar	11	15	40.8	+3.141	-42	+15	16	43.66	-19.75	-79
425	4377	ν Ursae Maj.	3.48	K3 III	11	19	57.5	+3.224	-20	+32	56	37.77	19.71	+28
426	4382	δ Crateris	3.56	9 IIIb CH 0	11	20	43.1	+3.006	-84	-14	55	39.91	19.54	+208
433	4434	λ Draconis	3.84	M0 III Ca-1	11	33	00.4	+3.481	-73	+69	10	44.30	19.92	-17
434	4450	ξ Hydrae	3.54	G7 III	11	34	21.6	+2.966	-162	-32	00	36.12	19.95	-39
436	4467	λ Centauri	3.13	B9.5 Iin	11	37	03.8	+2.805	-61	-63	10	19.69	-19.95	-5

* **No. 380 : *Regulus*, Magha.**
No. 416 : *Merak*, Pulaha.
No. 417 : *Dubhe*, Kratu.
No. 422 : *Zosma*, Purva Phalguni-1.
No. 423 : Purva Phalguni-2.

MEAN PLACES OF STARS, J 2027.5

FOR JULY $2^d.875$ TERRESTRIAL TIME

(The Annual Variations are for the middle of the year)

Cat. No. FK5	BS =HR No.	Star	Mag.	Spec-tral Type	Right Ascension			Annual Variation	Annual Proper motion	Declination			Annual Variation	Annual Proper motion
					h	m	s	s	s (0.0001)	°	'	"	"	" (0.001)
442	4520	λ Muscae	3.64	A7 IV	11	46	55.3	+2.880	-174	-66	52	52.61	-19.97	+37
441	4518	χ Ursae Maj.	3.71	K0.5 IIIb	11	47	29.5	+3.142	-136	+47	37	36.48	19.98	+30
1304	4527	93 Leonis*	4.53v	III-IV + A7	11	49	24.1	+3.087	-106	+20	03	57.55	20.02	-3
444	4534	β Leonis*	2.14	A3 Va	11	50	27.6	+3.056	-342	+14	25	05.61	20.14	-114
445	4540	β Virginis	3.61	F9 V	11	52	07.7	+3.126	+495	+1	36	34.64	20.30	-271
447	4554	γ Ursae Maj.*	2.44	A0 Van	11	55	15.9	+3.124	+107	+53	32	30.46	20.02	+12
452	4621	δ Centauri	2.60	B2 IVne	12	09	47.8	+3.142	-36	-50	52	31.69	-20.03	-8
453	4630	ε Corvi	3.00	K2.5 IIIa	12	11	32.6	+3.099	-51	-22	46	21.32	20.00	+13
455	4656	δ Crucis	2.80	B2 IV	12	16	37.3	+3.231	-53	-58	54	06.15	20.00	-9
456	4660	δ Ursae Maj.*	3.31	A2 Van	12	16	46.5	+2.938	+126	+56	52	47.89	19.98	+9
457	4662	γ Corvi*	2.59	B8p Hg Mn	12	17	13.5	+3.096	-112	-17	41	40.05	19.96	+23
459	4674	β Chamaeleont	4.26	B5 Vn	12	20	01.2	+3.685	-175	-79	27	52.67	19.95	+17
460	4689	η Virginis	3.89	AI IV	12	21	18.8	+3.070	-42	+0	30	51.09	-19.97	-18
462	4730	α Crucis*A	1.33	B0.5 IV	12	28	09.0	+3.395	-53	-63	15	04.14	19.90	-12
465	4757	δ Corvi*	2.95	B9.5 IV n	12	31	17.5	+3.115	-146	-16	40	05.62	19.99	-138
468	4763	γ Crucis	1.63v	M3.5 III	12	32	42.5	+3.374	+29	-57	16	00.52	20.10	-262
469	4773	γ Muscae	3.87	B5 V	12	34	08.8	+3.684	-127	-72	17	04.04	19.82	-2
472	4787	κ Draconis	3.87v	B6 IIIpe	12	34	38.5	+2.522	-112	+69	38	12.87	19.80	+12
471	4786	β Corvi	2.65	G5 IIb	12	35	50.2	+3.166	+2	-23	32	54.49	-19.85	-54
474	4798	α Muscae	2.69	B2 IV-V	12	38	51.3	+3.663	-90	-69	17	11.89	19.77	-13
475	4813	χ Virginis	4.66	K2 III CN 1.	12	40	40.1	+3.104	-51	-8	08	47.71	19.75	-25
1326	4828	ρ Virginis	4.88	A0 Va(λ Boo	12	43	16.6	+3.037	+57	+10	05	03.98	19.77	-90
481	4853	β Crucis	1.25	B0.5 III	12	49	20.9	+3.560	-63	-59	50	18.67	19.59	-14
483	4905	ε Ursae Maj.*	1.77	A0p Cr	12	55	13.9	+2.619	+132	+55	48	39.74	19.47	-6
484	4910	δ Virginis*	3.38	M3 III	12	56	59.4	+3.026	-313	+3	14	54.66	-19.48	-54
485	4915	α CVn sq*	2.90	A0p Si Eu	12	57	18.6	+2.796	-198	+38	10	13.37	19.36	+56
488	4932	ε Virginis*	2.83	G8 IIIab	13	03	32.7	+2.987	-185	+10	48	42.88	19.26	+20
487	4923	δ Muscae	3.62	K2 III	13	04	12.4	+4.247	+544	-71	41	46.75	19.28	-20
492	4983	β Com	4.26	F9.5 V	13	13	09.3	+2.795	-604	+27	44	21.84	18.15	+881
495	5020	γ Hydrae	3.00	G8 IIIa	13	20	25.4	+3.278	+47	-23	18	57.07	18.86	-45
496	5028	ι Centauri	2.75	A2 Va	13	22	09.2	+3.398	-284	-36	51	23.44	-18.85	-86
497	5054	ζ Ursae Maj.*p	2.27	A1 Va (Si)	13	25	01.7	+2.403	+141	+54	46	56.70	18.70	-20
498	5056	α Virginis*	0.98	B1 V	13	26	38.8	+3.171	-28	-11	18	14.36	18.65	-28
501	5107	ζ Virginis	3.37	A2 IV	13	36	05.5	+3.052	-190	+0	27	22.45	18.26	+42
504	5132	ε Centauri	2.30	B1 III	13	41	38.9	+3.850	-32	-53	36	18.18	18.12	-17
509	5191	η Ursae Maj.*	1.86	B3 V	13	48	37.3	+2.357	-125	+49	10	36.66	17.84	-11
508	5193	μ Centauri	3.04v	IV-Vpne(sh	13	51	17.1	+3.647	-21	-42	36	34.45	-17.74	-20
513	5235	η Bootis	2.68	G0 IV	13	55	59.7	+2.857	-44	+18	15	39.05	17.89	-358
512	5231	ζ Centauri	2.55	B2.5 IV	13	57	16.2	+3.782	-56	-47	25	20.86	-17.52	-43

* **No. 1304 : Uttara Phalguni-2.**
No. 444 : *Denebola,* Uttara Phalguni-1.
No. 447 : *Phecda or Phad,* Pulastya.
No. 456 : *Megrez,* Atri.
No. 457 : *Minkar.*
No. 462 : *Acrux* .
No. 465 : *Algorel* , Hasta.
No. 483 : *Alioth,* Angira.
No. 484 : Minelauva.
No. 485 : 12 Canum Venaticorum, Mag. *p*
No. 488 : *Vindemiatrix*.
No. 497 : *Mizar* , Vasista. Mag. *f* . 4.0.
No. 498 : *Spica* , Citra.
No. 509 : *Alkaid, Benetnasch,* Marichi.

MEAN PLACES OF STARS, J 2027.5

FOR JULY $2^d.875$ TERRESTRIAL TIME
(The Annual Variations are for the middle of the year)

Cat. No. FK5	BS =HR No.	Star	Mag.	Spec-tral Type	Right Ascension			Annual Variation	Annual Proper motion	Declination			Annual Variation	Annual Proper motion
					h	m	s	s	s (0.0001)	°	'	"	"	" (0.001)
521	5291	α Draconis*	3.65	A0 III	14	05	08.1	+1.629	-84	+64	14	42.07	-17.11	+18
518	5267	β Centauri*	0.61	B1 III	14	05	47.4	+4.303	-43	-60	30	14.75	17.12	-19
519	5287	π Hydrae	3.27	K2 III Fe-0.	14	07	56.7	+3.436	+33	-26	48	48.81	17.14	-139
520	5288	θ Centauri	2.06	K0 IIIb	14	08	18.7	+3.558	-429	-36	30	14.36	17.50	-520
523	5315	κ Virginis	4.19	2.5 III Fe-0	14	14	22.0	+3.212	+5	-10	24	01.67	16.55	+140
526	5340	α Bootis*	0	1.5 III Fe-0	14	16	55.0	+2.739	-768	+19	02	25.19	18.57	-2000
525	5338	ι Virginis	4.08	F7 III-IV	14	17	27.7	+3.156	-2	-6	07	49.85	-16.97	-432
1371	5359	λ Virginis	4.52	A5m:	14	20	36.2	+3.259	-11	-13	29	46.84	16.36	+30
531	5404	θ Bootis	4.05	F7 V	14	26	08.0	+2.042	-253	+51	43	28.31	16.50	-398
534	5429	ρ Bootis	3.58	K3 III	14	33	00.9	+2.585	-77	+30	15	06.71	15.62	+119
535	5435	γ Bootis	3.03	A7 IV	14	33	11.1	+2.414	-97	+38	11	20.57	15.58	+153
537	5440	η Centauri	2.31	.5 IVpne(sh	14	37	15.9	+3.842	-31	-42	16	37.08	15.54	-35
538	5460	α Centauri* cg	0	K1 V	14	41	29.3	+4.133	-5003	-60	56	49.71	-14.58	+690
541	5469	α Lupi	2.30	B1.5 III	14	43	46.4	+4.029	-21	-47	30	15.78	15.16	-18
545	5487	μ Virginis	3.88	F2 V	14	44	30.8	+3.172	+73	-5	46	34.54	15.41	-316
539	5463	α Circini	3.19	A 7p Sr Eu	14	44	45.8	+4.940	-302	-65	05	33.43	15.31	-233
544	5485	371 G.Cen	4.05	K3 IIIb	14	45	20.9	+3.695	-52	-35	17	25.49	15.23	-180
547	5511	109 Virginis	3.72	A0 Ivnn	14	47	38.5	+3.040	-76	+1	46	42.15	14.94	-27
550	5563	β Ursae Min.*	2.08	K4 III	14	50	39.3	-0.099	-76	+74	02	34.87	-14.72	+12
542	5470	α Apodis	3.83	K3 III CN 0.	14	51	24.8	+7.816	-40	-79	09	28.52	14.71	-16
548	5531	α Librae*	2.75	A3 III-IV	14	52	24.3	+3.333	-73	-16	09	15.93	14.70	-67
552	5571	β Lupi	2.68	B2 IV	15	00	20.7	+3.962	-32	-43	14	34.16	14.19	-39
553	5576	κ Centauri	3.13	B2 V	15	00	57.7	+3.934	-17	-42	12	45.66	14.14	-24
555	5602	β Bootis	3.50	G8 IIIa Fe-0.	15	02	58.9	+2.261	-35	+40	16	59.82	14.01	-28
556	5603	σ Librae	3.29	M2.5 III	15	05	41.2	+3.529	-54	-25	23	17.64	-13.86	-43
559	5652	ι Librae*	4.54	B9p Si	15	13	47.7	+3.435	-25	-19	53	38.32	13.33	-39
558	5649	ζ Lupi	3.41	G8 III	15	14	16.7	+4.355	-122	-52	12	05.88	13.33	-73
563	5681	δ Bootis	3.47	G8 III Fe-I	15	16	36.7	+2.421	+69	+33	12	48.74	13.22	-112
564	5685	β Librae*	2.61	B8 IIIn	15	18	29.4	+3.239	-65	-9	28	57.47	13.00	-19
569	5735	γ Ursae Min.	3.05	A 3 III	15	20	42.4	-0.038	-40	+71	44	10.09	12.81	+20
560	5671	γ Tr. Austrini	2.89	A1 III	15	21	31.1	+5.713	-132	-68	46	41.12	-12.81	-31
1402	5695	δ Lupi	3.22	B1.5 IVn	15	23	11.3	+3.966	-13	-40	44	42.17	12.69	-26
566	5705	φ' Lupi	3.56	K4 III	15	23	33.6	+3.831	-74	-36	21	32.66	12.73	-85
571	5744	ι Draconis	3.29	K2 III	15	25	32.7	+1.346	-12	+58	52	13.77	12.49	+17
572	5747	β Cr. Borealis	3.68	F0p Cr Eu	15	28	57.8	+2.476	-137	+29	00	44.39	12.19	+86
578	5793	α Cr.Borealis*	2.23	A0 IV	15	35	51.2	+2.543	+91	+26	37	25.13	11.88	-88
577	5787	γ Librae	3.91	G8.5 III	15	37	04.2	+3.368	+45	-14	52	45.54	-11.69	+9
579	5794	ν Librae	3.58	K3.5 III	15	38	42.0	+3.660	-7	-28	13	26.40	11.59	+3
1413	5838	κ Librae	4.74	M0 IIIb	15	43	32.2	+3.470	-26	-19	45	57.42	11.34	-103
582	5854	α Serpentis*	2.65	K2 IIIb CN	15	45	37.5	+2.961	+92	+6	20	27.29	-11.04	+47

* **No. 518 : *Agena*.**
No. 521 : *Thuban*.
No. 526 : *Arcturus*, Svati.
No. 538 : Rigil *Kentaurus* Mag. 0.33 & 1.70.
No. 548 : *Zuben el Genubi*, Visakha.
No. 550 : *Kochab*.
No. 559 : Visakha.
No. 564 : *Zuben es Chamali.*
No. 578 : *Margarita, Alphecca.*
No. 582 : *Unukalhaly.*

MEAN PLACES OF STARS, J 2027.5

FOR JULY 2^{d}.875 TERRESTRIAL TIME

(The Annual Variations are for the middle of the year)

Cat. No. FK5	BS =HR No.	Star	Mag.	Spec-tral Type	Right Ascension			Annual Variation	Annual Proper motion	Declination			Annual Variation	Annual Proper motion
					h	m	s	s	s (0.0001)	°	'	"	"	" (0.001)
583	5867	β Serpentis	3.67	A2 IV	15	47	27.5	+2.773	+46	+15	20	14.78	-11.00	-45
585	5881	μ Serpentis	3.54	A0 III	15	51	03.5	+3.139	-57	-3	30	44.92	10.71	-24
588	5892	ε Serpentis	3.71	A5m	15	52	11.4	+2.997	+86	+4	23	48.49	10.54	+63
589	5897	β Tr.Australis	2.85	F0 1V	15	57	35.5	+5.355	-282	-63	30	44.43	10.60	-399
591	5933	γ Serpentis	3.85	F6 V	15	57	43.5	+2.777	+218	+15	34	25.04	11.47	-1281
592	5944	π Scorpii	2.89	B1 V + B2 V	16	00	31.3	+3.644	-8	-26	11	27.68	10.01	-26
594	5953	δ Scorpii*	2.32	B0.3 IV	16	01	57.9	+3.561	-8	-22	41	51.83	-09.89	-22
597	5984	β Scorpii*pr	2.62	B0.5 V	16	07	02.4	+3.501	-4	-19	52	42.51	09.50	-19
603	6056	δ Ophiuchi	2.74	M0.5 III	16	15	47.4	+3.151	-29	-3	45	47.11	08.94	-143
605	6075	ε Ophiuchi	3.24	9.5 IIIb Fe-0	16	19	46.8	+3.182	+57	-4	45	26.85	08.45	+41
608	6092	τ Herculis	3.89	B5 IV	16	20	34.1	+1.808	-11	+46	14	56.72	08.38	+40
607	6084	σ Scorpii	2.89	B1 III	16	22	51.9	+3.660	-8	-25	39	23.24	08.26	-21
609	6095	γ Herculis	3.75	A9 IIIbn	16	23	08.1	+2.650	-33	+19	05	24.98	-08.18	+43
613	6117	ω Herculis	4.57	B9 p Cr	16	26	41.2	+2.773	+30	+13	58	18.46	08.00	-59
616	6134	α Scorpii* cg	var.	M1.5 Iab-Ib	16	31	05.9	+3.691	-7	-26	29	26.06	07.60	-20
618	6148	β Herculis	2.77	7 III a Fe-0	16	31	24.2	+2.583	-70	+21	25	53.04	07.57	-15
620	6165	τ Scorpii	2.82	B0 V	16	37	36.0	+3.747	-6	-28	16	14.18	07.07	-22
611	6102	γ Apodis	3.89	G8/K0 III	16	37	45.5	+9.438	-452	-78	57	10.17	07.12	-77
622	6175	ζ Ophiuchi	2.56	O9.5 Vn	16	38	40.6	+3.311	+9	-10	37	14.04	-06.94	+26
626	6220	η Herculis	3.53	G7 III Fe-1	16	43	50.4	+2.061	+32	+38	52	17.16	06.62	-82
1438	6243	20 Ophiuchi	4.65	F7 III	16	51	21.5	+3.326	+65	-10	49	45.82	06.01	-92
625	6217	α Tr. Austr.*	1.92	K2 IIb-IIIa	16	51	36.1	+6.418	+27	-69	04	26.18	05.93	-34
628	6241	ε Scorpii	2.29	K2 III	16	51	57.0	+3.899	-493	-34	20	26.08	06.12	-257
1435	6229	η Arae	3.76	K5 III	16	52	10.4	+5.215	+49	-59	05	13.40	05.87	-28
1439	6247	μ^{1} Scorpii	3.08v	B1.5 IVn	16	53	44.3	+4.078	-9	-38	05	30.70	-05.74	-25
633	6299	κ Ophiuchi	3.20	K2 III	16	58	58.3	+2.844	-197	+9	20	03.24	05.29	-11
631	6285	ζ Arae	3.13	K4 III	17	00	54.3	+4.991	-23	-56	01	48.70	05.15	-36
634	6324	ε Herculis	3.92	A0 IV	17	01	20.6	+2.299	-36	+30	53	15.11	05.05	+27
635	6355	60 Herculis	4.91	A4 IV	17	06	39.3	+2.786	+35	+12	42	18.13	04.63	-10
639	6396	ζ Draconis	3.17	B6 III	17	08	52.3	+0.189	-33	+65	40	51.35	04.41	+22
638	6380	η Scorpii	3.33	F2 V:p(Cr)	17	14	07.7	+4.311	+23	-43	16	20.78	-04.27	-287
643	6418	π Herculis	3.16	K3 II	17	16	00.4	+2.093	-22	+36	46	46.83	03.82	+4
641	6410	δ Herculis	3.14	A1 Vann	17	16	09.8	+2.468	-15	+24	48	30.74	03.97	-157
644	6453	θ Ophiuchi	3.27	B2 IV	17	23	42.1	+3.691	-3	-25	01	27.73	03.18	-20
645	6461	β Arae	2.85	K3 Ib-IIa	17	27	35.5	+5.003	-9	-55	33	08.71	02.85	-25
1457	6486	44 Ophiuchi	4.17	A9m:	17	28	03.1	+3.670	+0	-24	11	52.91	02.90	-116
653	6536	β Draconis	2.79	G2 Ib-IIa	17	31	03.3	+1.360	-17	+52	16	55.36	-02.51	+15
649	6508	ν Scorpii	2.69	B2 IV	17	32	38.2	+4.086	-1	-37	18	53.77	02.42	-31
648	6500	δ Arae	3.62	B8 Vn	17	33	35.2	+5.433	-79	-60	42	10.69	02.40	-97
651	6510	α Arae	2.95	B2 Vne	17	33	58.3	+4.648	-32	-49	53	41.23	02.34	-70
652	6527	λ Scorpii*	1.63	B1.5 IV	17	35	28.7	+4.081	-1	-37	07	15.62	02.17	-29
656	6556	α Ophiuchi*	2.08	A5 Vnn	17	36	12.7	+2.788	+83	+12	32	31.29	-02.30	-226

* **No. 594 : *Dschubba,* Anuradha**
No. 597 : *Graffias,* Mag. 2.9, 5.1
No. 616 : *Antares* , Jyestha, Mag. 0.9 to 1.8.
No. 625 : *Atria.*
No. 652 : *Schaula* , Mula.
No. 656 : *Ras Alhague.*

MEAN PLACES OF STARS, J 2027.5

FOR JULY 2^{d}.875 TERRESTRIAL TIME

(The Annual Variations are for the middle of the year)

Cat. No. FK5	BS =HR No.	Star	Mag.	Spec-tral Type	Right Ascension			Annual Variation	Annual Proper motion	Declination			Annual Variation	Annual Proper motion
					h	m	s	s	s (0.0001)	°	'	"	"	" (0.001)
658	6561	ξ Serpentis	3.54	F0 IIIb	17	39	09.8	+3.439	-29	-15	24	48.31	-01.88	-58
654	6553	θ Scorpii	1.87	F1 III	17	39	17.9	+4.318	+14	-43	00	44.35	01.81	-2
663	6588	ι Herculis	3.80	B3 IV	17	40	14.5	+1.697	-5	+45	59	34.66	01.72	+5
660	6580	κ Scorpii	2.41	B1.5 III	17	44	23.5	+4.156	-5	-39	02	28.61	01.39	-27
665	6603	β Ophiuchi	2.77	K2 III CN 0.	17	44	49.9	+2.966	-27	+4	33	28.56	01.17	+159
667	6623	μ Herculis	3.42	G5IV	17	47	32.2	+2.352	-232	+27	42	22.43	01.84	-752
661	6582	η Pavonis	3.62	K1 IIIa CN	17	48	26.2	+5.900	-21	-64	43	58.31	-01.07	-54
668	6629	γ Ophiuchi	3.75	A0 Van	17	49	16.4	+3.011	-14	+2	41	56.71	01.01	-74
666	6615	ι Scorpii	3.03	F2 Ia	17	49	30.6	+4.201	-0	-40	08	05.11	00.93	-8
669	6630	*G* Scorpii	3.21	K2 III	17	51	43.9	+4.087	+41	-37	02	57.08	00.69	+33
671	6688	ξ Draconis	3.75	K2 III	17	54	00.3	+1.040	+114	+56	52	08.77	00.44	+80
672	6695	θ Herculis	3.86	K1 IIa CN2	17	57	11.8	+2.060	+4	+37	14	54.20	00.24	+6
676	6705	γ Draconis*	2.23	K5 III	17	57	14.7	+1.396	-8	+51	29	12.28	-00.26	-19
674	6703	ξ Herculis	3.70	G8.5 III	17	58	50.1	+2.334	+64	+29	14	47.91	00.12	-17
673	6698	ν Ophiuchi	3.34	G 9 IIIa	18	00	32.5	+3.305	-4	-9	46	28.80	-00.07	-116
677	6714	67 Ophiuchi	3.97	B5 Ib	18	02	01.4	+3.007	+1	+2	55	56.58	+00.17	-8
679	6746	γ Sagittarii	2.99	K0 III	18	07	34.5	+3.855	-41	-30	25	15.70	00.48	-185
681	6779	*o* Herculis	3.83	A0 II-III	18	08	37.0	+2.343	+1	+28	46	04.70	00.76	+10
680	6771	72 Ophiuchi	3.73	A5 IV-V	18	08	39.3	+2.846	-41	+9	34	11.30	+00.84	+80
1471	6743	θ Arae	3.66	B2 Ib	18	08	46.3	+4.670	-10	-50	05	11.44	00.75	-14
682	6812	μ Sagittarii	3.86	B9 Ia	18	15	24.5	+3.589	+1	-21	02	56.70	01.35	+1
683	6832	η Sagittarii	3.11	M3.5 IIIab	18	19	29.3	+4.059	-106	-36	45	02.17	01.53	-167
695	6927	χ Draconis	3.57	F7 V	18	20	33.5	-1.088	+1202	+72	44	38.75	01.45	-345
688	6869	η Serpentis	3.26	K0 III-IV	18	22	44.0	+3.106	-364	-2	53	22.14	01.28	-702
687	6859	δ Sagittarii*	2.70	2.5 IIIa CN (	18	22	45.3	+3.840	+27	-29	48	49.57	+01.96	-28
690	6895	109 Herculis	3.84	K2 IIIab	18	24	52.2	+2.559	+141	+21	47	02.72	01.93	-242
689	6879	ε Sagittarii*	1.85	A0 II n(shell	18	25	59.8	+3.980	-31	-34	22	07.94	02.14	-124
691	6897	α Telescopii	3.51	B3 IV	18	29	00.7	+4.444	-15	-45	57	00.76	02.48	-54
692	6913	λ Sagittarii	2.81	K1 IIIb	18	29	40.0	+3.701	-32	-25	24	14.12	02.40	-185
697	6951	θ Coronae Aust	4.64	G8 III	18	35	27.9	+4.279	+28	-42	17	23.08	03.07	-22
1482	6973	α Scuti	3.85	K3 III	18	36	42.2	+3.265	-10	-8	13	21.10	+02.88	-312
699	7001	α Lyrae*	0.03	A0 Va	18	37	52.2	+2.033	+172	+38	48	38.60	03.58	+287
1487	7039	φ Sagittarii	3.17	B8 III	18	47	22.4	+3.745	+40	-26	57	35.71	04.11	+1
1489	7063	β Scuti	4.22	G4 IIa	18	48	38.0	+3.183	-3	-4	42	58.45	04.20	-16
705	7106	β Lyrae*	var.	37 Vpe(shell	18	51	05.8	+2.217	+3	+33	23	46.24	04.43	-3
706	7121	σ Sagittarii*	2.02	B3 IV	18	56	58.1	+3.715	+10	-26	15	36.11	04.88	-54
710	7150	ξ Sagittarii	3.51	K1 III	18	59	22.1	+3.575	+24	-21	04	05.01	+05.12	-12
713	7178	γ Lyrae	3.24	B9 II	18	59	58.4	+2.246	-2	+32	43	43.87	05.19	+2
712	7176	ε Aquilae	4.02	K1 III CN 0.	19	00	52.3	+2.724	-35	+15	06	27.00	05.19	-74
716	7235	ζ Aquilae	2.99	A0 Vann	19	06	40.5	+2.758	-3	+13	54	22.42	05.65	-96
717	7236	λ Aquilae	3.44	IVp(wk 44	19	07	42.5	+3.183	-11	-4	50	20.82	05.74	-90
1496	7234	τ Sagittarii	3.32	K1.5 IIIb	19	08	39.3	+3.740	-40	-27	37	39.79	+05.66	-251

No. 676 : *Eltanin.*
No. 687 : Purvasadha-1.
No. 689 : *Kaus Australis* , Purvasadha-2.
No. 699 : *Vega* , Abhijit.
No. 705 : Sheliak Mag. 3.3 to 4.3.
No. 706 : *Nunki* , Uttarasadha.

MEAN PLACES OF STARS, J 2027.5

FOR JULY 2^{d}.875 TERRESTRIAL TIME

(The Annual Variations are for the middle of the year)

Cat. No. FK5	BS =HR No.	Star	Mag.	Spectral Type	Right Ascension			Annual Variation	Annual Proper motion	Declination			Annual Variation	Annual Proper motion
					h	m	s	s	s (0.0001)	°	'	"	"	" (0.001)
720	7264	π Sagittarii	2.89	F2 II-III	19	11	23.8	+3.563	-0	-20	58	38.97	+06.11	-35
723	7310	δ Draconis	3.07	G9 III	19	12	33.2	-0.005	+164	+67	42	35.71	06.33	+93
726	7328	κ Cygni	3.77	G9 III	19	17	44.2	+1.384	+65	+53	25	12.64	06.79	+125
730	7377	δ Aquilae	3.36	F2 IV-V	19	26	53.1	+3.024	+171	+3	10	17.87	07.50	+83
1508	7405	α Vulpeculae	4.44	M0.5 IIIb	19	29	51.0	+2.498	-92	+24	43	20.05	07.55	-106
733	7420	ι Cygni	3.79	A4 V	19	30	23.9	+1.511	+21	+51	47	21.86	07.83	+130
732	7417	β Cygni∗*p*	3.08	3 II + B9.5	19	31	49.9	+2.421	+2	+28	01	08.53	+07.82	-2
1513	7488	β Sagittae	4.37	8 IIIa CN 0	19	42	17.1	+2.695	+7	+17	32	29.42	08.62	-32
741	7525	γ Aquilae	2.72	K3 II	19	47	34.0	+2.852	+12	+10	40	55.61	09.06	-2
743	7536	δ Sagittae	3.82	12 II + A0	19	48	36.9	+2.676	+5	+18	36	13.79	09.15	+8
745	7557	α Aquilae∗	0.77	A7 Vnn	19	52	07.5	+2.926	+362	+8	56	34.26	09.81	+388
746	7570	η Aquilae	var.	F6-GI Ib	19	53	52.4	+3.054	+7	+1	04	41.41	09.55	-7
749	7602	β Aquilae∗	3.71	G8 IV	19	56	39.8	+2.946	+33	+6	28	38.22	+09.28	-482
752	7635	γ Sagittae	3.47	M0 III	19	59	58.8	+2.669	+46	+19	34	06.70	10.04	+24
751	7623	θ Sagittarii	4.37	B2.5 IV	20	01	31.2	+3.889	+5	-35	11	58.57	10.11	-26
754	7665	δ Pavonis	3.56	G6/8 IV	20	11	23.7	+5.809	+1999	-66	06	30.21	09.75	-1124
756	7710	θ Aquilae	3.23	B9.5 III	20	12	42.5	+3.060	+26	+0	54	17.61	10.97	+4
757	7735	31 *o* Cygni	3.79	K2 II+ B4 V	20	14	29.9	+1.890	+4	+46	49	33.27	11.10	+3
761	7754	α Capricorni∗	3.57	G9III	20	19	34.6	+3.322	+44	-12	27	27.53	+11.47	+4
762	7776	β Capricorni	3.08	II: + A5n:	20	22	33.2	+3.363	+29	-14	41	33.32	11.68	+2
765	7796	γ Cygni	2.20	F8 Ib	20	23	13.0	+2.155	+4	+40	20	45.62	11.72	+0
764	7790	α Pavonis	1.94	B2.5 V	20	27	48.3	+4.698	+9	-56	38	39.59	11.96	-89
768	7852	ε Delphini	4.03	B6 III	20	34	31.6	+2.866	+9	+11	23	54.07	12.49	-22
(771)	7882	β Delphini∗m	3.64	F5 IV	20	38	50.3	+2.814	+82	+14	41	31.94	12.76	-47
769	7869	α Indi	3.11	K0 III CN-1	20	39	29.4	+4.188	+52	-47	11	36.05	+12.91	+66
774	7906	α Delphini∗	3.77	B9 IV	20	40	54.9	+2.787	+46	+16	00	38.01	12.94	-2
777	7924	α Cygni∗	1.25	A2 Ia	20	42	22.2	+2.048	+3	+45	22	47.14	13.04	+2
778	7928	δ Delphini	4.43	F0m	20	44	44.6	+2.801	-13	+15	10	29.00	13.15	-43
783	7957	η Cephei	3.43	K0 IV	20	45	50.7	+1.208	+118	+61	56	46.59	14.09	+819
780	7949	ε Cygni	2.46	K0 III	20	47	19.5	+2.431	+286	+34	04	28.54	13.69	+329
775	7913	β Pavonis	3.42	A6 IV	20	47	24.0	+5.314	-75	-66	06	05.60	+13.38	+11
1541	7948	γ Delphini sq	4.27	K1 IV	20	47	56.1	+2.784	-22	+16	13	29.55	13.21	-197
781	7950	ε Aquarii	3.77	A1 III	20	49	09.7	+3.241	+24	-9	23	36.14	13.45	-34
1547	7990	μ Aquarii	4.73	F2m	20	54	08.1	+3.230	+30	-8	52	42.43	13.77	-30
785	7986	β Indi	3.65	K1 II	20	56	56.2	+4.630	+21	-58	20	53.07	13.95	-26
1550	8039	γ Microscopii	4.67	G8 III	21	02	58.2	+3.661	-2	-32	08	54.45	14.36	+5
792	8079	ξ Cygni	3.72	K4.5 Ib-II	21	05	56.0	+2.187	+8	+44	02	19.16	+14.53	+1
797	8115	ζ Cygni	3.20	III-IIIa Ba	21	14	06.5	+2.558	+1	+30	20	27.56	14.96	-56
800	8131	α Equulei	3.92	II-III + A4	21	17	11.9	+2.998	+40	+5	21	46.61	15.11	-87
803	8162	α Cephei∗	2.44	A7 V n	21	19	14.0	+1.427	+219	+62	42	09.96	15.36	+50
806	8204	ζ Capricorni	3.74	G4 Ib: Ba 2	21	28	13.9	+3.412	+1	-22	17	26.67	+15.83	+23

∗ **No. 732 : *Albireo*., Mag. *f*. 5.4.**
No. 745 : *Altair*, Sravana.
No. 749 : *Alshain*.
No. 761 : Giedi or Algedi.
No. 771 : *Rotanev*, Dhanistha-1.
No. 774 : *Saulocin*, Dhanistha-2.
No. 777 : *Deneb*.
No. 803 : *Alderamin*.

MEAN PLACES OF STARS, J 2027.5

FOR JULY $2^d.875$ TERRESTRIAL TIME

(The Annual Variations are for the middle of the year)

Cat. No. FK5	BS =HR No.	Star	Mag.	Spec-tral Type	Right Ascension			Annual Variation	Annual Proper motion	Declination			Annual Variation	Annual Proper motion
					h	m	s	s	s (0.0001)	°	'	"	"	" (0.001)
809	8238	β Cephei	3.23	B1 III	21	29	0.211	+0.744	+21	+70	40	54.35	+15.85	+7
808	8232	β Aquarii*	2.91	G0 Ib	21	33	00.3	+3.153	+14	-5	26	55.90	16.05	-8
1569	8264	ξ Aquarii	4.69	A5 Vn	21	39	12.8	+3.188	+78	-7	43	46.52	16.35	-25
812	8278	γ Capricorni	3.68	A7 m:	21	41	36.6	+3.314	+132	-16	32	12.39	16.47	-23
810	8254	ν Octantis	3.76	K0 III	21	44	25.5	+6.386	+141	-77	15	55.27	16.40	-240
819	8322	δ Capricorni	var.	F2m	21	45	32.2	+2.947	+21	+10	00	07.99	16.69	-1
815	8308	ε Pegasi*	2.87	K2 Ib-II	21	48	33.3	+3.302	+183	-16	00	04.45	+16.54	-296
822	8353	γ Gruis	3.01	B8 IV-Vs	21	55	35.1	+3.609	+86	-37	14	03.29	17.14	-21
827	8414	α Aquarii*	2.96	G2 Ib	22	07	11.5	+3.072	+13	+0	27	16.13	17.65	-10
831	8430	ι Pegasi	3.76	F5 V	22	08	17.6	+2.799	+220	+25	28	49.25	17.73	+25
829	8425	α Gruis*	1.74	B7 Vn	22	09	57.2	+3.746	+126	-46	49	35.87	17.62	-151
834	8450	θ Pegasi	3.53	A2m AI IV-V	22	11	35.2	+3.026	+185	+6	20	02.88	17.87	+27
836	8465	ζ Cephei	3.35	K1.5 Ib	22	11	48.8	+2.092	+19	+58	20	14.96	+17.85	+4
841	8502	α Tucanae	2.86	K3 III	22	20	21.7	+4.045	-96	-60	07	16.85	18.13	-43
842	8518	γ Aquarii	3.84	B9.5 III-IV	22	23	04.5	+3.096	+88	-1	14	52.35	18.28	+7
846	8556	δ' Gruis	3.97	G6/8 III	22	30	54.1	+3.556	+26	-43	21	14.99	18.54	-5
848	8585	α Lacertae	3.77	A1 Va	22	32	25.8	+2.487	+144	+50	25	28.46	18.61	+19
849	8592	ν Aquarii	5.20	F5 V	22	36	11.6	+3.271	+158	-20	33	59.46	18.57	-144
850	8597	η Aquarii	4.02	B9 IV-V:n	22	36	46.1	+3.079	+61	+0	15	36.05	+18.68	-56
855	8634	ζ Pegasi	3.40	B8.5 III	22	42	50.1	+2.995	+55	+10	58	32.17	18.90	-12
856	8636	β Gruis	2.94	M4.5 III	22	44	17.7	+2.823	+11	+30	21	56.67	18.93	-25
857	8650	η Pegasi	2.11v	G8 II + F0V	22	44	17.8	+3.549	+133	-46	44	24.20	18.95	-8
860	8675	ε Gruis	3.49	A2 Va	22	50	12.1	+3.585	+115	-51	10	17.50	19.05	-71
863	8694	ι Cephei	3.52	K0⁻ III	22	50	40.0	+2.156	-108	+66	20	43.84	19.01	-125
861	8679	τ Aquarii	4.01	M0 III	22	51	02.7	+3.169	-8	-13	26	48.61	+19.10	-38
862	8684	μ Pegasi	3.48	G8⁻ III	22	51	20.0	+2.904	+108	+24	44	50.68	19.11	-42
864	8698	λ Aquarii*	3.74	K2.5 III Fe-0	22	54	02.8	+3.126	+8	-7	25	57.59	19.25	+37
866	8709	δ Aquarii	3.27	A3 IV-V	22	56	06.4	+3.176	-28	-15	40	26.26	19.24	-25
867	8728	α PsA*	1.16	A3 Va	22	59	09.9	+3.299	+255	-29	28	33.26	19.17	-164
869	8762	ο Andromedae	3.62	B6 pe (shell)	23	03	11.6	+2.777	+20	+42	28	27.26	19.42	-6
870	8775	β Pegasi*	2.42v	M2.5 II-III	23	05	06.7	+2.920	+143	+28	13	56.92	+19.61	+138
871	8781	α Pegasi*	2.49	A0 III-IV	23	06	08.0	+2.994	+44	+15	21	13.34	19.45	-42
873	8812	88 Aquarii	3.66	K1.5 III	23	10	54.5	+3.189	+40	-21	01	21.59	19.61	+31
878	8852	γ Piscium	3.69	G9 III: Fe-2	23	18	35.5	+3.112	+509	+3	25	58.52	19.73	+17
890	8961	λ Andromedae	3.82v	G8 III-IV	23	38	55.2	+2.961	+157	+46	36	26.52	19.54	-421
893	8974	γ Cephei	3.21	K1 III-IV CN	23	40	30.1	+2.530	-213	+77	47	09.99	20.12	+151
902	9072	ω Piscium	4.01	F4V	0	00	43.6	+3.086	+103	+7	00	55.81	+19.93	-115

BS = Bright Star Catalogue HR = Havard Revised Catalogue FK5 = Fifth Fundamental Catalogue

* **No. 808 : *Sadalsuud.***
No. 815 : *Enif* . Mag. 0.7 to 3.5.
No. 827 : *Sadalmelik.*
No. 829 : *Al Nair.*
No. 864 : Satabhisaj.
No. 867 : *Fomalhaut* .
No. 870 : *Scheat* , Purva Bhadrapada-2.
No. 871 : *Markab* , Purva Bhadrapada-1.

APPARENT PLACES OF STARS, 2027

FOR 0^h TERRESTRIAL TIME

Name	γ Pegasi (HR39)						α Phoenicis (HR 99)						β Ceti (HR 188)						β Andromedae (HR 337)					
Mag. Spect.	2.83			B2 IV			2.39			K0 III b			2.04			G9 III CH-1-CN 0.5 Ca 1			2.06			$M0^+$IIIa		
U.T.	Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination		
	h	m	s	°	'	"	h	m	s	°	'	"	h	m	s	°	'	"	h	m	s	°	'	"
Jan. 1	0	14	38	+15	20	09	0	27	38	-42	09	44	0	44	57	-17	50	22	1	11	16	+35	46	04
11	0	14	38	15	20	09	0	27	38	42	09	44	0	44	57	17	50	23	1	11	16	35	46	03
21	0	14	38	15	20	08	0	27	37	42	09	43	0	44	57	17	50	23	1	11	16	35	46	03
31	0	14	38	15	20	07	0	27	37	42	09	42	0	44	57	17	50	23	1	11	15	35	46	02
Feb. 10	0	14	38	15	20	06	0	27	37	42	09	41	0	44	57	17	50	23	1	11	15	35	46	00
20	0	14	38	15	20	05	0	27	37	42	09	39	0	44	57	17	50	22	1	11	15	35	45	59
Mar. 2	0	14	38	+15	20	04	0	27	37	-42	09	37	0	44	57	-17	50	21	1	11	15	+35	45	57
12	0	14	38	15	20	03	0	27	37	42	09	34	0	44	57	17	50	20	1	11	15	35	45	56
22	0	14	38	15	20	03	0	27	37	42	09	32	0	44	57	17	50	19	1	11	15	35	45	54
Apr. 1	0	14	38	15	20	02	0	27	37	42	09	29	0	44	57	17	50	17	1	11	15	35	45	53
11	0	14	38	15	20	02	0	27	37	42	09	26	0	44	57	17	50	15	1	11	15	35	45	51
21	0	14	38	15	20	02	0	27	37	42	09	23	0	44	57	17	50	13	1	11	15	35	45	50
May 1	0	14	38	+15	20	03	0	27	37	-42	09	19	0	44	57	-17	50	11	1	11	15	+35	45	49
11	0	14	39	15	20	04	0	27	38	42	09	16	0	44	57	17	50	09	1	11	15	35	45	49
21	0	14	39	15	20	05	0	27	38	42	09	14	0	44	58	17	50	06	1	11	16	35	45	49
31	0	14	39	15	20	06	0	27	38	42	09	11	0	44	58	17	50	04	1	11	16	35	45	49
June 10	0	14	39	15	20	08	0	27	39	42	09	08	0	44	58	17	50	01	1	11	16	35	45	50
20	0	14	40	15	20	10	0	27	39	42	09	06	0	44	59	17	49	59	1	11	17	35	45	51
30	0	14	40	+15	20	12	0	27	39	-42	09	04	0	44	59	-17	49	57	1	11	17	+35	45	52
July 10	0	14	40	15	20	14	0	27	40	42	09	03	0	44	59	17	49	55	1	11	18	35	45	54
20	0	14	41	15	20	16	0	27	40	42	09	02	0	45	00	17	49	53	1	11	18	35	45	56
30	0	14	41	15	20	18	0	27	40	42	09	01	0	45	00	17	49	52	1	11	18	35	45	57
Aug. 9	0	14	41	15	20	20	0	27	41	42	09	01	0	45	00	17	49	51	1	11	19	35	45	60
19	0	14	42	15	20	23	0	27	41	42	09	02	0	45	00	17	49	50	1	11	19	35	46	02
29	0	14	42	+15	20	25	0	27	41	-42	09	02	0	45	01	-17	49	50	1	11	19	+35	46	05
Sept. 8	0	14	42	15	20	26	0	27	42	42	09	04	0	45	01	17	49	50	1	11	19	35	46	07
18	0	14	42	15	20	28	0	27	42	42	09	05	0	45	01	17	49	50	1	11	20	35	46	09
28	0	14	42	15	20	29	0	27	42	42	09	07	0	45	01	17	49	51	1	11	20	35	46	12
Oct. 8	0	14	42	15	20	30	0	27	42	42	09	09	0	45	01	17	49	52	1	11	20	35	46	14
18	0	14	42	15	20	31	0	27	42	42	09	12	0	45	01	17	49	53	1	11	20	35	46	16
28	0	14	42	+15	20	32	0	27	42	-42	09	14	0	45	01	-17	49	54	1	11	20	+35	46	18
Nov. 7	0	14	42	15	20	32	0	27	42	42	09	16	0	45	01	17	49	55	1	11	20	35	46	20
17	0	14	42	15	20	32	0	27	42	42	09	18	0	45	01	17	49	57	1	11	20	35	46	21
27	0	14	42	15	20	32	0	27	41	42	09	20	0	45	01	17	49	58	1	11	20	35	46	22
Dec. 7	0	14	42	15	20	32	0	27	41	42	09	21	0	45	01	17	49	59	1	11	20	35	46	23
17	0	14	42	15	20	32	0	27	41	42	09	22	0	45	01	17	50	00	1	11	20	35	46	23
27	0	14	42	+15	20	31	0	27	41	-42	09	23	0	45	01	-17	50	01	1	11	20	+35	46	23
37	0	14	41	+15	20	30	0	27	41	-42	09	23	0	45	01	-17	50	02	1	11	19	+35	46	23

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FOR 0^h TERRESTRIAL TIME

Name		ζ Ceti (HR 539)						ν Ceti (HR 585)						α Arietis (HR 617)						α Ceti (HR 911)					
Mag. Spect.		3.73			K0 III			4.00			M0 IIIb			2.00			K2 IIIab			2.53			M1.5 IIIa		
U.T.		Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination		
		h	m	s	°	'	"	h	m	s	°	'	"	h	m	s	°	'	"	h	m	s	°	'	"
Jan.	1	1	52	49	-10	12	08	2	01	18	-20	56	54	2	08	43	+23	35	33	3	03	43	+4	11	46
	11	1	52	49	10	12	08	2	01	18	20	56	55	2	08	43	23	35	33	3	03	43	4	11	45
	21	1	52	49	10	12	09	2	01	18	20	56	56	2	08	43	23	35	33	3	03	43	4	11	45
	31	1	52	48	10	12	09	2	01	17	20	56	56	2	08	43	23	35	32	3	03	43	4	11	44
Feb.	10	1	52	48	10	12	10	2	01	17	20	56	56	2	08	43	23	35	31	3	03	43	4	11	44
	20	1	52	48	10	12	09	2	01	17	20	56	56	2	08	43	23	35	31	3	03	43	4	11	43
Mar.	2	1	52	48	-10	12	09	2	01	17	-20	56	55	2	08	42	+23	35	29	3	03	42	+4	11	43
	12	1	52	48	10	12	09	2	01	17	20	56	54	2	08	42	23	35	28	3	03	42	4	11	43
	22	1	52	48	10	12	08	2	01	17	20	56	53	2	08	42	23	35	28	3	03	42	4	11	43
Apr.	1	1	52	48	10	12	07	2	01	17	20	56	51	2	08	42	23	35	27	3	03	42	4	11	43
	11	1	52	48	10	12	06	2	01	17	20	56	49	2	08	42	23	35	26	3	03	42	4	11	43
	21	1	52	48	10	12	04	2	01	17	20	56	47	2	08	42	23	35	26	3	03	42	4	11	44
May	1	1	52	48	-10	12	02	2	01	17	-20	56	45	2	08	42	+23	35	25	3	03	42	+4	11	45
	11	1	52	48	10	12	00	2	01	17	20	56	42	2	08	43	23	35	25	3	03	42	4	11	46
	21	1	52	48	10	11	58	2	01	17	20	56	40	2	08	43	23	35	25	3	03	42	4	11	47
	31	1	52	49	10	11	56	2	01	17	20	56	37	2	08	43	23	35	26	3	03	42	4	11	48
June	10	1	52	49	10	11	54	2	01	18	20	56	34	2	08	43	23	35	27	3	03	43	4	11	50
	20	1	52	49	10	11	52	2	01	18	20	56	32	2	08	44	23	35	28	3	03	43	4	11	51
	30	1	52	49	-10	11	49	2	01	18	-20	56	30	2	08	44	+23	35	29	3	03	43	+4	11	53
July	10	1	52	50	10	11	47	2	01	19	20	56	27	2	08	44	23	35	31	3	03	43	4	11	55
	20	1	52	50	10	11	45	2	01	19	20	56	25	2	08	45	23	35	32	3	03	44	4	11	56
	30	1	52	50	10	11	44	2	01	19	20	56	24	2	08	45	23	35	34	3	03	44	4	11	58
Aug.	9	1	52	51	10	11	42	2	01	20	20	56	23	2	08	45	23	35	36	3	03	44	4	11	59
	19	1	52	51	10	11	41	2	01	20	20	56	22	2	08	46	23	35	37	3	03	45	4	12	01
	29	1	52	51	-10	11	40	2	01	20	-20	56	21	2	08	46	+23	35	39	3	03	45	+4	12	02
Sept.	8	1	52	51	10	11	40	2	01	20	20	56	21	2	08	46	23	35	41	3	03	45	4	12	03
	18	1	52	52	10	11	40	2	01	21	20	56	22	2	08	46	23	35	42	3	03	45	4	12	04
	28	1	52	52	10	11	40	2	01	21	20	56	22	2	08	47	23	35	44	3	03	46	4	12	04
Oct.	8	1	52	52	10	11	40	2	01	21	20	56	23	2	08	47	23	35	45	3	03	46	4	12	04
	18	1	52	52	10	11	41	2	01	21	20	56	25	2	08	47	23	35	46	3	03	46	4	12	04
	28	1	52	52	-10	11	42	2	01	21	-20	56	26	2	08	47	+23	35	48	3	03	46	+4	12	04
Nov.	7	1	52	52	10	11	43	2	01	21	20	56	28	2	08	47	23	35	49	3	03	46	4	12	03
	17	1	52	52	10	11	44	2	01	21	20	56	30	2	08	47	23	35	49	3	03	46	4	12	03
	27	1	52	52	10	11	46	2	01	21	20	56	32	2	08	47	23	35	50	3	03	47	4	12	02
Dec.	7	1	52	52	10	11	47	2	01	21	20	56	33	2	08	47	23	35	50	3	03	47	4	12	01
	17	1	52	52	10	11	48	2	01	21	20	56	35	2	08	47	23	35	50	3	03	47	4	12	01
	27	1	52	52	-10	11	49	2	01	21	-20	56	36	2	08	47	+23	35	50	3	03	47	+4	12	00
	37	1	52	52	-10	11	50	2	01	21	-20	56	37	2	08	47	+23	35	50	3	03	46	+4	11	59

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Name	η Tauri (HR 1165)						α Tauri (HR 1457)						β Eridani (HR 1666)						γ Orionis (HR 1790)					
Mag. Spect.	2.87			B7 IIIn			0.85			$K5^+III$			2.79			A3 IVn			1.64			B2 III		
U.T.	Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination		
	h	m	s	°	'	"	h	m	s	°	'	"	h	m	s	°	'	"	h	m	s	°	'	"
Jan. 1	3	49	07	+24	11	24	4	37	30	+16	33	50	5	09	13	-5	03	07	5	26	37	+6	22	25
11	3	49	07	24	11	24	4	37	30	16	33	50	5	09	13	5	03	09	5	26	37	6	22	25
21	3	49	07	24	11	24	4	37	30	16	33	49	5	09	13	5	03	10	5	26	37	6	22	24
31	3	49	07	24	11	24	4	37	30	16	33	49	5	09	13	5	03	11	5	26	37	6	22	23
Feb. 10	3	49	07	24	11	24	4	37	30	16	33	49	5	09	12	5	03	12	5	26	37	6	22	23
20	3	49	07	24	11	23	4	37	30	16	33	49	5	09	12	5	03	13	5	26	37	6	22	22
Mar. 2	3	49	07	+24	11	23	4	37	30	+16	33	48	5	09	12	-5	03	13	5	26	36	+6	22	22
12	3	49	07	24	11	22	4	37	30	16	33	48	5	09	12	5	03	13	5	26	36	6	22	22
22	3	49	06	24	11	22	4	37	29	16	33	48	5	09	12	5	03	13	5	26	36	6	22	22
Apr. 1	3	49	06	24	11	21	4	37	29	16	33	48	5	09	12	5	03	13	5	26	36	6	22	21
11	3	49	06	24	11	20	4	37	29	16	33	47	5	09	11	5	03	13	5	26	36	6	22	22
21	3	49	06	24	11	20	4	37	29	16	33	47	5	09	11	5	03	12	5	26	36	6	22	22
May 1	3	49	06	+24	11	19	4	37	29	+16	33	47	5	09	11	-5	03	11	5	26	36	+6	22	22
11	3	49	06	24	11	19	4	37	29	16	33	47	5	09	11	5	03	10	5	26	36	6	22	23
21	3	49	06	24	11	19	4	37	29	16	33	47	5	09	11	5	03	09	5	26	36	6	22	23
31	3	49	06	24	11	19	4	37	29	16	33	48	5	09	11	5	03	07	5	26	36	6	22	24
June 10	3	49	07	24	11	19	4	37	29	16	33	48	5	09	11	5	03	05	5	26	36	6	22	25
20	3	49	07	24	11	19	4	37	29	16	33	49	5	09	12	5	03	04	5	26	36	6	22	26
30	3	49	07	+24	11	20	4	37	30	+16	33	50	5	09	12	-5	03	02	5	26	36	+6	22	27
July 10	3	49	07	24	11	21	4	37	30	16	33	51	5	09	12	5	03	00	5	26	36	6	22	28
20	3	49	08	24	11	22	4	37	30	16	33	51	5	09	12	5	02	59	5	26	36	6	22	29
30	3	49	08	24	11	22	4	37	30	16	33	52	5	09	12	5	02	57	5	26	37	6	22	30
Aug. 9	3	49	08	24	11	24	4	37	31	16	33	53	5	09	13	5	02	56	5	26	37	6	22	32
19	3	49	09	24	11	25	4	37	31	16	33	54	5	09	13	5	02	54	5	26	37	6	22	33
29	3	49	09	+24	11	26	4	37	31	+16	33	55	5	09	13	-5	02	54	5	26	37	+6	22	33
Sept. 8	3	49	09	24	11	27	4	37	32	16	33	55	5	09	14	5	02	53	5	26	38	6	22	34
18	3	49	10	24	11	28	4	37	32	16	33	56	5	09	14	5	02	53	5	26	38	6	22	34
28	3	49	10	24	11	29	4	37	32	16	33	57	5	09	14	5	02	53	5	26	38	6	22	34
Oct. 8	3	49	10	24	11	30	4	37	33	16	33	57	5	09	14	5	02	53	5	26	39	6	22	34
18	3	49	11	24	11	30	4	37	33	16	33	57	5	09	15	5	02	54	5	26	39	6	22	33
28	3	49	11	+24	11	31	4	37	33	+16	33	57	5	09	15	-5	02	55	5	26	39	+6	22	33
Nov. 7	3	49	11	24	11	32	4	37	33	16	33	57	5	09	15	5	02	56	5	26	39	6	22	32
17	3	49	11	24	11	32	4	37	34	16	33	57	5	09	15	5	02	58	5	26	40	6	22	31
27	3	49	11	24	11	33	4	37	34	16	33	56	5	09	16	5	02	59	5	26	40	6	22	30
Dec. 7	3	49	11	24	11	33	4	37	34	16	33	56	5	09	16	5	03	01	5	26	40	6	22	29
17	3	49	11	24	11	33	4	37	34	16	33	56	5	09	16	5	03	02	5	26	40	6	22	28
27	3	49	11	+24	11	33	4	37	34	+16	33	56	5	09	16	-5	03	04	5	26	40	+6	22	27
37	3	49	11	+24	11	34	4	37	34	+16	33	55	5	09	16	-5	03	06	5	26	40	+6	22	26

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Name		β Leporis (HR 1829)						ι Orionis (HR 1899)						α Columbae (HR 1956)						κ Orionis (HR 2004)					
Mag. Spect.		2.84			G5 II			2.77			O9 III			2.64			B7 IV			2.06			B0.5 Ia		
U.T.		Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination		
		h	m	s	°	'	"	h	m	s	°	'	"	h	m	s	°	'	"	h	m	s	°	'	"
Jan.	1	5	29	26	-20	44	19	5	36	47	-5	53	34	5	40	40	-34	03	38	5	49	04	-9	39	38
	11	5	29	26	20	44	21	5	36	47	5	53	36	5	40	40	34	03	40	5	49	04	9	39	40
	21	5	29	26	20	44	24	5	36	47	5	53	37	5	40	40	34	03	43	5	49	04	9	39	42
	31	5	29	26	20	44	25	5	36	47	5	53	38	5	40	40	34	03	45	5	49	04	9	39	43
Feb.	10	5	29	26	20	44	26	5	36	47	5	53	39	5	40	39	34	03	47	5	49	04	9	39	44
	20	5	29	26	20	44	28	5	36	47	5	53	40	5	40	39	34	03	48	5	49	04	9	39	45
Mar.	2	5	29	26	-20	44	28	5	36	47	-5	53	41	5	40	39	-34	03	49	5	49	04	-9	39	46
	12	5	29	25	20	44	29	5	36	47	5	53	41	5	40	39	34	03	50	5	49	04	9	39	46
	22	5	29	25	20	44	29	5	36	46	5	53	41	5	40	39	34	03	50	5	49	03	9	39	46
Apr.	1	5	29	25	20	44	28	5	36	46	5	53	41	5	40	38	34	03	49	5	49	03	9	39	46
	11	5	29	25	20	44	28	5	36	46	5	53	41	5	40	38	34	03	49	5	49	03	9	39	46
	21	5	29	25	20	44	26	5	36	46	5	53	40	5	40	38	34	03	47	5	49	03	9	39	45
May	1	5	29	25	-20	44	25	5	36	46	-5	53	39	5	40	38	-34	03	45	5	49	03	-9	39	44
	11	5	29	24	20	44	24	5	36	46	5	53	38	5	40	38	34	03	44	5	49	03	9	39	43
	21	5	29	24	20	44	22	5	36	46	5	53	37	5	40	38	34	03	41	5	49	03	9	39	42
	31	5	29	24	20	44	19	5	36	46	5	53	35	5	40	38	34	03	39	5	49	03	9	39	40
June	10	5	29	25	20	44	17	5	36	46	5	53	34	5	40	38	34	03	36	5	49	03	9	39	39
	20	5	29	25	20	44	15	5	36	46	5	53	32	5	40	38	34	03	33	5	49	03	9	39	37
	30	5	29	25	-20	44	12	5	36	46	-5	53	31	5	40	38	-34	03	30	5	49	03	-9	39	35
July	10	5	29	25	20	44	10	5	36	46	5	53	29	5	40	38	34	03	27	5	49	03	9	39	33
	20	5	29	25	20	44	08	5	36	47	5	53	27	5	40	38	34	03	25	5	49	03	9	39	31
	30	5	29	25	20	44	06	5	36	47	5	53	26	5	40	38	34	03	22	5	49	04	9	39	30
Aug.	9	5	29	26	20	44	04	5	36	47	5	53	24	5	40	39	34	03	20	5	49	04	9	39	28
	19	5	29	26	20	44	02	5	36	47	5	53	23	5	40	39	34	03	18	5	49	04	9	39	27
	29	5	29	26	-20	44	01	5	36	48	-5	53	22	5	40	39	-34	03	17	5	49	04	-9	39	26
Sept.	8	5	29	27	20	44	00	5	36	48	5	53	21	5	40	39	34	03	16	5	49	05	9	39	25
	18	5	29	27	20	44	00	5	36	48	5	53	21	5	40	40	34	03	15	5	49	05	9	39	25
	28	5	29	27	20	44	00	5	36	49	5	53	21	5	40	40	34	03	16	5	49	05	9	39	25
Oct.	8	5	29	27	20	44	01	5	36	49	5	53	22	5	40	40	34	03	16	5	49	06	9	39	25
	18	5	29	28	20	44	02	5	36	49	5	53	22	5	40	41	34	03	18	5	49	06	9	39	26
	28	5	29	28	-20	44	03	5	36	49	-5	53	23	5	40	41	-34	03	19	5	49	06	-9	39	27
Nov.	7	5	29	28	20	44	05	5	36	50	5	53	25	5	40	41	34	03	22	5	49	06	9	39	29
	17	5	29	28	20	44	08	5	36	50	5	53	26	5	40	42	34	03	24	5	49	07	9	39	31
	27	5	29	29	20	44	10	5	36	50	5	53	28	5	40	42	34	03	27	5	49	07	9	39	33
Dec.	7	5	29	29	20	44	12	5	36	50	5	53	30	5	40	42	34	03	30	5	49	07	9	39	34
	17	5	29	29	20	44	15	5	36	50	5	53	32	5	40	42	34	03	33	5	49	07	9	39	37
	27	5	29	29	-20	44	17	5	36	50	-5	53	33	5	40	42	-34	03	37	5	49	07	-9	39	39
	37	5	29	29	-20	44	20	5	36	50	-5	53	35	5	40	42	-34	03	39	5	49	07	-9	39	41

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Name		α Orionis (HR 2061)						ζ Canis Majoris (HR 2282)						α Carinae (HR 2326)						γ Geminorum (HR 2421)					
Mag. Spect.		0.4 - 1.3 M1 M2 Ia Iab						3.02 B2.5V						-0.72 A9 II						1.93 A1 IVs					
U.T.		Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination		
		h	m	s	º	'	"	h	m	s	º	'	"	h	m	s	º	'	"	h	m	s	º	'	"
Jan.	1	5	56	40	+7	24	41	6	21	23	-30	04	33	6	24	36	-52	42	36	6	39	18	+16	22	30
	11	5	56	40	7	24	40	6	21	23	30	04	36	6	24	36	52	42	40	6	39	18	16	22	29
	21	5	56	40	7	24	39	6	21	23	30	04	39	6	24	36	52	42	43	6	39	19	16	22	29
	31	5	56	40	7	24	39	6	21	23	30	04	41	6	24	35	52	42	46	6	39	19	16	22	28
Feb.	10	5	56	40	7	24	38	6	21	23	30	04	43	6	24	35	52	42	49	6	39	18	16	22	28
	20	5	56	40	7	24	38	6	21	23	30	04	44	6	24	35	52	42	51	6	39	18	16	22	28
Mar.	2	5	56	40	+7	24	37	6	21	23	-30	04	46	6	24	35	-52	42	53	6	39	18	+16	22	28
	12	5	56	40	7	24	37	6	21	22	30	04	47	6	24	34	52	42	54	6	39	18	16	22	28
	22	5	56	39	7	24	37	6	21	22	30	04	47	6	24	34	52	42	54	6	39	18	16	22	28
Apr.	1	5	56	39	7	24	37	6	21	22	30	04	47	6	24	33	52	42	54	6	39	18	16	22	28
	11	5	56	39	7	24	37	6	21	22	30	04	47	6	24	33	52	42	54	6	39	18	16	22	28
	21	5	56	39	7	24	38	6	21	22	30	04	46	6	24	33	52	42	53	6	39	17	16	22	28
May	1	5	56	39	+7	24	38	6	21	21	-30	04	45	6	24	33	-52	42	52	6	39	17	+16	22	29
	11	5	56	39	7	24	38	6	21	21	30	04	43	6	24	32	52	42	50	6	39	17	16	22	28
	21	5	56	39	7	24	39	6	21	21	30	04	41	6	24	32	52	42	48	6	39	17	16	22	29
	31	5	56	39	7	24	40	6	21	21	30	04	39	6	24	32	52	42	45	6	39	17	16	22	29
June	10	5	56	39	7	24	40	6	21	21	30	04	37	6	24	32	52	42	42	6	39	17	16	22	29
	20	5	56	39	7	24	41	6	21	21	30	04	34	6	24	32	52	42	39	6	39	17	16	22	29
	30	5	56	39	+7	24	42	6	21	21	-30	04	31	6	24	32	-52	42	36	6	39	17	+16	22	29
July	10	5	56	39	7	24	43	6	21	21	30	04	29	6	24	32	52	42	32	6	39	18	16	22	30
	20	5	56	40	7	24	44	6	21	21	30	04	26	6	24	32	52	42	29	6	39	18	16	22	30
	30	5	56	40	7	24	45	6	21	22	30	04	24	6	24	32	52	42	27	6	39	18	16	22	30
Aug.	9	5	56	40	7	24	46	6	21	22	30	04	22	6	24	33	52	42	24	6	39	18	16	22	31
	19	5	56	40	7	24	47	6	21	22	30	04	20	6	24	33	52	42	21	6	39	18	16	22	31
	29	5	56	41	+7	24	47	6	21	22	-30	04	18	6	24	33	-52	42	19	6	39	19	+16	22	31
Sept.	8	5	56	41	7	24	47	6	21	23	30	04	17	6	24	34	52	42	18	6	39	19	16	22	31
	18	5	56	41	7	24	48	6	21	23	30	04	16	6	24	34	52	42	17	6	39	19	16	22	31
	28	5	56	41	7	24	48	6	21	23	30	04	16	6	24	34	52	42	17	6	39	20	16	22	30
Oct.	8	5	56	42	7	24	47	6	21	24	30	04	17	6	24	35	52	42	17	6	39	20	16	22	30
	18	5	56	42	7	24	47	6	21	24	30	04	18	6	24	35	52	42	18	6	39	20	16	22	29
	28	5	56	42	+7	24	46	6	21	24	-30	04	19	6	24	36	-52	42	20	6	39	21	+16	22	29
Nov.	7	5	56	43	7	24	45	6	21	25	30	04	21	6	24	36	52	42	22	6	39	21	16	22	28
	17	5	56	43	7	24	44	6	21	25	30	04	24	6	24	36	52	42	25	6	39	21	16	22	27
	27	5	56	43	7	24	43	6	21	25	30	04	26	6	24	37	52	42	28	6	39	21	16	22	26
Dec.	7	5	56	43	7	24	42	6	21	25	30	04	29	6	24	37	52	42	32	6	39	22	16	22	25
	17	5	56	43	7	24	41	6	21	25	30	04	32	6	24	37	52	42	35	6	39	22	16	22	25
	27	5	56	44	+7	24	40	6	21	26	-30	04	36	6	24	37	-52	42	39	6	39	22	+16	22	24
	37	5	56	44	+7	24	39	6	21	26	-30	04	38	6	24	37	-52	42	43	6	39	22	+16	22	23

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Name		αCanis MajorisA(HR2491)						o^2 Canis Majoris(HR 2653)						β Canis Minoris(HR 2845)						α Canis Minoris A(HR 2943)					
Mag. Spect.		-1.46			A0m A1 Va			3.02			B3 Ia			2.90			B8 V			0.38			F5 IV-V		
U.T.		Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination		
		h	m	s	°	'	"	h	m	s	°	'	"	h	m	s	°	'	"	h	m	s	°	'	"
Jan.	1	6	46	22	-16	45	14	7	04	11	-23	52	23	7	28	39	+8	14	01	7	40	45	+5	09	16
	11	6	46	22	16	45	16	7	04	11	23	52	26	7	28	39	8	13	59	7	40	45	5	09	14
	21	6	46	22	16	45	19	7	04	11	23	52	29	7	28	39	8	13	58	7	40	45	5	09	13
	31	6	46	22	16	45	21	7	04	11	23	52	31	7	28	39	8	13	58	7	40	45	5	09	12
Feb.	10	6	46	22	16	45	22	7	04	11	23	52	33	7	28	39	8	13	57	7	40	45	5	09	11
	20	6	46	22	16	45	24	7	04	11	23	52	35	7	28	39	8	13	57	7	40	45	5	09	10
Mar.	2	6	46	22	-16	45	25	7	04	11	-23	52	36	7	28	39	+8	13	56	7	40	45	+5	09	10
	12	6	46	22	16	45	26	7	04	11	23	52	37	7	28	39	8	13	56	7	40	45	5	09	10
	22	6	46	22	16	45	26	7	04	11	23	52	38	7	28	39	8	13	56	7	40	45	5	09	10
Apr.	1	6	46	21	16	45	26	7	04	10	23	52	38	7	28	39	8	13	56	7	40	45	5	09	09
	11	6	46	21	16	45	26	7	04	10	23	52	38	7	28	38	8	13	56	7	40	44	5	09	10
	21	6	46	21	16	45	26	7	04	10	23	52	38	7	28	38	8	13	56	7	40	44	5	09	10
May	1	6	46	21	-16	45	25	7	04	10	-23	52	37	7	28	38	+8	13	57	7	40	44	+5	09	10
	11	6	46	21	16	45	24	7	04	10	23	52	36	7	28	38	8	13	57	7	40	44	5	09	10
	21	6	46	21	16	45	23	7	04	10	23	52	35	7	28	38	8	13	57	7	40	44	5	09	11
	31	6	46	21	16	45	21	7	04	09	23	52	33	7	28	38	8	13	58	7	40	44	5	09	12
June	10	6	46	21	16	45	19	7	04	09	23	52	31	7	28	38	8	13	58	7	40	44	5	09	12
	20	6	46	21	16	45	17	7	04	09	23	52	29	7	28	38	8	13	59	7	40	44	5	09	13
	30	6	46	21	-16	45	15	7	04	10	-23	52	27	7	28	38	+8	14	00	7	40	44	+5	09	14
July	10	6	46	21	16	45	13	7	04	10	23	52	24	7	28	38	8	14	00	7	40	44	5	09	14
	20	6	46	21	16	45	11	7	04	10	23	52	22	7	28	38	8	14	01	7	40	44	5	09	15
	30	6	46	21	16	45	10	7	04	10	23	52	20	7	28	38	8	14	01	7	40	44	5	09	15
Aug.	9	6	46	21	16	45	08	7	04	10	23	52	18	7	28	38	8	14	02	7	40	44	5	09	16
	19	6	46	22	16	45	06	7	04	10	23	52	16	7	28	39	8	14	02	7	40	45	5	09	17
	29	6	46	22	-16	45	05	7	04	11	-23	52	15	7	28	39	+8	14	02	7	40	45	+5	09	17
Sept.	8	6	46	22	16	45	04	7	04	11	23	52	14	7	28	39	8	14	02	7	40	45	5	09	17
	18	6	46	22	16	45	04	7	04	11	23	52	13	7	28	39	8	14	02	7	40	45	5	09	17
	28	6	46	23	16	45	04	7	04	11	23	52	12	7	28	40	8	14	02	7	40	46	5	09	16
Oct.	8	6	46	23	16	45	04	7	04	12	23	52	13	7	28	40	8	14	01	7	40	46	5	09	16
	18	6	46	23	16	45	05	7	04	12	23	52	14	7	28	40	8	14	00	7	40	46	5	09	15
	28	6	46	24	-16	45	06	7	04	12	-23	52	15	7	28	41	+8	13	59	7	40	46	+5	09	14
Nov.	7	6	46	24	16	45	08	7	04	13	23	52	17	7	28	41	8	13	58	7	40	47	5	09	12
	17	6	46	24	16	45	10	7	04	13	23	52	19	7	28	41	8	13	57	7	40	47	5	09	11
	27	6	46	25	16	45	13	7	04	13	23	52	21	7	28	42	8	13	55	7	40	47	5	09	09
Dec.	7	6	46	25	16	45	15	7	04	13	23	52	24	7	28	42	8	13	54	7	40	48	5	09	08
	17	6	46	25	16	45	18	7	04	14	23	52	27	7	28	42	8	13	52	7	40	48	5	09	06
	27	6	46	25	-16	45	20	7	04	14	-23	52	30	7	28	42	+8	13	51	7	40	48	+5	09	04
	37	6	46	25	-16	45	23	7	04	14	-23	52	32	7	28	42	+8	13	50	7	40	48	+5	09	03

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Name		β Geminorum(HR 2990)						ξ Puppis(HR 3045)						ρ Puppis(HR 3185)						ζ Hydrae(HR 3547)					
Mag. Spect.		1.14			K0 IIIb			3.34			G6 Iab-Ib			2.81			F5 (Ib-II)p			3.11			G9 IIIa		
U.T.		Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination		
		h	m	s	°	'	"	h	m	s	°	'	"	h	m	s	°	'	"	h	m	s	°	'	"
Jan.	1	7	47	00	+27	57	31	7	50	28	-24	55	39	8	08	44	-24	22	56	8	56	51	+5	50	28
	11	7	47	00	27	57	31	7	50	28	24	55	42	8	08	44	24	22	59	8	56	51	5	50	26
	21	7	47	01	27	57	31	7	50	28	24	55	45	8	08	44	24	23	02	8	56	51	5	50	25
	31	7	47	01	27	57	32	7	50	28	24	55	48	8	08	44	24	23	04	8	56	52	5	50	23
Feb.	10	7	47	01	27	57	33	7	50	28	24	55	50	8	08	44	24	23	07	8	56	52	5	50	23
	20	7	47	01	27	57	33	7	50	28	24	55	52	8	08	44	24	23	09	8	56	52	5	50	22
Mar.	2	7	47	01	+27	57	33	7	50	28	-24	55	54	8	08	44	-24	23	11	8	56	52	+5	50	21
	12	7	47	00	27	57	34	7	50	28	24	55	56	8	08	44	24	23	12	8	56	52	5	50	21
	22	7	47	00	27	57	35	7	50	27	24	55	57	8	08	43	24	23	14	8	56	51	5	50	21
Apr.	1	7	47	00	27	57	35	7	50	27	24	55	58	8	08	43	24	23	15	8	56	51	5	50	21
	11	7	47	00	27	57	35	7	50	27	24	55	58	8	08	43	24	23	15	8	56	51	5	50	21
	21	7	47	00	27	57	36	7	50	27	24	55	58	8	08	43	24	23	15	8	56	51	5	50	21
May	1	7	47	00	+27	57	36	7	50	27	-24	55	57	8	08	43	-24	23	15	8	56	51	+5	50	22
	11	7	46	59	27	57	36	7	50	27	24	55	57	8	08	43	24	23	14	8	56	51	5	50	22
	21	7	46	59	27	57	36	7	50	26	24	55	56	8	08	42	24	23	13	8	56	51	5	50	22
	31	7	46	59	27	57	35	7	50	26	24	55	54	8	08	42	24	23	12	8	56	51	5	50	23
June	10	7	46	59	27	57	35	7	50	26	24	55	52	8	08	42	24	23	10	8	56	51	5	50	23
	20	7	46	59	27	57	34	7	50	26	24	55	51	8	08	42	24	23	09	8	56	50	5	50	24
	30	7	46	59	+27	57	34	7	50	26	-24	55	48	8	08	42	-24	23	07	8	56	50	+5	50	25
July	10	7	46	59	27	57	33	7	50	26	24	55	46	8	08	42	24	23	05	8	56	50	5	50	25
	20	7	46	59	27	57	33	7	50	26	24	55	44	8	08	42	24	23	03	8	56	51	5	50	25
	30	7	47	00	27	57	32	7	50	26	24	55	42	8	08	42	24	23	01	8	56	51	5	50	26
Aug.	9	7	47	00	27	57	31	7	50	27	24	55	40	8	08	42	24	22	58	8	56	51	5	50	26
	19	7	47	00	27	57	31	7	50	27	24	55	38	8	08	43	24	22	57	8	56	51	5	50	27
	29	7	47	00	+27	57	30	7	50	27	-24	55	36	8	08	43	-24	22	55	8	56	51	+5	50	26
Sept.	8	7	47	01	27	57	29	7	50	27	24	55	35	8	08	43	24	22	54	8	56	51	5	50	26
	18	7	47	01	27	57	28	7	50	27	24	55	34	8	08	43	24	22	53	8	56	51	5	50	26
	28	7	47	01	27	57	27	7	50	28	24	55	34	8	08	44	24	22	52	8	56	52	5	50	26
Oct.	8	7	47	01	27	57	26	7	50	28	24	55	34	8	08	44	24	22	52	8	56	52	5	50	25
	18	7	47	02	27	57	25	7	50	28	24	55	34	8	08	44	24	22	53	8	56	52	5	50	24
	28	7	47	02	+27	57	24	7	50	29	-24	55	35	8	08	44	-24	22	53	8	56	52	+5	50	22
Nov.	7	7	47	03	27	57	23	7	50	29	24	55	37	8	08	45	24	22	55	8	56	53	5	50	21
	17	7	47	03	27	57	22	7	50	29	24	55	39	8	08	45	24	22	57	8	56	53	5	50	19
	27	7	47	03	27	57	21	7	50	30	24	55	41	8	08	45	24	22	59	8	56	53	5	50	17
Dec.	7	7	47	04	27	57	21	7	50	30	24	55	44	8	08	46	24	23	02	8	56	54	5	50	16
	17	7	47	04	27	57	20	7	50	30	24	55	47	8	08	46	24	23	05	8	56	54	5	50	14
	27	7	47	04	+27	57	20	7	50	30	-24	55	50	8	08	46	-24	23	08	8	56	54	+5	50	12
	37	7	47	04	+27	57	20	7	50	31	-24	55	53	8	08	46	-24	23	11	8	56	54	+5	50	10

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Name		λ Velorum(HR 3634)						α Hydrae(HR 3748)						α Leonis(HR 3982)						α Antliae(HR 4104)					
Mag. Spect.		2.21			K4.5 Ib			1.98			K3 II-III			1.35			B7 Vn			4.25			K4.5 III		
U.T.		Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination		
		h	m	s	°	'	"	h	m	s	°	'	"	h	m	s	°	'	"	h	m	s	°	'	"
Jan.	1	9	09	01	-43	32	24	9	28	56	-8	46	35	10	09	50	+11	49	58	10	28	25	-31	12	15
	11	9	09	01	43	32	28	9	28	57	8	46	38	10	09	50	11	49	56	10	28	25	31	12	18
	21	9	09	02	43	32	32	9	28	57	8	46	40	10	09	51	11	49	55	10	28	25	31	12	21
	31	9	09	02	43	32	35	9	28	57	8	46	42	10	09	51	11	49	54	10	28	25	31	12	24
Feb.	10	9	09	02	43	32	38	9	28	57	8	46	44	10	09	51	11	49	53	10	28	26	31	12	27
	20	9	09	02	43	32	42	9	28	57	8	46	46	10	09	51	+11	49	52	10	28	26	31	12	30
Mar.	2	9	09	02	-43	32	45	9	28	57	-8	46	47	10	09	51	11	49	52	10	28	26	-31	12	33
	12	9	09	01	43	32	47	9	28	57	8	46	48	10	09	51	11	49	52	10	28	26	31	12	35
	22	9	09	01	43	32	50	9	28	57	8	46	49	10	09	51	11	49	53	10	28	26	31	12	38
Apr.	1	9	09	01	43	32	52	9	28	57	8	46	50	10	09	51	11	49	53	10	28	26	31	12	40
	11	9	09	01	43	32	53	9	28	57	8	46	50	10	09	51	11	49	53	10	28	26	31	12	41
	21	9	09	01	43	32	54	9	28	57	8	46	50	10	09	51	11	49	54	10	28	25	31	12	42
May	1	9	09	00	-43	32	55	9	28	57	-8	46	50	10	09	51	+11	49	54	10	28	25	-31	12	43
	11	9	09	00	43	32	55	9	28	56	8	46	50	10	09	51	11	49	55	10	28	25	31	12	44
	21	9	09	00	43	32	54	9	28	56	8	46	50	10	09	50	11	49	55	10	28	25	31	12	44
	31	9	09	00	43	32	53	9	28	56	8	46	49	10	09	50	11	49	56	10	28	25	31	12	44
June	10	9	09	00	43	32	52	9	28	56	8	46	48	10	09	50	11	49	56	10	28	25	31	12	43
	20	9	09	00	43	32	51	9	28	56	8	46	47	10	09	50	11	49	57	10	28	25	31	12	42
	30	9	08	59	-43	32	48	9	28	56	-8	46	46	10	09	50	+11	49	57	10	28	24	-31	12	41
July	10	9	08	59	43	32	46	9	28	56	8	46	45	10	09	50	11	49	57	10	28	24	31	12	40
	20	9	08	59	43	32	44	9	28	56	8	46	44	10	09	50	11	49	57	10	28	24	31	12	38
	30	9	08	59	43	32	41	9	28	56	8	46	43	10	09	50	11	49	57	10	28	24	31	12	36
Aug.	9	9	08	59	43	32	39	9	28	56	8	46	42	10	09	50	11	49	57	10	28	24	31	12	34
	19	9	08	59	43	32	36	9	28	56	8	46	41	10	09	50	11	49	57	10	28	24	31	12	32
	29	9	09	00	-43	32	34	9	28	56	-8	46	40	10	09	50	+11	49	57	10	28	24	-31	12	31
Sept.	8	9	09	00	43	32	32	9	28	56	8	46	39	10	09	50	11	49	56	10	28	24	31	12	29
	18	9	09	00	43	32	30	9	28	57	8	46	39	10	09	50	11	49	55	10	28	24	31	12	27
	28	9	09	00	43	32	28	9	28	57	8	46	39	10	09	51	11	49	54	10	28	25	31	12	26
Oct.	8	9	09	01	43	32	27	9	28	57	8	46	39	10	09	51	11	49	53	10	28	25	31	12	25
	18	9	09	01	43	32	27	9	28	57	8	46	40	10	09	51	11	49	52	10	28	25	31	12	24
	28	9	09	01	-43	32	27	9	28	58	-8	46	41	10	09	51	+11	49	50	10	28	25	-31	12	24
Nov.	7	9	09	02	43	32	28	9	28	58	8	46	42	10	09	52	11	49	48	10	28	26	31	12	25
	17	9	09	02	43	32	29	9	28	58	8	46	44	10	09	52	11	49	46	10	28	26	31	12	26
	27	9	09	02	43	32	31	9	28	59	8	46	46	10	09	52	11	49	44	10	28	26	31	12	27
Dec.	7	9	09	03	43	32	34	9	28	59	8	46	48	10	09	53	11	49	42	10	28	27	31	12	29
	17	9	09	03	43	32	37	9	28	59	8	46	50	10	09	53	11	49	40	10	28	27	31	12	32
	27	9	09	03	-43	32	40	9	29	00	-8	46	53	10	09	53	+11	49	38	10	28	28	-31	12	34
	37	9	09	04	-43	32	43	9	29	00	-8	46	55	10	09	54	+11	49	37	10	28	28	-31	12	37

APPARENT PLACES OF STARS, 2027

FOR 0^h TERRESTRIAL TIME

Name		ν Hydrae(HR 4232)						ξ Hydrae(HR 4450)						β Leonis (HR 4534)						γ Corvi(HR 4662)					
Mag. Spect.		3.11			K1.5 IIIb Hδ-0.5			3.54			G7 III			2.14			A3 Va			2.59			B8p Hg Mn		
U.T.		Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination		
		h	m	s	º	'	"	h	m	s	º	'	"	h	m	s	º	'	"	h	m	s	º	'	"
Jan.	1	10	50	59	-16	20	06	11	34	21	-32	00	20	11	50	27	+14	25	05	12	17	13	-17	41	30
	11	10	50	59	16	20	09	11	34	21	32	00	23	11	50	28	14	25	03	12	17	13	17	41	32
	21	10	50	59	16	20	12	11	34	22	32	00	26	11	50	28	14	25	02	12	17	13	17	41	35
	31	10	50	59	16	20	14	11	34	22	32	00	29	11	50	28	14	25	01	12	17	14	17	41	37
Feb.	10	10	51	00	16	20	16	11	34	22	32	00	32	11	50	28	14	25	00	12	17	14	17	41	39
	20	10	51	00	16	20	19	11	34	22	32	00	35	11	50	29	14	24	59	12	17	14	17	41	42
Mar.	2	10	51	00	-16	20	21	11	34	22	-32	00	37	11	50	29	+14	24	59	12	17	14	-17	41	43
	12	10	51	00	16	20	22	11	34	23	32	00	40	11	50	29	14	24	59	12	17	14	17	41	45
	22	10	51	00	16	20	24	11	34	23	32	00	42	11	50	29	14	25	00	12	17	14	17	41	47
Apr.	1	10	51	00	16	20	25	11	34	23	32	00	44	11	50	29	14	25	00	12	17	15	17	41	48
	11	10	51	00	16	20	26	11	34	23	32	00	46	11	50	29	14	25	01	12	17	15	17	41	49
	21	10	51	00	16	20	26	11	34	23	32	00	48	11	50	29	14	25	02	12	17	15	17	41	50
	1	10	51	00	-16	20	27	11	34	22	-32	00	49	11	50	29	+14	25	03	12	17	15	-17	41	51
May	11	10	51	00	16	20	27	11	34	22	32	00	50	11	50	29	14	25	04	12	17	14	17	41	51
	21	10	50	59	16	20	27	11	34	22	32	00	50	11	50	29	14	25	05	12	17	14	17	41	51
	31	10	50	59	16	20	27	11	34	22	32	00	51	11	50	29	14	25	05	12	17	14	17	41	51
June	10	10	50	59	16	20	26	11	34	22	32	00	51	11	50	28	14	25	06	12	17	14	17	41	51
	20	10	50	59	16	20	25	11	34	22	32	00	50	11	50	28	14	25	07	12	17	14	17	41	51
	30	10	50	59	-16	20	24	11	34	22	-32	00	50	11	50	28	+14	25	07	12	17	14	-17	41	50
July	10	10	50	59	16	20	23	11	34	22	32	00	49	11	50	28	14	25	07	12	17	14	17	41	50
	20	10	50	59	16	20	22	11	34	21	32	00	48	11	50	28	14	25	08	12	17	14	17	41	49
	30	10	50	59	16	20	21	11	34	21	32	00	46	11	50	28	14	25	08	12	17	14	17	41	48
Aug.	9	10	50	59	16	20	20	11	34	21	32	00	44	11	50	28	14	25	07	12	17	14	17	41	47
	19	10	50	59	16	20	19	11	34	21	32	00	43	11	50	28	14	25	07	12	17	14	17	41	46
	29	10	50	59	-16	20	18	11	34	21	-32	00	41	11	50	28	+14	25	06	12	17	14	-17	41	45
Sept.	8	10	50	59	16	20	17	11	34	21	32	00	39	11	50	28	14	25	06	12	17	14	17	41	44
	18	10	50	59	16	20	16	11	34	21	32	00	38	11	50	28	14	25	05	12	17	13	17	41	43
	28	10	50	59	16	20	15	11	34	21	32	00	36	11	50	28	14	25	03	12	17	14	17	41	43
Oct.	8	10	50	59	16	20	15	11	34	22	32	00	35	11	50	28	14	25	02	12	17	14	17	41	42
	18	10	51	00	16	20	15	11	34	22	32	00	34	11	50	28	14	25	00	12	17	14	17	41	42
	28	10	51	00	-16	20	15	11	34	22	-32	00	34	11	50	28	+14	24	58	12	17	14	-17	41	42
Nov.	7	10	51	00	16	20	17	11	34	22	32	00	34	11	50	29	14	24	56	12	17	14	17	41	43
	17	10	51	00	16	20	18	11	34	23	32	00	34	11	50	29	14	24	54	12	17	14	17	41	43
	27	10	51	01	16	20	19	11	34	23	32	00	35	11	50	29	14	24	51	12	17	15	17	41	45
Dec.	7	10	51	01	16	20	21	11	34	23	32	00	37	11	50	30	14	24	49	12	17	15	17	41	46
	17	10	51	01	16	20	24	11	34	24	32	00	39	11	50	30	14	24	47	12	17	15	17	41	48
	27	10	51	02	-16	20	26	11	34	24	-32	00	41	11	50	30	+14	24	45	12	17	16	-17	41	50
	37	10	51	02	-16	20	28	11	34	24	-32	00	43	11	50	31	+14	24	43	12	17	16	-17	41	52

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FOR 0^h TERRESTRIAL TIME

Name		β Corvi (HR 4786)						δ Virginis(HR 4910)						ε Virginis(HR4932)						ι Centauri (HR 5028)					
Mag. Spect.		2.65			G5 Iib			3.38			$M3^+III$			2.83			G8 IIIab			2.75			A2 Va		
U.T.		Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination		
		h	m	s	°	'	"	h	m	s	°	'	"	h	m	s	°	'	"	h	m	s	°	'	"
Jan.	1	12	35	49	-23	32	43	12	56	58	+3	14	56	13	03	32	+10	48	41	13	22	08	-36	51	09
	11	12	35	50	23	32	45	12	56	59	3	14	54	13	03	32	10	48	39	13	22	08	36	51	11
	21	12	35	50	23	32	48	12	56	59	3	14	52	13	03	32	10	48	37	13	22	08	36	51	13
	31	12	35	50	23	32	50	12	56	59	3	14	50	13	03	33	10	48	36	13	22	09	36	51	15
Feb.	10	12	35	50	23	32	52	12	57	00	3	14	49	13	03	33	10	48	35	13	22	09	36	51	18
	20	12	35	51	23	32	55	12	57	00	3	14	47	13	03	33	10	48	34	13	22	09	36	51	20
Mar.	2	12	35	51	-23	32	57	12	57	00	+3	14	47	13	03	34	+10	48	33	13	22	10	-36	51	23
	12	12	35	51	23	32	59	12	57	00	3	14	46	13	03	34	10	48	33	13	22	10	36	51	25
	22	12	35	51	23	33	01	12	57	00	3	14	46	13	03	34	10	48	33	13	22	10	36	51	28
Apr.	1	12	35	51	23	33	03	12	57	01	3	14	46	13	03	34	10	48	33	13	22	10	36	51	30
	11	12	35	51	23	33	04	12	57	01	3	14	46	13	03	34	10	48	34	13	22	10	36	51	32
	21	12	35	51	23	33	05	12	57	01	3	14	46	13	03	34	10	48	35	13	22	10	36	51	34
	1	12	35	51	-23	33	06	12	57	01	+3	14	47	13	03	34	+10	48	36	13	22	10	-36	51	36
May	11	12	35	51	23	33	07	12	57	01	3	14	47	13	03	34	10	48	37	13	22	10	36	51	37
	21	12	35	51	23	33	07	12	57	01	3	14	48	13	03	34	10	48	38	13	22	10	36	51	38
	31	12	35	51	23	33	08	12	57	01	3	14	49	13	03	34	10	48	39	13	22	10	36	51	40
June	10	12	35	51	23	33	08	12	57	01	3	14	49	13	03	34	10	48	40	13	22	10	36	51	40
	20	12	35	51	23	33	08	12	57	00	3	14	50	13	03	34	10	48	41	13	22	10	36	51	41
	30	12	35	51	-23	33	07	12	57	00	+3	14	51	13	03	34	+10	48	42	13	22	10	-36	51	41
July	10	12	35	51	23	33	07	12	57	00	3	14	52	13	03	34	10	48	42	13	22	10	36	51	41
	20	12	35	51	23	33	06	12	57	00	3	14	52	13	03	34	10	48	43	13	22	10	36	51	40
	30	12	35	51	23	33	05	12	57	00	3	14	53	13	03	33	10	48	43	13	22	10	36	51	39
Aug.	9	12	35	50	23	33	04	12	57	00	3	14	53	13	03	33	10	48	43	13	22	09	36	51	39
	19	12	35	50	23	33	03	12	57	00	3	14	53	13	03	33	10	48	43	13	22	09	36	51	37
	29	12	35	50	-23	33	02	12	57	00	+3	14	53	13	03	33	+10	48	43	13	22	09	-36	51	36
Sept.	8	12	35	50	23	33	00	12	57	00	3	14	53	13	03	33	10	48	42	13	22	09	36	51	34
	18	12	35	50	23	32	59	12	57	00	3	14	53	13	03	33	10	48	41	13	22	09	36	51	33
	28	12	35	50	23	32	58	12	57	00	3	14	52	13	03	33	10	48	40	13	22	09	36	51	31
Oct.	8	12	35	50	23	32	58	12	57	00	3	14	51	13	03	33	10	48	39	13	22	09	36	51	30
	18	12	35	50	23	32	57	12	57	00	3	14	50	13	03	33	10	48	38	13	22	09	36	51	28
	28	12	35	51	-23	32	57	12	57	00	+3	14	49	13	03	33	+10	48	36	13	22	09	-36	51	27
Nov.	7	12	35	51	23	32	57	12	57	00	3	14	47	13	03	33	10	48	34	13	22	09	36	51	26
	17	12	35	51	23	32	57	12	57	00	3	14	45	13	03	34	10	48	32	13	22	10	36	51	26
	27	12	35	51	23	32	58	12	57	01	3	14	44	13	03	34	10	48	30	13	22	10	36	51	26
Dec.	7	12	35	52	23	32	59	12	57	01	3	14	41	13	03	34	10	48	27	13	22	10	36	51	26
	17	12	35	52	23	33	01	12	57	01	3	14	39	13	03	35	10	48	25	13	22	11	36	51	27
	27	12	35	52	-23	33	03	12	57	02	+3	14	37	13	03	35	+10	48	22	13	22	11	-36	51	28
	37	12	35	53	-23	33	05	12	57	02	+3	14	35	13	03	35	+10	48	20	13	22	11	-36	51	30

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Name		α Virginis(HR 5056)						θ Centauri (HR 5288)						α^2 Librae (HR 5531)						β Lupi (HR 5571)					
Mag. Spect.		0.98			B1 V			2.06			$K0^-$ IIIb			2.75			A3 III-IV			2.68			B2 IV		
U.T.		Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination		
		h	m	s	°	'	"	h	m	s	°	'	"	h	m	s	°	'	"	h	m	s	°	'	"
Jan.	1	13	26	37	-11	18	09	14	08	17	-36	30	02	14	52	22	-16	09	13	15	00	18	-43	14	24
	11	13	26	38	11	18	11	14	08	17	36	30	04	14	52	23	16	09	15	15	00	19	43	14	25
	21	13	26	38	11	18	13	14	08	18	36	30	05	14	52	23	16	09	16	15	00	19	43	14	25
	31	13	26	38	11	18	15	14	08	18	36	30	07	14	52	23	16	09	18	15	00	19	43	14	27
Feb.	10	13	26	39	11	18	17	14	08	18	36	30	09	14	52	24	16	09	19	15	00	20	43	14	28
	20	13	26	39	11	18	19	14	08	19	36	30	11	14	52	24	16	09	21	15	00	20	43	14	30
Mar.	2	13	26	39	-11	18	20	14	08	19	-36	30	13	14	52	24	-16	09	22	15	00	21	-43	14	31
	12	13	26	39	-11	18	22	14	08	19	36	30	15	14	52	25	16	09	23	15	00	21	43	14	33
	22	13	26	40	-11	18	23	14	08	19	36	30	18	14	52	25	16	09	25	15	00	21	43	14	35
Apr.	1	13	26	40	-11	18	24	14	08	20	36	30	20	14	52	25	16	09	25	15	00	22	43	14	37
	11	13	26	40	-11	18	24	14	08	20	36	30	22	14	52	25	16	09	26	15	00	22	43	14	39
	21	13	26	40	-11	18	25	14	08	20	36	30	23	14	52	26	16	09	27	15	00	22	43	14	41
	1	13	26	40	-11	18	25	14	08	20	-36	30	25	14	52	26	-16	09	27	15	00	22	-43	14	43
May	11	13	26	40	11	18	25	14	08	20	36	30	27	14	52	26	16	09	27	15	00	23	43	14	45
	21	13	26	40	11	18	25	14	08	20	36	30	28	14	52	26	16	09	27	15	00	23	43	14	46
	31	13	26	40	11	18	25	14	08	20	36	30	29	14	52	26	16	09	27	15	00	23	43	14	48
June	10	13	26	40	11	18	25	14	08	20	36	30	30	14	52	26	16	09	27	15	00	23	43	14	50
	20	13	26	40	11	18	24	14	08	20	36	30	31	14	52	26	16	09	27	15	00	23	43	14	51
	30	13	26	40	-11	18	24	14	08	20	-36	30	31	14	52	26	-16	09	27	15	00	23	-43	14	51
July	10	13	26	40	11	18	23	14	08	20	36	30	31	14	52	26	16	09	27	15	00	22	43	14	52
	20	13	26	40	11	18	23	14	08	20	36	30	31	14	52	26	16	09	26	15	00	22	43	14	53
	30	13	26	39	11	18	22	14	08	20	36	30	31	14	52	26	16	09	26	15	00	22	43	14	53
Aug.	9	13	26	39	11	18	21	14	08	19	36	30	30	14	52	25	16	09	25	15	00	22	43	14	53
	19	13	26	39	11	18	21	14	08	19	36	30	30	14	52	25	16	09	25	15	00	22	43	14	52
	29	13	26	39	-11	18	20	14	08	19	-36	30	28	14	52	25	-16	09	24	15	00	22	-43	14	51
Sept.	8	13	26	39	11	18	20	14	08	19	36	30	27	14	52	25	16	09	24	15	00	21	43	14	50
	18	13	26	39	11	18	19	14	08	19	36	30	26	14	52	25	16	09	23	15	00	21	43	14	49
	28	13	26	39	11	18	19	14	08	19	36	30	24	14	52	25	16	09	23	15	00	21	43	14	48
Oct.	8	13	26	39	11	18	19	14	08	19	36	30	23	14	52	25	16	09	23	15	00	21	43	14	46
	18	13	26	39	11	18	19	14	08	19	36	30	21	14	52	25	16	09	22	15	00	21	43	14	44
	28	13	26	39	-11	18	19	14	08	19	-36	30	20	14	52	25	-16	09	22	15	00	21	-43	14	43
Nov.	7	13	26	39	11	18	20	14	08	19	36	30	19	14	52	25	16	09	22	15	00	21	43	14	41
	17	13	26	40	11	18	21	14	08	19	36	30	19	14	52	25	16	09	23	15	00	21	43	14	40
	27	13	26	40	11	18	22	14	08	19	36	30	18	14	52	25	16	09	23	15	00	21	43	14	39
Dec.	7	13	26	40	11	18	24	14	08	20	36	30	18	14	52	25	16	09	24	15	00	22	43	14	38
	17	13	26	40	11	18	26	14	08	20	36	30	19	14	52	26	16	09	25	15	00	22	43	14	38
	27	13	26	41	-11	18	27	14	08	20	-36	30	19	14	52	26	-16	09	26	15	00	22	-43	14	38
	37	13	26	41	-11	18	29	14	08	21	-36	30	20	14	52	26	-16	09	28	15	00	23	-43	14	38

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Name		β Librae(HR 5685)						α Serpentis (HR 5854)						δ Scorpii (HR 5953)						δ Ophiuchi (HR 6056)					
Mag. Spect.		2.61			B8 IIIn			2.65			K2 IIIb CN I			2.32			B0.3 IV			2.74			M0.5 III		
U.T.		Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination		
		h	m	s	°	'	"	h	m	s	°	'	"	h	m	s	°	'	"	h	m	s	°	'	"
Jan.	1	15	18	28	-9	28	58	15	45	36	+6	20	22	16	01	56	-22	41	52	16	15	45	-3	45	51
	11	15	18	28	9	28	59	15	45	36	6	20	20	16	01	56	22	41	53	16	15	46	3	45	53
	21	15	18	28	9	29	01	15	45	36	6	20	18	16	01	56	22	41	53	16	15	46	3	45	54
	31	15	18	29	9	29	02	15	45	37	6	20	16	16	01	57	22	41	54	16	15	46	3	45	56
Feb.	10	15	18	29	9	29	04	15	45	37	6	20	14	16	01	57	22	41	56	16	15	47	3	45	57
	20	15	18	29	9	29	05	15	45	37	6	20	13	16	01	57	22	41	57	16	15	47	3	45	59
Mar.	2	15	18	29	-9	29	06	15	45	37	+6	20	12	16	01	58	-22	41	58	16	15	47	-3	45	59
	12	15	18	30	9	29	07	15	45	38	6	20	12	16	01	58	22	41	59	16	15	47	3	46	00
	22	15	18	30	9	29	08	15	45	38	6	20	12	16	01	58	22	42	00	16	15	48	3	46	00
Apr.	1	15	18	30	9	29	09	15	45	38	6	20	12	16	01	59	22	42	00	16	15	48	3	46	00
	11	15	18	30	9	29	09	15	45	38	6	20	13	16	01	59	22	42	01	16	15	48	3	46	00
	21	15	18	31	9	29	09	15	45	39	6	20	13	16	01	59	22	42	01	16	15	48	3	46	00
	1	15	18	31	-9	29	09	15	45	39	+6	20	14	16	01	59	-22	42	02	16	15	49	-3	45	59
May	11	15	18	31	9	29	09	15	45	39	6	20	16	16	01	59	22	42	02	16	15	49	3	45	58
	21	15	18	31	9	29	08	15	45	39	6	20	17	16	02	00	22	42	03	16	15	49	3	45	58
	31	15	18	31	9	29	08	15	45	39	6	20	18	16	02	00	22	42	03	16	15	49	3	45	57
June	10	15	18	31	9	29	07	15	45	39	6	20	20	16	02	00	22	42	03	16	15	49	3	45	56
	20	15	18	31	9	29	07	15	45	39	6	20	21	16	02	00	22	42	03	16	15	49	3	45	55
	30	15	18	31	-9	29	06	15	45	39	+6	20	22	16	02	00	-22	42	03	16	15	49	-3	45	54
July	10	15	18	31	9	29	06	15	45	39	6	20	23	16	02	00	22	42	04	16	15	49	3	45	53
	20	15	18	31	9	29	05	15	45	39	6	20	24	16	02	00	22	42	03	16	15	49	3	45	53
	30	15	18	31	9	29	05	15	45	39	6	20	25	16	02	00	22	42	03	16	15	49	3	45	52
Aug.	9	15	18	31	9	29	04	15	45	39	6	20	26	16	02	00	22	42	03	16	15	49	3	45	51
	19	15	18	31	9	29	04	15	45	39	6	20	26	16	01	59	22	42	03	16	15	49	3	45	51
	29	15	18	30	-9	29	04	15	45	39	+6	20	27	16	01	59	-22	42	03	16	15	49	-3	45	50
Sept.	8	15	18	30	9	29	03	15	45	38	6	20	27	16	01	59	22	42	02	16	15	49	3	45	50
	18	15	18	30	9	29	03	15	45	38	6	20	26	16	01	59	22	42	02	16	15	48	3	45	50
	28	15	18	30	9	29	03	15	45	38	6	20	26	16	01	59	22	42	01	16	15	48	3	45	50
Oct.	8	15	18	30	9	29	03	15	45	38	6	20	26	16	01	59	22	42	01	16	15	48	3	45	50
	18	15	18	30	9	29	03	15	45	38	6	20	25	16	01	59	22	42	00	16	15	48	3	45	51
	28	15	18	30	-9	29	03	15	45	38	+6	20	23	16	01	58	-22	42	00	16	15	48	-3	45	51
Nov.	7	15	18	30	9	29	04	15	45	38	6	20	22	16	01	59	22	41	59	16	15	48	3	45	52
	17	15	18	30	9	29	04	15	45	38	6	20	21	16	01	59	22	41	59	16	15	48	3	45	53
	27	15	18	30	9	29	05	15	45	38	6	20	19	16	01	59	22	41	59	16	15	48	3	45	54
Dec.	7	15	18	30	9	29	07	15	45	38	6	20	17	16	01	59	22	41	59	16	15	48	3	45	55
	17	15	18	31	9	29	08	15	45	38	6	20	15	16	01	59	22	42	00	16	15	48	3	45	57
	27	15	18	31	-9	29	09	15	45	39	+6	20	13	16	01	59	-22	42	00	16	15	49	-3	45	58
	37	15	18	31	-9	29	11	15	45	39	+6	20	11	16	02	00	-22	42	01	16	15	49	-3	46	00

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FOR 0^h TERRESTRIAL TIME

Name		α Scorpii A (HR 6134)						ζ Ophiuchi (HR 6175)						ε Scorpii (HR 6241)						θ Ophiuchi(HR 6453)					
Mag. Spect.		0.9 - 1.8			M1.5 Iab-Ib			2.56			O9.5 Vn			2.29			K2 III			3.27			B2 IV		
U.T.		Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination		
		h	m	s	°	'	"	h	m	s	°	'	"	h	m	s	°	'	"	h	m	s	°	'	"
Jan.	1	16	31	03	-26	29	27	16	38	38	-10	37	18	16	51	54	-34	20	27	17	23	39	-25	01	32
	11	16	31	04	26	29	27	16	38	39	10	37	19	16	51	55	34	20	27	17	23	40	25	01	32
	21	16	31	04	26	29	28	16	38	39	10	37	20	16	51	55	34	20	26	17	23	40	25	01	33
	31	16	31	04	26	29	28	16	38	39	10	37	21	16	51	55	34	20	27	17	23	40	25	01	33
Feb.	10	16	31	05	26	29	29	16	38	40	10	37	23	16	51	56	34	20	27	17	23	41	25	01	33
	20	16	31	05	26	29	30	16	38	40	10	37	24	16	51	56	34	20	28	17	23	41	25	01	34
Mar.	2	16	31	05	-26	29	31	16	38	40	-10	37	24	16	51	56	-34	20	28	17	23	41	-25	01	34
	12	16	31	06	26	29	31	16	38	40	10	37	25	16	51	57	34	20	29	17	23	42	25	01	34
	22	16	31	06	26	29	32	16	38	41	10	37	26	16	51	57	34	20	29	17	23	42	25	01	35
Apr.	1	16	31	06	26	29	33	16	38	41	10	37	26	16	51	57	34	20	30	17	23	42	25	01	35
	11	16	31	07	26	29	33	16	38	41	10	37	25	16	51	58	34	20	31	17	23	43	25	01	35
	21	16	31	07	26	29	34	16	38	42	10	37	25	16	51	58	34	20	31	17	23	43	25	01	35
	1	16	31	07	-26	29	35	16	38	42	-10	37	25	16	51	58	-34	20	32	17	23	43	-25	01	35
May	11	16	31	07	26	29	35	16	38	42	10	37	25	16	51	59	34	20	33	17	23	44	25	01	35
	21	16	31	08	26	29	35	16	38	42	10	37	24	16	51	59	34	20	34	17	23	44	25	01	35
	31	16	31	08	26	29	36	16	38	42	10	37	24	16	51	59	34	20	35	17	23	44	25	01	36
June	10	16	31	08	26	29	36	16	38	42	10	37	23	16	51	59	34	20	35	17	23	44	25	01	36
	20	16	31	08	26	29	36	16	38	43	10	37	22	16	51	59	34	20	36	17	23	44	25	01	36
	30	16	31	08	-26	29	37	16	38	43	-10	37	22	16	51	59	-34	20	37	17	23	44	-25	01	36
July	10	16	31	08	26	29	37	16	38	43	10	37	21	16	51	59	34	20	37	17	23	44	25	01	36
	20	16	31	08	26	29	37	16	38	43	10	37	21	16	51	59	34	20	38	17	23	44	25	01	36
	30	16	31	08	26	29	37	16	38	42	10	37	20	16	51	59	34	20	38	17	23	44	25	01	36
Aug.	9	16	31	08	26	29	37	16	38	42	10	37	20	16	51	59	34	20	39	17	23	44	25	01	36
	19	16	31	08	26	29	37	16	38	42	10	37	20	16	51	59	34	20	39	17	23	44	25	01	37
	29	16	31	08	-26	29	37	16	38	42	-10	37	19	16	51	59	-34	20	39	17	23	44	-25	01	36
Sept.	8	16	31	07	26	29	37	16	38	42	10	37	19	16	51	59	34	20	39	17	23	44	25	01	36
	18	16	31	07	26	29	36	16	38	42	10	37	19	16	51	58	34	20	39	17	23	44	25	01	36
	28	16	31	07	26	29	36	16	38	42	10	37	19	16	51	58	34	20	38	17	23	43	25	01	36
Oct.	8	16	31	07	26	29	35	16	38	41	10	37	18	16	51	58	34	20	37	17	23	43	25	01	36
	18	16	31	07	26	29	35	16	38	41	10	37	18	16	51	58	34	20	37	17	23	43	25	01	35
	28	16	31	07	-26	29	34	16	38	41	10	37	19	16	51	58	-34	20	36	17	23	43	-25	01	35
Nov.	7	16	31	07	26	29	34	16	38	41	10	37	19	16	51	58	34	20	35	17	23	43	25	01	35
	17	16	31	07	26	29	33	16	38	41	10	37	19	16	51	58	34	20	34	17	23	43	25	01	34
	27	16	31	07	26	29	33	16	38	41	10	37	20	16	51	58	34	20	33	17	23	43	25	01	34
Dec.	7	16	31	07	26	29	33	16	38	41	10	37	21	16	51	58	34	20	32	17	23	43	25	01	34
	17	16	31	07	26	29	33	16	38	42	10	37	22	16	51	58	34	20	32	17	23	43	25	01	34
	27	16	31	07	-26	29	33	16	38	42	-10	37	23	16	51	58	-34	20	31	17	23	43	-25	01	33
	37	16	31	08	-26	29	33	16	38	42	-10	37	24	16	51	59	-34	20	31	17	23	44	-25	01	34

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Name	λ Scorpii (HR 6527)						α Ophiuchi(HR 6556)						β Ophiuchi (HR 6603)						δ Sagittarii (HR 6859)					
Mag. Spect.	1.63			B1.5 IV			2.08			A5 Vnn			2.77			K2 III CN 0.5			2.70			K2.5 IIIa CN 0.5		
U.T.	Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination		
	h	m	s	°	'	"	h	m	s	°	'	"	h	m	s	°	'	"	h	m	s	°	'	"
Jan. 1	17	35	26	-37	07	20	17	36	11	+12	32	23	17	44	48	+4	33	20	18	22	43	-29	48	57
11	17	35	26	37	07	19	17	36	11	12	32	20	17	44	48	4	33	18	18	22	43	29	48	57
21	17	35	26	37	07	18	17	36	11	12	32	19	17	44	48	4	33	17	18	22	43	29	48	56
31	17	35	27	37	07	18	17	36	11	12	32	17	17	44	48	4	33	15	18	22	43	29	48	56
Feb. 10	17	35	27	37	07	18	17	36	12	12	32	15	17	44	49	4	33	14	18	22	44	29	48	56
20	17	35	27	37	07	18	17	36	12	+12	32	14	17	44	49	4	33	13	18	22	44	29	48	55
Mar. 2	17	35	28	-37	07	18	17	36	12	12	32	13	17	44	49	+4	33	12	18	22	44	-29	48	55
12	17	35	28	37	07	18	17	36	12	12	32	12	17	44	50	4	33	12	18	22	45	29	48	55
22	17	35	29	37	07	18	17	36	13	12	32	12	17	44	50	4	33	11	18	22	45	29	48	55
Apr. 1	17	35	29	37	07	18	17	36	13	12	32	12	17	44	50	4	33	12	18	22	45	29	48	54
11	17	35	29	37	07	19	17	36	13	12	32	13	17	44	50	4	33	13	18	22	46	29	48	54
21	17	35	30	37	07	19	17	36	14	12	32	14	17	44	51	4	33	13	18	22	46	29	48	54
1	17	35	30	-37	07	20	17	36	14	+12	32	16	17	44	51	+4	33	14	18	22	46	-29	48	54
May 11	17	35	30	37	07	20	17	36	14	12	32	18	17	44	51	4	33	16	18	22	47	29	48	53
21	17	35	31	37	07	21	17	36	14	12	32	19	17	44	51	4	33	17	18	22	47	29	48	53
31	17	35	31	37	07	22	17	36	14	12	32	21	17	44	52	4	33	19	18	22	47	29	48	54
June 10	17	35	31	37	07	22	17	36	15	12	32	23	17	44	52	4	33	21	18	22	47	29	48	54
20	17	35	31	37	07	23	17	36	15	12	32	25	17	44	52	4	33	22	18	22	48	29	48	54
30	17	35	31	-37	07	24	17	36	15	+12	32	27	17	44	52	+4	33	24	18	22	48	-29	48	54
July 10	17	35	31	37	07	25	17	36	15	12	32	29	17	44	52	4	33	25	18	22	48	29	48	54
20	17	35	31	37	07	25	17	36	15	12	32	31	17	44	52	4	33	27	18	22	48	29	48	55
30	17	35	31	37	07	26	17	36	15	12	32	32	17	44	52	4	33	28	18	22	48	29	48	55
Aug. 9	17	35	31	37	07	27	17	36	15	12	32	34	17	44	52	4	33	29	18	22	48	29	48	56
19	17	35	31	37	07	27	17	36	14	12	32	34	17	44	52	4	33	30	18	22	48	29	48	56
29	17	35	31	-37	07	28	17	36	14	+12	32	35	17	44	52	+4	33	31	18	22	48	-29	48	56
Sept. 8	17	35	31	37	07	28	17	36	14	12	32	36	17	44	52	4	33	31	18	22	48	29	48	57
18	17	35	31	37	07	28	17	36	14	12	32	36	17	44	51	4	33	31	18	22	47	29	48	57
28	17	35	30	37	07	28	17	36	14	12	32	36	17	44	51	4	33	31	18	22	47	29	48	57
Oct. 8	17	35	30	37	07	27	17	36	14	12	32	36	17	44	51	4	33	31	18	22	47	29	48	57
18	17	35	30	37	07	26	17	36	13	12	32	35	17	44	51	4	33	31	18	22	47	29	48	57
28	17	35	30	-37	07	26	17	36	13	+12	32	34	17	44	51	+4	33	30	18	22	47	-29	48	57
Nov. 7	17	35	30	37	07	25	17	36	13	12	32	33	17	44	51	4	33	29	18	22	47	29	48	56
17	17	35	30	37	07	24	17	36	13	12	32	31	17	44	51	4	33	28	18	22	46	29	48	55
27	17	35	30	37	07	23	17	36	13	12	32	30	17	44	51	4	33	27	18	22	46	29	48	55
Dec. 7	17	35	30	37	07	22	17	36	13	12	32	28	17	44	51	4	33	25	18	22	46	29	48	54
17	17	35	30	37	07	21	17	36	13	12	32	26	17	44	51	4	33	24	18	22	47	29	48	54
27	17	35	30	-37	07	20	17	36	13	+12	32	24	17	44	51	+4	33	22	18	22	47	-29	48	53
37	17	35	30	-37	07	19	17	36	14	+12	32	21	17	44	51	+4	33	20	18	22	47	-29	48	53

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Name		ε Sagittarii (HR 6879)						σ Sagittarii (HR 7121)						ζ Aquilae (HR 7235)						γ Aquilae(HR 7525)					
Mag. Spect.		1.85			A0 II⁻n(shell)			2.02			B3 IV			2.99			A0 Vann			2.72			K3 II		
U.T.		Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination		
		h	m	s	°	'	"	h	m	s	°	'	"	h	m	s	°	'	"	h	m	s	°	'	"
Jan.	1	18	25	57	-34	22	16	18	56	56	-26	15	46	19	06	38	+13	54	14	19	47	32	+10	40	46
	11	18	25	57	34	22	15	18	56	56	26	15	46	19	06	38	13	54	12	19	47	32	10	40	45
	21	18	25	57	34	22	14	18	56	56	26	15	45	19	06	38	13	54	10	19	47	32	10	40	43
	31	18	25	58	34	22	14	18	56	56	26	15	45	19	06	39	13	54	08	19	47	32	10	40	42
Feb.	10	18	25	58	34	22	13	18	56	56	26	15	45	19	06	39	13	54	06	19	47	32	10	40	40
	20	18	25	58	34	22	13	18	56	57	26	15	44	19	06	39	13	54	05	19	47	33	10	40	39
Mar.	2	18	25	59	-34	22	12	18	56	57	-26	15	44	19	06	39	+13	54	04	19	47	33	+10	40	38
	12	18	25	59	34	22	12	18	56	57	26	15	43	19	06	40	13	54	03	19	47	33	10	40	37
	22	18	25	59	34	22	12	18	56	58	26	15	43	19	06	40	13	54	03	19	47	33	10	40	37
Apr.	1	18	26	00	34	22	11	18	56	58	26	15	42	19	06	40	13	54	03	19	47	34	10	40	37
	11	18	26	00	34	22	11	18	56	58	26	15	42	19	06	40	13	54	04	19	47	34	10	40	38
	21	18	26	01	34	22	11	18	56	59	26	15	41	19	06	41	13	54	05	19	47	34	10	40	39
	1	18	26	01	-34	22	11	18	56	59	-26	15	40	19	06	41	+13	54	06	19	47	34	+10	40	40
May	11	18	26	01	34	22	11	18	56	59	26	15	40	19	06	41	13	54	08	19	47	35	10	40	42
	21	18	26	02	34	22	11	18	57	00	26	15	39	19	06	42	13	54	10	19	47	35	10	40	44
	31	18	26	02	34	22	11	18	57	00	26	15	39	19	06	42	13	54	12	19	47	35	10	40	46
June	10	18	26	02	34	22	11	18	57	00	26	15	39	19	06	42	13	54	14	19	47	36	10	40	48
	20	18	26	02	34	22	12	18	57	00	26	15	38	19	06	42	13	54	17	19	47	36	10	40	50
	30	18	26	02	-34	22	12	18	57	01	-26	15	38	19	06	42	+13	54	19	19	47	36	+10	40	52
July	10	18	26	03	34	22	13	18	57	01	26	15	39	19	06	43	13	54	21	19	47	36	10	40	55
	20	18	26	03	34	22	14	18	57	01	26	15	39	19	06	43	13	54	23	19	47	36	10	40	57
	30	18	26	03	34	22	14	18	57	01	26	15	39	19	06	43	13	54	25	19	47	36	10	40	59
Aug.	9	18	26	03	34	22	15	18	57	01	26	15	39	19	06	43	13	54	27	19	47	36	10	41	00
	19	18	26	02	34	22	16	18	57	01	26	15	40	19	06	43	13	54	28	19	47	36	10	41	02
	29	18	26	02	-34	22	16	18	57	01	-26	15	40	19	06	42	+13	54	30	19	47	36	+10	41	03
Sept.	8	18	26	02	34	22	16	18	57	01	26	15	40	19	06	42	13	54	31	19	47	36	10	41	04
	18	18	26	02	34	22	17	18	57	00	26	15	41	19	06	42	13	54	31	19	47	36	10	41	05
	28	18	26	02	34	22	17	18	57	00	26	15	41	19	06	42	13	54	32	19	47	36	10	41	06
Oct.	8	18	26	02	34	22	17	18	57	00	26	15	41	19	06	42	13	54	32	19	47	36	10	41	06
	18	18	26	01	34	22	17	18	57	00	26	15	41	19	06	42	13	54	32	19	47	35	10	41	06
	28	18	26	01	-34	22	16	18	57	00	-26	15	41	19	06	41	+13	54	31	19	47	35	+10	41	06
Nov.	7	18	26	01	34	22	16	18	57	00	26	15	41	19	06	41	13	54	30	19	47	35	10	41	05
	17	18	26	01	34	22	15	18	56	59	26	15	40	19	06	41	13	54	29	19	47	35	10	41	04
	27	18	26	01	34	22	14	18	56	59	26	15	40	19	06	41	13	54	28	19	47	35	10	41	03
Dec.	7	18	26	01	34	22	13	18	56	59	26	15	40	19	06	41	13	54	26	19	47	35	10	41	02
	17	18	26	01	34	22	13	18	56	59	26	15	39	19	06	41	13	54	25	19	47	35	10	41	01
	27	18	26	01	-34	22	12	18	56	59	-26	15	39	19	06	41	+13	54	23	19	47	35	+10	40	59
	37	18	26	01	-34	22	11	18	57	00	-26	15	39	19	06	41	+13	54	21	19	47	35	+10	40	57

APPARENT PLACES OF STARS, 2027

FOR 0^h TERRESTRIAL TIME

Name		α Aquilae(HR 7557)						γ Cygni (HR 7796)						α Cygni (HR 7924)						β Aquarii (HR 8232)					
Mag. Spect.		0.77			A7 Vnn			2.20			F8 Ib			1.25			A2 Ia			2.91			G0 Ib		
U.T.		Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination		
		h	m	s	°	'	"	h	m	s	°	'	"	h	m	s	°	'	"	h	m	s	°	'	"
Jan.	1	19	52	05	+8	56	25	20	23	10	+40	20	41	20	42	20	+45	22	45	21	32	58	-5	27	07
	11	19	52	05	8	56	23	20	23	10	40	20	39	20	42	20	45	22	42	21	32	58	5	27	08
	21	19	52	05	8	56	22	20	23	11	40	20	36	20	42	20	45	22	39	21	32	58	5	27	08
	31	19	52	06	8	56	20	20	23	11	40	20	33	20	42	20	45	22	36	21	32	58	5	27	09
Feb.	10	19	52	06	8	56	19	20	23	11	40	20	30	20	42	20	45	22	33	21	32	59	5	27	09
	20	19	52	06	8	56	18	20	23	11	40	20	28	20	42	20	45	22	31	21	32	59	5	27	09
Mar.	2	19	52	06	+8	56	17	20	23	11	+40	20	26	20	42	20	+45	22	28	21	32	59	-5	27	09
	12	19	52	06	8	56	16	20	23	11	40	20	24	20	42	20	45	22	26	21	32	59	5	27	09
	22	19	52	07	8	56	16	20	23	12	40	20	23	20	42	21	45	22	25	21	32	59	5	27	08
Apr.	1	19	52	07	8	56	17	20	23	12	40	20	22	20	42	21	45	22	24	21	32	59	5	27	07
	11	19	52	07	8	56	17	20	23	12	40	20	22	20	42	21	45	22	23	21	33	00	5	27	06
	21	19	52	08	8	56	18	20	23	13	40	20	22	20	42	22	45	22	23	21	33	00	5	27	05
	1	19	52	08	+8	56	19	20	23	13	+40	20	23	20	42	22	+45	22	24	21	33	00	-5	27	04
May	11	19	52	08	8	56	21	20	23	13	40	20	25	20	42	22	45	22	26	21	33	00	5	27	02
	21	19	52	08	8	56	23	20	23	14	40	20	27	20	42	23	45	22	27	21	33	01	5	27	00
	31	19	52	09	8	56	25	20	23	14	40	20	29	20	42	23	45	22	30	21	33	01	5	26	59
June	10	19	52	09	8	56	27	20	23	14	40	20	32	20	42	24	45	22	32	21	33	01	5	26	57
	20	19	52	09	8	56	29	20	23	15	40	20	35	20	42	24	45	22	36	21	33	02	5	26	55
	30	19	52	09	+8	56	31	20	23	15	+40	20	38	20	42	24	+45	22	39	21	33	02	-5	26	53
July	10	19	52	10	8	56	33	20	23	15	40	20	42	20	42	24	45	22	42	21	33	02	5	26	51
	20	19	52	10	8	56	36	20	23	15	40	20	45	20	42	24	45	22	46	21	33	02	5	26	50
	30	19	52	10	8	56	38	20	23	15	40	20	48	20	42	25	45	22	49	21	33	03	5	26	48
Aug.	9	19	52	10	8	56	39	20	23	15	40	20	51	20	42	25	45	22	52	21	33	03	5	26	47
	19	19	52	10	8	56	40	20	23	15	40	20	54	20	42	25	45	22	55	21	33	03	5	26	46
	29	19	52	10	+8	56	42	20	23	15	+40	20	57	20	42	24	+45	22	59	21	33	03	-5	26	46
Sept.	8	19	52	10	8	56	43	20	23	15	40	20	59	20	42	24	45	23	01	21	33	03	5	26	45
	18	19	52	09	8	56	43	20	23	15	40	21	01	20	42	24	45	23	03	21	33	03	5	26	45
	28	19	52	09	8	56	44	20	23	15	40	21	03	20	42	24	45	23	05	21	33	03	5	26	45
Oct.	8	19	52	09	8	56	44	20	23	14	40	21	04	20	42	24	45	23	07	21	33	03	5	26	45
	18	19	52	09	8	56	44	20	23	14	40	21	05	20	42	23	45	23	08	21	33	03	5	26	45
	28	19	52	09	+8	56	44	20	23	14	+40	21	05	20	42	23	+45	23	08	21	33	02	-5	26	45
Nov.	7	19	52	09	8	56	44	20	23	14	40	21	05	20	42	23	45	23	09	21	33	02	5	26	46
	17	19	52	09	8	56	43	20	23	13	40	21	04	20	42	23	45	23	08	21	33	02	5	26	46
	27	19	52	08	8	56	42	20	23	13	40	21	03	20	42	22	45	23	07	21	33	02	5	26	47
Dec.	7	19	52	08	8	56	41	20	23	13	40	21	01	20	42	22	45	23	06	21	33	02	5	26	47
	17	19	52	08	8	56	40	20	23	13	40	21	00	20	42	22	45	23	04	21	33	02	5	26	48
	27	19	52	08	+8	56	38	20	23	13	+40	20	57	20	42	22	+45	23	02	21	33	02	-5	26	48
	37	19	52	08	+8	56	36	20	23	13	+40	20	54	20	42	22	+45	22	59	21	33	02	-5	26	49

APPARENT PLACES OF STARS, 2027

FOR 0^h TERRESTRIAL TIME

Name		ε Pegasi (HR 8308)						α Aquarii (HR 8414))						δ Aquarii (HR 8709)						α Pegasi (HR 8781)					
Mag. Spect.		0.7 - 3.5			K2 Ib-II			2.96			G2 Ib			3.27			A3 IV-V			2.49			A0 III-IV		
U.T.		Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination		
		h	m	s	°	'	"	h	m	s	°	'	"	h	m	s	°	'	"	h	m	s	°	'	"
Jan.	1	21	45	30	+10	00	01	22	07	10	-0	11	17	22	56	05	-15	40	40	23	06	06	+15	21	10
	11	21	45	30	10	00	00	22	07	10	0	11	17	22	56	05	15	40	40	23	06	06	15	21	09
	21	21	45	30	9	59	58	22	07	10	0	11	18	22	56	05	15	40	40	23	06	06	15	21	08
	31	21	45	30	9	59	57	22	07	10	0	11	19	22	56	05	15	40	40	23	06	06	15	21	06
Feb.	10	21	45	30	9	59	56	22	07	10	0	11	19	22	56	05	15	40	40	23	06	06	15	21	05
	20	21	45	30	9	59	55	22	07	10	0	11	20	22	56	05	15	40	39	23	06	06	15	21	04
Mar.	2	21	45	31	+9	59	54	22	07	10	-0	11	20	22	56	05	-15	40	38	23	06	06	+15	21	03
	12	21	45	31	9	59	53	22	07	10	0	11	20	22	56	05	15	40	37	23	06	06	15	21	02
	22	21	45	31	9	59	53	22	07	10	0	11	20	22	56	05	15	40	36	23	06	06	15	21	01
Apr.	1	21	45	31	9	59	53	22	07	11	0	11	19	22	56	05	15	40	34	23	06	07	15	21	01
	11	21	45	31	9	59	54	22	07	11	0	11	18	22	56	05	15	40	33	23	06	07	15	21	01
	21	21	45	32	9	59	54	22	07	11	0	11	17	22	56	06	15	40	31	23	06	07	15	21	01
	1	21	45	32	+9	59	56	22	07	11	-0	11	16	22	56	06	-15	40	29	23	06	07	+15	21	02
May	11	21	45	32	9	59	57	22	07	12	0	11	14	22	56	06	15	40	27	23	06	07	15	21	03
	21	21	45	33	9	59	59	22	07	12	0	11	12	22	56	06	15	40	25	23	06	08	15	21	05
	31	21	45	33	10	00	01	22	07	12	0	11	10	22	56	07	15	40	23	23	06	08	15	21	06
June	10	21	45	33	10	00	03	22	07	13	0	11	08	22	56	07	15	40	21	23	06	08	15	21	09
	20	21	45	33	10	00	05	22	07	13	0	11	06	22	56	07	15	40	19	23	06	09	15	21	11
	30	21	45	34	+10	00	07	22	07	13	-0	11	04	22	56	08	-15	40	17	23	06	09	+15	21	13
July	10	21	45	34	10	00	10	22	07	14	0	11	02	22	56	08	15	40	16	23	06	09	15	21	15
	20	21	45	34	10	00	12	22	07	14	0	11	00	22	56	08	15	40	14	23	06	10	15	21	18
	30	21	45	34	10	00	14	22	07	14	0	10	59	22	56	09	15	40	13	23	06	10	15	21	20
Aug.	9	21	45	35	10	00	16	22	07	14	0	10	57	22	56	09	15	40	13	23	06	10	15	21	22
	19	21	45	35	10	00	18	22	07	14	0	10	56	22	56	09	15	40	12	23	06	10	15	21	24
	29	21	45	35	+10	00	20	22	07	14	-0	10	55	22	56	09	-15	40	12	23	06	10	+15	21	26
Sept.	8	21	45	35	10	00	21	22	07	14	0	10	54	22	56	09	15	40	12	23	06	11	15	21	28
	18	21	45	35	10	00	22	22	07	14	0	10	54	22	56	09	15	40	12	23	06	11	15	21	30
	28	21	45	35	10	00	23	22	07	14	0	10	53	22	56	09	15	40	13	23	06	11	15	21	31
Oct.	8	21	45	34	10	00	24	22	07	14	0	10	53	22	56	09	15	40	13	23	06	11	15	21	32
	18	21	45	34	10	00	24	22	07	14	0	10	53	22	56	09	15	40	14	23	06	10	15	21	33
	28	21	45	34	+10	00	24	22	07	14	-0	10	53	22	56	09	-15	40	15	23	06	10	+15	21	33
Nov.	7	21	45	34	10	00	24	22	07	14	0	10	53	22	56	09	15	40	16	23	06	10	15	21	34
	17	21	45	34	10	00	24	22	07	14	0	10	54	22	56	09	15	40	16	23	06	10	15	21	34
	27	21	45	34	10	00	23	22	07	14	0	10	54	22	56	09	15	40	17	23	06	10	15	21	34
Dec.	7	21	45	34	10	00	22	22	07	13	0	10	55	22	56	09	15	40	18	23	06	10	15	21	33
	17	21	45	34	10	00	22	22	07	13	0	10	55	22	56	09	15	40	18	23	06	10	15	21	33
	27	21	45	34	+10	00	21	22	07	13	-0	10	56	22	56	08	-15	40	19	23	06	10	+15	21	32
	37	21	45	33	+10	00	19	22	07	13	-0	10	57	22	56	08	-15	40	19	23	06	10	+15	21	31

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FOR 0^h TERRESTRIAL TIME

Date		τ	A	B	C	D	E	dψ	dε
			"	"	"	"	s (0.0001)		
Jan.	0	-0.5034	-5.880	-6.867	-3.105	+20.553	+14	-0.014	+0.096
	1	0.5007	5.837	6.834	3.435	20.492	14	0.104	0.062
	2	0.4979	5.779	6.792	3.764	20.425	14	0.156	+0.017
	3	0.4952	5.704	6.749	4.093	20.352	14	0.164	-0.029
	4	0.4925	5.614	6.713	4.420	20.272	14	0.133	0.069
	5	0.4897	5.512	6.690	4.746	20.185	14	-0.072	0.096
	6	-0.4870	-5.403	-6.685	-5.071	+20.091	+14	+0.008	-0.107
	7	0.4843	5.294	6.698	5.394	19.991	15	0.089	0.099
	8	0.4815	5.190	6.729	5.716	19.884	15	0.157	0.075
	9	0.4788	5.098	6.773	6.035	19.771	15	0.197	-0.037
	10	0.4760	5.021	6.825	6.353	19.652	15	0.200	+0.007
	11	0.4733	4.960	6.877	6.668	19.525	15	0.162	0.052
	12	-0.4706	-4.915	-6.923	-6.981	+19.393	+15	+0.087	+0.089
	13	0.4678	4.883	6.955	7.291	19.255	15	-0.018	0.111
	14	0.4651	4.856	6.967	7.599	19.110	15	0.136	0.114
	15	0.4624	4.827	6.959	7.904	18.959	15	0.248	0.096
	16	0.4596	4.787	6.930	8.206	18.803	15	0.331	0.057
	17	0.4569	4.727	6.888	8.505	18.641	15	0.363	+0.003
	18	-0.4541	-4.641	-6.842	-8.801	+18.473	+15	-0.329	-0.055
	19	0.4514	4.530	6.806	9.094	18.300	15	0.227	0.102
	20	0.4487	4.398	6.795	9.384	18.122	15	-0.074	0.125
	21	0.4459	4.260	6.817	9.671	17.939	15	+0.095	0.115
	22	0.4432	4.134	6.871	9.954	17.751	16	0.238	0.075
	23	0.4405	4.033	6.945	10.235	17.558	16	0.317	-0.014
	24	-0.4377	-3.965	-7.021	-10.513	+17.360	+16	+0.318	+0.048
	25	0.4350	3.925	7.081	10.788	17.158	16	0.248	0.095
	26	0.4322	3.902	7.116	11.060	16.949	16	0.137	0.115
	27	0.4295	3.883	7.122	11.329	16.736	16	+0.017	0.107
	28	0.4268	3.857	7.105	11.594	16.518	15	-0.082	0.076
	29	0.4240	3.816	7.076	11.857	16.294	15	0.143	+0.031
	30	-0.4213	-3.759	-7.042	-12.116	+16.065	+15	-0.161	-0.017
	31	0.4185	3.685	7.014	12.371	15.831	15	0.136	0.060
Feb.	1	0.4158	3.599	6.997	12.622	15.592	16	0.079	0.092
	2	0.4131	3.506	6.997	12.870	15.347	16	-0.001	0.107
	3	0.4103	3.411	7.015	13.113	15.098	16	+0.083	0.104
	4	0.4076	3.320	7.051	13.353	14.844	16	0.156	0.083
	5	-0.4049	-3.240	-7.101	-13.587	+14.585	+16	+0.205	-0.048
	6	0.4021	3.175	7.160	13.818	14.321	16	0.219	-0.005
	7	0.3994	3.126	7.220	14.044	14.052	16	0.193	+0.041
	8	0.3966	3.094	7.275	14.265	13.780	16	0.126	0.080
	9	0.3939	3.076	7.317	14.482	13.502	16	+0.027	0.107
	10	0.3912	3.065	7.339	14.693	13.221	16	-0.089	0.115
	11	-0.3884	-3.055	-7.340	-14.900	+12.936	+16	-0.205	+0.101
	12	0.3857	3.036	7.321	15.101	12.647	15	0.296	0.067
	13	0.3830	3.000	7.286	15.298	12.354	15	0.345	+0.018
	14	0.3802	2.941	7.244	15.489	12.058	15	0.334	-0.037
	15	-0.3775	-2.859	-7.209	-15.675	+11.759	+15	-0.262	-0.086

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FOR 0^h TERRESTRIAL TIME

Date		τ	A	B	C	D	E	dψ	dε
			"	"	"	"	s (0.0001)		
Feb.	15	-0.3775	-2.859	-7.209	-15.675	+11.759	+15	-0.262	-0.086
	16	0.3747	2.755	7.192	15.856	11.457	16	-0.136	0.116
	17	0.3720	2.641	7.202	16.032	11.151	16	+0.018	0.119
	18	0.3693	2.531	7.243	16.202	10.844	16	0.165	0.091
	19	0.3665	2.438	7.307	16.368	10.533	16	0.269	-0.039
	20	0.3638	2.374	7.382	16.529	10.220	16	0.303	+0.023
	21	-0.3611	-2.340	-7.448	-16.685	+9.905	+16	+0.263	+0.078
	22	0.3583	2.328	7.493	16.836	9.587	16	0.167	0.112
	23	0.3556	2.327	7.508	16.983	9.266	16	+0.047	0.116
	24	0.3528	2.322	7.495	17.125	8.943	16	-0.064	0.093
	25	0.3501	2.304	7.463	17.261	8.617	16	0.140	0.051
	26	0.3474	2.269	7.422	17.393	8.288	15	0.170	+0.001
	27	-0.3446	-2.215	-7.384	-17.520	+7.957	+15	-0.155	-0.047
	28	0.3419	2.147	7.355	17.641	7.623	15	0.102	0.084
Mar.	1	0.3392	2.070	7.342	17.757	7.286	16	-0.024	0.105
	2	0.3364	1.990	7.346	17.868	6.948	16	+0.062	0.108
	3	0.3337	1.913	7.369	17.973	6.607	16	0.142	0.092
	4	0.3309	1.845	7.406	18.072	6.264	16	0.200	0.060
	5	-0.3282	-1.789	-7.454	-18.166	+5.919	+16	+0.227	-0.018
	6	0.3255	1.750	7.505	18.254	5.572	16	0.214	+0.028
	7	0.3227	1.728	7.551	18.336	5.223	16	0.159	0.070
	8	0.3200	1.720	7.586	18.413	4.873	15	+0.069	0.101
	9	0.3172	1.722	7.603	18.483	4.522	15	-0.045	0.115
	10	0.3145	1.726	7.597	18.547	4.169	15	0.162	0.107
	11	-0.3118	-1.722	-7.569	-18.606	+3.816	+15	-0.261	+0.077
	12	0.3090	1.703	7.523	18.658	3.461	15	0.320	+0.030
	13	0.3063	1.662	7.469	18.704	3.107	15	0.324	-0.024
	14	0.3036	1.597	7.419	18.744	2.752	15	0.268	0.074
	15	0.3008	1.512	7.383	18.779	2.396	15	0.159	0.109
	16	0.2981	1.414	7.371	18.807	2.041	15	-0.019	0.119
	17	-0.2953	-1.316	-7.388	-18.830	+1.686	+15	+0.123	-0.100
	18	0.2926	1.231	7.428	18.847	1.331	15	0.233	-0.057
	19	0.2899	1.168	7.483	18.859	0.977	15	0.285	+0.001
	20	0.2871	1.133	7.536	18.865	0.623	15	0.269	0.059
	21	0.2844	1.122	7.573	18.866	+0.269	15	0.192	0.101
	22	0.2817	1.125	7.583	18.862	-0.084	15	+0.078	0.118
	23	-0.2789	-1.131	-7.565	-18.853	-0.437	+15	-0.039	+0.106
	24	0.2762	1.126	7.522	18.838	0.789	15	0.132	0.070
	25	0.2734	1.104	7.465	18.818	1.142	14	0.181	+0.022
	26	0.2707	1.062	7.406	18.793	1.494	14	0.180	-0.029
	27	0.2680	1.002	7.354	18.763	1.845	14	0.136	0.072
	28	0.2652	0.930	7.316	18.727	2.196	14	-0.062	0.100
	29	-0.2625	-0.853	-7.296	-18.686	-2.547	+15	+0.027	-0.109
	30	0.2598	0.776	7.295	18.639	2.897	15	0.113	0.099
	31	0.2570	0.707	7.310	18.586	3.246	15	0.181	0.072
Apr.	1	0.2543	0.649	7.337	18.529	3.594	15	0.219	-0.033
	2	-0.2515	-0.606	-7.369	-18.465	-3.941	+15	+0.219	+0.013

BESSELIAN DAY NUMBERS, 2027.5

FOR 0^h TERRESTRIAL TIME

Date		τ	A	B	C	D	E	dψ	dε
			"	"	"	"	s (0.0001)		
Apr.	1	-0.2543	-0.649	-7.337	-18.529	-3.594	+15	+0.219	-0.033
	2	0.2515	0.606	7.369	18.465	3.941	15	0.219	+0.013
	3	0.2488	0.579	7.400	18.396	4.287	15	0.179	0.057
	4	0.2461	0.567	7.421	18.321	4.631	14	+0.100	0.093
	5	0.2433	0.565	7.426	18.240	4.974	14	-0.007	0.113
	6	0.2406	0.568	7.409	18.154	5.316	14	0.125	0.111
	7	-0.2379	-0.567	-7.369	-18.062	-5.655	+14	-0.232	+0.088
	8	0.2351	0.550	7.309	17.965	5.993	14	0.303	+0.044
	9	0.2324	0.512	7.238	17.862	6.328	14	0.321	-0.010
	10	0.2296	0.449	7.166	17.753	6.661	14	0.275	0.064
	11	0.2269	0.363	7.108	17.639	6.991	14	0.174	0.103
	12	0.2242	0.262	7.074	17.520	7.318	14	-0.037	0.119
	13	-0.2214	-0.159	-7.067	-17.395	-7.642	+14	+0.105	-0.107
	14	0.2187	-0.066	7.085	17.266	7.964	14	0.220	0.069
	15	0.2159	+0.006	7.119	17.132	8.282	14	0.283	-0.015
	16	0.2132	0.054	7.156	16.993	8.597	14	0.281	+0.043
	17	0.2105	0.077	7.181	16.850	8.909	14	0.219	0.089
	18	0.2077	0.084	7.184	16.702	9.218	14	+0.114	0.113
	19	-0.2050	+0.086	-7.160	-16.550	-9.524	+14	-0.005	+0.111
	20	0.2023	0.094	7.111	16.394	9.827	14	0.109	0.084
	21	0.1995	0.118	7.044	16.234	10.127	14	0.177	+0.039
	22	0.1968	0.161	6.971	16.069	10.424	14	0.195	-0.011
	23	0.1940	0.224	6.901	15.900	10.719	14	0.166	0.058
	24	0.1913	0.303	6.844	15.726	11.010	14	0.100	0.092
	25	-0.1886	+0.390	-6.804	-15.549	-11.298	+14	-0.012	-0.108
	26	0.1858	0.479	6.784	15.366	11.583	14	+0.078	0.104
	27	0.1831	0.563	6.782	15.180	11.865	14	0.154	0.082
	28	0.1804	0.636	6.794	14.989	12.144	14	0.203	0.046
	29	0.1776	0.696	6.813	14.794	12.419	14	0.216	-0.002
	30	0.1749	0.740	6.834	14.595	12.690	14	0.188	+0.043
May	1	-0.1721	+0.769	-6.848	-14.391	-12.958	+14	+0.121	+0.082
	2	0.1694	0.787	6.849	14.183	13.222	14	+0.023	0.108
	3	0.1667	0.798	6.831	13.971	13.483	14	-0.093	0.114
	4	0.1639	0.810	6.791	13.754	13.739	13	0.206	0.099
	5	0.1612	0.834	6.729	13.533	13.991	13	0.292	0.061
	6	0.1585	0.878	6.651	13.308	14.239	13	0.329	+0.009
	7	-0.1557	+0.948	-6.569	-13.079	-14.482	+13	-0.301	-0.048
	8	0.1530	1.044	6.498	12.846	14.720	14	0.209	0.095
	9	0.1502	1.159	6.449	12.610	14.954	14	-0.072	0.119
	10	0.1475	1.281	6.429	12.370	15.182	14	+0.080	0.115
	11	0.1448	1.394	6.437	12.126	15.406	14	0.210	0.082
	12	0.1420	1.487	6.465	11.879	15.624	14	0.289	-0.029
	13	-0.1393	+1.555	-6.498	-11.630	-15.838	+14	+0.302	+0.028
	14	0.1366	1.598	6.523	11.377	16.046	14	0.251	0.077
	15	0.1338	1.623	6.529	11.122	16.249	14	0.153	0.107
	16	0.1311	1.640	6.509	10.864	16.448	14	+0.035	0.111
	17	-0.1283	+1.661	-6.465	-10.604	-16.642	+14	-0.075	+0.091

BESSELIAN DAY NUMBERS, 2027.5
FOR 0^h TERRESTRIAL TIME

Date		τ	A	B	C	D	E	dψ	dε
			"	"	"	"	s (0.0001)		
May	17	-0.1283	+1.661	-6.465	-10.604	-16.642	+14	-0.075	+0.091
	18	0.1256	1.695	6.402	10.341	16.831	14	0.155	0.051
	19	0.1229	1.747	6.330	10.076	17.015	14	0.190	+0.003
	20	0.1201	1.818	6.260	9.808	17.195	14	0.177	-0.045
	21	0.1174	1.906	6.200	9.538	17.370	14	0.123	0.082
	22	0.1146	2.006	6.156	9.265	17.540	14	-0.042	0.104
	23	-0.1119	+2.110	-6.132	-8.990	-17.706	+14	+0.048	-0.106
	24	0.1092	2.210	6.127	8.713	17.866	14	0.130	0.090
	25	0.1064	2.302	6.137	8.433	18.022	15	0.188	0.058
	26	0.1037	2.381	6.158	8.151	18.174	15	0.212	-0.016
	27	0.1010	2.444	6.183	7.866	18.320	15	0.196	+0.029
	28	0.0982	2.492	6.204	7.579	18.461	15	0.140	0.070
	29	-0.0955	+2.527	-6.215	-7.290	-18.597	+15	+0.050	+0.100
	30	0.0927	2.553	6.209	6.999	18.728	15	-0.061	0.114
	31	0.0900	2.578	6.183	6.705	18.853	14	0.178	0.107
June	1	0.0873	2.610	6.136	6.409	18.973	14	0.277	0.078
	2	0.0845	2.659	6.071	6.112	19.088	14	0.336	+0.031
	3	0.0818	2.731	5.997	5.812	19.197	14	0.335	-0.026
	4	-0.0791	+2.832	-5.927	-5.510	-19.300	+15	-0.265	-0.080
	5	0.0763	2.956	5.876	5.207	19.397	15	-0.136	0.115
	6	0.0736	3.092	5.853	4.902	19.488	15	+0.023	0.121
	7	0.0708	3.226	5.863	4.596	19.573	15	0.175	0.096
	8	0.0681	3.342	5.898	4.288	19.652	15	0.280	-0.047
	9	0.0654	3.430	5.944	3.980	19.724	16	0.316	+0.013
	10	-0.0626	+3.491	-5.984	-3.671	-19.791	+16	+0.282	+0.066
	11	0.0599	3.530	6.006	3.362	19.852	16	0.194	0.101
	12	0.0572	3.558	6.004	3.053	19.907	15	+0.078	0.111
	13	0.0544	3.588	5.976	2.743	19.957	15	-0.036	0.096
	14	0.0517	3.627	5.930	2.432	20.001	15	0.124	0.060
	15	0.0489	3.684	5.873	2.122	20.039	15	0.171	+0.014
	16	-0.0462	+3.759	-5.815	-1.811	-20.072	+15	-0.171	-0.034
	17	0.0435	3.851	5.765	1.500	20.100	16	0.128	0.075
	18	0.0407	3.955	5.731	1.189	20.123	16	-0.056	0.100
	19	0.0380	4.066	5.716	0.877	20.140	16	+0.032	0.107
	20	0.0352	4.174	5.720	0.566	20.152	16	0.116	0.096
	21	0.0325	4.276	5.741	-0.254	20.159	16	0.180	0.068
	22	-0.0298	+4.364	-5.774	+0.057	-20.160	+16	+0.213	-0.029
	23	0.0270	4.437	5.813	0.369	20.156	16	0.208	+0.016
	24	0.0243	4.494	5.850	0.681	20.147	16	0.162	0.058
	25	0.0216	4.537	5.879	0.993	20.132	16	+0.080	0.092
	26	0.0188	4.570	5.894	1.305	20.111	16	-0.027	0.111
	27	0.0161	4.598	5.891	1.617	20.085	16	0.144	0.110
	28	-0.0133	+4.631	-5.867	+1.929	-20.053	+16	-0.252	+0.090
	29	0.0106	4.675	5.826	2.240	20.016	16	0.329	+0.050
	30	0.0079	4.739	5.772	2.551	19.973	16	0.355	-0.003
July	1	0.0051	4.829	5.716	2.862	19.924	16	0.317	0.058
	2	-0.0024	+4.945	-5.671	+3.173	-19.869	+16	-0.213	-0.102

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Date		τ	A	B	C	D	E	$d\psi$	$d\varepsilon$
			"	"	"	"	s (0.0001)		
July	1	-0.0051	+4.829	-5.716	+2.862	-19.924	+16	-0.317	-0.058
	2	-0.0024	4.945	5.671	3.173	19.869	16	0.213	0.102
	3	+0.0003	5.079	5.652	3.482	19.808	17	-0.062	0.122
	4	0.0031	5.219	5.665	3.791	19.740	17	+0.102	0.110
	5	0.0058	5.346	5.708	4.099	19.667	17	0.237	0.068
	6	0.0086	5.448	5.770	4.405	19.588	17	0.308	-0.008
	7	+0.0113	+5.519	-5.833	+4.710	-19.502	+17	+0.302	+0.052
	8	0.0140	5.563	5.880	5.013	19.411	17	0.229	0.095
	9	0.0168	5.592	5.901	5.314	19.314	17	0.118	0.113
	10	0.0195	5.617	5.895	5.613	19.212	17	0.000	0.103
	11	0.0222	5.652	5.867	5.910	19.104	17	-0.095	0.070
	12	0.0250	5.701	5.826	6.205	18.992	17	0.151	+0.024
	13	+0.0277	+5.769	-5.783	+6.498	-18.874	+17	-0.161	-0.025
	14	0.0305	5.853	5.747	6.789	18.751	17	0.127	0.067
	15	0.0332	5.950	5.724	7.078	18.623	17	-0.060	0.097
	16	0.0359	6.054	5.720	7.365	18.491	18	+0.024	0.108
	17	0.0387	6.158	5.734	7.650	18.353	18	0.109	0.101
	18	0.0414	6.255	5.767	7.933	18.211	18	0.179	0.077
	19	+0.0441	+6.341	-5.812	+8.214	-18.064	+18	+0.221	-0.040
	20	0.0469	6.411	5.864	8.493	17.912	18	0.224	+0.004
	21	0.0496	6.464	5.916	8.769	17.755	18	0.188	0.047
	22	0.0524	6.503	5.962	9.044	17.594	18	0.114	0.083
	23	0.0551	6.529	5.995	9.316	17.427	18	+0.012	0.106
	24	0.0578	6.550	6.010	9.586	17.256	18	-0.104	0.111
	25	+0.0606	+6.571	-6.006	+9.854	-17.080	+18	-0.217	+0.097
	26	0.0633	6.601	5.983	10.119	16.899	18	0.306	0.064
	27	0.0661	6.648	5.947	10.382	16.713	18	0.353	+0.016
	28	0.0688	6.717	5.905	10.642	16.522	18	0.342	-0.037
	29	0.0715	6.810	5.869	10.900	16.326	18	0.270	0.085
	30	0.0743	6.924	5.850	11.155	16.125	18	-0.143	0.115
	31	+0.0770	+7.049	-5.860	+11.407	-15.919	+18	+0.014	-0.116
Aug.	1	0.0797	7.171	5.901	11.656	15.707	18	0.164	0.087
	2	0.0825	7.274	5.967	11.902	15.491	19	0.267	-0.033
	3	0.0852	7.348	6.042	12.144	15.269	19	0.298	+0.030
	4	0.0880	7.391	6.109	12.382	15.043	19	0.253	0.083
	5	0.0907	7.411	6.151	12.617	14.812	18	0.153	0.113
	6	+0.0934	+7.423	-6.162	+12.847	-14.577	+18	+0.033	+0.112
	7	0.0962	7.441	6.147	13.074	14.338	18	-0.072	0.085
	8	0.0989	7.473	6.114	13.297	14.094	18	0.139	+0.039
	9	0.1016	7.523	6.076	13.515	13.847	18	0.158	-0.012
	10	0.1044	7.591	6.042	13.730	13.596	18	0.132	0.058
	11	0.1071	7.672	6.021	13.940	13.342	18	-0.069	0.092
	12	+0.1099	+7.762	-6.017	+14.147	-13.084	+18	+0.014	-0.108
	13	0.1126	7.853	6.032	14.349	12.823	18	0.102	0.106
	14	0.1153	7.938	6.065	14.548	12.558	19	0.177	0.085
	15	0.1181	8.012	6.111	14.743	12.290	19	0.227	0.051
	16	+0.1208	+8.072	-6.166	+14.934	-12.018	+19	+0.241	-0.008

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Date		τ	A	B	C	D	E	dψ	dε
			"	"	"	"	s (0.0001)		
Aug.	16	+0.1208	+8.072	-6.166	+14.934	-12.018	+19	+0.241	-0.008
	17	0.1235	8.115	6.222	15.120	11.743	19	0.215	+0.036
	18	0.1263	8.142	6.272	15.303	11.465	18	0.150	0.074
	19	0.1290	8.156	6.310	15.482	11.184	18	+0.054	0.101
	20	0.1318	8.162	6.332	15.657	10.899	18	-0.060	0.111
	21	0.1345	8.168	6.333	15.828	10.612	18	0.175	0.101
	22	+0.1372	+8.180	-6.315	+15.995	-10.321	+18	-0.272	+0.073
	23	0.1400	8.206	6.282	16.157	10.026	18	0.332	+0.030
	24	0.1427	8.252	6.242	16.316	9.729	18	0.341	-0.021
	25	0.1454	8.321	6.204	16.470	9.428	18	0.293	0.069
	26	0.1482	8.410	6.178	16.620	9.124	18	0.192	0.104
	27	0.1509	8.513	6.176	16.765	8.817	18	-0.054	0.115
	28	+0.1537	+8.619	-6.202	+16.906	-8.506	+18	+0.092	-0.099
	29	0.1564	8.714	6.254	17.042	8.192	18	0.211	-0.055
	30	0.1591	8.784	6.321	17.173	7.876	18	0.271	+0.005
	31	0.1619	8.826	6.388	17.299	7.556	18	0.258	0.064
Sept.	1	0.1646	8.840	6.437	17.419	7.233	18	0.179	0.106
	2	0.1674	8.840	6.457	17.534	6.909	18	+0.063	0.119
	3	+0.1701	+8.839	-6.445	+17.644	-6.581	+18	-0.052	+0.101
	4	0.1728	8.851	6.410	17.748	6.252	18	0.135	0.060
	5	0.1756	8.882	6.362	17.847	5.922	18	0.168	+0.007
	6	0.1783	8.933	6.316	17.940	5.589	18	0.151	-0.044
	7	0.1810	9.000	6.280	18.028	5.255	18	0.093	0.084
	8	0.1838	9.077	6.261	18.111	4.920	18	-0.009	0.106
	9	+0.1865	+9.157	-6.261	+18.188	-4.583	+18	+0.083	-0.109
	10	0.1893	9.233	6.280	18.260	4.246	18	0.165	0.094
	11	0.1920	9.299	6.313	18.327	3.907	18	0.225	0.062
	12	0.1947	9.351	6.355	18.389	3.567	18	0.250	-0.021
	13	0.1975	9.388	6.401	18.446	3.226	18	0.236	+0.023
	14	0.2002	9.408	6.442	18.498	2.884	18	0.182	0.064
	15	+0.2029	+9.415	-6.472	+18.545	-2.541	+18	+0.093	+0.095
	16	0.2057	9.413	6.485	18.587	2.197	17	-0.017	0.110
	17	0.2084	9.408	6.479	18.623	1.852	17	0.133	0.105
	18	0.2112	9.408	6.452	18.655	1.507	17	0.235	0.081
	19	0.2139	9.422	6.409	18.681	1.161	17	0.305	+0.040
	20	0.2166	9.454	6.356	18.703	0.814	17	0.327	-0.009
	21	+0.2194	+9.508	-6.302	+18.719	-0.466	+17	-0.294	-0.058
	22	0.2221	9.583	6.260	18.731	-0.117	17	0.209	0.096
	23	0.2248	9.673	6.237	18.736	+0.232	17	-0.086	0.113
	24	0.2276	9.768	6.239	18.737	0.582	17	+0.050	0.104
	25	0.2303	9.856	6.267	18.732	0.933	17	0.170	0.069
	26	0.2331	9.927	6.313	18.721	1.284	17	0.243	-0.016
	27	+0.2358	+9.972	-6.363	+18.705	+1.636	+17	+0.253	+0.043
	28	0.2385	9.990	6.403	18.683	1.987	17	0.197	0.091
	29	0.2413	9.990	6.418	18.654	2.339	17	+0.093	0.117
	30	0.2440	9.984	6.403	18.620	2.691	17	-0.026	0.112
Oct.	1	+0.2467	+9.986	-6.360	+18.580	+3.041	+17	-0.125	+0.079

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Date		τ	A	B	C	D	E	dψ	dε
			"	"	"	"	s (0.0001)		
Oct.	1	+0.2467	+9.986	-6.360	+18.580	+3.041	+17	-0.125	+0.079
	2	0.2495	10.006	6.298	18.534	3.391	16	0.180	+0.030
	3	0.2522	10.047	6.232	18.482	3.740	16	0.180	-0.025
	4	0.2550	10.109	6.172	18.424	4.088	16	0.131	0.071
	5	0.2577	10.184	6.129	18.360	4.434	17	-0.049	0.101
	6	0.2604	10.264	6.105	18.291	4.779	17	+0.047	0.111
	7	+0.2632	+10.343	-6.100	+18.217	+5.123	+17	+0.138	-0.101
	8	0.2659	10.414	6.111	18.137	5.465	17	0.209	0.074
	9	0.2687	10.472	6.134	18.052	5.805	17	0.246	-0.035
	10	0.2714	10.515	6.162	17.961	6.144	17	0.245	+0.010
	11	0.2741	10.542	6.188	17.866	6.480	17	0.203	0.053
	12	0.2769	10.555	6.204	17.765	6.815	16	0.125	0.087
	13	+0.2796	+10.558	-6.206	+17.659	+7.148	+16	+0.021	+0.107
	14	0.2823	10.557	6.188	17.548	7.479	16	-0.095	0.108
	15	0.2851	10.560	6.149	17.432	7.808	16	0.203	0.089
	16	0.2878	10.574	6.092	17.312	8.136	16	0.282	0.052
	17	0.2906	10.607	6.023	17.186	8.461	16	0.315	+0.003
	18	0.2933	10.662	5.951	17.055	8.784	16	0.294	-0.048
	19	+0.2960	+10.740	-5.888	+16.920	+9.105	+16	-0.217	-0.089
	20	0.2988	10.834	5.844	16.779	9.424	16	-0.101	0.111
	21	0.3015	10.935	5.825	16.634	9.741	16	+0.033	0.108
	22	0.3042	11.031	5.831	16.483	10.056	16	0.154	0.080
	23	0.3070	11.113	5.856	16.327	10.369	16	0.234	-0.031
	24	0.3097	11.171	5.889	16.166	10.679	16	0.256	+0.026
	25	+0.3125	+11.205	-5.916	+16.000	+10.986	+16	+0.216	+0.077
	26	0.3152	11.220	5.924	15.828	11.291	16	0.124	0.109
	27	0.3179	11.225	5.905	15.651	11.593	16	+0.008	0.114
	28	0.3207	11.233	5.858	15.468	11.891	16	-0.102	0.092
	29	0.3234	11.256	5.790	15.281	12.186	16	0.176	+0.049
	30	0.3261	11.300	5.711	15.088	12.478	16	0.199	-0.004
	31	+0.3289	+11.366	-5.635	+14.890	+12.765	+16	-0.168	-0.054
Nov.	1	0.3316	11.450	5.572	14.687	13.048	16	-0.095	0.091
	2	0.3344	11.543	5.528	14.480	13.328	16	+0.002	0.109
	3	0.3371	11.638	5.505	14.268	13.603	16	0.100	0.106
	4	0.3398	11.727	5.501	14.051	13.873	16	0.181	0.084
	5	0.3426	11.804	5.510	13.830	14.139	16	0.232	0.048
	6	+0.3453	+11.866	-5.527	+13.605	+14.401	+16	+0.244	-0.005
	7	0.3480	11.913	5.544	13.376	14.659	16	0.215	+0.039
	8	0.3508	11.945	5.555	13.143	14.912	16	0.149	0.077
	9	0.3535	11.967	5.553	12.906	15.160	16	+0.052	0.102
	10	0.3563	11.982	5.534	12.665	15.404	16	-0.061	0.109
	11	0.3590	11.998	5.495	12.421	15.643	16	0.173	0.097
	12	+0.3617	+12.024	-5.437	+12.173	+15.878	+16	-0.264	+0.066
	13	0.3645	12.066	5.364	11.921	16.108	16	0.314	+0.019
	14	0.3672	12.131	5.285	11.666	16.334	16	0.308	-0.033
	15	0.3700	12.221	5.212	11.408	16.555	16	0.243	0.080
	16	+0.3727	+12.330	-5.157	+11.146	+16.772	+16	-0.129	-0.109

BESSELIAN DAY NUMBERS, 2027.5
FOR 0^h TERRESTRIAL TIME

Date		τ	A	B	C	D	E	dψ	dε
			"	"	"	"	s (0.0001)		
Nov.	16	+0.3727	+12.330	-5.157	+11.146	+16.772	+16	-0.129	-0.109
	17	0.3754	12.450	5.126	10.881	16.984	16	+0.010	0.113
	18	0.3782	12.568	5.124	10.612	17.192	16	0.142	0.090
	19	0.3809	12.672	5.144	10.340	17.395	17	0.236	-0.045
	20	0.3836	12.753	5.174	10.064	17.593	17	0.272	+0.011
	21	0.3864	12.808	5.202	9.784	17.787	17	0.243	0.064
	22	+0.3891	+12.843	-5.214	+9.501	+17.975	+17	+0.161	+0.101
	23	0.3919	12.867	5.202	9.215	18.158	17	+0.048	0.113
	24	0.3946	12.891	5.163	8.925	18.335	16	-0.066	0.098
	25	0.3973	12.926	5.103	8.632	18.507	16	0.153	0.062
	26	0.4001	12.979	5.030	8.335	18.673	16	0.195	+0.012
	27	0.4028	13.054	4.956	8.036	18.834	16	0.184	-0.039
	28	+0.4055	+13.148	-4.892	+7.733	+18.988	+17	-0.126	-0.080
	29	0.4083	13.255	4.846	7.428	19.135	17	-0.038	0.105
	30	0.4110	13.367	4.820	7.120	19.277	17	+0.061	0.109
Dec.	1	0.4138	13.475	4.815	6.810	19.412	17	0.151	0.093
	2	0.4165	13.574	4.826	6.498	19.541	17	0.214	0.061
	3	0.4192	13.657	4.848	6.184	19.664	17	0.239	-0.019
	4	+0.4220	+13.725	-4.873	+5.868	+19.781	+17	+0.224	+0.025
	5	0.4247	13.778	4.894	5.550	19.891	17	0.168	0.065
	6	0.4274	13.818	4.905	5.231	19.995	17	+0.080	0.095
	7	0.4302	13.849	4.901	4.910	20.092	17	-0.029	0.108
	8	0.4329	13.880	4.879	4.588	20.184	17	0.144	0.103
	9	0.4357	13.915	4.839	4.265	20.269	17	0.244	0.079
	10	+0.4384	+13.965	-4.782	+3.940	+20.348	+17	-0.312	+0.039
	11	0.4411	14.034	4.716	3.615	20.421	17	0.330	-0.012
	12	0.4439	14.128	4.650	3.289	20.487	17	0.287	0.063
	13	0.4466	14.245	4.598	2.961	20.548	17	0.186	0.102
	14	0.4493	14.379	4.570	2.633	20.603	18	-0.046	0.116
	15	0.4521	14.515	4.572	2.305	20.653	18	+0.102	0.102
	16	+0.4548	+14.640	-4.601	+1.975	+20.696	+18	+0.221	-0.062
	17	0.4576	14.742	4.646	1.644	20.733	18	0.282	-0.005
	18	0.4603	14.816	4.692	1.313	20.765	18	0.272	+0.051
	19	0.4630	14.866	4.725	0.981	20.790	18	0.201	0.094
	20	0.4658	14.901	4.734	0.647	20.809	18	+0.092	0.112
	21	0.4685	14.933	4.717	+0.313	20.822	18	-0.024	0.103
	22	+0.4713	+14.973	-4.677	-0.021	+20.828	+18	-0.119	+0.070
	23	0.4740	15.030	4.623	0.356	20.827	18	0.173	+0.024
	24	0.4767	15.107	4.567	0.691	20.819	18	0.177	-0.027
	25	0.4795	15.202	4.517	1.027	20.805	18	0.134	0.071
	26	0.4822	15.311	4.484	1.362	20.784	19	-0.057	0.100
	27	0.4849	15.427	4.470	1.697	20.756	19	+0.038	0.109
	28	+0.4877	+15.542	-4.478	-2.031	+20.721	+19	+0.130	-0.099
	29	0.4904	15.648	4.502	2.365	20.679	19	0.201	0.072
	30	0.4932	15.740	4.540	2.698	20.631	19	0.238	-0.033
	31	0.4959	15.816	4.583	3.030	20.576	19	0.234	+0.012
	32	+0.4986	+15.876	-4.624	-3.361	+20.514	+19	+0.190	+0.053

SECOND-ORDER DAY NUMBERS, 2027
J FOR NORTHERN DECLINATIONS
FOR 0^h TT AND EQUINOX J 2027.5

Date	RIGHT ASCENSION												
	0^h 12^h	1^h 13^h	2^h 14^h	3^h 15^h	4^h 16^h	5^h 17^h	6^h 18^h	7^h 19^h	8^h 20^h	9^h 21^h	10^h 22^h	11^h 23^h	12^h 24^h
Jan. -3	-5	-3	-1	2	4	4	4	2	0	-3	-5	-5	-5
7	-6	-5	-2	1	3	5	5	4	1	-2	-4	-6	-6
17	-7	-7	-5	-1	2	5	6	6	4	0	-3	-6	-7
27	-8	-9	-7	-3	1	5	7	8	6	2	-2	-6	-8
Feb. 6	-8	-10	-9	-6	-1	3	7	9	8	5	0	-4	-8
16	-7	-10	-10	-8	-4	1	6	9	9	7	3	-2	-7
26	-5	-9	-11	-10	-6	-1	4	8	10	9	5	0	-5
Mar. 8	-3	-8	-11	-11	-8	-4	2	7	10	10	7	3	-3
18	-1	-6	-10	-12	-10	-6	0	5	9	11	9	5	-1
28	2	-4	-9	-11	-11	-8	-3	3	8	10	10	7	2
Apr. 7	5	-1	-6	-10	-12	-10	-6	0	5	9	11	9	5
17	6	1	-4	-9	-11	-10	-7	-2	3	8	10	9	6
27	8	4	-1	-6	-9	-10	-9	-5	0	5	8	9	8
May 7	8	5	1	-4	-8	-10	-9	-6	-2	3	7	9	8
17	8	6	3	-2	-6	-8	-9	-7	-4	1	5	7	8
27	7	6	4	0	-3	-6	-8	-7	-5	-1	2	5	7
June 6	5	6	4	2	-1	-4	-6	-7	-5	-3	0	3	5
16	4	5	4	3	0	-2	-5	-6	-5	-4	-1	1	4
26	2	3	4	3	1	-1	-3	-4	-5	-4	-2	0	2
July 6	0	2	3	3	2	1	-1	-3	-4	-4	-3	-2	0
16	-1	0	1	2	2	1	0	-1	-2	-3	-3	-2	-1
26	-2	-1	0	1	1	1	1	0	-1	-2	-2	-2	-2
Aug. 5	-2	-2	-1	0	0	1	1	1	0	-1	-1	-2	-2
15	-2	-2	-2	-1	-1	0	1	1	1	0	0	-1	-2
25	-1	-2	-2	-2	-2	-1	0	1	1	1	1	0	-1
Sept. 4	0	-1	-2	-2	-3	-2	-1	0	1	1	2	1	0
14	2	1	-1	-2	-3	-4	-3	-2	0	1	2	3	2
24	4	3	1	-1	-3	-5	-5	-4	-2	0	2	4	4
Oct. 4	5	5	3	0	-3	-5	-6	-6	-4	-1	2	4	5
14	6	7	6	3	-1	-5	-7	-8	-7	-4	0	4	6
24	7	9	8	6	1	-4	-8	-10	-9	-7	-2	3	7
Nov. 3	7	10	11	9	4	-2	-8	-11	-12	-10	-5	1	7
13	5	11	13	12	7	0	-6	-12	-14	-13	-8	-1	5
23	4	11	15	15	11	4	-5	-12	-16	-16	-12	-5	4
Dec. 3	1	10	16	17	14	7	-2	-11	-17	-18	-15	-8	1
13	-2	8	15	19	17	11	1	-9	-16	-20	-18	-12	-2
23	-6	5	14	20	20	15	5	-6	-15	-21	-21	-16	-6
33	-10	1	12	20	22	18	9	-2	-13	-21	-23	-19	-10

The second-order day number J given in this table in units of $0^s.00001$

The apparent right ascension of a star is given by:
$\alpha = \alpha_1 + \tau\mu_\alpha/100 + Aa + Bb + Cc + Dd + E + J \tan^2\delta_1$

Where the position (α_1, δ_1) and centennial proper motion in right ascension (μ_α) are referred to the mean equator and equinox of J 2027.5

SECOND-ORDER DAY NUMBERS, 2027
J' FOR NORTHERN DECLINATIONS
FOR 0h TT AND EQUINOX J 2027.5

Date		RIGHT ASCENSION												
		0^h 12^h	1^h 13^h	2^h 14^h	3^h 15^h	4^h 16^h	5^h 17^h	6^h 18^h	7^h 19^h	8^h 20^h	9^h 21^h	10^h 22^h	11^h 23^h	12^h 24^h
Jan.	-3	-1	0	-1	-1	-2	-4	-6	-6	-7	-6	-5	-3	-1
	7	-3	-1	0	-1	-2	-3	-6	-8	-9	-9	-8	-5	-3
	17	-6	-4	0	0	0	-2	-5	-8	-10	-11	-10	-9	-5
	27	-9	-6	-3	-1	-1	-2	-5	-8	-11	-12	-13	-11	-9
Feb.	6	-11	-8	-4	-2	-1	-1	-4	-7	-10	-13	-14	-13	-11
	16	-13	-10	-6	-3	-1	-1	-2	-6	-9	-13	-15	-15	-13
	26	-15	-13	-9	-5	-2	-1	-1	-4	-8	-12	-15	-16	-15
Mar.	8	-17	-15	-11	-7	-3	-1	-1	-3	-6	-11	-15	-17	-17
	18	-17	-16	-13	-9	-5	-2	-1	-2	-5	-9	-13	-16	-17
	28	-17	-17	-15	-11	-6	-3	-1	-1	-3	-7	-11	-15	-17
Apr.	7	-16	-17	-16	-13	-8	-4	-1	-1	-2	-5	-9	-13	-16
	17	-14	-16	-16	-14	-10	-6	-2	-1	-1	-3	-7	-11	-14
	27	-12	-15	-15	-14	-11	-7	-4	-1	-1	-2	-5	-9	-12
May	7	-10	-13	-14	-14	-12	-8	-5	-2	-1	-1	-3	-6	-10
	17	-8	-11	-13	-13	-12	-9	-6	-3	-1	-1	-2	-4	-8
	27	-5	-8	-10	-11	-11	-9	-7	-4	-2	-1	-1	-3	-5
June	6	-3	-6	-8	-9	-10	-9	-7	-5	-2	-1	-1	-1	-3
	16	-2	-4	-6	-7	-8	-8	-7	-5	-3	-1	-1	-1	-2
	26	-1	-2	-4	-5	-7	-7	-6	-5	-4	-2	-1	-1	-1
July	6	-1	-1	-2	-3	-5	-5	-5	-5	-4	-2	-1	-1	-1
	16	-1	-1	-1	-2	-3	-4	-4	-4	-4	-3	-2	-1	-1
	26	-1	-1	-1	-1	-2	-2	-3	-3	-3	-3	-2	-2	-1
Aug.	5	-2	-1	-1	-1	-1	-1	-2	-2	-3	-3	-3	-2	-2
	15	-2	-2	-1	-1	-1	-1	-1	-1	-2	-3	-3	-3	-2
	25	-3	-3	-2	-2	-1	-1	-1	-1	-1	-2	-3	-3	-3
Sept.	4	-4	-4	-3	-3	-2	-1	-1	-1	-1	-1	-2	-3	-4
	14	-4	-5	-5	-5	-4	-3	-2	-1	-1	-1	-2	-3	-4
	24	-4	-6	-7	-7	-6	-5	-3	-2	-1	-1	-1	-3	-4
Oct.	4	-4	-6	-8	-9	-9	-7	-5	-3	-1	-1	-1	-2	-4
	14	-4	-6	-9	-11	-11	-11	-8	-6	-3	-1	-1	-1	-4
	24	-3	-6	-10	-13	-15	-14	-12	-9	-5	-2	-1	-1	-3
Nov.	3	-2	-6	-10	-15	-17	-18	-16	-12	-8	-4	-1	-1	-2
	13	-2	-5	-10	-15	-19	-21	-20	-16	-11	-6	-2	-1	-2
	23	-1	-4	-9	-15	-21	-24	-24	-21	-15	-9	-4	-1	-1
Dec.	3	-1	-3	-8	-15	-22	-26	-27	-25	-20	-13	-6	-2	-1
	13	-1	-2	-7	-14	-21	-27	-30	-29	-24	-17	-9	-3	-1
	23	-1	-1	-5	-12	-20	-27	-32	-32	-28	-21	-12	-5	-1
	33	-2	-1	-3	-10	-19	-27	-33	-34	-31	-25	-16	-8	-2

The second-order day number J' given in this table in units of 0".0001

The apparent declination of a star is given by:
$\delta = \delta_1 + \tau\mu_\delta/100 + Aa' + Bb' + Cc' + J' \tan\delta_1$

Where the declination (δ_1) and centennial proper motion in declination (μ_δ) are referred to the mean equator and equinox of J 2027.5

SECOND-ORDER DAY NUMBERS, 2027
J FOR SOUTHERN DECLINATIONS
FOR 0h TT AND EQUINOX J 2027.5

Date		RIGHT ASCENSION												
		0^h 12^h	1^h 13^h	2^h 14^h	3^h 15^h	4^h 16^h	5^h 17^h	6^h 18^h	7^h 19^h	8^h 20^h	9^h 21^h	10^h 22^h	11^h 23^h	12^h 24^h
Jan.	-3	4	9	11	11	7	2	-5	-10	-12	-12	-8	-3	4
	7	1	6	9	10	8	4	-2	-7	-10	-11	-9	-5	1
	17	-2	3	6	8	8	5	1	-4	-7	-9	-9	-6	-2
	27	-3	0	4	6	7	5	2	-1	-5	-7	-8	-6	-3
Feb.	6	-4	-2	1	4	5	5	3	1	-2	-5	-6	-6	-4
	16	-4	-3	-1	2	3	4	3	2	0	-3	-4	-5	-4
	26	-4	-3	-2	0	1	3	3	2	1	-1	-2	-4	-4
Mar.	8	-3	-3	-3	-2	0	1	2	2	2	1	-1	-2	-3
	18	-1	-2	-3	-3	-2	-1	0	1	2	2	1	0	-1
	28	0	-1	-2	-3	-3	-2	-1	0	1	2	2	1	0
Apr.	7	1	0	-1	-2	-3	-3	-2	-1	0	1	2	2	1
	17	2	2	1	-1	-2	-3	-3	-3	-2	0	1	2	2
	27	3	3	2	1	-1	-3	-4	-4	-3	-2	0	2	3
May	7	3	4	4	3	1	-2	-4	-5	-5	-4	-2	1	3
	17	2	4	5	5	3	0	-3	-5	-6	-6	-4	-1	2
	27	1	4	6	6	5	2	-2	-5	-7	-7	-6	-3	1
June	6	-1	3	6	8	7	4	0	-4	-7	-9	-8	-5	-1
	16	-4	1	6	8	9	7	3	-2	-7	-9	-10	-8	-4
	26	-6	-1	4	9	10	9	5	0	-5	-10	-11	-10	-6
July	6	-9	-3	3	8	11	11	8	2	-4	-9	-12	-12	-9
	16	-11	-6	0	6	11	12	10	5	-1	-7	-12	-13	-11
	26	-13	-9	-3	4	10	12	12	8	2	-5	-11	-13	-13
Aug.	5	-14	-11	-5	2	8	12	13	10	4	-3	-9	-13	-14
	15	-14	-13	-8	-1	6	11	13	12	7	0	-7	-12	-14
	25	-14	-13	-10	-4	3	9	13	12	9	3	-4	-10	-14
Sept.	4	-12	-14	-11	-6	0	7	11	13	10	5	-1	-8	-12
	14	-10	-13	-12	-8	-2	4	9	12	11	7	1	-5	-10
	24	-8	-11	-12	-9	-4	2	7	10	11	8	3	-3	-8
Oct.	4	-5	-9	-11	-10	-6	-1	4	8	10	9	5	0	-5
	14	-3	-7	-9	-9	-7	-3	2	6	8	8	6	2	-3
	24	-1	-5	-7	-8	-7	-4	0	4	6	7	6	3	-1
Nov.	3	1	-3	-5	-7	-7	-5	-2	2	4	6	6	4	1
	13	2	-1	-3	-5	-6	-5	-3	0	2	4	5	4	2
	23	2	0	-2	-3	-4	-4	-3	-1	1	2	3	3	2
Dec.	3	2	1	-1	-2	-3	-3	-3	-2	0	1	2	2	2
	13	1	1	0	-1	-2	-2	-2	-2	-1	0	1	1	1
	23	0	0	0	0	-1	-1	-1	-1	-1	-1	0	0	0
	33	0	0	0	0	0	0	-1	-1	-1	-1	-1	-1	0

The second-order day number J given in this table in units of $0^s.00001$

The apparent right ascension of a star is given by:
$\alpha = \alpha_1 + \tau\mu_\alpha/100 + Aa + Bb + Cc + Dd + E + J \tan^2\delta_1$

Where the position (α_1, δ_1) and centennial proper motion in right ascension (μ_α) are referred to the mean equator and equinox of J 2027.5

SECOND-ORDER DAY NUMBERS, 2027
J' FOR SOUTHERN DECLINATIONS
FOR 0h TT AND EQUINOX J 2027.5

Date		RIGHT ASCENSION												
		0^h 12^h	1^h 13^h	2^h 14^h	3^h 15^h	4^h 16^h	5^h 17^h	6^h 18^h	7^h 19^h	8^h 20^h	9^h 21^h	10^h 22^h	11^h 23^h	12^h 24^h
Jan.	-3	-1	-4	-8	-12	-16	-18	-18	-15	-11	-6	-3	-1	-1
	7	-1	-2	-5	-9	-13	-15	-16	-15	-11	-7	-4	-1	-1
	17	-1	-1	-3	-6	-10	-12	-14	-13	-11	-8	-5	-2	-1
	27	-1	-1	-2	-4	-7	-9	-11	-11	-10	-8	-5	-3	-1
Feb.	6	-2	-1	-1	-2	-4	-6	-8	-9	-9	-8	-6	-3	-2
	16	-2	-1	-1	-1	-2	-4	-5	-7	-7	-7	-6	-4	-2
	26	-3	-2	-1	-1	-1	-2	-3	-4	-5	-6	-5	-4	-3
Mar.	8	-3	-2	-1	-1	-1	-1	-2	-3	-3	-4	-4	-4	-3
	18	-4	-3	-2	-1	-1	-1	-1	-1	-2	-3	-4	-4	-4
	28	-4	-4	-3	-2	-2	-1	-1	-1	-1	-2	-3	-3	-4
Apr.	7	-3	-4	-4	-4	-3	-2	-1	-1	-1	-1	-2	-2	-3
	17	-3	-4	-5	-5	-4	-4	-2	-1	-1	-1	-1	-2	-3
	27	-2	-4	-5	-6	-6	-5	-4	-3	-2	-1	-1	-1	-2
May	7	-2	-3	-5	-6	-7	-7	-6	-5	-3	-1	-1	-1	-2
	17	-1	-2	-4	-7	-8	-9	-9	-7	-5	-3	-1	-1	-1
	27	-1	-2	-4	-7	-9	-11	-11	-10	-8	-5	-2	-1	-1
June	6	-1	-1	-3	-6	-9	-12	-13	-12	-10	-7	-4	-2	-1
	16	-1	-1	-2	-5	-9	-12	-14	-15	-13	-10	-6	-3	-1
	26	-2	-1	-1	-4	-8	-12	-15	-17	-16	-13	-9	-5	-2
July	6	-3	-1	-1	-3	-7	-12	-16	-18	-18	-16	-12	-7	-3
	16	-5	-1	-1	-2	-6	-11	-15	-18	-19	-18	-14	-9	-5
	26	-7	-3	-1	-1	-4	-9	-14	-18	-20	-20	-17	-12	-7
Aug.	5	-9	-4	-1	-1	-3	-7	-12	-17	-20	-21	-19	-14	-9
	15	-11	-6	-2	-1	-2	-5	-10	-16	-20	-21	-20	-16	-11
	25	-13	-8	-3	-1	-1	-4	-8	-13	-18	-20	-20	-18	-13
Sept.	4	-15	-10	-5	-1	-1	-2	-6	-11	-16	-19	-20	-18	-15
	14	-16	-11	-6	-2	-1	-1	-4	-9	-13	-17	-19	-19	-16
	24	-16	-12	-8	-4	-1	-1	-3	-6	-11	-15	-17	-18	-16
Oct.	4	-15	-12	-9	-5	-2	-1	-1	-4	-8	-12	-15	-16	-15
	14	-14	-12	-9	-6	-3	-1	-1	-3	-6	-9	-12	-14	-14
	24	-12	-11	-9	-6	-3	-1	-1	-1	-4	-7	-10	-12	-12
Nov.	3	-10	-10	-8	-6	-4	-2	-1	-1	-2	-4	-7	-9	-10
	13	-8	-8	-7	-6	-4	-2	-1	-1	-1	-3	-5	-6	-8
	23	-6	-6	-6	-5	-4	-2	-1	-1	-1	-2	-3	-4	-6
Dec.	3	-3	-4	-4	-4	-3	-2	-1	-1	-1	-1	-2	-3	-3
	13	-2	-2	-3	-3	-3	-2	-1	-1	-1	-1	-1	-1	-2
	23	-1	-1	-2	-2	-2	-2	-1	-1	-1	-1	-1	-1	-1
	33	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1

The second-order day number J' given in this table in units of 0".0001

The apparent declination of a star is given by:
$\delta = \delta_1 + \tau\mu_\delta/100 + Aa' + Bb' + Cc' + J' \tan\delta_1$

Where the declination (δ_1) and centennial proper motion in declination (μ_δ) are referred to the mean equator and equinox of J 2027.5

POSITION AND VELOCITY OF THE EARTH, 2027
ORIGIN AT SOLAR SYSTEM BARYCENTRE
MEAN EQUATOR AND EQUINOX J 2000.0

Date 0^h T.D.B.		X	Y	Z	$\dot{X}$	$\dot{Y}$	$\dot{Z}$
Jan.	0	-0.153 287 72	+0.886 801 27	+0.384 502 84	-1727 1203	-250 0185	-108 3331
	1	0.170 535 07	0.884 162 36	0.383 359 31	1722 2579	277 7554	120 3698
	2	0.187 731 03	0.881 246 36	0.382 095 53	1716 8412	305 4340	132 3824
	3	0.204 870 04	0.878 053 92	0.380 711 77	1710 8672	333 0404	144 3643
	4	0.221 946 51	0.874 585 84	0.379 208 37	1704 3345	360 5610	156 3089
	5	0.238 954 86	0.870 843 03	0.377 585 73	1697 2429	387 9818	168 2094
	6	-0.255 889 51	+0.866 826 58	+0.375 844 35	-1689 5932	-415 2887	-180 0593
	7	0.272 744 87	0.862 537 68	0.373 984 74	1681 3874	442 4680	191 8522
	8	0.289 515 41	0.857 977 69	0.372 007 51	1672 6283	469 5055	203 5814
	9	0.306 195 61	0.853 148 09	0.369 913 34	1663 3202	496 3877	215 2406
	10	0.322 780 00	0.848 050 50	0.367 702 96	1653 4684	523 1008	226 8238
	11	0.339 263 19	0.842 686 68	0.365 377 14	1643 0791	549 6315	238 3249
	12	-0.355 639 82	+0.837 058 52	+0.362 936 75	-1632 1596	-575 9674	-249 7383
	13	0.371 904 64	0.831 168 03	0.360 382 69	1620 7183	602 0959	261 0586
	14	0.388 052 48	0.825 017 34	0.357 715 90	1608 7648	628 0053	272 2809
	15	0.404 078 26	0.818 608 69	0.354 937 41	1596 3096	653 6849	283 4007
	16	0.419 977 04	0.811 944 44	0.352 048 25	1583 3645	679 1246	294 4139
	17	0.435 743 96	0.805 027 03	0.349 049 50	1569 9426	704 3158	305 3174
	18	-0.451 374 35	+0.797 858 97	+0.345 942 27	-1556 0578	-729 2521	-316 1092
	19	0.466 863 63	0.790 442 85	0.342 727 69	1541 7250	753 9296	326 7887
	20	0.482 207 40	0.782 781 24	0.339 406 87	1526 9578	778 3478	337 3567
	21	0.497 401 37	0.774 876 75	0.335 980 92	1511 7674	802 5094	347 8160
	22	0.512 441 36	0.766 731 89	0.332 450 90	1496 1609	826 4195	358 1700
	23	0.527 323 21	0.758 349 18	0.328 817 86	1480 1399	850 0837	368 4218
	24	-0.542 042 77	+0.749 731 03	+0.325 082 80	-1463 7014	-873 5056	-378 5736
	25	0.556 595 82	0.740 879 87	0.321 246 72	1446 8387	896 6851	388 6252
	26	0.570 978 10	0.731 798 15	0.317 310 64	1429 5444	919 6181	398 5741
	27	0.585 185 25	0.722 488 36	0.313 275 59	1411 8122	942 2965	408 4160
	28	0.599 212 87	0.712 953 10	0.309 142 69	1393 6383	964 7096	418 1453
	29	0.613 056 54	0.703 195 09	0.304 913 08	1375 0213	986 8454	427 7559
	30	-0.626 711 83	+0.693 217 16	+0.300 587 99	-1355 9626	-1008 6915	-437 2415
	31	0.640 174 33	0.683 022 27	0.296 168 69	1336 4650	1030 2356	446 5960
Feb.	1	0.653 439 68	0.672 613 50	0.291 656 52	1316 5332	1051 4656	455 8138
	2	0.666 503 57	0.661 994 04	0.287 052 89	1296 1728	1072 3697	464 8889
	3	0.679 361 73	0.651 167 23	0.282 359 24	1275 3899	1092 9368	473 8163
	4	0.692 009 98	0.640 136 47	0.277 577 07	1254 1918	1113 1553	482 5904
	5	-0.704 444 21	+0.628 905 32	+0.272 707 96	-1232 5865	-1133 0142	-491 2062
	6	0.716 660 38	0.617 477 42	0.267 753 49	1210 5832	1152 5028	499 6586
	7	0.728 654 58	0.605 856 53	0.262 715 35	1188 1918	1171 6101	507 9425
	8	0.740 422 96	0.594 046 52	0.257 595 22	1165 4236	1190 3258	516 0536
	9	0.751 961 83	0.582 051 35	0.252 394 87	1142 2911	1208 6406	523 9876
	10	0.763 267 62	0.569 875 08	0.247 116 07	1118 8079	1226 5455	531 7407
	11	-0.774 336 87	+0.557 521 84	+0.241 760 66	-1094 9883	-1244 0326	-539 3099
	12	0.785 166 31	0.544 995 84	0.236 330 50	1070 8480	1261 0958	546 6927
	13	0.795 752 81	0.532 301 35	0.230 827 44	1046 4028	1277 7299	553 8876
	14	0.806 093 41	0.519 442 68	0.225 253 37	1021 6696	1293 9319	560 8939
	15	-0.816 185 30	+0.506 424 16	+0.219 610 19	-996 6648	-1309 7007	-567 7120

$\dot{X}$, $\dot{Y}$, $\dot{Z}$ are in units of 10^{-9} a.u. per day

FRAME BIAS, PRECESSION AND NUTATION, 2027
MATRIX ELEMENTS FOR CONVERSION FROM
GCRS TO TRUE EQUINOX OF DATE

Date	0^h TT	M_{11} - 1	M_{12}	M_{13}	M_{21}	M_{22} - 1	M_{23}	M_{31}	M_{32}	M_{33} - 1
Jan.	0	-2200	-608 414	-264 331	+608 405	-1851	-4129	+264 351	+2521	-349
	1	2201	608 462	264 351	608 453	1851	4114	264 372	2505	349
	2	2201	608 526	264 379	608 518	1852	4093	264 399	2484	350
	3	2202	608 610	264 416	608 601	1852	4073	264 436	2463	350
	4	2202	608 711	264 459	608 702	1853	4055	264 479	2445	350
	5	2203	608 825	264 509	608 816	1853	4044	264 529	2434	350
	6	-2204	-608 946	-264 562	+608 938	-1854	-4042	+264 582	+2431	-350
	7	2205	609 069	264 615	609 060	1855	4049	264 635	2437	350
	8	2206	609 184	264 665	609 176	1856	4064	264 685	2452	350
	9	2207	609 287	264 710	609 279	1856	4086	264 730	2473	350
	10	2207	609 374	264 747	609 365	1857	4112	264 767	2498	351
	11	2208	609 441	264 777	609 432	1857	4137	264 797	2524	351
	12	-2208	-609 491	-264 798	+609 482	-1857	-4160	+264 819	+2546	-351
	13	2208	609 528	264 814	609 519	1858	4175	264 835	2561	351
	14	2208	609 558	264 827	609 549	1858	4181	264 848	2567	351
	15	2209	609 590	264 841	609 581	1858	4177	264 862	2562	351
	16	2209	609 635	264 861	609 626	1858	4163	264 881	2548	351
	17	2210	609 701	264 890	609 692	1859	4143	264 910	2528	351
	18	-2210	-609 796	-264 931	+609 788	-1859	-4121	+264 951	+2505	-351
	19	2211	609 921	264 985	609 912	1860	4104	265 005	2488	351
	20	2212	610 068	265 049	610 059	1861	4099	265 069	2482	351
	21	2213	610 222	265 116	610 213	1862	4110	265 136	2492	352
	22	2214	610 363	265 177	610 355	1863	4136	265 197	2518	352
	23	2215	610 476	265 226	610 467	1863	4172	265 246	2553	352
	24	-2216	-610 552	-265 259	+610 543	-1864	-4209	+265 280	+2590	-352
	25	2216	610 597	265 278	610 588	1864	4239	265 299	2619	352
	26	2216	610 622	265 289	610 613	1864	4255	265 311	2635	352
	27	2216	610 643	265 299	610 634	1864	4259	265 320	2638	352
	28	2217	610 673	265 311	610 663	1865	4251	265 332	2630	352
	29	2217	610 718	265 331	610 709	1865	4236	265 352	2616	352
	30	-2217	-610 782	-265 359	+610 773	-1865	-4220	+265 380	+2599	-352
	31	2218	610 864	265 395	610 855	1866	4207	265 415	2585	352
Feb.	1	2219	610 960	265 436	610 951	1866	4199	265 457	2577	352
	2	2219	611 065	265 482	611 056	1867	4199	265 502	2577	352
	3	2220	611 171	265 528	611 162	1868	4208	265 548	2585	353
	4	2221	611 272	265 571	611 263	1868	4226	265 592	2602	353
	5	-2222	-611 361	-265 610	+611 352	-1869	-4250	+265 631	+2626	-353
	6	2222	611 434	265 642	611 425	1869	4279	265 663	2655	353
	7	2223	611 488	265 666	611 479	1870	4309	265 687	2684	353
	8	2223	611 524	265 681	611 515	1870	4335	265 703	2710	353
	9	2223	611 544	265 690	611 535	1870	4355	265 712	2730	353
	10	2223	611 556	265 695	611 547	1870	4366	265 717	2741	353
	11	-2223	-611 568	-265 700	+611 558	-1870	-4367	+265 722	+2742	-353
	12	2223	611 589	265 710	611 580	1870	4357	265 731	2732	353
	13	2224	611 629	265 727	611 620	1871	4340	265 749	2715	353
	14	2224	611 694	265 755	611 685	1871	4321	265 777	2695	353
	15	-2225	-611 787	-265 795	+611 777	-1871	-4304	+265 817	+2678	-353

POSITION AND VELOCITY OF THE EARTH, 2027
ORIGIN AT SOLAR SYSTEM BARYCENTRE
MEAN EQUATOR AND EQUINOX J 2000.0

Date 0^h T.D.B.		X	Y	Z	$\dot{X}$	$\dot{Y}$	$\dot{Z}$
Feb.	15	-0.816 185 30	+0.506 424 16	+0.219 610 19	-996 6648	-1309 7007	-567 7120
	16	0.826 025 85	0.493 250 11	0.213 899 75	971 4045	1325 0375	574 3436
	17	0.835 612 59	0.479 924 83	0.208 123 93	945 9036	1339 9460	580 7913
	18	0.844 943 16	0.466 452 59	0.202 284 53	920 1739	1354 4327	587 0590
	19	0.854 015 33	0.452 837 56	0.196 383 33	894 2236	1368 5049	593 1510
	20	0.862 826 91	0.439 083 85	0.190 422 08	868 0567	1382 1704	599 0715
	21	-0.871 375 74	+0.425 195 49	+0.184 402 47	-841 6724	-1395 4351	-604 8231
	22	0.879 659 62	0.411 176 47	0.178 326 18	815 0674	1408 3018	610 4068
	23	0.887 676 34	0.397 030 78	0.172 194 89	788 2375	1420 7692	615 8213
	24	0.895 423 61	0.382 762 44	0.166 010 32	761 1791	1432 8323	621 0635
	25	0.902 899 16	0.368 375 51	0.159 774 21	733 8916	1444 4836	626 1291
	26	0.910 100 69	0.353 874 17	0.153 488 35	706 3769	1455 7140	631 0134
	27	-0.917 025 95	+0.339 262 66	+0.147 154 57	-678 6392	-1466 5145	-635 7113
	28	0.923 672 75	0.324 545 34	0.140 774 76	650 6852	1476 8760	640 2182
Mar.	1	0.930 038 96	0.309 726 63	0.134 350 85	622 5225	1486 7902	644 5302
	2	0.936 122 53	0.294 811 05	0.127 884 82	594 1602	1496 2493	648 6433
	3	0.941 921 53	0.279 803 19	0.121 378 66	565 6077	1505 2463	652 5537
	4	0.947 434 09	0.264 707 69	0.114 834 43	536 8749	1513 7739	656 2584
	5	-0.952 658 46	+0.249 529 30	+0.108 254 19	-507 9726	-1521 8257	-659 7541
	6	0.957 593 01	0.234 272 79	0.101 640 05	478 9123	1529 3951	663 0375
	7	0.962 236 22	0.218 943 02	0.094 994 16	449 7063	1536 4756	666 1060
	8	0.966 586 70	0.203 544 92	0.088 318 66	420 3683	1543 0615	668 9567
	9	0.970 643 20	0.188 083 46	0.081 615 75	390 9131	1549 1476	671 5875
	10	0.974 404 62	0.172 563 65	0.074 887 65	361 3567	1554 7297	673 9968
	11	-0.977 870 05	+0.156 990 56	+0.068 136 56	-331 7163	-1559 8052	-676 1840
	12	0.981 038 73	0.141 369 24	0.061 364 71	302 0095	1564 3735	678 1492
	13	0.983 910 08	0.125 704 77	0.054 574 31	272 2542	1568 4357	679 8936
	14	0.986 483 71	0.110 002 20	0.047 767 56	242 4678	1571 9953	681 4199
	15	0.988 759 39	0.094 266 52	0.040 946 63	212 6664	1575 0578	682 7312
	16	0.990 737 04	0.078 502 68	0.034 113 64	182 8649	1577 6306	683 8317
	17	-0.992 416 72	+0.062 715 51	+0.027 270 68	-153 0754	-1579 7229	-684 7265
	18	0.993 798 62	0.046 909 79	0.020 419 78	123 3076	1581 3449	685 4210
	19	0.994 882 97	0.031 090 15	0.013 562 91	93 5677	1582 5072	685 9203
	20	0.995 670 07	+0.015 261 14	+0.006 702 01	63 8581	1583 2196	686 2290
	21	0.996 160 23	-0.000 572 77	-0.000 161 05	34 1783	1583 4903	686 3509
	22	0.996 353 73	0.016 407 21	0.007 024 39	-4 5260	1583 3244	686 2874
	23	-0.996 250 83	-0.032 237 81	-0.013 886 18	+25 1020	-1582 7235	-686 0387
	24	0.995 851 77	0.048 060 22	0.020 744 55	54 7076	1581 6865	685 6034
	25	0.995 156 75	0.063 870 07	0.027 597 62	84 2909	1580 2096	684 9789
	26	0.994 166 03	0.079 662 93	0.034 443 48	113 8494	1578 2879	684 1620
	27	0.992 879 86	0.095 434 33	0.041 280 21	143 3783	1575 9164	683 1497
	28	0.991 298 59	0.111 179 74	0.048 105 82	172 8705	1573 0897	681 9390
	29	-0.989 422 60	-0.126 894 60	-0.054 918 32	+202 3178	-1569 8036	-680 5275
	30	0.987 252 41	0.142 574 27	0.061 715 69	231 7109	1566 0546	678 9134
	31	0.984 788 60	0.158 214 13	0.068 495 90	261 0399	1561 8394	677 0948
Apr.	1	0.982 031 86	0.173 809 50	0.075 256 90	290 2948	1557 1556	675 0703
	2	-0.978 982 99	-0.189 355 68	-0.081 996 62	+319 4648	-1552 0009	-672 8388

$\dot{X}$, $\dot{Y}$, $\dot{Z}$ are in units of 10^{-9} a.u. per day

FRAME BIAS, PRECESSION AND NUTATION, 2027
MATRIX ELEMENTS FOR CONVERSION FROM
GCRS TO TRUE EQUINOX OF DATE

Date 0^h TT		M_{11} - 1	M_{12}	M_{13}	M_{21}	M_{22} - 1	M_{23}	M_{31}	M_{32}	M_{33} - 1
Feb.	15	-2225	-611 787	-265 795	+611 777	-1871	-4304	+265 817	+2678	-353
	16	2226	611 902	265 845	611 892	1872	4296	265 867	2669	353
	17	2226	612 029	265 900	612 020	1873	4301	265 922	2673	354
	18	2227	612 152	265 954	612 143	1874	4320	265 976	2692	354
	19	2228	612 256	265 999	612 247	1874	4352	266 021	2723	354
	20	2229	612 328	266 030	612 319	1875	4388	266 052	2759	354
	21	-2229	-612 367	-266 047	+612 357	-1875	-4421	+266 069	+2792	-354
	22	2229	612 379	266 053	612 370	1875	4443	266 075	2813	354
	23	2229	612 381	266 053	612 371	1875	4450	266 076	2821	354
	24	2229	612 386	266 056	612 376	1875	4444	266 078	2814	354
	25	2229	612 405	266 064	612 396	1875	4428	266 086	2799	354
	26	2229	612 445	266 081	612 435	1876	4408	266 103	2779	354
	27	-2230	-612 504	-266 107	+612 495	-1876	-4390	+266 129	+2760	-354
	28	2230	612 580	266 140	612 571	1876	4376	266 162	2745	354
Mar.	1	2231	612 666	266 177	612 657	1877	4370	266 199	2739	354
	2	2232	612 756	266 216	612 746	1877	4372	266 238	2741	354
	3	2232	612 842	266 254	612 833	1878	4383	266 276	2751	355
	4	2233	612 919	266 287	612 909	1878	4402	266 309	2769	355
	5	-2233	-612 980	-266 314	+612 971	-1879	-4425	+266 336	+2792	-355
	6	2234	613 024	266 333	613 014	1879	4450	266 355	2817	355
	7	2234	613 049	266 344	613 039	1879	4472	266 366	2840	355
	8	2234	613 057	266 347	613 048	1879	4489	266 370	2856	355
	9	2234	613 055	266 347	613 046	1879	4497	266 369	2864	355
	10	2234	613 051	266 345	613 041	1879	4494	266 367	2862	355
	11	-2234	-613 055	-266 346	+613 045	-1879	-4481	+266 369	+2848	-355
	12	2234	613 076	266 356	613 066	1879	4459	266 378	2826	355
	13	2234	613 122	266 376	613 112	1880	4433	266 398	2799	355
	14	2235	613 194	266 407	613 184	1880	4408	266 429	2775	355
	15	2236	613 289	266 448	613 280	1881	4391	266 470	2757	355
	16	2236	613 398	266 496	613 389	1881	4386	266 518	2751	355
	17	-2237	-613 508	-266 543	+613 498	-1882	-4394	+266 565	+2758	-355
	18	2238	613 604	266 585	613 594	1883	4413	266 607	2778	355
	19	2238	613 674	266 615	613 664	1883	4440	266 637	2804	356
	20	2239	613 713	266 632	613 703	1883	4466	266 655	2829	356
	21	2239	613 725	266 638	613 716	1883	4484	266 660	2847	356
	22	2239	613 721	266 636	613 712	1883	4489	266 659	2853	356
	23	-2239	-613 715	-266 633	+613 706	-1883	-4480	+266 656	+2844	-356
	24	2239	613 720	266 636	613 711	1883	4460	266 658	2823	356
	25	2239	613 745	266 646	613 735	1883	4432	266 669	2795	356
	26	2239	613 792	266 667	613 782	1884	4403	266 689	2766	356
	27	2240	613 858	266 696	613 849	1884	4378	266 717	2741	356
	28	2240	613 938	266 730	613 929	1885	4360	266 752	2722	356
	29	-2241	-614 025	-266 768	+614 016	-1885	-4351	+266 790	+2713	-356
	30	2242	614 110	266 805	614 101	1886	4350	266 827	2712	356
	31	2242	614 188	266 839	614 179	1886	4358	266 861	2719	356
Apr.	1	2243	614 253	266 867	614 244	1887	4371	266 889	2731	356
	2	-2243	-614 301	-266 888	+614 292	-1887	-4387	+266 910	+2747	-356

POSITION AND VELOCITY OF THE EARTH, 2027
ORIGIN AT SOLAR SYSTEM BARYCENTRE
MEAN EQUATOR AND EQUINOX J 2000.0

Date 0^h T.D.B.		X	Y	Z	$\dot{X}$	$\dot{Y}$	$\dot{Z}$
Apr.	1	-0.982 031 86	-0.173 809 50	-0.075 256 90	+290 2948	-1557 1556	-675 0703
	2	0.978 982 99	0.189 355 68	0.081 996 62	319 4648	1552 0009	672 8388
	3	0.975 642 89	0.204 847 94	0.088 712 98	348 5386	1546 3727	670 3991
	4	0.972 012 58	0.220 281 55	0.095 403 90	377 5042	1540 2695	667 7502
	5	0.968 093 21	0.235 651 74	0.102 067 28	406 3482	1533 6892	664 8914
	6	0.963 886 06	0.250 953 74	0.108 701 03	435 0562	1526 6311	661 8222
	7	-0.959 392 59	-0.266 182 77	-0.115 303 03	+463 6121	-1519 0953	-658 5433
	8	0.954 614 39	0.281 334 06	0.121 871 20	491 9990	1511 0838	655 0560
	9	0.949 553 23	0.296 402 87	0.128 403 46	520 1995	1502 6013	651 3629
	10	0.944 211 08	0.311 384 53	0.134 897 78	548 1964	1493 6545	647 4681
	11	0.938 590 03	0.326 274 45	0.141 352 17	575 9742	1484 2529	643 3766
	12	0.932 692 37	0.341 068 12	0.147 764 68	603 5193	1474 4081	639 0946
	13	-0.926 520 46	-0.355 761 18	-0.154 133 45	+630 8211	-1464 1333	-634 6285
	14	0.920 076 78	0.370 349 39	0.160 456 66	657 8720	1453 4419	629 9853
	15	0.913 363 87	0.384 828 67	0.166 732 58	684 6677	1442 3475	625 1713
	16	0.906 384 28	0.399 195 04	0.172 959 54	711 2067	1430 8628	620 1923
	17	0.899 140 59	0.413 444 66	0.179 135 90	737 4898	1418 9987	615 0530
	18	0.891 635 33	0.427 573 78	0.185 260 07	763 5199	1406 7639	609 7570
	19	-0.883 871 02	-0.441 578 73	-0.191 330 52	+789 3003	-1394 1650	-604 3063
	20	0.875 850 15	0.455 455 88	0.197 345 69	814 8345	1381 2054	598 7018
	21	0.867 575 15	0.469 201 64	0.203 304 04	840 1250	1367 8864	592 9433
	22	0.859 048 46	0.482 812 41	0.209 204 04	865 1724	1354 2076	587 0296
	23	0.850 272 51	0.496 284 58	0.215 044 11	889 9754	1340 1671	580 9588
	24	0.841 249 77	0.509 614 54	0.220 822 69	914 5302	1325 7635	574 7297
	25	-0.831 982 75	-0.522 798 64	-0.226 538 17	+938 8315	-1310 9946	-568 3409
	26	0.822 474 01	0.535 833 21	0.232 188 97	962 8729	1295 8594	561 7913
	27	0.812 726 19	0.548 714 60	0.237 773 46	986 6467	1280 3575	555 0802
	28	0.802 742 00	0.561 439 14	0.243 290 03	1010 1446	1264 4888	548 2076
	29	0.792 524 24	0.574 003 16	0.248 737 07	1033 3583	1248 2540	541 1735
	30	0.782 075 81	0.586 403 00	0.254 112 96	1056 2788	1231 6541	533 9780
May	1	-0.771 399 67	-0.598 635 02	-0.259 416 10	+1078 8968	-1214 6899	-526 6216
	2	0.760 498 91	0.610 695 59	0.264 644 86	1101 2023	1197 3626	519 1048
	3	0.749 376 71	0.622 581 07	0.269 797 66	1123 1840	1179 6740	511 4282
	4	0.738 036 35	0.634 287 87	0.274 872 90	1144 8292	1161 6260	503 5931
	5	0.726 481 29	0.645 812 40	0.279 869 00	1166 1245	1143 2221	495 6013
	6	0.714 715 08	0.657 151 14	0.284 784 41	1187 0545	1124 4677	487 4558
	7	-0.702 741 47	-0.668 300 62	-0.289 617 62	+1207 6037	-1105 3708	-479 1610
	8	0.690 564 33	0.679 257 45	0.294 367 15	1227 7576	1085 9426	470 7230
	9	0.678 187 68	0.690 018 41	0.299 031 62	1247 5035	1066 1973	462 1488
	10	0.665 615 65	0.700 580 39	0.303 609 70	1266 8324	1046 1506	453 4466
	11	0.652 852 44	0.710 940 48	0.308 100 16	1285 7389	1025 8200	444 6247
	12	0.639 902 28	0.721 095 90	0.312 501 82	1304 2215	1005 2220	435 6909
	13	-0.626 769 41	-0.731 044 08	-0.316 813 62	+1322 2825	-984 3717	-426 6518
	14	0.613 458 02	0.740 782 54	0.321 034 53	1339 9256	963 2821	417 5133
	15	0.599 972 27	0.750 308 96	0.325 163 57	1357 1564	941 9637	408 2795
	16	0.586 316 25	0.759 621 08	0.329 199 81	1373 9808	920 4249	398 9532
	17	-0.572 493 99	-0.768 716 74	-0.333 142 34	+1390 4045	-898 6716	-389 5366

$\dot{X}$, $\dot{Y}$, $\dot{Z}$ are in units of 10^{-9} a.u. per day

FRAME BIAS, PRECESSION AND NUTATION, 2027
MATRIX ELEMENTS FOR CONVERSION FROM
GCRS TO TRUE EQUINOX OF DATE

Date 0^h TT		M_{11} - 1	M_{12}	M_{13}	M_{21}	M_{22} - 1	M_{23}	M_{31}	M_{32}	M_{33} - 1
Apr.	1	-2243	-614 253	-266 867	+614 244	-1887	-4371	+266 889	+2731	-356
	2	2243	614 301	266 888	614 292	1887	4387	266 910	2747	356
	3	2243	614 331	266 901	614 322	1887	4401	266 923	2762	356
	4	2243	614 345	266 907	614 335	1887	4412	266 929	2772	356
	5	2243	614 346	266 908	614 336	1887	4414	266 930	2775	356
	6	2243	614 343	266 906	614 333	1887	4406	266 928	2766	356
	7	-2243	-614 345	-266 907	+614 335	-1887	-4387	+266 929	+2747	-356
	8	2243	614 362	266 915	614 353	1887	4358	266 937	2718	356
	9	2244	614 405	266 933	614 396	1888	4323	266 955	2683	356
	10	2244	614 476	266 964	614 466	1888	4289	266 985	2648	356
	11	2245	614 572	267 006	614 562	1889	4261	267 027	2620	357
	12	2246	614 684	267 055	614 675	1889	4244	267 076	2602	357
	13	-2247	-614 799	-267 105	+614 790	-1890	-4241	+267 126	+2599	-357
	14	2247	614 903	267 150	614 894	1891	4250	267 171	2607	357
	15	2248	614 984	267 185	614 975	1891	4267	267 206	2623	357
	16	2248	615 037	267 208	615 028	1891	4284	267 229	2641	357
	17	2249	615 063	267 219	615 054	1892	4297	267 241	2653	357
	18	2249	615 071	267 223	615 062	1892	4298	267 244	2655	357
	19	-2249	-615 073	-267 224	+615 064	-1892	-4287	+267 245	+2643	-357
	20	2249	615 082	267 228	615 073	1892	4263	267 249	2619	357
	21	2249	615 109	267 239	615 099	1892	4231	267 260	2587	357
	22	2249	615 157	267 260	615 148	1892	4195	267 281	2551	357
	23	2250	615 227	267 291	615 218	1893	4162	267 311	2517	357
	24	2250	615 315	267 329	615 306	1893	4134	267 349	2489	357
	25	-2251	-615 412	-267 371	+615 403	-1894	-4115	+267 391	+2470	-358
	26	2252	615 511	267 414	615 502	1894	4106	267 434	2460	358
	27	2253	615 605	267 455	615 596	1895	4105	267 475	2458	358
	28	2253	615 687	267 490	615 679	1895	4111	267 511	2464	358
	29	2254	615 754	267 519	615 745	1896	4120	267 540	2473	358
	30	2254	615 803	267 541	615 795	1896	4130	267 561	2483	358
May	1	-2254	-615 836	-267 555	+615 827	-1896	-4138	+267 575	+2490	-358
	2	2254	615 855	267 563	615 846	1896	4138	267 584	2490	358
	3	2254	615 867	267 569	615 858	1897	4130	267 589	2482	358
	4	2255	615 881	267 575	615 872	1897	4110	267 595	2462	358
	5	2255	615 907	267 586	615 898	1897	4080	267 606	2432	358
	6	2255	615 956	267 607	615 948	1897	4042	267 627	2394	358
	7	-2256	-616 034	-267 641	+616 026	-1898	-4003	+267 661	+2354	-358
	8	2256	616 142	267 688	616 133	1898	3968	267 707	2319	358
	9	2257	616 270	267 744	616 262	1899	3945	267 763	2295	359
	10	2258	616 406	267 803	616 398	1900	3936	267 822	2285	359
	11	2259	616 533	267 858	616 524	1901	3940	267 877	2288	359
	12	2260	616 637	267 903	616 629	1901	3954	267 922	2302	359
	13	-2261	-616 713	-267 936	+616 704	-1902	-3970	+267 955	+2318	-359
	14	2261	616 760	267 956	616 752	1902	3982	267 976	2329	359
	15	2261	616 788	267 969	616 780	1902	3985	267 988	2332	359
	16	2261	616 808	267 977	616 799	1902	3976	267 996	2323	359
	17	-2262	-616 831	-267 987	+616 822	-1902	-3954	+268 006	+2301	-359

POSITION AND VELOCITY OF THE EARTH, 2027
ORIGIN AT SOLAR SYSTEM BARYCENTRE
MEAN EQUATOR AND EQUINOX J 2000.0

Date 0^h T.D.B.		X	Y	Z	$\dot{X}$	$\dot{Y}$	$\dot{Z}$
May	17	-0.572 493 99	-0.768 716 74	-0.333 142 34	+1390 4045	-898 6716	-389 5366
	18	0.558 509 48	0.777 593 81	0.336 990 24	1406 4323	876 7075	380 0302
	19	0.544 366 65	0.786 250 19	0.340 742 64	1422 0679	854 5351	370 4344
	20	0.530 069 42	0.794 683 82	0.344 398 63	1437 3131	832 1557	360 7488
	21	0.515 621 69	0.802 892 62	0.347 957 32	1452 1684	809 5694	350 9728
	22	0.501 027 36	0.810 874 52	0.351 417 78	1466 6323	786 7766	341 1058
	23	-0.486 290 36	-0.818 627 46	-0.354 779 13	+1480 7019	-763 7778	-331 1476
	24	0.471 414 65	0.826 149 39	0.358 040 43	1494 3732	740 5736	321 0980
	25	0.456 404 24	0.833 438 26	0.361 200 78	1507 6414	717 1654	310 9574
	26	0.441 263 18	0.840 492 03	0.364 259 28	1520 5007	693 5550	300 7262
	27	0.425 995 61	0.847 308 69	0.367 215 01	1532 9455	669 7450	290 4056
	28	0.410 605 68	0.853 886 27	0.370 067 09	1544 9691	645 7380	279 9965
	29	-0.395 097 65	-0.860 222 81	-0.372 814 65	+1556 5649	-621 5371	-269 5004
	30	0.379 475 83	0.866 316 37	0.375 456 82	1567 7256	597 1453	258 9186
	31	0.363 744 62	0.872 165 09	0.377 992 74	1578 4426	572 5662	248 2528
June	1	0.347 908 49	0.877 767 09	0.380 421 60	1588 7066	547 8039	237 5052
	2	0.331 972 03	0.883 120 57	0.382 742 58	1598 5063	522 8639	226 6786
	3	0.315 939 95	0.888 223 80	0.384 954 92	1607 8299	497 7536	215 7769
	4	-0.299 817 06	-0.893 075 11	-0.387 057 89	+1616 6649	-472 4830	-204 8058
	5	0.283 608 32	0.897 672 97	0.389 050 83	1625 0000	447 0659	193 7722
	6	0.267 318 76	0.902 015 99	0.390 933 15	1632 8262	421 5191	182 6846
	7	0.250 953 51	0.906 102 98	0.392 704 37	1640 1390	395 8613	171 5524
	8	0.234 517 69	0.909 932 91	0.394 364 08	1646 9390	370 1119	160 3846
	9	0.218 016 42	0.913 504 97	0.395 911 97	1653 2307	344 2889	149 1895
	10	-0.201 454 74	-0.916 818 50	-0.397 347 80	+1659 0226	-318 4074	-137 9735
	11	0.184 837 60	0.919 872 97	0.398 671 39	1664 3242	292 4795	126 7416
	12	0.168 169 86	0.922 667 96	0.399 882 59	1669 1456	266 5141	115 4966
	13	0.151 456 26	0.925 203 15	0.400 981 29	1673 4961	240 5177	104 2407
	14	0.134 701 48	0.927 478 23	0.401 967 37	1677 3834	214 4943	92 9749
	15	0.117 910 11	0.929 492 95	0.402 840 75	1680 8143	188 4474	81 6996
	16	-0.101 086 70	-0.931 247 10	-0.403 601 33	+1683 7937	-162 3787	-70 4150
	17	0.084 235 73	0.932 740 46	0.404 249 02	1686 3251	136 2897	59 1210
	18	0.067 361 68	0.933 972 83	0.404 783 72	1688 4107	110 1818	47 8172
	19	0.050 469 00	0.934 944 04	0.405 205 33	1690 0515	84 0560	36 5040
	20	0.033 562 13	0.935 653 90	0.405 513 77	1691 2472	57 9137	25 1811
	21	-0.016 645 54	0.936 102 26	0.405 708 93	1691 9964	-31 7563	-13 8491
	22	+0.000 276 30	-0.936 288 98	-0.405 790 72	+1692 2970	-5 5858	-25 087
	23	0.017 198 89	0.936 213 94	0.405 759 07	1692 1463	+20 5951	+8 8394
	24	0.034 117 71	0.935 877 05	0.405 613 91	1691 5410	46 7835	20 1937
	25	0.051 028 19	0.935 278 26	0.405 355 18	1690 4775	72 9758	31 5527
	26	0.067 925 72	0.934 417 53	0.404 982 85	1688 9516	99 1686	42 9149
	27	0.084 805 66	0.933 294 90	0.404 496 88	1686 9585	125 3576	54 2781
	28	+0.101 663 31	-0.931 910 41	-0.403 897 29	+1684 4929	+151 5381	+65 6402
	29	0.118 493 92	0.930 264 18	0.403 184 09	1681 5483	177 7049	76 9982
	30	0.135 292 66	0.928 356 38	0.402 357 35	1678 1170	203 8517	88 3490
July	1	0.152 054 61	0.926 187 24	0.401 417 15	1674 1905	229 9699	99 6879
	2	+0.168 774 79	-0.923 757 11	-0.400 363 65	+1669 7601	+256 0482	+111 0090

$\dot{X}$, $\dot{Y}$, $\dot{Z}$ are in units of 10^{-9} a.u. per day

FRAME BIAS, PRECESSION AND NUTATION, 2027
MATRIX ELEMENTS FOR CONVERSION FROM
GCRS TO TRUE EQUINOX OF DATE

Date 0^h TT		M_{11} - 1	M_{12}	M_{13}	M_{21}	M_{22} - 1	M_{23}	M_{31}	M_{32}	M_{33} - 1
May	17	-2262	-616 831	-267 987	+616 822	-1902	-3954	+268 006	+2301	-359
	18	2262	616 868	268 003	616 860	1903	3924	268 022	2271	359
	19	2262	616 926	268 029	616 918	1903	3890	268 047	2236	359
	20	2263	617 006	268 063	616 998	1904	3855	268 082	2201	359
	21	2264	617 104	268 106	617 096	1904	3826	268 124	2172	359
	22	2264	617 216	268 154	617 208	1905	3805	268 173	2150	360
	23	-2265	-617 331	-268 204	+617 323	-1906	-3794	+268 223	+2138	-360
	24	2266	617 444	268 253	617 436	1906	3792	268 272	2136	360
	25	2267	617 547	268 298	617 539	1907	3797	268 316	2140	360
	26	2267	617 634	268 336	617 626	1907	3808	268 354	2150	360
	27	2268	617 705	268 367	617 697	1908	3820	268 385	2162	360
	28	2268	617 758	268 390	617 750	1908	3830	268 408	2172	360
	29	-2269	-617 797	-268 407	+617 789	-1908	-3836	+268 425	+2177	-360
	30	2269	617 826	268 419	617 818	1909	3833	268 438	2175	360
	31	2269	617 854	268 431	617 846	1909	3821	268 450	2162	360
June	1	2269	617 890	268 447	617 882	1909	3798	268 465	2139	360
	2	2270	617 944	268 470	617 936	1909	3766	268 489	2107	360
	3	2270	618 025	268 506	618 017	1910	3731	268 523	2071	361
	4	-2271	-618 136	-268 554	+618 129	-1911	-3697	+268 572	+2037	-361
	5	2272	618 275	268 614	618 267	1911	3673	268 632	2012	361
	6	2273	618 428	268 680	618 420	1912	3662	268 698	2000	361
	7	2274	618 577	268 745	618 569	1913	3667	268 763	2005	361
	8	2275	618 706	268 801	618 699	1914	3685	268 819	2021	361
	9	2276	618 805	268 844	618 797	1915	3707	268 862	2043	361
	10	-2277	-618 873	-268 874	+618 865	-1915	-3727	+268 891	+2063	-362
	11	2277	618 916	268 892	618 908	1915	3738	268 910	2073	362
	12	2277	618 948	268 906	618 940	1916	3736	268 924	2072	362
	13	2277	618 980	268 920	618 972	1916	3723	268 938	2059	362
	14	2278	619 025	268 940	619 017	1916	3701	268 957	2036	362
	15	2278	619 088	268 967	619 080	1916	3673	268 985	2008	362
	16	-2279	-619 171	-269 003	+619 164	-1917	-3646	+269 021	+1980	-362
	17	2279	619 274	269 048	619 267	1918	3622	269 065	1955	362
	18	2280	619 391	269 099	619 383	1918	3605	269 116	1938	362
	19	2281	619 514	269 152	619 506	1919	3598	269 169	1931	362
	20	2282	619 635	269 205	619 628	1920	3601	269 222	1932	362
	21	2283	619 748	269 254	619 741	1920	3611	269 271	1942	363
	22	-2284	-619 847	-269 297	+619 839	-1921	-3627	+269 314	+1958	-363
	23	2284	619 929	269 332	619 921	1922	3647	269 350	1977	363
	24	2285	619 992	269 360	619 985	1922	3665	269 377	1995	363
	25	2285	620 040	269 380	620 032	1922	3679	269 398	2009	363
	26	2285	620 076	269 396	620 069	1923	3687	269 414	2016	363
	27	2286	620 108	269 410	620 100	1923	3685	269 428	2014	363
	28	-2286	-620 144	-269 426	+620 136	-1923	-3674	+269 443	+2003	-363
	29	2286	620 193	269 447	620 185	1923	3653	269 465	1982	363
	30	2287	620 265	269 478	620 257	1924	3627	269 496	1956	363
July	1	2287	620 365	269 522	620 358	1924	3601	269 539	1929	363
	2	-2288	-620 494	-269 578	+620 487	-1925	-3580	+269 595	+1907	-363

POSITION AND VELOCITY OF THE EARTH, 2027
ORIGIN AT SOLAR SYSTEM BARYCENTRE
MEAN EQUATOR AND EQUINOX J 2000.0

Date 0^h T.D.B.		X	Y	Z	$\dot{X}$	$\dot{Y}$	$\dot{Z}$
July	1	+0.152 054 61	-0.926 187 24	-0.401 417 15	+1674 1905	+229 9699	+99 6879
	2	0.168 774 79	0.923 757 11	0.400 363 65	1669 7601	256 0482	111 0090
	3	0.185 448 11	0.921 066 46	0.399 197 06	1664 8183	282 0723	122 3048
	4	0.202 069 43	0.918 115 91	0.397 917 67	1659 3605	308 0245	133 5664
	5	0.218 633 60	0.914 906 28	0.396 525 88	1653 3866	333 8849	144 7841
	6	0.235 135 46	0.911 438 58	0.395 022 16	1646 9022	359 6339	155 9487
	7	+0.251 569 97	-0.907 714 03	-0.393 407 11	+1639 9177	+385 2536	+167 0524
	8	0.267 932 20	0.903 733 99	0.391 681 34	1632 4468	410 7298	178 0893
	9	0.284 217 34	0.899 499 95	0.389 845 55	1624 5042	436 0527	189 0558
	10	0.300 420 75	0.895 013 47	0.387 900 46	1616 1039	461 2156	199 9502
	11	0.316 537 93	0.890 276 18	0.385 846 79	1607 2583	486 2150	210 7718
	12	0.332 564 47	0.885 289 72	0.383 685 27	1597 9772	511 0489	221 5208
	13	+0.348 496 05	-0.880 055 76	-0.381 416 62	+1588 2691	+535 7158	+232 1974
	14	0.364 328 45	0.874 575 96	0.379 041 56	1578 1402	560 2151	242 8019
	15	0.380 057 47	0.868 852 02	0.376 560 82	1567 5958	584 5460	253 3347
	16	0.395 678 99	0.862 885 61	0.373 975 11	1556 6399	608 7075	263 7960
	17	0.411 188 91	0.856 678 43	0.371 285 14	1545 2751	632 6989	274 1859
	18	0.426 583 14	0.850 232 20	0.368 491 63	1533 5040	656 5190	284 5039
	19	+0.441 857 64	-0.843 548 63	-0.365 595 30	+1521 3277	+680 1663	+294 7501
	20	0.457 008 34	0.836 629 46	0.362 596 87	1508 7465	703 6392	304 9238
	21	0.472 031 22	0.829 476 44	0.359 497 07	1495 7605	726 9355	315 0239
	22	0.486 922 20	0.822 091 34	0.356 296 64	1482 3691	750 0527	325 0494
	23	0.501 677 24	0.814 475 99	0.352 996 33	1468 5710	772 9876	334 9988
	24	0.516 292 26	0.806 632 21	0.349 596 92	1454 3642	795 7368	344 8705
	25	+0.530 763 16	-0.798 561 89	-0.346 099 19	+1439 7468	+818 2960	+354 6622
	26	0.545 085 82	0.790 266 94	0.342 503 95	1424 7159	840 6604	364 3716
	27	0.559 256 09	0.781 749 34	0.338 812 04	1409 2679	862 8245	373 9955
	28	0.573 269 77	0.773 011 14	0.335 024 34	1393 3986	884 7810	383 5302
	29	0.587 122 64	0.764 054 44	0.331 141 75	1377 1034	906 5214	392 9711
	30	0.600 810 41	0.754 881 47	0.327 165 25	1360 3779	928 0343	402 3123
	31	+0.614 328 75	-0.745 494 56	-0.323 095 86	+1343 2188	+949 3056	+411 5462
Aug.	1	0.627 673 34	0.735 896 22	0.318 934 71	1325 6263	970 3182	420 6646
	2	0.640 839 85	0.726 089 12	0.314 682 99	1307 6046	991 0537	429 6583
	3	0.653 824 03	0.716 076 13	0.310 341 99	1289 1638	1011 4935	438 5186
	4	0.666 621 77	0.705 860 29	0.305 913 08	1270 3189	1031 6216	447 2390
	5	0.679 229 12	0.695 444 78	0.301 397 69	1251 0877	1051 4260	455 8145
	6	+0.691 642 30	-0.684 832 88	-0.296 797 28	+1231 4889	+1070 8993	+464 2430
	7	0.703 857 73	0.674 027 91	0.292 113 32	1211 5400	1090 0381	472 5243
	8	0.715 871 99	0.663 033 23	0.287 347 29	1191 2558	1108 8420	480 6590
	9	0.727 681 77	0.651 852 18	0.282 500 63	1170 6483	1127 3118	488 6487
	10	0.739 283 91	0.640 488 10	0.277 574 79	1149 7272	1145 4487	496 4947
	11	0.750 675 30	0.628 944 31	0.272 571 21	1128 5003	1163 2541	504 1983
	12	+0.761 852 92	-0.617 224 12	-0.267 491 30	+1106 9741	+1180 7289	+511 7605
	13	0.772 813 80	0.605 330 84	0.262 336 47	1085 1542	1197 8734	519 1817
	14	0.783 555 04	0.593 267 76	0.257 108 13	1063 0454	1214 6881	526 4625
	15	0.794 073 76	0.581 038 17	0.251 807 68	1040 6517	1231 1731	533 6032
	16	+0.804 367 13	-0.568 645 39	-0.246 436 53	+1017 9769	+1247 3280	+540 6039

$\dot{X}$, $\dot{Y}$, $\dot{Z}$ are in units of 10^{-9} a.u. per day

FRAME BIAS, PRECESSION AND NUTATION, 2027
MATRIX ELEMENTS FOR CONVERSION FROM
GCRS TO TRUE EQUINOX OF DATE

Date 0^h TT		M_{11} - 1	M_{12}	M_{13}	M_{21}	M_{22} - 1	M_{23}	M_{31}	M_{32}	M_{33} - 1
July	1	-2287	-620 365	-269 522	+620 358	-1924	-3601	+269 539	+1929	-363
	2	2288	620 494	269 578	620 487	1925	3580	269 595	1907	363
	3	2290	620 644	269 643	620 637	1926	3571	269 660	1897	364
	4	2291	620 800	269 710	620 793	1927	3577	269 727	1903	364
	5	2292	620 943	269 772	620 935	1928	3599	269 789	1924	364
	6	2293	621 056	269 822	621 049	1929	3629	269 839	1953	364
	7	-2293	-621 135	-269 856	+621 128	-1929	-3660	+269 874	+1983	-364
	8	2294	621 185	269 877	621 177	1929	3682	269 895	2006	364
	9	2294	621 216	269 891	621 208	1930	3693	269 909	2016	364
	10	2294	621 244	269 903	621 237	1930	3690	269 921	2013	364
	11	2294	621 282	269 920	621 275	1930	3677	269 938	2000	364
	12	2295	621 337	269 944	621 330	1930	3657	269 961	1980	364
	13	-2295	-621 413	-269 977	+621 405	-1931	-3636	+269 994	+1959	-365
	14	2296	621 507	270 018	621 500	1931	3619	270 035	1941	365
	15	2297	621 616	270 065	621 608	1932	3608	270 082	1929	365
	16	2298	621 732	270 115	621 724	1933	3606	270 132	1927	365
	17	2298	621 848	270 165	621 840	1934	3614	270 183	1934	365
	18	2299	621 956	270 212	621 949	1934	3630	270 230	1949	365
	19	-2300	-622 052	-270 254	+622 044	-1935	-3652	+270 271	+1971	-365
	20	2301	622 130	270 288	622 122	1935	3678	270 306	1996	365
	21	2301	622 190	270 314	622 182	1936	3703	270 332	2021	365
	22	2301	622 232	270 332	622 225	1936	3726	270 350	2043	365
	23	2302	622 262	270 345	622 254	1936	3741	270 363	2059	366
	24	2302	622 285	270 355	622 277	1936	3749	270 373	2066	366
	25	-2302	-622 308	-270 365	+622 300	-1936	-3747	+270 384	+2064	-366
	26	2302	622 342	270 380	622 334	1937	3736	270 398	2053	366
	27	2302	622 394	270 403	622 386	1937	3718	270 420	2035	366
	28	2303	622 470	270 436	622 462	1937	3698	270 454	2015	366
	29	2304	622 574	270 481	622 566	1938	3681	270 498	1997	366
	30	2305	622 701	270 536	622 693	1939	3672	270 554	1988	366
	31	-2306	-622 841	-270 597	+622 834	-1940	-3677	+270 615	+1992	-366
Aug.	1	2307	622 978	270 656	622 970	1941	3698	270 674	2012	366
	2	2308	623 093	270 706	623 085	1941	3730	270 724	2043	366
	3	2308	623 175	270 742	623 167	1942	3767	270 760	2080	367
	4	2309	623 223	270 763	623 215	1942	3799	270 781	2111	367
	5	2309	623 246	270 772	623 237	1942	3819	270 791	2132	367
	6	-2309	-623 259	-270 778	+623 251	-1942	-3825	+270 797	+2137	-367
	7	2309	623 278	270 786	623 270	1942	3818	270 805	2130	367
	8	2309	623 313	270 802	623 305	1943	3802	270 820	2114	367
	9	2310	623 369	270 826	623 361	1943	3784	270 845	2095	367
	10	2310	623 445	270 859	623 437	1943	3767	270 877	2079	367
	11	2311	623 536	270 899	623 529	1944	3757	270 917	2068	367
	12	-2312	-623 636	-270 942	+623 628	-1945	-3756	+270 960	+2066	-367
	13	2312	623 737	270 986	623 730	1945	3763	271 004	2073	367
	14	2313	623 833	271 027	623 825	1946	3779	271 046	2088	367
	15	2314	623 916	271 063	623 908	1946	3802	271 082	2111	367
	16	-2314	-623 982	-271 092	+623 974	-1947	-3829	+271 111	+2137	-368

POSITION AND VELOCITY OF THE EARTH, 2027
ORIGIN AT SOLAR SYSTEM BARYCENTRE
MEAN EQUATOR AND EQUINOX J 2000.0

Date 0^h T.D.B.		X	Y	Z	$\dot{X}$	$\dot{Y}$	$\dot{Z}$
Aug.	16	+0.804 367 13	-0.568 645 39	-0.246 436 53	+1017 9769	+1247 3280	+540 6039
	17	0.814 432 37	0.556 092 72	0.240 996 07	995 0237	1263 1525	547 4644
	18	0.824 266 69	0.543 383 45	0.235 487 71	971 7943	1278 6460	554 1846
	19	0.833 867 34	0.530 520 90	0.229 912 85	948 2902	1293 8072	560 7636
	20	0.843 231 58	0.517 508 42	0.224 272 91	924 5123	1308 6344	567 2005
	21	0.852 356 67	0.504 349 34	0.218 569 32	900 4606	1323 1250	573 4942
	22	+0.861 239 88	-0.491 047 05	-0.212 803 51	+876 1352	+1337 2761	+579 6426
	23	0.869 878 46	0.477 604 96	0.206 976 96	851 5355	1351 0833	585 6435
	24	0.878 269 67	0.464 026 54	0.201 091 15	826 6603	1364 5412	591 4937
	25	0.886 410 75	0.450 315 32	0.195 147 60	801 5088	1377 6434	597 1898
	26	0.894 298 92	0.436 474 89	0.189 147 88	776 0803	1390 3811	602 7271
	27	0.901 931 43	0.422 508 95	0.183 093 60	750 3745	1402 7440	608 1000
	28	+0.909 305 49	-0.408 421 30	-0.176 986 45	+724 3933	+1414 7194	+613 3019
	29	0.916 418 39	0.394 215 90	0.170 828 16	698 1414	1426 2928	618 3258
	30	0.923 267 45	0.379 896 84	0.164 620 55	671 6276	1437 4482	623 1639
	31	0.929 850 12	0.365 468 38	0.158 365 52	644 8657	1448 1707	627 8093
Sept.	1	0.936 164 00	0.350 934 91	0.152 065 03	617 8736	1458 4479	632 2569
	2	0.942 206 89	0.336 300 94	0.145 721 06	590 6721	1468 2709	636 5037
	3	+0.947 976 81	-0.321 571 02	-0.139 335 62	+563 2826	+1477 6362	+640 5491
	4	0.953 471 98	0.306 749 74	0.132 910 74	535 7245	1486 5438	644 3942
	5	0.958 690 80	0.291 841 66	0.126 448 40	508 0146	1494 9967	648 0417
	6	0.963 631 81	0.276 851 30	0.119 950 56	480 1663	1502 9994	651 4943
	7	0.968 293 70	0.261 783 16	0.113 419 15	452 1905	1510 5562	654 7550
	8	0.972 675 23	0.246 641 65	0.106 856 09	424 0962	1517 6715	657 8260
	9	+0.976 775 25	-0.231 431 19	-0.100 263 26	+395 8906	+1524 3489	+660 7094
	10	0.980 592 69	0.216 156 12	0.093 642 52	367 5805	1530 5912	663 4067
	11	0.984 126 53	0.200 820 80	0.086 995 74	339 1720	1536 4011	665 9195
	12	0.987 375 82	0.185 429 53	0.080 324 75	310 6708	1541 7810	668 2488
	13	0.990 339 66	0.169 986 61	0.073 631 37	282 0818	1546 7329	670 3956
	14	0.993 017 18	0.154 496 30	0.066 917 44	253 4097	1551 2587	672 3607
	15	+0.995 407 58	-0.138 962 85	-0.060 184 76	+224 6581	+1555 3605	+674 1450
	16	0.997 510 09	0.123 390 50	0.053 435 14	195 8301	1559 0393	675 7488
	17	0.999 323 94	0.107 783 47	0.046 670 39	166 9278	1562 2959	677 1721
	18	1.000 848 40	0.092 145 99	0.039 892 30	137 9524	1565 1302	678 4144
	19	1.002 082 75	0.076 482 28	0.033 102 71	108 9054	1567 5409	679 4745
	20	1.003 026 27	0.060 796 59	0.026 303 42	79 7871	1569 5254	680 3508
	21	+1.003 678 26	-0.045 093 20	-0.019 496 31	+50 5986	+1571 0795	+681 0407
	22	1.004 038 01	0.029 376 45	0.012 683 24	+21 3414	1572 1979	681 5408
	23	1.004 104 86	-0.013 650 72	-0.005 866 14	-7 9822	1572 8733	681 8472
	24	1.003 878 16	+0.002 079 51	+0.000 953 04	37 3680	1573 0969	681 9552
	25	1.003 357 31	0.017 809 68	0.007 772 29	66 8099	1572 8589	681 8596
	26	1.002 541 81	0.033 535 11	0.014 589 53	96 2989	1572 1480	681 5550
	27	+1.001 431 22	+0.049 251 02	+0.021 402 67	-125 8221	+1570 9534	+681 0363
	28	1.000 025 30	0.064 952 53	0.028 209 53	155 3631	1569 2654	680 2991
	29	0.998 323 97	0.080 634 66	0.035 007 92	184 9022	1567 0767	679 3407
	30	0.996 327 34	0.096 292 39	0.041 795 61	214 4178	1564 3837	678 1604
Oct.	1	+0.994 035 76	+0.111 920 66	+0.048 570 39	-243 8885	+1561 1873	+676 7595

$\dot{X}$, $\dot{Y}$, $\dot{Z}$ are in units of 10^{-9} a.u. per day

FRAME BIAS, PRECESSION AND NUTATION, 2027
MATRIX ELEMENTS FOR CONVERSION FROM
GCRS TO TRUE EQUINOX OF DATE

Date 0^h TT		M_{11} - 1	M_{12}	M_{13}	M_{21}	M_{22} - 1	M_{23}	M_{31}	M_{32}	M_{33} - 1
Aug.	16	-2314	-623 982	-271 092	+623 974	-1947	-3829	+271 111	+2137	-368
	17	2315	624 030	271 113	624 022	1947	3856	271 132	2164	368
	18	2315	624 060	271 126	624 052	1947	3881	271 145	2189	368
	19	2315	624 076	271 133	624 068	1947	3899	271 152	2207	368
	20	2315	624 083	271 136	624 075	1947	3910	271 155	2217	368
	21	2315	624 089	271 139	624 081	1947	3910	271 158	2218	368
	22	-2315	-624 103	-271 145	+624 094	-1948	-3902	+271 164	+2209	-368
	23	2315	624 132	271 158	624 124	1948	3886	271 177	2193	368
	24	2316	624 183	271 180	624 175	1948	3866	271 199	2174	368
	25	2316	624 259	271 213	624 251	1949	3848	271 232	2155	368
	26	2317	624 359	271 256	624 351	1949	3836	271 275	2142	368
	27	2318	624 474	271 306	624 466	1950	3835	271 325	2141	368
	28	-2319	-624 592	-271 358	+624 584	-1951	-3848	+271 376	+2153	-368
	29	2320	624 698	271 403	624 690	1951	3873	271 422	2178	368
	30	2320	624 777	271 438	624 769	1952	3906	271 457	2210	368
	31	2320	624 823	271 458	624 815	1952	3939	271 477	2243	369
Sept.	1	2321	624 839	271 465	624 831	1952	3963	271 484	2267	369
	2	2321	624 839	271 465	624 830	1952	3972	271 484	2276	369
	3	-2321	-624 838	-271 464	+624 830	-1952	-3967	+271 484	+2270	-369
	4	2321	624 851	271 470	624 843	1952	3949	271 489	2253	369
	5	2321	624 885	271 485	624 877	1952	3927	271 504	2230	369
	6	2321	624 942	271 510	624 934	1953	3904	271 529	2208	369
	7	2322	625 017	271 542	625 009	1953	3887	271 561	2190	369
	8	2323	625 103	271 580	625 095	1954	3878	271 598	2181	369
	9	-2323	-625 192	-271 618	+625 184	-1954	-3879	+271 637	+2180	-369
	10	2324	625 277	271 655	625 269	1955	3888	271 674	2189	369
	11	2324	625 351	271 687	625 343	1955	3904	271 706	2205	369
	12	2325	625 410	271 713	625 401	1956	3925	271 732	2225	369
	13	2325	625 450	271 730	625 442	1956	3947	271 750	2247	369
	14	2325	625 473	271 740	625 464	1956	3967	271 760	2267	369
	15	-2325	-625 480	-271 743	+625 472	-1956	-3982	+271 763	+2282	-369
	16	2325	625 477	271 742	625 469	1956	3988	271 762	2288	369
	17	2325	625 472	271 740	625 464	1956	3985	271 760	2285	369
	18	2325	625 473	271 740	625 464	1956	3972	271 760	2272	369
	19	2325	625 487	271 747	625 479	1956	3951	271 766	2251	369
	20	2326	625 524	271 763	625 515	1956	3925	271 782	2225	369
	21	-2326	-625 584	-271 789	+625 576	-1957	-3900	+271 808	+2199	-369
	22	2327	625 668	271 825	625 659	1957	3879	271 844	2178	370
	23	2328	625 768	271 869	625 760	1958	3868	271 887	2167	370
	24	2328	625 874	271 915	625 866	1959	3870	271 934	2168	370
	25	2329	625 973	271 958	625 965	1959	3883	271 977	2181	370
	26	2330	626 052	271 992	626 043	1960	3906	272 011	2203	370
	27	-2330	-626 102	-272 014	+626 093	-1960	-3930	+272 033	+2227	-370
	28	2330	626 122	272 023	626 114	1960	3950	272 042	2247	370
	29	2330	626 122	272 022	626 114	1960	3957	272 042	2254	370
	30	2330	626 115	272 020	626 107	1960	3950	272 039	2247	370
Oct.	1	-2330	-626 117	-272 020	+626 109	-1960	-3929	+272 040	+2226	-370

POSITION AND VELOCITY OF THE EARTH, 2027
ORIGIN AT SOLAR SYSTEM BARYCENTRE
MEAN EQUATOR AND EQUINOX J 2000.0

Date 0^h T.D.B.		X	Y	Z	$\dot{X}$	$\dot{Y}$	$\dot{Z}$
Oct.	1	+0.994 035 76	+0.111 920 66	+0.048 570 39	-243 8885	+1561 1873	+676 7595
	2	0.991 449 79	0.127 514 47	0.055 330 07	273 2940	1557 4916	675 1412
	3	0.988 570 16	0.143 068 85	0.062 072 50	302 6175	1553 3037	673 3094
	4	0.985 397 76	0.158 578 93	0.068 795 56	331 8449	1548 6318	671 2688
	5	0.981 933 62	0.174 039 90	0.075 497 19	360 9651	1543 4845	669 0237
	6	0.978 178 84	0.189 447 06	0.082 175 37	389 9694	1537 8694	666 5783
	7	+0.974 134 64	+0.204 795 75	+0.088 828 10	-418 8500	+1531 7939	+663 9359
	8	0.969 802 28	0.220 081 42	0.095 453 44	447 6004	1525 2646	661 0994
	9	0.965 183 09	0.235 299 55	0.102 049 45	476 2145	1518 2871	658 0717
	10	0.960 278 46	0.250 445 69	0.108 614 25	504 6864	1510 8672	654 8552
	11	0.955 089 85	0.265 515 44	0.115 145 94	533 0107	1503 0103	651 4521
	12	0.949 618 75	0.280 504 46	0.121 642 67	561 1826	1494 7216	647 8650
	13	+0.943 866 72	+0.295 408 45	+0.128 102 63	-589 1984	+1486 0063	+644 0955
	14	0.937 835 32	0.310 223 18	0.134 523 98	617 0546	1476 8691	640 1459
	15	0.931 526 16	0.324 944 44	0.140 904 95	644 7494	1467 3142	636 0173
	16	0.924 940 87	0.339 568 08	0.147 243 74	672 2817	1457 3448	631 7106
	17	0.918 081 07	0.354 089 96	0.153 538 57	699 6506	1446 9625	627 2259
	18	0.910 948 41	0.368 505 95	0.159 787 66	726 8558	1436 1670	622 5623
	19	+0.903 544 51	+0.382 811 92	+0.165 989 21	-753 8963	+1424 9566	+617 7179
	20	0.895 871 04	0.397 003 69	0.172 141 41	780 7694	1413 3274	612 6903
	21	0.887 929 69	0.411 077 05	0.178 242 40	807 4710	1401 2742	607 4765
	22	0.879 722 21	0.425 027 74	0.184 290 30	833 9945	1388 7909	602 0728
	23	0.871 250 43	0.438 851 42	0.190 283 21	860 3303	1375 8711	596 4762
	24	0.862 516 27	0.452 543 69	0.196 219 17	886 4665	1362 5087	590 6833
	25	+0.853 521 81	+0.466 100 10	+0.202 096 21	-912 3879	+1348 6983	+584 6920
	26	0.844 269 29	0.479 516 15	0.207 912 35	938 0771	1334 4369	578 5015
	27	0.834 761 11	0.492 787 33	0.213 665 58	963 5151	1319 7240	572 1118
	28	0.824 999 89	0.505 909 13	0.219 353 93	988 6818	1304 5621	565 5249
	29	0.814 988 44	0.518 877 09	0.224 975 43	1013 5577	1288 9573	558 7448
	30	0.804 729 76	0.531 686 83	0.230 528 19	1038 1251	1272 9185	551 7760
	31	+0.794 227 02	+0.544 334 05	+0.236 010 35	-1062 3691	+1256 4569	+544 6247
Nov.	1	0.783 483 50	0.556 814 60	0.241 420 10	1086 2776	1239 5845	537 2968
	2	0.772 502 62	0.569 124 42	0.246 755 71	1109 8409	1222 3136	529 7984
	3	0.761 287 86	0.581 259 58	0.252 015 52	1133 0516	1204 6564	522 1351
	4	0.749 842 78	0.593 216 29	0.257 197 88	1155 9043	1186 6237	514 3119
	5	0.738 170 98	0.604 990 84	0.262 301 24	1178 3940	1168 2261	506 3334
	6	+0.726 276 12	+0.616 579 63	+0.267 324 05	-1200 5164	+1149 4731	+498 2039
	7	0.714 161 89	0.627 979 15	0.272 264 83	1222 2677	1130 3737	489 9273
	8	0.701 832 02	0.639 185 98	0.277 122 12	1243 6443	1110 9373	481 5075
	9	0.689 290 26	0.650 196 80	0.281 894 51	1264 6434	1091 1725	472 9480
	10	0.676 540 41	0.661 008 36	0.286 580 62	1285 2630	1071 0877	464 2525
	11	0.663 586 27	0.671 617 52	0.291 179 12	1305 5017	1050 6920	455 4243
	12	+0.650 431 65	+0.682 021 19	+0.295 688 68	-1325 3596	+1029 9925	+446 4662
	13	0.637 080 35	0.692 216 38	0.300 108 02	1344 8381	1008 9960	437 3805
	14	0.623 536 15	0.702 200 14	0.304 435 87	1363 9390	987 7074	428 1684
	15	0.609 802 82	0.711 969 56	0.308 670 97	1382 6641	966 1291	418 8303
	16	+0.595 884 11	+0.721 521 75	+0.312 812 05	-1401 0150	+944 2615	+409 3650

$\dot{X}$, $\dot{Y}$, $\dot{Z}$ are in units of 10^{-9} a.u. per day

FRAME BIAS, PRECESSION AND NUTATION, 2027
MATRIX ELEMENTS FOR CONVERSION FROM
GCRS TO TRUE EQUINOX OF DATE

Date 0^h TT		M_{11} - 1	M_{12}	M_{13}	M_{21}	M_{22} - 1	M_{23}	M_{31}	M_{32}	M_{33} - 1
Oct.	1	-2330	-626 117	-272 020	+626 109	-1960	-3929	+272 040	+2226	-370
	2	2330	626 139	272 030	626 131	1960	3899	272 049	2196	370
	3	2331	626 185	272 050	626 177	1961	3867	272 069	2164	370
	4	2331	626 254	272 080	626 246	1961	3839	272 099	2135	370
	5	2332	626 338	272 116	626 329	1962	3818	272 135	2113	370
	6	2332	626 428	272 155	626 420	1962	3806	272 174	2101	370
	7	-2333	-626 516	-272 194	+626 508	-1963	-3804	+272 212	+2099	-371
	8	2334	626 595	272 228	626 587	1963	3810	272 247	2104	371
	9	2334	626 660	272 256	626 652	1964	3821	272 275	2115	371
	10	2335	626 708	272 277	626 700	1964	3835	272 296	2129	371
	11	2335	626 739	272 290	626 730	1964	3848	272 309	2141	371
	12	2335	626 753	272 297	626 745	1964	3856	272 316	2149	371
	13	-2335	-626 756	-272 298	+626 748	-1964	-3856	+272 317	+2150	-371
	14	2335	626 755	272 298	626 747	1964	3848	272 316	2141	371
	15	2335	626 758	272 299	626 750	1964	3829	272 318	2122	371
	16	2335	626 773	272 306	626 765	1964	3801	272 324	2094	371
	17	2335	626 810	272 322	626 802	1964	3768	272 340	2061	371
	18	2336	626 872	272 349	626 864	1965	3733	272 367	2026	371
	19	-2336	-626 958	-272 386	+626 950	-1965	-3703	+272 404	+1995	-371
	20	2337	627 063	272 432	627 056	1966	3682	272 449	1974	371
	21	2338	627 176	272 481	627 169	1967	3673	272 498	1964	371
	22	2339	627 285	272 528	627 277	1967	3676	272 545	1966	371
	23	2339	627 376	272 567	627 368	1968	3688	272 585	1978	372
	24	2340	627 441	272 596	627 433	1968	3705	272 614	1994	372
	25	-2340	-627 479	-272 612	+627 471	-1969	-3718	+272 630	+2007	-372
	26	2340	627 495	272 619	627 487	1969	3722	272 637	2011	372
	27	2340	627 500	272 622	627 493	1969	3713	272 640	2002	372
	28	2340	627 510	272 626	627 502	1969	3690	272 643	1979	372
	29	2341	627 535	272 637	627 528	1969	3657	272 654	1946	372
	30	2341	627 584	272 658	627 577	1969	3619	272 676	1908	372
	31	-2342	-627 658	-272 690	+627 651	-1970	-3582	+272 707	+1871	-372
Nov.	1	2342	627 752	272 731	627 744	1970	3552	272 748	1840	372
	2	2343	627 856	272 776	627 849	1971	3531	272 793	1818	372
	3	2344	627 962	272 822	627 955	1972	3520	272 839	1807	372
	4	2345	628 061	272 865	628 054	1972	3518	272 882	1805	372
	5	2345	628 147	272 903	628 140	1973	3523	272 919	1809	372
	6	-2346	-628 217	-272 933	+628 210	-1973	-3532	+272 950	+1817	-373
	7	2346	628 270	272 956	628 262	1974	3540	272 973	1825	373
	8	2346	628 306	272 971	628 298	1974	3545	272 988	1830	373
	9	2347	628 329	272 982	628 322	1974	3545	272 998	1829	373
	10	2347	628 346	272 989	628 339	1974	3536	273 006	1820	373
	11	2347	628 364	272 997	628 357	1974	3517	273 014	1801	373
	12	-2347	-628 392	-273 009	+628 385	-1974	-3488	+273 026	+1773	-373
	13	2347	628 440	273 030	628 433	1975	3453	273 046	1737	373
	14	2348	628 513	273 061	628 506	1975	3415	273 077	1699	373
	15	2349	628 612	273 105	628 606	1976	3380	273 121	1664	373
	16	-2350	-628 735	-273 158	+628 728	-1977	-3354	+273 173	+1636	-373

POSITION AND VELOCITY OF THE EARTH, 2027
ORIGIN AT SOLAR SYSTEM BARYCENTRE
MEAN EQUATOR AND EQUINOX J 2000.0

Date 0^h T.D.B.		X	Y	Z	$\dot{X}$	$\dot{Y}$	$\dot{Z}$
Nov.	16	+0.595 884 11	+0.721 521 75	+0.312 812 05	-1401 0150	+944 2615	+409 3650
	17	0.581 783 77	0.730 853 82	0.316 857 84	1418 9903	922 1027	399 7709
	18	0.567 505 57	0.739 962 83	0.320 807 03	1436 5863	899 6493	390 0456
	19	0.553 053 33	0.748 845 81	0.324 658 30	1453 7960	876 8979	380 1872
	20	0.538 430 97	0.757 499 78	0.328 410 32	1470 6091	853 8454	370 1939
	21	0.523 642 51	0.765 921 71	0.332 061 73	1487 0128	830 4907	360 0655
	22	+0.508 692 13	+0.774 108 59	+0.335 611 18	-1502 9920	+806 8344	+349 8024
	23	0.493 584 14	0.782 057 41	0.339 057 34	1518 5311	782 8798	339 4068
	24	0.478 323 03	0.789 765 21	0.342 398 89	1533 6137	758 6332	328 8824
	25	0.462 913 44	0.797 229 12	0.345 634 57	1548 2244	734 1030	318 2333
	26	0.447 360 16	0.804 446 36	0.348 763 16	1562 3486	709 3004	307 4657
	27	0.431 668 13	0.811 414 27	0.351 783 51	1575 9739	684 2385	296 5861
	28	+0.415 842 38	+0.818 130 32	+0.354 694 53	-1589 0902	+658 9316	+285 6016
	29	0.399 888 05	0.824 592 13	0.357 495 22	1601 6896	633 3949	274 5195
	30	0.383 810 33	0.830 797 50	0.360 184 62	1613 7669	607 6436	263 3469
Dec.	1	0.367 614 46	0.836 744 34	0.362 761 88	1625 3187	581 6927	252 0908
	2	0.351 305 72	0.842 430 73	0.365 226 18	1636 3430	555 5561	240 7571
	3	0.334 889 36	0.847 854 89	0.367 576 78	1646 8393	529 2470	229 3519
	4	+0.318 370 69	+0.853 015 14	+0.369 813 00	-1656 8073	+502 7782	+217 8804
	5	0.301 754 98	0.857 909 96	0.371 934 19	1666 2475	476 1614	206 3476
	6	0.285 047 50	0.862 537 91	0.373 939 76	1675 1607	449 4079	194 7585
	7	0.268 253 52	0.866 897 70	0.375 829 18	1683 5482	422 5293	183 1176
	8	0.251 378 28	0.870 988 12	0.377 601 96	1691 4122	395 5364	171 4294
	9	0.234 427 01	0.874 808 08	0.379 257 63	1698 7555	368 4398	159 6981
	10	+0.217 404 89	+0.878 356 60	+0.380 795 79	-1705 5825	+341 2494	+147 9274
	11	0.200 317 06	0.881 632 79	0.382 216 06	1711 8987	313 9742	136 1205
	12	0.183 168 60	0.884 635 83	0.383 518 08	1717 7104	286 6208	124 2795
	13	0.165 964 51	0.887 364 96	0.384 701 53	1723 0242	259 1934	112 4052
	14	0.148 709 75	0.889 819 45	0.385 766 07	1727 8457	231 6936	100 4970
	15	0.131 409 23	0.891 998 58	0.386 711 36	1732 1778	204 1202	88 5535
	16	+0.114 067 83	+0.893 901 60	+0.387 537 02	-1736 0194	+176 4707	+76 5727
	17	0.096 690 49	0.895 527 73	0.388 242 68	1739 3657	148 7424	64 5533
	18	0.079 282 20	0.896 876 18	0.388 827 96	1742 2078	120 9344	52 4947
	19	0.061 848 05	0.897 946 16	0.389 292 45	1744 5345	93 0486	40 3982
	20	0.044 393 27	0.898 736 91	0.389 635 80	1746 3333	65 0901	28 2668
	21	0.026 923 19	0.899 247 75	0.389 857 69	1747 5923	37 0669	16 1049
	22	+0.009 443 26	+0.899 478 07	+0.389 957 82	-1748 3003	+8 9898	+3 9180
	23	-0.008 040 95	0.899 427 41	0.389 935 98	1748 4483	-19 1282	-8 2872
	24	0.025 523 81	0.899 095 42	0.389 792 04	1748 0289	47 2732	20 5037
	25	0.042 999 62	0.898 481 91	0.389 525 90	1747 0367	75 4298	32 7240
	26	0.060 462 63	0.897 586 84	0.389 137 57	1745 4686	103 5822	44 9407
	27	0.077 907 07	0.896 410 33	0.388 627 12	1743 3234	131 7145	57 1462
	28	-0.095 327 18	+0.894 952 67	+0.387 994 71	-1740 6019	-159 8110	-69 3333
	29	0.112 717 19	0.893 214 28	0.387 240 54	1737 3062	187 8562	81 4951
	30	0.130 071 40	0.891 195 76	0.386 364 91	1733 4399	215 8354	93 6251
	31	0.147 384 11	0.888 897 84	0.385 368 16	1729 0081	243 7351	105 7176
	32	-0.164 649 69	+0.886 321 37	+0.384 250 70	-1724 0160	-271 5421	-117 7669

$\dot{X}$, $\dot{Y}$, $\dot{Z}$ are in units of 10^{-9} a.u. per day

FRAME BIAS, PRECESSION AND NUTATION, 2027
MATRIX ELEMENTS FOR CONVERSION FROM
GCRS TO TRUE EQUINOX OF DATE

Date 0^h TT		M_{11} - 1	M_{12}	M_{13}	M_{21}	M_{22} - 1	M_{23}	M_{31}	M_{32}	M_{33} - 1
Nov.	16	-2350	-628 735	-273 158	+628 728	-1977	-3354	+273 173	+1636	-373
	17	2351	628 869	273 216	628 862	1977	3340	273 232	1621	373
	18	2352	629 001	273 273	628 994	1978	3339	273 289	1620	373
	19	2352	629 117	273 323	629 110	1979	3348	273 339	1629	374
	20	2353	629 207	273 363	629 200	1980	3364	273 378	1643	374
	21	2354	629 269	273 390	629 262	1980	3377	273 406	1657	374
	22	-2354	-629 308	-273 407	+629 302	-1980	-3383	+273 423	+1662	-374
	23	2354	629 335	273 418	629 328	1980	3377	273 434	1656	374
	24	2354	629 361	273 430	629 354	1981	3359	273 446	1638	374
	25	2355	629 400	273 447	629 393	1981	3330	273 462	1609	374
	26	2355	629 460	273 473	629 453	1981	3295	273 488	1573	374
	27	2356	629 544	273 509	629 537	1982	3259	273 524	1537	374
	28	-2356	-629 649	-273 555	+629 642	-1982	-3228	+273 570	+1506	-374
	29	2357	629 768	273 607	629 762	1983	3206	273 621	1483	374
	30	2358	629 893	273 661	629 887	1984	3194	273 675	1470	375
Dec.	1	2359	630 014	273 713	630 008	1985	3192	273 728	1467	375
	2	2360	630 124	273 761	630 118	1985	3198	273 776	1473	375
	3	2361	630 218	273 802	630 212	1986	3209	273 816	1483	375
	4	-2361	-630 294	-273 835	+630 287	-1986	-3221	+273 849	+1495	-375
	5	2362	630 352	273 860	630 346	1987	3231	273 875	1505	375
	6	2362	630 397	273 879	630 390	1987	3237	273 894	1510	375
	7	2362	630 432	273 895	630 426	1987	3235	273 910	1508	375
	8	2363	630 466	273 909	630 459	1987	3224	273 924	1497	375
	9	2363	630 505	273 927	630 499	1988	3205	273 941	1478	375
	10	-2363	-630 560	-273 951	+630 554	-1988	-3177	+273 965	+1450	-375
	11	2364	630 638	273 984	630 632	1989	3146	273 999	1418	375
	12	2365	630 743	274 030	630 737	1989	3114	274 044	1386	376
	13	2366	630 874	274 087	630 868	1990	3089	274 101	1360	376
	14	2367	631 023	274 151	631 017	1991	3076	274 165	1346	376
	15	2368	631 175	274 217	631 169	1992	3077	274 231	1347	376
	16	-2369	-631 315	-274 278	+631 309	-1993	-3092	+274 292	+1360	-376
	17	2370	631 429	274 327	631 423	1994	3114	274 342	1382	376
	18	2370	631 512	274 363	631 506	1994	3137	274 378	1404	376
	19	2371	631 567	274 388	631 561	1994	3153	274 402	1420	376
	20	2371	631 606	274 405	631 600	1995	3157	274 419	1424	377
	21	2371	631 642	274 420	631 636	1995	3149	274 434	1415	377
	22	-2372	-631 687	-274 440	+631 681	-1995	-3130	+274 454	+1396	-377
	23	2372	631 750	274 467	631 744	1996	3104	274 481	1370	377
	24	2373	631 836	274 504	631 830	1996	3077	274 518	1342	377
	25	2374	631 942	274 550	631 936	1997	3053	274 564	1318	377
	26	2375	632 064	274 603	632 058	1998	3037	274 617	1301	377
	27	2376	632 194	274 660	632 188	1998	3031	274 673	1294	377
	28	-2377	-632 322	-274 715	+632 316	-1999	-3035	+274 729	+1298	-377
	29	2377	632 440	274 767	632 434	2000	3047	274 780	1309	378
	30	2378	632 544	274 811	632 538	2001	3066	274 825	1327	378
	31	2379	632 629	274 848	632 623	2001	3087	274 862	1348	378
	32	-2379	-632 695	-274 877	+632 689	-2002	-3107	+274 891	+1368	-378

APPARENT PLACES OF POLARIS, 2027

FOR 0^h TERRESTRIAL TIME

α Ursae Minoris							Mag. 2.02								F5-F8 Ib					
	JANUARY						FEBRUARY						MARCH				APRIL			
Date	Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination	Right Ascension			Declination		
	h	m	s	°	'	"	h	m	s	°	'	"	h	m	s	° ' "	h	m	s	°	'	"
1	3	08	38	+89	22	55	3	07	47	+89	23	00	3	06	53	+89 23 00	3	06	08	+89	22	54
2	3	08	37	+89	22	56	3	07	45	+89	23	00	3	06	52	+89 23 00	3	06	07	+89	22	53
3	3	08	36	+89	22	56	3	07	44	+89	23	00	3	06	50	+89 22 59	3	06	05	+89	22	53
4	3	08	35	+89	22	56	3	07	42	+89	23	01	3	06	48	+89 22 59	3	06	04	+89	22	53
5	3	08	33	+89	22	56	3	07	40	+89	23	01	3	06	46	+89 22 59	3	06	03	+89	22	53
6	3	08	32	+89	22	56	3	07	38	+89	23	01	3	06	44	+89 22 59	3	06	02	+89	22	52
7	3	08	31	+89	22	57	3	07	35	+89	23	01	3	06	42	+89 22 59	3	06	01	+89	22	52
8	3	08	29	+89	22	57	3	07	33	+89	23	01	3	06	40	+89 22 59	3	06	00	+89	22	52
9	3	08	28	+89	22	57	3	07	31	+89	23	01	3	06	38	+89 22 59	3	05	60	+89	22	51
10	3	08	26	+89	22	57	3	07	29	+89	23	01	3	06	37	+89 22 58	3	05	59	+89	22	51
11	3	08	24	+89	22	58	3	07	26	+89	23	01	3	06	35	+89 22 58	3	05	59	+89	22	51
12	3	08	22	+89	22	58	3	07	25	+89	23	01	3	06	33	+89 22 58	3	05	58	+89	22	50
13	3	08	20	+89	22	58	3	07	23	+89	23	01	3	06	32	+89 22 58	3	05	58	+89	22	50
14	3	08	18	+89	22	58	3	07	21	+89	23	01	3	06	31	+89 22 58	3	05	58	+89	22	50
15	3	08	17	+89	22	58	3	07	19	+89	23	01	3	06	30	+89 22 57	3	05	57	+89	22	50
16	3	08	15	+89	22	58	3	07	18	+89	23	01	3	06	28	+89 22 57	3	05	56	+89	22	49
17	3	08	13	+89	22	59	3	07	16	+89	23	01	3	06	27	+89 22 57	3	05	55	+89	22	49
18	3	08	12	+89	22	59	3	07	14	+89	23	01	3	06	26	+89 22 57	3	05	55	+89	22	49
19	3	08	11	+89	22	59	3	07	12	+89	23	01	3	06	24	+89 22 57	3	05	54	+89	22	49
20	3	08	09	+89	22	59	3	07	10	+89	23	01	3	06	22	+89 22 57	3	05	54	+89	22	48
21	3	08	08	+89	22	59	3	07	08	+89	23	01	3	06	21	+89 22 56	3	05	53	+89	22	48
22	3	08	06	+89	22	59	3	07	06	+89	23	00	3	06	19	+89 22 56	3	05	53	+89	22	47
23	3	08	04	+89	23	00	3	07	04	+89	23	00	3	06	18	+89 22 56	3	05	53	+89	22	47
24	3	08	02	+89	23	00	3	07	02	+89	23	00	3	06	16	+89 22 56	3	05	53	+89	22	47
25	3	08	00	+89	23	00	3	06	60	+89	23	00	3	06	15	+89 22 55	3	05	53	+89	22	47
26	3	07	58	+89	23	00	3	06	58	+89	23	00	3	06	14	+89 22 55	3	05	53	+89	22	46
27	3	07	56	+89	23	00	3	06	57	+89	23	00	3	06	13	+89 22 55	3	05	53	+89	22	46
28	3	07	54	+89	23	00	3	06	55	+89	23	00	3	06	12	+89 22 55	3	05	53	+89	22	46
29	3	07	52	+89	23	00							3	06	11	+89 22 54	3	05	53	+89	22	45
30	3	07	50	+89	23	00							3	06	10	+89 22 54	3	05	53	+89	22	45
31	3	07	49	+89	23	00							3	06	09	+89 22 54						

APPARENT PLACES OF POLARIS, 2027

FOR 0^h TERRESTRIAL TIME

	α Ursae Minoris						Mag. 2.02						F5-F8 Ib					
	MAY						JUNE						JULY					
Date	Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination		
	h	m	s	°	'	"	h	m	s	°	'	"	h	m	s	°	'	"
1	3	05	52	+89	22	45	3	06	11	+89	22	36	3	06	57	+89	22	30
2	3	05	52	+89	22	45	3	06	12	+89	22	35	3	07	00	+89	22	29
3	3	05	52	+89	22	44	3	06	13	+89	22	35	3	07	02	+89	22	29
4	3	05	52	+89	22	44	3	06	15	+89	22	35	3	07	04	+89	22	29
5	3	05	52	+89	22	43	3	06	17	+89	22	35	3	07	06	+89	22	29
6	3	05	53	+89	22	43	3	06	18	+89	22	34	3	07	08	+89	22	29
7	3	05	53	+89	22	43	3	06	20	+89	22	34	3	07	10	+89	22	29
8	3	05	54	+89	22	42	3	06	21	+89	22	34	3	07	11	+89	22	29
9	3	05	54	+89	22	42	3	06	22	+89	22	34	3	07	13	+89	22	29
10	3	05	55	+89	22	42	3	06	23	+89	22	34	3	07	15	+89	22	29
11	3	05	56	+89	22	42	3	06	24	+89	22	33	3	07	17	+89	22	29
12	3	05	56	+89	22	41	3	06	26	+89	22	33	3	07	19	+89	22	28
13	3	05	56	+89	22	41	3	06	27	+89	22	33	3	07	21	+89	22	28
14	3	05	57	+89	22	41	3	06	28	+89	22	33	3	07	24	+89	22	28
15	3	05	57	+89	22	41	3	06	30	+89	22	32	3	07	26	+89	22	28
16	3	05	57	+89	22	40	3	06	32	+89	22	32	3	07	28	+89	22	28
17	3	05	58	+89	22	40	3	06	34	+89	22	32	3	07	31	+89	22	28
18	3	05	58	+89	22	40	3	06	36	+89	22	32	3	07	33	+89	22	28
19	3	05	59	+89	22	39	3	06	37	+89	22	32	3	07	35	+89	22	28
20	3	06	00	+89	22	39	3	06	39	+89	22	31	3	07	37	+89	22	28
21	3	06	01	+89	22	39	3	06	41	+89	22	31	3	07	39	+89	22	28
22	3	06	02	+89	22	38	3	06	42	+89	22	31	3	07	40	+89	22	28
23	3	06	03	+89	22	38	3	06	44	+89	22	31	3	07	42	+89	22	28
24	3	06	04	+89	22	38	3	06	45	+89	22	31	3	07	44	+89	22	28
25	3	06	05	+89	22	38	3	06	47	+89	22	31	3	07	46	+89	22	28
26	3	06	06	+89	22	37	3	06	48	+89	22	31	3	07	48	+89	22	28
27	3	06	07	+89	22	37	3	06	50	+89	22	30	3	07	51	+89	22	28
28	3	06	07	+89	22	37	3	06	51	+89	22	30	3	07	53	+89	22	28
29	3	06	08	+89	22	37	3	06	53	+89	22	30	3	07	56	+89	22	28
30	3	06	09	+89	22	36	3	06	55	+89	22	30	3	07	58	+89	22	28
31	3	06	10	+89	22	36							3	08	01	+89	22	28

	AUGUST					
	Right Ascension			Declination		
	h	m	s	°	'	"
1	3	08	03	+89	22	28
2	3	08	05	+89	22	28
3	3	08	07	+89	22	28
4	3	08	09	+89	22	28
5	3	08	11	+89	22	28
6	3	08	13	+89	22	28
7	3	08	15	+89	22	28
8	3	08	18	+89	22	28
9	3	08	20	+89	22	28
10	3	08	22	+89	22	28
11	3	08	25	+89	22	28
12	3	08	27	+89	22	28
13	3	08	30	+89	22	28
14	3	08	32	+89	22	29
15	3	08	34	+89	22	29
16	3	08	36	+89	22	29
17	3	08	38	+89	22	29
18	3	08	40	+89	22	29
19	3	08	42	+89	22	29
20	3	08	44	+89	22	29
21	3	08	46	+89	22	29
22	3	08	48	+89	22	29
23	3	08	50	+89	22	29
24	3	08	53	+89	22	29
25	3	08	55	+89	22	30
26	3	08	58	+89	22	30
27	3	09	00	+89	22	30
28	3	09	03	+89	22	30
29	3	09	05	+89	22	30
30	3	09	07	+89	22	31
31	3	09	09	+89	22	31

APPARENT PLACES OF POLARIS, 2027

FOR 0^h TERRESTRIAL TIME

	α Ursae Minoris						Mag. 2.02							F5-F8 Ib						
	SEPTEMBER						OCTOBER						NOVEMBER						DECEMBER					
Date	Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination			Right Ascension			Declination		
	h	m	s	°	'	"	h	m	s	°	'	"	h	m	s	°	'	"	h	m	s	°	'	"
1	3	09	10	+89	22	31	3	10	07	+89	22	38	3	10	47	+89	22	48	3	10	56	+89	22	59
2	3	09	12	+89	22	31	3	10	09	+89	22	38	3	10	48	+89	22	48	3	10	55	+89	22	59
3	3	09	14	+89	22	31	3	10	11	+89	22	38	3	10	49	+89	22	49	3	10	55	+89	22	59
4	3	09	16	+89	22	31	3	10	13	+89	22	39	3	10	49	+89	22	49	3	10	54	+89	23	00
5	3	09	19	+89	22	31	3	10	15	+89	22	39	3	10	50	+89	22	49	3	10	54	+89	23	00
6	3	09	21	+89	22	32	3	10	16	+89	22	39	3	10	51	+89	22	50	3	10	53	+89	23	00
7	3	09	23	+89	22	32	3	10	18	+89	22	39	3	10	51	+89	22	50	3	10	52	+89	23	01
8	3	09	26	+89	22	32	3	10	19	+89	22	40	3	10	51	+89	22	50	3	10	52	+89	23	01
9	3	09	28	+89	22	32	3	10	21	+89	22	40	3	10	51	+89	22	51	3	10	51	+89	23	01
10	3	09	30	+89	22	32	3	10	22	+89	22	41	3	10	52	+89	22	51	3	10	51	+89	23	02
11	3	09	32	+89	22	33	3	10	23	+89	22	41	3	10	52	+89	22	51	3	10	50	+89	23	02
12	3	09	34	+89	22	33	3	10	24	+89	22	41	3	10	52	+89	22	52	3	10	50	+89	23	02
13	3	09	35	+89	22	33	3	10	25	+89	22	41	3	10	53	+89	22	52	3	10	49	+89	23	03
14	3	09	37	+89	22	33	3	10	27	+89	22	42	3	10	54	+89	22	52	3	10	49	+89	23	03
15	3	09	39	+89	22	34	3	10	28	+89	22	42	3	10	54	+89	22	53	3	10	49	+89	23	03
16	3	09	40	+89	22	34	3	10	29	+89	22	42	3	10	55	+89	22	53	3	10	48	+89	23	04
17	3	09	42	+89	22	34	3	10	30	+89	22	43	3	10	55	+89	22	54	3	10	47	+89	23	04
18	3	09	44	+89	22	34	3	10	32	+89	22	43	3	10	56	+89	22	54	3	10	46	+89	23	04
19	3	09	46	+89	22	34	3	10	33	+89	22	43	3	10	56	+89	22	54	3	10	45	+89	23	05
20	3	09	48	+89	22	35	3	10	35	+89	22	44	3	10	56	+89	22	55	3	10	44	+89	23	05
21	3	09	50	+89	22	35	3	10	36	+89	22	44	3	10	56	+89	22	55	3	10	42	+89	23	05
22	3	09	52	+89	22	35	3	10	38	+89	22	44	3	10	56	+89	22	56	3	10	41	+89	23	06
23	3	09	54	+89	22	35	3	10	39	+89	22	45	3	10	56	+89	22	56	3	10	41	+89	23	06
24	3	09	56	+89	22	36	3	10	39	+89	22	45	3	10	55	+89	22	56	3	10	40	+89	23	06
25	3	09	58	+89	22	36	3	10	40	+89	22	45	3	10	55	+89	22	57	3	10	39	+89	23	06
26	3	10	00	+89	22	36	3	10	41	+89	22	46	3	10	55	+89	22	57	3	10	38	+89	23	07
27	3	10	01	+89	22	37	3	10	42	+89	22	46	3	10	56	+89	22	57	3	10	37	+89	23	07
28	3	10	03	+89	22	37	3	10	42	+89	22	46	3	10	56	+89	22	58	3	10	36	+89	23	07
29	3	10	04	+89	22	37	3	10	43	+89	22	47	3	10	56	+89	22	58	3	10	35	+89	23	07
30	3	10	06	+89	22	38	3	10	44	+89	22	47	3	10	56	+89	22	58	3	10	34	+89	23	08
31							3	10	46	+89	22	47							3	10	32	+89	23	08
32																			3	10	31	+89	23	08

POLARIS TABLE, 2027

LST	0^h		1^h		2^h		3^h		4^h		5^h	
	a_0	b_0	a_0	b_0	a_0	b_0	a_0	b_0	a_0	b_0	a_0	b_0
m	′	′	′	′	′	′	′	′	′	′	′	′
0	-25.2	+27.5	-31.5	+20.0	-35.6	+11.1	-37.2	+1.4	-36.3	-8.4	-32.8	-17.7
3	25.6	27.2	31.8	19.6	35.7	10.6	37.2	0.9	36.2	8.9	32.6	18.1
6	26.0	26.8	32.0	19.1	35.9	10.1	37.2	+0.4	36.0	9.4	32.4	18.5
9	26.3	26.5	32.3	18.7	36.0	9.6	37.2	-0.1	35.9	9.9	32.1	18.9
12	26.6	26.1	32.5	18.3	36.1	9.2	37.2	0.6	35.8	10.4	31.9	19.4
15	-27.0	+25.8	-32.7	+17.9	-36.2	+8.7	-37.2	-1.1	-35.6	-10.8	-31.6	-19.8
18	27.3	25.4	33.0	17.4	36.3	8.2	37.2	1.6	35.5	11.3	31.4	20.2
21	27.7	25.1	33.2	17.0	36.4	7.7	37.2	2.1	35.4	11.8	31.1	20.6
24	28.0	24.7	33.4	16.5	36.5	7.2	37.2	2.6	35.2	12.2	30.8	21.0
27	28.3	24.3	33.6	16.1	36.6	6.7	37.1	3.1	35.0	12.7	30.5	21.4
30	-28.6	+23.9	-33.8	+15.7	-36.7	+6.3	-37.1	-3.6	-34.9	-13.2	-30.3	-21.8
33	28.9	23.6	34.0	15.2	36.8	5.8	37.0	4.1	34.7	13.6	30.0	22.2
36	29.2	23.2	34.2	14.8	36.9	5.3	37.0	4.6	34.5	14.1	29.7	22.6
39	29.5	22.8	34.4	14.3	36.9	4.8	36.9	5.1	34.3	14.5	29.4	23.0
42	29.8	22.4	34.6	13.8	37.0	4.3	36.8	5.5	34.1	15.0	29.1	23.4
45	-30.1	+22.0	-34.8	+13.4	-37.0	+3.8	-36.8	-6.0	-33.9	-15.4	-28.8	-23.8
48	30.4	21.6	35.0	12.9	37.1	3.3	36.7	6.5	33.7	15.9	28.4	24.1
51	30.7	21.2	35.1	12.5	37.1	2.8	36.6	7.0	33.5	16.3	28.1	24.5
54	31.0	20.8	35.3	12.0	37.2	2.3	36.5	7.5	33.3	16.8	27.8	24.9
57	31.2	20.4	35.4	11.5	37.2	1.8	36.4	8.0	33.1	17.2	27.5	25.3
60	-31.5	+20.0	-35.6	+11.1	-37.2	+1.4	-36.3	-8.4	-32.8	-17.7	-27.1	-25.6
Lat. °	a_1	b_1	a_1	b_1	a_1	b_1	a_1	b_1	a_1	b_1	a_1	b_1
0	-.1	-.2	-.1	-.2	.0	-.1	.0	.0	.0	+.1	-.1	+.2
10	-.1	-.2	-.1	-.2	.0	-.1	.0	.0	.0	+.1	.0	+.2
20	-.1	-.2	.0	-.2	.0	-.1	.0	.0	.0	+.1	.0	+.1
30	-.1	-.1	.0	-.1	.0	-.1	.0	.0	.0	+.1	.0	+.1
40	.0	-.1	.0	-.1	.0	.0	.0	.0	.0	.0	.0	+.1
45	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
50	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
55	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
60	+.1	+.1	.0	+.1	.0	+.1	.0	.0	.0	.0	.0	-.1
62	+.1	+.1	.0	+.1	.0	+.1	.0	.0	.0	-.1	.0	-.1
64	+.1	+.2	.0	+.2	.0	+.1	.0	.0	.0	-.1	.0	-.1
66	+.1	+.2	+.1	+.2	.0	+.1	.0	.0	.0	-.1	.0	-.2
Month	a_2	b_2	a_2	b_2	a_2	b_2	a_2	b_2	a_2	b_2	a_2	b_2
Jan.	+.1	-.1	+.2	-.1	+.2	-.1	+.2	.0	+.2	+.1	+.2	+.1
Feb.	+.1	-.3	+.1	-.3	+.2	-.2	+.2	-.1	+.3	-.1	+.3	.0
Mar.	-.1	-.3	.0	-.3	+.1	-.3	+.2	-.3	+.3	-.2	+.3	-.2
Apr.	-.2	-.3	-.1	-.3	.0	-.4	+.1	-.4	+.1	-.3	+.2	-.3
May	-.3	-.2	-.3	-.3	-.2	-.3	-.1	-.3	.0	-.4	+.1	-.4
June	-.3	.0	-.3	-.1	-.3	-.2	-.2	-.3	-.2	-.3	-.1	-.3
July	-.3	+.1	-.3	+.1	-.3	.0	-.3	-.1	-.3	-.2	-.2	-.2
Aug.	-.1	+.2	-.2	+.2	-.2	+.1	-.3	+.1	-.3	.0	-.3	-.1
Sept.	.0	+.3	.0	+.3	-.1	+.3	-.2	+.2	-.2	+.2	-.3	+.1
Oct.	+.2	+.3	+.2	+.3	+.1	+.4	.0	+.4	-.1	+.3	-.2	+.3
Nov.	+.4	+.2	+.3	+.3	+.2	+.4	+.1	+.4	.0	+.5	-.1	+.4
Dec.	+.5	+.1	+.5	+.2	+.4	+.3	+.3	+.4	+.2	+.5	+.1	+.5

Latitude = Corrected observed altitude of *Polaris* + a_0 + a_1 + a_2

Azimuth of *Polaris* = (b_0 + b_1 + b_2)/ cos (latitude)

POLARIS TABLE, 2027

LST	6^h		7^h		8^h		9^h		10^h		11^h	
	a_0	b_0	a_0	b_0	a_0	b_0	a_0	b_0	a_0	b_0	a_0	b_0
m	′	′	′	′	′	′	′	′	′	′	′	′
0	-27.1	-25.6	-19.6	-31.8	-10.7	-35.7	-1.1	-37.2	+8.6	-36.2	+17.6	-32.7
3	26.8	26.0	19.2	32.0	10.2	35.9	0.6	37.2	9.0	36.1	18.1	32.5
6	26.5	26.3	18.8	32.3	9.8	36.0	-0.1	37.2	9.5	35.9	18.5	32.2
9	26.1	26.7	18.3	32.5	9.3	36.1	+0.4	37.2	10.0	35.8	18.9	32.0
12	25.8	27.0	17.9	32.8	8.8	36.2	0.9	37.2	10.5	35.7	19.3	31.7
15	-25.4	-27.3	-17.5	-33.0	-8.3	-36.3	+1.3	-37.2	+10.9	-35.5	+19.7	-31.5
18	25.1	27.7	17.0	33.2	7.9	36.5	1.8	37.2	11.4	35.4	20.2	31.2
21	24.7	28.0	16.6	33.4	7.4	36.5	2.3	37.2	11.8	35.2	20.6	30.9
24	24.3	28.3	16.2	33.6	6.9	36.6	2.8	37.1	12.3	35.1	21.0	30.7
27	23.9	28.6	15.7	33.9	6.4	36.7	3.3	37.1	12.8	34.9	21.4	30.4
30	-23.6	-28.9	-15.3	-34.1	-5.9	-36.8	+3.8	-37.0	+13.2	-34.7	+21.8	-30.1
33	23.2	29.3	14.8	34.3	5.5	36.9	4.3	37.0	13.7	34.6	22.1	29.8
36	22.8	29.6	14.4	34.4	5.0	36.9	4.7	36.9	14.1	34.4	22.5	29.5
39	22.4	29.9	13.9	34.6	4.5	37.0	5.2	36.8	14.6	34.2	22.9	29.2
42	22.0	30.1	13.5	34.8	4.0	37.1	5.7	36.8	15.0	34.0	23.3	28.9
45	-21.6	-30.4	-13.0	-35.0	-3.5	-37.1	+6.2	-36.7	+15.5	-33.8	+23.7	-28.6
48	21.2	30.7	12.6	35.1	3.0	37.1	6.7	36.6	15.9	33.6	24.1	28.3
51	20.8	31.0	12.1	35.3	2.6	37.2	7.1	36.5	16.3	33.4	24.4	28.0
54	20.4	31.3	11.6	35.4	2.1	37.2	7.6	36.4	16.8	33.2	24.8	27.7
57	20.0	31.5	11.2	35.6	1.6	37.2	8.1	36.3	17.2	32.9	25.1	27.3
60	-19.6	-31.8	-10.7	-35.7	-1.1	-37.2	+8.6	-36.2	+17.6	-32.7	+25.5	-27.0
Lat. °	a_1	b_1	a_1	b_1	a_1	b_1	a_1	b_1	a_1	b_1	a_1	b_1
0	-.1	+.2	-.2	+.2	-.2	+.1	-.2	.0	-.2	-.1	-.2	-.2
10	-.1	+.2	-.2	+.2	-.2	+.1	-.2	.0	-.2	-.1	-.2	-.2
20	-.1	+.2	-.1	+.2	-.2	+.1	-.2	.0	-.2	-.1	-.1	-.1
30	-.1	+.1	-.1	+.1	-.1	+.1	-.1	.0	-.1	-.1	-.1	-.1
40	.0	+.1	-.1	+.1	-.1	.0	-.1	.0	-.1	.0	-.1	-.1
45	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
50	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
55	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
60	+.1	-.1	+.1	-.1	+.1	-.1	+.1	.0	+.1	.0	+.1	+.1
62	+.1	-.1	+.1	-.1	+.1	-.1	+.1	.0	+.1	+.1	+.1	+.1
64	+.1	-.2	+.1	-.2	+.2	-.1	+.2	.0	+.2	+.1	+.1	+.1
66	+.1	-.2	+.2	-.2	+.2	-.1	+.2	.0	+.2	+.1	+.2	+.2
Month	a_2	b_2	a_2	b_2	a_2	b_2	a_2	b_2	a_2	b_2	a_2	b_2
Jan.	+.1	+.1	+.1	+.1	+.1	+.2	.0	+.2	-.1	+.2	-.1	+.2
Feb.	+.3	+.1	+.3	+.1	+.2	+.2	+.1	+.2	+.1	+.3	.0	+.3
Mar.	+.3	-.1	+.3	-.1	+.3	+.1	+.3	+.2	+.2	+.3	+.2	+.3
Apr.	+.3	-.2	+.3	-.2	+.4	.0	+.4	+.1	+.3	+.1	+.3	+.2
May	+.2	-.3	+.3	-.3	+.3	-.2	+.4	-.1	+.4	.0	+.4	+.1
June	.0	-.3	+.1	-.3	+.2	-.3	+.3	-.2	+.3	-.2	+.3	-.1
July	-.1	-.3	-.1	-.3	.0	-.3	+.1	-.3	+.2	-.3	+.2	-.2
Aug.	-.2	-.1	-.2	-.1	-.1	-.2	-.1	-.3	.0	-.3	+.1	-.3
Sept.	-.3	.0	-.3	.0	-.3	-.1	-.2	-.2	-.2	-.2	-.1	-.3
Oct.	-.3	+.2	-.3	+.2	-.4	+.1	-.4	.0	-.3	-.1	-.3	-.2
Nov.	-.2	+.4	-.3	+.4	-.4	+.2	-.4	+.1	-.5	.0	-.4	-.1
Dec.	-.1	+.5	-.2	+.5	-.3	+.4	-.4	+.3	-.5	+.2	-.5	+.1

Latitude = Corrected observed altitude of *Polaris* + $a_0 + a_1 + a_2$

Azimuth of *Polaris* = $(b_0 + b_1 + b_2)$/ cos (latitude)

POLARIS TABLE, 2027

LST	12^h		13^h		14^h		15^h		16^h		17^h	
	a_0	b_0	a_0	b_0	a_0	b_0	a_0	b_0	a_0	b_0	a_0	b_0
m	′	′	′	′	′	′	′	′	′	′	′	′
0	+25.5	-27.0	+31.6	-19.5	+35.6	-10.8	+37.2	-1.3	+36.3	+8.2	+32.9	+17.3
3	25.9	26.7	31.9	19.1	35.8	10.3	37.2	0.8	36.2	8.7	32.7	17.7
6	26.2	26.3	32.1	18.7	35.9	9.9	37.2	-0.4	36.1	9.2	32.5	18.1
9	26.5	26.0	32.4	18.3	36.0	9.4	37.2	+0.1	36.0	9.6	32.2	18.5
12	26.9	25.7	32.6	17.9	36.1	8.9	37.2	0.6	35.8	10.1	32.0	18.9
15	+27.2	-25.3	+32.8	-17.5	+36.3	-8.5	+37.2	+1.1	+35.7	+10.6	+31.8	+19.4
18	27.5	24.9	33.1	17.0	36.4	8.0	37.2	1.6	35.5	11.0	31.5	19.8
21	27.9	24.6	33.3	16.6	36.5	7.5	37.2	2.1	35.4	11.5	31.2	20.2
24	28.2	24.2	33.5	16.2	36.6	7.0	37.2	2.5	35.2	11.9	31.0	20.6
27	28.5	23.9	33.7	15.7	36.6	6.6	37.1	3.0	35.1	12.4	30.7	21.0
30	+28.8	-23.5	+33.9	-15.3	+36.7	-6.1	+37.1	+3.5	+34.9	+12.9	+30.4	+21.4
33	29.1	23.1	34.1	14.9	36.8	5.6	37.0	4.0	34.8	13.3	30.1	21.8
36	29.4	22.7	34.3	14.4	36.9	5.1	37.0	4.4	34.6	13.8	29.8	22.2
39	29.7	22.3	34.5	14.0	36.9	4.7	36.9	4.9	34.4	14.2	29.6	22.5
42	30.0	21.9	34.7	13.5	37.0	4.2	36.8	5.4	34.2	14.6	29.3	22.9
45	+30.3	-21.6	+34.8	-13.1	+37.1	-3.7	+36.8	+5.9	+34.0	+15.1	+29.0	+23.3
48	30.6	21.2	35.0	12.6	37.1	3.2	36.7	6.4	33.8	15.5	28.6	23.7
51	30.8	20.8	35.2	12.2	37.1	2.8	36.6	6.8	33.6	16.0	28.3	24.0
54	31.1	20.4	35.3	11.7	37.2	2.3	36.5	7.3	33.4	16.4	28.0	24.4
57	31.4	20.0	35.5	11.2	37.2	1.8	36.4	7.8	33.2	16.8	27.7	24.8
60	+31.6	-19.5	+35.6	-10.8	+37.2	-1.3	+36.3	+8.2	+32.9	+17.3	+27.4	+25.1
Lat. °	a_1	b_1	a_1	b_1	a_1	b_1	a_1	b_1	a_1	b_1	a_1	b_1
0	-.1	-.2	-.1	-.2	.0	-.1	.0	.0	.0	+.1	-.1	+.2
10	-.1	-.2	-.1	-.2	.0	-.1	.0	.0	.0	+.1	.0	+.2
20	-.1	-.2	.0	-.2	.0	-.1	.0	.0	.0	+.1	.0	+.1
30	-.1	-.1	.0	-.1	.0	-.1	.0	.0	.0	+.1	.0	+.1
40	.0	-.1	.0	-.1	.0	.0	.0	.0	.0	.0	.0	+.1
45	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
50	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
55	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
60	+.1	+.1	.0	+.1	.0	+.1	.0	.0	.0	.0	.0	-.1
62	+.1	+.1	.0	+.1	.0	+.1	.0	.0	.0	-.1	.0	-.1
64	+.1	+.2	.0	+.2	.0	+.1	.0	.0	.0	-.1	.0	-.1
66	+.1	+.2	+.1	+.2	.0	+.1	.0	.0	.0	-.1	.0	-.2
Month	a_2	b_2	a_2	b_2	a_2	b_2	a_2	b_2	a_2	b_2	a_2	b_2
Jan.	-.1	+.1	-.2	+.1	-.2	+.1	-.2	.0	-.2	-.1	-.2	-.1
Feb.	-.1	+.3	-.1	+.3	-.2	+.2	-.2	+.1	-.3	+.1	-.3	.0
Mar.	+.1	+.3	.0	+.3	-.1	+.3	-.2	+.3	-.3	+.2	-.3	+.2
Apr.	+.2	+.3	+.1	+.3	.0	+.4	-.1	+.4	-.1	+.3	-.2	+.3
May	+.3	+.2	+.3	+.3	+.2	+.3	+.1	+.4	.0	+.4	-.1	+.4
June	+.3	.0	+.3	+.1	+.3	+.2	+.2	+.3	+.2	+.3	+.1	+.3
July	+.3	-.1	+.3	-.1	+.3	.0	+.3	+.1	+.3	+.2	+.2	+.2
Aug.	+.1	-.2	+.2	-.2	+.2	-.1	+.3	-.1	+.3	.0	+.3	+.1
Sept.	.0	-.3	.0	-.3	+.1	-.3	+.2	-.2	+.2	-.2	+.3	-.1
Oct.	-.2	-.3	-.2	-.3	-.1	-.4	.0	-.4	+.1	-.3	+.2	-.3
Nov.	-.4	-.2	-.3	-.3	-.2	-.4	-.1	-.4	.0	-.5	+.1	-.4
Dec.	-.5	-.1	-.5	-.2	-.4	-.3	-.3	-.4	-.2	-.5	-.1	-.5

Latitude = Corrected observed altitude of *Polaris* + $a_0 + a_1 + a_2$

Azimuth of *Polaris* = $(b_0 + b_1 + b_2)$/ cos (latitude)

POLARIS TABLE, 2027

LST	18^h		19^h		20^h		21^h		22^h		23^h	
	a_0	b_0	a_0	b_0	a_0	b_0	a_0	b_0	a_0	b_0	a_0	b_0
m	′	′	′	′	′	′	′	′	′	′	′	′
0	+27.4	+25.1	+19.9	+31.3	+11.1	+35.5	+1.6	+37.2	-8.1	+36.4	-17.3	+33.1
3	27.0	25.5	19.5	31.6	10.7	35.6	1.1	37.2	8.6	36.3	17.7	32.9
6	26.7	25.8	19.1	31.9	10.2	35.8	0.6	37.2	9.1	36.2	18.1	32.6
9	26.4	26.2	18.7	32.1	9.7	35.9	+0.1	37.2	9.5	36.1	18.6	32.4
12	26.0	26.5	18.3	32.4	9.3	36.0	-0.4	37.2	10.0	35.9	19.0	32.2
15	+25.7	+26.9	+17.8	+32.6	+8.8	+36.1	-0.9	+37.2	-10.5	+35.8	-19.4	+31.9
18	25.3	27.2	17.4	32.8	8.3	36.2	1.4	37.2	10.9	35.7	19.8	31.6
21	25.0	27.5	17.0	33.0	7.8	36.4	1.8	37.2	11.4	35.5	20.2	31.4
24	24.6	27.8	16.5	33.3	7.4	36.5	2.3	37.2	11.9	35.4	20.6	31.1
27	24.2	28.2	16.1	33.5	6.9	36.6	2.8	37.2	12.3	35.2	21.0	30.8
30	+23.9	+28.5	+15.7	+33.7	+6.4	+36.6	-3.3	+37.1	-12.8	+35.1	-21.4	+30.6
33	23.5	28.8	15.2	33.9	5.9	36.7	3.8	37.1	13.3	34.9	21.8	30.3
36	23.1	29.1	14.8	34.1	5.5	36.8	4.3	37.0	13.7	34.7	22.2	30.0
39	22.7	29.4	14.3	34.3	5.0	36.9	4.8	37.0	14.2	34.5	22.6	29.7
42	22.3	29.7	13.9	34.5	4.5	36.9	5.2	36.9	14.6	34.3	23.0	29.4
45	+21.9	+30.0	+13.4	+34.7	+4.0	+37.0	-5.7	+36.8	-15.1	+34.1	-23.4	+29.1
48	21.5	30.3	13.0	34.8	3.5	37.1	6.2	36.8	15.5	33.9	23.8	28.8
51	21.2	30.5	12.5	35.0	3.0	37.1	6.7	36.7	16.0	33.7	24.1	28.5
54	20.7	30.8	12.1	35.2	2.5	37.1	7.2	36.6	16.4	33.5	24.5	28.2
57	20.3	31.1	11.6	35.3	2.1	37.2	7.6	36.5	16.8	33.3	24.9	27.8
60	+19.9	+31.3	+11.1	+35.5	+1.6	+37.2	-8.1	+36.4	-17.3	+33.1	-25.2	+27.5
Lat. °	a_1	b_1	a_1	b_1	a_1	b_1	a_1	b_1	a_1	b_1	a_1	b_1
0	-.1	+.2	-.2	+.2	-.2	+.1	-.2	.0	-.2	-.1	-.2	-.2
10	-.1	+.2	-.1	+.2	-.2	+.1	-.2	.0	-.2	-.1	-.2	-.2
20	-.1	+.2	-.1	+.2	-.2	+.1	-.2	.0	-.2	-.1	-.1	-.1
30	-.1	+.1	-.1	+.1	-.1	+.1	-.1	.0	-.1	-.1	-.1	-.1
40	.0	+.1	-.1	+.1	-.1	.0	-.1	.0	-.1	.0	-.1	-.1
45	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
50	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
55	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
60	+.1	-.1	+.1	-.1	+.1	-.1	+.1	.0	+.1	.0	+.1	+.1
62	+.1	-.1	+.1	-.1	+.1	-.1	+.1	.0	+.1	+.1	+.1	+.1
64	+.1	-.2	+.1	-.2	+.2	-.1	+.2	.0	+.2	+.1	+.1	+.1
66	+.1	-.2	+.2	-.2	+.2	-.1	+.2	.0	+.2	+.1	+.2	+.2
Month	a_2	b_2	a_2	b_2	a_2	b_2	a_2	b_2	a_2	b_2	a_2	b_2
Jan.	-.1	-.1	-.1	-.2	-.1	-.2	.0	-.2	+.1	-.2	+.1	-.2
Feb.	-.3	-.1	-.3	-.1	-.2	-.2	-.1	-.2	-.1	-.3	.0	-.3
Mar.	-.3	+.1	-.3	.0	-.3	-.1	-.3	-.2	-.2	-.3	-.2	-.3
Apr.	-.3	+.2	-.3	+.1	-.4	.0	-.4	-.1	-.3	-.1	-.3	-.2
May	-.2	+.3	-.3	+.3	-.3	+.2	-.4	+.1	-.4	.0	-.4	-.1
June	.0	+.3	-.1	+.3	-.2	+.3	-.3	+.2	-.3	+.2	-.3	+.1
July	+.1	+.3	+.1	+.3	.0	+.3	-.1	+.3	-.2	+.3	-.2	+.2
Aug.	+.2	+.1	+.2	+.2	+.1	+.2	+.1	+.3	.0	+.3	-.1	+.3
Sept.	+.3	.0	+.3	.0	+.3	+.1	+.2	+.2	+.2	+.2	+.1	+.3
Oct.	+.3	-.2	+.3	-.2	+.4	-.1	+.4	.0	+.3	+.1	+.3	+.2
Nov.	+.2	-.4	+.3	-.3	+.4	-.2	+.4	-.1	+.5	.0	+.4	+.1
Dec.	+.1	-.5	+.2	-.5	+.3	-.4	+.4	-.3	+.5	-.2	+.5	-.1

Latitude = Corrected observed altitude of *Polaris* + a_0 + a_1 + a_2

Azimuth of *Polaris* = (b_0 + b_1 + b_2)/ cos (latitude)

PART - III

SUNRISE, SUNSET AND MOONRISE, MOONSET

SUNRISE, 2027

LOCAL MEAN TIME OF SUNRISE (SUN'S UPPER LIMB) AND BEGINNING OF MORNING TWILIGHT ON THE MERIDIAN OF GREENWICH

To obtain the standard time at any station, add four minutes for each degree if the station is west of the standard meridian, or deduct four minutes for each degree if the station is east of the standard meridian. In India, to obtain I.S.T., add 4 x (82º.5 - λ) mins. or deduct 4 x (λ - 82º.5) mins. as the station is west or east of 82º.5 E. Longitude.

Date \ Lat.		0º	10º	20º	30º	35º	40º	45º	50º	52º	54º	56º	58º	60º
		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Jan.	0	5 59	6 16	6 35	6 56	7 08	7 22	7 38	7 59	8 08	8 19	8 31	8 46	9 03
	4	6 01	6 18	6 36	6 56	7 08	7 22	7 38	7 58	8 08	8 18	8 30	8 44	9 01
	8	6 03	6 19	6 37	6 57	7 09	7 22	7 38	7 57	8 06	8 16	8 28	8 41	8 57
	12	6 04	6 20	6 38	6 57	7 08	7 21	7 36	7 55	8 04	8 14	8 25	8 38	8 53
	16	6 06	6 21	6 38	6 57	7 07	7 20	7 34	7 52	8 01	8 10	8 21	8 33	8 47
	20	6 07	6 22	6 38	6 56	7 06	7 18	7 32	7 49	7 57	8 05	8 15	8 27	8 40
	24	6 08	6 22	6 37	6 54	7 04	7 15	7 29	7 45	7 52	8 00	8 10	8 20	8 32
	28	6 09	6 23	6 37	6 53	7 02	7 12	7 25	7 40	7 47	7 54	8 03	8 13	8 24
Feb.	1	6 10	6 22	6 36	6 51	6 59	7 09	7 20	7 34	7 41	7 48	7 56	8 05	8 15
	5	6 10	6 22	6 34	6 48	6 56	7 05	7 16	7 28	7 34	7 41	7 48	7 56	8 05
	9	6 11	6 21	6 33	6 45	6 53	7 01	7 10	7 22	7 27	7 33	7 40	7 47	7 55
	13	6 11	6 20	6 31	6 42	6 49	6 56	7 05	7 15	7 20	7 25	7 31	7 37	7 45
	17	6 11	6 19	6 28	6 39	6 44	6 51	6 59	7 08	7 12	7 17	7 22	7 28	7 34
	21	6 10	6 18	6 26	6 35	6 40	6 46	6 52	7 00	7 04	7 08	7 12	7 17	7 23
	25	6 10	6 16	6 23	6 31	6 35	6 40	6 46	6 52	6 56	6 59	7 03	7 07	7 11
Mar.	1	6 09	6 15	6 20	6 27	6 30	6 34	6 39	6 44	6 47	6 50	6 53	6 56	7 00
	5	6 08	6 13	6 17	6 22	6 25	6 28	6 32	6 36	6 38	6 40	6 43	6 45	6 48
	9	6 07	6 11	6 14	6 18	6 20	6 22	6 25	6 28	6 29	6 31	6 32	6 34	6 36
	13	6 06	6 08	6 11	6 13	6 14	6 16	6 17	6 19	6 20	6 21	6 22	6 23	6 24
	17	6 05	6 06	6 07	6 08	6 09	6 09	6 10	6 11	6 11	6 11	6 12	6 12	6 12
	21	6 04	6 04	6 04	6 03	6 03	6 03	6 02	6 02	6 02	6 01	6 01	6 01	6 00
	25	6 03	6 02	6 00	5 59	5 58	5 56	5 55	5 53	5 52	5 51	5 50	5 49	5 48
	29	6 02	5 59	5 57	5 54	5 52	5 50	5 47	5 44	5 43	5 42	5 40	5 38	5 36
Apr.	2	6 00	5 57	5 53	5 49	5 46	5 43	5 40	5 36	5 34	5 32	5 29	5 27	5 24

BEGINNING OF MORNING TWILIGHT

		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Jan.	0	4 44	5 01	5 16	5 30	5 37	5 44	5 52	6 00	6 03	6 06	6 10	6 14	6 18
	8	4 48	5 04	5 19	5 32	5 39	5 45	5 52	5 59	6 02	6 06	6 09	6 12	6 16
	16	4 52	5 07	5 20	5 33	5 38	5 44	5 50	5 56	5 59	6 02	6 04	6 07	6 10
	24	4 55	5 09	5 21	5 31	5 36	5 41	5 46	5 51	5 53	5 55	5 57	5 59	6 01
Feb.	1	4 58	5 10	5 20	5 29	5 32	5 36	5 40	5 43	5 44	5 45	5 46	5 47	5 48
	9	5 00	5 10	5 18	5 24	5 27	5 29	5 31	5 32	5 33	5 33	5 33	5 33	5 32
	17	5 00	5 08	5 14	5 18	5 20	5 20	5 20	5 20	5 19	5 18	5 17	5 16	5 14
	25	5 00	5 06	5 10	5 11	5 11	5 10	5 08	5 05	5 03	5 01	4 59	4 56	4 53
Mar.	5	4 59	5 03	5 04	5 03	5 01	4 58	4 55	4 49	4 46	4 43	4 39	4 34	4 29
	13	4 58	4 59	4 58	4 54	4 50	4 46	4 40	4 31	4 27	4 22	4 17	4 11	4 03
	21	4 55	4 54	4 51	4 44	4 39	4 32	4 24	4 12	4 07	4 00	3 53	3 45	3 35
	29	4 53	4 49	4 43	4 33	4 26	4 18	4 07	3 52	3 45	3 37	3 27	3 16	3 03
Apr.	6	4 50	4 44	4 36	4 23	4 14	4 03	3 49	3 31	3 22	3 11	2 59	2 44	2 26

SUNSET, 2027

LOCAL MEAN TIME OF SUNSET (SUN'S UPPER LIMB) AND ENDING OF EVENING TWILIGHT ON THE MERIDIAN OF GREENWICH

To obtain the standard time at any station, add four minutes for each degree if the station is west of the standard meridian, or deduct four minutes for each degree if the station is east of the standard meridian. In India, to obtain I.S.T., add 4 x (82º.5 - λ) mins. or deduct 4 x (λ - 82º.5) mins. as the station is west or east of 82º.5 E. Longitude**.**

Date	Lat. 0º	10º	20º	30º	35º	40º	45º	50º	52º	54º	56º	58º	60º
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Jan. 0	18 07	17 49	17 31	17 10	16 58	16 44	16 28	16 07	15 58	15 47	15 34	15 20	15 03
4	18 08	17 52	17 34	17 13	17 01	16 48	16 31	16 12	16 02	15 52	15 39	15 26	15 09
8	18 10	17 54	17 36	17 16	17 05	16 51	16 36	16 16	16 07	15 57	15 45	15 32	15 16
12	18 12	17 56	17 39	17 20	17 08	16 55	16 40	16 22	16 13	16 3	15 52	15 39	15 24
16	18 13	17 58	17 42	17 23	17 12	17 00	16 45	16 27	16 19	16 10	15 59	15 47	15 33
20	18 15	18 00	17 44	17 26	17 16	17 04	16 50	16 34	16 26	16 17	16 07	15 56	15 42
24	18 16	18 02	17 47	17 30	17 20	17 09	16 56	16 40	16 32	16 24	16 15	16 04	15 52
28	18 16	18 03	17 49	17 33	17 24	17 14	17 01	16 47	16 40	16 32	16 23	16 14	16 02
Feb. 1	18 17	18 05	17 52	17 37	17 28	17 18	17 07	16 53	16 47	16 40	16 32	16 23	16 13
5	18 17	18 06	17 54	17 40	17 32	17 23	17 13	17 00	16 54	16 48	16 41	16 33	16 23
9	18 18	18 07	17 56	17 43	17 36	17 28	17 19	17 07	17 02	16 56	16 50	16 42	16 34
13	18 18	18 08	17 58	17 47	17 40	17 33	17 24	17 14	17 09	17 4	16 58	16 52	16 45
17	18 17	18 09	18 00	17 50	17 44	17 38	17 30	17 21	17 17	17 12	17 07	17 01	16 55
21	18 17	18 10	18 02	17 53	17 48	17 42	17 36	17 28	17 24	17 20	17 16	17 11	17 05
25	18 16	18 10	18 03	17 56	17 52	17 47	17 41	17 35	17 31	17 28	17 24	17 20	17 16
Mar. 1	18 16	18 10	18 05	17 59	17 55	17 51	17 47	17 41	17 39	17 36	17 33	17 30	17 26
5	18 15	18 11	18 06	18 01	17 59	17 56	17 52	17 48	17 46	17 44	17 42	17 39	17 36
9	18 14	18 11	18 08	18 04	18 02	18 00	17 57	17 54	17 53	17 52	17 50	17 48	17 46
13	18 13	18 11	18 09	18 07	18 05	18 04	18 03	18 01	18 00	17 59	17 58	17 57	17 56
17	18 12	18 11	18 10	18 09	18 09	18 08	18 08	18 07	18 07	18 7	18 07	18 06	18 06
21	18 11	18 11	18 11	18 12	18 12	18 12	18 13	18 14	18 14	18 14	18 15	18 15	18 16
25	18 09	18 11	18 12	18 14	18 15	18 17	18 18	18 20	18 21	18 22	18 23	18 24	18 26
29	18 08	18 11	18 13	18 17	18 18	18 21	18 23	18 26	18 28	18 29	18 31	18 33	18 35
Apr. 2	18 07	18 11	18 14	18 19	18 22	18 25	18 28	18 33	18 35	18 37	18 39	18 42	18 45

END OF EVENING TWILIGHT

	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Jan. 0	19 21	19 05	18 50	18 36	18 29	18 22	18 14	18 06	18 03	18 00	17 56	17 52	17 48
8	19 25	19 09	18 54	18 41	18 35	18 28	18 21	18 14	18 11	18 08	18 05	18 01	17 57
16	19 27	19 12	18 59	18 47	18 41	18 35	18 29	18 23	18 21	18 18	18 15	18 13	18 10
24	19 28	19 15	19 03	18 53	18 48	18 43	18 38	18 34	18 32	18 30	18 28	18 26	18 24
Feb. 1	19 29	19 17	19 07	18 59	18 55	18 51	18 48	18 45	18 44	18 43	18 42	18 41	18 40
9	19 29	19 19	19 11	19 05	19 02	19 00	18 58	18 57	18 57	18 57	18 57	18 57	18 57
17	19 28	19 20	19 14	19 10	19 09	19 08	19 08	19 09	19 10	19 11	19 12	19 14	19 16
25	19 26	19 20	19 17	19 16	19 16	19 17	19 19	19 22	19 24	19 26	19 29	19 32	19 35
Mar. 5	19 24	19 21	19 19	19 21	19 23	19 26	19 30	19 35	19 38	19 42	19 46	19 50	19 56
13	19 22	19 21	19 22	19 26	19 30	19 34	19 41	19 49	19 54	19 58	20 04	20 10	20 18
21	19 19	19 21	19 24	19 32	19 37	19 43	19 52	20 04	20 09	20 16	20 24	20 32	20 43
29	19 17	19 21	19 27	19 37	19 44	19 53	20 04	20 19	20 27	20 35	20 45	20 56	21 10
Apr. 6	19 15	19 21	19 30	19 43	19 52	20 03	20 17	20 36	20 45	20 56	21 09	21 24	21 43

SUNRISE, 2027

LOCAL MEAN TIME OF SUNRISE (SUN'S UPPER LIMB) AND BEGINNING OF MORNING TWILIGHT ON THE MERIDIAN OF GREENWICH

To obtain the standard time at any station, add four minutes for each degree if the station is west of the standard meridian, or deduct four minutes for each degree if the station is east of the standard meridian. In India, to obtain I.S.T., add 4 x (82º.5 - λ) mins. or deduct 4 x (λ - 82º.5) mins. as the station is west or east of 82º.5 E. Longitude.

Date \ Lat.	0º	10º	20º	30º	35º	40º	45º	50º	52º	54º	56º	58º	60º
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Apr. 2	6 00	5 57	5 53	5 49	5 46	5 43	5 40	5 36	5 34	5 32	5 29	5 27	5 24
6	5 59	5 55	5 50	5 44	5 41	5 37	5 33	5 27	5 25	5 22	5 19	5 16	5 12
10	5 58	5 53	5 47	5 40	5 35	5 31	5 25	5 19	5 16	5 12	5 09	5 04	5 00
14	5 57	5 50	5 43	5 35	5 30	5 25	5 18	5 10	5 07	5 03	4 58	4 54	4 48
18	5 56	5 48	5 40	5 31	5 25	5 19	5 11	5 02	4 58	4 53	4 48	4 43	4 36
22	5 55	5 47	5 37	5 26	5 20	5 13	5 04	4 54	4 50	4 44	4 39	4 32	4 25
26	5 55	5 45	5 34	5 22	5 15	5 07	4 58	4 47	4 41	4 35	4 29	4 22	4 13
30	5 54	5 43	5 32	5 19	5 11	5 02	4 52	4 39	4 33	4 27	4 20	4 11	4 02
May 4	5 53	5 42	5 29	5 15	5 07	4 57	4 46	4 32	4 26	4 19	4 11	4 02	3 51
8	5 53	5 41	5 27	5 12	5 03	4 53	4 40	4 26	4 19	4 11	4 02	3 52	3 41
12	5 53	5 40	5 25	5 09	4 59	4 48	4 35	4 19	4 12	4 03	3 54	3 43	3 31
16	5 53	5 39	5 24	5 06	4 56	4 44	4 31	4 14	4 05	3 57	3 46	3 35	3 21
20	5 53	5 38	5 22	5 04	4 53	4 41	4 26	4 08	4 00	3 50	3 39	3 27	3 12
24	5 53	5 38	5 21	5 02	4 51	4 38	4 23	4 04	3 55	3 45	3 33	3 20	3 04
28	5 54	5 38	5 21	5 01	4 49	4 36	4 20	4 00	3 50	3 40	3 27	3 13	2 57
June 1	5 54	5 38	5 20	5 00	4 48	4 34	4 17	3 56	3 46	3 35	3 23	3 08	2 50
5	5 55	5 38	5 20	4 59	4 46	4 32	4 15	3 54	3 44	3 32	3 19	3 03	2 45
9	5 56	5 38	5 20	4 58	4 46	4 31	4 14	3 52	3 41	3 29	3 16	3 00	2 40
13	5 56	5 39	5 20	4 58	4 46	4 31	4 13	3 51	3 40	3 28	3 14	2 57	2 37
17	5 57	5 40	5 21	4 59	4 46	4 31	4 13	3 50	3 39	3 27	3 13	2 56	2 36
21	5 58	5 40	5 21	4 59	4 46	4 31	4 13	3 51	3 40	3 27	3 13	2 56	2 36
25	5 59	5 41	5 22	5 00	4 47	4 32	4 14	3 52	3 41	3 29	3 14	2 58	2 37
29	6 00	5 42	5 23	5 02	4 49	4 34	4 16	3 54	3 43	3 31	3 17	3 00	2 40
July 3	6 01	5 43	5 25	5 03	4 50	4 36	4 18	3 56	3 46	3 34	3 20	3 04	2 44

BEGINNING OF MORNING TWILIGHT

	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Apr. 6	4 50	4 44	4 36	4 23	4 14	4 03	3 49	3 31	3 22	3 11	2 59	2 44	2 26
14	4 48	4 39	4 28	4 12	4 02	3 48	3 32	3 09	2 58	2 44	2 28	2 08	1 41
22	4 45	4 35	4 21	4 02	3 49	3 34	3 14	2 46	2 32	2 14	1 52	1 21	0 09
30	4 43	4 30	4 14	3 52	3 38	3 19	2 56	2 22	2 04	1 40	1 05		
May 8	4 41	4 27	4 08	3 43	3 27	3 06	2 38	1 57	1 32	0 55			
16	4 40	4 24	4 03	3 36	3 17	2 54	2 22	1 30	0 52				
24	4 40	4 22	4 00	3 30	3 09	2 43	2 06	0 59					
June 1	4 40	4 21	3 57	3 25	3 03	2 35	1 54	0 09					
9	4 41	4 21	3 56	3 23	3 00	2 30	1 44						
17	4 42	4 22	3 57	3 22	2 59	2 28	1 40						
25	4 44	4 24	3 58	3 24	3 00	2 29	1 41						
July 3	4 46	4 26	4 01	3 27	3 04	2 34	1 48						
11	4 48	4 28	4 05	3 32	3 10	2 41	1 59						

SUNSET, 2027

LOCAL MEAN TIME OF SUNSET (SUN'S UPPER LIMB) AND ENDING OF EVENING TWILIGHT ON THE MERIDIAN OF GREENWICH

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Date \ Lat.	0º	10º	20º	30º	35º	40º	45º	50º	52º	54º	56º	58º	60º
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Apr. 2	18 07	18 11	18 14	18 19	18 22	18 25	18 28	18 33	18 35	18 37	18 39	18 42	18 45
6	18 06	18 10	18 16	18 21	18 25	18 29	18 33	18 39	18 41	18 44	18 47	18 51	18 55
10	18 05	18 10	18 17	18 24	18 28	18 33	18 38	18 45	18 48	18 52	18 56	19 00	19 05
14	18 04	18 10	18 18	18 26	18 31	18 37	18 44	18 51	18 55	18 59	19 04	19 09	19 14
18	18 03	18 11	18 19	18 29	18 34	18 41	18 49	18 58	19 02	19 07	19 12	19 18	19 24
22	18 02	18 11	18 20	18 31	18 38	18 45	18 54	19 04	19 09	19 14	19 20	19 27	19 34
26	18 01	18 11	18 22	18 34	18 41	18 49	18 59	19 10	19 16	19 22	19 28	19 36	19 44
30	18 01	18 11	18 23	18 36	18 44	18 53	19 04	19 16	19 22	19 29	19 36	19 45	19 54
May 4	18 00	18 12	18 24	18 39	18 47	18 57	19 09	19 22	19 29	19 36	19 44	19 54	20 04
8	18 00	18 12	18 26	18 42	18 51	19 01	19 13	19 29	19 36	19 43	19 52	20 02	20 14
12	18 00	18 13	18 28	18 44	18 54	19 05	19 18	19 34	19 42	19 51	20 00	20 11	20 24
16	18 00	18 14	18 29	18 47	18 57	19 09	19 23	19 40	19 48	19 57	20 08	20 19	20 33
20	18 00	18 15	18 31	18 49	19 00	19 13	19 27	19 46	19 54	20 04	20 15	20 27	20 42
24	18 00	18 16	18 32	18 52	19 03	19 16	19 32	19 51	20 00	20 10	20 22	20 35	20 51
28	18 01	18 17	18 34	18 54	19 06	19 19	19 35	19 56	20 05	20 16	20 28	20 42	20 59
June 1	18 01	18 18	18 36	18 56	19 08	19 22	19 39	20 00	20 10	20 21	20 34	20 49	21 07
5	18 02	18 19	18 37	18 58	19 11	19 25	19 42	20 04	20 14	20 26	20 39	20 55	21 13
9	18 03	18 20	18 39	19 00	19 13	19 28	19 45	20 07	20 18	20 29	20 43	20 59	21 19
13	18 04	18 21	18 40	19 02	19 15	19 30	19 47	20 10	20 20	20 33	20 47	21 03	21 23
17	18 05	18 22	18 41	19 03	19 16	19 31	19 49	20 12	20 22	20 35	20 49	21 06	21 26
21	18 05	18 23	18 42	19 04	19 17	19 32	19 50	20 13	20 24	20 36	20 50	21 07	21 28
25	18 06	18 24	18 43	19 05	19 18	19 33	19 51	20 13	20 24	20 36	20 51	21 07	21 28
29	18 07	18 24	18 43	19 05	19 18	19 33	19 51	20 13	20 24	20 36	20 50	21 06	21 26
July 3	18 08	18 25	18 44	19 05	19 18	19 33	19 50	20 12	20 22	20 34	20 48	21 04	21 24

END OF EVENING TWILIGHT

	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Apr. 6	19 15	19 21	19 30	19 43	19 52	20 03	20 17	20 36	20 45	20 56	21 09	21 24	21 43
14	19 13	19 22	19 33	19 49	20 00	20 13	20 31	20 54	21 05	21 19	21 36	21 57	22 26
22	19 12	19 23	19 37	19 56	20 09	20 25	20 45	21 13	21 28	21 46	22 09	22 42	
30	19 12	19 24	19 41	20 03	20 18	20 36	21 00	21 35	21 54	22 19	22 56		
May 8	19 12	19 27	19 45	20 10	20 27	20 48	21 16	21 59	22 24	23 06			
16	19 13	19 29	19 50	20 18	20 36	21 00	21 33	22 26	23 06				
24	19 14	19 32	19 54	20 25	20 45	21 11	21 49	22 58					
June 1	19 16	19 35	19 58	20 31	20 53	21 21	22 03						
9	19 18	19 37	20 02	20 36	20 59	21 29	22 15						
17	19 20	19 40	20 05	20 40	21 03	21 34	22 22						
25	19 21	19 42	20 07	20 41	21 05	21 36	22 24						
July 3	19 23	19 42	20 07	20 41	21 04	21 34	22 20						
11	19 23	19 42	20 06	20 39	21 00	21 29	22 11						

SUNRISE, 2027

LOCAL MEAN TIME OF SUNRISE (SUN'S UPPER LIMB) AND BEGINNING OF MORNING TWILIGHT ON THE MERIDIAN OF GREENWICH

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Date \ Lat.		0º	10º	20º	30º	35º	40º	45º	50º	52º	54º	56º	58º	60º
		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
July	3	6 01	5 43	5 25	5 03	4 50	4 36	4 18	3 56	3 46	3 34	3 20	3 04	2 44
	7	6 01	5 44	5 26	5 05	4 52	4 38	4 21	3 59	3 49	3 37	3 24	3 08	2 49
	11	6 02	5 45	5 28	5 07	4 55	4 41	4 24	4 03	3 53	3 42	3 29	3 14	2 56
	15	6 02	5 46	5 29	5 09	4 57	4 43	4 27	4 07	3 57	3 47	3 34	3 20	3 03
	19	6 03	5 47	5 31	5 11	5 00	4 47	4 31	4 12	4 02	3 52	3 40	3 27	3 11
	23	6 03	5 48	5 32	5 13	5 02	4 50	4 35	4 17	4 08	3 58	3 47	3 34	3 19
	27	6 03	5 49	5 34	5 16	5 05	4 53	4 39	4 22	4 13	4 04	3 54	3 42	3 28
	31	6 03	5 49	5 35	5 18	5 08	4 57	4 44	4 27	4 19	4 11	4 01	3 50	3 37
Aug.	4	6 03	5 50	5 36	5 21	5 11	5 01	4 48	4 33	4 26	4 18	4 09	3 58	3 47
	8	6 02	5 50	5 38	5 23	5 14	5 04	4 53	4 39	4 32	4 25	4 16	4 07	3 56
	12	6 02	5 51	5 39	5 25	5 17	5 08	4 58	4 45	4 38	4 32	4 24	4 16	4 06
	16	6 01	5 51	5 40	5 28	5 20	5 12	5 02	4 50	4 45	4 39	4 32	4 24	4 15
	20	6 00	5 51	5 41	5 30	5 23	5 16	5 07	4 56	4 51	4 46	4 40	4 33	4 25
	24	5 59	5 51	5 42	5 32	5 26	5 20	5 12	5 02	4 58	4 53	4 48	4 42	4 35
	28	5 58	5 51	5 43	5 35	5 29	5 23	5 17	5 08	5 04	5 00	4 55	4 50	4 44
Sept.	1	5 57	5 51	5 44	5 37	5 32	5 27	5 21	5 14	5 11	5 07	5 03	4 59	4 54
	5	5 56	5 51	5 45	5 39	5 35	5 31	5 26	5 20	5 17	5 14	5 11	5 07	5 03
	9	5 54	5 50	5 46	5 41	5 38	5 35	5 31	5 26	5 24	5 22	5 19	5 16	5 13
	13	5 53	5 50	5 47	5 43	5 41	5 39	5 36	5 32	5 30	5 29	5 27	5 24	5 22
	17	5 51	5 50	5 48	5 45	5 44	5 42	5 40	5 38	5 37	5 36	5 34	5 33	5 31
	21	5 50	5 49	5 49	5 47	5 47	5 46	5 45	5 44	5 43	5 43	5 42	5 41	5 41
	25	5 49	5 49	5 49	5 50	5 50	5 50	5 50	5 50	5 50	5 50	5 50	5 50	5 50
	29	5 47	5 49	5 50	5 52	5 53	5 54	5 55	5 56	5 57	5 57	5 58	5 59	5 59
Oct.	3	5 46	5 49	5 51	5 54	5 56	5 58	6 00	6 02	6 03	6 05	6 06	6 07	6 09

BEGINNING OF MORNING TWILIGHT

		h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
July	3	4 46	4 26	4 01	3 27	3 04	2 34	1 48						
	11	4 48	4 28	4 05	3 32	3 10	2 41	1 59						
	19	4 49	4 31	4 09	3 38	3 17	2 51	2 13	1 02					
	27	4 50	4 34	4 13	3 45	3 26	3 02	2 29	1 34	0 51				
Aug.	4	4 51	4 36	4 17	3 52	3 35	3 13	2 45	2 01	1 34	0 49			
	12	4 51	4 38	4 21	3 58	3 43	3 25	3 00	2 25	2 05	1 39	0 58		
	20	4 50	4 39	4 25	4 05	3 52	3 36	3 15	2 46	2 31	2 12	1 48	1 11	
	28	4 48	4 40	4 28	4 11	4 00	3 46	3 29	3 05	2 53	2 39	2 21	1 59	1 28
Sept.	5	4 46	4 40	4 31	4 17	4 08	3 57	3 42	3 23	3 13	3 02	2 48	2 32	2 12
	13	4 44	4 40	4 33	4 22	4 15	4 06	3 54	3 39	3 31	3 22	3 12	3 00	2 45
	21	4 41	4 40	4 35	4 28	4 22	4 15	4 06	3 54	3 47	3 41	3 33	3 23	3 12
	29	4 39	4 39	4 37	4 32	4 29	4 23	4 17	4 07	4 03	3 58	3 52	3 45	3 37
Oct.	7	4 36	4 39	4 39	4 37	4 35	4 32	4 27	4 21	4 17	4 14	4 09	4 04	3 59

SUNSET, 2027

LOCAL MEAN TIME OF SUNSET (SUN'S UPPER LIMB) AND ENDING OF EVENING TWILIGHT ON THE MERIDIAN OF GREENWICH

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Date \ Lat.	0º	10º	20º	30º	35º	40º	45º	50º	52º	54º	56º	58º	60º
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
July 3	18 08	18 25	18 44	19 05	19 18	19 33	19 50	20 12	20 22	20 34	20 48	21 04	21 24
7	18 09	18 25	18 44	19 05	19 17	19 32	19 49	20 10	20 20	20 32	20 45	21 01	21 20
11	18 09	18 26	18 43	19 04	19 16	19 30	19 47	20 08	20 17	20 29	20 42	20 56	21 14
15	18 10	18 26	18 43	19 03	19 15	19 28	19 44	20 04	20 14	20 25	20 37	20 51	21 08
19	18 10	18 25	18 42	19 01	19 13	19 26	19 41	20 00	20 09	20 20	20 31	20 45	21 01
23	18 10	18 25	18 41	18 59	19 10	19 23	19 37	19 56	20 04	20 14	20 25	20 38	20 52
27	18 10	18 24	18 39	18 57	19 07	19 19	19 33	19 51	19 59	20 08	20 18	20 30	20 44
31	18 10	18 23	18 38	18 54	19 04	19 15	19 29	19 45	19 52	20 01	20 10	20 21	20 34
Aug. 4	18 10	18 22	18 36	18 51	19 01	19 11	19 23	19 39	19 46	19 54	20 02	20 12	20 24
8	18 09	18 21	18 34	18 48	18 57	19 06	19 18	19 32	19 38	19 46	19 54	20 03	20 14
12	18 09	18 19	18 31	18 45	18 52	19 01	19 12	19 25	19 31	19 37	19 45	19 53	20 03
16	18 08	18 18	18 28	18 41	18 48	18 56	19 06	19 17	19 23	19 29	19 36	19 43	19 52
20	18 07	18 16	18 25	18 37	18 43	18 51	18 59	19 10	19 15	19 20	19 26	19 33	19 40
24	18 06	18 14	18 22	18 32	18 38	18 45	18 52	19 02	19 06	19 11	19 16	19 22	19 29
28	18 05	18 12	18 19	18 28	18 33	18 39	18 45	18 54	18 57	19 01	19 06	19 11	19 17
Sept. 1	18 03	18 09	18 16	18 23	18 27	18 32	18 38	18 45	18 48	18 52	18 56	19 00	19 05
5	18 02	18 07	18 12	18 18	18 22	18 26	18 31	18 37	18 39	18 42	18 45	18 49	18 53
9	18 01	18 05	18 09	18 13	18 16	18 20	18 23	18 28	18 30	18 32	18 35	18 38	18 41
13	17 59	18 02	18 05	18 09	18 11	18 13	18 16	18 19	18 21	18 22	18 24	18 26	18 29
17	17 58	18 00	18 01	18 04	18 05	18 06	18 08	18 10	18 11	18 12	18 14	18 15	18 17
21	17 56	17 57	17 58	17 59	17 59	18 00	18 01	18 02	18 02	18 02	18 03	18 04	18 04
25	17 55	17 54	17 54	17 54	17 53	17 53	17 53	17 53	17 53	17 53	17 52	17 52	17 52
29	17 54	17 52	17 50	17 49	17 48	17 47	17 45	17 44	17 43	17 43	17 42	17 41	17 40
Oct. 3	17 52	17 50	17 47	17 44	17 42	17 40	17 38	17 35	17 34	17 33	17 31	17 30	17 28

END OF EVENING TWILIGHT

	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
July 3	19 23	19 42	20 07	20 41	21 04	21 34	22 20						
11	19 23	19 42	20 06	20 39	21 00	21 29	22 11						
19	19 24	19 41	20 04	20 34	20 54	21 21	21 58	23 07					
27	19 23	19 39	20 00	20 28	20 47	21 10	21 43	22 36	23 16				
Aug. 4	19 22	19 36	19 55	20 20	20 37	20 58	21 26	22 09	22 34	23 15			
12	19 20	19 32	19 49	20 11	20 26	20 45	21 09	21 43	22 02	22 27	23 05		
20	19 17	19 28	19 42	20 01	20 14	20 30	20 51	21 19	21 34	21 52	22 15	22 49	
28	19 14	19 23	19 34	19 51	20 02	20 15	20 33	20 56	21 08	21 21	21 38	22 00	22 29
Sept. 5	19 11	19 17	19 27	19 40	19 49	20 00	20 14	20 33	20 43	20 54	21 07	21 22	21 42
13	19 08	19 12	19 19	19 29	19 36	19 45	19 57	20 12	20 20	20 28	20 38	20 50	21 04
21	19 05	19 07	19 11	19 18	19 24	19 31	19 40	19 52	19 57	20 04	20 12	20 21	20 31
29	19 02	19 02	19 03	19 08	19 12	19 17	19 23	19 32	19 37	19 42	19 48	19 54	20 02
Oct. 7	19 00	18 57	18 57	18 58	19 00	19 03	19 08	19 14	19 17	19 21	19 25	19 30	19 35

SUNRISE, 2027

LOCAL MEAN TIME OF SUNRISE (SUN'S UPPER LIMB) AND BEGINNING OF MORNING TWILIGHT ON THE MERIDIAN OF GREENWICH

To obtain the standard time at any station, add four minutes for each degree if the station is west of the standard meridian, or deduct four minutes for each degree if the station is east of the standard meridian. In India, to obtain I.S.T., add 4 x (82º.5 - λ) mins. or deduct 4 x (λ - 82º.5) mins. as the station is west or east of 82º.5 E. Longitude.

Date \ Lat.	0º	10º	20º	30º	35º	40º	45º	50º	52º	54º	56º	58º	60º
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Oct. 3	5 46	5 49	5 51	5 54	5 56	5 58	6 00	6 02	6 03	6 05	6 06	6 07	6 09
7	5 45	5 48	5 52	5 57	5 59	6 02	6 05	6 08	6 10	6 12	6 14	6 16	6 19
11	5 44	5 48	5 53	5 59	6 02	6 06	6 10	6 15	6 17	6 19	6 22	6 25	6 28
15	5 43	5 48	5 55	6 02	6 05	6 10	6 15	6 21	6 24	6 27	6 30	6 34	6 38
19	5 42	5 49	5 56	6 04	6 09	6 14	6 20	6 27	6 31	6 34	6 38	6 43	6 48
23	5 41	5 49	5 57	6 07	6 12	6 18	6 25	6 34	6 38	6 42	6 47	6 52	6 58
27	5 41	5 50	5 59	6 10	6 16	6 23	6 31	6 40	6 45	6 50	6 55	7 01	7 08
31	5 40	5 50	6 01	6 13	6 20	6 27	6 36	6 47	6 52	6 58	7 04	7 11	7 18
Nov. 4	5 40	5 51	6 03	6 16	6 23	6 32	6 42	6 54	6 59	7 05	7 12	7 20	7 29
8	5 40	5 52	6 05	6 19	6 27	6 36	6 47	7 00	7 06	7 13	7 21	7 29	7 39
12	5 41	5 53	6 07	6 22	6 31	6 41	6 53	7 07	7 14	7 21	7 29	7 38	7 49
16	5 41	5 55	6 09	6 25	6 35	6 46	6 58	7 13	7 21	7 29	7 37	7 48	7 59
20	5 42	5 56	6 11	6 29	6 39	6 50	7 04	7 20	7 27	7 36	7 46	7 56	8 09
24	5 43	5 58	6 14	6 32	6 43	6 55	7 09	7 26	7 34	7 43	7 53	8 05	8 18
28	5 44	6 00	6 16	6 35	6 46	6 59	7 14	7 32	7 40	7 50	8 01	8 13	8 28
Dec. 2	5 46	6 02	6 19	6 39	6 50	7 03	7 18	7 37	7 46	7 56	8 08	8 21	8 36
6	5 47	6 04	6 21	6 42	6 53	7 07	7 23	7 42	7 52	8 02	8 14	8 27	8 43
10	5 49	6 06	6 24	6 45	6 57	7 10	7 27	7 47	7 56	8 07	8 19	8 33	8 50
14	5 51	6 08	6 26	6 47	6 59	7 13	7 30	7 51	8 00	8 11	8 24	8 38	8 55
18	5 53	6 10	6 29	6 50	7 02	7 16	7 33	7 54	8 04	8 15	8 27	8 42	8 59
22	5 55	6 12	6 31	6 52	7 04	7 18	7 35	7 56	8 06	8 17	8 30	8 45	9 02
26	5 57	6 14	6 32	6 54	7 06	7 20	7 37	7 58	8 08	8 19	8 31	8 46	9 03
30	5 59	6 16	6 34	6 55	7 07	7 21	7 38	7 58	8 08	8 19	8 32	8 46	9 03
34	6 00	6 17	6 36	6 56	7 08	7 22	7 38	7 58	8 08	8 19	8 31	8 45	9 01

BEGINNING OF MORNING TWILIGHT

	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Oct. 7	4 36	4 39	4 39	4 37	4 35	4 32	4 27	4 21	4 17	4 14	4 09	4 04	3 59
15	4 33	4 38	4 41	4 42	4 41	4 40	4 37	4 33	4 31	4 29	4 26	4 23	4 19
23	4 31	4 38	4 43	4 47	4 48	4 48	4 47	4 46	4 45	4 44	4 42	4 40	4 38
31	4 29	4 39	4 46	4 52	4 54	4 56	4 57	4 58	4 58	4 58	4 57	4 57	4 56
Nov. 8	4 29	4 40	4 49	4 57	5 01	5 04	5 07	5 09	5 10	5 11	5 12	5 12	5 13
16	4 29	4 42	4 53	5 03	5 07	5 12	5 16	5 20	5 22	5 24	5 25	5 27	5 29
24	4 29	4 44	4 57	5 08	5 14	5 19	5 25	5 31	5 33	5 36	5 38	5 41	5 43
Dec. 2	4 31	4 47	5 01	5 14	5 20	5 27	5 33	5 40	5 43	5 46	5 49	5 52	5 56
10	4 34	4 51	5 05	5 19	5 26	5 33	5 40	5 48	5 51	5 55	5 58	6 02	6 06
18	4 38	4 55	5 10	5 24	5 31	5 39	5 46	5 54	5 58	6 01	6 05	6 09	6 13
26	4 41	4 59	5 14	5 28	5 35	5 43	5 50	5 58	6 02	6 05	6 09	6 13	6 17
34	4 46	5 02	5 17	5 31	5 38	5 45	5 52	6 00	6 03	6 06	6 10	6 14	6 18
42	4 50	5 06	5 19	5 32	5 39	5 45	5 52	5 59	6 02	6 05	6 08	6 11	6 14

SUNSET, 2027

LOCAL MEAN TIME OF SUNSET (SUN'S UPPER LIMB) AND ENDING OF EVENING TWILIGHT ON THE MERIDIAN OF GREENWICH

To obtain the standard time at any station, add four minutes for each degree if the station is west of the standard meridian, or deduct four minutes for each degree if the station is east of the standard meridian. In India, to obtain I.S.T., add 4 x (82º.5 - λ) mins. or deduct 4 x (λ - 82º.5) mins. as the station is west or east of 82º.5 E. Longitude**.**

Date \ Lat.	0º	10º	20º	30º	35º	40º	45º	50º	52º	54º	56º	58º	60º
	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Oct. 3	17 52	17 50	17 47	17 44	17 42	17 40	17 38	17 35	17 34	17 33	17 31	17 30	17 28
7	17 51	17 47	17 43	17 39	17 36	17 34	17 30	17 27	17 25	17 23	17 21	17 19	17 16
11	17 50	17 45	17 40	17 34	17 31	17 27	17 23	17 18	17 16	17 13	17 11	17 08	17 04
15	17 49	17 43	17 37	17 30	17 26	17 21	17 16	17 10	17 07	17 04	17 01	16 57	16 53
19	17 48	17 41	17 34	17 26	17 21	17 15	17 09	17 02	16 59	16 55	16 51	16 46	16 41
23	17 48	17 40	17 31	17 22	17 16	17 10	17 03	16 54	16 50	16 46	16 41	16 36	16 30
27	17 47	17 38	17 29	17 18	17 12	17 04	16 56	16 47	16 42	16 37	16 32	16 26	16 19
31	17 47	17 37	17 26	17 14	17 07	16 59	16 50	16 39	16 34	16 29	16 23	16 16	16 08
Nov. 4	17 47	17 36	17 24	17 11	17 03	16 55	16 45	16 33	16 27	16 21	16 14	16 06	15 58
8	17 47	17 35	17 23	17 08	17 00	16 51	16 40	16 26	16 20	16 13	16 06	15 57	15 48
12	17 48	17 35	17 21	17 06	16 57	16 47	16 35	16 21	16 14	16 07	15 58	15 49	15 38
16	17 48	17 35	17 20	17 04	16 54	16 43	16 31	16 15	16 08	16 00	15 51	15 41	15 29
20	17 49	17 35	17 19	17 02	16 52	16 40	16 27	16 11	16 03	15 54	15 45	15 34	15 21
24	17 50	17 35	17 19	17 01	16 50	16 38	16 24	16 07	15 59	15 49	15 39	15 28	15 14
28	17 51	17 36	17 19	17 00	16 49	16 36	16 22	16 03	15 55	15 45	15 34	15 22	15 08
Dec. 2	17 53	17 37	17 19	17 00	16 48	16 35	16 20	16 01	15 52	15 42	15 30	15 17	15 02
6	17 55	17 38	17 20	17 00	16 48	16 35	16 19	15 59	15 50	15 39	15 28	15 14	14 58
10	17 56	17 39	17 21	17 00	16 48	16 35	16 18	15 58	15 49	15 38	15 26	15 12	14 55
14	17 58	17 41	17 23	17 01	16 49	16 35	16 19	15 58	15 48	15 37	15 25	15 10	14 53
18	18 00	17 43	17 24	17 03	16 51	16 36	16 20	15 59	15 49	15 38	15 25	15 11	14 53
22	18 02	17 45	17 26	17 05	16 52	16 38	16 21	16 01	15 51	15 40	15 27	15 12	14 54
26	18 04	17 47	17 28	17 07	16 55	16 40	16 24	16 03	15 53	15 42	15 29	15 15	14 57
30	18 06	17 49	17 30	17 09	16 57	16 43	16 27	16 06	15 57	15 46	15 33	15 19	15 02
34	18 08	17 51	17 33	17 12	17 00	16 47	16 30	16 10	16 01	15 50	15 38	15 24	15 07

END OF EVENING TWILIGHT

	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
Oct. 7	19 00	18 57	18 57	18 58	19 00	19 03	19 08	19 14	19 17	19 21	19 25	19 30	19 35
15	18 59	18 53	18 50	18 49	18 50	18 51	18 54	18 57	18 59	19 02	19 04	19 07	19 11
23	18 58	18 50	18 45	18 42	18 41	18 40	18 41	18 42	18 43	18 44	18 46	18 47	18 49
31	18 58	18 48	18 41	18 35	18 33	18 31	18 29	18 29	18 29	18 29	18 29	18 29	18 30
Nov. 8	18 59	18 48	18 38	18 30	18 26	18 23	18 20	18 17	18 16	18 16	18 15	18 14	18 13
16	19 01	18 48	18 36	18 26	18 22	18 17	18 13	18 08	18 07	18 05	18 03	18 01	18 00
24	19 04	18 49	18 36	18 24	18 19	18 13	18 08	18 02	17 59	17 57	17 54	17 52	17 49
Dec. 2	19 07	18 51	18 37	18 24	18 18	18 11	18 05	17 58	17 55	17 52	17 49	17 46	17 42
10	19 11	18 54	18 40	18 26	18 19	18 12	18 05	17 57	17 54	17 50	17 47	17 43	17 39
18	19 15	18 58	18 43	18 28	18 21	18 14	18 06	17 58	17 55	17 51	17 48	17 43	17 39
26	19 19	19 02	18 47	18 32	18 25	18 18	18 11	18 02	17 59	17 55	17 52	17 48	17 43
34	19 23	19 06	18 51	18 37	18 31	18 24	18 16	18 09	18 06	18 02	17 59	17 55	17 51
42	19 26	19 10	18 56	18 43	18 37	18 30	18 24	18 17	18 14	18 11	18 08	18 05	18 01

DURATION OF TWILIGHT, 2027

MORNING AND EVENING TWILIGHT: CIVIL (6º), NAUTICAL (12º) AND ASTRONOMICAL (18º)

Date	Lat.	0º Civ.	0º Nt.	0º Ast.	10º Civ.	10º Nt.	10º Ast.	20º Civ.	20º Nt.	20º Ast.	30º Civ.	30º Nt.	30º Ast.	40º Civ.	40º Nt.	40º Ast.
		m	m	m	m	m	m	m	m	m	m	m	m	m	m	m
Jan.	0	23	49	75	23	49	75	24	51	79	26	56	85	30	64	97
	8	22	48	74	23	49	75	24	51	78	26	56	85	30	64	96
	16	22	48	74	22	48	74	24	51	77	26	55	84	30	63	95
	24	22	47	73	22	48	73	23	50	76	25	54	83	29	62	94
Feb.	1	22	47	72	22	47	73	23	49	76	25	54	82	29	61	93
	9	21	46	71	22	47	72	23	49	75	25	53	81	28	60	92
	17	21	46	70	21	46	71	22	48	74	24	52	80	28	59	91
	25	21	45	70	21	46	70	22	48	74	24	52	80	27	59	90
Mar.	5	21	45	69	21	46	70	22	48	73	24	52	79	27	59	90
	13	21	45	69	21	45	70	22	48	73	24	52	80	27	58	90
	21	21	45	69	21	45	70	22	48	73	24	52	80	27	59	91
	29	21	45	69	21	46	70	22	48	74	24	52	81	27	59	92
Apr.	6	21	45	69	21	46	71	22	48	75	24	53	82	28	61	95
	14	21	45	70	21	46	71	23	49	76	25	54	83	28	62	97
	22	21	46	70	22	47	72	23	50	77	25	55	85	29	63	100
	30	21	46	71	22	47	73	23	50	77	25	55	87	29	65	103
May	8	22	47	72	22	48	74	23	51	79	26	57	89	30	67	108
	16	22	47	73	22	49	75	24	52	81	26	58	91	31	69	112
	24	22	48	74	23	49	76	24	53	82	27	59	93	32	71	116
June	1	22	48	74	23	50	77	24	53	83	27	60	95	32	73	119
	9	23	49	75	23	50	77	25	54	84	27	61	96	33	74	122
	17	23	49	75	23	50	78	25	54	84	28	61	97	33	75	123
	25	23	49	75	23	50	78	25	54	84	27	61	97	33	75	123
July	3	23	49	75	23	50	77	24	54	84	27	60	96	33	74	122
	11	22	48	74	23	50	77	24	53	83	27	60	95	32	73	119
	19	22	48	74	23	49	76	24	53	82	27	59	93	32	71	115
	27	22	47	73	22	49	75	24	52	80	26	58	91	31	69	111
Aug.	4	22	47	72	22	48	74	23	51	79	26	56	88	30	67	106
	12	21	46	71	22	47	73	23	50	78	25	55	86	29	65	103
	20	21	46	70	22	47	72	23	49	76	25	54	85	29	63	99
	28	21	45	70	21	46	71	22	49	75	25	53	83	28	61	96
Sept.	5	21	45	69	21	46	71	22	48	74	24	53	82	28	60	94
	13	21	45	69	21	46	70	22	48	74	24	52	81	27	59	92
	21	21	45	69	21	45	70	22	48	73	24	52	80	27	59	91
	29	21	45	69	21	45	70	22	48	73	24	52	79	27	58	90
Oct.	7	21	45	69	21	46	70	22	48	73	24	52	79	27	58	90
	15	21	45	70	21	46	70	22	48	74	24	52	80	27	59	90
	23	21	46	70	21	46	71	22	48	74	24	52	80	28	59	91
	31	21	46	71	22	47	72	23	49	75	25	53	81	28	60	92
Nov.	8	22	47	72	22	47	73	23	49	76	25	54	82	29	61	93
	16	22	47	73	22	48	73	23	50	76	25	54	83	29	62	94
	24	22	48	74	22	48	74	24	51	77	26	55	84	30	63	95
Dec.	2	22	48	74	23	49	75	24	51	78	26	56	85	30	64	96
	10	23	49	75	23	49	75	24	51	78	26	56	85	30	64	97
	18	23	49	75	23	49	75	24	52	79	26	56	86	31	65	98
	26	23	49	75	23	49	75	24	52	79	26	56	85	31	65	98
	34	23	49	75	23	49	75	24	51	78	26	56	85	30	64	97

DURATION OF TWILIGHT, 2027

MORNING AND EVENING TWILIGHT: CIVIL (6º), NAUTICAL (12º) AND ASTRONOMICAL (18º)

Date	Lat.	45º Civ.	45º Nt.	45º Ast.	50º Civ.	50º Nt.	50º Ast.	55º Civ.	55º Nt.	55º Ast.	60º Civ.	60º Nt.	60º Ast.
		m	m	m	m	m	m	m	m	m	m	m	m
Jan.	0	34	71	106	38	80	119	45	93	137	57	113	165
	8	33	70	105	38	78	117	44	91	135	55	111	161
	16	33	69	104	37	77	116	43	88	132	52	106	156
	24	32	68	102	36	75	113	41	86	129	50	102	151
Feb.	1	31	67	101	35	74	112	40	84	126	48	98	147
	9	31	65	100	34	72	110	39	82	124	45	95	143
	17	30	64	98	33	71	108	38	80	122	44	92	140
	25	30	64	98	33	70	108	37	79	121	42	91	139
Mar.	5	29	63	98	32	70	108	36	78	121	42	90	140
	13	29	64	98	32	70	108	36	79	121	42	90	142
	21	29	64	99	32	71	110	36	80	125	42	92	147
	29	30	65	101	33	72	113	37	81	130	43	95	155
Apr.	6	30	66	104	33	74	117	38	85	137	44	100	169
	14	31	68	108	34	77	123	39	89	147	46	107	193
	22	32	70	112	35	80	130	41	94	161	50	119	**
	30	32	72	117	36	83	139	43	100	184	53	135	**
May	8	33	76	123	38	88	151	46	110	**	59	169	**
	16	35	79	130	40	93	167	49	121	**	65	**	**
	24	36	82	137	42	99	188	52	136	**	74	**	**
June	1	36	84	144	43	104	**	54	156	**	85	**	**
	9	37	86	150	44	108	**	57	194	**	96	**	**
	17	37	87	153	45	110	**	58	**	**	106	**	**
	25	37	87	153	45	110	**	58	**	**	105	**	**
July	3	37	86	150	44	107	**	57	187	**	95	**	**
	11	36	84	144	43	103	**	54	154	**	83	**	**
	19	35	81	137	41	98	186	51	134	**	73	**	**
	27	34	78	129	40	93	165	48	120	**	64	**	**
Aug.	4	33	75	123	38	87	149	45	109	**	58	165	**
	12	32	72	116	36	82	138	42	100	182	53	134	**
	20	31	69	111	35	79	129	41	93	160	49	118	**
	28	31	67	107	34	76	122	39	88	146	46	107	192
Sept.	5	30	66	104	33	74	117	38	84	136	44	100	168
	13	30	65	101	33	72	113	37	81	130	43	95	155
	21	29	64	99	32	71	110	36	79	125	42	92	147
	29	29	63	98	32	70	108	36	78	122	41	90	142
Oct.	7	29	63	97	32	70	107	36	78	121	42	90	139
	15	30	64	98	33	70	107	37	78	121	42	90	139
	23	30	64	98	33	71	108	37	80	121	43	92	140
	31	31	65	99	34	72	109	38	81	123	45	94	142
Nov.	8	31	66	101	35	74	111	40	84	126	47	98	146
	16	32	68	102	36	75	113	41	86	129	50	102	151
	24	33	69	104	37	77	116	43	88	132	52	106	156
Dec.	2	33	70	105	38	78	117	44	91	135	55	110	161
	10	34	71	106	38	80	119	45	92	137	57	113	164
	18	34	71	107	39	80	120	46	93	138	58	115	166
	26	34	71	107	38	80	119	46	93	138	58	114	166
	34	34	71	106	38	79	119	45	92	136	56	112	163

SUNRISE, SUNSET AND TWILIGHT, 2027
CORRECTION FOR SOUTHERN LATITUDES

For	Use	Add	For	Use	Add	For	Use	Add	For	Use	Add	For	Use	Add
July	Dec.	m	Aug.	Feb.	m	Sept.	Mar.	m	Oct.	Apr.	m	Nov.	May	m
1	31	+1	7	3	-8	12	10	-14	19	16	-15	26	25	-10
July	Jan.		8	4	8	13	11	14	20	17	15	27	26	9
2	0	+1	9	5	9	14	12	14	21	18	15	28	27	9
3	1	0	10	6	9	15	13	14	22	19	15	29	28	9
4	2	0	11	7	9	16	14	14	23	20	15	30	29	9
5	3	0	12	8	9	17	15	15	24	21	14	Dec.	May	
6	4	-1	13	9	9	18	16	15	25	22	14	1	30	8
7	5	1	14	10	10	19	17	15	26	23	14	2	31	8
8	6	1	15	11	10	20	18	15	27	24	14	Dec.	June	
9	7	1	16	12	10	21	19	15	28	25	14	3	1	8
10	8	2	17	13	10	22	20	15	29	26	14	4	2	8
11	9	2	18	14	10	23	21	15	30	27	14	5	3	7
12	10	2	19	15	11	24	22	15	31	28	14	6	5	7
13	11	2	20	16	11	25	23	15	Nov.	Apr.		7	6	7
14	12	3	21	17	11	26	24	15	1	29	14	8	7	7
15	13	3	22	18	11	27	25	15	2	30	14	9	8	6
16	14	3	23	19	11	28	26	15	Nov.	May		10	9	6
17	15	3	24	19	12	29	26	15	3	1	13	11	10	6
18	16	3	25	20	12	30	27	15	4	2	13	12	11	6
19	16	4	26	21	12	Oct.	Mar.		5	3	13	13	12	5
20	17	4	27	22	12	1	28	15	6	4	13	14	13	5
21	18	4	28	23	12	2	29	15	7	5	13	15	14	5
22	19	4	29	24	12	3	30	15	8	6	13	16	15	5
23	20	5	30	25	13	4	31	15	9	7	13	17	16	4
24	21	5	31	26	13	Oct.	Apr.		10	8	12	18	17	4
25	22	5	Sept.	Feb.		5	1	16	11	9	12	19	18	4
26	23	6	1	27	13	6	2	16	12	10	12	20	19	4
27	24	6	2	28	13	7	3	16	13	11	12	21	21	3
28	25	6				8	4	15	14	12	12	22	22	3
29	26	6	Sept.	Mar.		9	5	15	15	13	12	23	23	3
30	27	7	3	1	13	10	6	15	16	14	12	24	24	3
31	28	7	4	2	13	11	7	15	17	15	11	25	25	2
Aug.	Jan.		5	3	13	12	9	15	18	17	11	26	26	2
1	29	7	6	4	14	13	10	15	19	18	11	27	27	2
2	30	7	7	5	14	14	11	15	20	19	11	28	28	2
3	30	7	8	6	14	15	12	15	21	20	11	29	29	1
4	31	8	9	7	14	16	13	15	22	21	10	30	30	1
Aug.	Feb.		10	8	14	17	14	15	23	22	10	Dec.	July	
5	1	8	11	9	14	18	15	15	24	23	10	31	1	-1
6	2	-8	12	10	-14	19	16	-15	25	24	-10	32	2	0

To obtain the times of sunrise, sunset and twilight for southern latitudes for any date, use the tables for the same northern latitude for the corresponding date given above, and apply to the times so obtained the correction given in the column headed 'Add'.

In the case of duration of twilight, however, take only the figures for the corresponding date without correction.

SUNRISE, SUNSET AND TWILIGHT, 2027
CORRECTION FOR SOUTHERN LATITUDES

For	Use	Add	For	Use	Add	For	Use	Add	For	Use	Add	For	Use	Add
Jan.	July	m	Feb.	Aug.	m	Mar.	Sept.	m	Apr.	Oct.	m	May	Nov.	m
0	1	0	5	9	+9	13	15	+14	19	22	+15	25	26	+10
1	3	0	6	10	9	14	16	14	20	23	15	26	27	9
2	4	0	7	11	9	15	17	14	21	24	14	27	28	9
			8	12	9	16	18	15	22	25	14	28	29	9
3	5	0	9	13	9	17	19	15	23	26	14	29	30	9
4	6	+1	10	14	10	18	20	15	24	27	14	May	Dec.	
5	7	1	11	15	10	19	21	15	25	28	14	30	1	8
6	8	1	12	16	10	20	22	15	26	29	14	31	2	8
7	9	1	13	17	10	21	23	15	27	30	14	June	Dec.	
8	10	2	14	18	10	22	24	15	28	31	14	1	3	8
9	11	2	15	19	11	23	25	15	Apr.	Nov.		2	4	8
10	12	2	16	20	11	24	26	15	29	1	14	3	5	7
11	13	2	17	21	11	25	27	15	30	2	14	4	5	7
12	14	3	18	22	11	26	29	15	May	Nov.		5	6	7
13	15	3	19	23	11	27	30	15	1	3	13	6	7	7
14	16	3	20	25	12	Mar.	Oct.		2	4	13	7	8	7
15	17	3	21	26	12	28	1	15	3	5	13	8	9	6
16	18	4	22	27	12	29	2	15	4	6	13	9	10	6
17	19	4	23	28	12	30	3	15	5	7	13	10	11	6
18	21	4	24	29	12	31	4	16	6	8	13	11	12	6
19	22	5	25	30	13	Apr.	Oct.		7	9	13	12	13	5
20	23	5	26	31	13	1	5	16	8	10	12	13	14	5
21	24	5				2	6	16	9	11	12	14	15	5
22	25	5	Feb.	Sept.		3	7	16	10	12	12	15	16	5
23	26	6	27	1	13	4	7	15	11	13	12	16	17	4
24	27	6	28	2	13	5	8	15	12	14	12	17	18	4
25	28	6	Mar.	Sept.		6	9	15	13	15	12	18	19	4
26	29	6	1	3	13	7	10	15	14	16	12	19	20	4
27	30	7	2	4	13	8	11	15	15	16	11	20	21	3
28	31	7	3	5	13	9	12	15	16	17	11	21	21	3
Jan.	Aug.		4	6	14	10	13	15	17	18	11	22	22	3
29	1	7	5	7	14	11	14	15	18	19	11	23	23	3
30	2	7	6	8	14	12	15	15	19	20	11	24	24	3
31	3	7	7	9	14	13	16	15	20	21	11	25	25	2
Feb.	Aug.		8	10	14	14	17	15	21	22	10	26	26	2
1	5	8	9	11	14	15	18	15	22	23	10	27	27	2
2	6	8	10	12	14	16	19	15	23	24	10	28	28	1
3	7	8	11	13	14	17	20	15	24	25	10	29	29	1
4	8	+9	12	14	+14	18	21	+15	25	26	+10	30	30	+1

To obtain the times of sunrise, sunset and twilight for southern latitudes for any date, use the tables for the same northern latitude for the corresponding date given above, and apply to the times so obtained the correction given in the column headed 'Add'.

In the case of duration of twilight, however, take only the figures for the corresponding date without correction.

SUNRISE AND SUNSET, 2027

INDIAN STANDARD TIME OF SUNRISE AND SUNSET (SUN'S UPPER LIMB)
FOR CERTAIN STATIONS IN INDIA

Date		Kolkata 22° N 32'				Varanasi 25° N 18'				Chennai 13° N 00'				Delhi 28° N 35'				Mumbai 18° N 54'			
		Rise		Set		Rise		Set		Rise		Set		Rise		Set		Rise		Set	
		h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m
Jan.	0	6	16.3	17	02.7	6	43.3	17	18.5	6	30.8	17	53.0	7	14.0	17	34.5	7	11.7	18	11.5
	2	6	16.9	17	04.0	6	43.9	17	19.8	6	31.6	17	54.1	7	14.6	17	35.9	7	12.4	18	12.7
	4	6	17.5	17	05.3	6	44.4	17	21.2	6	32.3	17	55.2	7	15.0	17	37.3	7	13.0	18	13.9
	6	6	17.9	17	06.7	6	44.8	17	22.6	6	33.0	17	56.3	7	15.3	17	38.8	7	13.6	18	15.1
	8	6	18.3	17	08.0	6	45.1	17	24.0	6	33.6	17	57.4	7	15.6	17	40.3	7	14.1	18	16.4
	10	6	18.6	17	09.4	6	45.4	17	25.5	6	34.1	17	58.5	7	15.7	17	41.9	7	14.4	18	17.7
	12	6	18.8	17	10.8	6	45.5	17	26.9	6	34.6	17	59.6	7	15.7	17	43.5	7	14.8	18	18.9
	14	6	19.0	17	12.2	6	45.5	17	28.5	6	35.0	18	00.7	7	15.6	17	45.1	7	15.0	18	20.2
	16	6	19.0	17	13.7	6	45.4	17	30.0	6	35.3	18	01.8	7	15.4	17	46.7	7	15.1	18	21.5
	18	6	18.9	17	15.1	6	45.2	17	31.5	6	35.6	18	02.8	7	15.1	17	48.4	7	15.2	18	22.8
	20	6	18.8	17	16.5	6	45.0	17	33.0	6	35.8	18	03.9	7	14.6	17	50.0	7	15.2	18	24.0
	22	6	18.5	17	17.9	6	44.6	17	34.5	6	35.9	18	04.9	7	14.1	17	51.7	7	15.1	18	25.3
	24	6	18.2	17	19.3	6	44.1	17	36.0	6	36.0	18	05.8	7	13.5	17	53.3	7	14.9	18	26.5
	26	6	17.7	17	20.7	6	43.6	17	37.5	6	35.9	18	06.8	7	12.7	17	55.0	7	14.6	18	27.7
	28	6	17.2	17	22.1	6	42.9	17	39.0	6	35.8	18	07.7	7	11.9	17	56.6	7	14.2	18	28.9
	30	6	16.6	17	23.4	6	42.1	17	40.5	6	35.6	18	08.6	7	11.0	17	58.2	7	13.8	18	30.1
Feb.	1	6	15.9	17	24.7	6	41.3	17	42.0	6	35.4	18	09.4	7	09.9	17	59.8	7	13.3	18	31.2
	3	6	15.1	17	26.0	6	40.3	17	43.4	6	35.1	18	10.2	7	08.8	18	01.4	7	12.6	18	32.3
	5	6	14.3	17	27.3	6	39.3	17	44.8	6	34.7	18	11.0	7	07.5	18	03.0	7	12.0	18	33.4
	7	6	13.3	17	28.5	6	38.2	17	46.2	6	34.2	18	11.7	7	06.2	18	04.6	7	11.2	18	34.5
	9	6	12.3	17	29.7	6	37.0	17	47.5	6	33.7	18	12.4	7	04.8	18	06.1	7	10.4	18	35.5
	11	6	11.2	17	30.9	6	35.7	17	48.8	6	33.1	18	13.1	7	03.3	18	07.6	7	09.4	18	36.4
	13	6	10.1	17	32.1	6	34.4	17	50.1	6	32.4	18	13.7	7	01.8	18	09.1	7	08.5	18	37.4
	15	6	08.8	17	33.2	6	33.0	17	51.4	6	31.7	18	14.3	7	00.1	18	10.6	7	07.4	18	38.3
	17	6	07.6	17	34.2	6	31.5	17	52.6	6	30.9	18	14.8	6	58.4	18	12.1	7	06.3	18	39.2
	19	6	06.2	17	35.3	6	30.0	17	53.8	6	30.1	18	15.3	6	56.6	18	13.5	7	05.1	18	40.0
	21	6	04.8	17	36.3	6	28.3	17	55.0	6	29.2	18	15.8	6	54.8	18	14.9	7	03.9	18	40.8
	23	6	03.3	17	37.3	6	26.7	17	56.2	6	28.3	18	16.2	6	52.9	18	16.3	7	02.6	18	41.6
	25	6	01.8	17	38.3	6	25.0	17	57.3	6	27.3	18	16.6	6	50.9	18	17.6	7	01.3	18	42.4
	27	6	00.3	17	39.2	6	23.2	17	58.4	6	26.3	18	17.0	6	48.9	18	18.9	6	59.9	18	43.1
Mar.	1	5	58.7	17	40.1	6	21.4	17	59.4	6	25.2	18	17.3	6	46.9	18	20.3	6	58.5	18	43.8
	3	5	57.0	17	41.0	6	19.5	18	00.5	6	24.1	18	17.7	6	44.8	18	21.5	6	57.0	18	44.4
	5	5	55.4	17	41.8	6	17.7	18	01.5	6	23.0	18	17.9	6	42.6	18	22.8	6	55.5	18	45.1
	7	5	53.6	17	42.7	6	15.7	18	02.5	6	21.8	18	18.2	6	40.4	18	24.1	6	53.9	18	45.7
	9	5	51.9	17	43.5	6	13.8	18	03.5	6	20.6	18	18.4	6	38.2	18	25.3	6	52.4	18	46.3
	11	5	50.1	17	44.3	6	11.8	18	04.4	6	19.3	18	18.6	6	36.0	18	26.5	6	50.8	18	46.9
	13	5	48.3	17	45.0	6	09.8	18	05.4	6	18.1	18	18.8	6	33.7	18	27.7	6	49.1	18	47.4
	15	5	46.5	17	45.8	6	07.8	18	06.3	6	16.8	18	19.0	6	31.5	18	28.9	6	47.5	18	48.0
	17	5	44.6	17	46.5	6	05.8	18	07.2	6	15.5	18	19.2	6	29.2	18	30.0	6	45.8	18	48.5
	19	5	42.7	17	47.2	6	03.7	18	08.1	6	14.2	18	19.3	6	26.8	18	31.2	6	44.1	18	49.0
	21	5	40.8	17	48.0	6	01.7	18	09.0	6	12.9	18	19.5	6	24.5	18	32.3	6	42.5	18	49.5
	23	5	38.9	17	48.7	5	59.7	18	09.9	6	11.6	18	19.6	6	22.2	18	33.4	6	40.8	18	50.0
	25	5	37.0	17	49.4	5	57.6	18	10.8	6	10.3	18	19.8	6	19.9	18	34.6	6	39.1	18	50.5
	27	5	35.1	17	50.1	5	55.6	18	11.7	6	09.0	18	19.9	6	17.6	18	35.7	6	37.4	18	51.0
	29	5	33.2	17	50.7	5	53.5	18	12.5	6	07.7	18	20.0	6	15.3	18	36.8	6	35.7	18	51.4
	31	5	31.3	17	51.4	5	51.4	18	13.4	6	06.4	18	20.1	6	13.0	18	37.9	6	34.0	18	51.9
Apr.	2	5	29.4	17	52.1	5	49.4	18	14.3	6	05.1	18	20.3	6	10.7	18	39.1	6	32.3	18	52.4

SUNRISE AND SUNSET, 2027

INDIAN STANDARD TIME OF SUNRISE AND SUNSET (SUN'S UPPER LIMB)
FOR CERTAIN STATIONS IN INDIA

Date	Kolkata 22º N 32'				Varanasi 25º N 18'				Chennai 13º N 00'				Delhi 28º N 35'				Mumbai 18º N 54'			
	Rise		Set		Rise		Set		Rise		Set		Rise		Set		Rise		Set	
	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m
Apr. 2	5	29.4	17	52.1	5	49.4	18	14.3	6	05.1	18	20.3	6	10.7	18	39.1	6	32.3	18	52.4
4	5	27.5	17	52.8	5	47.4	18	15.2	6	03.8	18	20.4	6	08.5	18	40.2	6	30.7	18	52.9
6	5	25.7	17	53.5	5	45.3	18	16.0	6	02.5	18	20.6	6	06.2	18	41.3	6	29.0	18	53.4
8	5	23.8	17	54.2	5	43.3	18	16.9	6	01.2	18	20.7	6	04.0	18	42.4	6	27.4	18	53.9
10	5	22.0	17	54.9	5	41.4	18	17.8	6	00.0	18	20.9	6	01.9	18	43.6	6	25.8	18	54.4
12	5	20.2	17	55.7	5	39.4	18	18.7	5	58.8	18	21.0	5	59.7	18	44.7	6	24.2	18	54.9
14	5	18.4	17	56.4	5	37.5	18	19.6	5	57.6	18	21.2	5	57.6	18	45.8	6	22.7	18	55.5
16	5	16.7	17	57.1	5	35.6	18	20.5	5	56.5	18	21.4	5	55.5	18	47.0	6	21.2	18	56.0
18	5	15.0	17	57.9	5	33.7	18	21.5	5	55.3	18	21.7	5	53.5	18	48.2	6	19.7	18	56.6
20	5	13.3	17	58.6	5	31.9	18	22.4	5	54.2	18	21.9	5	51.5	18	49.3	6	18.3	18	57.1
22	5	11.7	17	59.4	5	30.1	18	23.4	5	53.2	18	22.2	5	49.5	18	50.5	6	16.9	18	57.7
24	5	10.1	18	00.2	5	28.4	18	24.3	5	52.1	18	22.5	5	47.6	18	51.7	6	15.5	18	58.3
26	5	08.6	18	01.0	5	26.7	18	25.3	5	51.1	18	22.8	5	45.7	18	52.9	6	14.2	18	59.0
28	5	07.1	18	01.8	5	25.1	18	26.3	5	50.2	18	23.1	5	43.9	18	54.1	6	13.0	18	59.6
30	5	05.7	18	02.6	5	23.5	18	27.3	5	49.3	18	23.4	5	42.2	18	55.3	6	11.8	19	00.3
May 2	5	04.3	18	03.5	5	22.0	18	28.3	5	48.4	18	23.8	5	40.5	18	56.5	6	10.6	19	00.9
4	5	03.0	18	04.3	5	20.5	18	29.3	5	47.6	18	24.2	5	38.8	18	57.8	6	09.5	19	01.6
6	5	01.8	18	05.2	5	19.1	18	30.4	5	46.9	18	24.6	5	37.3	18	59.0	6	08.5	19	02.3
8	5	00.6	18	06.0	5	17.8	18	31.4	5	46.2	18	25.1	5	35.8	19	00.2	6	07.5	19	03.1
10	4	59.5	18	06.9	5	16.6	18	32.5	5	45.5	18	25.5	5	34.4	19	01.5	6	06.6	19	03.8
12	4	58.4	18	07.8	5	15.4	18	33.5	5	44.9	18	26.0	5	33.0	19	02.7	6	05.8	19	04.5
14	4	57.5	18	08.7	5	14.3	18	34.6	5	44.4	18	26.5	5	31.7	19	03.9	6	05.0	19	05.3
16	4	56.6	18	09.6	5	13.3	18	35.6	5	43.9	18	27.1	5	30.6	19	05.2	6	04.3	19	06.1
18	4	55.7	18	10.5	5	12.3	18	36.7	5	43.5	18	27.6	5	29.5	19	06.4	6	03.6	19	06.9
20	4	55.0	18	11.5	5	11.4	18	37.7	5	43.1	18	28.2	5	28.4	19	07.6	6	03.0	19	07.6
22	4	54.3	18	12.4	5	10.6	18	38.7	5	42.8	18	28.7	5	27.5	19	08.8	6	02.5	19	08.4
24	4	53.7	18	13.3	5	09.9	18	39.8	5	42.5	18	29.3	5	26.7	19	09.9	6	02.0	19	09.2
26	4	53.2	18	14.2	5	09.3	18	40.8	5	42.3	18	29.9	5	25.9	19	11.1	6	01.7	19	10.0
28	4	52.7	18	15.0	5	08.8	18	41.8	5	42.2	18	30.5	5	25.2	19	12.2	6	01.3	19	10.8
30	4	52.4	18	15.9	5	08.3	18	42.7	5	42.1	18	31.1	5	24.7	19	13.3	6	01.1	19	11.6
June 1	4	52.1	18	16.8	5	07.9	18	43.7	5	42.0	18	31.7	5	24.2	19	14.3	6	00.9	19	12.3
3	4	51.8	18	17.6	5	07.6	18	44.6	5	42.0	18	32.3	5	23.8	19	15.3	6	00.8	19	13.1
5	4	51.7	18	18.4	5	07.4	18	45.5	5	42.1	18	32.9	5	23.5	19	16.3	6	00.7	19	13.8
7	4	51.6	18	19.2	5	07.3	18	46.3	5	42.2	18	33.5	5	23.3	19	17.2	6	00.7	19	14.5
9	4	51.6	18	19.9	5	07.2	18	47.1	5	42.4	18	34.1	5	23.2	19	18.1	6	00.8	19	15.2
11	4	51.7	18	20.6	5	07.3	18	47.9	5	42.6	18	34.7	5	23.1	19	18.9	6	00.9	19	15.9
13	4	51.8	18	21.3	5	07.4	18	48.6	5	42.9	18	35.3	5	23.2	19	19.7	6	01.1	19	16.5
15	4	52.1	18	21.9	5	07.6	18	49.2	5	43.2	18	35.8	5	23.3	19	20.3	6	01.4	19	17.1
17	4	52.3	18	22.5	5	07.8	18	49.8	5	43.5	18	36.3	5	23.6	19	21.0	6	01.7	19	17.6
19	4	52.7	18	23.0	5	08.1	18	50.4	5	43.9	18	36.8	5	23.9	19	21.5	6	02.0	19	18.2
21	4	53.1	18	23.5	5	08.5	18	50.9	5	44.3	18	37.2	5	24.2	19	22.0	6	02.4	19	18.6
23	4	53.5	18	23.9	5	09.0	18	51.3	5	44.7	18	37.7	5	24.7	19	22.4	6	02.8	19	19.0
25	4	54.0	18	24.2	5	09.5	18	51.6	5	45.2	18	38.1	5	25.2	19	22.7	6	03.3	19	19.4
27	4	54.6	18	24.5	5	10.1	18	51.9	5	45.7	18	38.4	5	25.8	19	23.0	6	03.8	19	19.7
29	4	55.2	18	24.7	5	10.7	18	52.1	5	46.2	18	38.7	5	26.5	19	23.1	6	04.4	19	20.0
July 1	4	55.8	18	24.8	5	11.4	18	52.2	5	46.7	18	39.0	5	27.2	19	23.2	6	05.0	19	20.1
3	4	56.5	18	24.9	5	12.1	18	52.2	5	47.3	18	39.2	5	27.9	19	23.1	6	05.6	19	20.3

SUNRISE AND SUNSET, 2027

INDIAN STANDARD TIME OF SUNRISE AND SUNSET (SUN'S UPPER LIMB)
FOR CERTAIN STATIONS IN INDIA

Date	Kolkata 22º N 32'				Varanasi 25º N 18'				Chennai 13º N 00'				Delhi 28º N 35'				Mumbai 18º N 54'			
	Rise		Set		Rise		Set		Rise		Set		Rise		Set		Rise		Set	
	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m
July 1	4	55.8	18	24.8	5	11.4	18	52.2	5	46.7	18	39.0	5	27.2	19	23.2	6	05.0	19	20.1
3	4	56.5	18	24.9	5	12.1	18	52.2	5	47.3	18	39.2	5	27.9	19	23.1	6	05.6	19	20.3
5	4	57.2	18	24.9	5	12.8	18	52.1	5	47.8	18	39.3	5	28.8	19	23.0	6	06.2	19	20.3
7	4	57.9	18	24.8	5	13.6	18	52.0	5	48.4	18	39.4	5	29.6	19	22.8	6	06.9	19	20.3
9	4	58.7	18	24.7	5	14.5	18	51.8	5	48.9	18	39.5	5	30.5	19	22.5	6	07.5	19	20.3
11	4	59.5	18	24.5	5	15.3	18	51.5	5	49.5	18	39.5	5	31.5	19	22.1	6	08.2	19	20.1
13	5	00.3	18	24.2	5	16.2	18	51.1	5	50.0	18	39.4	5	32.5	19	21.6	6	08.9	19	19.9
15	5	01.1	18	23.8	5	17.1	18	50.6	5	50.6	18	39.3	5	33.5	19	21.0	6	09.6	19	19.6
17	5	02.0	18	23.3	5	18.1	18	50.1	5	51.1	18	39.1	5	34.5	19	20.3	6	10.3	19	19.3
19	5	02.8	18	22.8	5	19.0	18	49.4	5	51.7	18	38.9	5	35.6	19	19.6	6	11.0	19	18.8
21	5	03.7	18	22.2	5	20.0	18	48.7	5	52.2	18	38.6	5	36.7	19	18.7	6	11.8	19	18.3
23	5	04.5	18	21.5	5	20.9	18	47.9	5	52.7	18	38.2	5	37.8	19	17.7	6	12.5	19	17.8
25	5	05.4	18	20.7	5	21.9	18	47.0	5	53.2	18	37.8	5	38.9	19	16.7	6	13.2	19	17.1
27	5	06.3	18	19.9	5	22.9	18	46.0	5	53.7	18	37.3	5	40.0	19	15.6	6	13.9	19	16.4
29	5	07.1	18	18.9	5	23.8	18	44.9	5	54.1	18	36.8	5	41.1	19	14.3	6	14.5	19	15.6
31	5	08.0	18	17.9	5	24.8	18	43.8	5	54.5	18	36.2	5	42.2	19	13.0	6	15.2	19	14.8
Aug. 2	5	08.8	18	16.9	5	25.8	18	42.6	5	54.9	18	35.5	5	43.3	19	11.6	6	15.9	19	13.9
4	5	09.6	18	15.7	5	26.7	18	41.3	5	55.3	18	34.8	5	44.5	19	10.2	6	16.5	19	12.9
6	5	10.4	18	14.5	5	27.7	18	39.9	5	55.7	18	34.1	5	45.6	19	08.6	6	17.1	19	11.9
8	5	11.2	18	13.3	5	28.6	18	38.5	5	56.0	18	33.2	5	46.7	19	07.0	6	17.8	19	10.7
10	5	12.0	18	12.0	5	29.5	18	37.0	5	56.3	18	32.3	5	47.8	19	05.3	6	18.3	19	09.6
12	5	12.8	18	10.6	5	30.4	18	35.4	5	56.6	18	31.4	5	48.9	19	03.5	6	18.9	19	08.4
14	5	13.5	18	09.1	5	31.4	18	33.8	5	56.9	18	30.4	5	50.0	19	01.7	6	19.5	19	07.1
16	5	14.3	18	07.6	5	32.2	18	32.1	5	57.1	18	29.4	5	51.0	18	59.8	6	20.0	19	05.7
18	5	15.0	18	06.1	5	33.1	18	30.4	5	57.3	18	28.4	5	52.1	18	57.9	6	20.5	19	04.3
20	5	15.7	18	04.5	5	34.0	18	28.6	5	57.5	18	27.2	5	53.2	18	55.8	6	21.0	19	02.9
22	5	16.4	18	02.9	5	34.8	18	26.8	5	57.7	18	26.1	5	54.2	18	53.8	6	21.5	19	01.4
24	5	17.0	18	01.2	5	35.6	18	24.9	5	57.8	18	24.9	5	55.2	18	51.7	6	22.0	18	59.9
26	5	17.7	17	59.5	5	36.5	18	23.0	5	57.9	18	23.7	5	56.2	18	49.5	6	22.4	18	58.3
28	5	18.3	17	57.7	5	37.3	18	21.0	5	58.0	18	22.4	5	57.2	18	47.3	6	22.8	18	56.7
30	5	19.0	17	55.9	5	38.1	18	19.0	5	58.1	18	21.1	5	58.2	18	45.1	6	23.2	18	55.1
Sept. 1	5	19.6	17	54.1	5	38.9	18	17.0	5	58.2	18	19.8	5	59.2	18	42.8	6	23.6	18	53.4
3	5	20.2	17	52.3	5	39.6	18	15.0	5	58.2	18	18.5	6	00.2	18	40.5	6	24.0	18	51.7
5	5	20.8	17	50.4	5	40.4	18	12.9	5	58.3	18	17.1	6	01.2	18	38.2	6	24.4	18	50.0
7	5	21.4	17	48.5	5	41.1	18	10.8	5	58.3	18	15.8	6	02.1	18	35.8	6	24.8	18	48.3
9	5	22.0	17	46.5	5	41.9	18	08.7	5	58.3	18	14.4	6	03.1	18	33.5	6	25.1	18	46.5
11	5	22.5	17	44.6	5	42.6	18	06.6	5	58.3	18	13.0	6	04.0	18	31.1	6	25.5	18	44.8
13	5	23.1	17	42.6	5	43.4	18	04.5	5	58.3	18	11.6	6	05.0	18	28.7	6	25.8	18	43.0
15	5	23.7	17	40.6	5	44.1	18	02.3	5	58.4	18	10.1	6	06.0	18	26.3	6	26.2	18	41.2
17	5	24.3	17	38.6	5	44.9	18	00.2	5	58.4	18	08.7	6	06.9	18	23.9	6	26.5	18	39.4
19	5	24.8	17	36.6	5	45.6	17	58.1	5	58.4	18	07.3	6	07.9	18	21.5	6	26.9	18	37.6
21	5	25.4	17	34.6	5	46.4	17	55.9	5	58.4	18	05.9	6	08.9	18	19.1	6	27.3	18	35.8
23	5	26.0	17	32.6	5	47.1	17	53.8	5	58.4	18	04.5	6	09.8	18	16.7	6	27.6	18	34.0
25	5	26.6	17	30.6	5	47.9	17	51.6	5	58.4	18	03.1	6	10.8	18	14.3	6	28.0	18	32.3
27	5	27.2	17	28.6	5	48.7	17	49.5	5	58.4	18	01.7	6	11.8	18	11.9	6	28.4	18	30.5
29	5	27.8	17	26.7	5	49.5	17	47.4	5	58.5	18	00.4	6	12.8	18	09.6	6	28.8	18	28.8
Oct. 1	5	28.4	17	24.7	5	50.3	17	45.3	5	58.5	17	59.0	6	13.9	18	07.3	6	29.2	18	27.0

SUNRISE AND SUNSET, 2027

INDIAN STANDARD TIME OF SUNRISE AND SUNSET (SUN'S UPPER LIMB)
FOR CERTAIN STATIONS IN INDIA

Date	Kolkata 22° N 32'				Varanasi 25° N 18'				Chennai 13° N 00'				Delhi 28° N 35'				Mumbai 18° N 54'			
	Rise		Set		Rise		Set		Rise		Set		Rise		Set		Rise		Set	
	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m
Oct. 1	5	28.4	17	24.7	5	50.3	17	45.3	5	58.5	17	59.0	6	13.9	18	07.3	6	29.2	18	27.0
3	5	29.1	17	22.8	5	51.1	17	43.2	5	58.6	17	57.7	6	14.9	18	05.0	6	29.6	18	25.3
5	5	29.8	17	20.9	5	51.9	17	41.1	5	58.7	17	56.4	6	16.0	18	02.7	6	30.0	18	23.6
7	5	30.4	17	19.0	5	52.8	17	39.1	5	58.8	17	55.1	6	17.1	18	00.5	6	30.5	18	22.0
9	5	31.2	17	17.1	5	53.6	17	37.1	5	59.0	17	53.8	6	18.2	17	58.3	6	31.0	18	20.4
11	5	31.9	17	15.3	5	54.5	17	35.1	5	59.1	17	52.6	6	19.3	17	56.1	6	31.5	18	18.8
13	5	32.6	17	13.5	5	55.5	17	33.2	5	59.3	17	51.4	6	20.5	17	54.0	6	32.0	18	17.3
15	5	33.4	17	11.8	5	56.4	17	31.3	5	59.5	17	50.3	6	21.6	17	51.9	6	32.6	18	15.8
17	5	34.2	17	10.1	5	57.4	17	29.4	5	59.8	17	49.2	6	22.8	17	49.9	6	33.2	18	14.3
19	5	35.1	17	08.5	5	58.4	17	27.6	6	00.1	17	48.1	6	24.1	17	47.9	6	33.8	18	12.9
21	5	35.9	17	06.9	5	59.4	17	25.8	6	00.4	17	47.1	6	25.3	17	45.9	6	34.5	18	11.6
23	5	36.8	17	05.4	6	00.4	17	24.2	6	00.7	17	46.1	6	26.6	17	44.0	6	35.2	18	10.3
25	5	37.8	17	03.9	6	01.5	17	22.5	6	01.1	17	45.2	6	28.0	17	42.2	6	35.9	18	09.1
27	5	38.7	17	02.5	6	02.6	17	20.9	6	01.6	17	44.4	6	29.3	17	40.4	6	36.7	18	07.9
29	5	39.7	17	01.1	6	03.8	17	19.4	6	02.0	17	43.6	6	30.7	17	38.8	6	37.5	18	06.8
31	5	40.8	16	59.9	6	04.9	17	18.0	6	02.5	17	42.8	6	32.1	17	37.1	6	38.3	18	05.8
Nov. 2	5	41.8	16	58.7	6	06.1	17	16.7	6	03.1	17	42.1	6	33.5	17	35.6	6	39.2	18	04.8
4	5	42.9	16	57.5	6	07.4	17	15.4	6	03.7	17	41.5	6	35.0	17	34.1	6	40.1	18	03.9
6	5	44.0	16	56.5	6	08.6	17	14.2	6	04.3	17	41.0	6	36.5	17	32.7	6	41.0	18	03.1
8	5	45.2	16	55.5	6	09.9	17	13.1	6	05.0	17	40.5	6	38.0	17	31.4	6	42.0	18	02.3
10	5	46.4	16	54.7	6	11.3	17	12.1	6	05.7	17	40.1	6	39.5	17	30.2	6	43.0	18	01.7
12	5	47.6	16	53.9	6	12.6	17	11.1	6	06.5	17	39.8	6	41.1	17	29.1	6	44.1	18	01.1
14	5	48.8	16	53.2	6	14.0	17	10.3	6	07.2	17	39.5	6	42.7	17	28.1	6	45.2	18	00.6
16	5	50.0	16	52.6	6	15.4	17	09.5	6	08.1	17	39.3	6	44.3	17	27.2	6	46.3	18	00.1
18	5	51.3	16	52.0	6	16.8	17	08.9	6	08.9	17	39.2	6	45.9	17	26.4	6	47.4	17	59.8
20	5	52.6	16	51.6	6	18.2	17	08.3	6	09.8	17	39.2	6	47.5	17	25.7	6	48.6	17	59.5
22	5	53.9	16	51.3	6	19.6	17	07.9	6	10.8	17	39.2	6	49.1	17	25.1	6	49.8	17	59.3
24	5	55.2	16	51.1	6	21.1	17	07.5	6	11.7	17	39.4	6	50.7	17	24.6	6	51.0	17	59.3
26	5	56.5	16	50.9	6	22.5	17	07.3	6	12.7	17	39.6	6	52.3	17	24.2	6	52.2	17	59.3
28	5	57.9	16	50.9	6	24.0	17	07.1	6	13.8	17	39.8	6	53.9	17	23.9	6	53.4	17	59.3
30	5	59.2	16	50.9	6	25.4	17	07.1	6	14.8	17	40.2	6	55.5	17	23.8	6	54.7	17	59.5
Dec. 2	6	00.5	16	51.1	6	26.9	17	07.2	6	15.9	17	40.6	6	57.1	17	23.7	6	55.9	17	59.7
4	6	01.8	16	51.3	6	28.3	17	07.3	6	16.9	17	41.1	6	58.6	17	23.8	6	57.2	18	00.1
6	6	03.1	16	51.7	6	29.7	17	07.6	6	18.0	17	41.6	7	00.1	17	23.9	6	58.4	18	00.5
8	6	04.4	16	52.1	6	31.0	17	07.9	6	19.1	17	42.2	7	01.6	17	24.2	6	59.7	18	01.0
10	6	05.6	16	52.6	6	32.4	17	08.4	6	20.2	17	42.9	7	03.0	17	24.6	7	00.9	18	01.5
12	6	06.9	16	53.2	6	33.7	17	09.0	6	21.3	17	43.7	7	04.4	17	25.1	7	02.1	18	02.2
14	6	08.1	16	53.9	6	35.0	17	09.6	6	22.4	17	44.5	7	05.7	17	25.7	7	03.3	18	02.9
16	6	09.2	16	54.7	6	36.2	17	10.3	6	23.5	17	45.3	7	07.0	17	26.4	7	04.4	18	03.7
18	6	10.3	16	55.5	6	37.3	17	11.2	6	24.5	17	46.2	7	08.1	17	27.2	7	05.5	18	04.5
20	6	11.4	16	56.4	6	38.4	17	12.1	6	25.6	17	47.1	7	09.3	17	28.1	7	06.6	18	05.4
22	6	12.4	16	57.4	6	39.5	17	13.1	6	26.6	17	48.1	7	10.3	17	29.0	7	07.6	18	06.4
24	6	13.4	16	58.4	6	40.4	17	14.1	6	27.6	17	49.1	7	11.3	17	30.1	7	08.6	18	07.4
26	6	14.3	16	59.6	6	41.3	17	15.2	6	28.5	17	50.1	7	12.2	17	31.2	7	09.5	18	08.5
28	6	15.1	17	00.7	6	42.1	17	16.4	6	29.4	17	51.2	7	12.9	17	32.4	7	10.4	18	09.6
30	6	15.9	17	01.9	6	42.9	17	17.7	6	30.3	17	52.3	7	13.6	17	33.7	7	11.2	18	10.7
32	6	16.5	17	03.2	6	43.5	17	19.0	6	31.1	17	53.4	7	14.2	17	35.1	7	12.0	18	11.9

MOONRISE, 2027

LOCAL MEAN TIME AND INDIAN STANDARD TIME OF MOONRISE (MOON'S UPPER LIMB)

Date	Lat.	FOR THE CENTRAL MERIDIAN OF INDIA (82º.5 E) IN L. M. T.												FOR CERTAIN STATIONS IN INDIA IN I.S.T.							
		0º		10º		20º		30º		40º		50º		Kolkata		Chennai		Delhi		Mumbai	
		h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m
Jan.	0	**	**	**	**	0	00	0	07	0	14	0	25	**	**	0	06	0	28	0	40
	1	0	34	0	44	0	54	1	05	1	20	1	40	0	32	0	56	1	26	1	33
	2	1	19	1	33	1	47	2	04	2	25	2	54	1	27	1	47	2	23	2	26
	3	2	06	2	23	2	41	3	02	3	29	4	08	2	22	2	38	3	22	3	20
	4	2	55	3	15	3	36	4	00	4	32	5	18	3	18	3	31	4	19	4	14
	5	3	45	4	07	4	30	4	57	5	31	6	22	4	12	4	23	5	15	5	08
	6	4	36	4	58	5	22	5	49	6	25	7	17	5	05	5	15	6	07	6	00
	7	5	27	5	49	6	11	6	38	7	11	8	00	5	54	6	05	6	56	6	49
	8	6	17	6	36	6	57	7	20	7	50	8	33	6	38	6	52	7	39	7	35
	9	7	04	7	21	7	38	7	58	8	23	8	58	7	19	7	35	8	17	8	16
	10	7	49	8	02	8	16	8	31	8	51	9	17	7	56	8	15	8	51	8	54
	11	8	32	8	41	8	51	9	01	9	15	9	33	8	29	8	53	9	22	9	29
	12	9	13	9	18	9	24	9	30	9	37	9	47	9	01	9	29	9	50	10	03
	13	9	54	9	55	9	56	9	57	9	58	9	59	9	33	10	04	10	18	10	35
	14	10	36	10	33	10	29	10	24	10	19	10	12	10	04	10	40	10	46	11	09
	15	11	20	11	12	11	04	10	54	10	42	10	27	10	37	11	19	11	17	11	44
	16	12	07	11	55	11	42	11	27	11	09	10	44	11	14	12	00	11	51	12	23
	17	12	59	12	43	12	25	12	05	11	41	11	06	11	56	12	47	12	30	13	07
	18	13	57	13	37	13	16	12	52	12	21	11	37	12	46	13	40	13	17	13	58
	19	15	00	14	38	14	14	13	47	13	13	12	22	13	44	14	40	14	13	14	57
	20	16	06	15	44	15	20	14	53	14	18	13	26	14	49	15	46	15	19	16	03
	21	17	12	16	52	16	31	16	06	15	34	14	47	16	00	16	55	16	31	17	13
	22	18	15	17	59	17	41	17	21	16	55	16	18	17	12	18	03	17	46	18	23
	23	19	13	19	01	18	49	18	34	18	16	17	51	18	20	19	07	18	58	19	30
	24	20	06	19	59	19	52	19	44	19	34	19	20	19	26	20	06	20	07	20	33
	25	20	55	20	54	20	52	20	50	20	48	20	44	20	27	21	03	21	12	21	33
	26	21	42	21	46	21	49	21	53	21	58	22	05	21	26	21	56	22	14	22	29
	27	22	28	22	36	22	45	22	55	23	07	23	23	22	23	22	48	23	15	23	24
	28	23	15	23	27	23	40	23	55	**	**	**	**	23	19	23	40	**	**	**	**
	29	**	**	**	**	**	**	**	**	0	14	0	40	**	**	**	**	0	15	0	18
	30	0	02	0	18	0	35	0	55	1	20	1	55	0	15	0	32	1	14	1	13
	31	0	51	1	10	1	30	1	54	2	24	3	08	1	12	1	25	2	12	2	08
Feb.	1	1	41	2	02	2	25	2	51	3	25	4	15	2	07	2	18	3	09	3	02
	2	2	32	2	54	3	17	3	45	4	20	5	13	3	00	3	11	4	03	3	55
	3	3	23	3	45	4	08	4	35	5	09	6	00	3	50	4	01	4	53	4	45
	4	4	13	4	33	4	54	5	19	5	50	6	36	4	36	4	49	5	38	5	32
	5	5	01	5	18	5	37	5	58	6	25	7	03	5	19	5	34	6	17	6	15
	6	5	47	6	01	6	16	6	33	6	54	7	24	5	56	6	15	6	52	6	54
	7	6	31	6	41	6	52	7	04	7	20	7	41	6	31	6	54	7	25	7	31
	8	7	13	7	19	7	26	7	33	7	42	7	55	7	04	7	31	7	54	8	05
	9	7	54	7	56	7	58	8	01	8	04	8	08	7	35	8	06	8	22	8	38
	10	8	36	8	33	8	31	8	28	8	25	8	21	8	06	8	42	8	50	9	11
	11	9	19	9	12	9	05	8	57	8	47	8	34	8	39	9	19	9	20	9	45
	12	10	04	9	53	9	41	9	28	9	12	8	50	9	14	9	59	9	52	10	22
	13	10	53	10	38	10	22	10	04	9	41	9	10	9	54	10	42	10	28	11	04
	14	11	47	11	28	11	08	10	46	10	17	9	37	10	39	11	32	11	11	11	51
	15	12	46	12	24	12	02	11	36	11	02	10	14	11	31	12	27	12	01	12	44

The symbol (**) indicates that the phenomenon will occur on the next day

MOONSET, 2027
LOCAL MEAN TIME AND INDIAN STANDARD TIME OF
MOONSET (MOON'S UPPER LIMB)

Date	Lat.	FOR THE CENTRAL MERIDIAN OF INDIA (82º.5 E) IN L. M. T.												FOR CERTAIN STATIONS IN INDIA IN I.S.T.							
		0º		10º		20º		30º		40º		50º		Kolkata		Chennai		Delhi		Mumbai	
		h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m
Jan.	0	12	11	12	04	11	56	11	47	11	36	11	22	11	30	12	10	12	10	12	36
	1	12	56	12	44	12	32	12	18	12	01	11	38	12	05	12	50	12	41	13	13
	2	13	42	13	26	13	10	12	52	12	29	11	57	12	41	13	31	13	16	13	52
	3	14	29	14	11	13	51	13	29	13	00	12	20	13	22	14	14	13	54	14	33
	4	15	19	14	58	14	36	14	11	13	38	12	51	14	06	15	01	14	36	15	18
	5	16	10	15	48	15	25	14	57	14	23	13	31	14	54	15	50	15	23	16	07
	6	17	01	16	40	16	16	15	49	15	14	14	22	15	46	16	42	16	14	16	59
	7	17	52	17	31	17	09	16	44	16	11	15	23	16	39	17	34	17	09	17	52
	8	18	40	18	22	18	03	17	40	17	12	16	31	17	33	18	25	18	05	18	45
	9	19	26	19	11	18	55	18	37	18	14	17	41	18	26	19	16	19	02	19	37
	10	20	10	19	59	19	47	19	33	19	16	18	52	19	19	20	04	19	57	20	28
	11	20	52	20	45	20	37	20	29	20	18	20	03	20	11	20	52	20	51	21	18
	12	21	33	21	30	21	27	21	23	21	19	21	13	21	02	21	38	21	46	22	07
	13	22	14	22	16	22	17	22	19	22	21	22	24	21	53	22	25	22	40	22	57
	14	22	57	23	03	23	09	23	16	23	25	23	37	22	46	23	14	23	37	23	48
	15	23	42	23	52	**	**	**	**	**	**	**	**	23	42	**	**	**	**	**	**
	16	**	**	**	**	0	03	0	16	0	31	0	53	**	**	0	04	0	35	0	42
	17	0	31	0	46	1	01	1	19	1	42	2	14	0	41	1	00	1	39	1	40
	18	1	26	1	44	2	04	2	27	2	55	3	37	1	45	1	59	2	45	2	42
	19	2	26	2	47	3	10	3	36	4	10	4	59	2	52	3	04	3	55	3	48
	20	3	31	3	53	4	17	4	45	5	20	6	12	3	59	4	10	5	03	4	55
	21	4	38	4	59	5	22	5	48	6	21	7	09	5	04	5	15	6	06	6	00
	22	5	43	6	01	6	20	6	42	7	10	7	50	6	01	6	16	7	01	6	58
	23	6	43	6	57	7	12	7	29	7	50	8	18	6	52	7	11	7	49	7	51
	24	7	39	7	48	7	58	8	08	8	22	8	40	7	37	8	00	8	28	8	36
	25	8	30	8	34	8	38	8	43	8	49	8	57	8	16	8	45	9	04	9	18
	26	9	18	9	17	9	16	9	15	9	14	9	12	8	52	9	27	9	37	9	56
	27	10	04	9	59	9	53	9	46	9	38	9	27	9	28	10	06	10	09	10	33
	28	10	50	10	40	10	30	10	18	10	03	9	43	10	03	10	46	10	41	11	11
	29	11	37	11	23	11	08	10	51	10	30	10	01	10	40	11	28	11	15	11	50
	30	12	25	12	08	11	49	11	27	11	01	10	23	11	20	12	11	11	52	12	30
	31	13	15	12	54	12	33	12	08	11	37	10	51	12	03	12	57	12	33	13	15
Feb.	1	14	05	13	44	13	20	12	53	12	19	11	28	12	50	13	46	13	19	14	03
	2	14	57	14	35	14	11	13	44	13	08	12	16	13	40	14	37	14	09	14	53
	3	15	47	15	26	15	04	14	37	14	04	13	14	14	33	15	29	15	03	15	46
	4	16	36	16	18	15	57	15	34	15	04	14	20	15	28	16	21	15	59	16	39
	5	17	23	17	08	16	50	16	31	16	06	15	30	16	21	17	12	16	55	17	32
	6	18	08	17	56	17	43	17	27	17	08	16	41	17	15	18	01	17	51	18	24
	7	18	51	18	43	18	34	18	23	18	10	17	53	18	07	18	49	18	46	19	15
	8	19	33	19	28	19	24	19	19	19	12	19	04	18	58	19	36	19	41	20	04
	9	20	14	20	14	20	14	20	14	20	14	20	14	19	50	20	23	20	36	20	54
	10	20	56	21	00	21	05	21	11	21	17	21	27	20	42	21	11	21	32	21	45
	11	21	40	21	49	21	58	22	09	22	23	22	41	21	37	22	01	22	29	22	37
	12	22	27	22	40	22	54	23	10	23	31	23	59	22	33	22	53	23	30	23	33
	13	23	18	23	35	23	54	**	**	**	**	**	**	23	34	23	50	**	**	**	**
	14	**	**	**	**	**	**	0	15	0	42	1	20	**	**	**	**	0	33	0	31
	15	0	14	0	35	0	56	1	21	1	54	2	41	0	37	0	50	1	40	1	34

The symbol (**) indicates that the phenomenon will occur on the next day

MOONRISE, 2027

LOCAL MEAN TIME AND INDIAN STANDARD TIME OF MOONRISE (MOON'S UPPER LIMB)

Date		FOR THE CENTRAL MERIDIAN OF INDIA (82º.5 E) IN L. M. T.												FOR CERTAIN STATIONS IN INDIA IN I.S.T.							
	Lat.	0º		10º		20º		30º		40º		50º		Kolkata		Chennai		Delhi		Mumbai	
		h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m
Feb.	15	12	46	12	24	12	02	11	36	11	02	10	14	11	31	12	27	12	01	12	44
	16	13	48	13	26	13	02	12	35	11	59	11	07	12	31	13	28	13	00	13	45
	17	14	52	14	31	14	08	13	42	13	08	12	18	13	38	14	33	14	07	14	51
	18	15	55	15	37	15	17	14	54	14	25	13	43	14	47	15	40	15	19	15	59
	19	16	54	16	40	16	25	16	07	15	45	15	13	15	56	16	45	16	31	17	07
	20	17	49	17	40	17	30	17	18	17	04	16	44	17	03	17	47	17	42	18	11
	21	18	41	18	37	18	32	18	27	18	20	18	11	18	06	18	44	18	49	19	13
	22	19	30	19	31	19	32	19	32	19	34	19	35	19	08	19	41	19	54	20	11
	23	20	18	20	23	20	29	20	36	20	45	20	57	20	07	20	34	20	57	21	09
	24	21	05	21	15	21	26	21	39	21	55	22	17	21	05	21	28	21	59	22	05
	25	21	53	22	08	22	23	22	41	23	03	23	35	22	03	22	21	23	00	23	02
	26	22	43	23	01	23	20	23	42	**	**	**	**	23	01	23	16	**	**	23	58
	27	23	33	23	54	**	**	**	**	0	10	0	51	23	58	**	**	0	01	**	**
	28	**	**	**	**	0	16	0	41	1	14	2	02	**	**	0	10	1	00	0	54
Mar.	1	0	25	0	47	1	10	1	38	2	13	3	05	0	53	1	03	1	56	1	48
	2	1	17	1	38	2	02	2	29	3	04	3	56	1	45	1	55	2	47	2	40
	3	2	07	2	28	2	50	3	16	3	48	4	36	2	32	2	44	3	34	3	28
	4	2	56	3	14	3	34	3	57	4	25	5	06	3	16	3	30	4	15	4	12
	5	3	43	3	58	4	14	4	33	4	56	5	29	3	55	4	12	4	52	4	53
	6	4	27	4	39	4	51	5	06	5	23	5	47	4	31	4	52	5	26	5	30
	7	5	10	5	18	5	26	5	35	5	47	6	02	5	05	5	30	5	56	6	05
	8	5	52	5	56	5	59	6	04	6	09	6	16	5	37	6	06	6	24	6	38
	9	6	34	6	33	6	32	6	32	6	30	6	29	6	08	6	42	6	53	7	12
	10	7	17	7	12	7	06	7	00	6	53	6	43	6	41	7	20	7	23	7	47
	11	8	02	7	53	7	43	7	31	7	17	6	58	7	16	7	59	7	54	8	23
	12	8	51	8	37	8	22	8	06	7	45	7	17	7	54	8	42	8	29	9	04
	13	9	43	9	25	9	07	8	45	8	19	7	41	8	37	9	29	9	10	9	49
	14	10	40	10	19	9	57	9	32	9	00	8	14	9	27	10	22	9	58	10	40
	15	11	40	11	18	10	55	10	27	9	52	9	01	10	23	11	20	10	53	11	37
	16	12	42	12	20	11	57	11	30	10	55	10	04	11	26	12	22	11	56	12	39
	17	13	43	13	24	13	03	12	38	12	07	11	22	12	32	13	27	13	04	13	45
	18	14	42	14	26	14	08	13	49	13	23	12	48	13	39	14	29	14	13	14	50
	19	15	37	15	25	15	13	14	58	14	40	14	15	14	44	15	31	15	22	15	54
	20	16	28	16	22	16	14	16	06	15	56	15	42	15	48	16	29	16	29	16	55
	21	17	18	17	16	17	14	17	12	17	09	17	06	16	49	17	25	17	34	17	55
	22	18	06	18	09	18	12	18	16	18	21	18	28	17	49	18	19	18	37	18	52
	23	18	53	19	01	19	10	19	20	19	32	19	49	18	48	19	13	19	41	19	49
	24	19	42	19	54	20	07	20	23	20	42	21	09	19	47	20	07	20	43	20	46
	25	20	32	20	48	21	05	21	26	21	51	22	28	20	46	21	02	21	45	21	44
	26	21	23	21	42	22	03	22	27	22	58	23	43	21	45	21	58	22	45	22	41
	27	22	15	22	36	22	59	23	26	24	00	**	**	22	41	22	53	23	44	23	37
	28	23	08	23	30	23	53	**	**	**	**	0	50	23	36	23	46	**	**	**	**
	29	23	59	**	**	**	**	0	20	0	55	1	47	**	**	**	**	0	38	0	31
	30	**	**	0	20	0	43	1	09	1	43	2	32	0	25	0	37	1	28	1	21
	31	0	49	1	08	1	29	1	53	2	23	3	06	1	11	1	24	2	11	2	07
Apr.	1	1	36	1	53	2	11	2	31	2	56	3	32	1	52	2	08	2	50	2	49
	2	2	22	2	35	2	49	3	05	3	25	3	52	2	29	2	48	3	24	3	27

The symbol (**) indicates that the phenomenon will occur on the next day

MOONSET, 2027
LOCAL MEAN TIME AND INDIAN STANDARD TIME OF
MOONSET (MOON'S UPPER LIMB)

Date		FOR THE CENTRAL MERIDIAN OF INDIA (82º.5 E) IN L. M. T.												FOR CERTAIN STATIONS IN INDIA IN I.S.T.							
	Lat.	0º		10º		20º		30º		40º		50º		Kolkata		Chennai		Delhi		Mumbai	
		h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m
Feb.	15	0	14	0	35	0	56	1	21	1	54	2	41	0	37	0	50	1	40	1	34
	16	1	15	1	37	2	01	2	28	3	03	3	55	1	43	1	54	2	46	2	38
	17	2	19	2	41	3	04	3	31	4	06	4	57	2	46	2	57	3	50	3	42
	18	3	22	3	42	4	04	4	28	4	59	5	43	3	46	3	58	4	46	4	41
	19	4	24	4	40	4	57	5	17	5	42	6	16	4	38	4	55	5	37	5	36
	20	5	21	5	33	5	45	6	00	6	17	6	41	5	25	5	46	6	19	6	24
	21	6	14	6	21	6	28	6	37	6	47	7	00	6	06	6	33	6	57	7	08
	22	7	04	7	06	7	08	7	10	7	13	7	16	6	45	7	16	7	32	7	48
	23	7	53	7	50	7	46	7	42	7	38	7	31	7	22	7	58	8	05	8	26
	24	8	40	8	32	8	24	8	14	8	03	7	47	7	58	8	39	8	37	9	05
	25	9	28	9	16	9	03	8	48	8	29	8	04	8	35	9	21	9	12	9	44
	26	10	17	10	01	9	44	9	24	8	59	8	25	9	15	10	05	9	48	10	25
	27	11	07	10	48	10	27	10	04	9	34	8	51	9	58	10	51	10	28	11	09
	28	11	58	11	37	11	14	10	48	10	14	9	25	10	44	11	40	11	14	11	57
Mar.	1	12	50	12	28	12	04	11	37	11	02	10	09	11	34	12	30	12	03	12	47
	2	13	41	13	20	12	57	12	30	11	55	11	04	12	26	13	22	12	55	13	39
	3	14	31	14	11	13	50	13	25	12	54	12	07	13	20	14	14	13	51	14	32
	4	15	19	15	02	14	43	14	22	13	55	13	16	14	14	15	06	14	47	15	25
	5	16	04	15	51	15	36	15	19	14	58	14	28	15	08	15	56	15	43	16	17
	6	16	48	16	38	16	28	16	15	16	00	15	39	16	00	16	44	16	39	17	09
	7	17	30	17	25	17	18	17	11	17	03	16	51	16	52	17	32	17	34	17	59
	8	18	12	18	11	18	09	18	07	18	05	18	02	17	45	18	19	18	29	18	49
	9	18	54	18	57	19	01	19	04	19	09	19	15	18	37	19	08	19	26	19	40
	10	19	38	19	46	19	54	20	03	20	14	20	30	19	32	19	57	20	23	20	33
	11	20	25	20	37	20	49	21	04	21	22	21	47	20	28	20	50	21	24	21	28
	12	21	15	21	31	21	48	22	08	22	33	23	08	21	29	21	46	22	27	22	26
	13	22	10	22	29	22	50	23	14	23	44	**	**	22	31	22	44	23	32	23	28
	14	23	08	23	30	23	53	**	**	**	**	0	28	23	35	23	46	**	**	**	**
	15	**	**	**	**	**	**	0	19	0	54	1	44	**	**	**	**	0	37	0	30
	16	0	10	0	32	0	55	1	23	1	58	2	49	0	37	0	48	1	41	1	33
	17	1	11	1	32	1	54	2	20	2	52	3	39	1	36	1	48	2	38	2	32
	18	2	12	2	29	2	48	3	10	3	37	4	16	2	29	2	44	3	29	3	27
	19	3	08	3	22	3	37	3	54	4	14	4	42	3	17	3	36	4	13	4	15
	20	4	02	4	11	4	21	4	32	4	45	5	03	3	59	4	23	4	52	4	59
	21	4	52	4	56	5	01	5	06	5	12	5	20	4	38	5	07	5	27	5	40
	22	5	41	5	40	5	39	5	38	5	37	5	36	5	15	5	49	6	00	6	19
	23	6	28	6	23	6	17	6	10	6	02	5	51	5	52	6	30	6	33	6	57
	24	7	16	7	06	6	55	6	43	6	28	6	08	6	28	7	12	7	07	7	37
	25	8	05	7	51	7	36	7	19	6	57	6	27	7	08	7	56	7	43	8	17
	26	8	56	8	38	8	19	7	57	7	30	6	51	7	50	8	42	8	22	9	01
	27	9	48	9	28	9	06	8	41	8	09	7	22	8	35	9	31	9	06	9	48
	28	10	41	10	19	9	56	9	29	8	54	8	03	9	25	10	21	9	54	10	38
	29	11	33	11	11	10	48	10	21	9	46	8	54	10	17	11	13	10	46	11	30
	30	12	24	12	03	11	41	11	15	10	43	9	55	11	11	12	06	11	41	12	23
	31	13	12	12	54	12	35	12	12	11	43	11	02	12	05	12	57	12	37	13	17
Apr.	1	13	58	13	43	13	27	13	09	12	45	12	12	12	58	13	48	13	33	14	09
	2	14	43	14	31	14	19	14	05	13	47	13	23	13	51	14	37	14	28	15	00

The symbol (**) indicates that the phenomenon will occur on the next day

MOONRISE, 2027

LOCAL MEAN TIME AND INDIAN STANDARD TIME OF MOONRISE (MOON'S UPPER LIMB)

Date		FOR THE CENTRAL MERIDIAN OF INDIA (82º.5 E) IN L. M. T.												FOR CERTAIN STATIONS IN INDIA IN I.S.T.							
Lat.		0º		10º		20º		30º		40º		50º		Kolkata		Chennai		Delhi		Mumbai	
		h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m
Apr.	1	1	36	1	53	2	11	2	31	2	56	3	32	1	52	2	08	2	50	2	49
	2	2	22	2	35	2	49	3	05	3	25	3	52	2	29	2	48	3	24	3	27
	3	3	05	3	14	3	24	3	35	3	49	4	08	3	03	3	27	3	56	4	03
	4	3	47	3	52	3	58	4	04	4	12	4	22	3	36	4	03	4	25	4	37
	5	4	29	4	30	4	31	4	32	4	34	4	36	4	08	4	40	4	54	5	11
	6	5	12	5	09	5	05	5	01	4	56	4	50	4	40	5	17	5	23	5	45
	7	5	57	5	49	5	41	5	32	5	20	5	05	5	15	5	56	5	55	6	21
	8	6	45	6	33	6	20	6	05	5	47	5	22	5	53	6	38	6	29	7	01
	9	7	38	7	21	7	04	6	44	6	20	5	45	6	35	7	26	7	09	7	46
	10	8	34	8	14	7	54	7	30	6	59	6	16	7	24	8	17	7	55	8	36
	11	9	34	9	13	8	50	8	23	7	49	7	00	8	19	9	15	8	49	9	33
	12	10	36	10	14	9	51	9	24	8	49	7	58	9	20	10	17	9	50	10	34
	13	11	37	11	17	10	56	10	30	9	58	9	11	10	25	11	20	10	56	11	38
	14	12	36	12	19	12	01	11	39	11	12	10	34	11	31	12	22	12	04	12	42
	15	13	31	13	18	13	04	12	48	12	27	11	59	12	35	13	23	13	12	13	46
	16	14	22	14	14	14	05	13	54	13	41	13	23	13	38	14	20	14	17	14	45
	17	15	11	15	07	15	03	14	59	14	53	14	46	14	37	15	15	15	21	15	44
	18	15	58	15	59	16	00	16	02	16	03	16	06	15	36	16	08	16	23	16	40
	19	16	45	16	50	16	57	17	04	17	13	17	25	16	34	17	02	17	25	17	36
	20	17	32	17	42	17	54	18	06	18	23	18	45	17	33	17	55	18	26	18	32
	21	18	21	18	36	18	51	19	09	19	32	20	04	18	31	18	49	19	29	19	30
	22	19	12	19	30	19	49	20	11	20	40	21	21	19	30	19	45	20	30	20	27
	23	20	04	20	25	20	47	21	12	21	45	22	33	20	28	20	40	21	31	21	25
	24	20	57	21	19	21	42	22	09	22	44	23	35	21	25	21	36	22	27	22	20
	25	21	50	22	11	22	34	23	01	23	35	**	**	22	17	22	27	23	19	23	12
	26	22	41	23	01	23	22	23	47	**	**	0	25	23	04	23	17	**	**	**	**
	27	23	29	23	47	**	**	**	**	0	18	1	04	23	47	**	**	0	05	0	00
	28	**	**	**	**	0	06	0	27	0	54	1	32	**	**	0	02	0	46	0	43
	29	0	15	0	30	0	45	1	03	1	24	1	55	0	25	0	43	1	22	1	23
	30	0	59	1	10	1	21	1	34	1	50	2	12	1	01	1	23	1	54	2	00
May	1	1	41	1	48	1	55	2	03	2	14	2	27	1	34	1	59	2	24	2	34
	2	2	23	2	25	2	28	2	32	2	36	2	41	2	05	2	35	2	53	3	08
	3	3	05	3	03	3	02	3	00	2	58	2	55	2	37	3	12	3	22	3	42
	4	3	49	3	43	3	36	3	29	3	21	3	09	3	11	3	50	3	52	4	17
	5	4	36	4	25	4	14	4	02	3	47	3	26	3	47	4	31	4	25	4	55
	6	5	27	5	12	4	57	4	39	4	17	3	47	4	28	5	17	5	03	5	38
	7	6	23	6	05	5	45	5	23	4	55	4	15	5	16	6	08	5	48	6	27
	8	7	23	7	03	6	40	6	14	5	42	4	55	6	09	7	05	6	40	7	23
	9	8	27	8	05	7	42	7	15	6	40	5	49	7	11	8	07	7	41	8	24
	10	9	30	9	09	8	47	8	21	7	48	7	00	8	16	9	12	8	47	9	30
	11	10	31	10	13	9	53	9	31	9	03	8	22	9	24	10	16	9	56	10	36
	12	11	27	11	13	10	58	10	40	10	18	9	48	10	29	11	18	11	05	11	40
	13	12	20	12	10	11	59	11	48	11	33	11	12	11	32	12	16	12	11	12	41
	14	13	08	13	03	12	58	12	52	12	44	12	34	12	32	13	11	13	15	13	39
	15	13	55	13	55	13	54	13	54	13	54	13	53	13	30	14	04	14	16	14	34
	16	14	41	14	45	14	50	14	55	15	02	15	11	14	27	14	56	15	17	15	30
	17	15	27	15	36	15	45	15	56	16	10	16	29	15	24	15	48	16	16	16	24

The symbol (**) indicates that the phenomenon will occur on the next day

MOONSET, 2027
LOCAL MEAN TIME AND INDIAN STANDARD TIME OF
MOONSET (MOON'S UPPER LIMB)

		FOR THE CENTRAL MERIDIAN OF INDIA (82º.5 E) IN L. M. T.												FOR CERTAIN STATIONS IN INDIA IN I.S.T.							
Date \ Lat.		0º		10º		20º		30º		40º		50º		Kolkata		Chennai		Delhi		Mumbai	
		h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m
Apr.	1	13	58	13	43	13	27	13	09	12	45	12	12	12	58	13	48	13	33	14	09
	2	14	43	14	31	14	19	14	05	13	47	13	23	13	51	14	37	14	28	15	00
	3	15	25	15	18	15	10	15	01	14	50	14	34	14	43	15	25	15	24	15	51
	4	16	07	16	04	16	01	15	57	15	52	15	45	15	36	16	12	16	19	16	41
	5	16	50	16	51	16	52	16	54	16	55	16	58	16	28	17	00	17	15	17	32
	6	17	33	17	39	17	45	17	52	18	01	18	13	17	23	17	50	18	13	18	24
	7	18	20	18	30	18	41	18	53	19	09	19	31	18	19	18	42	19	14	19	20
	8	19	10	19	24	19	40	19	58	20	20	20	52	19	20	19	38	20	17	20	18
	9	20	04	20	22	20	42	21	04	21	33	22	14	20	22	20	37	21	23	21	20
	10	21	02	21	23	21	46	22	11	22	45	23	33	21	28	21	39	22	30	22	23
	11	22	04	22	26	22	49	23	16	23	51	**	**	22	31	22	42	23	35	23	27
	12	23	06	23	27	23	49	**	**	**	**	0	42	23	32	23	43	**	**	**	**
	13	**	**	**	**	**	**	0	16	0	49	1	37	**	**	**	**	0	33	0	27
	14	0	06	0	25	0	45	1	07	1	36	2	17	0	26	0	40	1	26	1	23
	15	1	03	1	18	1	34	1	52	2	15	2	46	1	14	1	32	2	11	2	12
	16	1	56	2	06	2	18	2	31	2	46	3	08	1	57	2	19	2	50	2	56
	17	2	46	2	52	2	58	3	05	3	14	3	26	2	36	3	03	3	26	3	37
	18	3	33	3	34	3	36	3	37	3	39	3	41	3	12	3	44	3	59	4	15
	19	4	20	4	17	4	13	4	09	4	03	3	57	3	48	4	24	4	31	4	53
	20	5	07	4	59	4	50	4	41	4	29	4	12	4	24	5	06	5	04	5	31
	21	5	55	5	43	5	30	5	15	4	56	4	31	5	02	5	48	5	39	6	11
	22	6	45	6	29	6	12	5	52	5	27	4	53	5	43	6	33	6	16	6	53
	23	7	37	7	18	6	57	6	33	6	04	5	21	6	27	7	21	6	59	7	39
	24	8	30	8	09	7	46	7	20	6	46	5	58	7	16	8	11	7	46	8	28
	25	9	23	9	01	8	38	8	11	7	36	6	45	8	07	9	03	8	36	9	21
	26	10	15	9	54	9	31	9	05	8	32	7	42	9	01	9	56	9	31	10	14
	27	11	05	10	46	10	25	10	01	9	31	8	47	9	55	10	49	10	26	11	07
	28	11	52	11	35	11	18	10	58	10	33	9	56	10	49	11	40	11	23	12	00
	29	12	36	12	24	12	10	11	54	11	34	11	06	11	42	12	28	12	18	12	51
	30	13	19	13	10	13	01	12	50	12	36	12	17	12	33	13	17	13	13	13	42
May	1	14	01	13	56	13	51	13	45	13	37	13	27	13	25	14	04	14	07	14	31
	2	14	43	14	42	14	41	14	41	14	40	14	38	14	17	14	51	15	02	15	21
	3	15	26	15	29	15	33	15	38	15	44	15	51	15	10	15	40	15	59	16	13
	4	16	11	16	19	16	28	16	38	16	50	17	08	16	06	16	31	16	58	17	07
	5	17	00	17	12	17	26	17	41	18	01	18	28	17	05	17	26	18	01	18	04
	6	17	53	18	10	18	27	18	48	19	14	19	51	18	08	18	24	19	07	19	06
	7	18	51	19	11	19	32	19	57	20	28	21	14	19	14	19	27	20	15	20	10
	8	19	53	20	15	20	38	21	05	21	39	22	30	20	20	20	31	21	23	21	16
	9	20	57	21	18	21	41	22	08	22	42	23	31	21	24	21	35	22	26	22	19
	10	21	59	22	19	22	40	23	03	23	33	**	**	22	21	22	34	23	22	23	18
	11	22	58	23	14	23	31	23	51	**	**	0	16	23	12	23	29	**	**	**	**
	12	23	53	**	**	**	**	**	**	0	15	0	49	23	57	**	**	0	10	0	09
	13	**	**	0	05	0	17	0	31	0	49	1	13	**	**	0	17	0	51	0	56
	14	0	43	0	50	0	58	1	07	1	18	1	32	0	36	1	02	1	28	1	37
	15	1	31	1	33	1	36	1	39	1	43	1	48	1	13	1	44	2	00	2	15
	16	2	17	2	15	2	13	2	10	2	07	2	03	1	48	2	23	2	32	2	52
	17	3	03	2	56	2	49	2	41	2	31	2	18	2	23	3	03	3	04	3	30

The symbol (**) indicates that the phenomenon will occur on the next day

MOONRISE, 2027

LOCAL MEAN TIME AND INDIAN STANDARD TIME OF MOONRISE (MOON'S UPPER LIMB)

Date		FOR THE CENTRAL MERIDIAN OF INDIA (82º.5 E) IN L. M. T.												FOR CERTAIN STATIONS IN INDIA IN I.S.T.							
	Lat.	0º		10º		20º		30º		40º		50º		Kolkata		Chennai		Delhi		Mumbai	
		h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m
May	17	15	27	15	36	15	45	15	56	16	10	16	29	15	24	15	48	16	16	16	24
	18	16	14	16	28	16	42	16	58	17	18	17	46	16	21	16	41	17	18	17	20
	19	17	04	17	21	17	39	17	59	18	26	19	03	17	19	17	36	18	18	18	17
	20	17	55	18	15	18	36	19	00	19	31	20	17	18	17	18	30	19	19	19	14
	21	18	48	19	09	19	32	19	59	20	32	21	22	19	14	19	26	20	17	20	10
	22	19	41	20	03	20	26	20	53	21	27	22	17	20	08	20	19	21	11	21	04
	23	20	33	20	53	21	15	21	41	22	13	23	00	20	58	21	10	21	59	21	53
	24	21	22	21	41	22	01	22	23	22	52	23	33	21	43	21	56	22	42	22	38
	25	22	09	22	25	22	41	23	00	23	24	23	57	22	22	22	39	23	20	23	20
	26	22	53	23	06	23	19	23	33	23	51	**	**	22	58	23	19	23	53	23	57
	27	23	36	23	44	23	53	**	**	**	**	0	16	23	32	23	56	**	**	**	**
	28	**	**	**	**	**	**	0	03	0	15	0	32	**	**	**	**	0	23	0	32
	29	0	17	0	21	0	26	0	31	0	37	0	46	0	03	0	32	0	52	1	05
	30	0	58	0	58	0	58	0	59	0	59	0	59	0	34	1	08	1	20	1	38
	31	1	40	1	36	1	32	1	27	1	21	1	13	1	07	1	44	1	49	2	12
June	1	2	25	2	17	2	08	1	58	1	45	1	29	1	41	2	23	2	20	2	48
	2	3	14	3	01	2	47	2	32	2	13	1	47	2	19	3	06	2	56	3	29
	3	4	07	3	51	3	33	3	13	2	47	2	12	3	04	3	54	3	37	4	14
	4	5	06	4	46	4	25	4	01	3	30	2	46	3	55	4	49	4	26	5	07
	5	6	10	5	48	5	25	4	58	4	24	3	35	4	54	5	50	5	24	6	07
	6	7	15	6	54	6	31	6	04	5	31	4	41	6	00	6	56	6	30	7	14
	7	8	19	8	00	7	39	7	16	6	45	6	01	7	09	8	03	7	41	8	22
	8	9	19	9	04	8	47	8	28	8	04	7	29	8	18	9	08	8	52	9	29
	9	10	14	10	03	9	52	9	38	9	21	8	57	9	24	10	09	10	02	10	33
	10	11	05	10	59	10	52	10	45	10	35	10	22	10	26	11	06	11	08	11	33
	11	11	53	11	52	11	50	11	48	11	46	11	43	11	26	12	01	12	10	12	30
	12	12	39	12	43	12	46	12	50	12	55	13	01	12	22	12	53	13	11	13	26
	13	13	25	13	33	13	41	13	51	14	02	14	18	13	19	13	45	14	11	14	20
	14	14	12	14	24	14	36	14	51	15	10	15	35	14	16	14	37	15	11	15	15
	15	15	00	15	16	15	32	15	52	16	16	16	51	15	13	15	30	16	11	16	11
	16	15	50	16	09	16	29	16	52	17	22	18	05	16	10	16	24	17	11	17	07
	17	16	42	17	03	17	25	17	51	18	24	19	13	17	07	17	19	18	09	18	03
	18	17	35	17	56	18	19	18	46	19	21	20	11	18	02	18	12	19	04	18	57
	19	18	27	18	48	19	10	19	36	20	09	20	58	18	52	19	04	19	55	19	48
	20	19	17	19	36	19	57	20	21	20	51	21	33	19	39	19	52	20	39	20	35
	21	20	05	20	21	20	39	20	59	21	25	22	00	20	20	20	36	21	19	21	17
	22	20	50	21	03	21	17	21	33	21	53	22	21	20	57	21	17	21	53	21	56
	23	21	33	21	42	21	52	22	04	22	18	22	38	21	32	21	55	22	24	22	31
	24	22	14	22	19	22	25	22	32	22	41	22	52	22	03	22	30	22	53	23	04
	25	22	54	22	56	22	57	22	59	23	02	23	05	22	34	23	06	23	21	23	37
	26	23	35	23	32	23	30	23	27	23	23	23	18	23	05	23	41	23	49	**	**
	27	**	**	**	**	**	**	23	55	23	46	23	33	23	38	**	**	**	**	0	09
	28	0	17	0	11	0	03	**	**	**	**	23	49	**	**	0	18	0	18	0	44
	29	1	03	0	52	0	40	0	27	0	11	**	**	0	13	0	58	0	51	1	22
	30	1	53	1	38	1	22	1	04	0	41	0	10	0	53	1	43	1	28	2	03
July	1	2	48	2	30	2	10	1	47	1	19	0	39	1	41	2	33	2	12	2	52
	2	3	49	3	28	3	06	2	40	2	07	1	19	2	35	3	31	3	05	3	48

The symbol (**) indicates that the phenomenon will occur on the next day

MOONSET, 2027
LOCAL MEAN TIME AND INDIAN STANDARD TIME OF
MOONSET (MOON'S UPPER LIMB)

Date	Lat.	FOR THE CENTRAL MERIDIAN OF INDIA (82º.5 E) IN L. M. T.												FOR CERTAIN STATIONS IN INDIA IN I.S.T.							
		0º		10º		20º		30º		40º		50º		Kolkata		Chennai		Delhi		Mumbai	
		h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m
May	17	3	03	2	56	2	49	2	41	2	31	2	18	2	23	3	03	3	04	3	30
	18	3	50	3	39	3	27	3	14	2	58	2	35	3	00	3	45	3	37	4	08
	19	4	38	4	23	4	07	3	49	3	27	2	56	3	39	4	27	4	13	4	49
	20	5	28	5	10	4	51	4	29	4	01	3	21	4	21	5	14	4	54	5	33
	21	6	21	6	00	5	38	5	13	4	41	3	55	5	08	6	03	5	39	6	20
	22	7	14	6	52	6	29	6	02	5	28	4	38	5	59	6	55	6	28	7	12
	23	8	06	7	45	7	22	6	56	6	22	5	32	6	52	7	48	7	22	8	05
	24	8	57	8	38	8	16	7	52	7	20	6	35	7	46	8	40	8	17	8	59
	25	9	45	9	28	9	10	8	48	8	21	7	42	8	40	9	32	9	13	9	52
	26	10	31	10	17	10	02	9	45	9	23	8	52	9	34	10	21	10	09	10	43
	27	11	14	11	04	10	53	10	40	10	24	10	02	10	25	11	10	11	03	11	34
	28	11	56	11	49	11	42	11	34	11	25	11	11	11	16	11	56	11	57	12	23
	29	12	36	12	34	12	32	12	29	12	25	12	20	12	07	12	42	12	51	13	12
	30	13	18	13	20	13	22	13	24	13	27	13	31	12	58	13	30	13	46	14	02
	31	14	01	14	07	14	14	14	22	14	31	14	45	13	52	14	18	14	42	14	53
June	1	14	48	14	58	15	10	15	23	15	39	16	02	14	48	15	11	15	43	15	49
	2	15	38	15	53	16	09	16	28	16	51	17	23	15	49	16	07	16	47	16	48
	3	16	35	16	53	17	13	17	36	18	05	18	47	16	54	17	08	17	55	17	51
	4	17	36	17	57	18	19	18	46	19	19	20	08	18	01	18	13	19	04	18	57
	5	18	41	19	02	19	26	19	53	20	27	21	17	19	08	19	19	20	10	20	03
	6	19	46	20	06	20	28	20	53	21	25	22	10	20	10	20	22	21	12	21	06
	7	20	48	21	06	21	24	21	45	22	12	22	49	21	05	21	21	22	04	22	02
	8	21	46	21	59	22	13	22	29	22	49	23	16	21	53	22	13	22	49	22	52
	9	22	39	22	48	22	57	23	07	23	20	23	37	22	35	23	00	23	28	23	36
	10	23	28	23	32	23	37	23	41	23	47	23	54	23	14	23	43	**	**	**	**
	11	**	**	**	**	**	**	**	**	**	**	**	**	23	50	**	**	0	02	0	16
	12	0	15	0	15	0	14	0	13	0	11	0	10	**	**	0	23	0	34	0	53
	13	1	01	0	56	0	50	0	44	0	36	0	25	0	24	1	03	1	06	1	31
	14	1	47	1	38	1	27	1	15	1	01	0	41	1	00	1	44	1	39	2	08
	15	2	35	2	21	2	06	1	50	1	29	1	00	1	39	2	26	2	13	2	47
	16	3	24	3	07	2	48	2	27	2	01	1	24	2	19	3	11	2	52	3	30
	17	4	15	3	55	3	34	3	10	2	39	1	54	3	04	3	58	3	35	4	16
	18	5	07	4	46	4	23	3	57	3	23	2	34	3	53	4	49	4	22	5	06
	19	6	00	5	39	5	16	4	49	4	15	3	24	4	45	5	41	5	15	5	58
	20	6	51	6	31	6	09	5	44	5	11	4	24	5	39	6	34	6	09	6	52
	21	7	41	7	22	7	03	6	40	6	12	5	31	6	33	7	26	7	06	7	45
	22	8	27	8	12	7	56	7	37	7	13	6	40	7	27	8	16	8	01	8	37
	23	9	11	8	59	8	47	8	32	8	15	7	50	8	19	9	05	8	56	9	28
	24	9	52	9	45	9	36	9	27	9	15	8	59	9	10	9	51	9	50	10	17
	25	10	33	10	29	10	25	10	21	10	15	10	07	10	00	10	37	10	43	11	05
	26	11	13	11	14	11	14	11	15	11	15	11	16	10	50	11	23	11	37	11	54
	27	11	55	11	59	12	04	12	10	12	17	12	26	11	42	12	10	12	31	12	44
	28	12	39	12	47	12	57	13	08	13	21	13	40	12	35	12	59	13	28	13	36
	29	13	26	13	39	13	53	14	09	14	29	14	58	13	33	13	53	14	29	14	31
	30	14	18	14	35	14	53	15	14	15	41	16	19	14	34	14	50	15	34	15	32
July	1	15	16	15	36	15	58	16	23	16	54	17	41	15	40	15	52	16	41	16	36
	2	16	19	16	41	17	04	17	31	18	05	18	56	16	46	16	57	17	49	17	42

The symbol (**) indicates that the phenomenon will occur on the next day

MOONRISE, 2027

LOCAL MEAN TIME AND INDIAN STANDARD TIME OF MOONRISE (MOON'S UPPER LIMB)

Date		FOR THE CENTRAL MERIDIAN OF INDIA (82º.5 E) IN L. M. T.												FOR CERTAIN STATIONS IN INDIA IN I.S.T.							
Lat.		0º		10º		20º		30º		40º		50º		Kolkata		Chennai		Delhi		Mumbai	
		h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m
July	1	2	48	2	30	2	10	1	47	1	19	0	39	1	41	2	33	2	12	2	52
	2	3	49	3	28	3	06	2	40	2	07	1	19	2	35	3	31	3	05	3	48
	3	4	54	4	32	4	09	3	42	3	07	2	17	3	38	4	34	4	07	4	51
	4	6	00	5	39	5	17	4	52	4	19	3	32	4	46	5	42	5	17	6	00
	5	7	03	6	46	6	27	6	06	5	38	4	59	5	57	6	49	6	30	7	09
	6	8	02	7	49	7	35	7	19	6	59	6	31	7	07	7	54	7	44	8	17
	7	8	57	8	49	8	40	8	30	8	17	8	00	8	13	8	55	8	53	9	21
	8	9	48	9	44	9	41	9	37	9	32	9	25	9	16	9	53	9	59	10	21
	9	10	36	10	37	10	39	10	41	10	44	10	47	10	15	10	47	11	03	11	19
	10	11	23	11	29	11	36	11	44	11	53	12	07	11	13	11	41	12	04	12	15
	11	12	10	12	20	12	32	12	45	13	02	13	25	12	11	12	33	13	05	13	11
	12	12	58	13	12	13	28	13	46	14	09	14	42	13	08	13	27	14	05	14	06
	13	13	47	14	05	14	24	14	47	15	15	15	56	14	05	14	20	15	06	15	03
	14	14	38	14	59	15	20	15	46	16	18	17	06	15	02	15	15	16	04	15	58
	15	15	30	15	52	16	15	16	42	17	16	18	07	15	57	16	08	17	00	16	53
	16	16	22	16	44	17	07	17	33	18	07	18	57	16	49	17	00	17	52	17	45
	17	17	13	17	33	17	54	18	19	18	50	19	35	17	37	17	49	18	37	18	32
	18	18	02	18	19	18	38	18	59	19	26	20	04	18	19	18	34	19	18	19	16
	19	18	48	19	02	19	17	19	35	19	57	20	27	18	58	19	16	19	54	19	56
	20	19	31	19	42	19	53	20	06	20	23	20	45	19	33	19	55	20	26	20	32
	21	20	12	20	19	20	27	20	35	20	46	20	59	20	05	20	31	20	56	21	06
	22	20	53	20	56	20	59	21	03	21	07	21	13	20	36	21	06	21	24	21	38
	23	21	33	21	32	21	31	21	29	21	28	21	26	21	07	21	41	21	51	22	10
	24	22	14	22	09	22	03	21	57	21	49	21	39	21	38	22	16	22	19	22	43
	25	22	57	22	48	22	38	22	27	22	13	21	54	22	11	22	54	22	50	23	19
	26	23	44	23	31	23	16	23	00	22	40	22	13	22	48	23	36	23	24	23	58
	27	**	**	**	**	**	**	23	39	23	13	22	37	23	31	**	**	**	**	**	**
	28	0	35	0	18	0	00	**	**	23	55	23	10	**	**	0	22	0	04	0	42
	29	1	32	1	12	0	51	0	26	**	**	23	58	0	20	1	15	0	51	1	33
	30	2	33	2	12	1	49	1	22	0	48	**	**	1	18	2	14	1	48	2	31
	31	3	38	3	16	2	53	2	27	1	53	1	03	2	22	3	19	2	53	3	36
Aug.	1	4	42	4	23	4	02	3	39	3	08	2	24	3	32	4	26	4	04	4	45
	2	5	44	5	29	5	12	4	53	4	29	3	55	4	43	5	33	5	18	5	54
	3	6	42	6	31	6	20	6	06	5	50	5	27	5	52	6	37	6	30	7	01
	4	7	35	7	30	7	24	7	17	7	08	6	57	6	57	7	37	7	40	8	04
	5	8	26	8	26	8	25	8	25	8	24	8	23	8	00	8	34	8	46	9	05
	6	9	15	9	20	9	24	9	30	9	37	9	46	9	01	9	31	9	51	10	04
	7	10	04	10	13	10	23	10	34	10	48	11	07	10	01	10	25	10	54	11	02
	8	10	53	11	06	11	20	11	37	11	58	12	27	11	00	11	20	11	57	11	59
	9	11	43	12	00	12	18	12	39	13	06	13	44	11	59	12	14	12	58	12	56
	10	12	34	12	54	13	15	13	39	14	11	14	57	12	56	13	09	13	58	13	53
	11	13	26	13	47	14	10	14	37	15	11	16	01	13	53	14	04	14	55	14	48
	12	14	18	14	40	15	03	15	30	16	04	16	55	14	45	14	56	15	48	15	41
	13	15	10	15	30	15	52	16	17	16	50	17	37	15	34	15	46	16	36	16	30
	14	15	59	16	17	16	37	16	59	17	28	18	08	16	18	16	32	17	18	17	15
	15	16	45	17	01	17	17	17	36	18	00	18	33	16	58	17	15	17	56	17	56
	16	17	30	17	42	17	54	18	09	18	27	18	52	17	34	17	55	18	28	18	33

The symbol (**) indicates that the phenomenon will occur on the next day

MOONSET, 2027
LOCAL MEAN TIME AND INDIAN STANDARD TIME OF
MOONSET (MOON'S UPPER LIMB)

Date	Lat.	FOR THE CENTRAL MERIDIAN OF INDIA (82º.5 E) IN L. M. T.												FOR CERTAIN STATIONS IN INDIA IN I.S.T.							
		0º		10º		20º		30º		40º		50º		Kolkata		Chennai		Delhi		Mumbai	
		h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m
July	1	15	16	15	36	15	58	16	23	16	54	17	41	15	40	15	52	16	41	16	36
	2	16	19	16	41	17	04	17	31	18	05	18	56	16	46	16	57	17	49	17	42
	3	17	25	17	46	18	09	18	35	19	09	19	57	17	51	18	03	18	54	18	47
	4	18	30	18	49	19	09	19	33	20	02	20	43	18	51	19	05	19	51	19	48
	5	19	32	19	47	20	03	20	22	20	44	21	16	19	44	20	01	20	41	20	41
	6	20	29	20	39	20	51	21	03	21	19	21	40	20	29	20	52	21	24	21	30
	7	21	21	21	27	21	33	21	40	21	48	21	59	21	11	21	38	22	01	22	12
	8	22	11	22	11	22	12	22	13	22	14	22	16	21	49	22	21	22	35	22	52
	9	22	58	22	54	22	50	22	45	22	39	22	31	22	25	23	02	23	08	23	30
	10	23	45	23	36	23	27	23	17	23	05	22	48	23	01	23	43	23	40	**	**
	11	**	**	**	**	**	**	23	51	23	32	23	06	23	39	**	**	**	**	0	08
	12	0	32	0	20	0	06	**	**	**	**	23	28	**	**	0	25	0	14	0	47
	13	1	21	1	05	0	47	0	27	0	03	23	56	0	18	1	09	0	52	1	29
	14	2	12	1	52	1	32	1	08	0	38	**	**	1	02	1	56	1	34	2	14
	15	3	03	2	42	2	20	1	54	1	21	0	32	1	50	2	45	2	19	3	02
	16	3	56	3	34	3	11	2	44	2	10	1	19	2	40	3	37	3	10	3	53
	17	4	47	4	26	4	04	3	38	3	05	2	16	3	34	4	29	4	03	4	46
	18	5	37	5	18	4	58	4	34	4	04	3	20	4	27	5	21	4	59	5	40
	19	6	24	6	08	5	51	5	31	5	05	4	29	5	22	6	12	5	55	6	32
	20	7	09	6	56	6	42	6	27	6	07	5	39	6	14	7	01	6	50	7	24
	21	7	51	7	42	7	32	7	21	7	08	6	49	7	05	7	48	7	45	8	13
	22	8	32	8	27	8	21	8	15	8	08	7	57	7	56	8	34	8	37	9	02
	23	9	12	9	11	9	10	9	09	9	07	9	05	8	45	9	20	9	31	9	50
	24	9	52	9	56	9	59	10	03	10	08	10	14	9	36	10	06	10	24	10	38
	25	10	34	10	42	10	50	10	59	11	10	11	25	10	27	10	53	11	19	11	29
	26	11	19	11	31	11	43	11	57	12	15	12	39	11	22	11	44	12	17	12	21
	27	12	08	12	23	12	40	12	59	13	23	13	57	12	20	12	37	13	18	13	18
	28	13	02	13	20	13	41	14	04	14	34	15	16	13	22	13	36	14	22	14	18
	29	14	01	14	22	14	44	15	11	15	44	16	33	14	26	14	38	15	29	15	23
	30	15	04	15	25	15	49	16	16	16	50	17	41	15	31	15	42	16	34	16	26
	31	16	09	16	29	16	51	17	16	17	48	18	33	16	32	16	45	17	35	17	29
Aug.	1	17	12	17	29	17	48	18	09	18	35	19	12	17	29	17	44	18	27	18	26
	2	18	12	18	25	18	39	18	54	19	14	19	40	18	18	18	38	19	14	19	17
	3	19	08	19	16	19	24	19	34	19	46	20	02	19	03	19	28	19	55	20	03
	4	20	00	20	03	20	06	20	10	20	14	20	20	19	43	20	13	20	31	20	45
	5	20	50	20	48	20	46	20	43	20	40	20	36	20	21	20	56	21	05	21	26
	6	21	38	21	31	21	24	21	16	21	06	20	53	20	58	21	39	21	39	22	05
	7	22	27	22	16	22	04	21	50	21	33	21	11	21	37	22	21	22	14	22	45
	8	23	16	23	01	22	45	22	27	22	04	21	32	22	16	23	06	22	51	23	27
	9	**	**	23	49	23	29	23	07	22	38	21	58	23	00	23	52	23	32	**	**
	10	0	07	**	**	**	**	23	51	23	19	22	32	23	46	**	**	**	**	0	11
	11	0	59	0	38	0	16	**	**	**	**	23	15	**	**	0	41	0	16	0	59
	12	1	52	1	30	1	07	0	40	0	06	**	**	0	36	1	32	1	06	1	49
	13	2	43	2	22	1	59	1	33	0	59	0	09	1	29	2	24	1	58	2	42
	14	3	34	3	14	2	53	2	28	1	57	1	11	2	22	3	17	2	54	3	35
	15	4	22	4	04	3	46	3	25	2	58	2	19	3	17	4	08	3	50	4	28
	16	5	07	4	53	4	38	4	21	3	59	3	29	4	09	4	58	4	45	5	20

The symbol (**) indicates that the phenomenon will occur on the next day

MOONRISE, 2027

LOCAL MEAN TIME AND INDIAN STANDARD TIME OF MOONRISE (MOON'S UPPER LIMB)

Date		FOR THE CENTRAL MERIDIAN OF INDIA (82º.5 E) IN L. M. T.												FOR CERTAIN STATIONS IN INDIA IN I.S.T.							
	Lat.	0º		10º		20º		30º		40º		50º		Kolkata		Chennai		Delhi		Mumbai	
		h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m
Aug.	16	17	30	17	42	17	54	18	09	18	27	18	52	17	34	17	55	18	28	18	33
	17	18	12	18	20	18	29	18	39	18	51	19	07	18	07	18	32	18	59	19	08
	18	18	53	18	57	19	01	19	07	19	13	19	21	18	39	19	08	19	28	19	41
	19	19	33	19	33	19	33	19	34	19	34	19	34	19	10	19	43	19	55	20	13
	20	20	14	20	10	20	05	20	01	19	55	19	48	19	41	20	17	20	23	20	45
	21	20	56	20	48	20	39	20	30	20	18	20	02	20	13	20	54	20	53	21	20
	22	21	41	21	29	21	16	21	01	20	43	20	19	20	48	21	34	21	25	21	57
	23	22	30	22	14	21	57	21	38	21	14	20	40	21	28	22	18	22	02	22	38
	24	23	23	23	04	22	43	22	20	21	51	21	09	22	13	23	07	22	45	23	26
	25	**	**	23	59	23	37	23	11	22	38	21	49	23	06	**	**	23	36	**	**
	26	0	20	**	**	**	**	**	**	23	35	22	45	**	**	0	02	**	**	0	19
	27	1	21	1	00	0	37	0	10	**	**	23	57	0	06	1	02	0	35	1	19
	28	2	24	2	04	1	42	1	16	0	44	**	**	1	11	2	06	1	42	2	24
	29	3	25	3	08	2	49	2	28	2	01	1	21	2	19	3	12	2	53	3	32
	30	4	24	4	11	3	57	3	41	3	20	2	52	3	29	4	16	4	05	4	38
	31	5	20	5	11	5	02	4	52	4	39	4	22	4	35	5	18	5	16	5	44
Sept.	1	6	12	6	09	6	05	6	02	5	57	5	50	5	40	6	17	6	24	6	46
	2	7	03	7	05	7	07	7	09	7	12	7	16	6	43	7	15	7	31	7	47
	3	7	53	7	59	8	07	8	15	8	26	8	41	7	45	8	11	8	36	8	46
	4	8	43	8	54	9	06	9	21	9	39	10	03	8	45	9	07	9	41	9	46
	5	9	34	9	49	10	06	10	25	10	50	11	24	9	46	10	03	10	44	10	44
	6	10	26	10	45	11	05	11	28	11	58	12	41	10	46	11	00	11	47	11	43
	7	11	19	11	40	12	02	12	28	13	01	13	50	11	44	11	56	12	46	12	40
	8	12	12	12	34	12	57	13	24	13	58	14	49	12	39	12	50	13	42	13	35
	9	13	04	13	25	13	48	14	14	14	47	15	35	13	30	13	42	14	32	14	25
	10	13	54	14	14	14	34	14	58	15	28	16	10	14	16	14	29	15	16	15	12
	11	14	42	14	59	15	16	15	36	16	02	16	37	14	57	15	13	15	55	15	54
	12	15	27	15	40	15	54	16	10	16	30	16	58	15	35	15	54	16	30	16	32
	13	16	10	16	19	16	30	16	41	16	55	17	15	16	09	16	32	17	01	17	08
	14	16	51	16	57	17	03	17	10	17	18	17	29	16	41	17	08	17	31	17	42
	15	17	32	17	33	17	35	17	37	17	40	17	43	17	12	17	43	17	59	18	14
	16	18	13	18	10	18	08	18	05	18	01	17	56	17	43	18	19	18	26	18	47
	17	18	55	18	48	18	41	18	33	18	23	18	10	18	15	18	55	18	56	19	22
	18	19	39	19	29	19	17	19	04	18	48	18	27	18	50	19	35	19	28	19	58
	19	20	27	20	12	19	57	19	39	19	17	18	47	19	29	20	17	20	03	20	38
	20	21	19	21	01	20	42	20	20	19	52	19	13	20	12	21	04	20	44	21	24
	21	22	14	21	54	21	32	21	07	20	35	19	49	21	02	21	57	21	33	22	14
	22	23	13	22	52	22	29	22	02	21	28	20	38	21	58	22	54	22	27	23	11
	23	**	**	23	53	23	30	23	04	22	31	21	43	23	00	23	55	23	30	**	**
	24	0	14	**	**	**	**	**	**	23	42	23	00	**	**	**	**	**	**	0	13
	25	1	13	0	55	0	35	0	12	**	**	**	**	0	05	0	58	0	37	1	17
	26	2	11	1	56	1	40	1	22	0	58	0	25	1	11	2	01	1	46	2	22
	27	3	06	2	56	2	44	2	31	2	15	1	53	2	16	3	01	2	55	3	26
	28	3	59	3	53	3	47	3	40	3	31	3	20	3	21	4	00	4	03	4	27
	29	4	49	4	49	4	48	4	47	4	46	4	45	4	23	4	58	5	09	5	28
	30	5	39	5	43	5	48	5	54	6	00	6	10	5	25	5	54	6	15	6	28
Oct.	1	6	29	6	39	6	48	7	00	7	14	7	34	6	26	6	51	7	20	7	28

The symbol (**) indicates that the phenomenon will occur on the next day

MOONSET, 2027
LOCAL MEAN TIME AND INDIAN STANDARD TIME OF
MOONSET (MOON'S UPPER LIMB)

Date		FOR THE CENTRAL MERIDIAN OF INDIA (82º.5 E) IN L. M. T.												FOR CERTAIN STATIONS IN INDIA IN I.S.T.							
	Lat.	0º		10º		20º		30º		40º		50º		Kolkata		Chennai		Delhi		Mumbai	
		h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m
Aug.	16	5	07	4	53	4	38	4	21	3	59	3	29	4	09	4	58	4	45	5	20
	17	5	50	5	40	5	29	5	16	5	00	4	39	5	01	5	46	5	40	6	10
	18	6	32	6	25	6	18	6	11	6	01	5	48	5	52	6	32	6	33	6	59
	19	7	12	7	10	7	07	7	04	7	01	6	56	6	42	7	18	7	27	7	47
	20	7	52	7	54	7	56	7	58	8	01	8	05	7	32	8	04	8	19	8	35
	21	8	34	8	40	8	46	8	53	9	03	9	15	8	23	8	51	9	14	9	25
	22	9	17	9	27	9	38	9	51	10	06	10	28	9	17	9	40	10	10	10	17
	23	10	04	10	18	10	33	10	50	11	12	11	43	10	12	10	31	11	10	11	11
	24	10	54	11	12	11	31	11	53	12	20	13	00	11	12	11	27	12	11	12	09
	25	11	50	12	10	12	32	12	57	13	29	14	16	12	13	12	25	13	15	13	10
	26	12	49	13	11	13	34	14	01	14	35	15	26	13	16	13	27	14	19	14	12
	27	13	51	14	12	14	35	15	01	15	34	16	23	14	17	14	28	15	20	15	13
	28	14	54	15	12	15	33	15	56	16	25	17	06	15	14	15	28	16	14	16	11
	29	15	54	16	09	16	25	16	44	17	07	17	38	16	06	16	23	17	03	17	04
	30	16	51	17	02	17	13	17	26	17	42	18	03	16	52	17	15	17	46	17	52
	31	17	45	17	50	17	56	18	03	18	12	18	23	17	35	18	02	18	24	18	36
Sept.	1	18	36	18	37	18	37	18	38	18	39	18	40	18	14	18	46	19	00	19	17
	2	19	26	19	22	19	17	19	12	19	05	18	57	18	52	19	30	19	35	19	58
	3	20	16	20	07	19	57	19	46	19	33	19	14	19	31	20	13	20	09	20	38
	4	21	07	20	53	20	39	20	23	20	02	19	35	20	11	20	58	20	47	21	21
	5	21	59	21	42	21	23	21	02	20	36	19	59	20	54	21	46	21	27	22	05
	6	22	52	22	32	22	11	21	46	21	15	20	31	21	41	22	34	22	11	22	53
	7	23	45	23	24	23	01	22	34	22	01	21	11	22	30	23	26	23	00	23	43
	8	**	**	**	**	23	53	23	27	22	52	22	02	23	23	**	**	23	52	**	**
	9	0	38	0	16	**	**	**	**	23	49	23	02	**	**	0	18	**	**	0	35
	10	1	29	1	09	0	47	0	22	**	**	**	**	0	16	1	11	0	47	1	29
	11	2	18	2	00	1	40	1	18	0	49	0	08	1	11	2	03	1	43	2	22
	12	3	04	2	49	2	33	2	14	1	51	1	17	2	04	2	53	2	38	3	14
	13	3	48	3	36	3	24	3	10	2	52	2	27	2	56	3	42	3	34	4	05
	14	4	30	4	22	4	14	4	04	3	53	3	36	3	47	4	28	4	27	4	54
	15	5	11	5	07	5	03	4	59	4	53	4	45	4	37	5	15	5	21	5	43
	16	5	51	5	52	5	52	5	53	5	54	5	54	5	28	6	01	6	14	6	32
	17	6	33	6	37	6	42	6	48	6	55	7	05	6	19	6	48	7	09	7	22
	18	7	16	7	25	7	34	7	45	7	59	8	17	7	13	7	37	8	05	8	13
	19	8	02	8	15	8	28	8	44	9	04	9	32	8	08	8	28	9	04	9	07
	20	8	51	9	08	9	26	9	46	10	12	10	49	9	06	9	23	10	05	10	04
	21	9	45	10	04	10	25	10	49	11	20	12	05	10	06	10	20	11	08	11	03
	22	10	42	11	03	11	26	11	52	12	26	13	16	11	08	11	20	12	10	12	04
	23	11	42	12	03	12	26	12	53	13	26	14	16	12	08	12	19	13	11	13	04
	24	12	42	13	02	13	23	13	48	14	18	15	03	13	05	13	18	14	06	14	01
	25	13	41	13	58	14	16	14	36	15	02	15	38	13	57	14	13	14	55	14	54
	26	14	38	14	50	15	04	15	19	15	38	16	04	14	43	15	04	15	39	15	43
	27	15	31	15	39	15	48	15	58	16	09	16	25	15	27	15	51	16	18	16	27
	28	16	23	16	26	16	29	16	33	16	37	16	43	16	06	16	36	16	54	17	09
	29	17	13	17	11	17	09	17	07	17	04	17	00	16	44	17	20	17	29	17	49
	30	18	03	17	56	17	49	17	41	17	31	17	17	17	23	18	03	18	04	18	29
Oct.	1	18	54	18	42	18	30	18	17	18	00	17	37	18	03	18	48	18	40	19	12

The symbol (**) indicates that the phenomenon will occur on the next day

MOONRISE, 2027
LOCAL MEAN TIME AND INDIAN STANDARD TIME OF
MOONRISE (MOON'S UPPER LIMB)

Date		FOR THE CENTRAL MERIDIAN OF INDIA (82º.5 E) IN L. M. T.												FOR CERTAIN STATIONS IN INDIA IN I.S.T.							
	Lat.	0º		10º		20º		30º		40º		50º		Kolkata		Chennai		Delhi		Mumbai	
		h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m
Oct.	1	6	29	6	39	6	48	7	00	7	14	7	34	6	26	6	51	7	20	7	28
	2	7	21	7	34	7	49	8	06	8	27	8	57	7	29	7	48	8	25	8	27
	3	8	14	8	31	8	50	9	11	9	38	10	17	8	30	8	46	9	30	9	28
	4	9	08	9	28	9	49	10	14	10	46	11	32	9	31	9	44	10	32	10	27
	5	10	02	10	24	10	46	11	13	11	47	12	37	10	28	10	40	11	31	11	24
	6	10	56	11	17	11	40	12	06	12	40	13	29	11	22	11	34	12	24	12	17
	7	11	48	12	07	12	29	12	53	13	24	14	09	12	10	12	23	13	11	13	06
	8	12	36	12	54	13	12	13	34	14	01	14	39	12	54	13	09	13	53	13	51
	9	13	22	13	37	13	52	14	10	14	32	15	02	13	33	13	51	14	29	14	30
	10	14	06	14	17	14	28	14	42	14	58	15	20	14	08	14	29	15	01	15	07
	11	14	48	14	55	15	02	15	11	15	21	15	36	14	40	15	06	15	32	15	41
	12	15	29	15	32	15	35	15	39	15	43	15	50	15	12	15	42	16	00	16	14
	13	16	10	16	09	16	07	16	06	16	05	16	03	15	44	16	17	16	28	16	47
	14	16	52	16	46	16	41	16	35	16	27	16	17	16	15	16	54	16	57	17	21
	15	17	36	17	26	17	17	17	05	16	52	16	33	16	50	17	33	17	29	17	57
	16	18	23	18	10	17	56	17	40	17	20	16	53	17	28	18	15	18	04	18	37
	17	19	14	18	57	18	39	18	19	17	53	17	17	18	10	19	01	18	44	19	22
	18	20	10	19	50	19	29	19	05	18	34	17	51	18	59	19	53	19	30	20	11
	19	21	08	20	47	20	24	19	58	19	25	18	36	19	54	20	49	20	24	21	07
	20	22	08	21	47	21	25	20	58	20	25	19	36	20	54	21	50	21	25	22	07
	21	23	08	22	48	22	28	22	04	21	34	20	49	21	58	22	52	22	29	23	10
	22	**	**	23	49	23	32	23	12	22	47	22	11	23	02	23	53	23	37	**	**
	23	0	05	**	**	**	**	**	**	**	**	23	35	**	**	**	**	**	**	0	14
	24	0	59	0	47	0	34	0	20	0	01	**	**	0	06	0	53	0	44	1	16
	25	1	51	1	43	1	35	1	26	1	15	1	00	1	09	1	50	1	50	2	16
	26	2	40	2	38	2	35	2	32	2	28	2	22	2	09	2	46	2	54	3	15
	27	3	29	3	31	3	34	3	36	3	40	3	45	3	10	3	41	3	58	4	13
	28	4	18	4	25	4	33	4	41	4	52	5	07	4	10	4	36	5	02	5	12
	29	5	08	5	20	5	32	5	46	6	04	6	29	5	11	5	33	6	06	6	11
	30	6	00	6	16	6	33	6	52	7	16	7	51	6	13	6	30	7	11	7	11
	31	6	54	7	13	7	33	7	56	8	26	9	09	7	14	7	29	8	15	8	11
Nov.	1	7	50	8	10	8	32	8	58	9	31	10	19	8	14	8	26	9	16	9	10
	2	8	44	9	06	9	28	9	55	10	28	11	18	9	11	9	22	10	13	10	06
	3	9	38	9	58	10	20	10	45	11	17	12	03	10	02	10	14	11	03	10	58
	4	10	28	10	47	11	06	11	29	11	57	12	38	10	48	11	02	11	48	11	44
	5	11	16	11	31	11	48	12	07	12	30	13	03	11	29	11	46	12	26	12	26
	6	12	00	12	12	12	25	12	40	12	59	13	23	12	05	12	25	13	00	13	04
	7	12	43	12	51	13	00	13	10	13	23	13	40	12	39	13	03	13	31	13	39
	8	13	23	13	28	13	33	13	39	13	45	13	55	13	11	13	39	13	59	14	12
	9	14	04	14	05	14	05	14	06	14	07	14	08	13	42	14	14	14	27	14	45
	10	14	45	14	42	14	38	14	34	14	29	14	22	14	13	14	50	14	56	15	18
	11	15	28	15	21	15	13	15	04	14	53	14	38	14	47	15	28	15	27	15	53
	12	16	15	16	03	15	51	15	37	15	19	14	56	15	24	16	08	16	00	16	31
	13	17	05	16	50	16	33	16	14	15	51	15	19	16	04	16	54	16	39	17	15
	14	18	00	17	41	17	21	16	59	16	30	15	49	16	52	17	45	17	24	18	03
	15	18	59	18	38	18	16	17	51	17	18	16	31	17	46	18	41	18	16	18	58
	16	20	00	19	39	19	16	18	50	18	17	17	28	18	46	19	42	19	16	19	59

The symbol (**) indicates that the phenomenon will occur on the next day

MOONSET, 2027
LOCAL MEAN TIME AND INDIAN STANDARD TIME OF
MOONSET (MOON'S UPPER LIMB)

Date	Lat.	FOR THE CENTRAL MERIDIAN OF INDIA (82º.5 E) IN L. M. T.												FOR CERTAIN STATIONS IN INDIA IN I.S.T.							
		0º		10º		20º		30º		40º		50º		Kolkata		Chennai		Delhi		Mumbai	
		h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m
Oct.	1	18	54	18	42	18	30	18	17	18	00	17	37	18	03	18	48	18	40	19	12
	2	19	46	19	31	19	14	18	55	18	32	18	00	18	46	19	35	19	20	19	56
	3	20	40	20	21	20	01	19	38	19	10	18	29	19	32	20	24	20	03	20	43
	4	21	34	21	14	20	51	20	26	19	53	19	06	20	21	21	16	20	51	21	34
	5	22	28	22	07	21	44	21	18	20	44	19	53	21	14	22	09	21	43	22	26
	6	23	21	23	01	22	38	22	12	21	39	20	51	22	08	23	03	22	38	23	21
	7	**	**	23	53	23	32	23	09	22	39	21	56	23	02	23	56	23	34	**	**
	8	0	11	**	**	**	**	**	**	23	40	23	04	23	56	**	**	**	**	0	14
	9	0	59	0	43	0	25	0	05	**	**	**	**	**	**	0	47	0	30	1	07
	10	1	44	1	31	1	17	1	01	0	41	0	14	0	49	1	36	1	25	1	58
	11	2	26	2	17	2	07	1	56	1	42	1	23	1	40	2	23	2	19	2	48
	12	3	07	3	02	2	57	2	50	2	42	2	32	2	30	3	10	3	13	3	37
	13	3	48	3	47	3	46	3	45	3	43	3	41	3	21	3	56	4	06	4	25
	14	4	30	4	33	4	36	4	40	4	44	4	51	4	12	4	42	5	01	5	15
	15	5	12	5	20	5	28	5	36	5	48	6	03	5	05	5	31	5	57	6	06
	16	5	58	6	09	6	22	6	36	6	53	7	18	6	01	6	22	6	55	7	00
	17	6	47	7	02	7	19	7	38	8	01	8	35	6	59	7	17	7	57	7	57
	18	7	40	7	59	8	19	8	42	9	11	9	53	8	00	8	14	9	00	8	57
	19	8	37	8	58	9	20	9	46	10	18	11	06	9	02	9	14	10	04	9	58
	20	9	37	9	58	10	21	10	47	11	21	12	10	10	03	10	14	11	05	10	59
	21	10	37	10	57	11	19	11	44	12	15	13	01	11	00	11	13	12	02	11	57
	22	11	35	11	53	12	12	12	34	13	00	13	38	11	53	12	08	12	52	12	50
	23	12	31	12	45	13	00	13	17	13	38	14	07	12	40	12	59	13	37	13	39
	24	13	24	13	34	13	44	13	56	14	10	14	29	13	23	13	46	14	16	14	23
	25	14	15	14	20	14	25	14	31	14	38	14	48	14	02	14	30	14	51	15	04
	26	15	03	15	04	15	04	15	04	15	04	15	05	14	40	15	13	15	26	15	44
	27	15	52	15	48	15	43	15	37	15	30	15	21	15	18	15	55	16	00	16	23
	28	16	42	16	32	16	23	16	12	15	58	15	39	15	56	16	39	16	35	17	04
	29	17	33	17	19	17	05	16	49	16	28	16	01	16	37	17	25	17	13	17	47
	30	18	26	18	09	17	51	17	30	17	04	16	27	17	22	18	13	17	55	18	32
	31	19	21	19	01	18	40	18	16	17	45	17	01	18	10	19	04	18	41	19	22
Nov.	1	20	16	19	55	19	33	19	06	18	33	17	44	19	02	19	58	19	32	20	15
	2	21	10	20	50	20	27	20	01	19	28	18	38	19	57	20	52	20	26	21	10
	3	22	03	21	43	21	22	20	58	20	27	19	41	20	52	21	46	21	23	22	04
	4	22	52	22	35	22	16	21	55	21	28	20	49	21	47	22	38	22	19	22	58
	5	23	38	23	24	23	09	22	51	22	29	21	59	22	40	23	28	23	15	23	50
	6	**	**	**	**	23	59	23	46	23	30	23	08	23	32	**	**	**	**	**	**
	7	0	21	0	10	**	**	**	**	**	**	**	**	**	**	0	16	0	10	0	40
	8	1	02	0	56	0	49	0	40	0	30	0	16	0	22	1	03	1	03	1	29
	9	1	43	1	40	1	37	1	34	1	30	1	24	1	12	1	49	1	56	2	17
	10	2	24	2	25	2	27	2	28	2	30	2	33	2	02	2	34	2	49	3	06
	11	3	06	3	11	3	17	3	24	3	32	3	44	2	54	3	22	3	45	3	56
	12	3	50	4	00	4	10	4	22	4	37	4	58	3	49	4	12	4	42	4	49
	13	4	38	4	52	5	07	5	24	5	45	6	15	4	46	5	06	5	43	5	45
	14	5	31	5	48	6	07	6	28	6	55	7	34	5	47	6	03	6	47	6	44
	15	6	28	6	48	7	09	7	34	8	05	8	51	6	50	7	03	7	52	7	47
	16	7	28	7	49	8	12	8	38	9	11	10	00	7	54	8	05	8	56	8	49

The symbol (**) indicates that the phenomenon will occur on the next day

MOONRISE, 2027

LOCAL MEAN TIME AND INDIAN STANDARD TIME OF MOONRISE (MOON'S UPPER LIMB)

Date		FOR THE CENTRAL MERIDIAN OF INDIA (82º.5 E) IN L. M. T.												FOR CERTAIN STATIONS IN INDIA IN I.S.T.							
	Lat.	0º		10º		20º		30º		40º		50º		Kolkata		Chennai		Delhi		Mumbai	
		h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m
Nov.	16	20	00	19	39	19	16	18	50	18	17	17	28	18	46	19	42	19	16	19	59
	17	21	01	20	42	20	20	19	56	19	25	18	39	19	50	20	45	20	21	21	03
	18	22	00	21	43	21	25	21	04	20	38	20	00	20	56	21	48	21	30	22	08
	19	22	56	22	43	22	29	22	13	21	52	21	24	22	01	22	48	22	37	23	11
	20	23	48	23	39	23	30	23	19	23	06	22	48	23	03	23	46	23	43	**	**
	21	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	0	11
	22	0	37	0	33	0	29	0	24	0	18	0	10	0	03	0	41	0	47	1	10
	23	1	25	1	26	1	26	1	27	1	29	1	30	1	02	1	35	1	49	2	06
	24	2	12	2	18	2	24	2	30	2	39	2	50	2	01	2	28	2	51	3	03
	25	3	01	3	11	3	21	3	33	3	49	4	10	3	00	3	23	3	54	4	00
	26	3	51	4	05	4	20	4	37	4	59	5	30	4	00	4	18	4	57	4	58
	27	4	43	5	01	5	20	5	41	6	09	6	48	5	00	5	16	6	00	5	58
	28	5	38	5	58	6	19	6	44	7	15	8	01	6	00	6	13	7	02	6	57
	29	6	33	6	54	7	16	7	42	8	16	9	05	6	58	7	10	8	01	7	54
	30	7	27	7	48	8	10	8	36	9	08	9	56	7	52	8	04	8	54	8	48
Dec.	1	8	19	8	38	8	59	9	22	9	52	10	35	8	40	8	54	9	41	9	37
	2	9	08	9	25	9	43	10	03	10	28	11	04	9	24	9	40	10	22	10	20
	3	9	54	10	08	10	22	10	38	10	58	11	26	10	02	10	21	10	58	11	00
	4	10	37	10	47	10	58	11	10	11	24	11	44	10	36	11	00	11	30	11	36
	5	11	18	11	24	11	31	11	38	11	47	11	59	11	09	11	36	11	59	12	10
	6	11	58	12	01	12	03	12	06	12	09	12	13	11	40	12	10	12	27	12	42
	7	12	39	12	37	12	35	12	33	12	30	12	27	12	10	12	45	12	55	13	15
	8	13	20	13	14	13	08	13	01	12	53	12	41	12	42	13	22	13	24	13	49
	9	14	04	13	54	13	44	13	32	13	17	12	58	13	17	14	00	13	55	14	24
	10	14	52	14	38	14	24	14	07	13	46	13	18	13	56	14	43	14	31	15	05
	11	15	45	15	28	15	09	14	48	14	22	13	45	14	40	15	31	15	13	15	51
	12	16	42	16	22	16	01	15	37	15	06	14	21	15	31	16	25	16	02	16	43
	13	17	44	17	23	17	00	16	34	16	01	15	12	16	29	17	25	17	00	17	43
	14	18	47	18	27	18	05	17	39	17	07	16	19	17	34	18	29	18	05	18	47
	15	19	49	19	31	19	12	18	49	18	21	17	40	18	42	19	35	19	15	19	54
	16	20	48	20	34	20	18	20	00	19	38	19	06	19	50	20	38	20	25	21	00
	17	21	43	21	33	21	22	21	10	20	55	20	33	20	55	21	39	21	34	22	04
	18	22	34	22	29	22	23	22	17	22	09	21	58	21	57	22	36	22	40	23	04
	19	23	23	23	22	23	22	23	21	23	21	23	20	22	57	23	32	23	44	**	**
	20	**	**	**	**	**	**	**	**	**	**	**	**	23	56	**	**	**	**	0	02
	21	0	10	0	15	0	19	0	24	0	31	0	39	**	**	0	25	0	45	0	59
	22	0	58	1	07	1	16	1	27	1	40	1	59	0	54	1	19	1	47	1	55
	23	1	47	2	00	2	14	2	30	2	49	3	17	1	53	2	13	2	49	2	52
	24	2	38	2	54	3	12	3	32	3	58	4	35	2	52	3	09	3	51	3	50
	25	3	30	3	50	4	10	4	34	5	05	5	49	3	52	4	05	4	53	4	48
	26	4	24	4	45	5	07	5	33	6	06	6	55	4	49	5	01	5	52	5	45
	27	5	19	5	40	6	02	6	28	7	01	7	50	5	44	5	56	6	46	6	40
	28	6	11	6	31	6	52	7	17	7	48	8	33	6	34	6	47	7	36	7	30
	29	7	02	7	19	7	38	8	00	8	27	9	05	7	19	7	34	8	18	8	16
	30	7	49	8	03	8	19	8	37	8	59	9	30	7	59	8	17	8	56	8	57
	31	8	33	8	44	8	56	9	10	9	26	9	49	8	35	8	57	9	30	9	35
	32	9	15	9	22	9	30	9	39	9	50	10	05	9	09	9	34	9	59	10	09

The symbol (**) indicates that the phenomenon will occur on the next day

MOONSET, 2027
LOCAL MEAN TIME AND INDIAN STANDARD TIME OF
MOONSET (MOON'S UPPER LIMB)

Date		FOR THE CENTRAL MERIDIAN OF INDIA (82º.5 E) IN L. M. T.												FOR CERTAIN STATIONS IN INDIA IN I.S.T.							
	Lat.	0º		10º		20º		30º		40º		50º		Kolkata		Chennai		Delhi		Mumbai	
		h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m	h	m
Nov.	16	7	28	7	49	8	12	8	38	9	11	10	00	7	54	8	05	8	56	8	49
	17	8	30	8	50	9	12	9	38	10	10	10	56	8	54	9	06	9	56	9	50
	18	9	30	9	48	10	08	10	30	10	59	11	39	9	49	10	04	10	49	10	46
	19	10	27	10	42	10	58	11	16	11	39	12	10	10	38	10	56	11	36	11	37
	20	11	21	11	32	11	43	11	56	12	12	12	34	11	23	11	45	12	16	12	22
	21	12	12	12	18	12	24	12	32	12	41	12	53	12	02	12	29	12	53	13	04
	22	13	00	13	02	13	03	13	05	13	07	13	10	12	40	13	11	13	27	13	43
	23	13	47	13	44	13	41	13	37	13	33	13	27	13	16	13	53	14	00	14	21
	24	14	35	14	28	14	19	14	10	13	59	13	44	13	53	14	34	14	33	15	00
	25	15	24	15	13	15	00	14	45	14	28	14	03	14	32	15	18	15	09	15	41
	26	16	16	16	00	15	43	15	24	15	00	14	27	15	15	16	04	15	49	16	25
	27	17	09	16	51	16	31	16	08	15	39	14	57	16	01	16	54	16	32	17	13
	28	18	04	17	44	17	22	16	56	16	24	15	37	16	51	17	46	17	22	18	04
	29	18	59	18	38	18	16	17	49	17	16	16	27	17	45	18	40	18	15	18	58
	30	19	53	19	32	19	11	18	46	18	14	17	27	18	40	19	35	19	11	19	53
Dec.	1	20	43	20	25	20	06	19	43	19	15	18	34	19	36	20	28	20	08	20	48
	2	21	31	21	16	20	59	20	41	20	17	19	43	20	30	21	20	21	05	21	41
	3	22	15	22	03	21	51	21	36	21	18	20	53	21	23	22	08	22	00	22	32
	4	22	57	22	49	22	40	22	31	22	18	22	01	22	13	22	55	22	53	23	21
	5	23	38	23	33	23	29	23	24	23	17	23	09	23	03	23	41	23	46	**	**
	6	**	**	**	**	**	**	**	**	**	**	**	**	23	53	**	**	**	**	0	09
	7	0	18	0	17	0	17	0	17	0	17	0	16	**	**	0	26	0	38	0	57
	8	0	58	1	02	1	06	1	11	1	17	1	25	0	43	1	13	1	32	1	46
	9	1	41	1	49	1	57	2	07	2	19	2	36	1	35	2	00	2	27	2	36
	10	2	27	2	39	2	51	3	06	3	25	3	50	2	30	2	51	3	26	3	30
	11	3	17	3	32	3	49	4	09	4	33	5	08	3	30	3	47	4	27	4	27
	12	4	12	4	31	4	51	5	14	5	44	6	27	4	31	4	46	5	33	5	29
	13	5	11	5	32	5	54	6	20	6	53	7	41	5	36	5	48	6	38	6	32
	14	6	14	6	35	6	58	7	24	7	57	8	45	6	39	6	51	7	42	7	36
	15	7	17	7	37	7	57	8	21	8	51	9	34	7	39	7	52	8	39	8	35
	16	8	18	8	34	8	52	9	11	9	36	10	10	8	32	8	49	9	31	9	30
	17	9	15	9	27	9	40	9	55	10	13	10	37	9	20	9	41	10	14	10	18
	18	10	08	10	15	10	23	10	33	10	44	10	59	10	02	10	27	10	53	11	03
	19	10	58	11	00	11	04	11	07	11	11	11	17	10	40	11	11	11	28	11	43
	20	11	46	11	44	11	42	11	40	11	37	11	33	11	18	11	53	12	02	12	22
	21	12	33	12	27	12	20	12	12	12	03	11	50	11	54	12	34	12	35	13	00
	22	13	21	13	11	12	59	12	46	12	30	12	09	12	32	13	17	13	10	13	40
	23	14	11	13	56	13	41	13	23	13	01	12	30	13	13	14	01	13	47	14	22
	24	15	03	14	45	14	26	14	04	13	37	12	58	13	57	14	48	14	29	15	08
	25	15	56	15	36	15	15	14	50	14	18	13	33	14	44	15	39	15	15	15	57
	26	16	51	16	30	16	07	15	41	15	08	14	19	15	37	16	32	16	06	16	49
	27	17	44	17	24	17	02	16	36	16	03	15	15	16	31	17	27	17	01	17	44
	28	18	36	18	17	17	57	17	33	17	03	16	19	17	27	18	20	17	58	18	39
	29	19	25	19	08	18	51	18	31	18	05	17	29	18	21	19	12	18	55	19	33
	30	20	10	19	57	19	43	19	27	19	07	18	39	19	15	20	02	19	51	20	24
	31	20	53	20	44	20	34	20	22	20	08	19	48	20	06	20	50	20	45	21	15
	32	21	34	21	28	21	22	21	16	21	07	20	55	20	56	21	36	21	38	22	03

The symbol (**) indicates that the phenomenon will occur on the next day

MOONRISE AND MOONSET
REDUCTION OF THE L.M.T. OF RISING OR SETTING FOR THE MERIDIAN OF 82°.5 E. LONGITUDE TO THE L.M.T. OF OTHER MERIDIANS

LONGITUDE EAST OF GREENWICH

Daily Variation in Rising or Setting	0°	30°	60°	68°	72°	76°	80°	84°	88°	92°	96°	120°	150°
m	m	m	m	m	m	m	m	m	m	m	m	m	m
28	+ 6.4	+ 4.1	+ 1.8	+ 1.1	+ 0.8	+ 0.5	+ 0.2	- 0.1	- 0.4	- 0.7	- 1.1	- 2.9	- 5.3
29	6.6	4.2	1.8	1.2	0.8	0.5	0.2	0.1	0.4	0.8	1.1	3.0	5.4
30	6.9	4.4	1.9	1.2	0.9	0.5	0.2	0.1	0.5	0.8	1.1	3.1	5.6
31	7.1	4.5	1.9	1.2	0.9	0.6	0.2	0.1	0.5	0.8	1.2	3.2	5.8
32	7.3	4.7	2.0	1.3	0.9	0.6	0.2	0.1	0.5	0.8	1.2	3.3	6.0
33	7.6	4.8	2.1	1.3	1.0	0.6	0.2	0.1	0.5	0.9	1.2	3.4	6.2
34	7.8	5.0	2.1	1.4	1.0	0.6	0.2	0.1	0.5	0.9	1.3	3.5	6.4
35	8.0	5.1	2.2	1.4	1.0	0.6	0.2	0.1	0.5	0.9	1.3	3.6	6.6
36	8.2	5.2	2.3	1.4	1.0	0.6	0.2	0.1	0.5	0.9	1.4	3.7	6.8
37	8.5	5.4	2.3	1.5	1.1	0.7	0.3	0.2	0.6	1.0	1.4	3.9	6.9
38	8.7	5.5	2.4	1.5	1.1	0.7	0.3	0.2	0.6	1.0	1.4	4.0	7.1
39	8.9	5.7	2.4	1.6	1.1	0.7	0.3	0.2	0.6	1.0	1.5	4.1	7.3
40	+ 9.2	+ 5.8	+ 2.5	+ 1.6	+ 1.2	+ 0.7	+ 0.3	- 0.2	- 0.6	- 1.1	- 1.5	- 4.2	- 7.5
41	9.4	6.0	2.6	1.7	1.2	0.7	0.3	0.2	0.6	1.1	1.5	4.3	7.7
42	9.6	6.1	2.6	1.7	1.2	0.8	0.3	0.2	0.6	1.1	1.6	4.4	7.9
43	9.9	6.3	2.7	1.7	1.3	0.8	0.3	0.2	0.7	1.1	1.6	4.5	8.1
44	10.1	6.4	2.8	1.8	1.3	0.8	0.3	0.2	0.7	1.2	1.7	4.6	8.3
45	10.3	6.6	2.8	1.8	1.3	0.8	0.3	0.2	0.7	1.2	1.7	4.7	8.4
46	10.5	6.7	2.9	1.9	1.3	0.8	0.3	0.2	0.7	1.2	1.7	4.8	8.6
47	10.8	6.9	2.9	1.9	1.4	0.8	0.3	0.2	0.7	1.2	1.8	4.9	8.8
48	11.0	7.0	3.0	1.9	1.4	0.9	0.3	0.2	0.7	1.3	1.8	5.0	9.0
49	11.2	7.1	3.1	2.0	1.4	0.9	0.3	0.2	0.7	1.3	1.8	5.1	9.2
50	+ 11.5	+ 7.3	+ 3.1	+ 2.0	+ 1.5	+ 0.9	+ 0.3	- 0.2	- 0.8	- 1.3	- 1.9	- 5.2	- 9.4
51	11.7	7.4	3.2	2.1	1.5	0.9	0.4	0.2	0.8	1.3	1.9	5.3	9.6
52	11.9	7.6	3.3	2.1	1.5	0.9	0.4	0.2	0.8	1.4	2.0	5.4	9.8
53	12.1	7.7	3.3	2.1	1.5	1.0	0.4	0.2	0.8	1.4	2.0	5.5	9.9
54	12.4	7.9	3.4	2.2	1.6	1.0	0.4	0.2	0.8	1.4	2.0	5.6	10.1
55	12.6	8.0	3.4	2.2	1.6	1.0	0.4	0.2	0.8	1.5	2.1	5.7	10.3
56	12.8	8.2	3.5	2.3	1.6	1.0	0.4	0.2	0.9	1.5	2.1	5.8	10.5
57	13.1	8.3	3.6	2.3	1.7	1.0	0.4	0.2	0.9	1.5	2.1	5.9	10.7
58	13.3	8.5	3.6	2.3	1.7	1.0	0.4	0.2	0.9	1.5	2.2	6.0	10.9
59	13.5	8.6	3.7	2.4	1.7	1.1	0.4	0.2	0.9	1.6	2.2	6.1	11.1
60	+ 13.7	+ 8.7	+ 3.8	+ 2.4	+ 1.7	+ 1.1	+ 0.4	- 0.2	- 0.9	- 1.6	- 2.3	- 6.2	- 11.3
61	14.0	8.9	3.8	2.5	1.8	1.1	0.4	0.3	0.9	1.6	2.3	6.4	11.4
62	14.2	9.0	3.9	2.5	1.8	1.1	0.4	0.3	0.9	1.6	2.3	6.5	11.6
63	14.4	9.2	3.9	2.5	1.8	1.1	0.4	0.3	1.0	1.7	2.4	6.6	11.8
64	14.7	9.3	4.0	2.6	1.9	1.2	0.4	0.3	1.0	1.7	2.4	6.7	12.0
65	14.9	9.5	4.1	2.6	1.9	1.2	0.5	0.3	1.0	1.7	2.4	6.8	12.2
66	15.1	9.6	4.1	2.7	1.9	1.2	0.5	0.3	1.0	1.7	2.5	6.9	12.4
67	15.4	9.8	4.2	2.7	2.0	1.2	0.5	0.3	1.0	1.8	2.5	7.0	12.6
68	15.6	9.9	4.3	2.7	2.0	1.2	0.5	0.3	1.0	1.8	2.6	7.1	12.8
69	15.8	10.1	4.3	2.8	2.0	1.2	0.5	0.3	1.1	1.8	2.6	7.2	12.9
70	+ 16.0	+ 10.2	+ 4.4	+ 2.8	+ 2.0	+ 1.3	+ 0.5	- 0.3	- 1.1	- 1.8	- 2.6	- 7.3	- 13.1
71	16.3	10.4	4.4	2.9	2.1	1.3	0.5	0.3	1.1	1.9	2.7	7.4	13.3
72	16.5	10.5	4.5	2.9	2.1	1.3	0.5	0.3	1.1	1.9	2.7	7.5	13.5
73	16.7	10.6	4.6	2.9	2.1	1.3	0.5	0.3	1.1	1.9	2.7	7.6	13.7
74	+ 17.0	+ 10.8	+ 4.6	+ 3.0	+ 2.2	+ 1.3	+ 0.5	- 0.3	- 1.1	- 2.0	- 2.8	- 7.7	- 13.9

SUNRISE, SUNSET AND MOONRISE, MOONSET
CORRECTION FOR LATITUDE

VARIATION PER 10° OF LATITUDE OF THE TIMES OF SUNRISE, SUNSET AND MOONRISE, MOONSET DISTRIBUTED OVER EACH DEGREE OF LATITUDE

Var. per 10° of Lat.	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	15'	30'	45'
m	m	m	m	m	m	m	m	m	m	m	m	m	m
5	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	0.1	0.3	0.4
6	0.6	1.2	1.8	2.4	3.0	3.6	4.2	4.8	5.4	6.0	0.2	0.3	0.5
7	0.7	1.4	2.1	2.8	3.5	4.2	4.9	5.6	6.3	7.0	0.2	0.4	0.5
8	0.8	1.6	2.4	3.2	4.0	4.8	5.6	6.4	7.2	8.0	0.2	0.4	0.6
9	0.9	1.8	2.7	3.6	4.5	5.4	6.3	7.2	8.1	9.0	0.2	0.5	0.7
10	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	0.3	0.5	0.8
11	1.1	2.2	3.3	4.4	5.5	6.6	7.7	8.8	9.9	11.0	0.3	0.6	0.8
12	1.2	2.4	3.6	4.8	6.0	7.2	8.4	9.6	10.8	12.0	0.3	0.6	0.9
13	1.3	2.6	3.9	5.2	6.5	7.8	9.1	10.4	11.7	13.0	0.3	0.7	1.0
14	1.4	2.8	4.2	5.6	7.0	8.4	9.8	11.2	12.6	14.0	0.4	0.7	1.1
15	1.5	3.0	4.5	6.0	7.5	9.0	10.5	12.0	13.5	15.0	0.4	0.8	1.1
16	1.6	3.2	4.8	6.4	8.0	9.6	11.2	12.8	14.4	16.0	0.4	0.8	1.2
17	1.7	3.4	5.1	6.8	8.5	10.2	11.9	13.6	15.3	17.0	0.4	0.9	1.3
18	1.8	3.6	5.4	7.2	9.0	10.8	12.6	14.4	16.2	18.0	0.5	0.9	1.4
19	1.9	3.8	5.7	7.6	9.5	11.4	13.3	15.2	17.1	19.0	0.5	1.0	1.4
20	2.0	4.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	0.5	1.0	1.5
21	2.1	4.2	6.3	8.4	10.5	12.6	14.7	16.8	18.9	21.0	0.5	1.1	1.6
22	2.2	4.4	6.6	8.8	11.0	13.2	15.4	17.6	19.8	22.0	0.6	1.1	1.7
23	2.3	4.6	6.9	9.2	11.5	13.8	16.1	18.4	20.7	23.0	0.6	1.2	1.7
24	2.4	4.8	7.2	9.6	12.0	14.4	16.8	19.2	21.6	24.0	0.6	1.2	1.8
25	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	22.5	25.0	0.6	1.3	1.9
26	2.6	5.2	7.8	10.4	13.0	15.6	18.2	20.8	23.4	26.0	0.7	1.3	2.0
27	2.7	5.4	8.1	10.8	13.5	16.2	18.9	21.6	24.3	27.0	0.7	1.4	2.0
28	2.8	5.6	8.4	11.2	14.0	16.8	19.6	22.4	25.2	28.0	0.7	1.4	2.1
29	2.9	5.8	8.7	11.6	14.5	17.4	20.3	23.2	26.1	29.0	0.7	1.5	2.2
30	3.0	6.0	9.0	12.0	15.0	18.0	21.0	24.0	27.0	30.0	0.8	1.5	2.3
31	3.1	6.2	9.3	12.4	15.5	18.6	21.7	24.8	27.9	31.0	0.8	1.6	2.3
32	3.2	6.4	9.6	12.8	16.0	19.2	22.4	25.6	28.8	32.0	0.8	1.6	2.4
33	3.3	6.6	9.9	13.2	16.5	19.8	23.1	26.4	29.7	33.0	0.8	1.7	2.5
34	3.4	6.8	10.2	13.6	17.0	20.4	23.8	27.2	30.6	34.0	0.9	1.7	2.6
35	3.5	7.0	10.5	14.0	17.5	21.0	24.5	28.0	31.5	35.0	0.9	1.8	2.6
36	3.6	7.2	10.8	14.4	18.0	21.6	25.2	28.8	32.4	36.0	0.9	1.8	2.7
37	3.7	7.4	11.1	14.8	18.5	22.2	25.9	29.6	33.3	37.0	0.9	1.9	2.8
38	3.8	7.6	11.4	15.2	19.0	22.8	26.6	30.4	34.2	38.0	1.0	1.9	2.9
39	3.9	7.8	11.7	15.6	19.5	23.4	27.3	31.2	35.1	39.0	1.0	2.0	2.9
40	4.0	8.0	12.0	16.0	20.0	24.0	28.0	32.0	36.0	40.0	1.0	2.0	3.0
41	4.1	8.2	12.3	16.4	20.5	24.6	28.7	32.8	36.9	41.0	1.0	2.1	3.1
42	4.2	8.4	12.6	16.8	21.0	25.2	29.4	33.6	37.8	42.0	1.1	2.1	3.2
43	4.3	8.6	12.9	17.2	21.5	25.8	30.1	34.4	38.7	43.0	1.1	2.2	3.2
44	4.4	8.8	13.2	17.6	22.0	26.4	30.8	35.2	39.6	44.0	1.1	2.2	3.3
45	4.5	9.0	13.5	18.0	22.5	27.0	31.5	36.0	40.5	45.0	1.1	2.3	3.4
46	4.6	9.2	13.8	18.4	23.0	27.6	32.2	36.8	41.4	46.0	1.2	2.3	3.5
47	4.7	9.4	14.1	18.8	23.5	28.2	32.9	37.6	42.3	47.0	1.2	2.4	3.5
48	4.8	9.6	14.4	19.2	24.0	28.8	33.6	38.4	43.2	48.0	1.2	2.4	3.6
49	4.9	9.8	14.7	19.6	24.5	29.4	34.3	39.2	44.1	49.0	1.2	2.5	3.7
50	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	1.3	2.5	3.8

REDUCTION OF TIME

REDUCTION OF LOCAL MEAN TIME OF A PLACE INTO
THE INDIAN STANDARD TIME

A-CORRECTION TO BE ADDED TO L.M.T. TO OBTAIN I.S.T.

	LONGITUDE OF PLACE (EAST OF GREENWICH)															
	67°	68°	69°	70°	71°	72°	73°	74°	75°	76°	77°	78°	79°	80°	81°	82°
	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m
0	62.0	58.0	54.0	50.0	46.0	42.0	38.0	34.0	30.0	26.0	22.0	18.0	14.0	10.0	6.0	2.0
3	61.8	57.8	53.8	49.8	45.8	41.8	37.8	33.8	29.8	25.8	21.8	17.8	13.8	9.8	5.8	1.8
6	61.6	57.6	53.6	49.6	45.6	41.6	37.6	33.6	29.6	25.6	21.6	17.6	13.6	9.6	5.6	1.6
9	61.4	57.4	53.4	49.4	45.4	41.4	37.4	33.4	29.4	25.4	21.4	17.4	13.4	9.4	5.4	1.4
12	61.2	57.2	53.2	49.2	45.2	41.2	37.2	33.2	29.2	25.2	21.2	17.2	13.2	9.2	5.2	1.2
15	61.0	57.0	53.0	49.0	45.0	41.0	37.0	33.0	29.0	25.0	21.0	17.0	13.0	9.0	5.0	1.0
18	60.8	56.8	52.8	48.8	44.8	40.8	36.8	32.8	28.8	24.8	20.8	16.8	12.8	8.8	4.8	0.8
21	60.6	56.6	52.6	48.6	44.6	40.6	36.6	32.6	28.6	24.6	20.6	16.6	12.6	8.6	4.6	0.6
24	60.4	56.4	52.4	48.4	44.4	40.4	36.4	32.4	28.4	24.4	20.4	16.4	12.4	8.4	4.4	0.4
27	60.2	56.2	52.2	48.2	44.2	40.2	36.2	32.2	28.2	24.2	20.2	16.2	12.2	8.2	4.2	0.2
30	60.0	56.0	52.0	48.0	44.0	40.0	36.0	32.0	28.0	24.0	20.0	16.0	12.0	8.0	4.0	0.0
33	59.8	55.8	51.8	47.8	43.8	39.8	35.8	31.8	27.8	23.8	19.8	15.8	11.8	7.8	3.8	
36	59.6	55.6	51.6	47.6	43.6	39.6	35.6	31.6	27.6	23.6	19.6	15.6	11.6	7.6	3.6	
39	59.4	55.4	51.4	47.4	43.4	39.4	35.4	31.4	27.4	23.4	19.4	15.4	11.4	7.4	3.4	
42	59.2	55.2	51.2	47.2	43.2	39.2	35.2	31.2	27.2	23.2	19.2	15.2	11.2	7.2	3.2	
45	59.0	55.0	51.0	47.0	43.0	39.0	35.0	31.0	27.0	23.0	19.0	15.0	11.0	7.0	3.0	
48	58.8	54.8	50.8	46.8	42.8	38.8	34.8	30.8	26.8	22.8	18.8	14.8	10.8	6.8	2.8	
51	58.6	54.6	50.6	46.6	42.6	38.6	34.6	30.6	26.6	22.6	18.6	14.6	10.6	6.6	2.6	
54	58.4	54.4	50.4	46.4	42.4	38.4	34.4	30.4	26.4	22.4	18.4	14.4	10.4	6.4	2.4	
57	58.2	54.2	50.2	46.2	42.2	38.2	34.2	30.2	26.2	22.2	18.2	14.2	10.2	6.2	2.2	
60	58.0	54.0	50.0	46.0	42.0	38.0	34.0	30.0	26.0	22.0	18.0	14.0	10.0	6.0	2.0	

B- CORRECTION TO BE SUBTRACTED FROM L.M.T. TO OBTAIN I.S.T.

	LONGITUDE OF PLACE (EAST OF GREENWICH)															
	82°	83°	84°	85°	86°	87°	88°	89°	90°	91°	92°	93°	94°	95°	96°	97°
	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m
0		2.0	6.0	10.0	14.0	18.0	22.0	26.0	30.0	34.0	38.0	42.0	46.0	50.0	54.0	58.0
3		2.2	6.2	10.2	14.2	18.2	22.2	26.2	30.2	34.2	38.2	42.2	46.2	50.2	54.2	58.2
6		2.4	6.4	10.4	14.4	18.4	22.4	26.4	30.4	34.4	38.4	42.4	46.4	50.4	54.4	58.4
9		2.6	6.6	10.6	14.6	18.6	22.6	26.6	30.6	34.6	38.6	42.6	46.6	50.6	54.6	58.6
12		2.8	6.8	10.8	14.8	18.8	22.8	26.8	30.8	34.8	38.8	42.8	46.8	50.8	54.8	58.8
15		3.0	7.0	11.0	15.0	19.0	23.0	27.0	31.0	35.0	39.0	43.0	47.0	51.0	55.0	59.0
18		3.2	7.2	11.2	15.2	19.2	23.2	27.2	31.2	35.2	39.2	43.2	47.2	51.2	55.2	59.2
21		3.4	7.4	11.4	15.4	19.4	23.4	27.4	31.4	35.4	39.4	43.4	47.4	51.4	55.4	59.4
24		3.6	7.6	11.6	15.6	19.6	23.6	27.6	31.6	35.6	39.6	43.6	47.6	51.6	55.6	59.6
27		3.8	7.8	11.8	15.8	19.8	23.8	27.8	31.8	35.8	39.8	43.8	47.8	51.8	55.8	59.8
30	0.0	4.0	8.0	12.0	16.0	20.0	24.0	28.0	32.0	36.0	40.0	44.0	48.0	52.0	56.0	60.0
33	0.2	4.2	8.2	12.2	16.2	20.2	24.2	28.2	32.2	36.2	40.2	44.2	48.2	52.2	56.2	60.2
36	0.4	4.4	8.4	12.4	16.4	20.4	24.4	28.4	32.4	36.4	40.4	44.4	48.4	52.4	56.4	60.4
39	0.6	4.6	8.6	12.6	16.6	20.6	24.6	28.6	32.6	36.6	40.6	44.6	48.6	52.6	56.6	60.6
42	0.8	4.8	8.8	12.8	16.8	20.8	24.8	28.8	32.8	36.8	40.8	44.8	48.8	52.8	56.8	60.8
45	1.0	5.0	9.0	13.0	17.0	21.0	25.0	29.0	33.0	37.0	41.0	45.0	49.0	53.0	57.0	61.0
48	1.2	5.2	9.2	13.2	17.2	21.2	25.2	29.2	33.2	37.2	41.2	45.2	49.2	53.2	57.2	61.2
51	1.4	5.4	9.4	13.4	17.4	21.4	25.4	29.4	33.4	37.4	41.4	45.4	49.4	53.4	57.4	61.4
54	1.6	5.6	9.6	13.6	17.6	21.6	25.6	29.6	33.6	37.6	41.6	45.6	49.6	53.6	57.6	61.6
57	1.8	5.8	9.8	13.8	17.8	21.8	25.8	29.8	33.8	37.8	41.8	45.8	49.8	53.8	57.8	61.8
60	2.0	6.0	10.0	14.0	18.0	22.0	26.0	30.0	34.0	38.0	42.0	46.0	50.0	54.0	58.0	62.0

Sunrise and Sunset

The local mean times of Sunrise and Sunset for latitudes 0° to 60° North at intervals of 4 days during the year have been given on pages 280 to 287. The timings relate to the visibility of the upper limb of the Sun on the horizon. From these tables the L.M.T. of rise or set for any day of the year and for any latitude of place can be obtained by simple interpolation. If the place is in the southern hemisphere, the corrections given on pages 290 to 291 will then have to be applied to the timings for the corresponding northern latitude. For a station in India, the timings of Sunrise and Sunset so obtained which are in L.M.T. can be reduced to I.S.T. by applying the correction given on page 314 according to the longitude of the station.

In addition to the above details given in the publication, the timings of Sunrise and Sunset of five important cities of India, viz., Kolkata, Varanasi, Chennai, Delhi and Mumbai have been specially calculated and given in I.S.T. on pages 292 to 295.

Sunrise and Sunset for Southern Latitudes

The timings of Sunrise and Sunset for southern latitudes, which have not been tabulated separately, can be deduced from those for the corresponding northern latitudes by applying the corrections given on pages 290 and 291.

Twilight

The timings of the beginning of morning twilight and ending of evening twilight have been given for latitudes 0° to 60° North on pages 280 to 287. The timings relate to the instant when the center of the Sun is 18° below the horizon. This is now known as astronomical twilight. The period of twilight has been divided into three parts - Civil when the Sun is 6° below the horizon, Nautical when 12° and Astronomical when 18° - and their durations have been given separately on pages 288 and 289 at an interval of 8 days. The figures for any intermediate date can be worked out from the tables by simple interpolation.

Moonrise and Moonset

The local mean times of Moonrise and Moonset for latitudes 0° to 50° North at 10- degrees interval together with the timings of these events in I.S.T. for four important stations in India, Viz., Kolkata, Chennai, Delhi and Mumbai for each day of the year have been given on pages 296 to 311 along with some supplementary tables on pages 312 to 313. A detailed method of calculation for any station is given below.

To find the time of Moonrise and Moonset for any station the figure for the phenomena concerned given against the date is to be taken from the table (pages 296 to 311) for the latitude just lower than the latitude of the station, to which the following corrections will have to be applied :

(a) Correction for difference in latitude;
(b) Correction for longitude, if the place is not on the Central Meridian of India (i.e., 82°.5 E. Long);
(c) Correction for converting L.M.T. into I.S.T., when and where necessary.

These corrections are detailed below :

(a) Correction for difference in latitude - The timings of Moonrise and Moonset have been given for latitudes 0°, 10°, 20°, 30°, 40° and 50° North, and in local mean time. The timing for any particular latitude of place falling within the above limits can be obtained by simple interpolation between figures for the two latitudes, one below and the other above the latitude of the given place. For this purpose the table on page 313 can be conveniently used wherein corrections for latitude are shown according to the variation per 10° of latitude of the timings of Moonrise or Moonset distributed over each degree of latitude. The correction can also be calculated directly by multiplying one-tenth of the time difference between the figures for two consecutive given latitudes by the excess of the latitude of the station over the given lower latitude.

(b) Correction for difference in longitude - The timings thus obtained are exact for the Central Meridian of India, i.e, for longitude 82°.5 East of Greenwich. For other longitudes the correction given on page 312 should be applied according to :

(i) the longitude of the station, and
(ii) the daily variation of the timings of rising or setting, as the case may be, between two consecutive dates.

If greater accuracy is not required, the daily variation may be assumed to be a constant (i.e., 50 minutes) for all dates and corrections from the following table may be applied instead of taking the corrections from the table on page 312.

Longitude of Station (East)	Correction m	Longitude of Station (East)	Correction m
0°	+ 11.5	84°	- 0.2
30°	+ 7.3	88°	- 0.8
60°	+ 3.1	92°	- 1.3
68°	+ 2.0	96°	- 1.9
72°	+ 1.5	120°	- 5.2
76°	+ 0.9	150°	- 9.4
80°	+ 0.3	180°	- 13.5

The timing thus obtained by the above two operations is in L.M.T. of the station

(c) Correction for converting L.M.T. into I.S.T. - The figures obtained by the operations (a) and (b) above would give the local mean time of Moonrise or Moonset for the given station. The local mean time can be reduced to the Indian Standard Time by the help of the reduction table on page 314. In other way to obtain the I.S.T., the L.M.T. may be increased at the rate of 4 minutes per degree of longitude if the station is to the west of 82°.5 East and decreased at the same rate if the station is to the east of 82°.5 East Longitude.

In practice, however, when dealing with the same station, it will be convenient to combine corrections (b) and (c) above, as these are constant day after day, and add this constant to the daily times corrected for latitude only.

Moonrise and Moonset for southern Latitudes

The times of Moonrise and Moonset for southern latitudes have not been given separately. The timings for a station in southern latitude can, however, be deduced from those for the corresponding northern latitude by the following formula :

Timings for a southern latitude = 2 × Timing for 0° latitude - Timing for the same northern latitude.

In this case the local mean time for the same latitude north will have to be calculated first by applying the latitude correction (a) above, and the corresponding time for the southern latitude will have to be deduced by the above formula by utilising the published figure for 0° latitude. The exact L.M.T. of rising or setting for the place in question will, however, be obtained by applying the correction (b) above to the time so deduced.

If necessary, the timings thus obtained may be reduced to I.S.T. by the usual method.

PHASES OF THE MOON, 2027

(Time in I.S.T.)

		d	h	m			d	h	m
Full Moon	Dec, 26	24	06	58	Full Moon	Jul	18	21	15
Last Quarter	Dec, 26	31	00	29	Last Quarter	Jul	26	22	25
New Moon	Jan, 27	08	01	54	New Moon	Aug	02	15	35
First Quarter	Jan, 27	16	02	04	First Quarter	Aug	09	10	24
Full Moon	Jan, 27	22	17	47	Full Moon	Aug	17	12	59
Last Quarter	Jan	29	16	25	Last Quarter	Aug	25	07	57
New Moon	Feb	06	21	26	New Moon	Aug	31	23	11
First Quarter	Feb	14	13	28	First Quarter	Sep	08	00	01
Full Moon	Feb	21	04	54	Full Moon	Sep	16	04	33
Last Quarter	Feb	28	10	46	Last Quarter	Sep	23	15	50
New Moon	Mar	08	14	59	New Moon	Sep	30	08	06
First Quarter	Mar	15	21	55	First Quarter	Oct	07	17	17
Full Moon	Mar	22	16	14	Full Moon	Oct	15	19	17
Last Quarter	Mar	30	06	24	Last Quarter	Oct	22	22	59
New Moon	Apr	07	05	21	New Moon	Oct	29	19	06
First Quarter	Apr	14	04	27	First Quarter	Nov	06	13	30
Full Moon	Apr	21	03	57	Full Moon	Nov	14	08	56
Last Quarter	Apr	29	01	48	Last Quarter	Nov	21	06	18
New Moon	May	06	16	29	New Moon	Nov	28	08	54
First Quarter	May	13	10	14	First Quarter	Dec	06	10	52
Full Moon	May	20	16	29	Full Moon	Dec	13	21	39
Last Quarter	May	28	19	28	Last Quarter	Dec	20	14	41
New Moon	Jun	05	01	10	New Moon	Dec	28	01	42
First Quarter	Jun	11	16	26	First Quarter	Jan, 28	05	07	10
Full Moon	Jun	19	06	14	Full Moon	Jan, 28	12	09	33
Last Quarter	Jun	27	10	24	Last Quarter	Jan, 28	19	00	56
New Moon	Jul	04	08	32	New Moon	Jan, 28	26	20	42
First Quarter	Jul	11	00	09	First Quarter	Feb, 28	04	00	40

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PART - IV

ECLIPSES AND OCCULTATIONS

ECLIPSES, 2027

In the year 2027, there are two eclipses of the Sun.

I	February	6	Annular eclipse of the Sun	320-323
II	August	2	Total eclipse of the Sun	324-333

In addition, there are three Penumbral eclipses of the Moon	February 20-21	334
	July 18	335
	August 17	336

I- Annular eclipse of the Sun, February 6, 2027, Saturday.

Not visible in India.

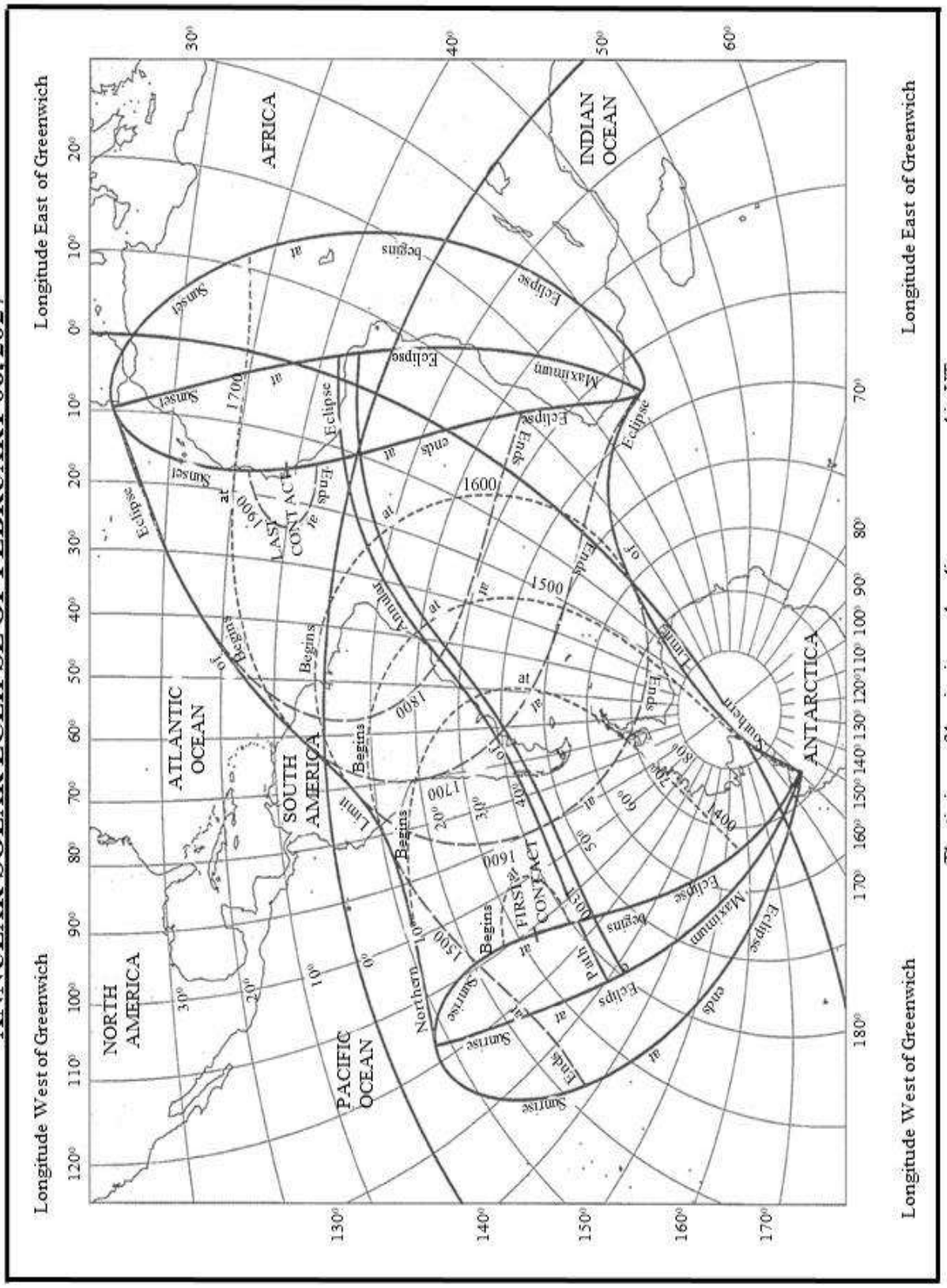
Area of Visibility

The eclipse is visible in the region covering South America, Antarctica, west and South Africa, South Pacific Ocean and South Atlantic Ocean.

ELEMENTS OF THE ECLIPSE						
Universal Time of Conjunction in Right Ascension : February $6^{d}15^{h}44^{m}29^{s}.3$						
	MOON			SUN		
	h	m	s	h	m	s
Right Ascension	21	20	15.11	21	20	15.10
Hourly Motion			115.39			10.02
	°	'	"	°	'	"
Declination	-15	50	34.36	-15	33	06.15
Hourly Motion		11	46.87			46.38
Equatorial Horizontal Parallax		54	26.83			08.92
True Semi-diameter		14	49.85		16	13.14

CIRCUMSTANCES OF THE ECLIPSE										
	Universal Time			Indian Standard Time			Latitude		Longitude	
	d	h	m	d	h	m	°	'	°	'
Eclipse begins	6	12	57.7	6	18	27.7	-33	3.9	-111	23.3
Annularity of Eclipse begins	6	14	07.1	6	19	37.1	-39	5.1	-131	20.9
Greatest eclipse*	6	15	59.6	6	21	29.6	-31	18.2	-48	28.8
Annularity of Eclipse ends	6	17	52.3	6	23	22.3	+6	11.7	+3	42.0
Eclipse ends	6	19	01.6	7	00	31.6	+12	20.6	-15	22.9

*Magnitude of the eclipse = 0.927, Duration of eclipse = 6 h 04 m.
Maximum duration of Annular phase = 7 m 59 s.


ANNULAR SOLAR ECLIPSE OF FEBRUARY 06, 2027
Longitude East of Greenwich
Longitude West of Greenwich
NORTH AMERICA
ATLANTIC OCEAN
PACIFIC OCEAN
SOUTH AMERICA
AFRICA
INDIAN OCEAN
ANTARCTICA
Northern Limit
Southern Limit
Sunset
Sunrise
Eclipse begins at
Eclipse ends at
Maximum Eclipse
Path begins at
Path ends at
FIRST CONTACT
LAST CONTACT
1500
1600
1700
1800
1900
The timings of beginning and ending are expressed in UT

ECLIPSES, 2027

BESSELIAN ELEMENTS OF THE ANNULAR ECLIPSE OF THE SUN

FEBRUARY 6

Terrestrial Time (TT)		Co-ordinates of the Centre of Shadow on the Fundamental Plane		Direction of the Axis of Shadow *					Radius of Penumbra and Umbra on the Fundamental Plane	
h	m	x	y	sind	cos d	μ °	'	"	l_1	l_2
12	50	-1.365725	-0.915609	-0.268703	+0.963223	+8	59	29.2	+0.571044	+0.026023
13	00	-1.287966	-0.881862	-0.268669	+0.963233	+11	29	29.5	+0.571044	+0.026022
	10	-1.210207	-0.848108	-0.268634	+0.963242	+13	59	29.8	+0.571042	+0.026021
	20	-1.132447	-0.814347	-0.268600	+0.963252	+16	29	30.1	+0.571041	+0.026019
	30	-1.054687	-0.780579	-0.268565	+0.963262	+18	59	30.4	+0.571038	+0.026017
	40	-0.976926	-0.746805	-0.268530	+0.963271	+21	29	30.7	+0.571035	+0.026014
	50	-0.899165	-0.713024	-0.268496	+0.963281	+23	59	31.0	+0.571032	+0.026011
14	00	-0.821405	-0.679237	-0.268461	+0.963291	+26	29	31.3	+0.571028	+0.026007
	10	-0.743644	-0.645443	-0.268426	+0.963300	+28	59	31.6	+0.571023	+0.026002
	20	-0.665885	-0.611642	-0.268392	+0.963310	+31	29	31.9	+0.571018	+0.025997
	30	-0.588125	-0.577836	-0.268357	+0.963320	+33	59	32.2	+0.571013	+0.025992
	40	-0.510367	-0.544023	-0.268322	+0.963329	+36	29	32.4	+0.571007	+0.025986
	50	-0.432609	-0.510204	-0.268288	+0.963339	+38	59	32.7	+0.571000	+0.025979
15	00	-0.354852	-0.476378	-0.268253	+0.963349	+41	29	33.0	+0.570993	+0.025972
	10	-0.277097	-0.442547	-0.268218	+0.963358	+43	59	33.3	+0.570986	+0.025964
	20	-0.199343	-0.408710	-0.268184	+0.963368	+46	29	33.7	+0.570978	+0.025956
	30	-0.121590	-0.374867	-0.268149	+0.963377	+48	59	34.0	+0.570969	+0.025948
	40	-0.043839	-0.341019	-0.268114	+0.963387	+51	29	34.3	+0.570960	+0.025938
	50	+0.033910	-0.307164	-0.268079	+0.963397	+53	59	34.6	+0.570950	+0.025929
16	00	+0.111657	-0.273304	-0.268045	+0.963406	+56	29	34.9	+0.570940	+0.025919
	10	+0.189401	-0.239439	-0.268010	+0.963416	+58	59	35.2	+0.570930	+0.025908
	20	+0.267144	-0.205568	-0.267975	+0.963426	+61	29	35.5	+0.570919	+0.025897
	30	+0.344884	-0.171691	-0.267941	+0.963435	+63	59	35.8	+0.570907	+0.025886
	40	+0.422621	-0.137810	-0.267906	+0.963445	+66	29	36.1	+0.570895	+0.025874
	50	+0.500355	-0.103923	-0.267871	+0.963455	+68	59	36.4	+0.570883	+0.025861
17	00	+0.578086	-0.070031	-0.267837	+0.963464	+71	29	36.7	+0.570870	+0.025848
	10	+0.655814	-0.036134	-0.267802	+0.963474	+73	59	37.0	+0.570856	+0.025835
	20	+0.733539	-0.002232	-0.267767	+0.963484	+76	29	37.3	+0.570842	+0.025821
	30	+0.811260	+0.031675	-0.267732	+0.963493	+78	59	37.6	+0.570828	+0.025807
	40	+0.888978	+0.065586	-0.267698	+0.963503	+81	29	37.9	+0.570813	+0.025792
	50	+0.966692	+0.099503	-0.267663	+0.963513	+83	59	38.2	+0.570798	+0.025777
18	00	+1.044401	+0.133424	-0.267628	+0.963522	+86	29	38.5	+0.570783	+0.025761
	10	+1.122107	+0.167349	-0.267593	+0.963532	+88	59	38.9	+0.570767	+0.025745
	20	+1.199808	+0.201279	-0.267559	+0.963542	+91	29	39.2	+0.570750	+0.025729
	30	+1.277505	+0.235214	-0.267524	+0.963551	+93	59	39.5	+0.570733	+0.025712
	40	+1.355197	+0.269153	-0.267489	+0.963561	+96	29	39.8	+0.570716	+0.025695
	50	+1.432884	+0.303096	-0.267454	+0.963570	+98	59	40.1	+0.570698	+0.025677
19	00	+1.510566	+0.337043	-0.267420	+0.963580	+101	29	40.4	+0.570680	+0.025659

tanf1= 0.00475023 tanf2= 0.00472660

TT	d			Variations per minute			
				x'	y'	μ'	
hr	°	'	"			'	"
12	-15	35	51	-0.007 775	-0.003 371	15	00
13	-15	35	06	-0.007 776	-0.003 375	15	00
14	-15	34	22	-0.007 776	-0.003 383	15	00
15	-15	33	37	-0.007 776	-0.003 387	15	00
16	-15	32	53	-0.007 774	-0.003 387	15	00
17	-15	32	08	-0.007 773	-0.003 390	15	00
18	-15	31	23	-0.007 771	-0.003 393	15	00
19	-15	30	39	-0.007 768	-0.003 395	15	00

$\xi' = 0.004364\rho\cos\phi'\cos(\mu+\lambda)$ $\eta' = 0.004364\xi\sin d$

*d stands for declination and μ stands for hourangle

ECLIPSES, 2027

PATH OF CENTRAL PHASE DURING THE ANNULAR ECLIPSE OF THE SUN
FEBRUARY 6

Terrestial Time (TT)		Northern Limit				Central Line				Southern Limit				Central Line	
		Latitude		Longitude		Latitude		Longitude		Latitude		Longitude		Duration of Annularity	
		°	′	°	′	°	′	°	′	°	′	°	′	m	s
Limit		-37	39.5	-130	22.2	-39	05.1	-131	21.2	-40	31.1	-132	23.2	-	-
h	m														
14	10	-41	52.1	+247	18.1	-42	45.5	+243	39.4	-43	18.8	+238	31.1	6	13.3
14	20	-43	42.9	+261	55.1	-45	03.2	+260	21.3	-46	23.0	+258	30.5	6	42.7
14	30	-43	54.7	+271	31.5	-45	19.1	+270	42.8	-46	44.4	+269	45.2	7	02.7
14	40	-43	23.6	+278	59.7	-44	47.6	+278	39.6	-46	12.9	+278	14.4	7	18.6
14	50	-42	26.3	+285	08.0	-43	48.2	+285	08.5	-45	11.4	+285	06.1	7	31.3
15	0	-41	11.1	+290	19.4	-42	29.9	+290	35.2	-43	50.0	+290	49.7	7	41.4
15	10	-39	42.4	+294	47.4	-40	57.9	+295	14.9	-42	14.5	+295	42.1	7	49.1
15	20	-38	03.4	+298	41.6	-39	15.4	+299	18.2	-40	28.2	+299	55.0	7	54.4
15	30	-36	16.0	+302	08.9	-37	24.4	+302	52.5	-38	33.7	+303	36.7	7	57.6
15	40	-34	21.5	+305	14.8	-35	26.6	+306	03.9	-36	32.3	+306	53.9	7	58.9
15	50	-32	20.7	-51	56.1	-33	22.7	-51	02.7	-34	25.2	-50	08.2	7	58.4
16	0	-30	14.2	-49	20.0	-31	13.3	-48	23.0	-32	12.9	-47	24.9	7	56.3
16	10	-28	02.3	-46	53.3	-28	58.8	-45	53.4	-29	55.7	-44	52.1	7	52.7
16	20	-25	44.9	-44	32.7	-26	39.1	-43	30.2	-27	33.7	-42	26.3	7	47.8
16	30	-23	21.9	-42	14.9	-24	14.1	-41	09.9	-25	06.7	-40	03.6	7	41.8
16	40	-20	52.8	-39	56.3	-21	43.4	-38	49.0	-22	34.3	-37	40.1	7	34.7
16	50	-18	16.9	-37	32.9	-19	06.0	-36	23.0	-19	55.5	-35	11.4	7	26.6
17	0	-15	32.8	-34	59.6	-16	20.9	-33	46.7	-17	09.2	-32	31.9	7	17.5
17	10	-12	38.8	-32	09.3	-13	25.9	-30	52.7	-14	13.4	-29	33.9	7	07.4
17	20	-9	31.6	-28	51.5	-10	18.0	-27	29.7	-11	04.6	-26	05.1	6	56.0
17	30	-6	05.5	-24	46.9	-6	50.9	-23	17.1	-7	36.4	-21	43.4	6	43.0
17	40	-2	07.4	-19	12.9	-2	50.6	-17	26.8	-3	33.1	-15	34.0	6	27.2
17	50	+3	13.3	-9	19.7	+2	46.5	-6	20.0	+2	32.7	-2	24.5	6	03.6
Limit		+7	38.7	+2	58.6	+6	11.7	+3	41.9	+4	43.9	+4	26.4	-	-

ECLIPSES, 2027

II- Total eclipse of the Sun, August 2, 2027, Monday.

Visible in India.

Area of Visibility

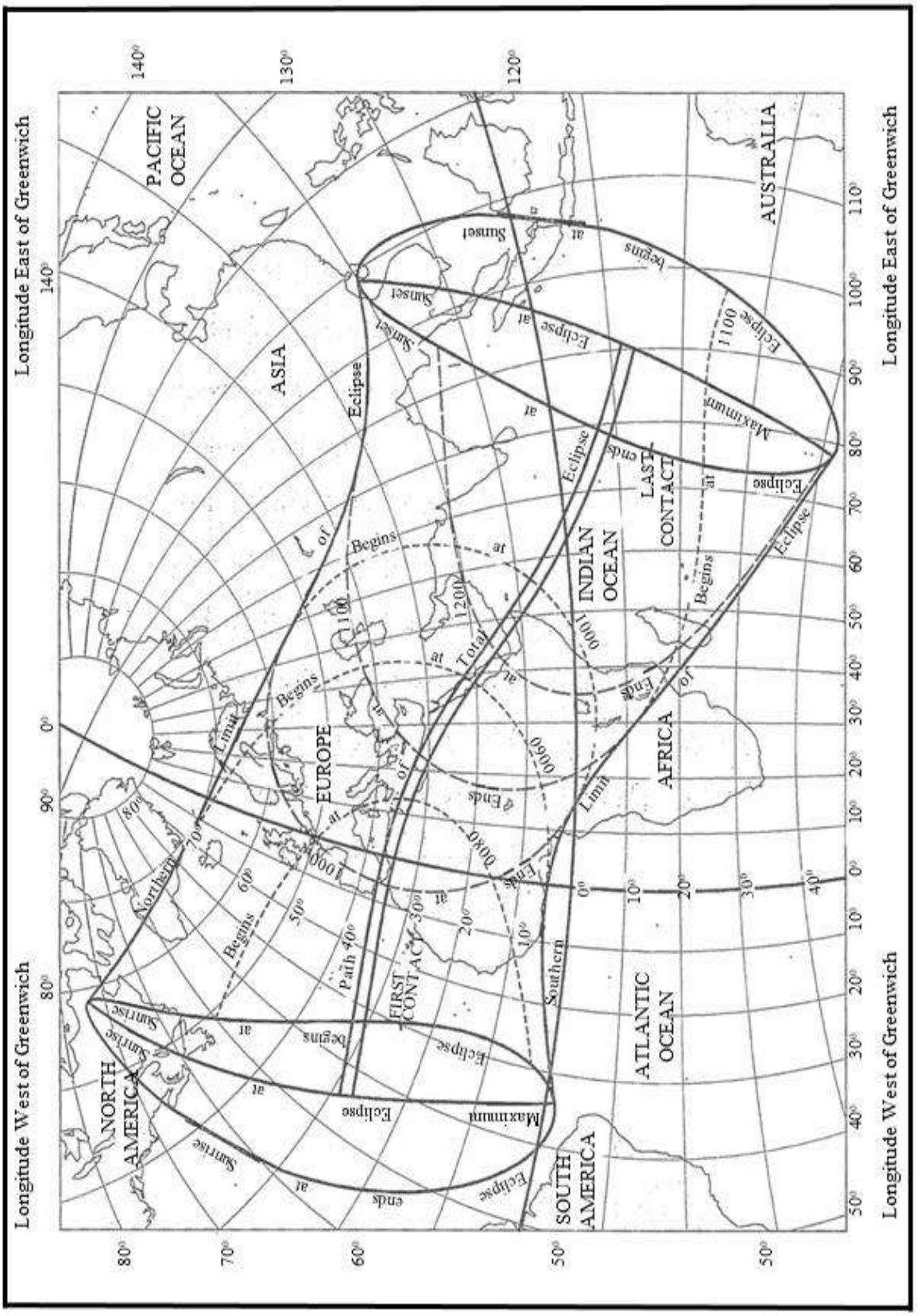
The eclipse will be visible in the region covering extreme eastern North America, Europe, Africa, southwest Asia, the north Atlantic Ocean and the Indian Ocean.

In India the partial phase of the eclipse will be visible from most places of the country except some parts of extreme north-east India such as Dibrugarh, Itanagar, Sibsagar.

ELEMENTS OF THE ECLIPSE						
Universal Time of Conjunction in Right Ascension : August $2^d10^h01^m00^s.3$						
	MOON			SUN		
	h	m	s	h	m	s
Right Ascension	8	49	25.10	8	49	25.91
Hourly Motion			150.06			09.68
	°	'	"	°	'	"
Declination	+17	55	09.27	+17	45	45.15
Hourly Motion		-13	30.17			-38.47
Equatorial Horizontal Parallax		61	21.47			08.66
True Semi-diameter		16	42.78		15	45.53

CIRCUMSTANCES OF THE ECLIPSE										
	Universal Time			Indian Standard Time			Latitude		Longitude	
	d	h	m	d	h	m	°	'	°	'
Eclipse begins	2	7	30.3	2	13	00.3	+25	15.9	-29	41.9
Totality of Eclipse begins	2	8	25.1	2	13	55.1	+27	57.5	-44	29.2
Greatest eclipse*	2	10	06.7	2	15	36.7	+25	30.1	+33	10.1
Totality of eclipse ends	2	11	48.3	2	17	18.3	-12	29.2	+90	25.6
Eclipse ends	2	12	43.1	2	18	13.1	-15	12.5	+75	48.3

*Magnitude of the eclipse = 1.079, Duration of eclipse = 5 h 14 m.
Maximum duration of Totality phase = 6 m 19.6 s.


TOTAL SOLAR ECLIPSE OF AUGUST 02, 2027
Longitude West of Greenwich
Longitude East of Greenwich
PACIFIC OCEAN
ASIA
AUSTRALIA
NORTH AMERICA
EUROPE
AFRICA
INDIAN OCEAN
ATLANTIC OCEAN
SOUTH AMERICA
FIRST CONTACT
LAST CONTACT
Path 40°
Northern Limit
Southern Limit
Begins
Ends
Eclipse
Maximum
Sunrise
Sunset
at
of
1000
1100
1200
0000
0060
0080
The timings of beginning and ending are expressed in UT

ECLIPSES, 2027

BESSELIAN ELEMENTS OF THE TOTAL ECLIPSE OF THE SUN

AUGUST 2

Terrestrial Time (TT)		Co-ordinates of the Centre of Shadow on the Fundamental Plane		Direction of the Axis of Shadow *					Radius of Penumbra and Umbra on the Fundamental Plane	
h	m	x	y	sin d	cos d	μ °	'	"	l_1	l_2
7	30	-1.381694	+0.687144	+0.305494	+0.952194	+290	55	02.2	+0.529632	-0.015389
	40	-1.290901	+0.652060	+0.305466	+0.952203	+293	25	03.5	+0.529645	-0.015376
	50	-1.200108	+0.616969	+0.305438	+0.952212	+295	55	04.7	+0.529657	-0.015364
8	00	-1.109314	+0.581869	+0.305410	+0.952221	+298	25	06.0	+0.529668	-0.015353
	10	-1.018520	+0.546762	+0.305382	+0.952230	+300	55	07.2	+0.529678	-0.015343
	20	-0.927725	+0.511647	+0.305354	+0.952239	+303	25	08.5	+0.529688	-0.015333
	30	-0.836931	+0.476524	+0.305325	+0.952248	+305	55	09.7	+0.529697	-0.015324
	40	-0.746137	+0.441393	+0.305297	+0.952257	+308	25	11.0	+0.529706	-0.015315
	50	-0.655343	+0.406255	+0.305269	+0.952266	+310	55	12.2	+0.529714	-0.015307
9	00	-0.564551	+0.371109	+0.305241	+0.952275	+313	25	13.4	+0.529721	-0.015300
	10	-0.473760	+0.335956	+0.305213	+0.952284	+315	55	14.7	+0.529727	-0.015294
	20	-0.382970	+0.300796	+0.305185	+0.952293	+318	25	15.9	+0.529733	-0.015288
	30	-0.292182	+0.265629	+0.305156	+0.952302	+320	55	17.2	+0.529738	-0.015283
	40	-0.201396	+0.230454	+0.305128	+0.952311	+323	25	18.4	+0.529742	-0.015279
	50	-0.110612	+0.195273	+0.305100	+0.952320	+325	55	19.7	+0.529745	-0.015276
10	00	-0.019831	+0.160085	+0.305072	+0.952329	+328	25	20.9	+0.529748	-0.015273
	10	+0.070948	+0.124890	+0.305044	+0.952338	+330	55	22.2	+0.529751	-0.015270
	20	+0.161723	+0.089688	+0.305015	+0.952347	+333	25	23.4	+0.529752	-0.015269
	30	+0.252495	+0.054480	+0.304987	+0.952356	+335	55	24.7	+0.529753	-0.015268
	40	+0.343264	+0.019266	+0.304959	+0.952365	+338	25	25.9	+0.529753	-0.015268
	50	+0.434029	-0.015955	+0.304931	+0.952375	+340	55	27.2	+0.529752	-0.015269
11	00	+0.524789	-0.051182	+0.304903	+0.952384	+343	25	28.4	+0.529751	-0.015270
	10	+0.615546	-0.086415	+0.304874	+0.952393	+345	55	29.7	+0.529749	-0.015272
	20	+0.706297	-0.121654	+0.304846	+0.952402	+348	25	30.9	+0.529746	-0.015275
	30	+0.797044	-0.156899	+0.304818	+0.952411	+350	55	32.2	+0.529743	-0.015278
	40	+0.887786	-0.192149	+0.304790	+0.952420	+353	25	33.4	+0.529739	-0.015282
	50	+0.978522	-0.227406	+0.304761	+0.952429	+355	55	34.7	+0.529734	-0.015287
12	00	+1.069252	-0.262668	+0.304733	+0.952438	+358	25	35.9	+0.529728	-0.015293
	10	+1.159977	-0.297935	+0.304705	+0.952447	+360	55	37.2	+0.529722	-0.015299
	20	+1.250695	-0.333208	+0.304677	+0.952456	+363	25	38.4	+0.529715	-0.015306
	30	+1.341407	-0.368487	+0.304649	+0.952465	+365	55	39.6	+0.529708	-0.015313
	40	+1.432112	-0.403770	+0.304620	+0.952474	+368	25	40.9	+0.529699	-0.015322
	50	+1.522810	-0.439058	+0.304592	+0.952483	+370	55	42.1	+0.529690	-0.015331

tanf1= 0. 00461378 tanf2= 0. 00459083

TT	d			Variations per minute			
				x'	y'	μ'	
hr	°	'	''			'	''
7	17	47	35	+0.009 079	-0.003 506	15	00
8	17	46	58	+0.009 079	-0.003 511	15	00
9	17	46	22	+0.009 079	-0.003 515	15	00
10	17	45	45	+0.009 078	-0.003 519	15	00
11	17	45	08	+0.009 076	-0.003 523	15	00
12	17	44	32	+0.009 072	-0.003 527	15	00

$\xi' = 0.004364\rho\cos\phi' \cos(\mu+\lambda)$ $\eta' = 0.004364\xi\sin d$

*d stands for declination and μ stands for hourangle

ECLIPSES, 2027

PATH OF CENTRAL PHASE DURING THE TOTAL ECLIPSE OF THE SUN

AUGUST 2

Terrestial Time (TT)		Northern Limit				Central Line				Southern Limit				Central Line	
		Latitude		Longitude		Latitude		Longitude		Latitude		Longitude		Duration of Totality	
		°	′	°	′	°	′	°	′	°	′	°	′	m	s
Limit		+28	48.6	-44	57.9	+27	57.5	-44	29.4	+27	06.5	-44	01.8	-	-
h	m														
8	30	+33	48.4	-27	15.4	+33	03.9	-25	59.6	+32	17.2	-24	51.3	3	48.3
8	40	+36	12.7	-13	09.2	+35	14.2	-12	31.0	+34	15.2	-11	56.5	4	27.3
8	50	+36	48.0	-3	45.0	+35	44.4	-3	25.6	+34	40.8	-3	08.7	4	55.9
9	0	+36	34.4	+3	41.4	+35	28.6	+3	46.7	+34	22.9	+3	50.3	5	19.1
9	10	+35	49.9	+9	55.6	+34	43.5	+9	49.3	+33	37.3	+9	42.0	5	38.1
9	20	+34	43.2	+15	18.7	+33	37.3	+15	02.8	+32	31.5	+14	46.3	5	53.3
9	30	+33	19.4	+20	03.1	+32	14.6	+19	39.1	+31	10.1	+19	15.0	6	04.9
9	40	+31	41.7	+24	17.2	+30	38.6	+23	46.6	+29	35.7	+23	16.2	6	13.1
9	50	+29	52.3	+28	07.5	+28	51.2	+27	31.6	+27	50.2	+26	56.0	6	17.9
10	0	+27	52.7	+31	39.5	+26	53.8	+30	59.1	+25	54.9	+30	19.3	6	19.6
10	10	+25	43.6	+34	57.5	+24	47.0	+34	13.7	+23	50.4	+33	30.4	6	18.2
10	20	+23	25.6	+38	06.1	+22	31.3	+37	19.4	+21	36.9	+36	33.3	6	14.0
10	30	+20	58.7	+41	09.4	+20	06.7	+40	20.5	+19	14.6	+39	32.2	6	07.0
10	40	+18	22.5	+44	12.0	+17	32.7	+43	21.3	+16	42.7	+42	31.2	5	57.4
10	50	+15	35.9	+47	19.3	+14	48.3	+46	27.0	+14	00.5	+45	35.4	5	45.3
11	0	+12	37.4	+50	37.8	+11	51.9	+49	44.2	+11	06.1	+48	51.4	5	30.8
11	10	+9	24.0	+54	17.3	+8	40.6	+53	22.3	+7	56.9	+52	28.2	5	13.6
11	20	+5	50.4	+58	33.3	+5	09.3	+57	36.7	+4	27.8	+56	41.0	4	53.4
11	30	+1	46.0	+63	56.9	+1	07.7	+62	57.3	+0	28.8	+61	59.0	4	29.4
11	40	-3	19.4	+71	55.1	-3	52.6	+70	47.3	-4	27.0	+69	41.6	3	58.6
Limit		-11	37.4	+90	49.7	-12	29.1	+90	25.6	-13	20.7	+90	01.8	-	-

ECLIPSES, 2027

THE TOTAL ECLIPSE OF THE SUN, AUGUST 2

LOCAL CIRCUMSTANCES RELATING TO INDIA

BEGINNING OF ECLIPSE PERTAINING TO INDIA
TIME IN I.S.T.

Lat (North)	Longitude East of Greenwich Beginning								
	68˚	72˚	76˚	80˚	84˚	88˚	92˚	96˚	100˚
	h m	h m	h m	h m	h m	h m	h m	h m	h m
36	15 31.0	15 42.3	15 55.0	16 17.2	- (18 58)	- (18 42)	- (18 26)	- (18 10)	- (17 54)
32	15 31.1	15 41.3	15 51.8	16 03.0	16 17.6	- (18 35)	- (18 19)	- (18 3)	- (17 47)
28	15 32.4	15 41.8	15 51.1	16 00.3	16 09.7	16 20.4	- (18 11)	- (17 55)	- (17 39)
24	15 34.5	15 43.2	15 51.6	15 59.7	16 07.4	16 15.0	16 22.8	16 31.8	- (17 33)
20	15 37.3	15 45.3	15 53.0	16 00.1	16 06.8	16 13.1	16 18.9	16 24.4	16 29.7
16	15 40.6	15 48.0	15 54.9	16 01.3	16 07.2	16 12.5	16 17.3	16 21.5	16 25.2
12	15 44.4	15 51.1	15 57.3	16 03.0	16 08.2	16 12.8	16 16.8	16 20.2	17 23.0
8	15 48.5	15 54.5	16 00.0	16 05.1	16 09.6	16 13.5	16 16.9	16 19.7	16 22.0

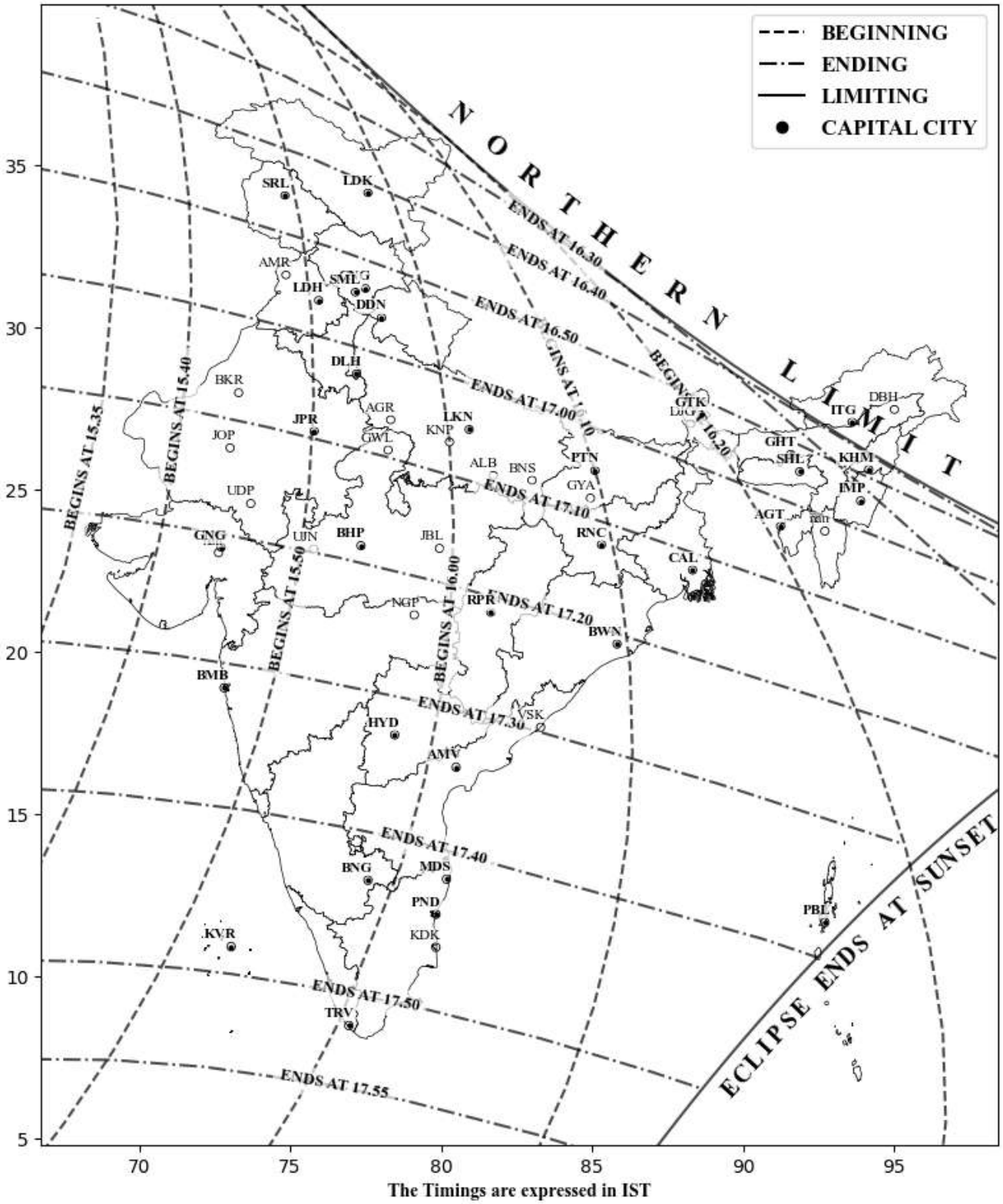
ENDING OF ECLIPSE PERTAINING TO INDIA
TIME IN I.S.T.

Lat (North)	Longitude East of Greenwich Beginning								
	68˚	72˚	76˚	80˚	84˚	88˚	92˚	96˚	100˚
	h m	h m	h m	h m	h m	h m	h m	h m	h m
36	16 45.7	16 42	16 36.2	16 20.2	- (18 58)	- (18 42)	- (18 26)	- (18 10)	- (17 54)
32	16 58.5	16 56.0	16 52.3	16 47.1	16 37.5	- (18 35)	- (18 19)	- (18 3)	- (17 47)
28	17 10.1	17 08.3	17 05.7	17 02.2	16 57.5	16 50.7	- (18 11)	- (17 55)	- (17 39)
24	17 20.8	17 19.5	17 17.5	17 14.9	17 11.6	17 07.5	17 02.3	16 55.0	- (17 33)
20	17 30.5	17 29.5	17 28.0	17 25.9	17 23.3	17 20.2	17 16.6	17 12.5	17 07.6
16	17 39.3	17 38.6	17 37.3	17 35.6	17 33.4	17 30.9	17 27.9	17 24.7	17 21.1
12	17 47.2	17 46.6	17 45.6	17 44.1	17 42.2	17 40.0	17 37.4	17 34.6	17 31.5
8	17 54.0	17 53.7	17 52.8	17 51.6	17 49.9	17 47.8	17 45.5	17 42.9	17 40.1

"–" Indicates Sun sets before the corresponding phenomenon (i.e. corresponding phenomenon is not visible)
( ) The value in the bracket indicates sunset time of corresponding locations.

ECLIPSES, 2027

TOTAL SOLAR ECLIPSE OF AUGUST 2, 2027



ECLIPSES, 2027

THE TOTAL ECLIPSE OF THE SUN, AUGUST 2

LOCAL CIRCUMSTANCES OF THE PARTIAL PHASE RELATING TO CERTAIN PLACES IN INDIA

Places	Partial Eclipse Begins (IST)	Position Angles at Eclipse Begins	Greatest Eclipse (IST)	Magnitude	Maximum Obscuration	Partial Eclipse Ends(IST)	Position Angles at Eclipse Ends	Duration of Eclipse
	h m	P V	h m			h m	P V	h m
Agartala	16 21.1	232 161	16 42.8	0.076	2.7%	17 03.9	187 118	0 42.8
Ahmadabad	15 45.0	263 187	16 35.1	0.347	24.0%	17 21.6	164 92	1 36.7
Aijawl	16 23.8	230 159	16 43.3	0.063	2.0%	17 02.4	189 120	0 38.6
Ajmer	15 48.1	254 184	16 31.0	0.248	14.8%	17 11.3	172 103	1 23.2
Allahabad (Prayagraj)	16 03.3	245 174	16 36.9	0.164	8.1%	17 09.0	178 109	1 05.7
Amritsar	15 48.7	244 181	16 22.5	0.147	7.1%	16 54.8	181 118	1 06.1
Bangalore	15 59.1	272 185	16 53.4	0.493	39.2%	17 43.1	153 72	1 44.1
Bhagalpur	16 13.9	236 166	16 39.5	0.100	4.0%	17 04.3	185 116	0 50.4
Bhopal	15 54.5	256 181	16 37.9	0.269	16.7%	17 18.7	169 98	1 24.2
Bhubaneswar	16 09.8	249 173	16 46.5	0.215	12.0%	17 21.2	172 100	1 11.5
Cannanore	15 56.4	276 187	16 53.8	0.554	46.1%	17 46.1	149 67	1 49.7
Chandigarh	15 55.4	240 176	16 25.0	0.116	5.0%	16 53.5	184 120	0 58.1
Chennai	16 02.8	269 182	16 54.5	0.454	34.9%	17 42.0	155 75	1 39.2
Cochin	15 59.0	278 187	16 56.8	0.585	49.8%	17 49.4	147 64	1 50.3
Cooch Behar	16 21.0	228 159	16 38.7	0.049	1.5%	16 56.1	192 125	0 35.1
Cuttack	16 10.0	249 172	16 46.2	0.209	11.5%	17 20.5	173 100	1 10.6
Daman	15 46.8	266 187	16 39.6	0.399	29.1%	17 28.2	160 85	1 41.4
Darjeeling	16 19.2	228 160	16 37.2	0.050	1.5%	16 54.9	192 125	0 35.7
Dehradun	15 56.4	241 176	16 26.9	0.124	5.6%	16 56.2	183 118	0 59.8
Delhi	15 53.9	246 179	16 29.2	0.168	8.5%	17 02.9	178 112	1 09.0
Dwarka	15 37.9	268 192	16 33.5	0.421	31.5%	17 24.6	159 86	1 46.8
Gandhinagar	15 45.1	262 187	16 34.9	0.342	23.5%	17 21.2	164 92	1 36.1
Gangtok	16 20.7	227 159	16 36.9	0.040	1.1%	16 52.9	194 127	0 32.2
Guwahati	16 26.1	224 155	16 39.6	0.029	0.7%	16 53.0	196 128	0 26.9
Gaya	16 09.6	241 170	16 39.5	0.135	6.1%	17 08.2	181 112	0 58.6
Haridwar	15 57.0	240 175	16 26.6	0.118	5.1%	16 55.1	184 119	0 58.2
Hazaribagh	16 10.0	242 170	16 40.8	0.145	6.8%	17 10.3	180 110	1 00.3
Hubli	15 53.8	270 186	16 47.8	0.456	35.1%	17 37.5	156 77	1 43.7
Hyderabad	15 58.3	264 182	16 47.5	0.377	26.8%	17 33.0	161 84	1 34.6
Imphal	16 28.4	224 154	16 42.2	0.032	0.8%	16 55.9	195 127	0 27.5
Jaipur	15 50.7	252 182	16 31.2	0.223	12.7%	17 09.5	174 105	1 18.8
Jalandhar	15 51.8	241 178	16 22.6	0.123	5.5%	16 52.3	183 120	1 00.5

ECLIPSES, 2027

THE TOTAL ECLIPSE OF THE SUN, AUGUST 2

LOCAL CIRCUMSTANCES OF THE PARTIAL PHASE RELATING TO CERTAIN PLACES IN INDIA

Places	Partial Eclipse Begins (IST)	Position Angles at Eclipse Begins	Greatest Eclipse (IST)	Magnitude	Maximum Obscuration	Partial Eclipse Ends(IST)	Position Angles at Eclipse Ends	Duration of Eclipse
	h m	P V	h m			h m	P V	h m
Jammu	15 48.9	242 180	16 20.7	0.129	5.9%	16 51.2	183 121	1 02.3
Kanyakumari	16 01.9	280 186	16 59.7	0.613	53.0%	17 52.3	145 60	1 50.3
Kavalur	16 01.7	270 183	16 54.2	0.467	36.2%	17 42.4	154 74	1 40.7
Kavaratti	15 53.6	281 189	16 53.8	0.613	53.0%	17 48.4	146 63	1 54.9
Kohima	16 33.0	217 149	16 40.8	0.010	0.2%	16 48.7	201 134	0 15.7
Kolhapur	15 51.5	270 187	16 46.2	0.459	35.4%	17 36.4	156 78	1 44.9
Kolkata	16 14.6	241 167	16 44.0	0.137	6.2%	17 12.1	180 109	0 57.5
Koraput	16 04.8	256 177	16 47.4	0.287	18.1%	17 27.3	167 92	1 22.4
Kozikode	15 57.5	277 187	16 54.8	0.561	46.9%	17 47.1	149 66	1 49.6
Kurnool	15 58.4	267 183	16 49.7	0.420	31.3%	17 36.9	158 80	1 38.5
Leh	15 58.0	232 172	16 20.1	0.063	2.2%	16 41.7	191 131	0 43.7
Lucknow	16 02.0	243 174	16 34.3	0.147	7.0%	17 05.1	180 112	1 03.1
Madurai	16 01.6	276 185	16 57.7	0.559	46.6%	17 48.8	148 65	1 47.2
Mangalore	15 55.0	275 187	16 52.1	0.536	44.0%	17 44.2	151 69	1 49.2
Midnapore	16 12.8	243 169	16 43.8	0.152	7.2%	17 13.5	178 108	1 00.7
Mount Abu	15 44.5	260 187	16 32.7	0.314	20.8%	17 17.5	167 96	1 33.0
Mumbai	15 47.6	269 188	16 41.9	0.433	32.7%	17 31.9	158 81	1 44.3
Murshidabad	16 16.2	236 165	16 41.4	0.099	3.9%	17 05.7	184 115	0 49.5
Muzaffarpur	16 11.3	237 167	16 37.6	0.103	4.2%	17 02.9	185 117	0 51.6
Mysore	15 58.1	274 186	16 53.9	0.522	42.4%	17 44.8	151 70	1 46.6
Nagpur	15 58.3	257 180	16 42.3	0.288	18.3%	17 23.4	167 94	1 25.1
Nalgonda	15 59.8	264 182	16 48.5	0.376	26.7%	17 33.6	161 84	1 33.9
Nasik	15 48.8	266 186	16 40.9	0.393	28.6%	17 28.9	161 85	1 40.1
Nellore	16 01.9	267 182	16 52.4	0.423	31.6%	17 39.0	157 78	1 37.1
Nowgong	15 58.6	249 177	16 36.3	0.203	11.1%	17 12.1	175 105	1 13.5
Panaji	15 52.2	272 187	16 47.6	0.477	37.5%	17 38.3	155 76	1 46.1
Patna	16 10.3	239 168	16 38.2	0.116	5.0%	17 05.1	183 114	0 54.8
Pondicherry	16 02.8	271 183	16 55.8	0.485	38.3%	17 44.4	153 72	1 41.5
Pune	15 49.7	268 187	16 43.2	0.424	31.8%	17 32.4	158 82	1 42.6
Port Blair	16 17.4	257 174	16 58.8	0.331	22.1%	17 37.7	161 83	1 20.3
Puri	16 09.7	250 173	16 47.1	0.225	12.8%	17 22.5	171 98	1 12.8

ECLIPSES, 2027

THE TOTAL ECLIPSE OF THE SUN, AUGUST 2

LOCAL CIRCUMSTANCES OF THE PARTIAL PHASE RELATING TO CERTAIN PLACES IN INDIA

Places	Partial Eclipse Begins (IST)	Position Angles at Eclipse Begins	Greatest Eclipse (IST)	Magnitude	Maximum Obscuration	Partial Eclipse Ends(IST)	Position Angles at Eclipse Ends	Duration of Eclipse
	h m	P V	h m			h m	P V	h m
Raipur	16 02.8	253 177	16 43.4	0.250	14.9%	17 21.5	170 97	1 18.7
Rajamundry	16 04.5	260 179	16 49.8	0.333	22.4%	17 32.0	163 87	1 27.5
Rajkot	15 41.5	266 190	16 35.0	0.393	28.6%	17 24.3	161 87	1 42.8
Ranchi	16 09.6	244 171	16 41.8	0.158	7.7%	17 12.5	178 108	1 02.9
Sambalpur	16 06.8	249 174	16 44.0	0.214	11.9%	17 19.2	173 101	1 12.4
Shillong	16 25.5	225 156	16 40.5	0.036	1.0%	16 55.3	194 126	0 29.7
Shimla	15 54.5	241 177	16 25.0	0.123	5.5%	16 54.3	183 119	0 59.8
Silchar	16 25.9	226 156	16 41.9	0.042	1.2%	16 57.6	193 125	0 31.7
Siliguri	16 18.8	229 161	16 37.8	0.056	1.8%	16 56.5	191 124	0 37.7
Silvassa	15 47.0	266 187	16 39.6	0.396	28.9%	17 28.1	160 85	1 41.1
Srinagar	15 49.6	239 179	16 18.3	0.104	4.4%	16 46.0	186 125	0 56.4
Sringeri	15 55.5	273 186	16 51.3	0.507	40.7%	17 42.4	152 72	1 46.8
Tamelong	16 29.6	222 153	16 41.7	0.024	0.6%	16 53.8	196 129	0 24.2
Thanjavur	16 02.5	274 184	16 56.9	0.523	42.5%	17 46.8	151 68	1 44.4
Thiruvanantapuram	16 00.9	280 187	16 59.0	0.611	52.8%	17 51.8	145 61	1 50.8
Tiruneveil	16 02.0	277 186	16 58.6	0.575	48.5%	17 50.1	147 64	1 48.0
Trichur	15 58.7	277 186	16 55.7	0.562	47.0%	17 47.7	149 66	1 49.0
Udaipur	15 46.6	259 186	16 33.4	0.299	19.4%	17 17.1	168 97	1 30.5
Ujjain	15 51.4	258 183	16 37.1	0.295	19.0%	17 19.8	167 96	1 28.4
Vadodara	15 46.6	263 187	16 36.8	0.352	24.4%	17 23.3	164 90	1 36.6
Varanasi	16 05.9	243 172	16 37.8	0.149	7.1%	17 08.3	179 111	1 02.4
Vijayawada	16 02.1	263 180	16 49.8	0.367	25.8%	17 34.1	161 84	1 32.0
Chittagong	16 20.5	236 163	16 45.1	0.100	3.9%	17 08.9	184 114	0 48.3
Colombo	16 05.6	279 185	17 02.0	0.607	52.3%	17 53.4	145 60	1 47.8
Dhaka	16 19.4	234 163	16 42.8	0.088	3.3%	17 05.6	185 116	0 46.2
Karachi	15 31.9	267 195	16 27.5	0.404	29.7%	17 18.9	161 90	1 47.0
Kathmandu	16 12.4	233 165	16 35.0	0.075	2.7%	16 57.0	188 122	0 44.7
Lahore	15 47.6	245 182	16 22.2	0.154	7.5%	16 55.2	180 117	1 07.7
Yangon	16 22.1	243 166	16 52.9	0.175	8.8%	17 22.4	174 101	1 00.3
Rwalpindi	15 44.5	243 183	16 17.7	0.138	6.5%	16 49.5	182 121	1 05.0
Islamabad	15 44.7	243 183	16 17.6	0.135	6.3%	16 49.1	182 121	1 04.3
Thimpu	16 25.2	222 155	16 37.0	0.022	0.5%	16 48.7	198 132	0 23.5

ECLIPSES, 2027
THE TOTAL ECLIPSE OF THE SUN, AUGUST 2

Eastern Limit of Ending of Eclipse

Latitude (N)	Ending at Sunset				Latitude (N)	Ending at Sunset			
	Longitude (E)		Time(IST)			Longitude (E)		Time (IST)	
	°	'	h	m	°	°	'	h	m
4	86	33	17	55.2	11	92	54	17	39.0
5	87	22	17	53.3	12	93	57	17	36.1
6	88	12	17	51.2	13	95	04	17	33.0
7	89	04	17	49.0	14	96	14	17	29.7
8	89	58	17	46.7	15	97	28	17	26.1
9	90	54	17	44.3	16	98	47	17	22.2
10	91	53	17	41.7	17	100	12	17	17.9

Northern Limit of Visibility of Eclipse

Time(IST)		Northern Limit				Time(IST)		Northern Limit			
		Latitude		Longitude				Latitude		Longitude	
h	m	°	'	°	'	h	m	°	'	°	'
10	38	+40	14.5	+75	04.7	10	58	+32	03.9	+85	02.0
10	40	+39	28.1	+75	57.6	11	00	+31	10.5	+86	15.5
10	42	+38	40.8	+76	51.9	11	02	+30	15.7	+87	33.8
10	44	+37	53.2	+77	47.1	11	04	+29	19.1	+88	57.9
10	46	+37	05.2	+78	43.5	11	06	+28	20.5	+90	29.1
10	48	+36	16.7	+79	41.3	11	08	+27	19.1	+92	09.7
10	50	+35	27.6	+80	40.7	11	10	+26	14.2	+94	02.6
10	52	+34	37.9	+81	42.1	11	12	+25	04.2	+96	13.3
10	54	+33	47.5	+82	45.8	11	14	+23	46.3	+98	51.8
10	56	+32	56.2	+83	52.3	11	16	+22	13.9	+102	22.8

ECLIPSES, 2027

PENUMBRAL ECLIPSE OF THE MOON, February 20-21, 2027, Saturday-Sunday

CIRCUMSTANCES OF THE ECLIPSE											
	Universal Time			Indian Standard Time			Position Angle from the North Point of Moon's Limb (N.E.S.W)**	The Moon being in the Zenith in			
								Latitude		Longitude	
	d	h	m	d	h	m	°	°	'	°	'
Moon enters penumbra	20	21	10.4	21	02	40.4	75	+10	20	+44	34
Middle of the eclipse*	20	23	12.9	21	04	42.9	-	+9	47	+15	00
Moon leaves penumbra	21	01	15.4	21	06	45.4	339	+9	14	-14	35

* Penumbral magnitude of eclipse: 0.952

** N.E.S.W stands for North, East, South and West

Note : - A penumbral eclipse of the Moon is not to be taken as an eclipse of the Moon in the ordinary sense, as the Moon is not covered by the real shadow of the Earth during such an eclipse.

ECLIPSES, 2027

PENUMBRAL ECLIPSE OF THE MOON, July 18, 2027, Sunday

CIRCUMSTANCES OF THE ECLIPSE											
	Universal Time			Indian Standard Time			Position Angle from the North Point of Moon's Limb (N.E.S.W)**	The Moon being in the Zenith in			
								Latitude		Longitude	
	d	h	m	d	h	m	°	°	'	°	'
Moon enters penumbra	18	15	36.9	18	21	06.9	352	-22	24	+127	51
Middle of the eclipse*	18	16	03.0	18	21	33.0	-	-22	20	+121	31
Moon leaves penumbra	18	16	29.2	18	21	59.2	336	-22	17	+115	11

* Penumbral magnitude of eclipse: 0.028

** N.E.S.W stands for North, East, South and West

Note : - A penumbral eclipse of the Moon is not to be taken as an eclipse of the Moon in the ordinary sense, as the Moon is not covered by the real shadow of the Earth during such an eclipse.

ECLIPSES, 2027

PENUMBRAL ECLIPSE OF THE MOON, August 17, 2027, Tuesday

CIRCUMSTANCES OF THE ECLIPSE											
	Universal Time			Indian Standard Time			Position Angle from the North Point of Moon's Limb (N.E.S.W)**	The Moon being in the Zenith in			
								Latitude		Longitude	
	d	h	m	d	h	m	°	°	'	°	'
Moon enters penumbra	17	05	21.6	17	10	51.6	119	-12	48	-80	22
Middle of the eclipse*	17	07	13.8	17	12	43.8	-	-12	25	-107	38
Moon leaves penumbra	17	09	06.0	17	14	36.0	192	-12	02	-134	53

* Penumbral magnitude of eclipse: 0.572

** N.E.S.W stands for North, East, South and West

Note : - A penumbral eclipse of the Moon is not to be taken as an eclipse of the Moon in the ordinary sense, as the Moon is not covered by the real shadow of the Earth during such an eclipse.

OCCULTATIONS, 2027

PLANETS BY THE MOON

Sl. No.	Date and Ingress - Egress Times (U.T.)		Planet	Magnitude of Planet	Area of Visibility
		h -- h			
1	Feb 8	01.7 06.2	Mercury	0.2	Kerguelen Is., Australia (except N.W. part), Melanesia (except westernmost part), E. Micronesia, E. Polynesia (except New Zealand).
2	Feb 20	03.9 06.1	Jupiter	-2.5	South easternmost Polynesia, westernmost Antarctica.
3	Mar 6	05.9 07.2	Mercury	0.6	Southernmost Antarctica.
4	Mar 19	07.9 11.0	Jupiter	-2.4	Australia, S. Melanesia, S.W Polynesia, south easternmost Antarctica.
5	Apr 15	12.9 15.8	Jupiter	-2.2	Southernmost southern Africa, Kerguelen Islands, north easternmost Antarctica.
6	May 12	21.5 22.3	Jupiter	-2.1	Micronesia, Polynesia, central Pacific Ocean, central parts of South America.
7	Nov 30	11.9 15.3	Venus	-3.9	Extreme S.tip of South America, Antarctica, Kerguelen Is.
8	Dec 29	09.7 14.1	Mars	1.2	Cape Verde Is. most of northern and central Africa, S.E. Europe, south westernmost Asia, S. western Russia.

OCCULTATIONS, 2027

ELEMENTS OF OCCULTATIONS OF PLANETS

Sl. No.	T0 (U.T. of Conj. in R.A.)			H_0		Y	x'	y'	Body Occulted					
									Right Ascension			Declination		
	d	h	m	h	m				h	m	s	°	′	″
1	Feb-8	3	37.0	-9	37.4	-0.3870	0.4937	0.2342	22	27	39.9	-7	48	27.9
2	Feb-20	5	43.8	6	10.4	-1.1772	0.5671	-0.2514	9	34	18.1	15	33	38.0
3	Mar-6	5	29.4	-5	07.7	-1.3459	0.4944	0.2312	21	33	09.8	-13	15	55.8
4	Mar-19	10	02.6	12	27.8	-0.9473	0.5602	-0.2388	9	22	54.0	16	27	57.8
5	Apr-15	14	58.3	19	14.5	-1.0084	0.5505	-0.2309	9	19	07.3	16	43	02.5
6	May-12	22	46.5	28	45.2	-1.3609	0.5453	-0.2326	9	24	19.2	16	15	55.4
7	Nov-30	13	20.7	0	29.0	-0.9494	0.5007	0.0694	18	27	35.6	-24	46	21.0
8	Dec-29	12	11.0	-1	09.6	0.5907	0.4970	0.1466	19	52	42.6	-22	02	17.5

ELEMENTS OF OCCULTATIONS OF PLANETS

Sl. No.	*l*	a
1	0.2734	1.00
2	0.2727	1.00
3	0.2735	1.00
4	0.2726	1.00
5	0.2726	1.00
6	0.2726	1.00
7	0.2730	1.00
8	0.2728	1.00

OCCULTATIONS, 2027

BRIGHT STARS BY THE MOON

Sl. No.	Date and Ingress - Egress Times (U.T.)			Star	Area of Visibility
		h	-- h		
1	Jan – 4	15.0	19.5	Antares	Easternmost Melanesia, central Polynesia, S.half of South America.
2	Jan – 31/ Feb-1	21.3	01.6	Antares	Madagascar, Kerguelen Is., south eastern Asia, south easternmost Australia, south easternmost Polynesia.
3	Feb – 28	04.7	09.0	Antares	S. south America, South Georgia & South Sandwich Is., extreme N. Antarctica, S.tip of Africa, S. half of Madagascar.
4	Mar - 27	13.1	17.5	Antares	Melanesia, Australia (except south westernmost part), New Zealand, Easternmost Polynesia(except Easter Is.)
5	Apr – 23/24	21.8	02.3	Antares	S.W. western Africa, southern Africa (except northernmost part), westernmost south eastern Asia, S.W. tip of Australia.
6	May - 21	05.7	10.2	Antares	Bellingshausen Sea off western Antarctica.
7	June – 17	12.3	16.8	Antares	S. southern asia, S.E. south eastern Asia, Australia, south easternmost Micronesia, S.W. Polynesia (except New Zealand).
8	July - 14	18.1	22.6	Antares	North easternmost south America, S.half of southern Africa, Seychelles, Maldives.
9	Aug - 11	00.0	04.6	Antares	E. Polynesia, central parts of South America.
10	Sep - 7	07.1	11.6	Antares	Seychelles, southernmost India, S.E south eastern Asia, Australia, S.W. Polynesia (except New Zealand).
11	Oct – 4	15.6	20.0	Antares	South easternmost USA, central America, Caribbean N. South America, central parts of Asia(except easternmost part).
12	Nov - 1	00.9	05.1	Antares	S.E. eastern Asia, E. south eastern Asia, Melanesia, Micronesia (except north easternmost part), N.W. Polynesia.
13	Dec - 25	16.8	20.9	Antares	N.E. Polynesia, most of central America, north easternmost South America, Caribbean(except S.E. part), south easternmost USA.

OCCULTATIONS, 2027

ELEMENTS OF OCCULTATIONS OF STARS

Sl. No.	T0 (U.T. of Conj. in R.A.)			H_0		Y	x'	y'	Body Occulted					
									Right Ascension			Declination		
	d	h	m	h	m				h	m	s	°	′	″
1	Jan - 4	17	18.6	7	45.1	-0.3524	0.5454	-0.0671	16	31	03.5	-26	29	26.7
2	Jan – 31/ Feb-1	23	33.7	15	51.6	-0.4534	0.5443	-0.0661	16	31	04.4	-26	29	28.3
3	Feb - 28	06	54.1	0	55.7	-0.4279	0.5471	-0.0664	16	31	05.4	-26	29	30.5
4	Mar - 27	15	20.6	11	10.0	-0.2612	0.5526	-0.0666	16	31	06.3	-26	29	32.5
5	Apr–24	00	00.6	21	41.8	-0.0604	0.5570	-0.0656	16	31	07.1	-26	29	34.1
6	May- 21	07	52.9	7	17.9	0.0522	0.5579	-0.0635	16	31	07.7	-26	29	35.3
7	Jun - 17	14	31.6	15	44.1	0.0354	0.5556	-0.0612	16	31	08.0	-26	29	36.3
8	Jul - 14	20	20.1	23	20.0	-0.0478	0.5526	-0.0597	16	31	08.0	-26	29	37.0
9	Aug- 11	02	16.5	7	03.8	-0.0817	0.5524	-0.0595	16	31	07.8	-26	29	37.3
10	Sep- 7	09	18.4	15	53.4	0.0139	0.5565	-0.0599	16	31	07.3	-26	29	36.7
11	Oct - 4	17	44.4	2	07.3	0.2177	0.5633	-0.0599	16	31	06.9	-26	29	35.4
12	Nov - 1	02	55.9	-10	53.4	0.4191	0.5688	-0.0587	16	31	06.6	-26	29	33.8
13	Dec - 25	18	45.1	8	31.3	0.4691	0.5651	-0.0543	16	31	07.3	-26	29	32.6

l =0.2725* and a =1.00*

*Elements l and a have identical values correct upto last significant digit (as reported) in each 13 occultations of the bright stars.

PART - V

ASTRONOMICAL PHENOMENA
AND
MISCELLANEOUS TABLES

PHENOMENA, 2027

ELONGATIONS AND MAGNITUDES OF PLANETS AT 0^h U.T.

Date	Mercury			Venus			Date	Mercury			Venus		
	Elong.		Mag.	Elong.		Mag.		Elong.		Mag.	Elong.		Mag.
		°			°				°			°	
Jan. 0	W	2	-1.3	W	47	-4.6	July 4	W	15	+2.6	W	11	-3.9
5	E	3	-1.3		47	-4.5	9	W	19	+1.4	W	9	-3.9
10		5	-1.2		47	-4.5	14		21	+0.5		8	-3.9
15		9	-1.1		47	-4.4	19		20	-0.1		7	-3.9
20		12	-1.0		46	-4.4	24		18	-0.6		5	-3.9
25	E	15	-1.0	W	46	-4.4	29		14	-1.1		4	-3.9
30		17	-0.9		45	-4.3	Aug 3	W	9	-1.4	W	3	-4.0
Feb. 4		18	-0.6		45	-4.3	8	W	4	-1.9	W	2	-4.0
9		16	+0.4		44	-4.2	13	E	2	-1.9	E	1	----
14	E	10	+2.7		43	-4.2	18		7	-1.3		2	-4.0
19	W	4	+5.3	W	42	-4.1	23		11	-0.8		3	-4.0
24		11	+2.9		41	-4.1	28	E	15	-0.5	E	5	-3.9
Mar. 1		19	+1.3		40	-4.1	Sept 2		18	-0.3		6	-3.9
6		24	+0.6		40	-4.1	7		21	-0.2		7	-3.9
11		27	+0.3		39	-4.0	12		23	-0.1		9	-3.9
16	W	28	+0.1	W	38	-4.0	17		25	+0.0		10	-3.9
21		27	+0.1		37	-4.0	22	E	26	+0.0	E	11	-3.9
26		26	+0.0		36	-3.9	27		26	+0.0		12	-3.9
31		24	-0.1		34	-3.9	Oct. 2		25	+0.2		14	-3.9
Apr. 5		22	-0.2		33	-3.9	7		22	+0.6		15	-3.9
10	W	18	-0.4	W	32	-3.9	12		16	+1.6		16	-3.9
15		14	-0.7		31	-3.9	17	E	6	+4.2	E	18	-3.8
20		10	-1.1		30	-3.9	22	W	5	+4.5		19	-3.8
25	W	5	-1.7		29	-3.8	27		14	+1.1		20	-3.8
30	E	1	-2.3		28	-3.8	Nov 1		18	-0.3		21	-3.8
May 5	E	7	-1.7	W	26	-3.8	6		19	-0.7		22	-3.8
10		13	-1.2		25	-3.8	11	W	17	-0.8	E	24	-3.9
15		17	-0.8		24	-3.8	16		15	-0.8		25	-3.9
20		21	-0.4		23	-3.8	21		12	-0.8		26	-3.9
25		23	+0.1		21	-3.8	26		9	-0.8		27	-3.9
30	E	23	+0.5	W	20	-3.8	Dec. 1		6	-1.0		28	-3.9
June 4		21	+1.2		19	-3.8	6	W	3	-1.1	E	29	-3.9
9		18	+2.0		17	-3.8	11	W	1	-1.3		31	-3.9
14		13	+3.2		16	-3.8	16	E	3	-1.2		32	-3.9
19	E	7	+4.8		15	-3.8	21		5	-1.0		33	-3.9
24	W	4	----	W	13	-3.8	26		8	-0.9		34	-4.0
29		10	+4.1		12	-3.9	31	E	11	-0.8	E	35	-4.0
July 4	W	15	+2.6	W	11	-3.9	36		14	-0.8		36	-4.0

Conjunction-	d h	d h	d h	d h
Superior:	Jan. 1 17	Apr. 28 21	…	Aug. 11 11
Inferior:	Feb. 18 17	June 23 08	…	Oct. 19 16
				Dec. 11 22
				…
				Aug. 12 00
				…

N.B.- E. means that the planet is in the east of the Sun and W. means that it is in the west of the Sun by the amount of the arc stated.

PHENOMENA, 2027

ELONGATIONS AND MAGNITUDES OF PLANETS AT 0^h UT

Date		Mars			Jupiter			Saturn			Uranus		Neptune		Pluto	
		Elong.		Mag.	Elong.		Mag.	Elong.		Mag.	Elong.		Elong.		Elong.	
			°			°			°			°		°		°
Jan.	-5	W	115	0.0	W	127	-2.4	E	94	+0.8	E	148	E	87	E	30
	5		124	-0.2		138	-2.4		84	+0.8		138		77		21
	15		134	-0.5		149	-2.5		74	+0.8		127		67		11
	25		145	-0.7		161	-2.5		65	+0.9		117		57	E	4
Feb.	4		158	-1.0	W	172	-2.5		56	+0.8		107		47	W	10
	14	W	171	-1.2	E	176	-2.6	E	46	+0.8	E	97	E	38	W	20
	24	E	172	-1.2		165	-2.5		37	+0.8		87		28		29
Mar.	6		160	-1.0		154	-2.5		29	+0.8		77		18		39
	16		147	-0.8		143	-2.4		20	+0.7		67	E	9		49
	26		136	-0.5		132	-2.4		11	+0.7		57	W	2		58
Apr.	5	E	126	-0.3	E	122	-2.3	E	3	+0.6	E	48	W	11	W	68
	15		117	+0.0		112	-2.3	W	7	+0.7		39		20		78
	25		109	+0.2		103	-2.2		15	+0.7		29		29		87
May	5		102	+0.4		93	-2.1		23	+0.7		20		39		97
	15		96	+0.5		85	-2.0		32	+0.7		11		48		107
	25	E	91	+0.7	E	76	-2.0	W	40	+0.7	E	2	W	58	W	116
June	4		85	+0.8		68	-1.9		49	+0.7	W	7		67		126
	14		81	+0.9		60	-1.9		58	+0.6		16		76		136
	24		76	+1.0		52	-1.8		66	+0.6		25		86		145
July	4		72	+1.1		44	-1.8		75	+0.6		34		95		155
	14	E	68	+1.2	E	36	-1.8	W	84	+0.6	W	43	W	105	W	164
	24		64	+1.2		29	-1.7		93	+0.5		52		114	W	173
Aug.	3		61	+1.3		21	-1.7		103	+0.5		61		124	E	173
	13		57	+1.3		14	-1.7		112	+0.4		71		134		165
	23		54	+1.3	E	6	-1.7		122	+0.4		80		143		155
Sept.	2	E	51	+1.3	W	2	-1.7	W	132	+0.3	W	89	W	153	E	146
	12		48	+1.3		9	-1.7		142	+0.2		99		163		136
	22		45	+1.3		16	-1.7		152	+0.2		109	W	173		126
Oct.	2		42	+1.3		24	-1.7		163	+0.1		119	E	176		116
	12		39	+1.3		32	-1.7	W	173	+0.1		129		166		106
	22	E	36	+1.3	W	40	-1.8	E	175	+0.1	W	139	E	156	E	96
Nov.	1		33	+1.3		48	-1.8		165	+0.1		149		146		86
	11		31	+1.3		56	-1.8		154	+0.2		160		136		77
	21		28	+1.3		65	-1.9		143	+0.3	W	170		126		67
Dec.	1		25	+1.3		74	-1.9		133	+0.3	E	179		115		57
	11	E	23	+1.2	W	83	-2.0	E	122	+0.4	E	169	E	105	E	47
	21		20	+1.2		92	-2.1		112	+0.5		158		95		37
	31		18	+1.2		102	-2.1		102	+0.5		148		85		27
	41	E	16	+1.2	W	112	-2.2	E	92	+0.5	E	137	E	75	E	18
				d h			d h			d h		d h		d h		d h
Conjunction:				….		Aug.	31 07		Apr.	7 17		May 27 06		Mar. 24 23		Jan. 25 08
Opposition:				Feb. 19 16		Feb.	11 00		Oct.	18 01		Nov. 30 09		Sept. 28 14		July 29 07

Magnitudes at opposition: Uranus +5.6; Neptune +7.8; Pluto +14.5

N.B. - E. means that the planet is in the east of the Sun and W. means that it is in the west of the Sun by the amount of the arc stated.

PHENOMENA, 2027

CONJUNCTIONS, OPPOSITIONS ETC. OF PLANETS WITH THE SUN (IN LONGITITUDE)

UNIVERSAL TIME

MERCURY

		d	h	m			d	h	m	
Heliacal setting W.		…	…	…		Aug	02	09	04	
Superior conjuction	Jan.	1	17	06		Aug	11	11	05	
Heliacal rising E.	Jan.	18	04	35		Aug	25	20	19	
Greatest elongation E.	Feb	3	06	15	(18˚.3)	Sep	24	21	59	(26˚.3)
Retrograde	Feb	9	17	35		Oct.	07	14	29	
Heliacal setting E.	Feb.	13	15	50		Oct.	10	15	13	
Inferior conjunction	Feb	18	16	37		Oct.	19	15	32	
Heliacal rising W.	Feb.	23	19	08		Oct.	24	12	47	
Direct	Mar.	3	12	36		Oct.	28	14	15	
Greatest elongation W	Mar.	17	06	50	(27˚.6)	Nov	4	08	55	(18˚.8)
Heliacal setting W.	Apr.	11	12	02		Nov	24	01	31	
Superior conjuction	Apr.	28	21	21		Dec	11	22	17	
Heliacal rising E.	May	7	10	28		Dec	31	06	32	
Greatest elongation E.	May	28	09	58	(22˚.9)		…	…	…	
Retrograde	Jun	10	18	19			…	…	…	
Heliacal setting E.	Jun	14	18	54			…	…	…	
Inferior conjunction	Jun	23	08	00			…	…	…	
Heliacal rising W.	July	3	00	35			…	…	…	
Direct	July	4	19	34			…	…	…	
Greatest elongation W	July	15	19	24	(20˚.7)		…	…	…	

VENUS

		d	h	m		d	h	m
Greatest elongation W.	Jan	3	17	58	(47˚.0)			
Retrograde		…	…	…				
Heliacal setting W.	Jul	21	01	03		…	…	…
Superior conjunction	Aug	12	00	21		…	…	…
Heliacal rising W.		…	…	…		…	…	…
Direct		…	…	…		…	…	…
Greatest elongation E.		…	…	…		…	…	…
Heliacal rising E.	Sep	7	14	21				

EARTH

		d	h	m			d	h	m			d	h	m
Perihelion	Jan.	3	02	30	Equinoxes	Mar.	20	20	25		Sept.	23	06	02
Aphelion	July	5	05	14	Solstices	June	21	14	11		Dec.	22	02	42

SUPERIOR PLANETS

	MARS				JUPITER				SATURN			
	d	h	m			d	h	m		d	h	m
Opposition	…	…	…		Feb	11	00	29		…	…	…
Direct	…	…	…		Apr	13	02	13		…	…	…
Heliacal setting E.	…	…	…		Aug	16	09	01	Mar	24	18	25
Conjunction	…	…	…		Aug	31	07	30	Apr	7	17	18
Heliacal rising W.	…	…	…		Sep	11	13	54	Apr	30	12	52
Retrograde	Jan	10	12	59		…	…	…	Aug	9	18	06
Opposition	Feb	19	15	51		…	…	…	Oct	18	00	36
Direct	Apr	1	14	10		…	…	…	Dec	24	02	47

PHENOMENA, 2027

CONJUNCTIONS, OPPOSITIONS ETC. OF PLANETS WITH THE SUN (IN LONGITUDE)

UNIVERSAL TIME

SUPERIOR PLANETS

		URANUS				NEPTUNE				PLUTO		
		d	h	m		d	h	m		d	h	m
Conjunction	May	27	06	12	Mar.	24	23	13	Jan.	25	07	58
Retrograde	Sept	15	09	08	July	9	22	50	May	8	12	47
Opposition	Nov.	30	9	21	Sept.	28	14	19	July	29	06	44
Direct	Feb	8	12	28	Dec.	15	09	09	Oct.	18	03	51

N.B.- The heliacal risings and settings have been calculated for 23° 11' North latitude. Here E. means east of the Sun (i.e. western horizon) and W. means west of the Sun (i.e. eastern horizon).

PHENOMENA, 2027

CONJUNCTION OF PLANETS WITH THE MOON AND OTHER PLANETS (IN LONGITUDE)

UNIVERSAL TIME

	d	h	m			d	h	m	
Jan.	3	13	08	Moon Conj. With Venus	May	12	22	04	Moon Conj. With Jupiter
	8	05	11	Moon Conj. With Mercury		13	17	32	Moon Conj. With Mars
	14	14	16	Moon Conj. With Saturn	Jun.	1	07	02	Moon Conj. With Saturn
	23	23	33	Moon Conj. With Jupiter		3	10	22	Moon Conj. With Venus
	24	23	40	Moon Conj. With Mars		6	06	40	Moon Conj. With Mercury
Feb.	2	13	06	Moon Conj. With Venus		9	09	51	Moon Conj. With Jupiter
	8	03	53	Moon Conj. With Mercury		10	20	04	Moon Conj. With Mars
	10	23	57	Moon Conj. With Saturn		28	20	16	Moon Conj. With Saturn
	20	05	07	Moon Conj. With Jupiter	Jul.	1	09	22	*Mercury Conj. With Venus*
	20	20	28	Moon Conj. With Mars		3	04	05	Moon Conj. With Mercury
Mar.	4	20	06	Moon Conj. With Venus		3	08	29	Moon Conj. With Venus
	6	06	17	Moon Conj. With Mercury		7	01	49	Moon Conj. With Jupiter
	10	11	25	Moon Conj. With Saturn		9	04	30	Moon Conj. With Mars
	19	09	33	Moon Conj. With Jupiter		26	06	12	Moon Conj. With Saturn
	19	16	16	Moon Conj. With Mars	Aug.	1	15	53	Moon Conj. With Mercury
Apr.	4	04	09	Moon Conj. With Venus		2	05	31	Moon Conj. With Venus
	5	05	22	Moon Conj. With Mercury		3	20	49	Moon Conj. With Jupiter
	7	00	59	Moon Conj. With Saturn		6	17	32	Moon Conj. With Mars
	15	14	27	Moon Conj. With Jupiter		11	06	29	*Mercury Conj. With Venus*
	15	23	11	Moon Conj. With Mars		19	22	47	*Mercury Conj. With Jupiter*
	19	13	03	*Mercury Conj. With Saturn*		22	12	18	Moon Conj. With Saturn
May	4	09	18	Moon Conj. With Venus		26	03	00	*Venus Conj. with Jupiter*
	4	16	01	Moon Conj. With Saturn		31	17	10	Moon Conj. With Jupiter
	7	04	35	Moon Conj. With Mercury	Sept.	1	03	10	Moon Conj. With Venus
	7	18	48	*Venus Conj. with Saturn*		2	01	29	Moon Conj. With Mercury

PHENOMENA, 2027 --- contd.

CONJUNCTION OF PLANETS WITH THE MOON AND OTHER PLANETS (IN LONGITUDE)

UNIVERSAL TIME

	d	h	m			d	h	m	
Sept.	4	10	26	Moon Conj. With Mars	Nov.	11	23	16	Moon Conj. With Saturn
	18	15	40	Moon Conj. With Saturn		22	20	06	Moon Conj. With Jupiter
	28	12	54	Moon Conj. With Jupiter		25	01	36	*Venus Conj. With Mars*
Oct.	1	02	51	Moon Conj. With Venus		27	11	22	Moon Conj. With Mercury
	1	23	22	Moon Conj. With Mercury		30	07	59	Moon Conj. With Mars
	3	06	42	Moon Conj. With Mars		30	13	26	Moon Conj. With Venus
	11	09	32	*Mercury Conj. With Venus*	Dec.	9	06	17	Moon Conj. With Saturn
	15	18	38	Moon Conj. With Saturn		20	06	29	Moon Conj. With Jupiter
	26	06	16	Moon Conj. With Jupiter		28	16	45	Moon Conj. With Mercury
	28	09	03	Moon Conj. With Mercury		29	11	58	Moon Conj. With Mars
	31	06	00	Moon Conj. With Venus		30	23	38	Moon Conj. With Venus
Nov.	1	06	01	Moon Conj. With Mars					

CONJUNCTIONS OF PLANETS WITH BRIGHT STARS (IN R.A.)

	d	h	m			d	h	m	
Jan.	15	18	51	Venus 7º.85 N. of *Antares*	Aug.	20	17	12	Venus 0º.97 N. of *Regulus*
Feb.	24	19	59	Mars 4º.22N. of *Regulus*	Aug.	22	23	08	Mars 2º.05N. of *Spica*
May.	13	21	31	Mars 1º.36N. of *Regulus*	Sep.	21	15	10	Mercury 0º.34 S. of *Spica*
May.	15	00	03	Mercury 7º.65 N. of *Aldebaran*	Oct.	2	14	14	Venus 3º.12 N. of *Spica*
Jun.	17	10	01	Venus 4º.82 N. of *Aldebaran*	Oct.	21	14	41	Mercury 1º.50 N. of *Spica*
Jul.	23	04	54	Venus 6º.08 S. of *Pollux*	Oct.	29	06	34	Mars 3º.78N. of *Antares*
Jul.	26	10	04	Jupiter 0º.47 N. of *Regulus*	Nov.	3	20	11	Mercury 4º.54 N. of *Spica*
Jul.	30	18	45	Mercury 6º.18 S. of *Pollux*	Nov.	9	00	18	Venus 3º.93 N. of *Antares*
Aug.	17	01	39	Mercury 1º.30 N. of *Regulus*	Dec.	5	11	47	Mercury 4º.11 N. of *Antares*

ASTRONOMICAL DIARY, 2027

UNIVERSAL TIME

	d	h	m			d	h	m	
Jan.	1	17	06	Mercury in superior conjunction	Feb.	16	12	47	Mercury greatest helio. lat N.
				1° 45'.8 S of Sun		18	16	37	Mercury in inferior conjunction
	2	13	55	Moon greatest lat. S 5º 08'					3° 42'.6 N of Sun
	3	02	30	*Earth at Perihelion*		19	07	30	Moon at Perigee
	3	17	29	Venus 8°.75N of Moon		19	15	51	Mars in opposition with Sun
	3	17	58	Venus in Greatest Elongation (W) 47.0		20	00	13	Mars nearest to Earth
	7	08	09	Moon at Apogee		20	04	40	Moon in descending node
	7	20	24	NEW MOON		20	05	44	Jupiter 1°.19N of Moon
	8	05	00	Mercury 0°.49N of Moon					*Occultation*
	9	08	59	Pluto 2°.97S of Moon		20	15	10	Uranus in Square with Sun
	10	12	59	Mars in Retrograde		20	23	24	FULL MOON
	10	15	57	Moon in ascending node		20	23	50	Mars 5°.93N of Moon
	11	16	08	Mars Stationary in RA		24	19	59	Mars 4º.22N. of Regulus
	13	13	59	Mercury greatest helio lat. S.		26	08	19	Moon greatest lat. S 5º 13'
	14	04	58	Neptune 5°.42S of Moon		28	05	16	LAST QUARTER
	14	19	28	Saturn 7°.05S of Moon	Mar.	2	20	06	Mercury Stationary in RA
	15	18	51	Venus 7º.85 N. of Antares		3	05	40	Moon at Apogee
	15	20	34	FIRST QUARTER		3	12	36	Mercury in Direct
	16	10	16	Venus greatest helio. lat N.		4	18	58	Venus 2°.11N of Moon
	17	08	20	Moon greatest lat. N 5º 11'		4	23	08	Mars in Aphelion
	18	13	28	Uranus 5°.38S of Moon		5	01	51	Pluto 3°.24S of Moon
	21	21	47	Moon at Perigee		6	04	39	Moon in ascending node
	22	12	17	FULL MOON		6	05	29	Mercury 1°.22N of Moon
	23	17	27	Moon in descending node					*Occultation*
	24	00	21	Jupiter 1°.49N of Moon		8	09	29	NEW MOON
	25	03	41	Mars 6°.46N of Moon		9	19	43	Neptune 5°.52S of Moon
	25	07	58	Pluto in conjunction with Sun		10	16	33	Saturn 7°.17S of Moon
	25	16	47	Mars greatest helio. lat N.		11	22	28	Mercury in Descending node
	29	10	55	LAST QUARTER		12	13	58	Moon greatest lat. N 5º 10'
	29	16	27	Moon greatest lat. S 5º 14'		13	11	57	Venus in Descending node
Feb.	1	15	32	Mercury in Ascending node		14	03	08	Uranus 5°.30S of Moon
	2	13	13	Venus 6°.57N of Moon		15	16	25	FIRST QUARTER
	3	06	15	Mercury in Greatest Elongation (E) 18.3		17	06	50	Mercury in Greatest Elongation (W) 27.6
	3	13	31	Moon at Apogee		19	04	29	Moon at Perigee
	5	17	05	Pluto 3°.09S of Moon		19	10	02	Jupiter 0°.94N of Moon
	6	07	43	Mercury at perihelion					*Occultation*
	6	15	56	NEW MOON, *Solar Eclipse*		19	13	06	Moon in descending node
	6	21	44	*Moon in ascending node*		19	18	35	*Mars 4°.26N of Moon*
	8	03	37	Mercury 0°.35N of Moon		20	20	25	Sun enter Vernal Equinox
				Occultation		22	07	22	Mercury at aphelion
	8	12	28	Uranus in Direct		22	10	44	FULL MOON
	8	14	02	Uranus Stationary in RA		24	23	13	Neptune in conjunction with Sun
	9	03	05	Mercury Stationary in RA		25	12	08	Moon greatest lat. S 5º 08'
	9	17	35	Mercury in Retrograde		30	00	54	LAST QUARTER
	10	11	53	Neptune 5°.51S of Moon		31	01	34	Moon at Apogee
	11	00	29	Jupiter in opposition with Sun	Apr.	1	11	04	Pluto 3°.52S of Moon
	11	05	13	Saturn 7°.13S of Moon		1	14	10	Mars in Direct
	13	11	34	Moon greatest lat. N 5º 17'		2	10	16	Moon in ascending node
	14	07	58	FIRST QUARTER		2	17	34	Mars Stationary in RA
	14	20	48	Uranus 5°.41S of Moon		4	06	49	Venus 3°.30S of Moon

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	d	h	m			d	h	m	
Apr.	5	10	30	Mercury 6°.05S of Moon	May	13	21	31	Mars 1º.36N. of Regulus
	6	05	18	Neptune 5°.57S of Moon		15	00	03	Mercury 7º.65 N. of Aldebaran
	6	23	51	NEW MOON		15	12	01	Mercury greatest helio. lat N.
	7	05	59	Saturn 7°.24S of Moon		18	15	58	Moon greatest lat. S 4º 57'
	7	17	18	Saturn in conjunction with Sun		20	10	59	FULL MOON
	8	15	45	Moon greatest lat. N 5º 00'		25	15	14	Moon at Apogee
	10	10	32	Uranus 5°.09S of Moon		25	23	14	Mars in Square with Sun
	11	12	03	Mercury 1° 2' S. of Neptune		26	03	48	Pluto 4°.26S of Moon
	11	13	17	Mercury greatest helio lat. S.		26	15	20	Moon in ascending node
	13	02	13	Jupiter in Direct		27	06	12	Uranus in conjunction with Sun
	13	06	19	Jupiter Stationary in RA		28	09	58	Mercury in Greatest Elongation (E) 22.9
	13	22	57	FIRST QUARTER		28	13	58	LAST QUARTER
	14	00	37	Moon at Perigee		31	02	51	Neptune 6°.03S of Moon
	15	14	58	Jupiter 0°.99N of Moon	June	1	12	06	Saturn 7°.71S of Moon
				Occultation					
	15	16	32	*Moon in descending node*		2	08	21	Moon greatest lat. N 5º 00'
	16	01	02	Mars 3°.26N of Moon		3	13	14	Venus 6°.33S of Moon
	17	05	02	Venus at aphelion		4	08	23	Uranus 4°.82S of Moon
	19	16	10	Mercury 0° 37' N. of Saturn		4	19	40	NEW MOON
	20	22	27	FULL MOON		6	06	29	Mercury 2°.72S of Moon
	21	14	40	Moon greatest lat. S 4º 59'		6	14	53	Moon at Perigee
	24	08	53	Venus 0° 15' S. of Neptune		7	21	31	Mercury in Descending node
	27	15	21	Pluto in Square with Sun		8	19	24	Moon in descending node
	27	21	21	Moon at Apogee		9	10	52	Jupiter 1°.87N of Moon
	28	20	00	Pluto 3°.90S of Moon		10	14	11	Mercury Stationary in RA
	28	20	18	LAST QUARTER		10	18	19	Mercury in Retrograde
	28	21	21	Mercury in superior conjunction		10	22	46	Mars 3°.95N of Moon
				0° 18'.2 S of Sun		11	10	56	FIRST QUARTER
	29	13	23	Moon in ascending node		13	23	47	Venus 0° 43' S. of Uranus
	30	15	03	Mercury in Ascending node		14	16	60	Moon greatest lat. S 5º 04'
May	3	16	07	Neptune 5°.75S of Moon		17	10	01	Venus 4º.82 N. of Aldebaran
	4	14	18	Venus 6°.66S of Moon		18	06	39	Mercury at aphelion
	4	20	59	Saturn 7°.42S of Moon		19	00	44	FULL MOON
	5	07	00	Mercury at perihelion		21	14	11	Sun enter Summer solctice
	5	17	43	Moon greatest lat. N 4º 56'		22	05	07	Moon at Apogee
	6	10	59	NEW MOON		22	10	06	Pluto 4°.49S of Moon
	7	06	23	Mercury 3°.87S of Moon		22	18	26	Moon in ascending node
	7	20	22	Uranus 4°.91S of Moon		23	08	00	Mercury in inferior conjunction
	8	00	08	Venus 0° 39' N. of Saturn					3° 59'.2 S of Sun
	8	12	47	Pluto in Retrograde		27	04	54	LAST QUARTER
	8	19	38	Jupiter in Square with Sun		27	12	04	Neptune 6°.29S of Moon
	9	07	51	Venus greatest helio lat. S.		28	12	51	Neptune in Square with Sun
	9	20	07	Moon at Perigee		29	01	32	Saturn 8°.02S of Moon
	10	13	36	Pluto Stationary in RA		29	11	49	Moon greatest lat. N 5º 12'
	11	17	17	Mercury 1° 54' N. of Uranus	July	1	10	29	Mercury 4° 33' S. of Venus
	12	17	04	Moon in descending node		1	21	09	Uranus 4°.82S of Moon
	12	22	46	Jupiter 1°.34N of Moon		3	04	19	Mercury 8°.26S of Moon
				Occultation		3	08	29	Venus 3°.51S of Moon
	13	04	44	FIRST QUARTER		4	03	02	NEW MOON
	13	19	35	Mars 3°.30N of Moon		4	15	28	Venus in Ascending node

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	d	h	m			d	h	m	
July	4	19	34	Mercury in Direct	Aug.	15	19	57	Pluto 4°.49S of Moon
	4	20	02	Mercury Stationary in RA		16	05	48	Moon in ascending node
	4	20	55	Moon at Perigee		17	01	39	Mercury 1º.30 N. of Regulus
	5	05	14	Earth at Aphelion		17	07	29	FULL MOON
	6	02	15	Moon in descending node		19	19	09	Mercury 0° 40' N. of Jupiter
	7	03	12	Jupiter 2°.46N of Moon		20	17	12	Venus 0º.97 N. of Regulus
	8	12	35	Mercury greatest helio lat. S.		20	23	58	Neptune 6°.41S of Moon
	9	07	53	Mars 4°.73N of Moon		22	17	53	Saturn 8°.37S of Moon
	9	22	50	Neptune in Retrograde		22	23	08	Mars 2º.05N. of Spica
	10	16	15	Neptune Stationary in RA		23	06	45	Moon greatest lat. N 5º 12'
	10	18	39	FIRST QUARTER		25	02	27	LAST QUARTER
	12	06	53	Moon greatest lat. S 5º 11'		25	17	54	Uranus 4°.75S of Moon
	15	19	24	Mercury in Greatest Elongation (W) 20.7		25	22	22	Venus 0° 31' N. of Jupiter
	18	15	45	FULL MOON		29	03	04	Venus greatest helio. lat N.
	19	11	52	Moon at Apogee		29	23	01	Moon in descending node
	19	15	12	Pluto 4°.54S of Moon		30	15	42	Moon at Perigee
	19	23	33	Moon in ascending node		31	07	30	Jupiter in conjunction with Sun
	20	10	49	Saturn in Square with Sun		31	17	41	NEW MOON
	23	04	54	Venus 6º.08 S. of Pollux		31	19	22	Jupiter 3°.63N of Moon
	24	18	58	Neptune 6°.42S of Moon	Sept.	1	06	24	Venus 4°.77N of Moon
	26	10	04	Jupiter 0º.47 N. of Regulus		2	04	46	Mercury 4°.50N of Moon
	26	11	40	Saturn 8°.26S of Moon		2	13	50	Uranus in Square with Sun
	26	15	37	Moon greatest lat. N 5º 14'		3	20	55	Mercury in Descending node
	26	16	55	LAST QUARTER		4	13	45	Mars 5°.19N of Moon
	27	14	26	Mercury in Ascending node		4	13	50	Moon greatest lat. S 5º 11'
	29	06	44	Pluto in opposition with Sun		7	18	31	FIRST QUARTER
	29	08	50	Uranus 4°.82S of Moon		11	23	36	Moon at Apogee
	30	18	45	Mercury 6º.18 S. of Pollux		12	01	22	Pluto 4°.49S of Moon
Aug.	1	06	17	*Mercury at perihelion*		12	11	25	Moon in ascending node
	1	15	47	Mercury 0°.30S of Moon		14	05	55	*Mercury at aphelion*
	2	05	49	Venus 0°.64N of Moon		15	08	49	Uranus Stationary in RA
	2	06	25	Moon at Perigee		15	09	08	Uranus in Retrograde
	2	10	05	NEW MOON, *Solar Eclipse*		15	23	03	FULL MOON
	2	12	34	Moon in descending node		17	04	30	Neptune 6°.31S of Moon
	3	22	36	Jupiter 3°.05N of Moon		18	21	15	Saturn 8°.34S of Moon
	6	21	14	Mars 5°.24N of Moon		19	08	40	Moon greatest lat. N 5º 05'
	7	13	50	Venus at perihelion		21	15	10	Mercury 0º.34 S. of Spica
	8	10	02	Moon greatest lat. S 5º 15'		22	00	03	Uranus 4°.58S of Moon
	9	04	54	FIRST QUARTER		23	06	02	*Sun enter Autumnal Equinox*
	9	18	06	Saturn in Retrograde		23	10	20	LAST QUARTER
	10	17	52	Saturn Stationary in RA		24	21	59	Mercury in Greatest Elongation (E) 26.3
	11	01	37	Mercury 0° 32' N. of Venus		26	06	02	Moon in descending node
	11	11	05	Mercury in superior conjunction		27	20	12	Moon at Perigee
				1° 44'.6 N of Sun		28	14	19	Neptune in opposition with Sun
	11	11	19	Mercury greatest helio. lat N.		28	15	37	Jupiter 4°.23N of Moon
	11	14	21	Mars in Descending node		30	02	36	NEW MOON
	12	00	21	Venus in superior conjunction	Oct.	1	07	10	Venus 6°.22N of Moon
				1° 14.7 N of Sun		1	17	16	Moon greatest lat. S 5º 00'
	15	14	24	Moon at Apogee		2	00	28	Mercury 1°.76N of Moon

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	d	h	m			d	h	m	
Oct.	2	14	14	Venus 3º.12 N. of Spica	Nov.	15	10	11	Uranus 4°.31S of Moon
	3	08	58	Mars 4°.50N of Moon		19	00	12	Moon at Perigee
	4	11	50	Mercury greatest helio lat. S.		19	08	33	Moon in descending node
	7	11	47	FIRST QUARTER		21	00	48	LAST QUARTER
	7	14	29	Mercury in Retrograde		22	23	54	Jupiter 5°.51N of Moon
	7	16	21	Mercury Stationary in RA		25	01	39	Venus 0° 18' S. of Mars
	9	08	12	Pluto 4°.63S of Moon		25	09	32	Moon greatest lat. S 5º 01'
	9	14	58	Moon in ascending node		27	13	48	Mercury 5°.14N of Moon
	9	15	47	Moon at Apogee		27	20	25	Venus at aphelion
	10	13	10	Mercury 4° 9' S. of Venus		28	03	24	NEW MOON
	14	10	08	Neptune 6°.27S of Moon		30	07	53	Mars 1°.55N of Moon
	15	13	47	FULL MOON		30	09	21	Uranus in opposition with Sun
	16	00	11	Saturn 8°.28S of Moon		30	13	21	Venus 0°.87N of Moon
	16	09	50	Moon greatest lat. N 4º 59'					*Occultation*
	18	00	36	Saturn in opposition with Sun		30	20	24	Mercury in Descending node
	18	03	51	Pluto in Direct	Dec.	2	19	37	Moon in ascending node
	18	15	55	Pluto Stationary in RA		3	01	36	Pluto 5°.17S of Moon
	19	04	43	Uranus 4°.40S of Moon		4	08	41	Moon at Apogee
	19	15	32	Mercury in inferior conjunction		5	11	47	Mercury 4º.11 N. of Antares
				1° 19'.9 S of Sun		6	05	22	FIRST QUARTER
	21	14	41	Mercury 1º.50 N. of Spica		8	02	09	Neptune 6°.56S of Moon
	22	17	29	LAST QUARTER		9	12	05	Saturn 8°.33S of Moon
	23	08	14	Moon in descending node		9	14	12	Moon greatest lat. N 5º 06'
	23	13	34	Mercury in Ascending node		11	05	10	Mercury at aphelion
	24	04	49	Venus in Descending node		11	22	17	Mercury in superior conjunction
	25	05	37	Moon at Perigee					1° 9'.8 S of Sun
	26	09	32	Jupiter 4°.87N of Moon		12	17	49	Uranus 4°.37S of Moon
	28	02	39	Mercury Stationary in RA		13	16	09	FULL MOON
	28	05	32	Mercury at perihelion		15	09	09	Neptune in Direct
	28	10	23	Pluto in Square with Sun		15	22	19	Neptune Stationary in RA
	28	13	23	Mercury 6°.71N of Moon		16	02	25	Moon at Perigee
	28	14	15	Mercury in Direct		16	12	19	Moon in descending node
	29	06	34	Mars 3º.78N. of Antares		18	17	42	Jupiter in Square with Sun
	29	07	53	Moon greatest lat. S 4º 56'		20	00	38	Venus greatest helio lat. S.
	29	13	36	NEW MOON		20	09	11	LAST QUARTER
	31	07	57	Venus 4°.41N of Moon		20	10	39	Jupiter 6°.04N of Moon
Nov.	1	06	53	Mars 3°.25N of Moon		22	02	42	Sun enter Winter solctice
	3	20	11	Mercury 4º.54 N. of Spica		22	11	07	Moon greatest lat. S 5º 11'
	4	08	55	Mercury in Greatest Elongation (W) 18.8		24	02	47	Saturn in Direct
	5	16	28	Pluto 4°.89S of Moon		25	03	05	Saturn Stationary in RA
	5	16	53	Moon in ascending node		25	22	13	Neptune in Square with Sun
	6	08	00	FIRST QUARTER		27	20	12	NEW MOON
	6	11	37	Moon at Apogee		28	16	57	Mercury 0°.71S of Moon
	7	10	36	Mercury greatest helio. lat N.		29	12	11	Mars 0°.54S of Moon
	9	00	18	Venus 3º.93 N. of Antares					*Occultation*
	10	17	32	Neptune 6°.37S of Moon		30	00	50	Moon in ascending node
	12	04	53	Saturn 8°.28S of Moon		30	10	43	Pluto 5°.36S of Moon
	12	11	22	Moon greatest lat. N 5º 00'		31	01	55	Venus 3°.12S of Moon
	14	03	26	FULL MOON		31	11	03	Mercury greatest helio lat. S.

TABLE-I
CONVERSION OF MEAN SOLAR INTO SIDEREAL TIME
CORRECTION TO BE *ADDED* TO A MEAN TIME INTERVAL

HOURS			MINUTES				SECONDS			
Mean Time	Correction		Mean Time	Correction	Mean Time	Correction	Mean Time	Correction	Mean Time	Correction
h	m	s	m	s	m	s	s	s	s	s
1	0	09.856	1	0.164	31	5.093	1	.003	31	.085
2	0	19.713	2	0.329	32	5.257	2	.005	32	.088
3	0	29.569	3	0.493	33	5.421	3	.008	33	.090
4	0	39.426	4	0.657	34	5.585	4	.011	34	.093
5	0	49.282	5	0.821	35	5.750	5	.014	35	.096
6	0	59.139	6	0.986	36	5.914	6	.016	36	.099
7	1	08.995	7	1.150	37	6.078	7	.019	37	.101
8	1	18.852	8	1.314	38	6.242	8	.022	38	.104
9	1	28.708	9	1.478	39	6.407	9	.025	39	.107
10	1	38.565	10	1.643	40	6.571	10	.027	40	.110
11	1	48.421	11	1.807	41	6.735	11	.030	41	.112
12	1	58.278	12	1.971	42	6.900	12	.033	42	.115
13	2	08.134	13	2.136	43	7.064	13	.036	43	.118
14	2	17.991	14	2.300	44	7.228	14	.038	44	.120
15	2	27.847	15	2.464	45	7.392	15	.041	45	.123
16	2	37.704	16	2.628	46	7.557	16	.044	46	.126
17	2	47.560	17	2.793	47	7.721	17	.047	47	.129
18	2	57.417	18	2.957	48	7.885	18	.049	48	.131
19	3	07.273	19	3.121	49	8.049	19	.052	49	.134
20	3	17.129	20	3.285	50	8.214	20	.055	50	.137
21	3	26.986	21	3.450	51	8.378	21	.057	51	.140
22	3	36.842	22	3.614	52	8.542	22	.060	52	.142
23	3	46.699	23	3.778	53	8.707	23	.063	53	.145
24	3	56.555	24	3.943	54	8.871	24	.066	54	.148
			25	4.107	55	9.035	25	.068	55	.151
			26	4.271	56	9.199	26	.071	56	.153
			27	4.435	57	9.364	27	.074	57	.156
			28	4.600	58	9.528	28	.077	58	.159
			29	4.764	59	9.692	29	.079	59	.162
			30	4.928	60	9.856	30	.082	60	.164

Local Apparent Sidereal time for any given local mean time
= mean Sid. Time for 0^h U.T. (Pages 13 to 16)
— reduction for longitude of place
+ local mean time reckoned from midnight
+ correction for local mean time added (Table-I)
+ Equation of Equinoxes.

Local apparent Sidereal Time for any hour of Universal Time.
= Sid. Time for 0^h U.T. (Pages 13 to 16)
+ longitude of place (in time)
+ Universal Time
+ correction for U.T. added (Table-I)
+ Equation of Equinoxes.

N.B. The longitude of place is to be taken in time and regarded *positive* for places East of Greenwich. The reduction of Sidereal Time for the longitude of place may be taken from the above table and with the same sign as that of longitude. The correction for the L.M.T. or U.T. added should also be taken from the above table. For details, see the examples given under the EXPLANATION.

TABLE-II
CONVERSION OF SIDEREAL INTO MEAN SOLAR TIME
CORRECTION TO BE *SUBTRACTED* FROM A SIDEREAL TIME INTERVAL

HOURS		MINUTES				SECONDS			
Sidereal Time	Correction	Sidereal Time	Correction	Sidereal Time	Correction	Sidereal Time	Correction	Sidereal Time	Correction
h	m s	m	s	m	s	s	s	s	s
1	0 09.830	1	0.164	31	5.079	1	.003	31	.085
2	0 19.659	2	0.328	32	5.242	2	.005	32	.087
3	0 29.489	3	0.491	33	5.406	3	.008	33	.090
4	0 39.318	4	0.655	34	5.570	4	.011	34	.093
5	0 49.148	5	0.819	35	5.734	5	.014	35	.096
6	0 58.977	6	0.983	36	5.898	6	.016	36	.098
7	1 08.807	7	1.147	37	6.062	7	.019	37	.101
8	1 18.636	8	1.311	38	6.225	8	.022`	38	.104
9	1 28.466	9	1.474	39	6.389	9	.025	39	.106
10	1 38.296	10	1.638	40	6.553	10	.027	40	.109
11	1 48.125	11	1.802	41	6.717	11	.030	41	.112
12	1 57.955	12	1.966	42	6.881	12	.033	42	.115
13	2 07.784	13	2.130	43	7.045	13	.035	43	.117
14	2 17.614	14	2.294	44	7.208	14	.038	44	.120
15	2 27.443	15	2.457	45	7.372	15	.041	45	.123
16	2 37.273	16	2.621	46	7.536	16	.044	46	.126
17	2 47.103	17	2.785	47	7.700	17	.046	47	.128
18	2 56.932	18	2.949	48	7.864	18	.049	48	.131
19	3 06.762	19	3.113	49	8.027	19	.052	49	.134
20	3 16.591	20	3.277	50	8.191	20	.055	50	.137
21	3 26.421	21	3.440	51	8.355	21	.057	51	.139
22	3 36.250	22	3.604	52	8.519	22	.060	52	.142
23	3 46.080	23	3.768	53	8.683	23	.063	53	.145
24	3 55.909	24	3.932	54	8.847	24	.066	54	.147
		25	4.096	55	9.010	25	.068	55	.150
		26	4.259	56	9.174	26	.071	56	.153
		27	4.423	57	9.338	27	.074	57	.156
		28	4.587	58	9.502	28	.076	58	.158
		29	4.751	59	9.666	29	.079	59	.161
		30	4.915	60	9.830	30	.082	60	.164

Local Mean Time for any given local apparent Sidereal Time
= Time of preceding transit of First Point of Aries (pages 13 to 16)
16)
+ reduction for longitude of place
+ given local apparent Sidereal Time — Equation of Equinoxes
— correction for Sidereal Time added (Table-II).

Otherwise, L.M.T. for any given Sidereal Time may be obtained as follows:-
Given Sidereal Time
— Sidereal Time for 0^h U.T. (pages 13 to

+ reduction for longitude of place
= Sidereal interval since 0^h L.M.T.
This Sidereal interval corrected by the above table gives the required local mean time.

or, Universal Time for any given Sidereal Time may be obtained as follows:-
Given Sidereal Time —longitude of place —Sidereal Time for 0^h U.T. = Sidereal interval since 0^h U.T.
This interval converted into Mean Solar Time by the above table gives the Universal Time required.

N.B. The reduction for longitude of place is of the same sign as that of the longitude, i.e. *positive* for places East of Greenwich and *negative* for West. See Example under EXPLANATION.

TABLE-III
CONVERSION OF ARC TO TIME

DEGREES						MINUTES			SECONDS					
°	h m	°	h m	°	h m	′	m s		″	s	″	s	″	s
0	0 00	49	3 16	98	6 32	0	0 00		0	0.000	0.00	0.000	0.50	0.033
1	0 04	50	3 20	99	6 36	1	0 04		1	0.067	.01	.001	.51	.034
2	0 08	51	3 24	100	6 40	2	0 08		2	0.133	.02	.001	.52	.035
3	0 12	52	3 28	101	6 44	3	0 12		3	0.200	.03	.002	.53	.035
4	0 16	53	3 32	102	6 48	4	0 16		4	0.267	.04	.003	.54	.036
5	0 20	54	3 36	103	6 52	5	0 20		5	0.333	.05	.003	.55	.037
6	0 24	55	3 40	104	6 56	6	0 24		6	0.400	.06	.004	.56	.037
7	0 28	56	3 44	105	7 00	7	0 28		7	0.467	.07	.005	.57	.038
8	0 32	57	3 48	106	7 04	8	0 32		8	0.533	.08	.005	.58	.039
9	0 36	58	3 52	107	7 08	9	0 36		9	0.600	.09	.006	.59	.039
10	0 40	59	3 56	108	7 12	10	0 40		10	0.667	0.10	0.007	0.60	0.040
11	0 44	60	4 00	109	7 16	11	0 44		11	0.733	.11	.007	.61	.041
12	0 48	61	4 04	110	7 20	12	0 48		12	0.800	.12	.008	.62	.041
13	0 52	62	4 08	111	7 24	13	0 52		13	0.867	.13	.009	.63	.042
14	0 56	63	4 12	112	7 28	14	0 56		14	0.933	.14	.009	.64	.043
15	1 00	64	4 16	113	7 32	15	1 00		15	1.000	.15	.010	.65	.043
16	1 04	65	4 20	114	7 36	16	1 04		16	1.067	.16	.011	.66	.044
17	1 08	66	4 24	115	7 40	17	1 08		17	1.133	.17	.011	.67	.045
18	1 12	67	4 28	116	7 44	18	1 12		18	1.200	.18	.012	.68	.045
19	1 16	68	4 32	117	7 48	19	1 16		19	1.267	.19	.013	.69	.046
20	1 20	69	4 36	118	7 52	20	1 20		20	1.333	0.20	0.013	0.70	0.047
21	1 24	70	4 40	119	7 56	21	1 24		21	1.400	.21	.014	.71	.047
22	1 28	71	4 44	120	8 00	22	1 28		22	1.467	.22	.015	.72	.048
23	1 32	72	4 48	121	8 04	23	1 32		23	1.533	.23	.015	.73	.049
24	1 36	73	4 52	122	8 08	24	1 36		24	1.600	.24	.016	.74	.049
25	1 40	74	4 56	123	8 12	25	1 40		25	1.667	.25	.017	.75	.050
26	1 44	75	5 00	124	8 16	26	1 44		26	1.733	.26	.017	.76	.051
27	1 48	76	5 04	125	8 20	27	1 48		27	1.800	.27	.018	.77	.051
28	1 52	77	5 08	126	8 24	28	1 52		28	1.867	.28	.019	.78	.052
29	1 56	78	5 12	127	8 28	29	1 56		29	1.933	.29	.019	.79	.053
30	2 00	79	5 16	128	8 32	30	2 00		30	2.000	0.30	0.020	0.80	0.053
31	2 04	80	5 20	129	8 36	31	2 04		31	2.067	.31	.021	.81	.054
32	2 08	81	5 24	130	8 40	32	2 08		32	2.133	.32	.021	.82	.055
33	2 12	82	5 28	131	8 44	33	2 12		33	2.200	.33	.022	.83	.055
34	2 16	83	5 32	132	8 48	34	2 16		34	2.267	.34	.023	.84	.056
35	2 20	84	5 36	133	8 52	35	2 20		35	2.333	.35	.023	.85	.057
36	2 24	85	5 40	134	8 56	36	2 24		36	2.400	.36	.024	.86	.057
37	2 28	86	5 44	135	9 00	37	2 28		37	2.467	.37	.025	.87	.058
38	2 32	87	5 48	136	9 04	38	2 32		38	2.533	.38	.025	.88	.059
39	2 36	88	5 52	137	9 08	39	2 36		39	2.600	.39	.026	.89	.059
40	2 40	89	5 56	138	9 12	40	2 40		40	2.667	0.40	0.027	0.90	0.06
41	2 44	90	6 00	139	9 16	41	2 44		41	2.733	.41	.027	.91	.061
42	2 48	91	6 04	140	9 20	42	2 48		42	2.800	.42	.028	.92	.061
43	2 52	92	6 08	141	9 24	43	2 52		43	2.867	.43	.029	.93	.062
44	2 56	93	6 12	142	9 28	44	2 56		44	2.933	.44	.029	.94	.063
45	3 00	94	6 16	143	9 32	45	3 00		45	3.000	.45	.030	.95	.063
46	3 04	95	6 20	144	9 36	46	3 04		46	3.067	.46	.031	.96	.064
47	3 08	96	6 24	145	9 40	47	3 08		47	3.133	.47	.031	97	.065
48	3 12	97	6 28	146	9 44	48	3 12		48	3.200	.48	.032	.98	.065

TABLE-III ---- *contd.*
CONVERSION OF ARC TO TIME

DEGREES						MINUTES		SECONDS					
°	h m	°	h m	°	h m	′	m s	″	s	″	s	″	s
147	9 48	158	10 32	169	11 16	49	3 16	49	3.267	0.49	0.033	0.99	0.066
148	9 52	159	10 36	170	11 20	50	3 20	50	3.333	0.50	0.033	1.00	0.067
149	9 56	160	10 40	171	11 24	51	3 24	51	3.400				
150	10 00	161	10 44	172	11 28	52	3 28	52	3.467				
151	10 04	162	10 48	173	11 32	53	3 32	53	3.533				
152	10 08	163	10 52	174	11 36	54	3 36	54	3.600				
153	10 12	164	10 56	175	11 40	55	3 40	55	3.667				
154	10 16	165	11 00	176	11 44	56	3 44	56	3.733				
155	10 20	166	11 04	177	11 48	57	3 48	57	3.800				
156	10 24	167	11 08	178	11 52	58	3 52	58	3.867				
157	10 28	168	11 12	179	11 56	59	3 56	59	3.933				

TABLE-IV
CONVERSION OF TIME TO ARC

	0^h	1^h	2^h	3^h	4^h	5^h	SECONDS					
m	° ′	° ′	° ′	° ′	° ′	° ′	s	′ ″	s	″	s	″
0	0 00	15 00	30 00	45 00	60 00	75 00	0	0 00	0.00	0.00	0.50	7.50
1	0 15	15 15	30 15	45 15	60 15	75 15	1	0 15	.01	0.15	.51	7.65
2	0 30	15 30	30 30	45 30	60 30	75 30	2	0 30	.02	0 30	.52	7.80
3	0 45	15 45	30 45	45 45	60 45	75 45	3	0 45	.03	0.45	.53	7.95
4	1 00	16 00	31 00	46 00	61 00	76 00	4	1 00	.04	0.60	.54	8.10
5	1 15	16 15	31 15	46 15	61 15	76 15	5	1 15	.05	0.75	.55	8.25
6	1 30	16 30	31 30	46 30	61 30	76 30	6	1 30	.06	0.90	.56	8.40
7	1 45	16 45	31 45	46 45	61 45	76 45	7	1 45	.07	1.05	.57	8.55
8	2 00	17 00	32 00	47 00	62 00	77 00	8	2 00	.08	1.20	.58	8.70
9	2 15	17 15	32 15	47 15	62 15	77 15	9	2 15	.09	1.35	.59	8.85
10	2 30	17 30	32 30	47 30	62 30	77 30	10	2 30	0.10	1.50	0.60	9.00
11	2 45	17 45	32 45	47 45	62 45	77 45	11	2 45	.11	1.65	.61	9.15
12	3 00	18 00	33 00	48 00	63 00	78 00	12	3 00	.12	1.80	.62	9.30
13	3 15	18 15	33 15	48 15	63 15	78 15	13	3 15	.13	1.95	.63	9.45
14	3 30	18 30	33 30	48 30	63 30	78 30	14	3 30	.14	2.10	.64	9.60
15	3 45	18 45	33 45	48 45	63 45	78 45	15	3 45	.15	2.25	.65	9.75
16	4 00	19 00	34 00	49 00	64 00	79 00	16	4 00	.16	2.40	.66	9.90
17	4 15	19 15	34 15	49 15	64 15	79 15	17	4 15	.17	2.55	.67	10.05
18	4 30	19 30	34 30	49 30	64 30	79 30	18	4 30	.18	2.70	.68	10.20
19	4 45	19 45	34 45	49 45	64 45	79 45	19	4 45	.19	2.85	.69	10.35
20	5 00	20 00	35 00	50 00	65 00	80 00	20	5 00	.20	3.00	0.70	10.50
21	5 15	20 15	35 15	50 15	65 15	80 15	21	5 15	.21	3.15	.71	10.65
22	5 30	20 30	35 30	50 30	65 30	80 30	22	5 30	.22	3.30	.72	10.80
23	5 45	20 45	35 45	50 45	65 45	80 45	23	5 45	.23	3.45	.73	10.95
24	6 00	21 00	36 00	51 00	66 00	81 00	24	6 00	.24	3.60	.74	11.10
25	6 15	21 15	36 15	51 15	66 15	81 15	25	6 15	.25	3.75	.75	11.25
26	6 30	21 30	36 30	51 30	66 30	81 30	26	6 30	.26	3.90	.76	11.40
27	6 45	21 45	36 45	51 45	66 45	81 45	27	6 45	.27	4.05	.77	11.55
28	7 00	22 00	37 00	52 00	67 00	82 00	28	7 00	.28	4.20	.78	11.70
29	7 15	22 15	37 15	52 15	67 15	82 15	29	7 15	.29	4.35	.79	11.85
30	7 30	22 30	37 30	52 30	67 30	82 30	30	7 30	.30	4.50	0.80	12.00

TABLE-IV ---- *contd.*
CONVERSION OF TIME TO ARC

	0 h	1 h	2 h	3 h	4 h	5 h	SECONDS					
m	° ′	° ′	° ′	° ′	° ′	° ′	s	′ ″	s	″	s	″
31	7 45	22 45	37 45	52 45	67 45	82 45	31	7 45	0.31	4.65	0.81	12.15
32	8 00	23 00	38 00	53 00	68 00	83 00	32	8 00	.32	4.80	.82	12.30
33	8 15	23 15	38 15	53 15	68 15	83 15	33	8 15	.33	4.95	.83	12.45
34	8 30	23 30	38 30	53 30	68 30	83 30	34	8 30	.34	5.10	.84	12.60
35	8 45	23 45	38 45	53 45	68 45	83 45	35	8 45	.35	5.25	.85	12.75
36	9 00	24 00	39 00	54 00	69 00	84 00	36	9 00	.36	5.40	.86	12.90
37	9 15	24 15	39 15	54 15	69 15	84 15	37	9 15	.37	5.55	.87	13.05
38	9 30	24 30	39 30	54 30	69 30	84 30	38	9 30	.38	5.70	.88	13.20
39	9 45	24 45	39 45	54 45	69 45	84 45	39	9 45	.39	5.85	.89	13.35
40	10 00	25 00	40 00	55 00	70 00	85 00	40	10 00	.40	6.00	.90	13.50
41	10 15	25 15	40 15	55 15	70 15	85 15	41	10 15	.41	6.15	.91	13.65
42	10 30	25 30	40 30	55 30	70 30	85 30	42	10 30	.42	6.30	.92	13.80
43	10 45	25 45	40 45	55 45	70 45	85 45	43	10 45	.43	6.45	.93	13.95
44	11 00	26 00	41 00	56 00	71 00	86 00	44	11 00	.44	6.60	.94	14.10
45	11 15	26 15	41 15	56 15	71 15	86 15	45	11 15	.45	6.75	.95	14.25
46	11 30	26 30	41 30	56 30	71 30	86 30	46	11 30	.46	6.90	.96	14.40
47	11 45	26 45	41 45	56 45	71 45	86 45	47	11 45	.47	7.05	.97	14.55
48	12 00	27 00	42 00	57 00	72 00	87 00	48	12 00	.48	7.20	.98	14.70
49	12 15	27 15	42 15	57 15	72 15	87 15	49	12 15	.49	7.35	0.99	14.85
50	12 30	27 30	42 30	57 30	72 30	87 30	50	12 30	0.50	7.50	1.00	15.00
51	12 45	27 45	42 45	57 45	72 45	87 45	51	12 45				
52	13 00	28 00	43 00	58 00	73 00	88 00	52	13 00				
53	13 15	28 15	43 15	58 15	73 15	88 15	53	13 15				
54	13 30	28 30	43 30	58 30	73 30	88 30	54	13 30	h	°		
55	13 45	28 45	43 45	58 45	73 45	88 45	55	13 45	6 =	90		
56	14 00	29 00	44 00	59 00	74 00	89 00	56	14 00	12 =	180		
57	14 15	29 15	44 15	59 15	74 15	89 15	57	14 15	18 =	270		
58	14 30	29 30	44 30	59 30	74 30	89 30	58	14 30				
59	14 45	29 45	44 45	59 45	74 45	89 45	59	14 45				

TABLE - V
CONVERSION OF HOURS, MINUTES AND SECONDS TO DECIMALS OF A DAY

	0 h	1 h	2 h	3 h	4 h	5 h	SECONDS	
m	d	d	d	d	d	d	s	d
0	0.000 000	0.041 667	0.083 333	0.125 000	0.166 667	0.208 333	0	0.000 000
1	.000 694	.042 361	.084 028	.125 694	.167 361	.209 028	1	.000 012
2	.001 389	.043 056	.084 722	.126 389	.168 056	.209 722	2	.000 023
3	.002 083	.043 750	.085 417	.127 083	.168 750	.210 417	3	.000 035
4	.002 778	.044 444	.086 111	.127 778	.169 444	.211 111	4	.000 046
5	.003 472	.045 139	.086 806	.128 472	.170 139	.211 806	5	.000 058
6	.004 167	.045 833	.087 500	.129 167	.170 833	.212 500	6	.000 069
7	.004 861	.046 528	.088 194	.129 861	.171 528	.213 194	7	.000 081
8	.005 556	.047 222	.088 889	.130 556	.172 222	.213 889	8	.000 093
9	.006 250	.047 917	.089 583	.131 250	.172 917	.214 583	9	.000 104
10	0.006 944	0.048 611	0.090 278	0.131 944	0.173 611	0.215 278	10	0.000 116
11	.007 639	.049 306	.090 972	0.132 639	.174 306	.215 972	11	.000 127

TABLE - V ---- *contd.*
CONVERSION OF HOURS, MINUTES AND SECONDS TO DECIMALS OF A DAY

	0 h	1 h	2 h	3 h	4 h	5 h	SECONDS	
m	d	d	d	d	d	d	s	d
12	0.008 333	0.050 000	0.091 667	0.133 333	0.175 000	0.216 667	12	0.000 139
13	.009 028	.050 694	.092 361	.134 028	.175 694	.217 361	13	.000 150
14	.009 722	.051 389	.093 056	.134 722	.176 389	.218 056	14	.000 162
15	.010 417	.052 083	.093 750	.135 417	.177 083	.218 750	15	.000 174
16	.011 111	.052 778	.094 444	.136 111	.177 778	.219 444	16	.000 185
17	.011 806	.053 472	.095 139	.136 806	. 178 472	.220 139	17	.000 197
18	.012 500	.054 167	.095 833	.137 500	.179 167	.220 833	18	.000 208
19	.013 194	.054 861	.096 528	.138 194	.179 861	.221 528	19	.000 220
20	0.013 889	0.055 556	0.097 222	0.138 889	0.180 556	0.222 222	20	0.000 231
21	.014 583	056 250	.097 917	.139 583	.181 250	.222 917	21	.000 243
22	.015 278	.056 944	.098 611	.140 278	.181 944	.223 611	22	.000 255
23	.015 972	.057 639	.099 306	.140 972	182 639	.224 306	23	.000 266
24	.016 667	.058 333	.100 000	.141 667	.183 333	.225 000	24	.000 278
25	.017 361	.059 028	.100 694	.142 361	.184 028	.225 694	25	.000 289
26	.018 056	.059 722	.101 389	.143 056	.184 722	.226 389	26	.000 301
27	.018 750	.060 417	.102 083	.143 750	.185 417	.227 083	27	.000 312
28	.019 444	.061 111	.102 778	.144 444	.186 111	.227 778	28	.000 324
29	.020 139	.061 806	.103 472	.145 139	.186 806	.228 472	29	.000 336
30	0.020 833	0.062 500	0.104 167	0.145 833	0.187 500	0.229 167	30	0.000 347
31	.021 528	.063 194	.104 861	.146 528	.188 194	.229 861	31	.000 359
32	.022 222	.063 889	.105 556	.147 222	.188 889	.230 556	32	.000370
33	.022 917	.064 583	.106 250	.147 917	.189 583	.231 250	33	.000 382
34	.023 611	.065 278	.106 944	.148 611	.190 278	.231 944	34	.000 394
35	.024 306	.065 972	.107 639	.149 306	.190 972	.232 639	35	.000 405
36	.025 000	.066 667	.108 333	.150 000	.191 667	.233 333	36	.000 417
37	.025 694	.067 361	.109 028	.150 694	.192 361	.234 028	37	.000 428
38	.026 389	.068 056	.109 722	.151 389	.193 056	.234 722	38	.000 440
39	.027 083	.068 750	.110 417	.152 083	.193 750	.235 417	39	.000 451
40	0.027 778	0.069 444	0.111 111	0.152 778	0.194 444	0.236 111	40	0.000 463
41	.028 472	.070 139	.111 806	.153 472	.195 139	.236 806	41	.000 475
42	.029 167	.070 833	.112 500	.154 167	.195 833	.237 500	42	.000 486
43	.029 861	.071 528	.113 194	.154 861	.196 528	.238 194	43	.000 498
44	.030 556	.072 222	.113 889	.155 556	.197 222	.238 889	44	.000 509
45	.031 250	.072 917	.114 583	.156 250	.197 917	.239 583	45	.000 521
46	.031 944	.073 611	.115 278	.156 944	.198 611	.240 278	46	.000 532
47	.032 639	.074 306	.115 972	.157 639	.199 306	.240 972	47	.000 544
48	.033 333	.075 000	.116 667	.158 333	.200 000	.241 667	48	.000 556
49	.034 028	.075 694	.117 361	.159 028	.200 694	.242 361	49	.000 567
50	0.034 722	0.076 389	0.118 056	0.159 722	0.201 389	0.243 056	50	0.000 579
51	.035 417	.077 083	.118 750	.160 417	.202 083	.243 750	51	.000 590
52	.036 111	.077 778	.119 444	.161 111	.202 778	.244 444	52	.000 602
53	.036 806	.078 472	.120 139	.161 806	.203 472	.245 139	53	.000 613
54	.037 500	.079 167	.120 833	.162 500	.204 167	.245 833	54	.000 625
55	.038 194	.079 861	.121 528	.163 194	.204 861	.246 528	55	.000 637
56	.038 889	.080 556	.122 222	.163 889	.205 556	.247 222	56	.000 648
57	.039 583	.081 250	.122 917	.164 583	.206 250	.247 917	57	.000 660
58	.040 278	.081 944	.123 611	.165 278	.206 944	.248 611	58	.000 671
59	0.040 972	0.082 639	0.124 306	0.165 972	0.207 639	0.249 306	59	0.000 683

TABLE - V ---- *contd.*
CONVERSION OF HOURS, MINUTES AND SECONDS TO DECIMALS OF A DAY

	6 h	7 h	8 h	9 h	10 h	11 h	SECONDS	
m	d	d	d	d	d	d	s	d
0	0.250 000	0.291 667	0.333 333	0.375 000	0.416 667	0.458 333	0	0.000 000
1	.250 694	.292 361	.334 028	.375 694	. 417 361	.459 028	1	.000 012
2	.251 389	.293 056	.334 722	.376 389	.418 056	.459 722	2	.000 023
3	.252 083	.293 750	.335 417	.377 083	.418 750	.460 417	3	.000 035
4	.252 778	.294 444	.336 111	.377 778	.419 444	.461 111	4	.000 046
5	.253 472	.295 139	.336 806	.378 472	.420 139	.461 806	5	.000 058
6	.254 167	.295 833	.337 500	.379 167	.420 833	.462 500	6	.000 069
7	.254 861	.296 528	338 194	.379 861	.421 528	. 463 194	7	.000 081
8	.255 556	.297 222	.338 889	.380 556	.422 222	. 463 889	8	.000 093
9	.256 250	.297 917	.339 583	.381 250	.422 917	.464 583	9	.000 104
10	0.256 944	0.298 611	0.340 278	0.381 944	0.423 611	0.465 278	10	0.000 116
11	.257 639	.299 306	.340 972	.382 639	.424 306	.465 972	11	.000 127
12	.258 333	.300 000	.341 667	.383 333	.425 000	.466 667	12	.000 139
13	.259 028	.300 694	.342 361	384 028	.425 694	.467 361	13	.000 150
14	.259 722	.301 389	.343 056	.384 722	.426 389	.468 056	14	.000 162
15	.260 417	.302 083	.343 750	.385 417	.427 083	.468 750	15	.000 174
16	.261 111	.302 778	.344 444	.386 111	.427 778	.469 444	16	.000 185
17	.261 806	.303 472	.345 139	.386 806	.428 472	.470 139	17	.000 197
18	.262 500	.304 167	.345 833	.387 500	.429 167	.470 833	18	.000 208
19	.263 194	.304 861	.346 528	.388 194	.429 861	.471 528	19	.000 220
20	0.263 889	0.305 556	0.347 222	0.388 889	0.430 556	0.472 222	20	0.000 231
21	.264 583	.306 250	.347 917	.389 583	.431 250	.472 917	21	.000 243
22	.265 278	.306 944	.348 611	.390 278	.431 944	.473 661	22	.000 255
23	.265 972	.307 639	.349 306	.390 972	.432 639	.474 306	23	.000 266
24	.266 667	.308 383	.350 000	.391 667	.433 333	.475 000	24	.000 278
25	.267 361	.309 028	.350 694	.392 361	.434 028	.475 694	25	.000289
26	.268 056	.309 722	.351 389	.393 056	.434 722	.476 389	26	.000 301
27	.268 750	.310 417	.352 083	.393 750	.435 417	.477 083	27	.000 312
28	.269 444	.311 111	.352 778	.394 444	.436 111	.477 778	28	.000 324
29	.270 139	.311 806	.353 472	.395 139	.436 806	.478 472	29	.000 336
30	0.270 833	0.312 500	0.354 167	0.395 833	0.437 500	0.479 167	30	0.000 347
31	.271 528	.313 194	.354 861	.396 528	.438 194	.479 861	31	.000 359
32	.272 222	.313 889	.355 556	.397 222	.438 889	.480 556	32	.000 370
33	.272 917	.314 583	.356 250	.397 917	.439 583	.481 250	33	.000 382
34	.273 611	.315 278	.356 944	.398 611	.440 278	.481 944	34	.000 394
35	.274 306	.315 972	.357 639	.399 306	.440 972	.482 639	35	.000 405
36	.275 000	.316 667	.358 333	.400 000	.441 667	.483 333	36	.000 417
37	.275 694	.317 361	.359 028	.400 694	.442 361	.484 028	37	.000 428
38	276 389	.318 056	.359 722	.401 389	.443 056	.484 722	38	.000 440
39	.277 083	.318 750	.360 417	.402 083	.443 750	.485 417	39	.000 451
40	0.277 778	0.319 444	0.361 111	0.402 778	0.444 444	0.486 111	40	0.000 463
41	.278 472	.320 139	.361 806	.403 472	.445 139	.486 806	41	.000 475
42	279 167	.320 833	.362 500	.404 167	.445 833	.487 500	42	.000 486
43	.279 861	.321 528	.363 194	.404 861	.446 528	.488 194	43	.000 498
44	.280 556	.322 222	.363 889	.405 556	.447 222	.488 889	44	.000 509
45	.281 250	.322 917	.364 583	.406 250	.447 917	.489 583	45	.000 521
46	0.281 944	0.323 611	0.365 278	0.406 944	0.448 611	0.490 278	46	0.000 532

TABLE - V ---- *contd.*
CONVERSION OF HOURS, MINUTES AND SECONDS TO DECIMALS OF A DAY

	6 h	7 h	8 h	9 h	10 h	11 h	SECONDS	
m	d	d	d	d	d	d	s	d
47	0.282 639	0.324 306	0.365 972	0.407 639	0.449 306	0.490 972	47	0.000 544
48	.283 333	.325 000	.366 667	.408 333	.450 000	.491 667	48	.000 556
49	.284 028	.325 694	.367 361	.409 028	.450 694	.492 361	49	.000 567
50	0.284 722	0.326 389	0.368 056	0.409 722	0.451 389	0.493 056	50	0.000 579
51	.285 417	.327 083	.368 750	.410 417	.452 083	.493 750	51	.000 590
52	.286 111	.327 778	.369 444	.411 111	.452 778	.494 444	52	.000 602
53	.286 806	.328 472	. 370 139	.411 806	.453 472	.495 139	53	.000 613
54	.287 500	.329 167	.370 833	.412 500	.454 167	.495 833	54	.000 625
55	.288 194	.329 861	.371 528	.413 194	.454 861	.496 528	55	.000 637
56	.288 889	.330 556	.372 222	.413 889	.455 556	.497 222	56	.000 648
57	.289 583	.331 250	.372 917	.414 583	.456 250	.497 917	57	.000 660
58	.290 278	.331 944	.373 611	.415 278	.456 944	.498 611	58	.000 671
59	0.290 972	0.332 639	0.374 306	0.415 972	0.457 639	0.499 306	59	0.000 683

TABLE - VI
CONVERSION OF MINUTES AND SECONDS TO DECIMALS OF A DEGREE

	0′	1′	2′	3′	4′	5′
″	°	°	°	°	°	°
0	0.00000	0.01667	0.03333	0.05000	0.06667	0.08333
1	0028	1694	3361	5028		8361
2	0056	1722	3389	5056	6722	8389
3	0083	1750	3417	5083	6750	8417
4	0111	1778	3444	5111	6778	8444
5	0139	1806	3472	5139	6806	8472
6	0167	1833	3500	5167	6833	8500
7	0194	1861	3528	5194	6861	8528
8	0222	1889	3556	5222	6889	8556
9	0250	1917	3583	5250	6917	8583
10	0.00278	0.01944	0.03611	0.05278	0.06944	0.08611
11	0306	1972	3639	5306	6972	8639
12	0333	2000	3667	5333	7000	8667
13	0361	2028	3694	5361	7028	8694
14	0389	2056	3722	5389	7056	8722
15	0417	2083	3750	5417	7083	8750
16	0444	2111	3778	5444	7111	8778
17	0472	2139	3806	5472	7139	8806
18	0500	2167	3833	5500	7167	8833
19	0528	2194	3861	5528	7194	8861
20	0.00556	0.02222	0.03889	0.05556	0.07222	0.08889
21	0583	2250	3917	5583	7250	8917
22	0611	2278	3944	5611	7278	8944
23	0639	2306	3972	5639	7306	8972
24	0667	2333	4000	5667	7333	9000
25	0.00694	0.02361	0.04028	0.05694	0.07361	0.09028

″	°
0	0.0
6	0.1
12	0.2
18	0.3
24	0.4
30	0.5
36	0.6
42	0.7
48	0.8
54	0.9

TABLE - VI ---- *contd.*
CONVERSION OF MINUTES AND SECONDS TO DECIMALS OF A DEGREE

	0′	1′	2′	3′	4′	5′	In units of the fifth decimal of a Degree.	
″	°	°	°	°	°	°	″	°
26	0.00722	0.02389	0.04056	0.05722	0.07389	0.09056	0.00	0
27	0750	2417	4083	5750	7417	9083	.01	1
28	0778	2444	4111	5778	7444	9111	.05	2
29	0806	2472	4139	5806	7472	9139	.09	3
30	0.00833	0.02500	0.04167	0.05833	0.07500	0.09167	.12	4
31	0861	2528	4194	5861	7528	9194	.16	5
32	0889	2556	4222	5889	7556	9222	.19	6
33	0917	2583	4250	5917	7583	9250	.23	7
34	0944	2611	4278	5944	7611	9278	.26	8
35	0972	2639	4306	5972	7639	9306	.30	9
36	1000	2667	4333	6000	7667	9333	.34	10
37	1028	2694	4361	6028	7694	9361	.37	11
38	1056	2722	4389	6056	7722	9389	.41	12
39	1083	2750	4417	6083	7750	9417	.45	13
40	0.01111	0.02778	0.04444	0.06111	0.07778	0.09444	.48	14
41	1139	2806	4472	6139	7806	9472	.52	15
42	1167	2833	4500	6167	7833	9500	.55	16
43	1194	2861	4528	6194	7861	9528	.59	17
44	1222	2889	4556	6222	7889	9556	.62	18
45	1250	2917	4583	6250	7917	9583	.66	19
46	1278	2944	4611	6278	7944	9611	.70	20
47	1306	2972	4639	6306	7972	9639	.73	21
48	1333	3000	4667	6333	8000	9667	.77	22
49	1361	3028	4694	6361	8028	9694	.81	23
50	0.01389	0.03056	0.04722	0.06389	0.08056	0.09722	.84	24
51	1417	3083	4750	6417	8083	9750	.88	25
52	1444	3111	4778	6444	8111	9778	.91	26
53	1472	3139	4806	6472	8139	9806	.95	27
54	1500	3167	4833	6500	8167	9833	0.98	28
55	1528	3194	4861	6528	8194	9861	1.00	
56	1556	3222	4889	6556	8222	9889		
57	1583	3250	4917	6583	8250	9917	*In critical*	
58	1611	3278	4944	6611	8278	9944	*cases ascend*	
59	0.01639	0.03306	0.04972	0.06639	0.08306	0.09972		

TABLE - VII
INTERPOLATION COEFFICIENTS

n	*B″*	$E_0″$	$E_1″$	n	*B″*	$E_0″$	$E_1″$
0.00	0.00000	0.00000	0.00000	0.05	0.01188	0.01544	0.00831
.01	.00248	.00328	.00167	.06	0.01410	0.01824	0.00996
.02	.00490	.00647	.00333	.07	.01628	.02094	.01161
.03	.00728	.00955	.00500	.08	.01840	.02355	.01325
.04	.00960	.01254	.00666	.09	.02048	.02607	.01488
0.05	0.01188	0.01544	0.00831	0.10	0.02250	0.02850	0.01650

TABLE - VII ---- *contd.*
INTERPOLATION COEFFICIENTS

n	*B″*	*E_0″*	*E_1″*	n	*B″*	*E_0″*	*E_1″*
0.10	0.02250	0.02850	0.01650	0.55	0.06188	0.05981	0.06394
.11	.02448	.03084	.01811	.56	0.06160	0.05914	0.06406
.12	.02640	.03309	.01971	.57	.06128	.05842	.06413
.13	.02828	.03525	.02130	.58	.06090	.05765	.06415
.14	.03010	.03732	.02288	.59	.06048	.05685	.06410
.15	.03188	.03931	.02444	0.60	0.06000	0.05600	0.06400
.16	.03360	.04122	.02598	.61	.05948	.05511	.06384
.17	.03528	.04304	.02751	.62	.05890	.05419	.06361
.18	.03690	.04477	.02903	.63	.05828	.05322	.06333
.19	.03848	.04643	.03052	.64	.05760	.05222	.06298
0.20	0.04000	0.04800	0.03200	.65	.05688	.05119	.06256
.21	.04148	.04949	.03346	.66	.05610	.05012	.06208
.22	.04290	.05091	.03489	.67	.05528	.04901	.06154
.23	.04428	.05224	.03631	.68	.05440	.04787	.06093
.24	.04560	.05350	.03770	.69	.05348	.04670	.06025
.25	.04688	.05469	.03906	0.70	0.05250	0.04550	0.05950
.26	.04810	.05580	.04040	.71	.05148	.04427	.05868
.27	.04928	.05683	.04172	.72	.05040	.04301	.05779
.28	.05040	.05779	.04301	.73	.04928	.04172	.05683
.29	.05148	.05868	.04427	.74	.04810	.04040	.05580
0.30	0.05250	0.05950	0.04550	.75	.04688	.03906	.05469
.31	.05348	.06025	.04670	.76	.04560	.03770	.05350
.32	.05440	.06093	.04787	.77	.04428	.03631	.05224
.33	.05528	.06154	.04901	.78	.04290	.03489	.05091
.34	.05610	.06208	.05012	.79	.04148	.03346	.04949
.35	.05688	.06256	.05119	0.80	0.04000	0.03200	0.04800
.36	.05760	.06298	.05222	.81	. 03848	.03052	.04643
.37	.05828	.06333	.05322	.82	.03690	.02903	.04477
.38	.05890	.06361	.05419	.83	.03528	.02751	.04304
.39	.05948	.06384	.05511	.84	.03360	.02598	.04122
0.40	0.06000	0.06400	0.05600	.85	.03188	.02444	.03931
.41	.06048	.06410	.05685	.86	.03010	.02288	.03732
.42	.06090	.06415	.05765	.87	.02828	.02130	.03525
.43	.06128	.06413	.05842	.88	.02640	.01971	.03309
.44	.06160	.06406	.05914	.89	.02448	.01811	.03084
.45	.06188	.06394	.05981	0.90	0.02250	0.01650	0.02850
.46	.06210	.06376	.06044	.91	.02048	.01488	.02607
.47	.06228	.06352	.06103	.92	.01840	.01325	.02355
.48	.06240	.06323	.06157	.93	.01628	.01161	.02094
.49	.06248	.06289	.06206	.94	.01410	.00996	.01824
0.50	0.06250	0.06250	0.06250	.95	.01188	.00831	.01544
.51	.06248	.06206	.06289	.96	.00960	.00666	.01254
.52	.06240	.06157	.06323	.97	.00728	.00500	.00955
.53	.06228	.06103	.06352	.98	.00490	.00333	.00647
.54	.06210	.06044	.06376	0.99	.00248	.00167	.00328
0.55	0.06188	0.05981	0.06394	1.00	0.00000	0.00000	0.00000

N.B. – The coefficients are all *negative*. For details about Bessel's and Everett's interpolation formula, please *see* Explanation

TABLE - VIII
EVERETT COEFFICIENTS OF THE SECOND DIFFERENCES

(*The coefficients are all negative*)

n	E_0''	E_1''		n	E_0''	E_1''		n	E_0''	E_1''	
0.000			1.000	0.050			0.950	0.100			0.900
.001	0.0002	0.0001	0.999	.051	0.0156	0.0084	.949	.101	0.0286	0.0166	.899
.002	.0005	.0002	.998	.052	.0159	.0086	.948	.102	.0289	.0167	.898
.003	.0008	.0004	.997	.053	.0161	.0087	.947	.103	.0291	.0169	.897
.004	.0012	.0006	.996	.054	.0164	.0089	.946	.104	.0293	.0171	.896
.005	.0015	.0007	.995	.055	.0167	.0091	.945	.105	.0296	.0172	.895
.006	.0018	.0009	.994	.056	.0170	.0092	.944	.106	.0298	.0174	.894
.007	.0021	.0011	.993	.057	.0173	.0094	.943	.107	.0300	.0175	.893
.008	.0025	.0012	.992	.058	.0175	.0096	.942	.108	.0303	.0177	.892
.009	.0028	.0014	.991	.059	.0178	.0097	.941	.109	.0305	.0179	.891
.010	.0031	.0016	.990	.060	.0181	.0099	.940	.110	.0307	.0180	.890
.011	.0034	.0017	.989	.061	.0184	.0100	.939	.111	.0310	.0182	.889
.012	.0038	.0019	.988	.062	.0186	.0102	.938	.112	.0312	.0184	.888
.013	.0041	.0021	.987	.063	.0189	.0104	.937	.113	.0314	.0185	.887
.014	.0044	.0022	.986	.064	.0192	.0105	.936	.114	.0316	.0187	.886
.015	.0047	.0024	.985	.065	.0195	.0107	.935	.115	.0319	.0188	.885
.016	.0050	.0026	.984	.066	.0197	.0109	.934	.116	.0321	.0190	.884
.017	.0054	.0027	.983	.067	.0200	.0110	.933	.117	.0323	.0192	.883
.018	.0057	.0029	.982	.068	.0203	.0112	.932	.118	.0325	.0193	.882
.019	.0060	.0031	.981	.069	.0205	.0114	.931	.119	.0328	.0195	.881
.020	.0063	.0032	.980	.070	.0208	.0115	.930	.120	.0330	.0196	.880
.021	.0066	.0034	.979	.071	.0211	.0117	.929	.121	.0332	.0198	.879
.022	.0069	.0036	.978	.072	.0213	.0119	.928	.122	.0334	.0200	.878
.023	.0072	.0037	.977	.073	.0216	.0120	.927	.123	.0336	.0201	.877
.024	.0076	.0039	.976	.074	.0219	.0122	.926	.124	.0339	.0203	.876
.025	.0079	.0041	.975	.075	.0221	.0123	.925	.125	.0341	.0204	.875
.026	.0082	.0042	.974	.076	.0224	.0125	.924	.126	.0343	.0206	.874
.027	.0085	.0044	.973	.077	.0226	.0127	.923	.127	.0345	.0207	.873
.028	.0088	.0046	.972	.078	.0229	.0128	.922	.128	.0347	.0209	.872
.029	.0091	.0047	.971	.079	.0232	.0130	.921	.129	.0349	.0211	.871
.030	.0094	.0049	.970	.080	.0234	.0132	.920	.130	.0351	.0212	.870
.031	.0097	.0051	.969	.081	.0237	.0133	.919	.131	.0354	.0214	.869
.032	.0100	.0052	.968	.082	.0239	.0135	.918	.132	.0356	.0215	.868
.033	.0103	.0054	.967	.083	.0242	.0137	.917	.133	.0358	.0217	.867
.034	.0106	.0056	.966	.084	.0244	.0138	.916	.134	.0360	.0219	.866
.035	.0109	.0057	.965	.085	.0247	.0140	.915	.135	.0362	.0220	.865
.036	.0112	.0059	.964	.086	.0249	.0141	.914	.136	.0364	.0222	.864
.037	.0115	.0061	.963	.087	.0252	.0143	.913	.137	.0366	.0223	.863
.038	.0118	.0062	.962	.088	.0255	.0145	.912	.138	.0368	.0225	.862
.039	.0121	.0064	.961	.089	.0257	.0146	.911	.139	.0370	.0226	.861
.040	.0124	.0066	.960	.090	.0259	.0148	.910	.140	.0372	.0228	.860
.041	.0127	.0067	.959	.091	.0262	.0150	.909	.141	.0374	.0230	.859
.042	.0130	.0069	.958	.092	.0264	.0151	.908	.142	.0376	.0231	.858
.043	.0133	.0071	.957	.093	.0267	.0153	.907	.143	.0378	.0233	.857
.044	.0136	.0072	.956	.094	.0269	.0154	.906	.144	.0380	.0234	.856
.045	.0139	.0074	.955	.095	.0272	.0156	.905	.145	.0382	.0236	.855
.046	.0141	.0076	.954	.096	.0274	.0158	.904	.146	.0384	.0237	.854
.047	.0144	.0077	.953	.097	.0277	.0159	.903	.147	.0386	.0239	.853
.048	.0147	.0079	.952	.098	.0279	.0161	.902	.148	.0388	.0240	.852
.049	.0150	.0081	.951	.099	.0281	.0163	.901	.149	.0390	.0242	.851
0.050	0.0153	0.0082	0.950	0.100	0.0284	0.0164	0.900	0.150	0.0392	0.0244	0.850
	E_1''	E_0''	n		E_1''	E_0''	n		E_1''	E_0''	n

Formula : $f_n = f_0 + n\,\Delta_{1/2}' + E_0''\Delta_0'' + E_1''\Delta_1''$

TABLE - VIII ---- *contd.*
EVERETT COEFFICIENTS OF THE SECOND DIFFERENCES
(*The coefficients are all negative*)

n	E_0''	E_1''		*n*	E_0''	E_1''		*n*	E_0''	E_1''	
0.150			0.850	0.200			0.800	0.300			0.700
.151	0.0394	0.0245	.849	.202	0.0482	0.0321	.798	.304	0.0597	0.0457	.696
.152	.0396	.0247	.848	.204	.0485	.0324	.796	.308	.0600	.0462	.692
.153	.0398	.0248	.847	.206	.0488	.0327	.794	.312	.0602	.0467	.688
.154	.0400	.0250	.846	.208	.0491	.0330	.792	.316	.0605	.0472	.684
.155	.0402	.0251	.845	.210	.0493	.0333	.790	.320	.0608	.0476	.680
.156	.0404	.0253	.844	.212	.0496	.0336	.788	.324	.0611	.0481	.676
.157	.0406	.0254	.843	.214	.0499	.0339	.786	.328	.0613	.0486	.672
.158	.0407	.0256	.842	.216	.0502	.0342	.784	.332	.0615	.0490	.668
.159	.0409	.0258	.841	.218	.0505	.0345	.782	.336	.0618	.0495	.664
.160	.0411	.0259	.840	.220	.0508	.0347	.780	.340	.0620	.0499	.660
.161	.0413	.0261	.839	.222	.0510	.0350	.778	.344	.0622	.0503	.656
.162	.0415	.0262	.838	.224	.0513	.0353	.776	.348	.0624	.0508	.652
.163	.0417	.0264	.837	.226	.0516	.0356	.774	.352	.0626	.0512	.648
.164	.0419	.0265	.836	.228	.0519	.0359	.772	.356	.0627	.0516	.644
.165	.0420	.0267	.835	.230	.0521	.0362	.770	.360	.0629	.0520	.640
.166	.0422	.0268	.834	.232	.0524	.0364	.768	.364	.0631	.0524	.636
.167	.0424	.0270	.833	.234	.0526	.0367	.766	.368	.0632	.0528	.632
.168	.0426	.0271	.832	.236	.0529	.0370	.764	.372	.0633	.0532	.628
.169	.0428	.0273	.831	.238	.0531	.0373	.762	.376	.0634	.0536	.624
.170	.0429	.0274	.830	.240	.0534	.0376	.760	.380	.0636	.0540	.620
.171	.0431	.0276	.829	.242	.0536	.0378	.758	.384	.0637	.0544	.616
.172	.0433	.0277	.828	.244	.0539	.0381	.756	.388	.0638	.0547	.612
.173	.0435	.0279	.827	.246	.0541	.0384	.754	.392	.0638	.0551	.608
.174	.0437	.0280	.826	.248	.0543	.0387	.752	.396	.0639	.0555	.604
.175	.0438	.0282	.825	.250	.0546	.0389	.750	.400	.0640	.0558	.600
.176	.0440	.0283	.824	.252	.0548	.0392	.748	.404	.0640	.0562	.596
.177	.0442	.0285	.823	.254	.0550	.0395	.746	.408	.0641	.0565	.592
.178	.0443	.0287	.822	.256	.0553	.0397	.744	.412	.0641	.0568	.588
.179	.0445	.0288	.821	.258	.0555	.0400	.742	.416	.0641	.0572	.584
.180	.0447	.0290	.820	.260	.0557	.0403	.740	.420	.0641	.0575	.580
.181	.0449	.0291	.819	.262	.0559	.0405	.738	.424	.0641	.0578	.576
.182	.0450	.0293	.818	.264	.0561	.0408	.736	.428	.0641	.0581	.572
.183	.0452	.0294	.817	.266	.0563	.0411	.734	.432	.0641	.0584	.568
.184	.0454	.0296	.816	.268	.0565	.0413	.732	.436	.0641	.0587	.564
.185	.0455	.0297	.815	.270	.0567	.0416	.730	.440	.0641	.0590	.560
.186	.0457	.0299	.814	.272	.0569	.0418	.728	.444	.0640	.0593	.556
.187	.0459	.0300	.813	.274	.0571	.0421	.726	.448	.0640	.0595	.552
.188	.0460	.0302	.812	.276	.0573	.0424	.724	.452	.0639	.0598	.548
.189	.0462	.0303	.811	.278	.0575	.0426	.722	.456	.0639	.0601	.544
.190	.0463	.0304	.810	.280	.0577	.0429	.720	.460	.0638	.0603	.540
.191	.0465	.0306	.809	.282	.0579	.0431	.718	.464	.0637	.0606	.536
.192	.0467	.0307	.808	.284	.0581	.0434	.716	.468	.0636	.0608	.532
.193	.0468	.0309	.807	.286	.0582	.0436	.714	.472	.0635	.0610	.528
.194	.0470	.0310	.806	.288	.0584	.0439	.712	.476	.0634	.0613	.524
.195	.0471	.0312	.805	.290	.0586	.0441	.710	.480	.0633	.0615	.520
.196	.0473	.0313	.804	.292	.0588	.0444	.708	.484	.0632	.0617	.516
.197	.0475	.0315	.803	.294	.0589	.0446	.706	.488	.0630	.0619	.512
.198	.0476	.0316	.802	.296	.0591	.0449	.704	.492	.0629	.0621	.508
.199	.0478	.0318	.801	.298	.0593	.0451	.702	.496	.0627	.0622	.504
0.200	0.0479	0.0319	0.800	0.300	0.0594	0.0454	0.700	0.500	0.0626	0.0624	0.500
	E_1''	E_0''	*n*		E_1''	E_0''	*n*		E_1''	E_0''	*n*

N. B. -- The table is to be used like a critical table without interpolation

TABLE - IX

JULIAN DAY NUMBER

DAYS ELAPSED AT GREENWICH NOON OF JANUARY 0

Yr. A.D.	100	200	300	400	500	600	700	800	900	1000
0	175 7582	179 4107	183 0632	186 7157	190 3682	194 0207	197 6732	201 3257	204 9782	208 6307
20	176 4887	180 1412	183 7937	187 4462	191 0987	194 7512	198 4037	202 0562	205 7087	209 3612
40	177 2192	180 8717	184 5242	188 1767	191 8292	195 4817	199 1342	202 7867	206 4392	210 0917
60	177 9497	181 6022	185 2547	188 9072	192 5597	196 2122	199 8647	203 5172	207 1697	210 8222
80	178 6802	182 3327	185 9852	189 6377	193 2902	196 9427	200 5952	204 2477	207 9002	211 5527

Yr. A.D.	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000
							*	*	*	
0	212 2832	215 9357	219 5882	223 2407	226 8932	230 5447	234 1971	237 8495	241 5020	245 1544
20	213 0137	216 6662	220 3187	223 9712	227 6237	231 2752	234 9276	238 5806	242 2324	245 8849
40	213 7442	217 3967	221 0492	224 7017	228 3542	232 0057	235 6581	239 3105	242 9629	246 6154
60	214 4747	218 1272	221 7797	225 4322	229 0847	232 7362	236 3886	240 0410	243 6934	247 3459
80	215 2052	218 8577	222 5102	226 1627	229 8152	233 4667	237 1191	240 7715	244 4239	248 0764
					†					
100	215 9357	219 5882	223 2407	226 8932	230 5447	234 1971	237 8495	241 5020	245 1544	248 8069

NUMBER OF DAYS TO BE ADDED TO REDUCE TO THE BEGINNING OF EACH MONTH

Year	Jan. 0	Feb. 0	Mar. 0	Apr. 0	May 0	Jun. 0	July 0	Aug. 0	Sept. 0	Oct. 0	Nov. 0	Dec. 0
	*	*										
0	0	31	60	91	121	152	182	213	244	274	305	335
1	366	397	425	456	486	517	547	578	609	639	670	700
2	731	762	790	821	851	882	912	943	974	1004	1035	1065
3	1096	1127	1155	1186	1216	1247	1277	1308	1339	1369	1400	1430
4	1461	1492	1521	1552	1582	1613	1643	1674	1705	1735	1766	1796
5	1827	1858	1886	1917	1947	1978	2008	2039	2070	2100	2131	2161
6	2192	2223	2251	2282	2312	2343	2373	2404	2435	2465	2496	2526
7	2557	2588	2616	2647	2677	2708	2738	2769	2800	2830	2861	2891
8	2922	2953	2982	3013	3043	3074	3104	3135	3166	3196	3227	3257
9	3288	3319	3347	3378	3408	3439	3469	3500	3531	3561	3592	3622
10	3353	3684	3712	3743	3773	3804	3834	3865	3896	3926	3957	3987
11	4018	4049	4077	4108	4138	4169	4199	4230	4261	4291	4322	4352
12	4383	4414	4443	4474	4504	4535	4565	4596	4627	4657	4688	4718
13	4749	4780	4808	4839	4869	4900	4930	4961	4992	5022	5053	5083
14	5114	5145	5173	5204	5234	5265	5295	5326	5357	5387	5418	5448
15	5479	5510	5538	5569	5599	5630	5660	5691	5722	5752	5783	5813
16	5844	5875	5904	5935	5965	5996	6026	6057	6088	6118	6149	6179
17	6210	6241	6269	6300	6330	6361	6391	6422	6453	6483	6514	6544
18	6575	6606	6634	6665	6695	6726	6756	6787	6818	6848	6879	6909
19	6940	6971	6999	7030	7060	7091	7121	7152	7183	7213	7244	7274

† From 1582 October 15 to 1599 December 31 inclusive, Gregorian calendar, the numbers given by the above tables must be diminished by 10.

* The numbers given for the years 1700, 1800 and 1900 which are not leap years, are for January - 1 and consequently the numbers 0 and 31 for January 0 and February 0 of these years must be increased by 1 and read as 1 and 32 respectively.

N.B. To find the Julian Day Number for a B.C. date, first express the year astronomically, i.e. diminish it by 1 and put a negative sign before it. Then make the number positive by adding the smallest multiple of 1000. The Julian Day Number for the date thus obtained diminished by 365250 for each multiple of 1000 added will give the required Julian Day Number for the B.C. date in question.

The Julian Day is completed at noon. In order to obtain the Julian Day Number for 0^h U.T., diminish the figure obtained from the above tables by 0.5.

The tables give the Day Numbers upto 1582, Oct. 4 for the Julian calendar and from 1582, Oct. 15 onward for the Gregorian calendar.

TABLE – X
ATMOSPHERIC REFRACTION
MEAN REFRACTION FOR TEMPERATURE 25° C AND PRESSURE 1000 mb

Apparent Altitude	Mean Refraction	Apparent Altitude	Mean Refraction	Apparent Altitude	Mean Refraction	Apparent Altitude	Mean Refraction
° ′	′ ″	° ′	′ ″	° ′	′ ″	°	′ ″
-1 00	46 17.5	6 10	7 39.0	17 30	2 49.6	53	0 40.8
0 00	30 59.6	20	7 28.5	18 00	2 44.7	54	39.3
+0 10	29 09.3	30	7 18.5	18 30	2 40.0	55	37.9
20	27 28.9	40	7 08.9	19 00	2 35.6	56	36.5
30	25 57.8	6 50	6 59.7	19 30	2 31.4	57	35.1
0 40	24 34.6	7 00	6 50.8	20 00	2 27.3	58	33.8
0 50	23 18.3	7 10	6 42.3	21 00	2 19.8	59	0 32.6
1 00	22 07.9	20	6 34.1	22 00	2 12.9	60	31.2
10	21 02.6	30	6 26.3	23 00	2 06.6	61	30.0
20	20 02.4	40	6 18.7	24 00	2 00.8	62	28.8
30	19 07.0	7 50	6 11.4	25 00	1 55.4	63	27.6
1 40	18 15.6	8 00	6 04.4	26 00	1 50.4	64	26.4
1 50	17 28.2	8 10	5 57.6	27 00	1 45.7	65	0 25.2
2 00	16 44.0	20	5 51.2	28 00	1 41.3	66	24.1
10	16 02.6	30	5 44.7	29 00	1 37.2	67	23.0
20	15 24.0	40	5 38.6	30 00	1 33.4	68	21.9
30	14 48.0	8 50	5 32.6	31 00	1 29.8	69	20.8
2 40	14 14.4	9 00	5 26.8	32 00	1 26.3	70	19.7
2 50	13 42.9	9 10	5 21.3	33 00	1 23.1	71	0 18.6
3 00	13 13.5	20	5 15.9	34 00	1 20.0	72	17.6
10	12 45.8	30	5 10.6	35 00	1 17.1	73	16.5
20	12 19.6	40	5 05.5	36 00	1 14.3	74	15.5
30	11 55.0	9 50	5 00.6	37 00	1 11.7	75	14.5
3 40	11 31.9	10 00	4 55.9	38 00	1 09.1	76	13.5
3 50	11 10.0	10 30	4 42.4	39 00	1 06.8	77	0 12.5
4 00	10 49.5	11 00	4 30.0	40 00	1 04.4	78	11.5
10	10 30.1	11 30	4 18.7	41 00	1 02.2	79	10.5
20	10 11.7	12 00	4 08.1	42 00	1 00.0	80	09.5
30	9 54.2	12 30	3 58.4	43 00	0 57.9	81	08.6
4 40	9 37.5	13 00	3 49.3	44 00	0 56.0	82	07.6
4 50	9 21.6	13 30	3 40.8	45 00	0 54.1	83	0 06.6
5 00	9 06.5	14 00	3 32.9	46 00	0 52.2	84	05.7
10	8 52.1	14 30	3 25.6	47 00	0 50.4	85	04.7
20	8 38.6	15 00	3 18.6	48 00	0 48.7	86	03.8
30	8 25.5	15 30	3 12.1	49 00	0 47.0	87	02.8
5 40	8 13.0	16 00	3 06.0	50 00	0 45.4	88	01.9
5 50	8 01.2	16 30	3 00.2	51 00	0 43.8	89	0 00.9
6 00	7 49.8	17 00	2 54.8	52 00	0 42.2	90	0 00.0
6 10	7 39.0	17 30	2 49.6	53 00	0 40.8		

Rule: True altitude of a celestial object = Its apparent or observed altitude - refraction.

N.B.-The figures of mean refraction given in the above table are for temperature 25° C and pressure 1000 mb. (750.06 mm. Or 29.530 inches of mercury barometer). For other values of temperature and pressure, corrections form the tables on the following two pages are to be taken and applied to the mean refraction.

TABLE - Xa
ATMOSPHERIC REFRACTION
CORRECTION OF MEAN REFRACTION FOR DIFFERENT VALUES OF TEMPERATURE

Apparent Altitude	- 10° C (14° F)	0° C (32° F)	10° C (50° F)	20° C (68° F)	25° C (77° F)	30° C (86° F)	40° C (104° F)	50° C (122° F)
° ′	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″
- 1 00	+ 13 31.7	+ 9 17.8	+ 5 13.4	+ 1 37.7	0 00.0	- 1 32.6	- 4 22.5	- 6 54.8
0 00	7 16.3	5 04.8	2 53.4	0 54.8	0 00.0	0 52.1	2 29.6	3 58.2
+ 0 30	5 39.4	3 57.4	2 15.6	0 42.8	0 00.0	0 41.2	1 58.4	3 09.1
1 00	4 27.7	3 07.8	1 47.8	0 34.7	0 00.0	0 32.1	1 33.8	2 30.7
1 30	3 38.4	2 33.1	1 27.9	0 27.8	0 00.0	0 27.1	1 18.1	2 05.2
2 00	3 00.9	2 07.0	1 13.1	0 23.4	0 00.0	0 22.4	1 05.0	1 44.5
2 30	+ 2 32.9	+ 1 48.1	+ 1 02.1	+ 0 19.6	0 00.0	- 0 19.5	- 0 56.0	- 1 29.9
3 00	2 12.7	1 33.2	0 53.8	0 17.2	0 00.0	0 16.7	0 48.2	1 17.5
3 30	1 56.6	1 21.9	0 47.3	0 15.1	0 00.0	0 14.6	0 42.4	1 08.3
4 00	1 43.2	1 12.5	0 42.0	0 13.5	0 00.0	0 12.9	0 37.6	1 00.6
4 30	1 32.5	1 05.0	0 37.9	0 12.0	0 00.0	0 11.7	0 33.9	0 54.5
5 00	1 23.7	0 58.9	0 35.0	0 10.9	0 00.0	0 10.6	0 30.7	0 49.5
6 00	+ 1 10.2	+ 0 49.4	+ 0 30.0	+ 0 09.1	0 00.0	- 0 09.0	- 0 25.8	- 0 41.5
7 00	1 00.3	0 42.5	0 25.6	0 07.9	0 00.0	0 07.6	0 22.1	0 35.7
8 00	0 52.7	0 37.1	0 21.4	0 06.9	0 00.0	0 06.6	0 19.4	0 31.3
9 00	0 46.8	0 32.9	0 19.1	0 06.1	0 00.0	0 05.9	0 17.2	0 27.8
10 00	0 43.0	0 29.6	0 17.1	0 05.4	0 00.0	0 05.3	0 15.5	0 25.0
11 00	0 39.4	0 26.9	0 15.6	0 05.0	0 00.0	0 04.8	0 14.1	0 22.8
12 00	+ 0 35.7	+ 0 24.3	+ 0 14.2	+ 0 04.6	0 00.0	- 0 04.4	- 0 12.8	- 0 20.7
13 00	0 33.1	0 22.6	0 13.2	0 04.2	0 00.0	0 04.0	0 11.9	0 19.2
14 00	0 30.4	0 21.0	0 12.1	0 03.9	0 00.0	0 03.7	0 11.0	0 17.7
15 00	0 28.4	0 19.6	0 11.3	0 03.6	0 00.0	0 03.5	0 10.2	0 16.5
16 00	0 26.4	0 18.2	0 10.3	0 03.4	0 00.0	0 03.3	0 09.5	0 15.4
17 00	0 24.8	0 17.2	0 09.9	0 03.2	0 00.0	0 03.1	0 08.9	0 14.4
18 00	+ 0 23.3	+ 0 16.2	+ 0 09.3	+ 0 03.0	0 00.0	- 0 02.9	- 0 08.4	- 0 13.5
19 00	0 22.1	0 15.2	0 08.8	0 02.7	0 00.0	0 02.7	0 07.9	0 12.8
20 00	0 20.9	0 14.3	0 08.3	0 02.5	0 00.0	0 02.6	0 07.5	0 12.1
25 00	0 16.3	0 11.2	0 06.5	0 02.1	0 00.0	0 02.0	0 05.9	0 09.4
30 00	0 13.1	0 09.0	0 05.2	0 01.7	0 00.0	0 01.6	0 04.7	0 07.6
35 00	0 10.8	0 07.4	0 04.3	0 01.4	0 00.0	0 01.3	0 03.9	0 06.3
40 00	+ 0 09.0	+ 0 06.2	+ 0 03.6	+ 0 01.2	0 00.0	- 0 01.1	- 0 03.2	- 0 05.2
45 00	0 07.5	0 05.2	0 03.0	0 01.0	0 00.0	0 00.9	0 02.7	0 04.4
50 00	0 06.0	0 04.4	0 02.5	0 00.8	0 00.0	0 00.8	0 02.3	0 03.7
55 00	0 05.3	0 03.6	0 02.1	0 00.7	0 00.0	0 00.7	0 02.0	0 03.1
60 00	0 04.4	0 03.0	0 01.8	0 00.6	0 00.0	0 00.6	0 01.6	0 02.5
65 00	0 03.6	0 02.4	0 01.4	0 00.5	0 00.0	0 00.5	0 01.3	0 02.1
70 00	+ 0 02.8	+ 0 01.9	+ 0 01.1	+ 0 00.4	0 00.0	- 0 00.4	- 0 01.0	- 0 01.6
75 00	0 02.0	0 01.4	0 00.8	0 00.3	0 00.0	0 00.3	0 00.7	0 01.2
80 00	0 01.4	0 00.9	0 00.5	0 00.2	0 00.0	0 00.2	0 00.4	0 00.8
85 00	0 00.7	0 00.4	0 00.2	0 00.1	0 00.0	0 00.1	0 00.2	0 00.4
90 00	+ 0 00.0	+ 0 00.0	+ 0 00.0	+ 0 00.0	0 00.0	- 0 00.0	- 0 00.0	- 0 00.0

TABLE - Xb
ATMOSPHERIC REFRACTION
PRESSURE CORRECTION OF REFRACTION FOR DIFFERENT VALUES OF PRESSURE

PRESSURE			AMOUNT OF REFRACTION CORRECTED FOR PRESSURE							
			1′	2′	3′	5′	10′	20′	30′	60′
mb	mm	Inch	″	″	″	′ ″	′ ″	′ ″	′ ″	′ ″
660	495.0	19.49	- 20.4	- 40.8	- 61.3	- 1 42.3	- 3 26.5	- 7 04.9	- 10 59.1	- 24 19
670	502.5	19.79	19.8	39.7	59.5	1 39.3	3 20.4	6 52.5	10 39.8	23 36
680	510.0	20.08	19.2	38.4	57.7	1 36.3	3 14.3	6 39.8	10 20.2	22 53
690	517.5	20.38	18.6	37.2	55.9	1 33.3	3 08.2	6 27.4	10 00.9	22 10
700	525.0	20.67	18.0	36.0	54.1	1 30.3	3 02.2	6 14.9	9 41.5	21 27
710	532.5	20.97	17.4	34.8	52.3	1 27.3	2 56.1	6 02.5	9 22.2	20 45
720	540.0	21.26	- 16.8	- 33.5	- 50.6	- 1 24.3	- 2 50.0	- 5 50.0	- 9 02.8	- 20 01
730	547.5	21.56	16.2	32.4	48.7	1 21.2	2 43.9	5 37.4	8 43.3	19 18
740	555.0	21.85	15.6	31.2	46.9	1 18.2	2 37.8	5 24.9	8 23.9	18 35
750	562.6	22.15	15.0	30.0	45.1	1 15.2	2 31.8	5 12.4	8 04.6	17 53
760	570.1	22.44	14.4	28.9	43.3	1 12.3	2 25.8	5 00.2	7 45.6	17 21
770	577.6	22.74	13.8	27.6	41.5	1 09.2	2 19.7	4 47.5	7 25.9	16 27
780	585.1	23.03	- 13.2	- 26.4	- 39.7	- 1 06.2	- 2 13.6	- 4 35.0	- 7 06.5	- 15 44
790	592.6	23.33	12.6	25.2	37.9	1 03.2	2 07.6	4 22.5	6 47.2	15 01
800	600.1	23.62	12.0	24.0	36.0	1 00.2	2 01.4	4 09.9	6 27.6	14 18
810	607.6	23.92	11.4	22.8	34.3	0 57.2	1 55.4	3 57.5	6 08.3	13 35
820	615.1	24.22	10.8	21.6	32.4	0 54.2	1 49.3	3 44.9	5 48.9	12 52
830	622.6	24.51	10.2	20.4	30.7	0 51.2	1 43.3	3 32.5	5 29.6	12 10
840	630.1	24.81	- 9.6	- 19.2	- 28.9	- 0 48.2	- 1 37.2	- 3 20.0	- 5 10.2	- 11 27
850	637.6	25.10	9.0	18.0	27.0	0 45.1	1 31.1	3 07.4	4 50.7	10 43
860	645.1	25.40	8.4	16.8	25.2	0 42.1	1 25.0	2 54.9	4 31.3	10 01
870	652.6	25.69	7.8	15.6	23.4	0 39.1	1 19.0	2 42.5	4 12.0	9 18
880	660.1	25.99	7.2	14.4	21.6	0 36.1	1 12.9	2 30.0	3 52.6	8 35
890	667.6	26.28	6.6	13.2	19.8	0 33.1	1 06.8	2 17.5	3 33.3	7 52
900	675.1	26.58	- 6.0	- 12.0	- 18.0	- 0 30.1	- 1 00.7	- 2 04.9	- 3 13.7	- 7 09
910	682.6	26.87	5.4	10.8	16.2	0 27.1	0 54.7	1 52.5	2 54.3	6 26
920	690.1	27.17	4.8	9.6	14.4	0 24.1	0 48.6	1 39.9	2 35.0	5 43
930	697.6	27.46	4.2	8.4	12.6	0 21.1	0 42.5	1 27.5	2 15.7	5 01
940	705.1	27.76	3.6	7.2	10.8	0 18.1	0 36.4	1 15.0	1 50.3	4 17
950	712.6	28.05	3.0	6.0	9.0	0 15.0	0 30.3	1 02.4	1 36.9	3 34
960	720.1	28.35	- 2.4	- 4.8	- 7.2	- 0 12.0	- 0 24.3	- 0 49.9	- 1 17.4	- 2 51
970	727.6	28.64	1.8	3.6	5.4	0 09.0	0 18.2	0 37.5	0 58.2	2 09
980	735.1	28.94	1.2	2.4	3.6	0 06.0	0 12.1	0 25.0	0 38.7	1 26
990	742.6	29.24	- 0.6	- 1.2	- 1.8	- 0 03.0	- 0 06.1	- 0 12.5	- 0 19.4	- 0 43
1000	750.1	29.53	0.0	0.0	0.0	0 00.0	0 00.0	0 00.0	0 00.0	0 00
1010	757.6	29.83	+ 0.6	+ 1.2	+ 1.8	+ 0 03.1	+ 0 06.1	+ 0 12.5	+ 0 19.5	+ 0 43
1020	765.1	30.12	1.2	2.4	3.6	0 06.0	0 12.2	0 25.1	0 38.9	1 26
1030	772.6	30.42	1.8	3.6	5.4	0 09.0	0 18.2	0 37.5	0 58.2	2 09
1040	780.1	30.71	2.4	4.8	7.2	0 12.0	0 24.3	0 50.0	0 77.6	2 52
1050	787.6	31.01	+ 3.0	+ 6.0	+ 9.0	+ 0 15.0	+ 0 30.3	+ 0 62.4	+ 0 96.9	+ 3 24

TABLE - XI
FACTORS FOR COMPUTING THE GEOCENTRIC COORDINATES OF A PLACE

ϕ	S	C	ϕ	S	C
°			°		
0	0.993306	1.000000	45	0.994972	1.001678
1	0.993307	1.000001	46	0.995031	1.001737
2	0.993310	1.000004	47	0.995089	1.001795
3	0.993315	1.000009	48	0.995147	1.001854
4	0.993322	1.000016	49	0.995205	1.001912
5	0.993331	1.000025	50	0.995262	1.001970
6	0.993342	1.000037	51	0.995320	1.002028
7	0.993355	1.000050	52	0.995377	1.002085
8	0.993370	1.000065	53	0.995433	1.002142
9	0.993387	1.000082	54	0.995489	1.002198
10	0.993406	1.000101	55	0.995544	1.002254
11	0.993427	1.000122	56	0.995599	1.002309
12	0.993449	1.000145	57	0.995652	1.002363
13	0.993474	1.000169	58	0.995705	1.002416
14	0.993500	1.000196	59	0.995758	1.002468
15	0.993528	1.000224	60	0.995809	1.002520
16	0.993558	1.000254	61	0.995859	1.002570
17	0.993590	1.000286	62	0.995908	1.002620
18	0.993623	1.000320	63	0.995956	1.002668
19	0.993658	1.000355	64	0.996002	1.002715
20	0.993695	1.000392	65	0.996048	1.002761
21	0.993733	1.000430	66	0.996092	1.002805
22	0.993773	1.000470	67	0.996135	1.002848
23	0.993814	1.000511	68	0.996176	1.002890
24	0.993856	1.000554	69	0.996216	1.002930
25	0.993900	1.000598	70	0.996255	1.002969
26	0.993945	1.000644	71	0.996291	1.003006
27	0.993992	1.000691	72	0.996327	1.003041
28	0.994039	1.000739	73	0.996360	1.003075
29	0.994088	1.000788	74	0.996392	1.003107
30	0.994138	1.000838	75	0.996422	1.003138
31	0.994189	1.000889	76	0.996451	1.003166
32	0.994241	1.000941	77	0.996477	1.003193
33	0.994293	1.000994	78	0.996502	1.003218
34	0.994347	1.001048	79	0.996525	1.003241
35	0.994401	1.001103	80	0.996546	1.003262
36	0.994456	1.001158	81	0.996565	1.003281
37	0.994512	1.001214	82	0.996582	1.003299
38	0.994568	1.001271	83	0.996597	1.003314
39	0.994625	1.001328	84	0.996610	1.003327
40	0.994682	1.001386	85	0.996622	1.003338
41	0.994740	1.001444	86	0.996631	1.003348
42	0.994798	1.001502	87	0.996638	1.003355
43	0.994856	1.001560	88	0.996643	1.003360
44	0.994914	1.001619	89	0.996646	1.003363
45	0.994972	1.001678	90	0.996647	1.003364

$\rho \sin \phi' = (S+H) \sin \phi$ $\qquad$ $\rho \cos \phi' = (C+H) \cos \phi$

$H = 0.156779 \times$ elevation in meters $\times 10^{-6}$ $\qquad$ $H = 0.047786 \times$ elevation in feet $\times 10^{-6}$

TABLE - XII
CONVERSION OF GEOGRAPHIC TO GEOCENTRIC COORDINATES

φ	φ′ - φ	ρ	ONE DEGREE OF		φ	φ′ - φ	ρ	ONE DEGREE OF	
			Latitude	Longitude				Latitude	Longitude
°	′ ″		Kilometers	Kilometers	°	′ ″		Kilometers	Kilometers
0	0 00.0	1.000000	110.57	111.32	45	- 11 32.7	0.998331	111.13	78.85
1	- 0 24.1	0.999999	110.58	111.30	46	11 32.4	0.998272	111.15	77.46
2	0 48.2	0.999996	110.58	111.25	47	11 31.2	0.998214	111.17	76.06
3	1 12.2	0.999991	110.58	111.17	48	11 29.2	0.998155	111.19	74.63
4	1 36.1	0.999984	110.58	111.05	49	11 26.3	0.998097	111.21	73.17
5	1 59.9	0.999975	110.58	110.90	50	11 22.6	0.998039	111.23	71.70
6	2 23.6	0.999964	110.59	110.71	51	11 18.1	0.997982	111.25	70.20
7	2 47.0	0.999951	110.59	110.50	52	11 12.7	0.997925	111.27	68.68
8	3 10.3	0.999936	110.60	110.24	53	11 06.5	0.997868	111.29	67.14
9	3 33.4	0.999919	110.60	109.96	54	10 59.5	0.997812	111.31	65.58
10	- 3 56.2	0.999900	110.61	109.64	55	- 10 51.7	0.997756	111.32	63.99
11	4 18.7	0.999879	110.62	109.29	56	10 43.1	0.997702	111.34	62.39
12	4 40.9	0.999856	110.62	108.90	57	10 33.7	0.997648	111.36	60.77
13	5 02.8	0.999832	110.63	108.49	58	10 23.5	0.997594	111.38	59.13
14	5 24.3	0.999805	110.64	108.03	59	10 12.6	0.997542	111.40	57.48
15	5 45.4	0.999777	110.65	107.55	60	10 00.9	0.997491	111.41	55.80
16	6 06.0	0.999747	110.66	107.03	61	9 48.5	0.997440	111.43	54.11
17	6 26.3	0.999716	110.67	106.49	62	9 35.4	0.997391	111.45	52.40
18	6 46.1	0.999682	110.68	105.91	63	9 21.5	0.997343	111.46	50.67
19	7 05.4	0.999647	110.69	105.29	64	9 07.0	0.997296	111.48	48.93
20	- 7 24.1	0.999611	110.70	104.65	65	- 8 51.8	0.997250	111.49	47.18
21	7 42.4	0.999573	110.72	103.97	66	8 36.0	0.997206	111.51	45.40
22	8 00.0	0.999533	110.73	103.26	67	8 19.5	0.997163	111.52	43.62
23	8 17.1	0.999492	110.74	102.52	68	8 02.4	0.997121	111.54	41.82
24	8 33.6	0.999449	110.76	101.75	69	7 44.7	0.997081	111.55	40.01
25	8 49.5	0.999405	110.77	100.95	70	7 26.4	0.997042	111.56	38.19
26	9 04.7	0.999360	110.79	100.12	71	7 07.6	0.997005	111.57	36.35
27	9 19.3	0.999314	110.80	99.26	72	6 48.3	0.996970	111.59	34.50
28	9 33.2	0.999266	110.82	98.36	73	6 28.4	0.996936	111.60	32.65
29	9 46.4	0.999217	110.84	97.44	74	6 08.1	0.996904	111.61	30.78
30	- 9 58.9	0.999167	110.85	96.49	75	- 5 47.4	0.996874	111.61	28.90
31	10 10.7	0.999116	110.87	95.50	76	5 26.2	0.996845	111.62	27.02
32	10 21.7	0.999064	110.89	94.49	77	5 04.6	0.996818	111.63	25.12
33	10 32.0	0.999011	110.90	93.45	78	4 42.6	0.996793	111.64	23.22
34	10 41.5	0.998958	110.92	92.39	79	4 20.3	0.996770	111.65	21.31
35	10 50.2	0.998903	110.94	91.29	80	3 57.7	0.996749	111.66	19.39
36	10 58.1	0.998848	110.96	90 16	81	3 34.7	0.996730	111.67	17.47
37	11 05.3	0.998792	110.98	89.01	82	3 11.6	0.996713	111.67	15.54
38	11 11.6	0.998736	111.00	87.83	83	2 48.1	0.996697	111.68	13.61
39	11 17.1	0.998679	111.02	86.63	84	2 24.5	0.996684	111.68	11.67
40	-11 21.8	0.998622	111.03	85.39	85	- 2 00.7	0.996673	111.69	9.73
41	11 25.7	0.998564	111.05	84.14	86	1 36.7	0.996664	111.69	7.79
42	11 28.7	0.998506	111.07	82.85	87	1 12.7	0.996656	111.69	5.85
43	11 30.9	0.998447	111.09	81.54	88	0 48.5	0.996651	111.69	3.90
44	11 32.2	0.998389	111.11	80.21	89	- 0 24.3	0.996648	111.69	1.95
45	-11 32.7	0.998331	111.13	78.85	90	0 00.0	0.996647	111.69	0.00

φ and φ′ are the geographic and geocentric latitude respectively
ρ = radius of the earth.
1 kilometre = 0.621372 miles.

LATITUDE AND LONGITUDE OF PLACES

Place	Altitude (Metre)	Latitude	Longitude		Reduction of Greenwich Sid. Time	Reduction of L.M.T. to Indian Standard Time	ρ sin φ′	ρ cos φ′
			In arc	In time				
		° ′	° ′	h m s	s	m s		
Agartala	16	+23 31.8	+ 91 09.0	+6 04 36	+59.89	-34 36	+0.39677	0.91734
Agra	160	+27 05.6	+ 77 34.8	+5 10 19	+50.98	+19 51	+0.45272	0.89091
Ahmedabad	49	+23 03.0	+ 72 40.2	+4 50 41	+47.75	+39 19	+0.38912	0.92064
Aizawl	1097	+23 26.4	+ 92 43.2	+6 10 53	+60.93	-40 53	+0.39540	0.91812
Ajmer	486	+26 16.2	+ 74 22.2	+4 57 29	+48.87	+32 31	+0.43996	0.89738
Alibag (Obs.) Mumbai,	7	+19 00.0	+ 72 30.6	+4 50 02	+47.65	+39 58	+0.33350	0.94586
Aligarh	187	+27 31.8	+ 78 2.44	+5 12 10	+51.28	+17 47	+0.45946	0.88743
Allahabad	96	+25 16.2	+ 81 26.4	+5 25 46	+53.51	+04 14	+0.42429	0.90487
Amritsar	231	+31 22.8	+ 74 31.2	+4 58 05	+48.97	+31 55	+0.51771	0.85454
Bangalore	921	+12 34.8	+ 77 21.0	+5 09 24	+50.83	+20 36	+0.21641	0.97629
Bangkok, Thailand	16	+13 25.0	+100 18.0	+6 41 12	+65.91	- 71 12	+0.23052	0.97289
Baroda	35	+22 12.0	+ 73 9.6	+4 52 38	+48.07	+37 22	+0.37549	0.92632
Bhopal	506	+23 10.2	+ 77 12.6	+5 08 50	+50.73	+21 10	+0.39106	0.91989
Bhuj	105	+23 09.0	+ 69 24.0	+4 37 36	+45.60	+52 24	+0.39072	0.91997
Bhubaneswar	46	+20 00.0	+ 85 30.0	+5 42 00	+56.18	- 12 00	+0.33987	0.94007
Bikaner	224	+28 01.0	+ 73 10.8	+4 52 43	+48.09	+37 17	+0.46695	0.88349
Bilaspur,(H.P)	502	+31 11.4	+ 76 30.0	+5 06 00	+50.27	+24 00	+0.51491	0.85629
Buenos Aires (Naval Obs.), Argentina	6	-34 21.0	- 58 12.0	- 3 52 48	-38.24	.. ..	-0.56107	0.82649
Cairo	68	+30 01.0	+ 31 09.0	+2 04 36	+20.47	.. ..	+0.49733	0.86662
Canberra (Mount Stromlo), Australia	767	-35 10.2	+149 10.5	+9 56 42	+98.02	.. ..	-0.57285	0.81845
Cape Town (Ast. Obs.), S. Africa	18	-33 33.6	+ 18 15.0	+1 13 00	+11.99	.. ..	-0.54967	0.83416
Chandigarh	347	+30 25.2	+ 76 32.0	+5 06 08	+50.29	+23 52	+0.50340	0.86312
Chennai (or Madras) Obs.	7	+13 00.0	+ 80 06.6	+5 20 26	+52.64	+ 9 34	+0.22348	0.97454
Chittagong, Bangladesh	27	+22 12.6	+ 91 31.8	+6 06 07	+60.14	- 36 07	+0.37565	0.92625
Colaba Obs. Mumbai, (Bombay)	14	+19 04.2	+ 72 31.0	+4 50 04	+47.65	+39 56	+0.32465	0.94546
Colombo (Obs.), Srilanka	6	+ 6 33.6	+ 79 33.6	+5 18 14	+52.28	+11 46	+011348	0.99350
Cuttack	26	+20 16.8	+ 85 33.6	+5 42 14	+56.42	- 12 14	+0.34443	0.93839
Dacca,Bangladesh	7	+23 25.8	+ 90 15.6	+6 01 02	+59.31	- 31 02	+0.39518	0.91803
Darjeeling	2128	+27 02.0	+ 88 10.8	+5 52 43	+57.94	- 22 43	+0.45193	0.89166
Dehra Dun	682	+30 11.3	+ 78 01.2	+5 12 05	+51.27	+17 55	+0.49995	0.86520
Delhi	220	+28 21.0	+ 77 07.2	+5 08 29	+50.68	+21 31	+0.47205	0.88076
Dibrugarh	106	+27 17.4	+ 94 06.0	+6 16 24	+61.83	- 46 24	+0.45575	0.88734
Gangtok	1768	+27 12.0	+ 88 22.2	+5 53 29	+58.07	- 23 29	+0.45448	0.89029
Guwahati	55	+26 3.6.0	+ 91 21.0	+6 05 24	+60.03	- 35 24	+0.43666	0.89892
Gauribidanur (Radio Astr. Obs.)	686	+13 36.2	+ 77 26.1	+5 09 44	+50.88	+20 16	+0.23369	0.97223
Gaya	111	+24 27.0	+ 84 34.2	+5 38 17	+55.57	- 8 17	+0.41137	0.91086

1 metre = 3.2808 feet

LATITUDE AND LONGITUDE OF PLACES

Place	Altitude (Metre)	Latitude	Longitude		Reduction of Greenwich Sid. Time	Reduction of L.M.T. to Indian Standard Time	$\rho \sin \varphi'$	$\rho \cos \varphi'$
			In arc	In time				
		° ′	° ′	h m s	s	m s		
Geneva (Obs.), Switzerland	465	+46 07.8	+ 6 04.2	+0 24 17	+ 3.99	.. ..	+0.71739	0.69428
Greenwich (Royal Obs.).	47	+51 28.6	0 00	0 00 00.0	0.00	.. ..	+0.77872	0.62412
Hanle/ Mt.Saraswati (Indian Ast. Obs.)	4467	+32 46.8	+ 78 57.9	+5 15 51.6	+51.89	+14 8.4	+0.53870	0.84217
Haridwar	274	+29 34.8	+ 78 08.0	+5 12 32.0	+51.34	+ 17 28	+0.49076	0.87041
Heidelberg Obs., Germany	570	+49 14.0	+ 8 25.2	+0 33 41.0	+ 5.53	.. ..	+0.75382	0.65430
Helwan (Obs.), Egypt	116	+29 51.5	+ 31 22.8	+2 05 31.2	+20.62	.. ..	+0.49494	0.86800
Herstmonceux (Royal Obs.), Sussex, U.K.	31	+50 52.0	+ 0 20.3	+0 01 21.0	+ 0.22	.. ..	+0.77205	0.63241
Hyderabad (Nizamiah Obs.)	554	+17 25.9	+ 78 27.2	+5 13 49.0	+51.55	+ 16 11	+0.29768	0.95444
Imphal	801	+24 26.4	+ 93 34.8	+6 14 19.0	+61.49	- 44 19	+0.41126	0.91103
India, Central Station of	-	+23 11.0	+ 82 30.0	+5 30 00.0	+54.21	0 00	+0.39124	0.91973
Indore	556	+22 26.4	+ 75 30.0	+5 02 00.0	+49.61	+ 28 00	+0.37938	0.92481
Istambul (Univ. Obs.), Turkey	65	+41 00.7	+ 28 57.9	+1 55 51.6	+19.03	.. ..	+0.65277	0.75567
IUCAA Giravali Obs., Pune	1000	+18 19.2	+ 73 30.6	+4 54 02.0	+48.3	+35 58	+0.31237	0.94978
Jabalpur	393	+23 07.2	+ 79 34.2	+5 18 17.0	+52.29	+ 11 43	+0.39026	0.92022
Jaipur	436	+26 33.0	+ 75 31.2	+5 02 05.0	+49.62	+ 27 55	+0.44431	0.89520
Jakarta, Indonesia	23	- 6 07.2	+106 30.0	+7 06 00.0	+69.98	.. ..	-0.10590	0.99434
Jamshedpur	152	+22 29.4	+ 86 06.6	+5 44 26.0	+56.58	- 14 26	+0.38016	0.92442
Japal Rangapur (Obs.),	695	+17 05.9	+ 78 43.7	+5 14 55.0	+51.73	+ 15 05	+0.29216	0.95618
Jodhpur	224	+26 10.8	+ 73 00.6	+4 52 02.0	+47.97	+ 37 58	+0.43854	0.89803
Johannesberg, South Africa	1806	- 26 10.9	+ 28 04.5	+1 52 18.0	+18.45	.. ..	-0.43868	0.89824
Kabul, Afghanistan	1766	+34 18.0	+ 69 10.8	+4 36 43.0	+45.46	+ 53 17	+0.56051	0.82721
Kanchipuram	76	+12 30.0	+ 79 27.0	+5 17 48.0	+52.21	+ 12 12	+0.21503	0.97646
Kanpur	126	+26 15.6	+ 80 13.2	+5 20 53.0	+52.71	+ 9 07	+0.43978	0.89740
Karachi, Pakistan	4	+24 53.6	+ 67 02.4	+4 28 10.0	+44.05	+ 61 50	+0.41836	0.90763
Kathmandu, Nepal	1324	+27 23.2	+ 85 07.2	+5 40 29.0	+55.93	- 10 29	+0.45733	0.88874
Kavalur (Vainu Bappu Obs.),	725	+12 34.6	+ 78 49.6	+5 15 18.0	+51.80	+ 14 42	+0.21635	0.97627
Kodaikanal (Solar Obs.)	2343	+10 13.8	+ 77 28.1	+5 09 52.0	+50.90	+ 20 08	+0.17649	0.98457
Kohima	1405	+25 24.0	+ 94 04.8	+6 16 19.0	+61.82	- 46 19	+0.42642	0.90409
Kolkata (Alipore Obs.), (Calcutta)	6	+22 19.2	+ 88 12.0	+5 52 48.0	+57.96	- 22 48	+0.37742	0.92553
Kolkata (Presi. Coll. Obs.)	12	+22 23.4	+ 88 16.2	+5 53 05.0	+58.00	- 23 05	+0.37854	0.92506
Kurnool	281	+15 30.0	+ 78 03.0	+5 12 12.0	+51.29	+ 17 48	+0.26552	0.96390

1 metre = 3.2808 feet

LATITUDE AND LONGITUDE OF PLACES

Place	Altitude (Metre)	Latitude	Longitude		Reduction of Greenwich Sid. Time	Reduction of L.M.T. to Indian Standard Time	ρ sin φ′	ρ cos φ′
			In arc	In time				
		° ′	° ′	h m s	s	m s		
Kyoto (Univ. Ast. Dept. Obs.), Japan	86	+35 00.6	+135 20.4	+9 1 22.0	+88.93	.. ..	+0.57052	0.81997
Lahore, Pakistan	214	+31 22.2	+ 74 15.6	+4 57 02.0	+48.80	+ 32 58	+0.51756	0.85269
Lucknow	113	+26 31.2	+ 80 33.6	+5 22 14.0	+52.94	+ 7 46	+0.44383	0.89539
Maitri (Indian base station at Antarctica)	132	-70 46.0	+ 11 45.0	+0 47 00.0	+ 7.72	.. ..	-0.94069	0.33041
Mangalore	22	+12 33.0	+ 74 31.8	+4 58 07.0	+48.97	+ 31 53	+0.21587	0.97626
Moscow (Sternberg State Ast. Inst.), Russia	195	+55 27.0	+ 37 22.2	+2 29 29.0	+24.56	.. ..	+0.82001	0.56843
Mount Abu (Gurushikhar Obs.)	1700	+24 23.4	+ 72 25.8	+4 49 43.0	+47.59	+40 17	+0.41053	0.91152
Mount Palomar (Obs.), U.S.A.	1706	+33 21.4	-116 51.8	- 7 47 27.2	-76.79	.. ..	+054687	0.83633
Mount Wilson (Obs.), U.S.A.	1742	+34 13.0	-118 03.6	- 7 52 14.4	-77.58	.. ..	+0.55931	0.82802
Mysore	767	+12 10.8	+ 76 25.2	+5 05 41.0	+50.22	+ 24 19	+0.20963	0.97775
Nagpur	312	+21 05.4	+ 79 04.2	+5 16 17.0	+51.96	+ 13 43	+0.35760	0.93347
Nainital (Aryabhatta Res. Inst. Of Obs. Sci.)	1927	+29 13.8	+ 79 18.0	+5 17 12.0	+52.11	+ 12 48	+0. 48558	0.87363
New York (Rutherford Obs.), U.S.A.	25	+40 25.8	- 74 00.6	- 4 56 02.0	-48.63	.. ..	+0.64509	0.76228
Ottawa, Canada	87	+45 16.2	- 75 22.2	- 5 01 29.0	-49.53	.. ..	+0.70688	0.70497
Panaji	56	+15 18.0	+ 73 33.0	+4 54 12.0	+48.33	+ 35 48	+0.26217	0.96479
Paris (Obs.), France	67	+48 30.0	+ 2 12.0	+0 08 49.0	+ 1.45	.. ..	+0.74535	0.66387
Patiala	251	+30 12.0	+ 76 15.0	+5 05 00.0	+50.10	+ 25 00	+0.50010	0.86504
Patna	53	+25 21.6	+ 85 03.6	+5 40 14.0	+55.89	- 10 14	+0.42570	0.90420
Peshawar, Pakistan	358	+34 01.0	+ 71 34.0	+4 46 15.0	+47.03	+ 43 45	+0.55630	0.82979
Pondicherry	6	+11 34.8	+ 79 29.4	+5 17 58.0	+52.23	+ 12 02	+0. 19942	0.97978
Pune	559	+18 19.0	+ 73 30.0	+4 54 00.0	+48 .30	+ 36 00	+0.31230	0.94973
Porbandar	7	+21 22.2	+ 69 29.4	+4 37 58.0	+45.66	+ 52 02	+0.36211	0.93166
Port Blair	79	+11 24.0	+ 92 25.8	+6 09 43.0	+60.74	- 39 43	+0.19636	0.98041
Puri	6	+19 28.8	+ 85 29.4	+5 41 58.0	+56.18	- 11 58	+0.33137	0.94311
Quetta, Pakistan	1673	+30 07.2	+ 67 00.0	+4 28 00.0	+44.03	+ 62 00	+0.49901	0.86593
Rajkot	132	+22 10.8	+ 70 33.6	+4 42 14.0	+46 .36	+ 47 46	+0.37518	0.92646
Rawalpindi, Pakistan	510	+33 22.2	+ 73 03.6	+4 52 14.0	+48.01	+ 37 46	+0.54696	0.83605
Rome (Obs.), Italy	152	+41 33.0	+ 12 16.8	+0 49 07.2	+ 8.07	.. ..	+0.65982	0.74950
San Fernando (Naval Obs.), Spain	27	+36 28.0	- 6 12.2	-0 24 48.8	- 4.08	.. ..	+0.59108	0.80516
Shillong	1500	+25 20.4	+ 91 33.6	+6 06 14.0	+61.16	- 36 14	+0.42549	0.90455

1 metre = 3.2808 feet

LATITUDE AND LONGITUDE OF PLACES

Place	Altitude (Metre)	Latitude	Longitude		Reduction of Greenwich Sid. Time	Reduction of L.M.T. to Indian Standard Time	$\rho \sin \varphi'$	$\rho \cos \varphi'$
			In arc	In time				
		° ′	° ′	h m s	s	m s		
Sholapur	476	+17 24.0	+ 75 33.6	+5 02 14	+49.65	+ 27 46	+0.29715	0.95460
Siliguri	127	+26 24.0	+ 88 13.2	+5 52 53	+57.97	- 22 53	+0.44196	0.89632
Simla	2202	+31 03.6	+ 77 07.8	+5 08 31	+50. 68	+ 21 29	+0.51312	0.85769
Singapore	18	+ 1 10.2	+103 30.6	+6 54 02	+68.02	.. ..	+0.02028	0.99980
Srinagar	1586	+34 03.6	+ 74 30.6	+4 58 02	+48.96	+ 31 58	+0.55704	0.82953
St. Petersburg Univ. Obs., Russia	3	+59 56.5	+ 30 17.7	+2 01 11	+19.91	.. ..	+0.86189	0.50214
Tehran, Iran	1200	+35 24.6	+ 51 15.0	+3 25 00	+33.68	.. ..	+0.57630	0.81610
Tokyo (Hydrographic Obs.), Japan	41	+35 24.0	+138 27.0	+9 13 48	+90.98	.. ..	+0.57605	0.81605
Thiruvanantapuram	61	+ 8 17.4	+ 76 34.2	+5 06 17	+50.31	+ 23 43	+0.14323	0.98963
Udaipur (Solar Obs.)	301	+24 21.0	+ 73 25.2	+4 53 41	+48.24	+ 36 19	+0.40980	0.91161
Udhagamandalam (Ooty) (Rad. Astr.Centre)	2150	+11 22.9	+ 76 40.0	+5 06 40	+50.38	+ 23 20	+0.19611	0.98079
Ujjain	496	+23 06.3	+ 75 28.2	+5 01 53	+49.59	+ 28 07	+0.39002	0.92033
Varanasi	76	+25 10.8	+ 83 00.0	+5 32 00	+54.54	- 2 00	+0.42288	0.90554
Visakhapatnam	38	+17 25.8	+ 83 08.4	+5 32 34	+54.63	- 2 34	+0.29763	0.95438
Washington (U. S. Naval Obs.), U.S.A.	92	+38 33.0	- 77 02.4	- 5 08 10	-50.62	.. ..	+0.61984	0.78309
Yangon, Myanmar	28	+16 27.0	+ 96 7.20	+6 24 29	+63.16	- 54 29	+0.28136	0.95933

1 metre = 3.2808 feet

SEMI-DIURNAL AND SEMI-NOCTURNAL ARCS

(FOR TRUE ALTITUDE = 0)

Lat. / Decli.	0º	10º	20º	30º	35º	40º	45º	50º	52º	54º	56º	58º	60º
º '	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
0 00	6 00	6 00	6 00	6 00	6 00	6 00	6 00	6 00	6 00	6 00	6 00	6 00	6 00
5 00	6 00	6 04	6 07	6 12	6 14	6 17	6 20	6 24	6 26	6 28	6 30	6 32	6 35
10 00	6 00	6 07	6 15	6 23	6 28	6 34	6 41	6 49	6 52	6 56	7 01	7 06	7 11
15 00	6 00	6 11	6 22	6 36	6 43	6 52	7 02	7 14	7 20	7 27	7 34	7 42	7 51
20 00	6 00	6 15	6 30	6 49	6 59	7 11	7 25	7 43	7 51	8 00	8 11	8 22	8 36
23 00	6 00	6 18	6 36	6 58	7 11	7 25	7 43	8 05	8 15	8 27	8 40	8 56	9 15
25 00	6 00	6 19	6 39	7 02	7 16	7 32	7 51	8 15	8 27	8 40	8 55	9 13	9 35
28 00	6 00	6 22	6 45	7 12	7 27	7 46	8 08	8 37	8 52	9 08	9 28	9 59	10 28
30 00	6 00	6 23	6 49	7 18	7 35	7 56	8 21	8 54	9 11	9 30	9 55	10 30	12 00

When the latitude of the place and the declination of the heavenly body are of the same sign then the figure represent semi-diurnal arc, when of opposite signs then semi-nocturnal arc.

AMPLITUDE OF RISING AND SETTING

(FOR TRUE ALTITUDE = 0)

Lat. / Decli.	0º	10º	20º	30º	35º	40º	45º	50º	52º	54º	56º	58º	60º
º '	º '	º '	º '	º '	º '	º '	º '	º '	º '	º '	º '	º '	º '
0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
5 00	5 00	5 05	5 19	5 47	6 06	6 32	7 05	7 48	8 08	8 32	8 58	9 28	10 02
10 00	10 00	10 09	10 39	11 34	12 14	13 06	14 13	15 40	16 23	17 11	18 05	19 08	20 19
15 00	15 00	15 14	15 59	17 23	18 25	19 45	21 28	23 45	24 52	26 07	27 34	29 14	31 10
20 00	20 00	20 19	21 21	23 16	24 41	26 31	28 56	32 09	33 45	35 35	37 42	40 12	43 10
23 00	23 00	23 50	25 03	27 21	29 04	31 18	34 15	38 15	40 16	42 37	45 22	48 40	52 44
25 00	25 00	25 25	26 44	29 13	31 04	33 29	36 42	41 06	43 21	45 58	49 06	52 54	57 42
28 00	28 00	28 28	29 58	32 50	34 58	37 48	41 36	46 55	49 41	53 00	57 06	62 22	69 52
30 00	30 00	30 31	32 09	35 16	37 37	40 45	45 00	51 04	54 18	58 17	63 24	70 39	90 00

The amplitude of rising and setting points of a heavenly body is measured from the East or the West point of the horizon towards the northern or southern direction as the case may be. The amplitude is of the same sign as that of declination of the body.

Note - If true zenith distance of the heavenly body at the time of rising or setting be 90º + *h*, then the figures of the above two tables would require some correction according to the value of *h* (vide Explanation).

AUGMENTATION OF MOON'S SEMI-DIAMETER

Moon 's Apparent Altitude

Semi-diame-ter	0º	6º	12º	18º	24º	30º	36º	42º	48º	54º	60º	66º	72º	78º	84º	90º
' "	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
14 30	0.1	1.5	2.9	4.3	5.6	6.9	8.1	9.2	10.2	11.1	11.8	12.5	13.0	13.4	13.6	13.7
15 00	0.1	1.6	3.1	4.6	6.0	7.3	8.6	9.8	10.9	11.8	12.7	13.4	13.9	14.3	14.6	14.6
15 30	0.1	1.7	3.3	4.9	6.4	7.9	9.2	10.5	11.6	12.7	13.5	14.3	14.9	15.3	15.6	15.6
16 00	0.1	1.9	3.6	5.2	6.8	8.4	9.8	11.2	12.4	13.5	14.4	15.2	15.9	16.3	16.6	16.7
16 30	0.2	2.0	3.8	5.6	7.3	8.9	10.5	11.9	13.2	14.4	15.4	16.2	16.9	17.4	17.6	17.7
17 00	0.2	2.1	4.0	5.9	7.7	9.5	11.1	12.6	14.0	15.3	16.3	17.2	17.9	18.4	18.7	18.8

The visible or apparent semi-diameter of the moon is augmented over the tabulated value due to moon's altitude above the horizon.

NATURAL TRIGONOMETRIC FUNCTIONS

ANGLE		Sin	Cos	Tan	Cot	Sec	Cosec		
Arc	Time								
°	h m							h m	°
0	0 00	0.00000	1.00000	0.00000	Infinity	1.00000	Infinity	6 00	90
1	0 04	.01745	0.99985	.01746	57.28996	.00015	57.29869	5 56	89
2	0 08	.03490	.99939	.03492	28.63625	.00061	28.65371	5 52	88
3	0 12	.05234	.99863	.05241	19.08114	.00137	19.10732	5 48	87
4	0 16	.06976	.99756	.06993	14.30067	.00244	14.33559	5 44	86
5	0 20	.08716	.99619	.08749	11.43005	.00382	11.47371	5 40	85
6	0 24	.10453	.99452	.10510	9.51436	.00551	9.56667	5 36	84
7	0 28	.12187	.99255	.12278	8.14435	.00751	8.20551	5 32	83
8	0 32	.13917	.99027	.14054	7.11537	.00983	7.18530	5 28	82
9	0 36	.15643	.98769	.15838	6.31375	.01247	6.39245	5 24	81
10	0 40	.17365	.98481	.17633	5.67128	.01543	5.75877	5 20	80
11	0 44	0.19081	0.98163	0.19438	5.14455	1.01872	5.24084	5 16	79
12	0 48	.20791	.97815	.21256	4.70463	.02234	4.80973	5 12	78
13	0 52	.22495	.97437	.23087	4.33148	.02630	4.44541	5 08	77
14	0 56	.24192	.97030	.24933	4.01078	.03061	4.13357	5 04	76
15	1 00	.25882	.96593	.26795	3.73205	.03528	3.86370	5 00	75
16	1 04	.27564	.96126	.28675	3.48741	.04030	3.62796	4 56	74
17	1 08	.29237	.95630	.30573	3.27085	.04569	3.42030	4 52	73
18	1 12	.30902	.95106	.32492	3.07768	.05146	3.23607	4 48	72
19	1 16	.32557	.94552	.34433	2.90421	.05762	3.07155	4 44	71
20	1 20	.34202	.93969	.36397	2.74748	.06418	2.92380	4 40	70
21	1 24	0.35837	0.93358	0.38386	2.60509	1.07115	2.79043	4 36	69
22	1 28	.37461	.92718	.40403	2.47509	.07853	2.66947	4 32	68
23	1 32	.39073	.92050	.42447	2.35585	.08636	2.55930	4 28	67
24	1 36	.40674	.91355	.44523	2.24604	.09464	2.45859	4 24	66
25	1 40	.42262	.90631	.46631	2.14451	.10338	2.36620	4 20	65
26	1 44	.43837	.89879	.48773	2.05030	.11260	2.28117	4 16	64
27	1 48	.45399	.89101	.50953	1.96261	.12233	2.20269	4 12	63
28	1 52	.46947	.88295	.53171	1.88073	.13257	2.13005	4 08	62
29	1 56	.48481	.87462	.55431	1.80405	.14335	2.06267	4 04	61
30	2 00	.50000	.86603	.57735	1.73205	.15470	2.00000	4 00	60
31	2 04	0.51504	0.85717	0.60086	1.66428	1.16663	1.94160	3 56	59
32	2 08	.52992	.84805	.62487	1.60033	.17918	1.88708	3 52	58
33	2 12	.54464	.83867	.64941	1.53987	.19236	1.83608	3 48	57
34	2 16	.55919	.82904	.67451	1.48256	.20622	1.78829	3 44	56
35	2 20	.57358	.81915	.70021	1.42815	.22077	1.74345	3 40	55
36	2 24	.58779	.80902	.72654	1.37638	.23607	1.70130	3 36	54
37	2 28	.60182	.79864	.75355	1.32704	.25214	1.66164	3 32	53
38	2 32	.61566	.78801	.78129	1.27994	.26902	1.62427	3 28	52
39	2 36	.62932	.77715	.80978	1.23490	.28676	1.58902	3 24	51
40	2 40	.64279	.76604	.83910	1.19175	.30541	1.55572	3 20	50
41	2 44	0.65606	0.75471	0.86929	1.15037	1.32501	1.52425	3 16	49
42	2 48	.66913	.74314	.90040	1.11061	.34563	1.49448	3 12	48
43	2 52	.68200	.73135	.93252	1.07237	.36733	1.46628	3 08	47
44	2 56	.69446	.71934	0.96569	1.03553	.39016	1.43956	3 04	46
45	3 00	0.70711	0.70711	1.00000	1.00000	1.41421	1.41421	3 00	45
		Cos	Sin	Cot	Tan	Cosec	Sec	Time	Arc
								ANGLE	

STANDARD TIMES

LOCAL STANDARD TIME FOR EACH COUNTRY OR AREA
THE AHEAD OF (+) OR BEHIND (-) U.T. OR G.M.T

Country or Area	Standard Time	L.S.T at 12h U.T or 17-30 I.S.T.	Country or Area	Standard Time	L.S.T at 12h U.T or 17-30 I.S.T.
	h	h m		h	h m
Aden	+ 3	15 00	Belgium	+ 1	13 00
Afghanistan	+ 4 1/2	16 30	Belize	- 6Ψ	06 00Ψ
Alaska	-9	03 00	Bermuda	- 4	08 00
- Day light Saving Time	- 8	04 00	Bhutan	+ 6	18 00
Albania	+ 1	13 00	Bolivia	- 4	08 00
- Day light Saving Time	+ 2	14 00	Brazil-		
Aleutian Islands	- 10	02 00	Eastern (including coast)	- 3*	09 00*
Algeria	0	12 00	Western	- 3*	09 00*
Angola	+ 1	13 00	Territory of Acre	- 4*	08 00*
Argentina	- 3	09 00	Bulgaria	+ 2	14 00
Ascension Islands	0	12 00	Cambodia	+ 7	19 00
Australia-			Cameroon	+ 1	13 00
Capital Territory (Canberra), Victoria, New South Wales, Queensland, Tasmania.	+ 10	22 00	Canada- Newfoundland	- 3 1/2*	08 30*
South Australia, Northern Territory, Broken Hill Area	+ 9 1/2	21 30	East of Long. 63° W	- 4*	08 00*
- Day light Saving Time	+ 10 1/2	22 30	N W Territories (Ea- St of Long. 68° W), New Brunswick Nova Scotia, Prince Edward Island		
Western Australia	+ 8	20 00	Quebec (West of	- 5*	07 00*
- Day light Saving Time	+ 9	21 00	Long.63°W), Ontario (East of Long 90° W) (Ottawa), Nunavut (East) and NW Territories (Long.. W 68°-85°)		
Austral Islands	- 10	02 00	Ontario (West of Long. 90° W), Manitoba, NW Territories (Long. W 85°-102°), East Saskatchewan, Nunavut (Central)	- 6*	06 00*
Austria	+ 1	13 00	Alberta	- 7*	05 00*
Azores	- 1	11 00	Yukon Time	- 8	04 00
Bahrain	+ 3	15 00	Canary Island	+ 1	13 00
Bangladesh	+ 6	18 00	Cape Verde Islands	- 1	11 00

STANDARD TIMES

LOCAL STANDARD TIME FOR EACH COUNTRY OR AREA
THE AHEAD OF (+) OR BEHIND (-) U.T. OR G.M.T

Country or Area	Standard Time	L.S.T at 12h U.T or 17-30 I.S.T.		Country or Area	Standard Time	L.S.T at 12h U.T or 17-30 I.S.T.	
	h	h	m		h	h	m
Caroline Islands-	+ 11	23	00	Ghana	0	12	00
Truk, Ponape	+ 11	23	00	Gibraltar	+ 1↓	13	00↓
Central African Republic	+ 1	13	00	Greece	+ 2	14	00
Chile	- 4*	08	00*	Greenland			
China, People's Republic of	+ 8	20	00	Angmagssalik, W. Coast	- 3	09	00
Cocos-keeling Islands	+ 6 1/2	18	30	Thule Area	- 4	08	00
Colombia	- 5	07	00	Guam	+ 10	22	00
Congo Republic	+ 1	13	00	Guatemala	- 6	06	00
Cook Islands	- 10	02	00	Guiana			
				Dutch (Surinam)	- 3	09	00
Corsica	+ 1↓	13	00↓	French	- 3	09	00
Costa Rica	- 6	06	00	Guyana Republic	- 4	08	00
Croatia	+1	13	00	Haiti	- 5	07	00
Cuba	- 5*	07	00*	Hawaiian Islands	- 10	02	00
Czech Republic	+1	13	00	Honduras	- 6	06	00
Cyprus	+ 2	14	00	Hong Kong	+ 8*	20	00*
Dahomey Republic (Africa)	+ 1	13	00	Hungary	+ 1	13	00
Denmark	+ 1	13	00	Iceland	0	12	00
Ecuador	- 5	07	00	India	+ 5 1/2	17	30
Egypt	+ 2*	14	00*	Indonesia, Republic of-	--	--	
Estonia	+ 2	14	00	Sumatra, Java, West & Central Kalimantan	+ 7	19	00
El Salvador	- 6	06	00	Bali, South & East Kalimantan	+ 8	20	00
Ethiopia	+ 3	15	00	Irian Jaya, Maluku	+ 9	21	00
Falkland Islands	-4	08	00	Iran	+ 3 1/2	15	30
Fiji	+12	24	00	Iraq	+ 3	15	00
Finland	+2	14	00	Ireland, Republic of	0	12	00
France	+1↓	13	00↓	Israel	+2	14	00
Germany	+1	13	00	Italy	+1*	13	00*

STANDARD TIMES

LOCAL STANDARD TIME FOR EACH COUNTRY OR AREA
THE AHEAD OF (+) OR BEHIND (-) U.T. OR G.M.T

Country or Area	Standard Time	L.S.T at 12h U.T or 17-30 I.S.T.		Country or Area	Standard Time	L.S.T at 12h U.T or 17-30 I.S.T.	
	h	h	m		h	h	m
Ivory Coast	0	12	00	Monaco	+ 1	13	00
Japan (and Japan Is.)	+ 9	21	00	Mongolia	+ 8	20	00
Jordan	+ 2	14	00	Morocco	0*	12	00*
Kenya	+ 3	15	00	Mozambique	+ 2	14	00
Korea (North & South)	+ 9	21	00	Nepal	+ 5 3/4	17	45
Kuwait	+ 3	15	00	Netherlands (Holland)	+ 1	13	00
Laos	+ 7	19	00	New Caledonia	+ 11	23	00
Latvia	+ 2	14	00	New Hebrides	+ 11	23	00
Lebanon	+ 2*	14	00*	New Zealand	+ 12	24	00
Liberia	0	12	00	Nicaragua	- 6	06	00
Libya	+ 2	14	00	Niger	+ 1	13	00
Lithuania	+ 3	15	00	Nigeria	+ 1	13	00
Luxembourg	+ 1↓	13	00↓	Norfolk Island	+ 11 1/2	23	30
Madagascar	+ 3	15	00	Norway	+ 1*	13	00*
Madeira	- 1*	11	00*	Oman (Masira, Muscat, Salalah)	+ 4	16	00
Malawi	+ 2	14	00	Pakistan	+ 5	17	00
Malaysia	+ 8	20	00	Papua New Guinea	+ 10	22	00
Maldives Island	+ 5	17	00	Paraguay	- 4	08	00
Malta	+ 1	13	00	Peru	- 5	07	00
Manchuria (China)	+ 8	20	00	Philippines	+ 8	20	00
Mariana Island	+ 10	22	00	Poland	+ 1*	13	00*
Marquesas Islands	- 9 1/2	02	30	Portugal	+ 1	13	00
Marshall Islands	+ 12	24	00	Puerto Rico	- 4	08	00
Mauritania	0	12	00	Reunion	+ 4	16	00
Mauritius	+ 4	16	00	Romania	+ 2	14	00
Mayanmar	+ 6 1/2	18	30	Sakhalin	+ 11	23	00
Mexico-				Samoa	- 11	01	00
Mexico City	- 6	06	00	Sardinia	+ 1	13	00
Sonora, Sinaloa, Nayarit, Baja California Sur	- 7	05	00				
Baja California	- 8	04	00				

STANDARD TIMES

LOCAL STANDARD TIME FOR EACH COUNTRY OR AREA
THE AHEAD OF (+) OR BEHIND (-) U.T. OR G.M.T

Country or Area	Standard Time	L.S.T at 12h U.T or 17-30 I.S.T.	Country or Area	Standard Time	L.S.T at 12h U.T or 17-30 I.S.T.
	h	h m		h	h m
Saudi Arabia-			Tangier	0	12 00
Jeddah	+ 3	15 00	Thailand	+ 7	19 00
Dhahran	+ 4	16 00	Uganda	+ 3	15 00
Senegal	0	12 00	Ukraine	+ 2	14 00
Serbia	+ 1	13 00	United Arab Emirates	+ 4	16 00
Sierra Leone	0	12 00	USA Aleutian	- 10*	02 00*
Singapore	+ 8	20 30	USA Hawaii	- 10*	02 00*
Solomon Islands	+ 11	23 00	USA Pacific	- 8*	04 00*
Somalia	+ 3	15 00	USA Mountain	- 7*	05 00*
South Africa	+ 2	14 00	USA Arizona	- 7*	05 00*
Spain	+ 1↓	13 00↓	USA Central	- 6*	06 00*
Sri Lanka	+ 5 1/2	17 30	USA Eastern	- 5*	07 00*
Sudan	+ 2	14 00	Uruguay	- 3	09 00
Sweden	+ 1	13 00	Uzbekistan	+ 5	17 00
Switzerland	+ 1	13 00	Zambia	+ 2	14 00
Syria	+ 2*	14 00*	Zimbabwe	+ 2	14 00
Tanzania	+ 3	15 00			

* During summer seasons clock time differs from Standard time.
Ψ Winter time may be kept in these countries.
↓ This time is used throughout the year, but may differ from legal time.

PART - VI

INDIAN CALENDAR
AND
EXPLANATION

INDIAN CALENDAR
EXPLANATORY NOTE

The astronomical data included in this section on Indian Calendar have been calculated in accordance with the recommendations of the Calendar Reform Committee, as outlined in its report, and the calculations have been done on the basis of the positions of the Sun, Moon and Planets, as contained in the main tables of the Ephemeris. However, the information on Luni- Solar Calendar in this section have been calculated on the basis of traditional Nirayana Calendric system following the Government's decision not to disturb the traditional procedure in fixing the days of religious festivals. Certain additional data, which are required for the compilation of an Indian Panchang (Almanac), have also been furnished to meet the requirements of the numerous Panchang makers of this country. The tables of this section have been extended beyond December, 2027 and materials up to April 21, 2028 have been furnished in order to facilitate preparation of Almanacs for one complete Indian year. The longitudes of the Sun, Moon and Planets and certain other data relating to their positions for the period of 2027 covered by this calendar have also been given in separate table for the same purpose.

All calculations contained in this section have been done for an adopted Central Station of India situated at $82^0\,30'$ longitude East of Greenwich and $23^0\,11'$ latitude North (latitude of Ujjain) and accordingly the timings have been expressed in the local mean time of this Central Station, which is also the Indian Standard Time. This time (I.S.T.) is $5^h\,30^m$ ahead on the Universal Time or Greenwich Mean Time.

The Calendar used in this section is the 'National Calendar' of India as recommended by the Calendar Reform Committee and introduced by the Government of India with effect from the 22 nd March 1957, corresponding to the 1st of Chaitra, 1879 Saka Era. Thereafter, Govt. of India has decided to introduce an all India Nirayana Solar Calendar in addition to the existing National Calendar. This new Calendar has been introduced with effect from 14th April, 2004 corresponding to 1st Vaisakha of 5105 Kali, Kali Era being the Era of this new Calendar and this Calendar have fixed number of days for its months. Dates of the Nirayana Calendar have been indicated in addition to the existing National Calendar. The months of these Calendars, the number of days assigned to each month of the two Calendars, and the dates of the Gregorian calendar corresponding to the first day of each month of both the Calendars are as follows :-

Months of the National Calendar	Gregorian date for 1st of the month	Months of the Nirayana Calendar	Gregorian date for 1st of the month
Chaitra (30 days ; 31 days in a leap-year)	March 22 (March 21 in a leap-year)	Vaisakha (31 days)	April 14
Vaisakha (31 days)	April 21	Jyaishtha (31 days)	May 15
Jyaishtha (31 days)	May 22	Ashadha (31 days)	June 15
Ashadha (31 days)	June 22	Sravana (31 days)	July 16
Sravana (31 days)	July 23	Bhadra (31 days)	August 16
Bhadra (31 days)	August 23	Asvina (30 days)	September 16
Asvina (30 days)	September 23	Kartika (30 days)	October 16
Kartika (30 days)	October 23	Agrahayana (30 days)	November 15
Agrahayana (30 days)	November 22	Pausha (30 days)	December 15
Pausha (30 days)	December 22	Magha (30 days)	January 14
Magha (30 days)	January 21	Phalguna (30 days ; 31 days in a leap-year)	February 13
Phalguna (30 days)	February 20	Chaitra (30 days)	March 15

Different items included in this section are elaborated below :-

The Sunrise and Sunset times, calculated for the Central Station, relate respectively to the appearance and disappearance of the upper limb of the Sun on the horizon. The amount of horizontal refraction taken for this purpose is $31'$ and the semi-diameter of the Sun as $16'$, so that at the given times of Sunrise and Sunset, the centre of the Sun actually $47'$ below the horizon.

The apparent noon is the local mean time of the sun's meridian passage, i.e., the mid-day reduced to the above standard meridian of India ($82\frac{1}{2}^0$ E. Longitude).

The ending moments of tithis, nakshatras and yogas have been given in Indian Standard Time and shown against their ordinal numbers. The phenomena being geocentric ones, their timings in I.S.T. are applicable for the whole of India without any modification. These timings reduced by a deduction of $5^h\ 30^m$ would give the G.M.T. applicable for all places on the earth.

The tithi is based on the difference of longitude of the Moon and that of the Sun. A tithi is completed when the longitude of the Moon gains exactly 12^0 or its integral multiple on that of the Sun and as such there are 30 tithis in lunar month. A difference in longitude of 12^0 indicates the ending of the 1st tithi, 24^0 that of the 2nd tithi and so on. The number of tithis have been shown from Sukla 1 to Sukla 15 (full-moon) and again from Krishna 1 to Krishna 14 and Krishna 30 (new moon), using the symbols S and K for Sukla paksha (waxing Moon)and Krishna paksha (waning Moon) respectively.

A nakshatra is completed when the nirayana longitude of the Moon as measured from the initial point attains a value of $13°\ 20'$ or an integral multiple thereof. When this longitude is $13°\ 20'$ the 1st nakshatra ends and so on. There are thus 27 nakshatras in a sidereal month and the nakshatra divisions occupy fixed positions in the sphere of stars. In the case of the Sun the calculation also has been done on the same basis. But in this case, the time of Sun's entry into a nakshatra-division has been stated, whereas in the case of the Moon, the time of its exit from the division has been given.

Like nakshatras, there are 27 yogas. Yoga is calculated from the sum of nirayana longitudes of the Sun and the Moon. When the sum amounts to $13°\ 20'$, the first yoga ends; when it amounts to $26°\ 40'$, the second yoga ends, and so on. Thus, in all 27 yogas cover 360°. Names of the nakshatras and yogas have been given at the bottom of the table. It will be seen that two of the names Vyatipata and Vaidhriti occur also under Phenomena, where they have been treated as special yogas and calculated by a somewhat different rule. The 27 yogas which have got very little astronomical significance have been included in this publication only to meet the needs of Panchang where the yoga is also one of the components.

For the purpose of calculation of rasis, nakshatras and yogas, an initial point which occupies a fixed position on the ecliptic has been adopted as the origin for the measurement of longitudes. The position of this initial point coincides with the vernal equinoctial point of vernal equinox day of 285 A.D. For the purpose of assigning a precise position to it, the tropical longitude of this initial point has been adopted as $23°\ 15'\ 00''$ for 0^h on 21st March, 1956. The tropical longitude of this fixed initial point for any day is known as ayanamsa. The longitude of a celestial body measured from this initial point is known as nirayana longitude.

The entry into different rasis of the Moon and of the Sun have been shown at the bottom of the relevant pages of the calendar and the calculations have been done on the same basis as in the case of nakshatras, utilising the nirayana longitudes. Rasis, which cover arc of 30^0 of the zodiac belt, are measured along the ecliptic from the above-mentioned initial point.

The tithi, nakshatra and yoga as are current at Sunrise at the Central Station, have been shown against the date with their ending moments in I. S. T. When the time of these or any other phenomena falls after midnight and before the next Sunrise, the time has been expressed after adding 24^h to the I.S.T. without changing the date after midnight in order to maintain continuity of time-reckoning from one Sunrise to the next, in conformity with the system followed in Indian religious calendars.

The solar months recommended for the religious calendar, such as, Saura Vaisakha, Saura Jyaishtha, etc., by the Calendar Reform Committee in 1955 have been reckoned from the moments when the apparent longitude of the Sun equals $23°\ 15'$, $53°\ 15'$ and so on. The calculation for this purpose thus has not been done with a variable ayanamsa, as in the case of rasis and nakshatras, but with a fixed ayanamsa of $23°\ 15'$. These months are shown for purpose of illustration only, but are not used in practice for actual luni-solar adjustment.

The lunar months for determining the dates of religious festivals are reckoned from one New-Moon to the next (Sukladi system or mukhya mana). The lunar month for this purpose is named after the Nirayana or Sidereal solar month in which the initial New-Moon from which the month starts, falls.

Phenomena mentioned in the table include New-Moon, Full-Moon, Sayana Vyatipata (when the sum of the tropical longitudes of the Sun and the Moon equals 180^0), Sayana Vaidhriti (when the above sum amounts to 360^0), eclipses, heliacal rising and setting of Venus, Mars and Jupiter and Jupiter's transit into rasis.

The principal festivals of different states have been fixed on the basis of the criterion stated here, but in doing so, the rules and conventions of the states concerned have been followed as far as practicable.

LIST OF HOLIDAYS

The list of holidays for the Government of India as well as for the State Governments have been prepared in a consolidated form and the dates fixed for them, have been shown in a separate table under the head 'Principal Festivals for Holidays'. The principal festivals of Moslems, Parsis, Jewish and Christians have also been shown separately.

AYANAMSA

The value of ayanamsa has been given in the calendar for the first day of the month and also in a separate table at the end at interval of three days. The ayanamsa value has been calculated from the polynomial of precession in longitude published by N.Capitaine et. al. (2003) in journal Astronomy and Astrophysics. The polynomial for ayanamsa has been introduced in this publication from the year 2021. The polynomial used is as given below.

Mean Ayanamsa $=23^0 51' 25".53+5028".796195*T+1".1054348*T^2+0".00007964*T^3-0".00023857*T^4-0".0000000383*T^5$

Where T=(JD-2451545)/36525

Ayanamsha for J2000.0 is taken as $23^0 51' 25".53$

The Sayana Vyatipata and Sayana Vaidhriti, reported under the column "Phenomena", are calculated on the basis of defination given in the report of Calendar Reform Committee. These are classified as the Calendar Reform Committee view and no way related to the 'mahapata yoga' defined in some Indian traditional texts (siddhantic treatises).

HELIACAL RISING AND SETTING OF PLANETS, 2028
(JANUARY TO APRIL)

Planet	National Date	Nirayana Date	Gregorian Date	Time (I.S.T)
				h m
Mercury setting West	Magha 08, 1949 Saka	Magha 15, 5128 Kali	Jan 28, 2028	21 10
Mercury rising East	Magha 17, 1949 Saka	Magha 24, 5128 Kali	Feb. 06, 2028	28 34
Mercury setting East	Chaitra 04, 1950 Saka	Chaitra 10, 5129 Kali	Mar. 24, 2028	10 36
Mercury rising West	Chaitra 31, 1950 Saka	Vaishakha 07, 5129 Kali	Apr. 20, 2028	26 27
Mars setting West	Pausha 25, 1949 Saka	Magha 02, 5128 Kali	Jan 15, 2028	27 03
Saturn setting West	Chaitra 17, 1950 Saka	Chaitra 23, 5128 Kali	Apr. 06, 2028	12 25

N.B.- Here East means Eastern Horizon and West means Western Horizon.

RETROGRESSION OF PLANETS, 2028
(JANUARY TO APRIL)

Planet		National Date	Nirayana Date	Gregorian Date	Time (I.S.T)
					h m
Mercury	Retrograde	Magha 04, 1949 Saka	Magha 11, 5128 Kali	Jan. 24, 2028	16 30
Mercury	Direct	Magha 25, 1949 Saka	Phalguna 02, 5128 Kali	Feb. 14, 2028	18 13
Jupiter	Retrograde	Pausha 22, 1949 Saka	Pausha 29, 5128 Kali	Jan. 12, 2028	14 24
Uranus	Direct	Magha 23, 1949 Saka	Magha 30, 5128 Kali	Feb. 12, 2028	29 16

MEAN RAHU, 2028

Date	Longitude	Date	Longitude	Date	Longitude
	° / //		° / //		° / //
Jan. -2	279 25 26	Feb. 7	277 18 15	Mar. 19	275 07 53
8	278 53 38	17	276 46 27	29	274 36 06
18	278 21 50	27	276 14 39	Apr. 8	274 04 18
Jan. 28	277 50 03	Mar. 9	275 39 41	18	273 32 30

ECLIPSES, 2028
(JANUARY TO APRIL)

Partial Lunar Eclipse **Not visible in India**

22 Pausha, 1949 SE, 29 Pausha, 5128 KE, 12 January, 2028

Annular Solar Eclipse **Not visible in India**

06 Magha, 1949 SE, 13 Magha, 5128 KE, 26 January, 2028

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INDIAN CALENDAR

SAKA ERA 1948

Makara : Tapas
Winter (Sisira), 1st Month

Month of PAUSHA (30 days)

(*Nirayana*) 8 Pausha, 5127 Kali Era to (*Nirayana)* 7 Magha, 5127 Kali Era

Date	Week Day	Gregorian Date	Sunrise		Apparent Noon		Sunset		Tithi			Nakshatra			Yoga		
									No.	Ending Moment		No.	Ending Moment		No.	Ending Moment	
			h	m	h	m	h	m		h	m		h	m		h	m
		2026 A.D.															
1	Tue	Dec. 22	6	37.5	11	58.4	17	19.6	S 13	14	24.1	3	10	45.7	22	21	32.2
2	Wed	23	6	37.9	11	58.9	17	20.2	14	10	47.5	4	7	56.7	23	17	15.6
												(5	28	53.3)			
3	Thu	24	6	38.4	11	59.4	17	20.7	S 15	6	58.2	6	25	47.3	24	12	51.4
									(K 1	27	07.5)						
4	Fri	25	6	38.9	11	59.9	17	21.2	2	23	26.6	7	22	50.3	25	8	28.8
															(26	28	16.5)
5	Sat	26	6	39.3	12	00.4	17	21.8	3	20	05.6	8	20	13.1	27	24	22.7
6	Sun	27	6	39.7	12	00.9	17	22.4	4	17	13.8	9	18	05.0	1	20	53.9
7	Mon	28	6	40.1	12	01.4	17	23.0	K 5	14	58.6	10	16	33.4	2	17	55.4
8	Tue	29	6	40.5	12	01.9	17	23.6	6	13	25.4	11	15	43.3	3	15	30.9
9	Wed	30	6	40.8	12	02.4	17	24.2	7	12	36.9	12	15	37.1	4	13	41.5
10	Thu	31	6	41.2	12	02.9	17	24.8	8	12	32.9	13	16	13.7	5	12	26.7
		2027 A.D.															
11	Fri	Jan. 1	6	41.5	12	03.3	17	25.4	9	13	10.5	14	17	29.8	6	11	43.8
12	Sat	2	6	41.8	12	03.8	17	26.1	K 10	14	24.6	15	19	19.8	7	11	28.9
13	Sun	3	6	42.1	12	04.3	17	26.7	11	16	08.8	16	21	37.1	8	11	37.1
14	Mon	4	6	42.3	12	04.7	17	27.4	12	18	16.1	17	24	15.1	9	12	03.5
15	Tue	5	6	42.6	12	05.2	17	28.1	13	20	40.0	18	27	07.4	10	12	43.3
16	Wed	6	6	42.8	12	05.6	17	28.8	14	23	14.6	19	30	08.4	11	13	32.1
17	Thu	7	6	43.0	12	06.1	17	29.5	K 30	25	54.4	20	---	---	12	14	26.3
18	Fri	8	6	43.1	12	06.5	17	30.1	S 1	28	34.0	20	9	13.1	13	15	22.1
19	Sat	9	6	43.3	12	06.9	17	30.8	2	---	---	21	12	16.3	14	16	15.7
20	Sun	10	6	43.4	12	07.3	17	31.5	2	7	07.7	22	15	12.1	15	17	02.9
21	Mon	11	6	43.5	12	07.7	17	32.3	3	9	28.8	23	17	53.9	16	17	38.7
22	Tue	12	6	43.6	12	08.1	17	33.0	4	11	29.7	24	20	14.1	17	17	57.7
23	Wed	13	6	43.6	12	08.5	17	33.7	S 5	13	02.3	25	22	04.8	18	17	54.1
24	Thu	14	6	43.7	12	08.9	17	34.4	6	13	59.0	26	23	19.0	19	17	22.4
25	Fri	15	6	43.7	12	09.2	17	35.1	7	14	13.9	27	23	51.2	20	16	18.2
26	Sat	16	6	43.7	12	09.6	17	35.8	8	13	43.4	1	23	38.9	21	14	38.8
27	Sun	17	6	43.6	12	09.9	17	36.5	9	12	27.1	2	22	42.5	22	12	23.5
28	Mon	18	6	43.6	12	10.3	17	37.3	S 10	10	27.5	3	21	05.5	23	9	33.8
															(24	30	13.5)
29	Tue	19	6	43.5	12	10.6	17	38.0	11	7	49.9	4	18	54.4	25	26	27.7
									(12	28	41.8)						
30	Wed	20	6	43.4	12	10.9	17	38.7	S 13	25	12.0	5	16	17.4	26	22	23.4

N.B. - All timings are given in I.S.T. or the local mean time of the meridian of 82½° E. Long.

Names of Nakshatras:- 1.Asvini 2.Bharani 3.Krittika 4.Rohini 5.Mrigasiras 6.Ardra 7.Punarvasu 8.Pushya 9.Aslesha 10.Magha 11.Purva Phalguni 12.Uttara Phalguni 13.Hasta 14.Chitra 15.Svati 16.Visakha 17.Anuradha 18.Jyestha 19.Mula 20.Purvasadha 21.Uttarasadha 22.Sravana 23.Dhanistha 24.Satabhisaj 25.Purva Bhadrapada 26.Uttara Bhadrapada 27.Revati

Names of Yogas:- 1.Viskumbha 2.Priti 3.Ayusman 4.Saubhagya 5.Sobhana 6.Atiganda 7.Sukarma 8.Dhriti 9.Sula 10.Ganda 11. Vriddhi 12.Dhruva 13.Vyaghata 14.Harshana 15.Vajra 16.Siddhi (Asrik) 17.Vyatipata 18.Variyan 19.Parigha 20.Siva 21.Siddha 22.Sadhya 23.Subha 24.Sukla (Sukra) 25.Brahma 26.Indra 27.Vaidhriti

INDIAN CALENDAR

Uttarayana
Dakshina Gola

SAKA ERA 1948
Month of PAUSHA (30 days)

Ayanamsa on 1st : $24^0\ 14'\ 12''$

(*Nirayana*) 8 Pausha, 5127 Kali Era to (*Nirayana)* 7 Magha, 5127 Kali Era

Date	Gregorian Date	Solar Month	Lunar Month	Transit of the Sun	Phenomena	Festivals
	2026A.D.					1- Uttarayana Day
1	Dec. 22					
2	23		MARGASIRSHA		2- Sayana Vaidhriti ($24^h\ 24^m.3$)	2- Shri Datta Jayanti (Maharastra) (Mrigasirasnak.Upto28h 53.3m), Dattatreya Jayanti,Margi Purnima
3	24				3- Full Moon ($6^h\ 58^m.2$)	3- Arudra Darsanam (Purvarunodaya) (S.India)
4	25					4- Birthday of Sadhu T.L.Vaswani (Sindhi)
5	26					5- Jor Mela-3days(Punjab)
6	27					
7	28					
8	29			8- Sun enters Purvashadha nak. ($12^h\ 44^m.3$)		
9	30					9- Ashtaka(Pupashtaka)
10	31					
	2027A.D.					
11	Jan. 1					
12	2					12- Birthday of Parsvanath(Jain)
13	3					13- Saphala Ekadasi
14	4					
15	5				15- Sayana Vyatipata ($9^h\ 22^m.3$)	
16	6					
17	7				17- New Moon ($25^h\ 54^m.4$)	17- Vakula Amavasya(Odisha)
18	8		PAUSHA			
19	9					
20	10	SAURA				
21	11			21- Sun enters Uttarashadha nak.($14^h\ 39^m.8$)		
22	12					
23	13			23- Saura Maghadi ($21^h\ 54^m.1$)		23- Lohri(Punjab, Jammu & Kashmir)
24	14					24- Birthday of Sant Parmanand (Sindhi), Makara Samkranti (Bengal), Magha Bihu(Assam), Makara Samkranti(N. India), Bhogi(S.India)
25	15	SAURA MAGHA	CHANDRA			25- Pongal(S.India), Tai Pongal(Kerala), Tila Samkranti, Makara Snana, Guru Gobind Singh's Birthday
26	16					26- Mattu Pongal or Kanumu(S.India)
27	17					
28	18				28- Sayana Vaidhriti ($17^h\ 04^m.3$)	28- Samba D asami (Odisha), Putrada Ekadasi (Smarta)
29	19					29- Trispriśha Mahadvadasi, Putrada Ekadasi (Vaishnava& Vidhava)
30	Jan. 20			30- Sun Enters Trop.Aquarius ($12^h\ 59^m.8$)		

N.B. - All timings are given in I.S.T. or the local mean time of the meridian of 82½° E. Long.

Moon enters :- Mithuna 2,18h26.0m;Karkata 4,17h33.2m;Simha 6,18h05.0m;Kanya 8,21h37.7m;Tula 10,28h47.1m;Vrischika 13,15h00.6m;Dhanus 15,27h07.4m;Makara 18,15h59.3m;Kumbha 20,28h35.2m;Mina 23,15h40.3m;Mesha 25,23h51.2m;Vrisha 27,28h21.9m;Mithuna 30,5h38.6m

Sun enters : Nir. Makara 24, 21h 10.4m

INDIAN CALENDAR

SAKA ERA 1948

Kumbha : Tapasya

Month of MAGHA (30 days)

Winter (Sisira), 2nd Month

(*Nirayana*) 8 Magha, 5127 Kali Era to (*Nirayana)* 7 Phalguna, 5127 Kali Era

Date	Week Day	Gregorian Date	Sunrise	Apparent Noon	Sunset	Tithi		Nakshatra		Yoga	
						No.	Ending Moment	No.	Ending Moment	No.	Ending Moment
			h m	h m	h m		h m		h m		h m
		2027A.D.									
1	Thu	Jan. 21	6 43.2	12 11.2	17 39.4	S 14	21 30.5	6	13 24.2	27	18 08.4
2	Fri	22	6 43.1	12 11.4	17 40.1	S 15	17 47.4	7	10 25.4	1	13 50.6
3	Sat	23	6 42.9	12 11.7	17 40.8	K 1	14 13.2	8	7 31.6	2	9 38.5
								(9	28 53.6)	(3	29 40.2)
4	Sun	24	6 42.7	12 11.9	17 41.5	2	10 57.8	10	26 41.3	4	26 03.3
5	Mon	25	6 42.5	12 12.2	17 42.2	3	8 10.9	11	25 03.5	5	22 54.3
						(4	30 00.6)				
6	Tue	26	6 42.2	12 12.4	17 42.9	K 5	28 33.8	12	24 07.0	6	20 18.5
7	Wed	27	6 41.9	12 12.6	17 43.6	6	27 54.3	13	23 56.4	7	18 19.3
8	Thu	28	6 41.6	12 12.8	17 44.3	7	28 03.3	14	24 33.0	8	16 58.0
9	Fri	29	6 41.3	12 13.0	17 45.0	8	28 58.6	15	25 54.6	9	16 13.5
10	Sat	30	6 41.0	12 13.2	17 45.7	9	30 34.2	16	27 55.7	10	16 02.2
11	Sun	31	6 40.6	12 13.3	17 46.3	K 10	--- ---	17	30 28.1	11	16 18.9
12	Mon	Feb. 1	6 40.3	12 13.5	17 47.0	K 10	8 41.7	18	--- ---	12	16 56.4
13	Tue	2	6 39.8	12 13.6	17 47.7	11	11 10.7	18	9 21.7	13	17 47.5
14	Wed	3	6 39.4	12 13.7	17 48.3	12	13 50.7	19	12 26.4	14	18 44.9
15	Thu	4	6 39.0	12 13.8	17 49.0	13	16 31.8	20	15 32.6	15	19 41.9
16	Fri	5	6 38.5	12 13.9	17 49.6	14	19 05.7	21	18 32.4	16	20 33.1
17	Sat	6	6 38.0	12 14.0	17 50.3	K 30	21 26.1	22	21 19.5	17	21 14.0
18	Sun	7	6 37.5	12 14.1	17 50.9	S 1	23 27.8	23	23 49.0	18	21 41.2
19	Mon	8	6 37.0	12 14.1	17 51.5	2	25 06.9	24	25 57.1	19	21 51.7
20	Tue	9	6 36.5	12 14.2	17 52.1	3	26 20.3	25	27 40.5	20	21 43.2
21	Wed	10	6 35.9	12 14.2	17 52.7	4	27 05.0	26	28 56.3	21	21 13.5
22	Thu	11	6 35.3	12 14.2	17 53.3	S 5	27 18.8	27	29 42.2	22	20 20.5
23	Fri	12	6 34.7	12 14.2	17 53.9	6	26 59.8	1	29 56.3	23	19 02.7
24	Sat	13	6 34.1	12 14.2	17 54.5	7	26 07.2	2	29 37.7	24	17 18.9
25	Sun	14	6 33.5	12 14.2	17 55.1	8	24 41.5	3	28 46.9	25	15 08.8
26	Mon	15	6 32.8	12 14.1	17 55.7	9	22 44.6	4	27 25.8	26	12 33.2
27	Tue	16	6 32.1	12 14.1	17 56.2	S 10	20 19.8	5	25 38.2	27	9 34.0
										(1	30 14.2)
28	Wed	17	6 31.5	12 14.0	17 56.8	11	17 32.3	6	23 29.3	2	26 38.0
29	Thu	18	6 30.8	12 13.9	17 57.3	12	14 28.1	7	21 05.9	3	22 50.9
30	Fri	19	6 30.0	12 13.8	17 57.9	S 13	11 14.8	8	18 35.9	4	18 58.9

N.B. - All timings are given in I.S.T. or the local mean time of the meridian of 82½° E. Long.

Names of Nakshatras:- 1.Asvini 2.Bharani 3.Krittika 4.Rohini 5.Mrigasiras 6.Ardra 7.Punarvasu 8.Pushya 9.Aslesha 10.Magha 11.Purva Phalguni 12.Uttara Phalguni 13.Hasta 14.Chitra 15.Svati 16.Visakha 17.Anuradha 18.Jyestha 19.Mula 20.Purvasadha 21.Uttarasadha 22.Sravana 23.Dhanistha 24.Satabhisaj 25.Purva Bhadrapada 26.Uttara Bhadrapada 27.Revati

Names of Yogas:- 1.Viskumbha 2.Priti 3.Ayusman 4.Saubhagya 5.Sobhana 6.Atiganda 7.Sukarma 8.Dhriti 9.Sula 10.Ganda 11. Vriddhi 12.Dhruva 13.Vyaghata 14.Harshana 15.Vajra 16.Siddhi (Asrik) 17.Vyatipata 18.Variyan 19.Parigha 20.Siva 21.Siddha 22.Sadhya 23.Subha 24.Sukla (Sukra) 25.Brahma 26.Indra 27.Vaidhriti

INDIAN CALENDAR

Uttarayana — SAKA ERA 1948

Dakshina Gola — Month of MAGHA (30 days) — Ayanamsa on 1st : 24° 14′ 18″

(*Nirayana*) 8 Magha, 5127 Kali Era to (*Nirayana)* 7 Phalguna, 5127 Kali Era

Date	Gregorian Date	Solar Month	Lunar Month	Transit of the Sun Date	Phenomena	Festivals
	2027A.D.					
1	Jan. 21					1- Martyrdom day of Hemu Kalani(Sindhi)
2	22				2-Full Moon ($17^h 47^m.4$)	2- Paushi Purnima, Pushyabhisheka Yatra (Pushyanak.Starts at 10h 25.4m) Floating Festival/Tai Poosam
3	23					3- Netaji'sBirthday
4	24			4- Sun enters Sravana nak. ($17^h 00^m.5$)	4- Jupiter enters Nir. Karkata ($25^h 32^m.3$)	
5	25					5- Ganesha Sankastha Chaturthi
6	26					6- Republic Day
7	27					
8	28					8- Birthday of Swami Vivekananda (According to tithi), Birthday of Lala Lajpat Rai
9	29					9- Astaka(Mamsastaka)
10	30				10- Sayana Vyatipata ($12^h 48^m.6$)	10- Martyr's day (Mahatma Gandhi Commemoration Day)
11	31					
12	Feb. 1					
13	2					13- Sattila Ekadasi
14	3					
15	4					15- Meru Trayodasi(Jain), Ratanti Kalika Puja
16	5					
17	6			17- Sun enters Dhanistha nak. ($20^h 08^m.4$)	17- New Moon ($21^h 26^m.1$) 17- Annular solar eclipse (Not visible in India)	17- Mauni Amavasya, Mahodayayoga, Tai Amavasya, Makara Vavu (Kerala)
18	7					18- Magha Sukladi
19	8					
20	9					
21	10					21- Tila Chaturthi,Kunda Chaturthi, Varada Chaturthi, Ganesha Puja(Bengal)
22	11					22- Sri Panchami, Saraswati Puja, Vasanta Panchami
23	12			23- Saura Phalgunadi ($10^h 40^m.7$)	23- Sayana Vaidhriti ($27^h 10^m.6$)	
24	13					24- Ratha Saptami(Purvarunodaya), Vidhana Saptami, Arogya Saptami
25	14					25- Bhismashtami
26	15					
27	16					
28	17					28- Jaya Ekadasi, Bhaimi Ekadasi (Bengal)
29	18			29- Sun enters Trop. Pisces ($27^h 03^m.4$)		29- Bhisma Dvadasi
30	Feb. 19			30- Sun enters Satabhisaj nak. ($24^h 37^m.8$)		30- Desert Festival-3days (Jaisalmer), Sivaji Jayanti

N.B. - All timings are given in I.S.T. or the local mean time of the meridian of 82½° E. Long.

Moon enters :- Karkata 1,29h10.0m;Simha 3,28h53.6m;Kanya 6,6h45.2m;Tula 8,12h8.8m;Vrischika 10,21h22.2m;Dhanus 13,9h21.7m;Makara 15,22h18.4m;Kumbha 18,10h36.7m;Mina 20,21h17.1m;Mesha 22,29h42.2m;Vrisha 25,11h28.0m;Mithuna 27,14h 35.0m;Karkata 29,15h 42.7m

Sun enters : Nir. Kumbha 24, 10h 09.1m

INDIAN CALENDAR

SAKA ERA 1948

Mina : Madhu

Month of PHALGUNA (30 days)

Spring (Vasanta), 1st Month

(*Nirayana*) 8 Phalguna, 5127 Kali Era to (*Nirayana)* 7 Chaitra, 5127 Kali Era

Date	Week Day	Gregorian Date	Sunrise		Apparent Noon		Sunset		Tithi			Nakshatra			Yoga		
									No.	Ending Moment		No.	Ending Moment		No.	Ending Moment	
			h	m	h	m	h	m		h	m		h	m		h	m
		2027A.D.															
1	Sat	Feb. 20	6	29.3	12	13.7	17	58.4	S 14	8	00.4	9	16	08.0	5	15	08.7
									(S 15	28	53.6)						
2	Sun	21	6	28.6	12	13.6	17	58.9	K 1	26	03.7	10	13	51.3	6	11	27.5
3	Mon	22	6	27.8	12	13.5	17	59.4	2	23	39.6	11	11	55.1	7	8	02.3
															(8	29	00.0)
4	Tue	23	6	27.0	12	13.4	17	59.9	3	21	49.5	12	10	28.5	9	26	26.7
5	Wed	24	6	26.3	12	13.2	18	00.4	4	20	40.7	13	9	39.2	10	24	27.2
6	Thu	25	6	25.5	12	13.1	18	00.9	K 5	20	18.1	14	9	33.2	11	23	04.5
7	Fri	26	6	24.6	12	12.9	18	01.4	6	20	43.6	15	10	13.7	12	22	19.1
8	Sat	27	6	23.8	12	12.7	18	01.9	7	21	55.2	16	11	40.1	13	22	08.8
9	Sun	28	6	23.0	12	12.6	18	02.4	8	23	46.6	17	13	47.6	14	22	28.7
10	Mon	Mar. 1	6	22.1	12	12.4	18	02.8	9	26	07.5	18	16	27.3	15	23	11.1
11	Tue	2	6	21.3	12	12.2	18	03.3	K 10	28	44.8	19	19	27.4	16	24	07.0
12	Wed	3	6	20.4	12	12.0	18	03.8	11	---	---	20	22	34.5	17	25	06.6
13	Thu	4	6	19.5	12	11.8	18	04.2	11	7	24.7	21	25	35.9	18	26	00.9
14	Fri	5	6	18.7	12	11.6	18	04.7	12	9	54.4	22	28	20.9	19	26	42.3
15	Sat	6	6	17.8	12	11.3	18	05.1	13	12	04.0	23	---	---	20	27	05.2
16	Sun	7	6	16.9	12	11.1	18	05.5	14	13	46.8	23	6	42.1	21	27	06.2
17	Mon	8	6	16.0	12	10.9	18	06.0	K 30	14	59.4	24	8	35.1	22	26	43.9
18	Tue	9	6	15.0	12	10.6	18	06.4	S 1	15	41.2	25	9	58.4	23	25	58.3
19	Wed	10	6	14.1	12	10.4	18	06.8	2	15	53.3	26	10	52.8	24	24	50.4
20	Thu	11	6	13.2	12	10.1	18	07.2	3	15	37.9	27	11	20.1	25	23	22.0
21	Fri	12	6	12.3	12	09.8	18	07.6	4	14	57.6	1	11	22.7	26	21	34.7
22	Sat	13	6	11.3	12	09.6	18	08.0	S 5	13	55.0	2	11	03.2	27	19	30.5
23	Sun	14	6	10.4	12	09.3	18	08.4	6	12	32.4	3	10	23.8	1	17	10.8
24	Mon	15	6	09.4	12	09.0	18	08.8	7	10	51.7	4	9	26.5	2	14	37.0
25	Tue	16	6	08.5	12	08.8	18	09.2	8	8	54.9	5	8	13.2	3	11	50.7
26	Wed	17	6	07.5	12	08.5	18	09.6	9	6	44.1	6	6	46.0	4	8	53.4
									(S 10	28	21.9)	(7	29	07.5)	(5	29	47.2)
27	Thu	18	6	06.5	12	08.2	18	10.0	11	25	51.6	8	27	21.2	6	26	34.7
28	Fri	19	6	05.6	12	07.9	18	10.4	12	23	17.8	9	25	31.7	7	23	19.5
29	Sat	20	6	04.6	12	07.6	18	10.8	13	20	45.7	10	23	44.8	8	20	05.8
30	Sun	21	6	03.6	12	07.3	18	11.2	S 14	18	22.0	11	22	07.1	9	16	58.9

N.B. - All timings are given in I.S.T. or the local mean time of the meridian of 82½° E. Long.

Names of Nakshatras:- 1.Asvini 2.Bharani 3.Krittika 4.Rohini 5.Mrigasiras 6.Ardra 7.Punarvasu 8.Pushya 9.Aslesha 10.Magha 11.Purva Phalguni 12.Uttara Phalguni 13.Hasta 14.Chitra 15.Svati 16.Visakha 17.Anuradha 18.Jyestha 19.Mula 20.Purvasadha 21.Uttarasadha 22.Sravana 23.Dhanistha 24.Satabhisaj 25.Purva Bhadrapada 26.Uttara Bhadrapada 27.Revati

Names of Yogas:- 1.Viskumbha 2.Priti 3.Ayusman 4.Saubhagya 5.Sobhana 6.Atiganda 7.Sukarma 8.Dhriti 9.Sula 10.Ganda 11. Vriddhi 12.Dhruva 13.Vyaghata 14.Harshana 15.Vajra 16.Siddhi (Asrik) 17.Vyatipata 18.Variyan 19.Parigha 20.Siva 21.Siddha 22.Sadhya 23.Subha 24.Sukla (Sukra) 25.Brahma 26.Indra 27.Vaidhriti

INDIAN CALENDAR

Uttarayana
Dakshina Gola

SAKA ERA 1948
Month of PHALGUNA (30 days)

Ayanamsa on 1st : $24^0\ 14'\ 23''$

(*Nirayana*) 8 Phalguna, 5127 Kali Era to (*Nirayana)* 7 Chaitra, 5127 Kali Era

Date	Gregorian Date	Solar Month	Lunar Month	Transit of the Sun Date	Phenomena	Festivals
	2027A.D.					
1	Feb. 20				1- Full Moon ($28^h\ 53^m.6$)	1- Guru Rabi Das's Birthday, Maghi Purnima
2	21		M A G H A			2- Masi Magham
3	22	M A G U N A				
4	23					
5	24				5- Sayana Vyatipata ($21^h\ 30^m.8$)	
6	25					
7	26					
8	27					8- Vaikkatashtami (Kerala)
9	28	P H A L G U N A				9- Astaka(Sakashtaka), Janaki Janma
10	Mar. 1					
11	2		C H A N D R A			11- Birthday of Swami Dayananda Saraswati (Founder of Arya Samaj)
12	3					
13	4					13- Vijaya Ekadasi
14	5			14- Sun enters Purva Bhadrapada nak. ($6^h\ 57^m.7$)		
15	6					15- Maha Shivaratri (Kashmir), Maha Shivaratri, Shivaratri (S.India)
16	7	S A U R A				
17	8		P H A L G U N A		17- New Moon ($14^h\ 59^m.4$)	
18	9					
19	10					19- Birthday of Sri Ramakrishna Paramahamsa Deva
20	11				20- Sayana Vaidhriti ($15^h\ 57^m.9$)	
21	12					
22	13					
23	14			23- Saura Chaitradi ($7^h\ 10^m.3$)		
24	15	S A U R A C H A I T R A				24- Holastaka
25	16					
26	17		C H A N D R A			
27	18			27- Sun enters Uttara Bhadrapada nak. ($15^h\ 20^m.0$)		27- Amalaki Ekadasi
28	19					
29	20			29- Sun enters Trop. Aries ($25^h\ 54^m.7$)		
30	Mar. 21					30- Indian Year Ending Day, Mahavisuva Day

N.B. - All timings are given in I.S.T. or the local mean time of the meridian of $82\frac{1}{2}^0$ E. Long.

Moon enters :- Simha 1,16h08.0m;Kanya 3,17h30.4m;Tula 5,21h30.6m;Vrischika 7,29h14.4m;Dhanus 10,16h27.3m;Makara 12,29h20.9m;Kumbha 15,17h34.8m;Mina 17,27h40.4m;Mesha 20,11h20.1m;Vrisha 22,16h55.1m;Mithuna 24,20h51.7m;Karkata 26,23h33.0m;Simha 28,25h31.7m;Kanya 30,27h45.0m

Sun enters : Nir. Mina 24, 7h 00.1m

INDIAN CALENDAR Mesha:Madhava

SAKA ERA 1949 Spring(Vasanta) 2nd Month

Month of CHAITRA (30 DAYS)

(Nirayana) 8 Chaitra, 5127 Kali Era to *(Nirayana)* 7 Vaisakha, 5128 Kali Era

Date	Week Day	Gregorian Date	Sunrise		Apparent Noon		Sunset		Tithi				Nakshatra				Yoga			
									No.		Ending Moment		No.	Ending Moment			No.	Ending Moment		
			h	m	h	m	h	m			h	m		h	m			h	m	
		2027 A.D.																		
1	Mon	Mar 22	6	02.6	12	07.0	18	11.5	S	15	16	13.8	12	20	46.2		10	14	04.2	
2	Tue	23	6	01.7	12	06.7	18	11.9	K	1	14	28.9	13	19	50.0		11	11	27.8	
3	Wed	24	6	00.7	12	06.4	18	12.3		2	13	14.7	14	19	25.8		12	9	15.4	
4	Thu	25	5	59.7	12	06.1	18	12.7		3	12	38.2	15	19	40.0		13	7	32.1	
5	Fri	26	5	58.7	12	05.8	18	13.0		4	12	44.0	16	20	36.3		14	6	21.5	
																	(15	29	45.3)	
6	Sat	27	5	57.8	12	05.5	18	13.4	K	5	13	33.9	17	22	15.1		16	29	42.2	
7	Sun	28	5	56.8	12	05.2	18	13.8		6	15	05.4	18	24	32.1		17	---	---	
8	Mon	29	5	55.8	12	04.9	18	14.1		7	17	11.5	19	27	18.4		17	6	07.8	
9	Tue	30	5	54.8	12	04.6	18	14.5		8	19	40.3	20	---	---		18	6	54.8	
10	Wed	31	5	53.9	12	04.3	18	14.9		9	22	16.9	20	6	21.3		19	7	53.4	
11	Thu	Apr 1	5	52.9	12	04.0	18	15.3	K	10	24	45.6	21	9	25.6		20	8	52.4	
12	Fri	2	5	51.9	12	03.7	18	15.6		11	26	52.4	22	12	16.6		21	9	41.2	
13	Sat	3	5	51.0	12	03.4	18	16.0		12	28	27.0	23	14	41.9		22	10	10.6	
14	Sun	4	5	50.0	12	03.1	18	16.4		13	29	23.6	24	16	33.3		23	10	14.0	
15	Mon	5	5	49.1	12	02.8	18	16.8		14	29	40.9	25	17	47.0		24	9	47.9	
16	Tue	6	5	48.1	12	02.5	18	17.1	K	30	29	21.1	26	18	23.3		25	8	51.5	
17	Wed	7	5	47.2	12	02.3	18	17.5	S	1	28	29.0	27	18	25.7		26	7	26.5	
																	(27	29	36.4)	
18	Thu	8	5	46.3	12	02.0	18	17.9		2	27	10.6	1	17	59.7		1	27	25.7	
19	Fri	9	5	45.3	12	01.7	18	18.3		3	25	32.4	2	17	11.5		2	24	59.2	
20	Sat	10	5	44.4	12	01.4	18	18.7		4	23	40.4	3	16	07.6		3	22	21.6	
21	Sun	11	5	43.5	12	01.2	18	19.0	S	5	21	40.0	4	14	53.7		4	19	37.0	
22	Mon	12	5	42.6	12	00.9	18	19.4		6	19	35.4	5	13	34.4		5	16	48.8	
23	Tue	13	5	41.7	12	00.6	18	19.8		7	17	29.4	6	12	13.3		6	13	59.3	
24	Wed	14	5	40.8	12	00.4	18	20.2		8	15	24.3	7	10	52.5		7	11	10.4	
25	Thu	15	5	39.9	12	00.2	18	20.6		9	13	21.4	8	9	33.8		8	8	23.2	
26	Fri	16	5	39.0	11	59.9	18	21.0	S	10	11	22.1	9	8	18.5		10	26	58.5	
27	Sat	17	5	38.2	11	59.7	18	21.4		11	9	28.3	10	7	08.3		11	24	24.1	
28	Sun	18	5	37.3	11	59.4	18	21.8		12	7	42.6	11	6	6.0		12	21	58.3	
													(12	29	15.3)					
29	Mon	19	5	36.5	11	59.2	18	22.2		13	6	08.9	13	28	40.9		13	19	44.7	
										(14	28	51.8)								
30	Tue	20	5	35.6	11	59.0	18	22.6	S	15	27	57.2	14	28	28.6		14	17	47.2	

N.B. All timings are given in IST or the local time of meridian of 82 1/2 ˚ E longitude

Name of Nakshatras: 1. Asvini 2. Bharani 3. Krittika 4. Rohini 5. Mrigasiras 6. Ardra 7. Punarvasu 8.Pushya 9. Aslesha 10. Magha 11. Purva Phalguni 12.Uttar Phalguni 13. Hasta 14. Chitra 15. Svati 16. Visakha 17. Anuradha 18. Jyestha 19. Mula 20. Purvasadha 21. Uttarasadha 22. Sravana 23. Dhanistha 24. Satabhisaj 25. Purva Bhadrapada 26. Uttar Bhadrapada 27. Revati.

Name of Yogas: 1. Viskumbha 2. Priti 3. Ayusman 4. Saubhagya 5. Sobhana 6. Atiganda 7. Sukarma 8. Dhriti 9. Sula 10. Ganda 11. Vriddhi 12. Dhruba 13. Vyaghata 14. Harshana 15. Vajra 16. Siddhi(Asrik) 17.Vyatipata 18. Variyan 19. Parigha 20. Siva 21. Siddha 22. Sadhya 23. Subha 24. Sukla(Sukra) 25. Bramha 26. Indra 27. Vaidhriti

Uttarayana
Uttara gola

INDIAN CALENDAR

Saka Era 1949

Ayanamsa on 1st 24˚14'26"

Month of CHAITRA (30days)

Nirayana 8 Chaitra 5127 KE to Nirayana 7 Vaisakha 5128 KE

Date	Gregorian Date	Solar Month	Lunar Month	Transit of the sun	Phenomena	Festivals
	2027 A.D.					
1	Mar 22				1- Full Moon (16h 13.8m)	1- Indian New Year Day,Panguni Uttiram, Dolayatra, Holikadahana, Birthday of Sri Chaitanya
2	23					2- Holi, Hola, Vasantatsava
3	24				1-Sayana Vyatipata (11h 13.1m)	
4	25					
5	26					
6	27		CHANDRA PHALGUNA			6- Ranga Panchami, Bijoy Gavindaji Halangkar (Manipur)
7	28					
8	29					
9	30	SAURA CHAITRA				9- Varsitaparambha(Jain), Sitalashtami
10	31			10- Sun enters Revati nak. (26h 13.8m)		
11	Apr 1					
12	2					12- Papamochini Ekadasi
13	3					
14	4				14-Sayana Vaidhriti (18h 47.9m)	14-Varuni,Madhu Krishna Trayodasi
15	5					15-Birthday anniversary of Swami Leela Shah
16	6				16- New Moon (29h 21.1m)	
17	7					17- Cheti Chand (Sindhi New Year's day),Chaitra Sukladi(Gudi Padava, Ugadi), Vasanta Navaratrambha (or Sthapana Navaratrambha),Telugu New year's day
18	8					
19	9					19-Gauri Tritiya(Gangaur), Andolana Tritiya, Sarhul (Bihar)
20	10					
21	11					21-Sri (Lakshmi) Panchami
22	12					22- Skanda Sashthi,Oli begins(Jain)
23	13			23- Saura		23- Vastanti Pujarambha
24	14		CHANDRA CHAITRA	24- Sun enters Asvini nak. (15h 28.4m)		24-Dr. B. R. Ambedkar Jayanti, Vaisakhi (Punjab, Haryana, H.P, Delhi & Odisha), Mesa Samkranti (Odisha), Visu(Kerala), Chaitra Samkranti, Chadaka Puja(Bengal), Cheiraoba (Manipur), Meshadi (Tamilnadu), Beginning of 5128 K.E, Annapurna Puja, Asokashtami(Punarvasu upto 10h. 52.5m), Mela Bahu Fort(Jammu),Tamil New Year's Day
25	15					25-Vaisakhadi (Bengal),Bahag Bihu(Assam), Shilhenba (Manipur),Rama Navami
26	16	SAURA VAISAKHA			26-Sayana Vyatipata (24h 04.7m)	
27	17					27-Kamada Ekadasi.Trichur Pooram(Kerala)
28	18					28-Ananga Travodasi,Minakshi Kalyanam
29	19					29-Mahavira Jayanti (Jain),Damanaka Chaturdasi (Vishnu damanaka & Shiva Damanaka)
30	20			30-Sun enters trop. Taurus (12h	30- Full Moon (27h 57.2m)	30-Trivandrum Arat(Kerala),Chaitri Purnima, Hanumat Jayanti (S. India), Oli Ends(Jain)

N.B: All the timings are given in I.S.T. or the local mean time of the meridian of 82½ ˚ E long.

Moon enters: Tula 3,7h33.4m;Vrischika 5,14h18.2m;Dhanus 7,24h32.1m;Makara 10,7h33.4m;Kumbha 12,14h18.2m;Mina 14,24h32.1m;Mesha 17,13h7.8m;Vrisha 19,25h33.1m;Mithuna 22,11h32.2m;Karkata 24,18h25.7m;Simha 26,22h56.8m;Kanya 28,26h14.5m;Tula 30,29h12.6m

Sun enters : Nir. Mesha 24, 15h 28.4m

INDIAN CALENDAR

SAKA ERA 1949

Month of VAISAKHA (31 DAYS)

(Nirayana) 8 Vaisakha, 5128 Kali Era to *(Nirayana)* 7 Jyaishtha, 5128 Kali Era

Vrisha: Sukra

Summer (Grisma) 1st month

Date	Week Day	Gregorian Date	Sunrise		Apparent Noon		Sunset		Tithi				Nakshatra			Yoga		
									No.		Ending Moment		No.	Ending Moment		No.	Ending Moment	
			h	m	h	m	h	m			h	m		h	m		h	m
		2027 A.D.																
1	Wed	Apr 21	5	34.8	11	58.8	18	23.0	K	1	27	30.7	15	28	44.2	15	16	10.2
2	Thu	22	5	34.0	11	58.6	18	23.4		2	27	37.5	16	29	32.7	16	14	57.9
3	Fri	23	5	33.2	11	58.4	18	23.9		3	28	21.2	17	---	---	17	14	13.4
4	Sat	24	5	32.4	11	58.2	18	24.3		4	---	---	17	6	57.2	18	13	58.1
5	Sun	25	5	31.6	11	58.0	18	24.7		4	5	42.2	18	8	57.7	19	14	11.1
6	Mon	26	5	30.8	11	57.9	18	25.1	K	5	7	37.2	19	11	30.1	20	14	48.3
7	Tue	27	5	30.1	11	57.7	18	25.6		6	9	57.7	20	14	25.5	21	15	42.8
8	Wed	28	5	29.4	11	57.6	18	26.0		7	12	31.1	21	17	30.9	22	16	44.6
9	Thu	29	5	28.6	11	57.4	18	26.4		8	15	01.9	22	20	30.9	23	17	42.7
10	Fri	30	5	27.9	11	57.3	18	26.9		9	17	14.1	23	23	10.3	24	18	25.6
11	Sat	May 1	5	27.2	11	57.2	18	27.3	K	10	18	54.1	24	25	16.2	25	18	43.6
12	Sun	2	5	26.5	11	57.0	18	27.8		11	19	52.3	25	26	40.4	26	18	29.6
13	Mon	3	5	25.9	11	56.9	18	28.2		12	20	04.5	26	27	19.5	27	17	39.9
14	Tue	4	5	25.2	11	56.8	18	28.7		13	19	31.3	27	27	15.0	1	16	14.2
15	Wed	5	5	24.6	11	56.7	18	29.1		14	18	17.0	1	26	32.1	2	14	15.1
16	Thu	6	5	24.0	11	56.7	18	29.6	K	30	16	28.6	2	25	18.2	3	11	47.4
17	Fri	7	5	23.4	11	56.6	18	30.1	S	1	14	14.4	3	23	42.3	4	8	57.4
18	Sat	8	5	22.8	11	56.5	18	30.5		2	11	43.3	4	21	53.3	5	5	51.7
																(6	26	37.3)
19	Sun	9	5	22.2	11	56.5	18	31.0		3	9	03.7	5	19	59.6	7	23	20.5
20	Mon	10	5	21.7	11	56.4	18	31.5		4	6	23.4	6	18	08.7	8	20	06.8
									S	(5	27	48.6)						
21	Tue	11	5	21.1	11	56.4	18	31.9		6	25	24.2	7	16	26.1	9	17	00.4
22	Wed	12	5	20.6	11	56.4	18	32.4		7	23	13.5	8	14	56.1	10	14	04.4
23	Thu	13	5	20.1	11	56.4	18	32.9		8	21	18.3	9	13	41.1	11	11	20.7
24	Fri	14	5	19.6	11	56.4	18	33.3		9	19	39.7	10	12	42.4	12	8	50.4
25	Sat	15	5	19.2	11	56.4	18	33.8	S	10	18	18.0	11	12	00.4	13	6	33.7
																(14	28	31.0)
26	Sun	16	5	18.7	11	56.4	18	34.3		11	17	13.9	12	11	35.7	15	26	42.9
27	Mon	17	5	18.3	11	56.4	18	34.8		12	16	28.6	13	11	29.3	16	25	10.6
28	Tue	18	5	17.9	11	56.4	18	35.2		13	16	04.2	14	11	43.0	17	23	55.6
29	Wed	19	5	17.5	11	56.5	18	35.7		14	16	03.4	15	12	19.4	18	23	00.2
30	Thu	20	5	17.1	11	56.5	18	36.2	S	15	16	29.0	16	13	21.3	19	22	26.3
31	Fri	21	5	16.7	11	56.6	18	36.6	K	1	17	23.8	17	14	51.3	20	22	15.5

N.B. All timings are given in IST or the local time of meridian of 82 1/2 ˚ E longitude

Name of Nakshatras: 1. Asvini 2. Bharani 3. Krittika 4. Rohini 5. Mrigasiras 6. Ardra 7. Punarvasu 8.Pushya 9. Aslesha 10. Magha 11. Purva Phalguni 12.Uttar Phalguni 13. Hasta 14. Chitra 15. Svati 16. Visakha 17. Anuradha 18. Jyestha 19. Mula 20. Purvasadha 21. Uttarasadha 22. Sravana 23. Dhanistha 24. Satabhisaj 25. Purva Bhadrapada 26. Uttar Bhadrapada 27. Revati.

Name of Yogas: 1. Viskumbha 2. Priti 3. Ayusman 4. Saubhagya 5. Sobhana 6. Atiganda 7. Sukarma 8. Dhriti 9. Sula 10. Ganda 11. Vriddhi 12. Dhruba 13. Vyaghata 14. Harshana 15. Vajra 16. Siddhi(Asrik) 17.Vyatipata 18. Variyan 19. Parigha 20. Siva 21. Siddha 22. Sadhya 23. Subha 24. Sukla(Sukra) 25. Bramha 26. Indra 27. Vaidhriti

Uttarayana
Uttara gola

INDIAN CALENDAR

Saka Era 1949

Ayanamsa on 1st 24˚14'29"

Month of VAISAKHA (31 Days)

(*Nirayana*) 8 Vaisakha 5128 KE to (*Nirayana*) 7 Jyaishtha 5128 KE

Date	Gregorian Date	Solar Month	Lunar Month	Transit of the sun	Phenomena	Festivals
	2027 A.D.					
1	Apr 21					
2	22					
3	23					3- Babu Kuer Singh Day(Bihar)
4	24					
5	25					
6	26					
7	27					
8	28		CHANDRA CHAITRA	8-Sun enters Bharani nak. (7h 22.7m)		
9	29				9- Sayana Vaidhriti (26h 43.2m)	
10	30					
11	May 1					11- May Day
12	2					12- Shri Vallabhacharya Jayanti, Varuthini Ekadasi
13	3	SAURA VAISAKHA				13- Birthday Anniversary of Dada Chellaram (Sindhi)
14	4					
15	5					
16	6				16- New Moon (16h 28.6m)	
17	7					17- Tithi of Deva Damodara (Assam)
18	8					18- Parasurama Jayanti
19	9					19- Akshaya Tritiya, Kedar Badri Yatra, Varsitapa Samapana(Jain), Birthday of Ravindranath Tagore
20	10					20- Sri Sankaracharya Jayanti, Sri Ramanujacharya
21	11		CHANDRA VAISAKHA	21- Sun enters Krittika nak. (25h 27.1m)		21- Sri Ramanujacharya Jayanti
22	12				22- Sayana Vyatipata (11h 12.6m)	22- Gangotpatti
23	13					
24	14			24- Saura Jaisthadi (11h 38.3m)		24- Sita Navami
25	15					
26	16					26- Mohini Ekadasi
27	17					
28	18					28- Nrisimha Chaturdasi
29	19					
30	20	SAURA JYAISHTHA			30- Full Moon (16h 29.0m)	30- Vaisakhi Purnima, Buddha Purnima
31	21			31-Sun enters trop. Gemini (11h 48.2m)		

N.B: All the timings are given in I.S.T. or the local mean time of the meridian of 82½ ˚ E long.

Moon enters: Vrischika 2, 23h17.3m; Dhanus 5, 08h57.7m; Makara 7, 21h11.4m; Kumbha 10, 09h54.1m; Mina 12, 20h23.5m; Mesha 14, 27h15.0m; Vrisha 17, 06h56.0m; Mithuna 19, 08h56.5m; Karkata 21, 10h 50.7m; Simha 23,13h 41.1m; Kanya 25, 17h 52.6m; Tula 27, 23h33.5 m; Vrischika 30, 07h 03.3m

Sun enters : Nir. Vrisha 25, 12h 19.7m

INDIAN CALENDAR Mithuna:Suchi

SAKA ERA 1949 Summer (Grisma) 2nd month

Month of JYAISHTHA (31 DAYS)

(Nirayana) 8 Jyaishtha, 5128 Kali Era to *(Nirayana)* 7 Ashadha, 5128 Kali Era

Date	Week Day	Gregorian Date	Sunrise		Apparent Noon		Sunset		Tithi			Nakshatra			Yoga		
									No.	Ending Moment		No.	Ending Moment		No.	Ending Moment	
			h	m	h	m	h	m		h	m		h	m		h	m
		2027 A.D.															
1	Sat	May 22	5	16.4	11	56.6	18	37.1	K 2	18	48.6	18	16	50.6	21	22	28.0
2	Sun	23	5	16.1	11	56.7	18	37.6	3	20	42.2	19	19	17.7	22	23	02.3
3	Mon	24	5	15.8	11	56.8	18	38.0	4	22	59.4	20	22	08.1	23	23	54.2
4	Tue	25	5	15.5	11	56.9	18	38.5	K 5	25	31.3	21	25	12.8	24	24	57.1
5	Wed	26	5	15.3	11	57.0	18	39.0	6	28	05.2	22	28	19.8	25	26	01.9
6	Thu	27	5	15.0	11	57.1	18	39.4	7	---	---	23	---	---	26	26	58.1
7	Fri	28	5	14.8	11	57.2	18	39.9	7	6	26.6	23	7	14.5	27	27	35.0
8	Sat	29	5	14.6	11	57.4	18	40.3	8	8	20.7	24	9	42.8	1	27	43.1
9	Sun	30	5	14.4	11	57.5	18	40.8	9	9	35.4	25	11	32.4	2	27	15.6
10	Mon	31	5	14.3	11	57.6	18	41.2	K 10	10	02.9	26	12	35.8	3	26	08.9
11	Tue	June 1	5	14.1	11	57.8	18	41.6	11	9	40.2	27	12	49.9	4	24	22.7
12	Wed	2	5	14.0	11	57.9	18	42.1	12	8	29.1	1	12	16.9	5	21	59.8
13	Thu	3	5	13.9	11	58.1	18	42.5	13 (14	6 28	35.0 05.6)	2	11	02.1	6	19	05.5
14	Fri	4	5	13.8	11	58.3	18	42.9	K 30	25	10.3	3	9	14.0	7	15	46.5
15	Sat	5	5	13.8	11	58.4	18	43.3	S S1	21	59.0	4 (5	7 28	02.3 37.1)	8	12	10.5
16	Sun	6	5	13.7	11	58.6	18	43.7	2	18	41.4	6	26	08.6	9 (10	8 28	25.4 39.0)
17	Mon	7	5	13.7	11	58.8	18	44.1	3	15	26.5	7	23	45.9	11	24	58.3
18	Tue	8	5	13.7	11	59.0	18	44.5	4	12	22.4	8	21	37.1	12	21	29.4
19	Wed	9	5	13.7	11	59.2	18	44.9	S 5	9	35.8	9	19	48.4	13	18	17.1
20	Thu	10	5	13.7	11	59.4	18	45.2	6	7	12.0	10	18	24.3	14	15	24.9
21	Fri	11	5	13.8	11	59.6	18	45.6	7 (8	5 27	14.4 45.0)	11	17	27.7	15	12	55.1
22	Sat	12	5	13.8	11	59.8	18	45.9	9	26	44.5	12	16	59.6	16	10	48.6
23	Sun	13	5	13.9	12	00.0	18	46.2	S 10	26	12.6	13	17	00.1	17	9	05.5
24	Mon	14	5	14.0	12	00.2	18	46.6	11	26	08.5	14	17	28.3	18	7	45.1
25	Tue	15	5	14.1	12	00.4	18	46.9	12	26	31.4	15	18	23.4	19	6	46.8
26	Wed	16	5	14.2	12	00.6	18	47.2	13	27	20.5	16	19	44.4	20	6	09.8
27	Thu	17	5	14.4	12	00.9	18	47.4	14	28	35.2	17	21	30.5	21	5	53.2
28	Fri	18	5	14.6	12	01.1	18	47.7	S 15	---	---	18	23	40.6	22	5	56.6
29	Sat	19	5	14.7	12	01.3	18	47.9	S 15	6	14.3	19	26	13.0	23	6	18.8
30	Sun	20	5	14.9	12	01.5	18	48.2	K 1	8	15.8	20	29	04.2	24	6	58.2
31	Mon	21	5	15.1	12	01.7	18	48.4	K 2	10	35.7	21	---	---	25	7	51.9

N.B. All timings are given in IST or the local time of meridian of 82 1/2 ˚ E longitude

Name of Nakshatras: 1. Asvini 2. Bharani 3. Krittika 4. Rohini 5. Mrigasiras 6. Ardra 7. Punarvasu 8.Pushya 9. Aslesha 10. Magha 11. Purva Phalguni 12.Uttar Phalguni 13. Hasta 14. Chitra 15. Svati 16. Visakha 17. Anuradha 18. Jyestha 19. Mula 20. Purvasadha 21. Uttarasadha 22. Sravana 23. Dhanistha 24. Satabhisaj 25. Purva Bhadrapada 26. Uttar Bhadrapada 27. Revati.

Name of Yogas: 1. Viskumbha 2. Priti 3. Ayusman 4. Saubhagya 5. Sobhana 6. Atiganda 7. Sukarma 8. Dhriti 9. Sula 10. Ganda 11. Vriddhi 12. Dhruba 13. Vyaghata 14. Harshana 15. Vajra 16. Siddhi(Asrik) 17.Vyatipata 18. Variyan 19. Parigha 20. Siva 21. Siddha 22. Sadhya 23. Subha 24. Sukla(Sukra) 25. Bramha 26. Indra 27. Vaidhriti

Uttarayana
Uttara gola

INDIAN CALENDAR
Saka Era 1949
Month of JYAISHTHA (31 Days)
(*Nirayana)* 8 Jyaishtha 5128 KE to (*Nirayana)* 7 Ashadha 5128 KE

Ayanamsa on 1st 24˚14'34"

Date	Gregorian Date	Solar Month	Lunar Month	Transit of the sun	Phenomena	Festivals
	2027 A.D.					
1	May 22					
2	23					
3	24		CHANDRA VAISAKHA			
4	25			4- Sun enters Rohini nak. (21h 44.7m)	4- Sayana Vaidhriti (08h 59.8m)	
5	26					
6	27					
7	28					
8	29					
9	30					
10	31					
11	June 1					11- Apara Ekadasi, Bhadrakali Ekadasi (Punjab)
12	2					
13	3	SAURA JYAISHTHA				13- Savitri Chaturdasi
14	4				14- New Moon (25h 10.3m)	14- Phalaharini Kalika Puja, Vata Savitri Vrata (Amavasya Paksha)
15	5		CHANDRA JYAISHTHA			
16	6				16- Sayana Vyatipata (25h 53.8m)	
17	7					17- Pratap Jayanti(Rajasthan),Rambha tritiya
18	8			18- Sun enters Mrigasiras nak. (19h 32.1m)		18- Guru Arjan Dev's Martyardom Day (Sikh)
19	9					
20	10					20- Vindhya Vasini Puja, Aranya Shashthi or Jamatri Shashthi(Bengal)
21	11					21- Mela Kshir Bhawani(Kashmir)
22	12					
23	13					23- Ganga Dasahara
24	14			24- Saura Asadhadi (17h 57.4m)		24- Nirjala Ekadasi
25	15					25- Champaka Dvadasi, Rajas Sankranti(Odisha)
26	16					
27	17	SAURA ASHADHA				
28	18					28- Vata Savitri Vrata(Purnima Paksha), Deva Snana Purnima
29	19				29-Full Moon(06h 14.3m)	
30	20				29- Sayana Vaidhriti (15h 16.0m)	30- Guru Hargobind's Birthday
31	21			31- Sun enters trop. Cancer (19h 40.8m)		31- Dakshinayan Day

N.B: All the timings are given in I.S.T. or the local mean time of the meridian of 82½ ˚ E long.

Moon enters: Dhanus 1, 16h50.6m; Makara 3, 28h53.3m; Kumbha 6, 17h49.6m; Mina 8, 29h09.2m; Mesha 11, 12h49.9m; Vrisha 13, 16h37.8m; Mithuna 15, 17h50.7m; Karkata 17, 18h 20.6m; Simha 19, 19h 48.4m; Kanya 21, 23h 18.0m; Tula 23, 29h10.8 m; Vrischika 26, 13h 21.7m; Dhanus 28, 23h 40.6m; Makara 31, 11h 49.3m; Sun enters : Nir. Mithuna 25, 18h 55.9m

INDIAN CALENDAR

SAKA ERA 1949

Month of ASHADHA (31 DAYS)

(Nirayana) 8 Ashadha, 5128 Kali Era to *(Nirayana)* 7 Sravana, 5128 Kali Era

Karkata: Nabhas

Rains(Varsa) 1st month

Date	Week Day	Gregorian Date	Sunrise		Apparent Noon		Sunset		Tithi				Nakshatra				Yoga			
									No.		Ending Moment		No.	Ending Moment			No.	Ending Moment		
			h	m	h	m	h	m			h	m		h	m			h	m	
		2027 A.D																		
1	Tue	June 22	5	15.3	12	01.9	18	48.6	K	3	13	07.7	21	8	08.5		26	8	55.5	
2	Wed	23	5	15.6	12	02.1	18	48.8		4	15	43.1	22	11	17.8		27	10	02.8	
3	Thu	24	5	15.8	12	02.4	18	49.0	K	5	18	10.4	23	14	21.4		1	11	06.1	
4	Fri	25	5	16.1	12	02.6	18	49.1		6	20	17.4	24	17	07.1		2	11	56.4	
5	Sat	26	5	16.3	12	02.8	18	49.3		7	21	52.2	25	19	23.1		3	12	24.7	
6	Sun	27	5	16.6	12	03.0	18	49.4	K	8	22	45.0	26	20	59.1		4	12	23.2	
7	Mon	28	5	16.9	12	03.2	18	49.5		9	22	49.7	27	21	48.6		5	11	45.6	
8	Tue	29	5	17.2	12	03.4	18	49.6	K	10	22	04.5	1	21	48.8		6	10	28.7	
9	Wed	30	5	17.5	12	03.6	18	49.7		11	20	31.1	2	21	01.3		7	8	32.0	
10	Thu	July 1	5	17.9	12	03.8	18	49.7		12	18	15.0	3	19	31.3		8	5	57.9	
																	(9	26	50.9)	
11	Fri	2	5	18.2	12	04.0	18	49.8		13	15	23.7	4	17	26.4		10	23	17.6	
12	Sat	3	5	18.6	12	04.2	18	49.8		14	12	06.1	5	14	55.9		11	19	25.3	
13	Sun	4	5	18.9	12	04.4	18	49.8	K S	30 (1	8 28	32.1 51.5)	6	12	10.1		12	15	22.2	
14	Mon	5	5	19.3	12	04.6	18	49.8		2	25	14.1	7	9	19.5		13	11	16.3	
15	Tue	6	5	19.7	12	04.7	18	49.7		3	21	49.1	8 (9	6 28	34.2 03.7)		14 (15	7 27	15.7 27.5)	
16	Wed	7	5	20.0	12	04.9	18	49.7		4	18	44.6	10	25	56.3		16	23	58.4	
17	Thu	8	5	20.4	12	05.1	18	49.6	S	5	16	07.8	11	24	18.8		17	20	53.5	
18	Fri	9	5	20.8	12	05.2	18	49.5		6	14	04.2	12	23	16.2		18	18	16.9	
19	Sat	10	5	21.2	12	05.4	18	49.4		7	12	37.7	13	22	51.5		19	16	10.8	
20	Sun	11	5	21.6	12	05.5	18	49.3		8	11	50.1	14	23	05.4		20	14	36.3	
21	Mon	12	5	22.0	12	05.6	18	49.1		9	11	41.3	15	23	56.6		21	13	32.6	
22	Tue	13	5	22.4	12	05.7	18	48.9	S	10	12	09.2	16	25	22.4		22	12	57.9	
23	Wed	14	5	22.9	12	05.9	18	48.7		11	13	10.6	17	27	18.4		23	12	49.3	
24	Thu	15	5	23.3	12	06.0	18	48.5		12	14	41.0	18	---	---		24	13	03.2	
25	Fri	16	5	23.7	12	06.1	18	48.3		13	16	35.4	18	5	39.9		25	13	35.9	
26	Sat	17	5	24.1	12	06.2	18	48.0		14	18	48.6	19	8	21.7		26	14	23.4	
27	Sun	18	5	24.6	12	06.2	18	47.7	S	15	21	14.9	20	11	18.2		27	15	21.7	
28	Mon	19	5	25.0	12	06.3	18	47.4	K	1	23	48.2	21	14	23.7		1	16	26.3	
29	Tue	20	5	25.4	12	06.4	18	47.1		2	26	21.5	22	17	31.7		2	17	32.5	
30	Wed	21	5	25.9	12	06.4	18	46.8		3	28	47.2	23	20	34.9		3	18	34.8	
31	Thu	22	5	26.3	12	06.5	18	46.4	K	4	---	---	24	23	25.2		4	19	27.4	

N.B. All timings are given in IST or the local time of meridian of 82 1/2 ° E longitude

Name of Nakshatras: 1. Asvini 2. Bharani 3. Krittika 4. Rohini 5. Mrigasiras 6. Ardra 7. Punarvasu 8.Pushya 9. Aslesha 10. Magha 11. Purva Phalguni 12.Uttar Phalguni 13. Hasta 14. Chitra 15. Svati 16. Visakha 17. Anuradha 18. Jyestha 19. Mula 20. Purvasadha 21. Uttarasadha 22. Sravana 23. Dhanistha 24. Satabhisaj 25. Purva Bhadrapada 26. Uttar Bhadrapada 27. Revati.

Name of Yogas: 1. Viskumbha 2. Priti 3. Ayusman 4. Saubhagya 5. Sobhana 6. Atiganda 7. Sukarma 8. Dhriti 9. Sula 10. Ganda 11. Vriddhi 12. Dhruba 13. Vyaghata 14. Harshana 15. Vajra 16. Siddhi(Asrik) 17.Vyatipata 18. Variyan 19. Parigha 20. Siva 21. Siddha 22. Sadhya 23. Subha 24. Sukla(Sukra) 25. Bramha 26. Indra 27. Vaidhriti

Dakshinayana
Uttara gola

INDIAN CALENDAR
Saka Era 1949
Month of ASHADHA (31 Days)
(*Nirayana*) 8 Ashadha 5128 KE to (*Nirayana*) 7 Sravana 5128 KE

Ayanamsa on 1st 24˚14'40"

Date	Gregorian Date	Solar Month	Lunar Month	Transit of the sun	Phenomena	Festivals
	2027 A.D.					
1	June 22			1- Sun enters Ardra nak. (18h 36.0m)		
2	23					
3	24					
4	25					
5	26		CHANDRA JYAISHTHA		5- Jupiter enters Nir. Simha (5h 18.7m)	
6	27					
7	28					
8	29					
9	30					9- Yogini Ekadasi
10	July 1					
11	2				11- Sayana Vyatipata (20h 28.2m)	
12	3					
13	4	SAURA ASHADHA			13- New Moon (8h 32.1m)	
14	5					14- Ratha Yatra, Manoratha dvitiya Vrata(Bengal)
15	6			15- Sun enters Punarvasu nak. (18h 07.2m)		
16	7					
17	8					
18	9					18- Kumara Shashthi(Vrata), Vivasvat Saptami
19	10					
20	11					20- Kharchi Puja(Tripura)
21	12					21- Mela Sharik Bhagwati(Kashmir)
22	13		CHANDRA ASHADHA			22- Punaryatra, Ultaratha(Odisha), Bahudha Yatra, Martyr's Day(Kashmir)
23	14				23- Sayana Vaidhriti (21h 37.3m)	23- Harisayani Ekadasi
24	15			24- Saura Sravanadi (28h 45.6m)		
25	16					
26	17	SAURA SRAVANA				26- Manasa Puja Begins(Bengal), Mela Jwalamukhi(Kashmir)
27	18				27-Full Moon (21h 14.9m)	27- Guru Purnima, Vyasa Puja, Asadhi Purnima
28	19					
29	20			29- Sun enters Pushya nak. (17h 41.5m)	30-Venus sets in the East (06h 33.0m)	
30	21					
31	22					

N.B: All the timings are given in I.S.T. or the local mean time of the meridian of 82½ ˚ E long.

Moon enters: Kumbha 2,24h51.0m;Mina 5,12h52.5m;Mesha 7,21h48.6m;Vrisha 9,26h42.6m;Mithuna 11,28h13.7m;Karkata 13,28h 02.0m;Simha 15,28h 03.7m;Kanya 18,05h 59.6m;Tula 20,10h53.6 m;Vrischika 22,18h57.9m;Dhanus 25,05h39.9m;Makara 27,18h04.0m; Kumba 30, 07h 04.4m

Sun enters : Nir. Karkata 26, 05h 48.9m

INDIAN CALENDAR

SAKA ERA 1949

Month of SRAVANA (31 DAYS)

(*Nirayana*) 8 Sravana, 5128 Kali Era to (*Nirayana*) 7 Bhadra, 5128 Kali Era

Simha:Nabhasya

Rains (Varsa) 2nd month

Date	Week Day	Gregorian Date	Sunrise		Apparent Noon		Sunset		Tithi				Nakshatra				Yoga			
									No.		Ending Moment		No.	Ending Moment			No.	Ending Moment		
			h	m	h	m	h	m			h	m		h	m			h	m	
		2027 A.D.																		
1	Fri	July	5	26.7	12	06.5	18	46.1	K	4	6	56.8	25	25	53.9		5	20	03.8	
2	Sat	24	5	27.2	12	06.5	18	45.7	K	5	8	41.5	26	27	52.6		6	20	17.8	
3	Sun	25	5	27.6	12	06.5	18	45.2		6	9	53.2	27	29	14.1		7	20	03.5	
4	Mon	26	5	28.0	12	06.5	18	44.8		7	10	25.2	1	---	---		8	19	16.3	
5	Tue	27	5	28.5	12	06.5	18	44.4		8	10	13.2	1	5	53.3		9	17	53.4	
6	Wed	28	5	28.9	12	06.5	18	43.9		9	9	15.8	2 (3	5 28	47.7 58.2)		10	15	54.2	
7	Thu	29	5	29.3	12	06.5	18	43.4	K	10 (11	7 29	34.6 13.5)	4	27	28.3		11	13	19.9	
8	Fri	30	5	29.8	12	06.5	18	42.9		12	26	18.7	5	25	23.9		12	10	14.1	
9	Sat	31	5	30.2	12	06.4	18	42.4		13	22	58.1	6	22	53.2		13 (14	6 26	41.7 49.1)	
10	Sun	Aug 1	5	30.6	12	06.4	18	41.8		14	19	20.5	7	20	05.1		15	22	43.5	
11	Mon	2	5	31.1	12	06.3	18	41.3	K	30	15	35.2	8	17	09.6		16	18	32.8	
12	Tue	3	5	31.5	12	06.2	18	40.7	S	1	11	51.9	9	14	16.9		17	14	25.0	
13	Wed	4	5	31.9	12	06.2	18	40.1		2 (3	8 29	20.2 09.3)	10	11	37.0		18	10	27.9	
14	Thu	5	5	32.3	12	06.1	18	39.5		4	26	28.0	11	9	19.6		19 (20	6 27	49.0 35.1)	
15	Fri	6	5	32.8	12	06.0	18	38.8	S	5	24	23.4	12	7	33.4		21	24	52.0	
16	Sat	7	5	33.2	12	05.9	18	38.2		6	23	01.4	13	6	25.5		22	22	43.4	
17	Sun	8	5	33.6	12	05.7	18	37.5		7	22	25.0	14	6	01.0		23	21	11.6	
18	Mon	9	5	34.0	12	05.6	18	36.8		8	22	34.8	15	6	22.1		24	20	16.6	
19	Tue	10	5	34.4	12	05.5	18	36.1		9	23	28.1	16	7	27.9		25	19	56.0	
20	Wed	11	5	34.8	12	05.3	18	35.4	S	10	24	59.1	17	9	14.2		26	20	05.4	
21	Thu	12	5	35.2	12	05.1	18	34.7		11	27	00.1	18	11	34.3		27	20	39.0	
22	Fri	13	5	35.6	12	05.0	18	34.0		12	29	21.6	19	14	19.5		1	21	30.0	
23	Sat	14	5	36.0	12	04.8	18	33.2		13	---	---	20	17	20.6		2	22	31.5	
24	Sun	15	5	36.3	12	04.6	18	32.4		13	7	54.3	21	20	28.3		3	23	37.0	
25	Mon	16	5	36.7	12	04.4	18	31.6		14	10	29.2	22	23	34.4		4	24	40.5	
26	Tue	17	5	37.1	12	04.2	18	30.8	S	15	12	58.7	23	26	32.1		5	25	37.0	
27	Wed	18	5	37.5	12	04.0	18	30.0	K	1	15	16.2	24	29	15.5		6	26	22.3	
28	Thu	19	5	37.8	12	03.7	18	29.2		2	17	16.2	25	---	---		7	26	52.4	
29	Fri	20	5	38.2	12	03.5	18	28.4		3	18	53.9	25	7	39.3		8	27	04.1	
30	Sat	21	5	38.5	12	03.3	18	27.5		4	20	05.1	26	9	39.3		9	26	54.2	
31	Sun	22	5	38.9	12	03.0	18	26.7	K	5	20	46.0	27	11	11.3		10	26	19.9	

N.B. All timings are given in IST or the local time of meridian of 82 1/2 ˚ E longitude

Name of Nakshatras: 1. Asvini 2. Bharani 3. Krittika 4. Rohini 5. Mrigasiras 6. Ardra 7. Punarvasu 8.Pushya 9. Aslesha 10. Magha 11. Purva Phalguni 12.Uttar Phalguni 13. Hasta 14. Chitra 15. Svati 16. Visakha 17. Anuradha 18. Jyestha 19. Mula 20. Purvasadha 21. Uttarasadha 22. Sravana 23. Dhanistha 24. Satabhisaj 25. Purva Bhadrapada 26. Uttar Bhadrapada 27. Revati.

Name of Yogas: 1. Viskumbha 2. Priti 3. Ayusman 4. Saubhagya 5. Sobhana 6. Atiganda 7. Sukarma 8. Dhriti 9. Sula 10. Ganda 11. Vriddhi 12. Dhruba 13. Vyaghata 14. Harshana 15. Vajra 16. Siddhi(Asrik) 17.Vyatipata 18. Variyan 19. Parigha 20. Siva 21. Siddha 22. Sadhya 23. Subha 24. Sukla(Sukra) 25. Bramha 26. Indra 27. Vaidhriti

Dakshinayana
Uttara gola

INDIAN CALENDAR

Saka Era 1949
Month of SRAVANA (31 Days)
(*Nirayana*) 8 Sravana 5128 KE to (*Nirayana)* 7 Bhadra 5128 KE

Ayanamsa on 1st 24˚14'45"

Date	Gregorian Date	Solar Month	Lunar Month	Transit of the sun	Phenomena	Festivals
	2027 A.D.					
1	July 23			1- Sun enters trop. Leo (06h 34.6m)		1- Naga Panchami(Bengal)
2	24					
3	25					
4	26					
5	27		CHANDRA ASHADHA			5- Ker Puja(Tripura)
6	28				06- Sayana Vyatipata (12h 51.6m)	
7	29					7- Kamika Ekadasi(Smarta)
8	30					8-Kamika Ekadasi(Vaishnava & Vidhava)
9	31					
10	Aug 1					10- Tilak Commemoration Dav
11	2				11- New Moon (15h 35.2m)	11- Chitalagi Amavasya(Odisha), Adi Amavasya (Tamilnadu), Karkataka Vavu(Kerala)
12	3	SAURA SRAVANA		12- Sun enters Aslesha nak. (16h 32.9m)	11-Total Solar Eclipse (Partial Phase Visible in India)	
13	4					13- Madhusrava Tritiya(Teej), Adi
14	5					
15	6					15- Naga Panchami, Rik Upakarma
16	7					
17	8				17- Sayana Vaidhriti (29h 30.2m)	17- Goswami Tulasidas Jayanti
18	9					
19	10					
20	11					
21	12					21- Jhulana Yatrarambha(Prodosha), Jhulana Yatrarambha (Purvahna), Pavitra Ekadasi
22	13					22- Vara Maha Lakshmi Vrata(S.India)
23	14					
24	15					24- Independence Day
25	16		CHANDRA SRAVANA	25- Saura Bhadrapadadi (13h 19.5m)	25- Jupiter sets in the West (14h 31.0m)	25- Jhulana Yatra Samapana (Prodosa), Balabhadra Puja(Odisha), Naroli Purnima
26	17			26- Sun enters Magha nak. (14h 13.7m)	26-Full Moon(12h 58.7m)	26- Raksha Bandhana, Jhulana Yatra Samapana (Purvahna), Amarnath Yatra, Solono (Rakhi Bandhan), Avani Avittam(S.India), Manasa Puja
27	18	SAURA BHADRA				27- Simhadi(Kerala), Beginning of Kollam Era
28	19					
29	20					29- Teejri(Sindhi)
30	21					30- Bahula Chaturthi(Sankashta Chaturthi)
31	22				31- Sayana Vyatipata (23h 05.4m)	31- Raksha Panchami(Odisha), Tithi of Sri Madhava deva(Assam)

N.B: All the timings are given in I.S.T. or the local mean time of the meridian of 82½ ˚ E long.

Moon enters: Mina 1,19h19.2m;Mesha 3,29h14.1m;Vrisha 6,11h39.3m;Mithuna 8,14h29.9m;Karkata 10,14h 48.2m;Simha 12,14h 16.9m;Kanya 14,14h 49.9m;Tula 16,18h07.7 m;Vrischika 18,25h07.5m;Dhanus 21,11h34.3m;Makara 23,24h07.2m; Kumba 26, 13h 04.7m; Mina 28, 25h05.4m; Mesha 31, 11h11.3m

Sun enters : Nir. Simha 26, 14h 13.7m

INDIAN CALENDAR

Kanya:Isha

SAKA ERA 1949

Autumn (Sarat) 1st month

Month of BHADRA (31 DAYS)

(*Nirayana*) 8 Bhadra, 5128 Kali Era to (N*irayana*) 7 Asvina, 5128 Kali Era

Date	Week Day	Gregorian Date	Sunrise		Apparent Noon		Sunset		Tithi				Nakshatra				Yoga			
									No.		Ending Moment		No.	Ending Moment			No.	Ending Moment		
			h	m	h	m	h	m			h	m		h	m			h	m	
		2027 A.D.																		
1	Mon	Aug 23	5	39.3	12	02.8	18	25.8	K	6	20	53.4	1	12	11.8		11	25	18.6	
2	Tue	24	5	39.6	12	02.5	18	24.9		7	20	25.1	2	12	37.9		12	23	48.8	
3	Wed	25	5	39.9	12	02.2	18	24.0		8	19	20.4	3	12	28.2		13	21	49.6	
4	Thu	26	5	40.3	12	01.9	18	23.1		9	17	39.7	4	11	42.6		14	19	21.5	
5	Fri	27	5	40.6	12	01.7	18	22.2	K	10	15	25.8	5	10	22.9		15	16	26.2	
6	Sat	28	5	41.0	12	01.4	18	21.3		11	12	42.6	6	8	32.8		16	13	06.9	
7	Sun	29	5	41.3	12	01.1	18	20.4		12	9	36.0	7	6	17.9		17	9	28.3	
													(8	27	45.1)		(18	29	35.8)	
8	Mon	30	5	41.6	12	00.8	18	19.4		13	6	13.0	9	25	03.0		19	25	36.2	
										(14	26	41.7)								
9	Tue	31	5	42.0	12	00.5	18	18.5	K	30	23	11.2	10	22	20.9		20	21	36.7	
10	Wed	Sep 1	5	42.3	12	00.1	18	17.5	S	1	19	50.9	11	19	48.7		21	17	45.1	
11	Thu	2	5	42.6	11	59.8	18	16.6		2	16	50.6	12	17	36.5		22	14	09.3	
12	Fri	3	5	42.9	11	59.5	18	15.6		3	14	19.6	13	15	54.0		23	10	56.6	
13	Sat	4	5	43.3	11	59.2	18	14.6		4	12	26.4	14	14	49.8		24	8	14.0	
14	Sun	5	5	43.6	11	58.9	18	13.6	S	5	11	17.9	15	14	30.4		25	6	06.7	
																	(26	28	38.0)	
15	Mon	6	5	43.9	11	58.5	18	12.7		6	10	58.4	16	14	59.5		27	27	48.6	
16	Tue	7	5	44.2	11	58.2	18	11.7		7	11	28.5	17	16	16.6		1	27	36.2	
17	Wed	8	5	44.5	11	57.8	18	10.7		8	12	44.8	18	18	17.1		2	27	55.7	
18	Thu	9	5	44.8	11	57.5	18	09.7		9	14	39.3	19	20	52.4		3	28	39.5	
19	Fri	10	5	45.1	11	57.1	18	08.7	S	10	17	00.9	20	23	50.6		4	29	38.6	
20	Sat	11	5	45.4	11	56.8	18	07.7		11	19	36.5	21	26	59.0		5	---	---	
21	Sun	12	5	45.7	11	56.4	18	06.6		12	22	13.3	22	---	---		5	6	43.3	
22	Mon	13	5	46.0	11	56.1	18	05.6		13	24	40.1	22	6	05.1		6	7	45.1	
23	Tue	14	5	46.3	11	55.7	18	04.6		14	26	48.6	23	8	59.0		7	8	36.7	
24	Wed	15	5	46.6	11	55.4	18	03.6	S	15	28	33.5	24	11	33.4		8	9	12.8	
25	Thu	16	5	46.9	11	55.0	18	02.6	K	1	---	---	25	13	44.1		9	9	30.3	
26	Fri	17	5	47.2	11	54.7	18	01.5	K	K1	5	52.3	26	15	29.0		10	9	27.4	
27	Sat	18	5	47.6	11	54.3	18	00.5		2	6	44.2	27	16	47.9		11	9	03.6	
28	Sun	19	5	47.9	11	53.9	17	59.5		3	7	09.5	1	17	41.2		12	8	19.1	
29	Mon	20	5	48.2	11	53.6	17	58.5		4	7	09.0	2	18	09.4		13	7	14.2	
30	Tue	21	5	48.5	11	53.2	17	57.5	K	5	6	43.2	3	18	13.0		14	5	49.3	
																	(15	28	04.5)	
31	Wed	22	5	48.8	11	52.9	17	56.4		6	5	52.5	4	17	52.2		16	26	00.0	
									K	(7	28	37.2)								

N.B. All timings are given in IST or the local time of meridian of 82 1/2 ˚ E longitude

Name of Nakshatras: 1. Asvini 2. Bharani 3. Krittika 4. Rohini 5. Mrigasiras 6. Ardra 7. Punarvasu 8.Pushya 9. Aslesha 10. Magha 11. Purva Phalguni 12.Uttar Phalguni 13. Hasta 14. Chitra 15. Svati 16. Visakha 17. Anuradha 18. Jyestha 19. Mula 20. Purvasadha 21. Uttarasadha 22. Sravana 23. Dhanistha 24. Satabhisaj 25. Purva Bhadrapada 26. Uttar Bhadrapada 27. Revati.

Name of Yogas: 1. Viskumbha 2. Priti 3. Ayusman 4. Saubhagya 5. Sobhana 6. Atiganda 7. Sukarma 8. Dhriti 9. Sula 10. Ganda 11. Vriddhi 12. Dhruba 13. Vyaghata 14. Harshana 15. Vajra 16. Siddhi(Asrik) 17.Vyatipata 18. Variyan 19. Parigha 20. Siva 21. Siddha 22. Sadhya 23. Subha 24. Sukla(Sukra) 25. Bramha 26. Indra 27. Vaidhriti

Dakshinayana
Uttara gola

INDIAN CALENDAR

Saka Era 1949
Month of BHADRA (31 Days)
(*Nirayana)* 8 Bhadra 5128 KE to (*Nirayana)* 7 Asvina 5128 KE

Ayanamsa on 1st 24˚14'49

Date	Gregorian Date	Solar Month	Lunar Month	Transit of the sun	Phenomena	Festivals
	2027 A.D.					
1	Aug 23			1- Sun enters trop. Virgo (13h 44.3m)		
2	24		SRAVANA			2- Vadi Thadri (Sindhi), Sri Krishna Jayanti (Tamilnadu, Kerala,Assam)
3	25					3- Janmashtami(Smarta), Janmashtami (Vaishnava), Gokulashtami(South)
4	26					4- Sri Jayanti (Ramanuja),
5	27					
6	28		CHANDRA			6- Paryusana Parvarambha(Chaturthi Paksha-Jain), Paryusana Parvarambha(Panchami Paksha-Jain), Aja Ekadasi
7	29					
8	30					8- Aghora Chaturdasi, Kailas Yatra(2 days)
9	31			9- Sun enters Purva Phalguni nak.(10h 11.8m)	9- New Moon (23h. 11.2m)	9- Saptapuri Amavasya(Odisha), Pithori, Kusotpatini, Jain festival
10	Sep 1					
11	2					11- Tithi of Sri Sankara Deva(Assam)
12	3	SAURA BHADRA			12- Sayana Vaidhriti (18h 41.9m)	12- Haritalika Gauri Tritiya, Haritalika Chaturthi, Samaveda Upakarma, Keil Muhurth(Coorg)
13	4					13- Ganesha Chaturthi, Vinayaka Chaturthi(Tamil Nadu), Samvatsari (Chaturthi Paksha -Jain), Samvatsari (Panchami Paksha -Jain), Rishi Panchami
14	5					14- Melapat-3days(Jammu & Kashmir)
15	6					15- Surya Shashthi
16	7		CHANDRA BHADRA		16- Venus rises in the West (19h 51.0m)	16- Maha Lakashmi Vratarambha, Durvashtami(Except Bengal)
17	8					17- Radhashtami,Durvashtami(Bengal)
18	9					
19	10					
20	11				20- Jupiter rises in the east (19h 24.0m)	20- Heikru Hidongba(Manipur), Dolgyaras(Madhya Pradesh), Parsvaparivartani Ekadasi, First Onam Day
21	12			22- Sun enters Uttar Phalguni nak. (28h 02.5m)		21- Sravana Dvadasi, Vamana Jayanti, Sakrotthana, Onam or Thiru Onam day(Kerala)
22	13					22- Third Onam Day
23	14					23- Ananta Chaturdasi, Fourth Onam Day
24	15				24-Full Moon(28h 33.5m)	24- Indra Purnima,Yaju Upakarma, Sri Narayan Guru Deva's Birthday(Kerala)
25	16					25- Pitri Paksha Tarpana Begins, Gayatri Japam
26	17			25- Saura Asvinadi (13h 36.3m)	26- Sayana Vyatipata(06h 11.3m)	26- Visvakarma Puja
27	18					
28	19	SAURA ASVINA				
29	20					
30	21					30- Samadhi Dav of Naravan Guru(Kerala)
31	22					

N.B: All the timings are given in I.S.T. or the local mean time of the meridian of 82½ ˚ E long.

Moon enters: Vrisha 2,18h38.9m;Mithuna 4,23h06.8m;Karkata 6,24h 53.6m;Simha 8,25h 03.0m;Kanya 10,25h 13.3m;Tula 12,27h16.6 m;Vrischika 15,08h47.6m;Dhanus 17,18h17.1m;Makara 20,06h37.3m; Kumba 22, 19h 34.1m; Mina 25, 07h13.8m; Mesha 27, 16h47.9m;Vrisha 29,24h12.6m; Mithuna 31, 29h 32.7m

Sun enters : Nir. Kanya 26, 14h 10.6m

INDIAN CALENDAR Tula:Urja

SAKA ERA 1949 Autumn (Sarat) 2nd month

Month of ASVINA (30 DAYS)

(Nirayana) 8 Asvina, 5128 Kali Era to *(Nirayana)* 7 Kartika, 5128 Kali Era

Date	Week Day	Gregorian Date	Sunrise		Apparent Noon		Sunset		Tithi			Nakshatra			Yoga		
									No.	Ending Moment		No.	Ending Moment		No.	Ending Moment	
			h	m	h	m	h	m		h	m		h	m		h	m
		2027 A.D.															
1	Thu	Sep 23	5	49.1	11	52.5	17	55.4	K 8	26	57.7	5	17	07.1	17	23	35.8
2	Fri	24	5	49.4	11	52.2	17	54.4	9	24	55.0	6	15	58.4	18	20	52.5
3	Sat	25	5	49.7	11	51.8	17	53.4	K 10	22	31.2	7	14	27.8	19	17	51.6
4	Sun	26	5	50.1	11	51.5	17	52.4	11	19	49.8	8	12	38.0	20	14	35.5
5	Mon	27	5	50.4	11	51.1	17	51.4	12	16	55.6	9	10	33.6	21	11	07.6
6	Tue	28	5	50.7	11	50.8	17	50.4	13	13	55.0	10	8	20.7	22 (23	7 27	32.8 56.8)
7	Wed	29	5	51.0	11	50.5	17	49.4	14	10	55.6	11 (12	6 28	06.7 00.5)	24	24	26.5
8	Thu	30	5	51.4	11	50.1	17	48.4	K 30 S (S1	8 29	06.1 35.7)	13	26	11.6	25	21	09.1
9	Fri	Oct 1	5	51.7	11	49.8	17	47.4	2	27	33.8	14	24	49.7	26	18	12.0
10	Sat	2	5	52.1	11	49.5	17	46.4	3	26	09.2	15	24	03.6	27	15	42.0
11	Sun	3	5	52.4	11	49.2	17	45.4	4	25	28.7	16	24	00.4	1	13	45.1
12	Mon	4	5	52.8	11	48.9	17	44.5	S 5	25	36.7	17	24	44.4	2	12	25.1
13	Tue	5	5	53.1	11	48.6	17	43.5	6	26	33.3	18	26	15.4	3	11	43.5
14	Wed	6	5	53.5	11	48.3	17	42.5	7	28	13.7	19	28	28.7	4	11	38.2
15	Thu	7	5	53.9	11	48.0	17	41.6	8	---	---	20	---	---	5	12	03.9
16	Fri	8	5	54.2	11	47.7	17	40.7	8	6	28.0	20	7	14.2	6	12	52.2
17	Sat	9	5	54.6	11	47.4	17	39.7	9	9	02.4	21	10	18.3	7	13	52.7
18	Sun	10	5	55.0	11	47.1	17	38.8	S 10	11	41.1	22	13	25.6	8	14	54.0
19	Mon	11	5	55.4	11	46.9	17	37.9	11	14	09.0	23	16	21.9	9	15	46.0
20	Tue	12	5	55.8	11	46.6	17	37.0	12	16	14.2	24	18	55.6	10	16	20.2
21	Wed	13	5	56.2	11	46.3	17	36.1	13	17	48.9	25	20	59.5	11	16	31.2
22	Thu	14	5	56.6	11	46.1	17	35.2	14	18	49.7	26	22	30.6	12	16	16.3
23	Fri	15	5	57.0	11	45.9	17	34.3	S 15	19	16.9	27	23	29.5	13	15	35.3
24	Sat	16	5	57.4	11	45.7	17	33.5	K 1	19	13.6	1	23	59.2	14	14	29.9
25	Sun	17	5	57.8	11	45.4	17	32.6	2	18	43.7	2	24	04.0	15	13	03.1
26	Mon	18	5	58.3	11	45.2	17	31.8	3	17	52.1	3	23	48.2	16	11	18.0
27	Tue	19	5	58.7	11	45.0	17	31.0	4	16	42.7	4	23	16.0	17	9	17.9
28	Wed	20	5	59.2	11	44.9	17	30.1	K 5	15	18.9	5	22	30.2	18 (19	7 28	05.5 42.7)
29	Thu	21	5	59.6	11	44.7	17	29.4	6	13	43.0	6	21	32.9	20	26	10.8
30	Fri	22	6	00.1	11	44.5	17	28.6	K 7	11	56.3	7	20	25.1	21	23	30.5

N.B. All timings are given in IST or the local time of meridian of 82 1/2 ˚ E longitude

Name of Nakshatras: 1. Asvini 2. Bharani 3. Krittika 4. Rohini 5. Mrigasiras 6. Ardra 7. Punarvasu 8.Pushya 9. Aslesha 10. Magha 11. Purva Phalguni 12.Uttar Phalguni 13. Hasta 14. Chitra 15. Svati 16. Visakha 17. Anuradha 18. Jyestha 19. Mula 20. Purvasadha 21. Uttarasadha 22. Sravana 23. Dhanistha 24. Satabhisaj 25. Purva Bhadrapada 26. Uttar Bhadrapada 27. Revati.

Name of Yogas: 1. Viskumbha 2. Priti 3. Ayusman 4. Saubhagya 5. Sobhana 6. Atiganda 7. Sukarma 8. Dhriti 9. Sula 10. Ganda 11. Vriddhi 12. Dhruba 13. Vyaghata 14. Harshana 15. Vajra 16. Siddhi(Asrik) 17.Vyatipata 18. Variyan 19. Parigha 20. Siva 21. Siddha 22. Sadhya 23. Subha 24. Sukla(Sukra) 25. Bramha 26. Indra 27. Vaidhriti

Dakshinayana
Dakshina gola

INDIAN CALENDAR
Saka Era 1949
Month of ASVINA (30 Days)
(*Nirayana)* 8 Asvina 5128 KE to (*Nirayana)* 7 Kartika 5128 KE

Ayanamsa on 1st 24˚14'53"

Date	Gregorian Date	Solar Month	Lunar Month	Transit of the sun	Phenomena	Festivals
	2027 A.D.					
1	Sep 23		CHANDRA BHADRA	1- Sun enters trop. Libra (11h 31.7m)		1- Maha Lakshmi Vrata Sampana, Jalavisuva Day
2	24					2-Matri Navami
3	25					
4	26					4- Indira Ekadasi
5	27			5- Sun enters Hasta nak. (19h 35.1m)		
6	28					6- Magha Trayodasi (Magha Nak. End time 8h. 20.7m)
7	29				07- Sayana Vaidhriti (11h 23.4m)	7- Mahalaya Amavasya, Sarvapitri Amavasya
8	30				8- New Moon (8h. 06.1m)	8- Tarpana Loiba(Manipur), Saradiya Navaratrambha, Maharaja Agrasen's Jayanti,
9	Oct 1					
10	2					10- Mahatma Gandhi's Birthday
11	3					
12	4	SAURA ASVINA				12- Upanga Lalita Vrata(Lalita Panchami)
13	5					
14	6					14- Durga Puja Begins(Saptami),Saraswati Avahana
15	7					15- Oli Begins (Jain), Mahastami
16	8					16- Mahanavami, Ayudha Puja
17	9					17- Maha Navami(Bengal), Vijaya Dasami(Dussehara or Dasahara), Saraswati Visarjana
18	10					18- Vijaya Dasami(Bengal), Vijaya Dasami (Kerala), Vijaya Dasami (Mysore), Madhavacharya Jayanti
19	11		CHANDRA ASVINA	19- Sun enters Chitra nak. (08h 31.9m)		19- Papankusa(Pasankusa) Ekadasi,Bharat Milap
20	12				20- Sayana Vyatipata (12h 56.8m)	
21	13					
22	14					22- Kojagar(Lakshmindra Puja)
23	15				23-Full Moon(19h 16.9m)	23- Kojagari Lakshmi Puja(Bengal), Kumara Purnima (Odisha), Sarat Purnima, Maharshi Valmiki's Birthday, Oli Ends(Jain)
24	16			24- Saura Kartikadi (25h 58.7m)		
25	17					
26	18	SAURA KARTIKA				26- Karaka Chaturthi, Dasaratha Chaturthi, Kaveri Samkramana Snana
27	19					
28	20					
29	21					
30	22					30- Ahoyi Ashtami, Ahoyi Ashtami(Punjab),Karashtami

N.B: All the timings are given in I.S.T. or the local mean time of the meridian of 82½ ˚ E long.

Moon enters: Karkata 3,08h52.4m,Simha 5,10h33.6m,Kanya 7,11h34.1m,Tula 9,13h26.7m; Vrischika 11,17h56.9m;Dhanus 13,26h15.4m;Makara 16,13h59.0m; Kumba 18, 26h 56.0m; Mina 21, 14h31.5m; Mesha 23, 23h29.5m; Vrisha 26, 06h 01.8m; Mithuna 28, 10h 54.6m; Karkata 30, 14h 43.0m Sun enters : Nir. Tula 25, 26h 08.9m

INDIAN CALENDAR

SAKA ERA 1949

Month of KARTIKA (30 DAYS)

(Nirayana) 8 Kartika, 5128 Kali Era to *(Nirayana)* 7 Agrahayana, 5128 Kali Era

Vrischika: Sahas

(Hemanta) 1st month

Date	Week Day	Gregorian Date	Sunrise		Apparent Noon		Sunset		Tithi			Nakshatra			Yoga		
									No.	Ending Moment		No.	Ending Moment		No.	Ending Moment	
			h	m	h	m	h	m		h	m		h	m		h	m
		2027 A.D.															
1	Sat	Oct 23	6	00.6	11	44.4	17	27.8	K 8	9	59.6	8	19	07.7	22	20	42.4
2	Sun	24	6	01.1	11	44.2	17	27.1	K 9 (10	7 29	53.8 40.6)	9	17	41.8	23	17	47.4
3	Mon	25	6	01.6	11	44.1	17	26.3	11	27	22.6	10	16	09.5	24	14	47.1
4	Tue	26	6	02.1	11	44.0	17	25.6	12	25	04.0	11	14	34.2	25	11	44.1
5	Wed	27	6	02.6	11	43.9	17	24.9	13	22	50.3	12	13	01.0	26 (27	8 29	42.1 46.0)
6	Thu	28	6	03.1	11	43.8	17	24.2	14	20	48.6	13	11	36.3	1	27	01.3
7	Fri	29	6	03.6	11	43.7	17	23.5	K 30	19	06.6	14	10	27.7	2	24	34.2
8	Sat	30	6	04.1	11	43.7	17	22.9	S 1	17	52.4	15	9	43.5	3	22	30.7
9	Sun	31	6	04.7	11	43.6	17	22.3	2	17	13.6	16	9	31.4	4	20	56.1
10	Mon	Nov 1	6	05.2	11	43.6	17	21.7	3	17	16.1	17	9	57.9	5	19	54.1
11	Tue	2	6	05.8	11	43.6	17	21.1	4	18	02.7	18	11	06.8	6	19	26.2
12	Wed	3	6	06.4	11	43.6	17	20.5	S 5	19	32.3	19	12	57.6	7	19	30.7
13	Thu	4	6	06.9	11	43.6	17	19.9	6	21	38.5	20	15	25.4	8	20	02.8
14	Fri	5	6	07.5	11	43.6	17	19.4	7	24	09.7	21	18	19.9	9	20	54.0
15	Sat	6	6	08.1	11	43.6	17	18.9	8	26	50.6	22	21	26.9	10	21	53.9
16	Sun	7	6	08.7	11	43.6	17	18.4	9	29	24.2	23	24	30.1	11	22	50.5
17	Mon	8	6	09.3	11	43.7	17	17.9	S 10	---	---	24	27	14.2	12	23	32.7
18	Tue	9	6	09.9	11	43.8	17	17.4	S 10	7	35.0	25	29	27.2	13	23	51.5
19	Wed	10	6	10.5	11	43.9	17	17.0	11	9	11.7	26	---	---	14	23	40.8
20	Thu	11	6	11.1	11	44.0	17	16.6	12	10	07.6	26	7	01.8	15	22	57.7
21	Fri	12	6	11.8	11	44.1	17	16.2	13	10	21.4	27	7	55.7	16	21	42.8
22	Sat	13	6	12.4	11	44.2	17	15.8	14	9	55.7	1	8	10.8	17	19	58.6
23	Sun	14	6	13.0	11	44.3	17	15.5	S 15	8	55.9	2	7	52.1	18	17	49.8
24	Mon	15	6	13.7	11	44.5	17	15.1	K 1 (2	7 29	28.9 42.0)	3 4	7 30	06.3 00.9	19	15	21.6
25	Tue	16	6	14.3	11	44.7	17	14.8	3	27	42.3	5	28	42.8	20	12	39.5
26	Wed	17	6	15.0	11	44.8	17	14.6	4	25	35.9	6	27	18.3	21	9	48.7
27	Thu	18	6	15.7	11	45.0	17	14.3	K 5	23	27.6	7	25	52.1	22 (23	6 27	53.5 57.5)
28	Fri	19	6	16.3	11	45.3	17	14.1	6	21	20.8	8	24	27.7	24	25	03.2
29	Sat	20	6	17.0	11	45.5	17	13.9	7	19	17.8	9	23	07.3	25	22	12.0
30	Sun	21	6	17.7	11	45.7	17	13.7	8	17	20.1	10	21	52.2	26	19	25.2

N.B. All timings are given in IST or the local time of meridian of 82 1/2 ˚ E longitude

Name of Nakshatras: 1. Asvini 2. Bharani 3. Krittika 4. Rohini 5. Mrigasiras 6. Ardra 7. Punarvasu 8.Pushya 9. Aslesha 10. Magha 11. Purva Phalguni 12.Uttar Phalguni 13. Hasta 14. Chitra 15. Svati 16. Visakha 17. Anuradha 18. Jyestha 19. Mula 20. Purvasadha 21. Uttarasadha 22. Sravana 23. Dhanistha 24. Satabhisaj 25. Purva Bhadrapada 26. Uttar Bhadrapada 27. Revati.

Name of Yogas: 1. Viskumbha 2. Priti 3. Ayusman 4. Saubhagya 5. Sobhana 6. Atiganda 7. Sukarma 8. Dhriti 9. Sula 10. Ganda 11. Vriddhi 12. Dhruba 13. Vyaghata 14. Harshana 15. Vajra 16. Siddhi(Asrik) 17.Vyatipata 18. Variyan 19. Parigha 20. Siva 21. Siddha 22. Sadhya 23. Subha 24. Sukla(Sukra) 25. Bramha 26. Indra 27. Vaidhriti

Dakshinayana
Dakshina gola

INDIAN CALENDAR

Saka Era 1949
Month of KARTIKA (30 Days)
(Nirayana) 8 Kartika 5128 KE to *(Nirayana)* 7 Agrahayana 5128 KE

Ayanamsa on 1st 24˚14'57"

Date	Gregorian Date	Solar Month	Lunar Month	Transit of the sun	Phenomena	Festivals
	2027 A.D.					
1	Oct 23			1- Sun enters trop. Scorpio(21h 02.8m)		
2	24			2- Sun enters Svati nak. (19h 07.0m)	2- Sayana Vaidhriti (25h 24.3m)	
3	25		CHANDRA ASVINA			3- Rama Ekadasi (Smarta)
4	26					4- Govatsa Dvadasi,Rama Ekadasi (Vaishnava & Vidhava)
5	27					5- Dhana Trayodasi
6	28					6- Naraka Chaturdasi(Purvarunodaya), Hanumajjanma (N.India) (Purvarunodaya), Kali Chaturdasi, Dipavali (S.India), Kali Puja
7	29				7- New Moon (19h 06.6m)	7- Dipavali, Lakshmi Puja, Kaumudi Dipam, Lakshmi Dipam, Kedar Gauri Vrata, Mahavira
8	30					8- Kartika Sukladi, Govardhana Puja, Bali Puja, Annakuta
9	31	SAURA KARTIKA				9- Yama Dvitiya, Visvakarma day, Dwat Puja(Bihar), Bhratri Dvitiya(Bengal)
10	Nov 1					10- Martyrdom Day of Bhagat Kanwar
11	2					
12	3					12- Jnana Panchami(Jain)
13	4					13- Pratihara Shashthi or Surya Shashthi(Chhat-
14	5					
15	6			15- Sun enters Visakha nak. (27h 11.3m)	15- Sayana Vyatipata (18h 26.8m)	15- Gopashtami Or Gothastami, Trivandrum Arat(Kerala)
16	7					16- Jagaddhatri Puja, Akshaya Navami
17	8					
18	9					
19	10					19- Tulsi Vivaha, Utthana or Deva Probodhani Ekadasi
20	11					
21	12					21- Vaikuntha Chaturdasi, Vaikuntha Chaturdasi (Prodosa)
22	13					22- Rasayatra(Smarta), Tripurotsava
23	14		CHANDRA KARTIKA		23- Full Moon (08h 55.9m)	23- Rasayatra(Vaishnava), Kartiki Purnima, Ratha Yatra (Jain), Guru Nanak's Birtyhday,Pushkar Fair, Children's Day(Nehru's Birthday)
24	15			24- Saura Margasirsadi (26h 08.9m)		
25	16					
26	17					26- Kartika Puja, Death Anniversary of Lala Lajpat Rai
27	18					
28	19	SAURA MARGASIRSHA				
29	20			29- Sun enters Anuradha nak. (09h 19.7m)	28- Sayana Vaidhriti (11h 36.4m)	29- Birthday celebration of Sri Prof Ram Panjwani (Sindhi)
30	21					30- Prathamashtami (Odisha), Vaikkatashtami (Kerala),Kalashtami

N.B: All the timings are given in I.S.T. or the local mean time of the meridian of 82½ ˚ E long.

Moon enters: Simha 2,17h41.8m;Kanya 4,20h10.5m;Tula 6,22h59.5m;Vrischika 8,27h31.1m;Dhanus 11,11h06.8m;Makara 13,22h07.1m;Kumbha 16,10h59.9m;Mina 18,22h57.4m;Mesha 21,07h55.7m;Vrisha 23,13h42.9m;Mithuna 25,17h23.0m;Karkata 27,20h 13.6m;Simha 29,23h07.3m

Sun enters : Nir. Vrischika 25, 25h 58.6m

INDIAN CALENDAR

Dhanus: Sahasya

SAKA ERA 1949

(Hemanta) 2nd month

Month of AGRAHAYANA (30 DAYS)

(Nirayana) 8 Agrahayanra, 5128 Kali Era to *(Nirayana)* 7 Pausha, 5128 Kali Era

Date	Week Day	Gregorian Date	Sunrise		Apparent Noon		Sunset		Tithi				Nakshatra				Yoga			
									No.		Ending Moment		No.	Ending Moment			No.	Ending Moment		
			h	m	h	m	h	m			h	m		h	m			h	m	
1	Mon	2027 A.D. Nov 22	6	18.3	11	46.0	17	13.5		9	15	28.8	11	20	43.7		27	16	43.5	
2	Tue	23	6	19.0	11	46.2	17	13.4	K	10	13	45.3	12	19	43.3		1	14	08.0	
3	Wed	24	6	19.7	11	46.5	17	13.3		11	12	11.8	13	18	53.3		2	11	40.5	
4	Thu	25	6	20.4	11	46.8	17	13.2		12	10	51.4	14	18	17.3		3	9	23.2	
5	Fri	26	6	21.1	11	47.1	17	13.1		13	9	48.3	15	17	59.7		4 (5	7 29	19.4 32.5)	
6	Sat	27	6	21.8	11	47.4	17	13.1		14	9	07.6	16	18	05.7		6	28	06.5	
7	Sun	28	6	22.4	11	47.8	17	13.1	K	30	8	54.4	17	18	40.3		7	27	04.9	
8	Mon	29	6	23.1	11	48.1	17	13.1	S	1	9	13.7	18	19	47.7		8	26	30.1	
9	Tue	30	6	23.8	11	48.5	17	13.1		2	10	08.7	19	21	29.9		9	26	22.9	
10	Wed	Dec 1	6	24.5	11	48.8	17	13.2		3	11	39.9	20	23	45.8		10	26	41.8	
11	Thu	2	6	25.2	11	49.2	17	13.3		4	13	44.2	21	26	30.1		11	27	22.3	
12	Fri	3	6	25.9	11	49.6	17	13.4	S	S5	16	13.9	22	29	33.3		12	28	17.3	
13	Sat	4	6	26.5	11	50.0	17	13.5		6	18	56.7	23	---	---		13	29	17.1	
14	Sun	5	6	27.2	11	50.4	17	13.7		7	21	37.5	23	8	42.0		14	30	10.8	
15	Mon	6	6	27.9	11	50.8	17	13.8		8	24	00.3	24	11	40.8		15	---	---	
16	Tue	7	6	28.5	11	51.2	17	14.0		9	25	51.0	25	14	15.2		15	6	47.4	
17	Wed	8	6	29.2	11	51.7	17	14.2	S	10	26	59.4	26	16	13.1		16	6	57.7	
18	Thu	9	6	29.8	11	52.1	17	14.5		11	27	20.4	27	17	27.1		17 (18	6 29	34.9 35.7)	
19	Fri	10	6	30.5	11	52.6	17	14.8		12	26	53.7	1	17	54.7		19	27	59.6	
20	Sat	11	6	31.1	11	53.0	17	15.0		13	25	43.2	2	17	37.9		20	25	49.3	
21	Sun	12	6	31.7	11	53.5	17	15.3		14	23	55.5	3	16	42.1		21	23	09.5	
22	Mon	13	6	32.3	11	53.9	17	15.7	S	15	21	38.7	4	15	14.9		22	20	06.2	
23	Tue	14	6	32.9	11	54.4	17	16.0	K	1	19	01.8	5	13	25.1		23	16	46.1	
24	Wed	15	6	33.5	11	54.9	17	16.4		2	16	13.6	6	11	21.7		24	13	15.9	
25	Thu	16	6	34.1	11	55.4	17	16.8		3	13	22.2	7	9	13.4		25 (26	9 30	42.3 11.2)	
26	Fri	17	6	34.7	11	55.8	17	17.2		4	10	35.0	8 (9	7 29	07.9 11.8)		27	26	47.5	
27	Sat	18	6	35.2	11	56.3	17	17.6	K	5 (6	7 29	58.2 36.7)	10	27	30.3		1	23	35.3	
28	Sun	19	6	35.8	11	56.8	17	18.1		7	27	34.2	11	26	07.2		2	20	37.6	
29	Mon	20	6	36.3	11	57.3	17	18.5		8	25	53.2	12	25	05.0		3	17	56.4	
30	Tue	21	6	36.8	11	57.8	17	19.0	K	9	24	35.2	13	24	25.5		4	15	33.2	

N.B. All timings are given in IST or the local time of meridian of 82 1/2 ˚ E longitude

Name of Nakshatras: 1. Asvini 2. Bharani 3. Krittika 4. Rohini 5. Mrigasiras 6. Ardra 7. Punarvasu 8.Pushya 9. Aslesha 10. Magha 11. Purva Phalguni 12.Uttar Phalguni 13. Hasta 14. Chitra 15. Svati 16. Visakha 17. Anuradha 18. Jyestha 19. Mula 20. Purvasadha 21. Uttarasadha 22. Sravana 23. Dhanistha 24. Satabhisaj 25. Purva Bhadrapada 26. Uttar Bhadrapada 27. Revati.

Name of Yogas: 1. Viskumbha 2. Priti 3. Ayusman 4. Saubhagya 5. Sobhana 6. Atiganda 7. Sukarma 8. Dhriti 9. Sula 10. Ganda 11. Vriddhi 12. Dhruba 13. Vyaghata 14. Harshana 15. Vajra 16. Siddhi(Asrik) 17.Vyatipata 18. Variyan 19. Parigha 20. Siva 21. Siddha 22. Sadhya 23. Subha 24. Sukla(Sukra) 25. Bramha 26. Indra 27. Vaidhriti

Dakshinayana
Dakshina gola

INDIAN CALENDAR
Saka Era 1949
Month of AGRAHAYANA (30 Days)
(Nirayana) 8 Agrahayana 5128 KE to (*Nirayana)* 7 Pausha 5128 KE

Ayanamsa on 1st 24˚15'01"

Date	Gregorian Date	Solar Month	Lunar Month	Transit of the sun	Phenomena	Festivals
	2027 A.D.					
1	Nov 22		CHANDRA KARTIKA	1- Sun enters trop. Sagittarius (18h 46.2m)		
2	23					
3	24					3- Guru Tegh Bahadur's Martyrdom Day, Utpanna Ekadasi
4	25					
5	26				5- Jupiter enters Nir. Kanya (18h 44.3m)	
6	27					
7	28				7- New Moon (8h 54.4m)	
8	29					
9	30					
10	Dec 1	SAURA MARGASIRSHA			10- Sayana Vyatipata (23h 21.9m)	
11	2					
12	3			12- Sun enters Jyeshtha nak. (13h 33.8m)		
13	4					13- Guha Shashthi, Subrahmanya Shashthi (S.India), Champa Shashthi (Maharastra), Mulakarupini Shashthi(Bengal)
14	5		CHANDRA MARGASIRSHA			14-Mitra Saptami
15	6					
16	7					
17	8					
18	9					18- Mauna Ekadasi(Jain), Gita Jayanti, Mokshada Ekadasi
19	10					19- Akhanda Dvadasi, Bharani Dipam
20	11					20- Krittika Dipam
21	12					
22	13				22-Full Moon(21h 38.7m)	22- Huthri-3 Days(Coorg), Margi Purnima, Shri Datta Jayanti(Maharastra), Dattatreya Jayanti (Mrigasiras nak. Start 15h 14.9m)
23	14					
24	15			24- Saura Pausadi (17h 00.9m)	23- Sayana Vaidhriti (24h 11.6m)	
25	16			25- Sun enters Mula nak. (16h 39.0m)		
26	17	SAURA PAUSHA				
27	18					
28	19					
29	20					29- Ashtaka(Pupashtaka)
30	21					

N.B: All the timings are given in I.S.T. or the local mean time of the meridian of 82½ ˚ E long.

Moon enters: Kanya 1,26h27.8m;Tula 4,6h33.3m;Vrischika 6,12h01.7m;Dhanus 8,19h47.7m;Makara 10,30h24.5m;Kumbha 13,19h07.9m;Mina 16,07h39.6m;Mesha 18,17h27.1m;Vrisha 20,23h27.4m;Mithuna 22,26h22.3m;Karkata 24,27h45.5m;Simha 26,29h11.8m;Kanya 29, 07h49.6

Sun enters : Nir. Dhanus 25, 16h 39.0m

INDIAN CALENDAR

Makara:Tapas

SAKA ERA 1949

Winter(Sisira) 1st month

Month of PAUSHA (30 DAYS)

(Nirayana) 8 Pausha, 5128 Kali Era to *(Nirayana)* 7 Magha 5128, Kali Era

Date	Week Day	Gregorian Date	Sunrise		Apparent Noon		Sunset		Tithi			Nakshatra			Yoga		
									No.	Ending Moment		No.	Ending Moment		No.	Ending Moment	
			h	m	h	m	h	m		h	m		h	m		h	m
		2027 A.D.															
1	Wed	Dec 22	6	37.3	11	58.3	17	19.5	K 10	23	41.2	14	24	09.4	5	13	28.6
2	Thu	23	6	37.8	11	58.8	17	20.0	11	23	12.2	15	24	17.5	6	11	43.2
3	Fri	24	6	38.3	11	59.3	17	20.6	12	23	08.9	16	24	50.6	7	10	17.5
4	Sat	25	6	38.7	11	59.8	17	21.1	13	23	32.2	17	25	49.5	8	9	12.0
5	Sun	26	6	39.2	12	00.3	17	21.7	14	24	23.2	18	27	14.9	9	8	27.2
6	Mon	27	6	39.6	12	00.8	17	22.2	K 30	25	42.3	19	29	07.3	10	8	03.6
7	Tue	28	6	40.0	12	01.3	17	22.8	S 1	27	28.9	20	---	---	11	8	01.1
8	Wed	29	6	40.4	12	01.8	17	23.4	2	29	40.6	20	7	25.6	12	8	18.9
9	Thu	30	6	40.8	12	02.3	17	24.0	3	---	---	21	10	07.0	13	8	54.8
10	Fri	31	6	41.1	12	02.7	17	24.7	3	8	12.3	22	13	06.3	14	9	44.9
		2028 A.D.															
11	Sat	Jan 1	6	41.4	12	03.2	17	25.3	4	10	55.9	23	16	15.1	15	10	43.4
12	Sun	2	6	41.7	12	03.7	17	25.9	S 5	13	40.4	24	19	22.5	16	11	42.6
13	Mon	3	6	42.0	12	04.2	17	26.6	6	16	12.9	25	22	15.8	17	12	33.8
14	Tue	4	6	42.3	12	04.6	17	27.3	7	18	20.1	26	24	42.4	18	13	07.5
15	Wed	5	6	42.5	12	05.1	17	27.9	8	19	50.3	27	26	31.6	19	13	15.3
16	Thu	6	6	42.7	12	05.5	17	28.6	9	20	35.2	1	27	35.9	20	12	50.4
17	Fri	7	6	42.9	12	06.0	17	29.3	S S10	20	30.6	2	27	52.0	21	11	48.2
18	Sat	8	6	43.1	12	06.4	17	30.0	11	19	36.4	3	27	20.7	22	10	07.4
19	Sun	9	6	43.3	12	06.8	17	30.7	12	17	56.3	4	26	06.2	23 (24	7 28	49.1 56.9)
20	Mon	10	6	43.4	12	07.2	17	31.4	13	15	36.8	5	24	15.5	25	25	36.0
21	Tue	11	6	43.5	12	07.6	17	32.1	14	12	46.0	6	21	57.5	26	21	53.2
22	Wed	12	6	43.6	12	08.0	17	32.8	S 15 K (1	9 30	33.1 7.6)	7	19	21.6	27	17	55.8
23	Thu	13	6	43.6	12	08.4	17	33.5	2	26	39.4	8	16	37.9	1	13	51.4
24	Fri	14	6	43.7	12	08.8	17	34.2	3	23	17.7	9	13	56.1	2 (3	9 29	47.6 51.6)
25	Sat	15	6	43.7	12	09.1	17	34.9	4	20	11.0	10	11	25.7	4	26	10.1
26	Sun	16	6	43.7	12	09.5	17	35.6	K 5	17	27.2	11	9	14.8	5	22	48.8
27	Mon	17	6	43.6	12	09.8	17	36.3	6	15	12.7	12 (13	7 30	30.8 19.1)	6	19	52.1
28	Tue	18	6	43.6	12	10.2	17	37.1	7	13	32.3	14	29	43.1	7	17	23.4
29	Wed	19	6	43.5	12	10.5	17	37.8	8	12	29.2	15	29	44.5	8	15	24.3
30	Thu	20	6	43.4	12	10.8	17	38.5	K 9	12	04.4	16	30	22.5	9	13	55.2

N.B. All timings are given in IST or the local time of meridian of 82 1/2 ˚ E longitude

Name of Nakshatras: 1. Asvini 2. Bharani 3. Krittika 4. Rohini 5. Mrigasiras 6. Ardra 7. Punarvasu 8.Pushya 9. Aslesha 10. Magha 11. Purva Phalguni 12.Uttar Phalguni 13. Hasta 14. Chitra 15. Svati 16. Visakha 17. Anuradha 18. Jyestha 19. Mula 20. Purvasadha 21. Uttarasadha 22. Sravana 23. Dhanistha 24. Satabhisaj 25. Purva Bhadrapada 26. Uttar Bhadrapada 27. Revati.

Name of Yogas: 1. Viskumbha 2. Priti 3. Ayusman 4. Saubhagya 5. Sobhana 6. Atiganda 7. Sukarma 8. Dhriti 9. Sula 10. Ganda 11. Vriddhi 12. Dhruba 13. Vyaghata 14. Harshana 15. Vajra 16. Siddhi(Asrik) 17.Vyatipata 18. Variyan 19. Parigha 20. Siva 21. Siddha 22. Sadhya 23. Subha 24. Sukla(Sukra) 25. Bramha 26. Indra 27. Vaidhriti

Uttarayana
Dakshina gola

INDIAN CALENDAR

Saka Era 1949

Ayanamsa on 1st 24˚15'06"

Month of PAUSHA (30 Days)

(Nirayana) 8 Pausha 5128 KE to (*Nirayana)* 7 Magha 5128 KE

Date	Gregorian Date	Solar Month	Lunar Month	Transit of the sun	Phenomena	Festivals
	2027 A.D.					
1	Dec 22		CHANDRA MARGASIRSHA	1- Sun enters trop. Capricorn (08h 12.1m)		1- Birthday of Parsvanath(Jain), Uttarayana Day
2	23					2- Saphala Ekadasi
3	24					
4	25					4- Birthday of Sadhu T. L. Vaswani(Sindhi)
5	26				5- Sayana Vyatipata (28h 47.5m)	5- Jor Mela-3 days(Punjab)
6	27				6- New Moon(25h 42.3m)	6- Vakula Amavasya(Odisha)
7	28					
8	29			8- Sun enters Purvasadha nak. (18h 50.7m)		
9	30					
10	31					
11	Jan 1	SAURA PAUSHA				
12	2					
13	3					
14	4					14- Guru Gobind Singh's Birthday
15	5					
16	6					
17	7					17- Samba Dasami (Odisha)
18	8					18- Vaikuntha Ekadasi (S.India), Putrada Ekadasi
19	9		CHANDRA PAUSHA		19- Sayana Vaidhriti (15h 27.4m)	
20	10					
21	11				22-Full Moon(09h 33.1m)	21- Arudra Darsanam (Purvarunodaya) (S.India)
22	12			21- Sun enters Uttarasadha nak. (20h 50.7m)	22-Partial Lunar Eclipse (Not Visible in India)	22- Paushi Purnima, Pushyabhisheka Yatra
23	13			23- Saura Maghadi (27h 45.6m)		23- Lohri (Punjab, Jammu & Kashmir)
24	14					24- Birthday of Sant Parmanand (Sindhi), Bhogi(S.India), Makara Samkranti(N. India)
25	15	SAURA MAGHA			25- Mars sets in the West (27h 03.0m)	25-Ganesha Sankastha Chaturthi, Makara Samkranti(Bengal), Magha Bihu (Assam),Pongal (S.India),Tai Pongal (Kerala), Tila Samkranti, Makara Snana
26	16					26- Mattu Pongal or Kanuvu (S.India)
27	17					
28	18					
29	19					
30	20			30-Sun enters trop. Aquarius (18h 51.9m)		28- Birthday of Swami Vivekananda(According to tithi), Astaka(Mamsataka)

N.B: All the timings are given in I.S.T. or the local mean time of the meridian of 82½ ˚ E long.

Moon enters: Tula 1,12h14.4m;Vrischika 3,18h39.9m;Dhanus 5,27h14.9m;Makara 8,14h03.9m;Kumbha 10,26h40.2m;Mina 13,15h34.5m;Mesha 15,26h31.6m;Vrisha 18,09h48.5m;Mithuna 20,13h14.8m;Karkata 22,14h01.7m;Simha 24,13h56.1m;Kanya 26,14h46.1m; Tula 28, 17h 56.5m; Vrischika 30, 24h 09.7m

Sun enters : Nir. Makara 24, 27h 24.1m

INDIAN CALENDAR Kumbha:Tapasya

SAKA ERA 1949 Winter(Sisira) 2nd month

Month of MAGHA (30 DAYS)

(Nirayana) 8 Magha, 5128 Kali Era to (Nirayana) 7 Phalguna, 5128 Kali Era

Date	Week Day	Gregorian Date	Sunrise		Apparent Noon		Sunset		Tithi				Nakshatra				Yoga			
									No.		Ending Moment		No.	Ending Moment			No.	Ending Moment		
			h	m	h	m	h	m			h	m		h	m			h	m	
		2028 A.D																		
1	Fri	Jan 21	6	43.3	12	11.1	17	39.2	K	10	12	17.1	17	---	---		10	12	54.9	
2	Sat	22	6	43.1	12	11.4	17	39.9		11	13	04.7	17	7	34.9		11	12	21.3	
3	Sun	23	6	42.9	12	11.6	17	40.6		12	14	23.6	18	9	18.2		12	12	11.6	
4	Mon	24	6	42.7	12	11.9	17	41.3		13	16	09.4	19	11	28.0		13	12	22.3	
5	Tue	25	6	42.5	12	12.1	17	42.0		14	18	17.4	20	13	59.7		14	12	50.2	
6	Wed	26	6	42.3	12	12.4	17	42.7	K	30	20	42.5	21	16	48.5		15	13	31.6	
7	Thu	27	6	42.0	12	12.6	17	43.4	S	1	23	19.4	22	19	49.2		16	14	22.9	
8	Fri	28	6	41.7	12	12.8	17	44.1		2	26	02.0	23	22	56.2		17	15	20.0	
9	Sat	29	6	41.4	12	13.0	17	44.8		3	28	43.3	24	26	02.7		18	16	18.5	
10	Sun	30	6	41.1	12	13.1	17	45.5		4	---	---	25	29	01.1		19	17	12.8	
11	Mon	31	6	40.7	12	13.3	17	46.2		4	7	15.1	26	---	---		20	17	57.1	
12	Tue	Feb 1	6	40.4	12	13.5	17	46.8	S	5	9	28.2	26	7	42.7		21	18	24.8	
13	Wed	2	6	40.0	12	13.6	17	47.5		6	11	13.3	27	9	58.3		22	18	29.4	
14	Thu	3	6	39.5	12	13.7	17	48.2		7	12	21.9	1	11	39.6		23	18	04.9	
15	Fri	4	6	39.1	12	13.8	17	48.8		8	12	47.7	2	12	39.9		24	17	06.8	
16	Sat	5	6	38.6	12	13.9	17	49.5		9	12	26.7	3	12	55.0		25	15	32.3	
17	Sun	6	6	38.2	12	14.0	17	50.1	S	10	11	18.4	4	12	24.1		26	13	20.8	
18	Mon	7	6	37.7	12	14.1	17	50.7		11	9	25.2	5	11	09.4		27	10	34.0	
19	Tue	8	6	37.1	12	14.1	17	51.4		12 (13	6 27	52.3 46.8)	6	9	15.8		1 (2	7 27	15.6 30.7)	
20	Wed	9	6	36.6	12	14.1	17	52.0		14	24	17.4	7 (8	6 28	50.8 03.3)		3	23	26.2	
21	Thu	10	6	36.0	12	14.2	17	52.6	S	15	20	33.7	9	25	03.3		4	19	09.6	
22	Fri	11	6	35.5	12	14.2	17	53.2	K	1	16	46.0	10	22	01.6		5	14	49.1	
23	Sat	12	6	34.9	12	14.2	17	53.8		2	13	04.7	11	19	09.1		6 (7	10 30	33.0 29.8)	
24	Sun	13	6	34.2	12	14.2	17	54.4		3	9	40.1	12	16	36.4		8	26	47.3	
25	Mon	14	6	33.6	12	14.1	17	54.9	K	4 (5	6 28	42.0 19.4)	13	14	33.2		9	23	32.4	
26	Tue	15	6	33.0	12	14.1	17	55.5		6	26	39.2	14	13	08.0		10	20	50.6	
27	Wed	16	6	32.3	12	14.1	17	56.1		7	25	46.2	15	12	26.8		11	18	45.6	
28	Thu	17	6	31.6	12	14.0	17	56.6		8	25	42.0	16	12	32.8		12	17	18.9	
29	Fri	18	6	30.9	12	13.9	17	57.2		9	26	24.6	17	13	25.7		13	16	29.3	
30	Sat	19	6	30.2	12	13.8	17	57.7	K	10	27	48.8	18	15	01.7		14	16	13.4	

N.B. All timings are given in IST or the local time of meridian of 82 1/2 ˚ E longitude

Name of Nakshatras: 1. Asvini 2. Bharani 3. Krittika 4. Rohini 5. Mrigasiras 6. Ardra 7. Punarvasu 8.Pushya 9. Aslesha 10. Magha 11. Purva Phalguni 12.Uttar Phalguni 13. Hasta 14. Chitra 15. Svati 16. Visakha 17. Anuradha 18. Jyestha 19. Mula 20. Purvasadha 21. Uttarasadha 22. Sravana 23. Dhanistha 24. Satabhisaj 25. Purva Bhadrapada 26. Uttar Bhadrapada 27. Revati.

Name of Yogas: 1. Viskumbha 2. Priti 3. Ayusman 4. Saubhagya 5. Sobhana 6. Atiganda 7. Sukarma 8. Dhriti 9. Sula 10. Ganda 11. Vriddhi 12. Dhruba 13. Vyaghata 14. Harshana 15. Vajra 16. Siddhi(Asrik) 17.Vyatipata 18. Variyan 19. Parigha 20. Siva 21. Siddha 22. Sadhya 23. Subha 24. Sukla(Sukra) 25. Bramha 26. Indra 27. Vaidhriti

Uttarayana
Dakshina gola

INDIAN CALENDAR

Ayanamsa on 1st 24˚15'12"

Saka Era 1949
Month of MAGHA (30 Days)
(Nirayana) 8 Magha 5128 KE to (*Nirayana)* 7 Phalguna 5128 KE

Date	Gregorian Date	Solar Month	Lunar Month	Transit of the sun	Phenomena	Festivals
	2028 A.D.					
1	Jan 21		CHANDRA PAUSHA		1- Sayana Vyatipata (09h 44.3m)	1-Martyrdom day of Hemu Kalani (Sindhi)
2	22					2- Sattila Ekadasi
3	23					3- Netaji's Birthday
4	24			4- Sun enters Sravana nak. (23h 10.1m)		4- Meru Trayodasi(Jain), Ratanti Kalika Puja
5	25					
6	26				6- New Moon (20h. 42.5m)	6- Mauni Amavasya,Tai Amavasya, Republic Day, Makara Vavu (Kerala)
7	27				6-Annular Solar Eclipse (Not Visible in India)	7- Magha Sukladi
8	28					8- Birthday of Lala Lajpat Rai
9	29					
10	30	SAURA MAGHA				10- Tila Chaturthi,Kunda Chaturthi,Varada Chaturthi, Ganesha Puja(Bengal), Martyr's day (Mahatma Gandhi Commemoration Day)
11	31					11- Sri Panchami, Saraswati Puja
12	Feb 1					12- Vasanta Panchami
13	2					
14	3				14- Sayana Vaidhriti (26h 26.5m)	14- Ratha Saptami(Purvarunodaya), Vidhana Saptami, Arogya Saptami
15	4		CHANDRA MAGHA			15- Bhismashtami
16	5					
17	6			17- Sun enters Dhanistha nak. (26h 16.4m)		18- Bhisma Dvadasi, Jaya Ekadasi, Bhaimi Ekadasi (Bengal)
18	7					
19	8					19- Desert Festival-3 days (Jaisalmer)
20	9					20- Floating Festival/Tai Poosam
21	10				21-Full Moon(20h 33.7m)	21- Guru Rabi Das's Birthday, Maghi Purnima
22	11					
23	12			23- Saura Phalguni (16h 32.6m)		
24	13					
25	14	SAURA PHALGUNA				
26	15				26- Sayana Vyatipata (17h 57.5m)	28- Astaka(Sakashtaka), Janaki Janma, Vaikkatashtami (Kerala)
27	16					
28	17					
29	18					
30	19			30-Sun enters trop. Pisces (08h 56.0m)		30- Shivaji Jayanti, Birthday of Swami Dayananda Saraswati (Founder of AryaSamaj)

N.B: All the timings are given in I.S.T. or the local mean time of the meridian of 82½ ˚ E long.

Moon enters Dhanus 3,09h18.2m;Makara 05,20h 40.5m; Kumbha 8,09h22.3m;Mina 10,22h17.8m;Mesha 13,09h58.3m;Vrisha 15,18h48.0m;Mithuna 17,23h52.0m;Karkata 19,25h29.5m;Simha 21, 25h03.3m;Kanya 23,24h28.7m;Tula 25,25h45.4m;Vrischika 27,30h26.8m;Dhanus 30, 15h01.7m

Sun enters : Nir. Kumbha 24, 16h 23.2m

INDIAN CALENDAR Mina:Madhu

SAKA ERA 1949 Spring(Vasanta) 1st month

Month of PHALGUNA (30 DAYS)

(Nirayana) 8 Phalguna, 5128 Kali Era to (Nirayana) 6 Chaitraa, 5128 Kali Era

Date	Week Day	Gregorian Date	Sunrise		Apparent Noon		Sunset		Tithi			Nakshatra			Yoga		
									No.	Ending Moment		No.	Ending Moment		No.	Ending Moment	
			h	m	h	m	h	m		h	m		h	m		h	m
		2028 A.D.															
1	Sun	Feb 20	6	29.5	12	13.7	17	58.3	K 11	29	46.6	19	17	13.9	15	16	26.0
2	Mon	21	6	28.7	12	13.6	17	58.8	12	---	---	20	19	53.6	16	17	00.4
3	Tue	22	6	28.0	12	13.5	17	59.3	12	8	08.5	21	22	51.3	17	17	49.8
4	Wed	23	6	27.2	12	13.4	17	59.8	13	10	44.9	22	25	58.0	18	18	47.5
5	Thu	24	6	26.4	12	13.3	18	00.3	14	13	27.0	23	29	05.9	19	19	47.7
6	Fri	25	6	25.6	12	13.1	18	00.8	K 30	16	07.4	24	---	---	20	20	45.6
7	Sat	26	6	24.8	12	13.0	18	01.3	S 1	18	40.1	24	8	08.9	21	21	37.3
8	Sun	27	6	24.0	12	12.8	18	01.8	2	21	00.1	25	11	01.7	22	22	19.2
9	Mon	28	6	23.2	12	12.6	18	02.3	3	23	02.7	26	13	39.7	23	22	48.0
10	Tue	29	6	22.4	12	12.4	18	02.7	4	24	43.2	27	15	58.5	24	23	00.6
11	Wed	Mar 1	6	21.5	12	12.2	18	03.2	S 5	25	56.9	1	17	53.3	25	22	53.1
12	Thu	2	6	20.6	12	12.0	18	03.7	6	26	38.7	2	19	19.1	26	22	21.9
13	Fri	3	6	19.8	12	11.8	18	04.1	7	26	44.3	3	20	11.1	27	21	23.5
14	Sat	4	6	18.9	12	11.6	18	04.6	8	26	10.4	4	20	25.7	1	19	54.9
15	Sun	5	6	18.0	12	11.4	18	05.0	9	24	55.7	5	20	00.5	2	17	54.4
16	Mon	6	6	17.1	12	11.2	18	05.4	S 10	23	01.1	6	18	55.8	3	15	21.8
17	Tue	7	6	16.2	12	10.9	18	05.9	11	20	30.0	7	17	14.1	4	12	18.7
18	Wed	8	6	15.3	12	10.7	18	06.3	12	17	27.8	8	15	00.5	5 (6	8 28	48.5 56.3)
19	Thu	9	6	14.3	12	10.4	18	06.7	13	14	01.9	9	12	22.4	7	24	48.4
20	Fri	10	6	13.4	12	10.2	18	07.1	14	10	21.4	10	9	28.8	8	20	32.7
21	Sat	11	6	12.5	12	09.9	18	07.5	S 15 K (1	6 26	36.1 56.7)	11 12	6 27	29.9 37.1	9	16	17.6
22	Sun	12	6	11.5	12	09.6	18	07.9	2	23	34.5	13	25	01.8	10	12	11.9
23	Mon	13	6	10.6	12	09.4	18	08.3	3	20	40.0	14	22	55.1	11 (12	8 29	24.3 03.2)
24	Tue	14	6	09.6	12	09.1	18	08.7	4	18	23.2	15	21	26.9	13	26	15.7
25	Wed	15	6	08.7	12	08.8	18	09.1	K 5	16	52.4	16	20	45.1	14	24	06.9
26	Thu	16	6	07.7	12	08.5	18	09.5	6	16	12.9	17	20	54.4	15	22	39.7
27	Fri	17	6	06.8	12	08.2	18	09.9	7	16	26.7	18	21	55.2	16	21	53.7
28	Sat	18	6	05.8	12	07.9	18	10.3	8	17	30.9	19	23	43.4	17	21	45.6
29	Sun	19	6	04.8	12	07.6	18	10.7	9	19	17.9	20	26	10.4	18	22	08.9
30	Mon	20	6	03.8	12	07.4	18	11.1	K 10	21	36.7	21	29	04.6	19	22	55.1

N.B. All timings are given in IST or the local time of meridian of 82 1/2 ˚ E longitude

Name of Nakshatras: 1. Asvini 2. Bharani 3. Krittika 4. Rohini 5. Mrigasiras 6. Ardra 7. Punarvasu 8.Pushya 9. Aslesha 10. Magha 11. Purva Phalguni 12.Uttar Phalguni 13. Hasta 14. Chitra 15. Svati 16. Visakha 17. Anuradha 18. Jyestha 19. Mula 20. Purvasadha 21. Uttarasadha 22. Sravana 23. Dhanistha 24. Satabhisaj 25. Purva Bhadrapada 26. Uttar Bhadrapada 27. Revati.

Name of Yogas: 1. Viskumbha 2. Priti 3. Ayusman 4. Saubhagya 5. Sobhana 6. Atiganda 7. Sukarma 8. Dhriti 9. Sula 10. Ganda 11. Vriddhi 12. Dhruba 13. Vyaghata 14. Harshana 15. Vajra 16. Siddhi(Asrik) 17.Vyatipata 18. Variyan 19. Parigha 20. Siva 21. Siddha 22. Sadhya 23. Subha 24. Sukla(Sukra) 25. Bramha 26. Indra 27. Vaidhriti

Uttarayana
Dakshina gola

INDIAN CALENDAR

Ayanamsa on 1st 24˚15'17"

Saka Era 1949
Month of PHALGUNA (30 Days)
Nirayana 8 Phalguna 5128 KE to Nirayana 6 Chaitra 5128 KE

Date	Gregorian Date	Solar Month	Lunar Month	Transit of the sun	Phenomena	Festivals
	2028 A.D.					
1	Feb 20		CHANDRA MAGHA	1- Sun enters Satabhisaj nak. (6h 51.0m)		1- Vijaya Ekadasi
2	21					2- Vanjuli Mahadvadasi
3	22					3- Maha Shivaratri(Kashmir)
4	23					4- Maha Shivaratri, Shivaratri(S.India)
5	24					
					6- New Moon (16h. 07.4m)	
6	25					
7	26					
						8- Birthday of Sri Ramakrishna Paramahamsa Deva
8	27					
					9- Jupiter enters Nir. Simha	
9	28				(19h 17.9m)	
					10- Sayana Vaidhriti (07h 35.0m)	
10	29					
11	Mar 1	SAURA PHALGUNA				
12	2					
13	3					
				14- Sun enters Purva Bhadrapada nak. (13h 04.0m)		14- Holastaka
14	4					
15	5					
16	6		CHANDRA PHALGUNA			
17	7					17- Amalaki Ekadasi
						18- Govinda Dvadasi (Pusya nak. Upto 15h.
18	8					00.5m, Sobhana yoga Upto 8h. 48.5m)
19	9					
						20- Holikadahana,Birthday of Sri Chaitanya, Masi
20	10					Magham (Magha nak. ends 9h. 28.8m)
					21-Full Moon(06h 36.1m)	21- Holi, Hola, Vasantotsava, Dolayatra
21	11					
22	12				22- Sayana Vyatipata (09h 27.7m)	
				23- Saura Chaitradi (13h 02.9m)		25- Ranga Panchami, Bijoy Gavindaji Halangkar (Manipur)
23	13					
24	14					
25	15	SAURA CHAITRA				
26	16					
27	17			27- Sun enters Uttar Bhadrapada nak. (21h 35.4m)		
28	18					28- Varsitaparambha(Jain), Sitalashtami
29	19					
30	20			30- Sun enters trop. Aries (7h 47.1m)		30- Indian year ending day, Mahavisuva Day

N.B: All the timings are given in I.S.T. or the local mean time of the meridian of 82½ ˚ E long.

Moon enters: Makara 2,26h36.7m;Kumbha 5,15h32.2m;Mina 7,28h19.7m; Mesha 10,15h 58.5m;Vrisha 12,25h35.4m;Mithuna 15,08h18.1m;Karkata 17,11h42.8m;Simha 19,12h22.4m;Kanya 21, 11h 45.7m;Tula 23,11h54.2m;Vrischika 25,14h50.8m;Dhanus 27,21h55.2m; Makara 30, 08h51.9m

Sun enters : Nir. Mina 24, 13h 15.1m

PRINCIPAL FESTIVALS AND ANNIVERSARIES FOR HOLIDAYS

	Festivals	Criterion	Date
			National/Nirayana/Gregorian
			1948 S.E/ 5127 K.E./ 2027 A.D.
61	Bhogi (S.India)	Day before Pongal	Pausha 24/ Magha1/Jan14
	Makara Samkranti (Bengal)	The Day of Saura Maghadi	Pausha 24/ Magha1/Jan14
	Magha Bihu (Assam)	The Day of Saura Maghadi	Pausha 24/ Magha1/Jan14
62	Makara Snana, TilaSamkranti,	The Day of Saura Maghadi	Pausha 25/ Magha2/Jan15
	Pongal (S.India)	The Day of Saura Maghadi	Pausha 25/ Magha2/Jan15
	Guru Gobind Singh's Birthday	Pausha S7	Pausha 25/ Magha2/Jan15
	Tai Pongal (Kerala)	The Day of Saura Maghadi (18 Ghatika rule)	Pausha 25/ Magha2/Jan15
63	Mattu Pongal or Kanumu	The Day after Pongal	Pausha 26/Magha 3/Jan 16
64	Netaji's Birthday	Fixed	Magha 3/Magha10/Jan 23
65	Republic Day	Fixed	Magha 6/Magha13/Jan 26
66	Sri Panchami, Vasanta Panchami	Magha S5	Magha 22/Magha 29/Feb 11
67	Shivaji Jayanti	Fixed	Magha 30/Phalguna 7/Feb 19
68	Guru Ravi Das's Birthday	Magha S15	Phalguna 1/Phalguna 8/Feb 20
69	Birthday of Swami Dayananda Saraswati (Founder of AryaSamaj)	Phalguna K10 (Purnimanta)	Phalguna 11/ Phalguna 18/Mar2
70	Maha Shivaratri	Magha K14	Phalguna 15/ Phalguna 22/Mar 6
71	Mahavisuva Day	Day of Sun's entry into Trop.Aries (Midnight rule)	Phalguna 30/Chaitra 7/Mar 21
			1949 S.E/ 5127 K.E./ 2027 A.D.
1	Indian New Year's Day	Fixed	Chaitra 1/Chaitra 8/ March 22
	Holikadahana	Phalguna S15(Night)	Chaitra 1/Chaitra 8/ March 22
	Dolayatra	Phalguna S15	Chaitra 1/Chaitra 8/ March 22
2	Holi,	Day after Holikadahana	Chaitra 2/Chaitra 9/ March 23
	Hola, Vasantotsava	Phalguna K1	Chaitra 2/Chaitra 9/ March 23
3	Chaitra Sukladi(GudiPadava,Ugadi),	Chaitra S1	Chaitra 17/ Chaitra 24/ Apr 7
	Cheti Chand (Sindhi New Year's Day),Telugu New Year's Day, Vasanta Navaratrarambha	Chaitra S1	Chaitra 17/ Chaitra 24/ Apr 7
		Chaitra S1	Chaitra 17/ Chaitra 24/ Apr 7
		Chaitra S1	Chaitra 17/ Chaitra 24/ Apr 7
4	Sarhul (Bihar)	Chaitra S3	Chaitra 19/ Chaitra 26/ Apr 9
5	Oli Begins (Jain)	Eight days before Oli ends	Chaitra 22/Chaitra 29/ Apr 12
6	Vastanti Pujarambha	Chaitra S7	Chaitra 23/Chaitra 30/ Apr 13
			1949 S.E/ 5128 K.E./ 2027 A.D.
7	Chaitra Samkranti, Chadak Puja (Bengal), Cheiraoba(Manipur),	Saura Vaisakhadi (Midnight Rule)	Chaitra 24/Vaisakha 1/ Apr 14
	Meshadi (T.N), Tamil New Year's Day,	Saura Vaisakhadi (Midnight Rule)	Chaitra 24/ Vaisakha 1/ Apr 14
	Dr.B.R.Ambedkar Jayanti,Beginning of 5128 K.E. Vaisakhi(Punjab,Hariyana,H.P.Delhi & Odisha),Visu(Kerala)	Saura Vaisakhadi (Sunset Rule)	Chaitra 24/ Vaisakha 1/ Apr 14
		Fixed	Chaitra 24/ Vaisakha 1/ Apr 14
		SauraVaisakhadi (Sunrise Rule)	Chaitra 24/ Vaisakha 1/ Apr 14
8	Rama Navami,	Chaitra S9	Chaitra 25/Vaisakha 2/ Apr 15
	Vaisakhadi (Bengal),Bhag Bihu (Assam), Shilhenba (Manipur)	Day following Saura Vaisakhadi	Chaitra 25/Vaisakha 2/ Apr 15
		(Midnight Rule)	Chaitra 25/Vaisakha 2/ Apr 15
			Chaitra 25/Vaisakha 2 / Apr 15
9	Mahavira Jayanti	Chaitra S13	Chaitra 29/Vaisakha 6/ Apr 19
10	Oli Ends(Jain)	Chaitra S15(Udayavyapini)	Chaitra 30/Vaisakha 7/ Apr 20
11	Babu Kuer Singh Day(Bihar)	Fixed	Vaisakha 3/ Vaisakha 10/ Apr 23
12	May Day	Fixed	Vaisakha 11/ Vaisakha 18/ May 1
13	Tithi of Deva Damodara (Assam)	S1 of Saura Vaisakha	Vaisakha 17/ Vaisakha 24/ May 7
14	Akshaya Tritiya	Vaisakha S3	Vaisakha 19/ Vaisakha 26/ May 9
	Birthday of RabindranathTagore	25 Vaisakha of Beng. Calendar	Vaisakha 19/ Vaisakha 26/ May 9
15	Buddha Purnima	Vaisakha S15	Vaisakha 30/ Jyaishtha 6 / May 20
16	Pratap Jayanti (Rajasthan)	Jyaishtha S3	Jyaishtha 17/ Jyaishtha 24/ June 7
17	Guru Arjan Dev's Martyrdom Day	Jyaishtha S4	Jyaishtha 18/ Jyaishtha 25/ June 8
18	Rajas Samkranti (Odisha)	Saura Ashadhadi (Sunrise rule)	Jyaishtha 25/ Ashadha 1/ June 15
19	Rathayatra	Ashadha S2	Ashadha 14/ Ashadha 21/ July 5
20	Kharchi Puja (Tripura)	Ashadha S8	Ashadha 20/ Ashadha 27/ July 11

PRINCIPAL FESTIVALS AND ANNIVERSARIES FOR HOLIDAYS

	Festivals	Criterion	Date
21	Ultaratha (Odisha),Bahudha Yatra	9th day from Rathayatra	Ashadha 22/ Ashadha 29/ July 13
	Punaryatra	Ashadha S10	Ashadha 22/ Ashadha 29/ July 13
22	Ker Puja (Tripura)	First Tuesday or Saturday after 14 days from Kharchi Puja not falling on K10	Sarvana 5/ Sravana 12/July 27
23	Tilak Commemoration Day	Fixed	Sravana 10/ Sravana 17/Aug 1
24	Karkataka Vavu (Kerala)	K30 of Saura Sravana	Sravana 11/ Sravana 18/Aug 2
25	Rik Upakarma	Sravana Nak. of Chandra	Sravana 15/ Sravana 22/Aug 6
26	Jhulana Yatrarambha	Sravana S11	Sarvana 21/ Sravana 28/Aug 12
27	Independence Day	Fixed	Sarvana 24/ Sravana 31/Aug 15
28	Naroli Purnima	Sravana S15 (Aparahna&Sayahna)	Sarvana 25/ Bhadra 1/Aug 16
29	Raksha Bandhan	Sravana S15 (Pradosa)	Sarvana 26/ Bhadra 2/Aug 17
	Avani Avittam (S.India)	Sravana S15	Sarvana 26/ Bhadra 2/Aug 17
	Solono (Rakhi Bandhan)	Sravana S15 (Udayavyapini)	Sarvana 26/ Bhadra 2/Aug 17
	Jhulana Yatra Samapanna	Sravana S15 (Purvahna)	Sarvana 26/ Bhadra 2/Aug 17
30	Tithi of Sri Madhava Deva (Assam)	K5 of Saura Bhadra	Sarvana 31/ Bhadra 7/Aug 22
31	Janmashtami (Smarta)	Sravana K8	Bhadra 3/ Bhadra 10/Aug 25
	Janmashtami (Vaishnava)	Sravana K8	Bhadra 3/ Bhadra 10/Aug 25
32	Sri Jayanti (Ramanuja)	Rohini Nakshatra of Saura Bhadra	Bhadra 4/ Bhadra 11/Aug 26
	Gokulashtami (Nandotsava)	Day after Janmashtami	Bhadra 4/ Bhadra 11/Aug 26
33	Paryusana Parvarambha (Chaturthi Paksha-Jain)	7 Days before Samvatsari (Chaturthi Paksha)	Bhadra 6/ Bhadra 13/Aug 28
	ParyusanaParvarambha (Panchami Paksha-Jain)	7 Days before Samvatsari (Panchami Paksha)	Bhadra 6/ Bhadra 13/Aug 28
34	Jain Festival	Sravana K30 (Udayavyapini)	Bhadra 9/ Bhadra 16/Aug 31
35	Tithi of Sri Sankara Deva(Assam)	S2 of Saura Bhadra	Bhadra 11/ Bhadra 18/Sep 2
36	Vinayak Chaturthi (Tamilnadu)	S4 of Saura Bhadra	Bhadra 13/ Bhadra 20/Sep 4
	Ganesha Chaturthi	Bhadra S4	Bhadra 13/ Bhadra 20/Sep 4
	Samvatsari (Chaturthi Paksha-Jain)	Bhadra S4 (Udayavyapini)	Bhadra 13/ Bhadra 20/Sep 4
	Samvatsari (Panchami Paksha-Jain)	Bhadra S5 (Current at Sunset)	Bhadra 13/ Bhadra 20/Sep 4
37	Radhashtami	Bhadra S8	Bhadra 17/ Bhadra 24/Sep 8
38	First Onam Day	Day before Thiru Onam Day	Bhadra 20/ Bhadra 27/Sep 11
39	Onam or Thiru Onam Day	Sravana Nak. of Saura Bhadra	Bhadra 21/ Bhadra 28/Sep 12
40	Third Onam Day	Day after Thiru Onam Day	Bhadra 22/ Bhadra 29/Sep 13
41	Fourth Onam Day,	Two Days after Thiru Onam Day	Bhadra 23/ Bhadra 30/Sep 14
	Ananta Chaturdasi	Bhadra S14	Bhadra 23/ Bhadra 30/Sep 14
42	Samadhi Day of Narayana Guru (Kerala)	Fixed	Bhadra 30/ Asvina 6/Sep 21
43	Mahalaya Amavasya, Sarvapitri Amavasya	Bhadra K30	Asvina 7/Asvina 14/Sep 29
44	Tarpana Loiba(Manipur),	Bhadra K30	Asvina 8/Asvina 15/Sep 30
	Saradiya Navaratrarambha	Asvina S1	Asvina 8/Asvina 15/Sep 30
45	Mahatma Gandhi's Birthday	Fixed	Asvina 10/Asvina 17/Oct 2
46	Durga Puja Begins (Saptami)	Asvina S7	Asvina 14/Asvina 21/Oct 6
47	Oli Begins (Jain)	Eight Days before Oli Ends	Asvina 15/Asvina 22/Oct 7
	Durga Puja (Mahashtami)	Asvina S8	Asvina 15/Asvina 22/Oct 7
48	Ayudha Puja	Day before Dussehara	Asvina 16/Asvina 23/Oct 8
49	Durga Puja (Mahanavami)(Bengal)	Asvina S9	Asvina 17/Asvina 24/Oct 9
	Vijaya Dasami (Dussehara or Dasahara)	Asvina S10 (Aparahna)	Asvina 17/Asvina 24/Oct 9
50	Vijaya Dasami (Bengal & Kerala)	Asvina S10 (Purvahna)	Asvina 18/Asvina 25/Oct 10
51	Kumara Purnima (Odisha)	Asvina S15(Pradosa)	Asvina 23/Asvina 30/Oct 15
	Kojagori Lakshmi Puja (Bengal),	Asvina S15(Pradosa)	Asvina 23/Asvina 30/Oct 15
	Maharshi Valmiki's Birthday,	Asvina S15(Udayavyapini)	Asvina 23/Asvina 30/Oct 15
	Oli Ends (Jain)	Asvina S15 (Udayavyapini)	Asvina 23/Asvina 30/Oct 15
52	Kaveri Samkramana Snana	Saura Kartikadi (Midnight Rule)	Asvina 26/Kartika 3/Oct 18
53	NarakaChaturdasi(Purvarunodaya), Hanumajjanma,	Asvina K14 (Purvarunodaya)	Kartika 6/ Kartika 13/ Oct 28
	Kali Puja, Dipavali (S.India)	Asvina K14 (Udayavyapini)	Kartika 6/ Kartika 13/ Oct 28
		Asvina K14	Kartika 6/ Kartika 13/ Oct 28

PRINCIPAL FESTIVALS AND ANNIVERSARIES FOR HOLIDAYS

	Festivals	Criterion	Date
54	Dipavali	Asvina K30	Kartika 7/ Kartika 14/ Oct 29
55	Govardhana Puja	Kartika S1	Kartika 8/ Kartika 15/ Oct 30
	Bali Puja,	Kartika S1	Kartika 8/ Kartika 15/ Oct 30
	Kartika Sukladi	Kartika S1	Kartika 8/ Kartika 15/ Oct 30
56	Bhratri Dvitiya, Tikka Ceremony, Bhai Duj	Kartika S2 (Aparahna)	Kartika 9/ Kartika 16/ Oct 31
	Dwat Puja (Bihar)	Kartika S2 (Purvahna)	Kartika 9/ Kartika 16/ Oct 31
57	PratiharaShashthi or Surya Shashthi (Chhat - Bihar)	Kartika S6	Kartika 13/ Kartika 20/ Nov 4
58	Jagaddhatri Puja	Kartika S9	Kartika 16/ Kartika 23/ Nov 7
59	Rasayatra(Smarta)	Kartika S15	Kartika 22/ Kartika 29/ Nov 13
60	Rasayatra(Vaishnava)	Kartika S15	Kartika 23/ Kartika 30/ Nov 14
	Rathayatra (Jain)	Kartika S15 (Udayavyapini)	Kartika 23/ Kartika 30/ Nov 14
	Kartiki Purnima,	Kartika S15	Kartika 23/ Kartika 30/ Nov 14
	Guru Nanak's Birthday,	Kartika S15(Udayavyapini)	Kartika 23/ Kartika 30/ Nov 14
	Puskar Fair	Kartika S15	Kartika 23/ Kartika 30/ Nov 14
61	Prathamashtami (Odisha)	Kartika K8	Kartika 30/ Agrahayana 7/ Nov 21
62	Guru Tegh Bahadur's Martyrdom Day	Fixed	Agrahayana3/Agrahayana10/Nov 24
63	Huthri-3 Days (Coorg)	S15 to K2 of Saura Margasirsha	Agrahayana22/Agrahayana29/Dec 13
64	Jor Mela-3 Days (Punjab)	Fixed	Pausha 5/Pausha 12/Dec 26
			1949 S.E/ 5128 K.E./ 2028 A.D.
65	Guru Gobind Singh's Birthday	Pausha S7	Pausha 14/ Pausha 21/Jan 4
66	Vaikuntha Ekadasi (S.India)	S11 of Saura Pausha	Pausha 18/ Pausha 25/Jan 8
67	Bhogi (S.India)	Day before Pongal	Pausha 24/ Magha 1/Jan14
68	Makara Samkranti (Bengal)	The Day of Saura Maghadi	Pausha 25/ Magha 2/Jan15
	Magha Bihu (Assam)	The Day of Saura Maghadi	Pausha 25/ Magha 2/Jan15
	Makara Snana, TilaSamkranti,	The Day of Saura Maghadi	Pausha 25/ Magha 2/Jan15
	Pongal (S.India)	The Day of Saura Maghadi	Pausha 25/ Magha 2/Jan15
	Tai Pongal (Kerala)	The Day of Saura Maghadi (18 Ghatika rule)	Pausha 25/ Magha 2/Jan15
69	Mattu Pongal or Kanuvu	The Day after Pongal	Pausha 26/Magha 3/Jan 16
70	Netaji's Birthday	Fixed	Magha 3/Magha10/Jan 23
71	Republic Day	Fixed	Magha 6/Magha13/Jan 26
72	Sri Panchami	Magha S5	Magha 11/Magha18/Jan 31
73	Vasanta Panchami	Magha S5	Magha 12/Magha 19/Feb 1
74	Guru Ravi Das's Birthday	Magha S15	Magha 21/Magha 28/Feb 10
75	Shivaji Jayanti,	Fixed	Magha 30/Phalguna 7/Feb 19
	Birthday of Swami Dayananda Saraswati (Founder of AryaSamaj)	Phalguna K10 (Purnimanta)	Magha 30/Phalguna 7/Feb 19
76	Maha Shivaratri	Magha K14	Phalguna 4/ Phalguna 11/Feb 23
77	Holikadahana	Phalguna S15(Night)	Phalguna 20/ Phalguna 27/Mar 10
78	Dolayatra	Phalguna S15	Phalguna 21/ Phalguna 28/Mar 11
	Holi,	Day after Holikadahana	Phalguna 21/ Phalguna 28/Mar 11
	Hola, Vasantotsava	Phalguna K1	Phalguna 21/ Phalguna 28/Mar 11
79	Mahavisuva Day	Day of Sun's entry into Trop.Aries (Midnight rule)	Phalguna 30/Chaitra 6/Mar 20

Special Festivals for Jammu and Kashmir

	Festivals	Criterion	Date
			National / Nirayana / Gregorian
			Saka 1948/ Kali 5127/ 2027 A D.
7	Lohri	Day before Saura Maghadi (Sunrise Rule)	Pausha 23/ Pausha 30/ Jan13
			Saka 1949/ Kali 5128/ 2027 A D.
1	Mela Bahu Fort	Chaitra S 8	Chaitra 24/ Vaisakha 1/ April 14
			Saka 1949/ Kali 5128/ 2027 A D.
2	Mela Kshir Bhawani	Jyaishtha S 8	Jyaishtha 21 / Jyaishtha 28 / June 11
3	Guru Hargobind's Birthday	Jyaishtha K 1	Jyaishtha 30 / Ashadha 6 / June 20
4	Martyr's Day	Fixed	Ashadha 22 / Ashadha 29 / July 13
5	Kailas Yatra-2days	Sravana K 13 & K 14	Bhadra 8 / Bhadra 15 / Aug 30
6	Mela Pat -3days	Bhadra S 5 to S 7	Bhadra 14 / Bhadra 21/ Sep 5
			Saka 1949/ Kali 5128/ 2028 A D.
7	Lohri	Day before Saura Maghadi (Sunrise Rule)	Pausha 23/ Pausha 30/ Jan 13
			Saka 1950/ Kali 5128/ 2028 A D.
8	Mela Bahu Fort	Chaitra S 8	Chaitra 14/ Chaitra 20/ April 3

Moslem Festival (2027-2028 A.D.)

	Festivals	Criterion	Date
			National/Nirayana/Gregorian
			Saka 1948/Kali 5127/2027 A.D.
1	Sab-e-Miraj*	27 Rajab	Pausha 16/ Pausha 23/Jan 6
2	Sab-e-Barat*	15 Shaban	Magha 4/ Magha 11/ Jan 24
3	First Day of Ramadan	1 Ramadan	Magha 20/ Magha 27/Feb 9
			Saka 1948/Kali 5127/2027 A.D.
4	Shahadat-e-Hazrat Ali	21 Ramadan	Phalguna 10/ Phalguna 17/Mar 1
5	Jumatul Vida	Last Friday of Ramadan	Phalguna 14/ Phalguna 21/Mar 5
6	Sab-e-Qadr*	27 Ramadan	Phalguna 16/ Phalguna 23/Mar 7
7	Id-ul-Fitr	1 Shawwal	Phalguna 19/ Phalguna 26/Mar 10
			Saka 1949/Kali 5128/2027 A.D.
8	Id-uz-Zuha (Bakrid)	10 Zulhijja	Vaishakha 27 / Jyaishtha 3 / May 17
9	Muharram	10 Muharram	Jyaishtha 26 / Ashadha 2 / June 16
10	Chelhum	Fortieth Day from (39 days after) 10 Muharram	Sravana 3 / Sravana 10 / July 25
11	AkheriChaharShumba	Last Wednesday of Safar	Sravana 6 / Sravana 13 / July 28
12	Shahadat-e-Iman Hasan	28 Safar	Sravana 11 / Sravana 18 / August 2
13	Milad-un-Nabi or Id-e-Milad (Birthday of Prophet), Fateha Dwaz Daham or Bara Wafat	12 Rabiu'lawwal	Sravana 24 / Sravana 31 / August 15
14	Id-e-Maulad	17 Rabiu'lawwal	Sravana 29 / Bhadra 5 / August 20
15	FatehaYazdaham (Giarhween Sharif)	11 Rabiu'ssani	Bhadra 22 / Bhadra 29 / Sep 13
16	Hazrat Ali's Birthday	13 Rajab	Agrahayana 21 / Agrahayana 28 / Dec 12
17	Sab-e-Miraj*	27 Rajab	Pausha 5 / Pausha 12 / Dec 26
			Saka 1949/Kali 5128/2028 A.D.
1	Sab-e-Barat*	15 Shaban	Pausha 23 / Pausha 30 / Jan 13
2	First Day of Ramadan	1 Ramadan	Magha 9 / Magha 16 / Jan 29
3	Shahadat-e-Hazrat Ali	21 Ramadan	Magha 29 / Phalguna 6 / Feb 18
4	Sab-e-Qadr*	27 Ramadan	Phalguna 5 / Phalguna 12 / Feb 24
5	Jumatul Vida	Last Friday of Ramadan	Phalguna 6 / Phalguna 13 / Feb 25
6	Id-ul-Fitr	1 Shawwal	Phalguna 8 / Phalguna 15 / Feb 27

The Islamic Calendar (2027-28 A.D.)

(Hejira: 1448-1449 A.H.)

The beginning dates of the different months of the Islamic Calendar for the year 2027-28 A.D. determined on the basis of the first visibility of the lunar crescent after the New-Moon day calculated for Central Station of India are as follows: -

Shaban	**1448**	Jan 10	2027 A.D.	(30)	Rabiu'ssani	**1449**	Sep 03	2027 A.D.	(29)
Ramadan	,,	Feb 09	,,	(29)	Jumadu'lawwal	,,	Oct 02	,,	(30)
Shawwal	,,	Mar 10	,,	(30)	Jumadu'ssani	,,	Nov 01	,,	(29)
Zu'lqada	,,	Apr 09	,,	(29)	Rajab	,,	Nov 30	,,	(30)
Zulhijja	,,	May 08	,,	(30)	Shaban	,,	Dec 30	,,	(30)
MUHARRAM	**1449**	Jun 07	,,	(29)	Ramadan	,,	Jan 29	2028 A.D.	(29)
Safar	,,	Jul 06	,,	(29)	Shawwal	,,	Feb 27	,,	(30)
Rabiu'lawwal	,,	Aug 04	,,	(30)	Zu'lqada	,,	Mar 28	,,	(30)

N.B.- Actually the months begin from sunset of the preceding day when the Moon becomes first visible.

Fixed Calendar

According to Fixed Calendar the beginning dates of different months are as follows:

Jan 10 (2027 A.D.), Feb 8, Mar 10, April 8, May 8, June 6, July 6, Aug 4, Sep 3, Oct 2, Nov 1, Nov 30, Dec 30, Jan 28 (2028 A.D.), Feb 27, Mar 27.

THE PARSI (SHAHENSHAHI) CALENDAR, 2027 - 28 A.D.

(As used by the Indian Parsis)

Yazdejardi Era: 1396-1397

The beginning dates of different months of the ParsiShahenshahi Calendar are as follows:

As regards the ParsiKadmi Calendar, the months are the same but they begin 30 days earlier.

Shahrivar	1396	Jan. 12	2027	(30)	Ardibehesht	1397	Sept. 14	2027	(30)
Meher	"	Feb. 11	"	(30)	Khordad	"	Oct. 14	"	(30)
Avan	"	Mar. 13	"	(30)	Tir	"	Nov. 13	"	(30)
Adar	"	Apr 12	"	(30)	Amardad	"	Dec. 13	"	(30)
Dei	"	May 12	"	(30)	Shahrivar	"	Jan. 12,	2028	(30)
Bahman	"	Jun 11	"	(30)	Meher	"	Feb. 11	"	(30)
Aspandad	"	Jul 11	"	(30)	Avan	"	Mar. 12	"	(30)
*Gathas (*I-V)	"	Aug. 10	"	(5)	Adar	"	Apr 11	"	(30)
FARVARDIN	1397	Aug. 15	"	(30)	Dei	"	May 11	"	(30)

PARSI FESTIVALS 2027-2028 A.D.

Festival	Criterion	**Shahenshahi**	**Kadmi**
		National/Nirayana/Gregorian	**National/ Nirayana /Gregorian**
		Saka 1949 / Kali 5128/ 2027 A.D.	**Saka 1949 / Kali 5128 / 2027 A.D.**
Zarthost-no-Diso	11 Dei	Jyaishtha 1 / Jyaishtha 8 / May22	Vaisakha 2/Vaisakha 9/ April 22
Gatha Gahambar	Gatha III	Sravana 21 / Sravana 28 /Aug.12	Ashadha 22/ Ashadha 29/ July 13
Parsi New Year Eve	Gatha V	Sravana 23 / Sravana 30 / Aug. 14	Ashadha 24/ Ashadha 31 / July 15
Parsi New Year's Day	1 Farvardin	Sravana 24 / Sravana 31 / Aug. 15	Ashadha 25 / Sravana 1/ July 16
Khordad Sal (Birthday of Prophet Zarthost)	6 Farvardin	Sravana 29 / Bhadra 5 / Aug. 20	Ashadha 30/ Sravana 6 / July 21

N.B.-Jamshedi Naoroj falls on March 21 every year

THE JEWISH CALENDAR (2027-28 A.D.)

Jewish Era: 5787-88 A.M.

The beginning dates of different months of the Jewish Calendar are as follows:

Shebat	5787	Jan 09	2027	(30)	TISHRI	5788	Oct 02	2027	(30)
Vedar	,,	Feb 08	,,	(30)	Heshvan	,,	Nov 01	,,	(30)
Adar	,,	Mar 10	,,	(29)	Kislev	,,	Dec 01	,,	(30)
Nisan	,,	Apr 08	,,	(30)	Tebeth	,,	Dec 31	,,	(29)
Iyar	,,	May 08	,,	(29)	Shebat	,,	Jan 29	2028	(30)
Sivan	,,	Jun 06	,,	(30)	Adar	,,	Feb 28	,,	(29)
Tammuz	,,	Jul 06	,,	(29)	Nisan	,,	Mar 28	,,	(30)
Ab	,,	Aug 04	,,	(30)	Iyar	,,	Apr 27	,,	(29)
Ellul	,,	Sep 03	,,	(29)	Sivan	,,	May 26	,,	(30)

JEWISH FESTIVALS (2027-28 A.D.)

Festivals	**Criterion**	**Date**
		Saka 1949 / Kali 5127 / 2027 A.D.
Purim	14 Adar	Chaitra 2/ Chaitra 9/ March 23
		Saka 1949 / Kali 5128 / 2027 A.D.
First day of Passover (Pesach)	15 Nisan	Vaisakha 2/ Vaisakha 9/ April 22
Feast of Weeks (Shebuoth)	6 Sivan	Jyaishtha 21 / Jyaishtha 28 / Jun 11
Tishabeab	9 Ab	Sravana 21 / Sravana 28 / August 12
Jewish New Year (Rosh Hashnah)	1 Tishri	Asvina 10 / Asvina 17 / October 2
Day of Atonement (Yom Kippur)	10 Tishri	Asvina 19 / Asvina 26 / October 11
First day of Tabernacles (Succoth)	15 Tishri	Ashvina 24 / Kartika 1/ October 16
Last day of Succoth(Simhath Torah)	23 Tishri	Kartika 2 / Kartika 9 / October 24
Hanukah	25 Kislev	Pausha 4 / Pausha 11 / December 25
		Saka 1949 / Kali 5128 / 2028 A.D.
Purim	14 Adar	Phalguna 22 / Phalguna 29 / March 12
		Saka 1950 / Kali 5128/ 2028 A.D.
First day of Passover (Pesach)	15 Nisan	Chaitra 22 / Chaitra 28 / April 11

CHRISTIAN FESTIVALS (2027-28 A.D.)

	FESTIVALS	CRITERION	DATE
			Saka 1948/ Kali 5127/ 2027 A.D.
1	Christian (English) New Year's Day	Fixed	Pausha 11/Pausha 18/Jan 01
2	Epiphany	Fixed	Pausha 16/Pausha 23/Jan 06
3	Septuagesima Sunday	63 days before Easter Sunday	Magha 4/Magha 11/ Jan 24
4	Quinquagesima (Shrove) Sunday	49 days before Easter Sunday	Magha 18/ Magha 25/Feb 7
5	Ash Wednesday	46 days before Easter Sunday	Magha 21/ Magha 28/Feb 10
6	Palm Sunday	7 days before Easter Sunday	Phalguna 30/Chaitra 7/ Mar 21
			Saka 1949 / Kali 5127/ 2027 A.D.
7	Good Friday	2 days before Easter Sunday	Chaitra 5 / Chaitra 12 / March 26
8	Easter (Holy) Saturday	Day before Easter Sunday	Chaitra 6 / Chaitra 13 / March 27
9	Easter Sunday	First Sunday after the 14th day of the Moon (nearly Full Moon) occurring on or immediately after March 21	Chaitra 7 / Chaitra 14 / March 28
10	Low Sunday	7 days after Easter Sunday	Chaitra 14 / Chaitra 21 / April 4
			Saka 1949 / Kali 5128/ 2027 A.D.
11	Rogation Sunday	35 days after Easter Sunday	Vaishakha 12 / Vaishakha 19 / May 2
12	Ascension Day-Holy Thursday	39 days after Easter Sunday	Vaishakha 16 / Vaishakha 23 / May 6
13	Ascension Sunday	3 days after Ascension day	Vaishakha 19 / Vaishakha 26 / May 9
14	Whit Sunday-Pentecost	49 days after Easter Sunday	Vaishakha 26 / Jyaishtha 2 / May 16
15	Trinity Sunday	56 days after Easter Sunday	Jyaishtha 2 / Jyaishtha 9 / May 23
16	Corpus Christi (Thursday)	60 days after Easter Sunday	Jyaishtha 6 / Jyaishtha 13 / May 27
17	First Sunday in Advent	Fourth Sunday before Christmas, i.e.,Sunday nearest to Nov. 30.	Agrahayana 7 / Agrahayana 14 / Nov 28
18	Christmas Eve	Day before Christmas	Pausha 3/Pausha 10/Dec 24
19	Christmas Day	Fixed	Pausha4/Pausha 11/Dec 25
20	New Year Eve	Fixed	Pausha 10/Pausha 17/Dec 31
			Saka 1949/ Kali 5128/ 2028 A.D.
1	Christian (English) New Year's Day	Fixed	Pausha 11/Pausha 18/Jan 01
2	Epiphany	Fixed	Pausha 16/Pausha 23/Jan 06
3	Septuagesima Sunday	63 days before Easter Sunday	Magha 24 / Phalguna 1/ Feb 13
4	Quinquagesima (Shrove) Sunday	49 days before Easter Sunday	Phalguna 8 / Phalguna 15 / Feb 27
5	Ash Wednesday	46 days before Easter Sunday	Phalguna 11 / Phalguna 18 / March 1
			Saka 1950/ Kali 5128/ 2028 A.D.
6	Palm Sunday	7 days before Easter Sunday	Chaitra 20 / Chaitra 26 / April 9
			Saka 1950 / Kali 5129/ 2028 A.D.
7	Good Friday	2 days before Easter Sunday	Chaitra 25 / Vaishakha 1 / April 14
8	Easter (Holy) Saturday	Day before Easter Sunday	Chaitra 26 / Vaishakha 2/ April 15
9	Easter Sunday	First Sunday after the 14th day of the Moon (nearly Full Moon) occurring on or immediately after March 21	Chaitra 27 / Vaishakha 3 / April 16
10	Low Sunday	7 days after Easter Sunday	Vaishakha 3 / Vaishakha 10 / April 23

THE INDIAN LUNAR CALENDAR

TIME OF NEW MOON(IN I.S.T.) MARKING THE COMMENCEMENT OF LUNAR MONTHS

	2009 (1930-31 S.E.)				2012 (1933-34 S.E.)				2015 (1936-37 S.E.)			
		d	h	m		d	h	m		d	h	m
Pausha		---				---				---		
Magha	Jan.	26	13	25	Jan.	23	13	09	Jan.	20	18	44
Phalguna	Feb.	25	07	05	Feb.	21	28	05	Feb.	18	29	17
Chaitra	Mar.	26	21	36	Mar.	22	20	07	Mar.	20	15	06
Vaisakha	Apr.	25	08	53	Apr.	21	12	48	Apr.	18	24	27
Jyaishtha	May	24	17	41	May	20	05	17	May	18	09	43
Ashadha	June	22	25	05	June	19	20	32	*June*	*16*	*19*	*35*
									July	16	06	54
Sravana	July	22	08	05	July	19	09	54	Aug.	14	20	23
Bhadra	Aug.	20	15	32	*Aug.*	*17*	*21*	*24*	Sept.	13	12	11
					Sept.	16	07	41				
Asvina	Sept.	18	24	14	Oct.	15	17	33	Oct.	12	29	36
Kartika	Oct.	18	11	03	Nov.	13	27	38	Nov.	11	23	17
Margasirsha	Nov.	16	24	44	Dec.	13	14	12	Dec.	11	15	59
Pausha	Dec.	17	17	32						---		

	2010 (1931-32 S.E.)				2013 (1934-35 S.E.)				2016 (1937-38 S.E.)			
		d	h	m		d	h	m		d	h	m
Pausha		---			Jan.	11	25	14	Jan.	10	07	01
Magha	Jan.	15	12	41	Feb.	10	12	50	Feb.	8	20	09
Phalguna	Feb.	14	08	21	Mar.	11	25	21	Mar.	9	07	25
Chaitra	Mar.	15	26	31	Apr.	10	15	05	Apr.	7	16	54
Vaisakha	*Apr.*	*14*	*17*	*59*	May	10	05	58	May	6	25	00
	May	14	06	34								
Jyaishtha	June	12	16	45	June	8	21	26	June	5	08	30
Ashadha	July	11	25	10	July	8	12	44	July	4	16	31
Sravana	Aug.	10	08	38	Aug.	6	27	21	Aug.	2	26	15
Bhadra	Sept.	8	16	00	Sept.	5	17	06	Sept.	1	14	33
Asvina	Oct.	7	24	15	Oct.	5	06	05	Sept.	30	29	41
Kartika	Nov.	6	10	22	Nov.	3	18	20	Oct.	30	23	08
Margasirsha	Dec.	5	23	06	Dec.	2	29	52	Nov.	29	17	48
Pausha		---				---			Dec.	29	12	23

	2011 (1932-33 S.E.)				2014 (1935-36 S.E.)				2017 (1938-39 S.E.)			
		d	h	m		d	h	m		d	h	m
Pausha	Jan.	4	14	33	Jan.	1	16	44		---		
Magha	Feb.	3	08	01	Jan.	30	27	09	Jan.	27	29	37
Phalguna	Mar.	4	26	16	Feb.	1	13	30	Feb.	26	20	28
Chaitra	Apr.	3	20	02	Mar.	30	24	15	Mar.	28	08	27
Vaisakha	May	3	12	21	Apr.	29	11	44	Apr.	26	17	46
Jyaishtha	June	1	26	33	May	28	24	10	May	25	25	14
Ashadha	July	1	14	24	June	27	13	39	June	24	08	01
Sravana	July	30	24	10	July	26	28	12	July	23	15	16
Bhadra	Aug.	29	08	34	Aug.	25	19	43	Aug.	21	24	00
Asvina	Sept.	27	16	39	Sept.	24	11	44	Sept.	20	11	00
Kartika	Oct.	26	25	26	Oct.	23	27	27	Oct.	19	24	42
Margasirsha	Nov.	25	11	40	Nov.	22	18	02	Nov.	18	17	12
Pausha	Dec.	24	23	36	Dec.	22	07	06	Dec.	18	12	00

N.B.-The figures in the italics show the beginning of the intercalary (*mala or adhika*) month followed by the normal (*suddha or nija*) month of the same name.

THE INDIAN LUNAR CALENDAR

TIME OF NEW MOON(IN I.S.T.) MARKING THE COMMENCEMENT OF LUNAR MONTHS

	2018 (1939-40 S.E.)				2021 (1942-43 S.E.)				2024 (1945-46 S.E.)				2027 (1948-49 S.E.)			
		d	h	m		d	h	m		d	h	m		d	h	m
Pausha			---		Jan.	13	10	30	Jan.	11	17	27	Jan.	7	25	54
Magha	Jan.	17	07	47	Feb.	11	24	36	Feb.	09	28	29	Feb	6	21	26
Phalguna	Feb.	15	26	35	Mar.	13	15	51	Mar.	10	14	30	Mar.	8	14	59
Chaitra	Mar.	17	18	42	Apr.	12	08	01	Apr.	08	23	51	Apr.	6	29	21
Vaisakha	Apr.	16	07	27	May	11	24	30	May	08	08	52	May	6	16	29
Jyaishtha	*May*	*15*	*17*	*18*	June	10	16	23	June	06	18	08	June	4	25	10
	June	13	25	13												
Ashadha	July	13	08	18	July	10	06	47	July	05	28	27	July	4	08	32
Sravana	Aug.	11	15	28	Aug.	08	19	20	Aug.	04	16	43	Aug.	2	15	35
Bhadra	Sept.	9	23	32	Sept.	07	06	22	Sept.	03	07	26	Aug.	31	23	11
Asvina	Oct.	9	09	17	Oct.	06	16	35	Oct.	02	24	19	Sept.	30	08	06
Kartika	Nov.	7	21	32	Nov.	04	26	45	Nov.	01	17	18	Oct.	29	19	07
Margasirsha	Dec.	7	12	50	Dec.	04	13	13	Dec.	01	11	51	Nov.	28	08	54
Pausha			---				---		Dec.	30	27	57	Dec.	27	25	42

	2019 (1940-41 S.E.)				2022 (1943-44 S.E.)				2025 (1946-47 S.E.)				2028 (1949-50 S.E.)			
		d	h	m		d	h	m		d	h	m		d	h	m
Pausha	Jan.	6	06	58	Jan.	02	24	04			---				---	
Magha	Feb.	4	26	34	Feb.	01	11	16	Jan.	29	18	06	Jan.	26	20	43
Phalguna	Mar.	6	21	34	Mar.	02	23	05	Feb	27	30	15	Feb	25	16	07
Chaitra	Apr.	5	14	21	Apr.	01	11	54	Mar.	29	16	28	Mar.	26	10	01
Vaisakha	May	4	28	16	Apr.	30	25	58	Apr.	27	25	01	Apr.	24	25	17
Jyaishtha	June	3	15	32	May	30	17	00	May	27	8	32	May	24	13	46
Ashadha	July	2	24	46	June	29	08	22	June	25	16	02	June	22	23	58
Sravana	Aug.	1	08	42	July	28	23	25	July	24	24	41	July	22	08	32
Bhadra	Aug.	30	16	7	Aug.	27	13	47	Aug.	23	11	37	Aug.	20	16	15
Asvina	Sept.	28	23	56	Sept.	25	27	25	Sept.	21	25	24	Sept.	18	23	55
Kartika	Oct.	28	09	9	Oct.	25	16	19	Oct.	21	17	55	Oct.	18	08	28
Margasirsha	Nov.	26	20	36	Nov.	23	28	27	Nov.	20	12	17	Nov.	16	18	49
Pausha	Dec.	26	10	43	Dec.	23	15	47	Dec.	20	07	13	Dec.	16	07	38

	2020 (1941-42 S.E.)				2023 (1944-45 S.E.)				2026 (1947-48 S.E.)				2029 (1950-51 S.E.)			
		d	h	m		d	h	m		d	h	m		d	h	m
Pausha			---				---				---				---	
Magha	Jan.	24	27	12	Jan.	21	26	23	Jan.	18	25	22	Jan.	14	22	55
Phalguna	Feb.	23	21	02	Feb.	20	12	36	Feb	17	17	31	Feb.	13	16	02
Chaitra	Mar.	24	14	58	Mar.	21	22	53	Mar.	19	06	53	*Mar.*	*15*	*09*	*49*
													Apr.	13	27	10
Vaisakha	Apr.	23	07	56	Apr.	20	09	43	Apr.	17	17	22	May	13	19	22
Jyaishtha	May	22	23	09	May	19	21	23	*May*	*16*	*25*	*31*	June	12	09	21
									June	15	08	24				
Ashadha	June	21	12	11	June	18	10	07	July	14	15	14	July	11	21	21
Sravana	July	20	23	03	July	*17*	*24*	*02*	Aug.	12	23	07	Aug.	10	07	26
					Aug.	16	15	08								
Bhadra	Aug.	19	08	12	Sept.	15	07	10	Sept.	11	08	57	Sept.	8	16	14
Asvina	Sept.	*17*	*16*	*30*	Oct.	14	23	25	Oct.	10	21	20	Oct.	7	24	45
	Oct.	16	25	01												
Kartika	Nov.	15	10	37	Nov.	13	14	57	Nov.	9	12	32	Nov.	6	09	54
Margasirsha	Dec.	14	21	47	Dec.	12	29	02	Dec.	8	30	22	Dec.	5	20	22
Pausha			---				---				---				---	

N.B.-The figres in the italics show the beginning of the intercalary(*mala or adhika*) month followed by the normal (*suddha or nija*) month of the same name.

INDIAN CALENDAR Mesha:Madhava

SAKA ERA 1950 Spring(Vasanta) 2nd month

Month of CHAITRA (31 DAYS)

(Nirayana) 7 Chaitra, 5128 Kali Era to *(Nirayana)* 7 Vaisakha, 5129 Kali Era

Date	Week Day	Gregorian Date	Sunrise		Apparent Noon		Sunset		Tithi			Nakshatra			Yoga		
									No.	Ending Moment		No.	Ending Moment		No.	Ending Moment	
			h	m	h	m	h	m		h	m		h	m		h	m
		2028 A.D.															
1	Tue	Mar 21	6	02.9	12	07.1	18	11.4	K 11	24	14.1	22	---	---	20	23	54.8
2	Wed	22	6	01.9	12	06.8	18	11.8	12	26	56.9	22	8	12.8	21	24	58.8
3	Thu	23	6	00.9	12	06.5	18	12.2	13	29	34.0	23	11	22.9	22	25	59.2
4	Fri	24	5	59.9	12	06.2	18	12.6	14	---	---	24	14	24.9	23	26	50.0
5	Sat	25	5	59.0	12	05.9	18	12.9	14	7	57.2	25	17	11.8	24	27	27.2
6	Sun	26	5	58.0	12	05.6	18	13.3	K 30	10	01.3	26	19	39.5	25	27	48.5
7	Mon	27	5	57.0	12	05.3	18	13.7	S1	11	43.7	27	21	46.0	26	27	52.7
8	Tue	28	5	56.1	12	05.0	18	14.1	2	13	03.1	1	23	30.1	27	27	39.2
9	Wed	29	5	55.1	12	04.7	18	14.4	3	13	58.9	2	24	51.3	1	27	07.3
10	Thu	30	5	54.1	12	04.4	18	14.8	4	14	30.2	3	25	48.4	2	26	16.2
11	Fri	31	5	53.1	12	04.1	18	15.2	S 5	14	35.9	4	26	19.8	3	25	04.4
12	Sat	Apr 1	5	52.2	12	03.8	18	15.6	6	14	13.9	5	26	23.3	4	23	30.4
13	Sun	2	5	51.2	12	03.5	18	15.9	7	13	22.6	6	25	57.3	5	21	32.7
14	Mon	3	5	50.3	12	03.2	18	16.3	8	12	00.5	7	25	00.8	6	19	10.4
15	Tue	4	5	49.3	12	02.9	18	16.7	9	10	07.8	8	23	34.7	7	16	23.6
16	Wed	5	5	48.4	12	02.6	18	17.0	S 10 (11	7 28	46.0 58.9)	9	21	41.7	8	13	14.0
17	Thu	6	5	47.4	12	02.3	18	17.4	12	25	52.2	10	19	27.1	9	9	44.7
18	Fri	7	5	46.5	12	02.0	18	17.8	13	22	33.5	11	16	57.9	10 (11	6 26	00.7 08.1)
19	Sat	8	5	45.6	12	01.8	18	18.2	14	19	11.6	12	14	23.0	12	22	14.3
20	Sun	9	5	44.6	12	01.5	18	18.6	S 15	15	56.7	13	11	52.7	13	18	27.7
21	Mon	10	5	43.7	12	01.2	18	18.9	K 1	12	59.0	14	9	37.8	14	14	56.4
22	Tue	11	5	42.8	12	01.0	18	19.3	2	10	29.1	15	7	49.1	15	11	48.9
23	Wed	12	5	41.9	12	00.7	18	19.7	3	8	36.7	16	6	36.6	16	9	12.3
24	Thu	13	5	41.0	12	00.4	18	20.1	4	7	29.7	17	6	08.6	17	7	12.5
25	Fri	14	5	40.1	12	00.2	18	20.5	K 5	7	13.1	18	6	30.0	18 (19	5 29	52.9 13.8)
26	Sat	15	5	39.2	12	00.0	18	20.9	6	7	48.1	19	7	41.5	20	29	12.0
27	Sun	16	5	38.4	11	59.7	18	21.3	7	9	10.5	20	9	39.1	21	---	---
28	Mon	17	5	37.5	11	59.5	18	21.7	8	11	11.5	21	12	13.6	21	5	41.0
29	Tue	18	5	36.7	11	59.3	18	22.1	9	13	37.9	22	15	11.9	22	6	31.7
30	Wed	19	5	35.8	11	59.0	18	22.5	K 10	16	14.8	23	18	19.4	23	7	33.4
31	Thu	20	5	35.0	11	58.8	18	22.9	K 11	18	47.5	24	21	22.0	24	8	35.5

N.B. All timings are given in IST or the local time of meridian of 82 1/2 ˚ E longitude

Name of Nakshatras: 1. Asvini 2. Bharani 3. Krittika 4. Rohini 5. Mrigasiras 6. Ardra 7. Punarvasu 8.Pushya 9. Aslesha 10. Magha 11. Purva Phalguni 12.Uttar Phalguni 13. Hasta 14. Chitra 15. Svati 16. Visakha 17. Anuradha 18. Jyestha 19. Mula 20. Purvasadha 21. Uttarasadha 22. Sravana 23. Dhanistha 24. Satabhisaj 25. Purva Bhadrapada 26. Uttar Bhadrapada 27. Revati.

Name of Yogas: 1. Viskumbha 2. Priti 3. Ayusman 4. Saubhagya 5. Sobhana 6. Atiganda 7. Sukarma 8. Dhriti 9. Sula 10. Ganda 11. Vriddhi 12. Dhruba 13. Vyaghata 14. Harshana 15. Vajra 16. Siddhi(Asrik) 17.Vyatipata 18. Variyan 19. Parigha 20. Siva 21. Siddha 22. Sadhya 23. Subha 24. Sukla(Sukra) 25. Bramha 26. Indra 27. Vaidhriti

AYANAMSA, 2027

TRUE AYANAMSA FOR $5^h\ 29^m$

Date 2027	Ayanamsa			Date 2027	Ayanamsa			Date 2027	Ayanamsa			Date 2027-28	Ayanamsa		
	º	'	"		º	'	"		º	'	"		º	'	"
Jan. 1	24	14	13.9	May 1	24	14	30.5	Aug. 29	24	14	50.4	Dec. 27	24	15	07.3
4	24	14	14.5	4	24	14	30.6	Sept. 1	24	14	50.7	30	24	15	08.1
7	24	14	15.3	7	24	14	30.9	4	24	14	50.8	Jan. 2	24	15	08.5
10	24	14	16.0	10	24	14	31.8	7	24	14	51.1	5	24	15	08.8
13	24	14	16.3	13	24	14	32.5	10	24	14	51.7	8	24	15	09.2
16	24	14	16.5	16	24	14	32.7	13	24	14	52.1	11	24	15	10.1
19	24	14	17.2	19	24	14	32.9	16	24	14	52.2	14	24	15	10.9
22	24	14	18.2	22	24	14	33.6	19	24	14	52.2	17	24	15	11.2
25	24	14	18.7	25	24	14	34.3	22	24	14	52.6	20	24	15	11.6
28	24	14	18.9	28	24	14	34.8	25	24	14	53.3	23	24	15	12.3
31	24	14	19.3	31	24	14	35.0	28	24	14	53.6	26	24	15	13.0
Feb. 3	24	14	20.0	June 3	24	14	35.4	Oct. 1	24	14	53.6	29	24	15	13.4
6	24	14	20.6	6	24	14	36.3	4	24	14	53.9	Feb. 1	24	15	13.5
9	24	14	20.8	9	24	14	37.2	7	24	14	54.5	4	24	15	13.8
12	24	14	20.9	12	24	14	37.5	10	24	14	54.9	7	24	15	14.5
15	24	14	21.4	15	24	14	37.8	13	24	14	55.1	10	24	15	15.3
18	24	14	22.2	18	24	14	38.5	16	24	14	55.1	13	24	15	15.5
21	24	14	22.7	21	24	14	39.3	19	24	14	55.5	16	24	15	15.7
24	24	14	22.7	24	24	14	39.8	22	24	14	56.2	19	24	15	16.2
27	24	14	23.0	27	24	14	40.1	25	24	14	56.7	22	24	15	16.8
Mar. 2	24	14	23.6	30	24	14	40.5	28	24	14	56.7	25	24	15	17.1
5	24	14	24.1	July 3	24	14	41.3	31	24	14	57.1	28	24	15	17.2
8	24	14	24.2	6	24	14	42.2	Nov. 3	24	14	57.8	Mar. 2	24	15	17.3
11	24	14	24.2	9	24	14	42.6	6	24	14	58.3	5	24	15	17.8
14	24	14	24.5	12	24	14	42.9	9	24	14	58.6	8	24	15	18.5
17	24	14	25.3	15	24	14	43.5	12	24	14	58.7	11	24	15	18.7
20	24	14	25.7	18	24	14	44.3	15	24	14	59.2	14	24	15	18.7
23	24	14	25.7	21	24	14	44.8	18	24	15	00.1	17	24	15	19.2
26	24	14	25.9	24	24	14	45.0	21	24	15	00.7	20	24	15	19.7
29	24	14	26.4	27	24	14	45.2	24	24	15	00.9	23	24	15	20.0
1	24	14	26.9	30	24	14	45.9	27	24	15	01.3	26	24	15	20.0
Apr. 4	24	14	27.1	Aug. 2	24	14	46.8	30	24	15	02.1	29	24	15	20.1
7	24	14	27.1	5	24	14	47.2	Dec. 3	24	15	02.8	Apr. 1	24	15	20.6
10	24	14	27.4	8	24	14	47.3	6	24	15	03.2	4	24	15	21.2
13	24	14	28.2	11	24	14	47.8	9	24	15	03.5	7	24	15	21.5
16	24	14	28.7	14	24	14	48.5	12	24	15	04.0	10	24	15	21.5
19	24	14	28.8	17	24	14	48.9	15	24	15	05.0	13	24	15	22.0
22	24	14	29.0	20	24	14	49.0	18	24	15	05.7	16	24	15	22.6
25	24	14	29.5	23	24	14	49.1	21	24	15	06.0	19	24	15	23.0
28	24	14	30.2	26	24	14	49.7	24	24	15	06.5	22	24	15	23.0
May 1	24	14	30.5	Aug. 29	24	14	50.4	Dec. 27	24	15	07.3	Apr. 25	24	15	23.2

Mean Ayanamsa= 23º51′25″.53 for J2000.0
Mean Ayanamsa= 24º14′03″.22+ precession from 2027.0 to date
Mean Ayanamsa= 24º14′53″.48+ precession from 2028.0 to date
True Ayanamsa= Mean Ayanamsa+ nutation in longitude

LONGITUDE OF SUN, MOON AND PLANETS, 2028

APPARENT GEOCENTRIC LONGITUDE FOR $5^h\ 29^m.0$ I.S.T.

Date	Sun			Moon			Mercury			Venus			Mars			Jupiter			Saturn		
	°	'	"	°	'	"	°	'	"	°	'	"	°	'	"	°	'	"	°	'	"
Jan. 0	279	03	24	313	49	48	289	59	57	313	46	52	297	07	42	177	16	11	21	03	53
1	280	04	35	325	37	57	291	36	35	315	00	20	297	54	38	177	18	26	21	04	43
2	281	05	44	337	24	52	293	13	08	316	13	45	298	41	35	177	20	29	21	05	39
3	282	06	54	349	14	40	294	49	29	317	27	07	299	28	34	177	22	22	21	06	41
4	283	08	04	1	11	55	296	25	34	318	40	26	300	15	35	177	24	03	21	07	51
5	284	09	13	13	21	27	298	01	15	319	53	41	301	02	37	177	25	33	21	09	07
6	285	10	22	25	48	06	299	36	24	321	06	54	301	49	41	177	26	51	21	10	29
7	286	11	31	38	36	13	301	10	50	322	20	03	302	36	46	177	27	58	21	11	58
8	287	12	39	51	49	17	302	44	20	323	33	09	303	23	53	177	28	54	21	13	34
9	288	13	48	65	29	13	304	16	42	324	46	11	304	11	01	177	29	38	21	15	16
10	289	14	55	79	35	49	305	47	37	325	59	10	304	58	10	177	30	11	21	17	05
11	290	16	03	94	06	19	307	16	47	327	12	05	305	45	21	177	30	33	21	19	00
12	291	17	10	108	55	24	308	43	47	328	24	56	306	32	33	177	30	43	21	21	01
13	292	18	16	123	55	35	310	08	14	329	37	43	307	19	46	177	30	42	21	23	09
14	293	19	23	138	58	15	311	29	35	330	50	25	308	07	00	177	30	28	21	25	23
15	294	20	29	153	54	51	312	47	18	332	03	04	308	54	15	177	30	04	21	27	44
16	295	21	35	168	38	09	314	00	44	333	15	38	309	41	31	177	29	27	21	30	10
17	296	22	40	183	02	54	315	09	12	334	28	08	310	28	49	177	28	40	21	32	43
18	297	23	46	197	06	11	316	11	55	335	40	34	311	16	08	177	27	40	21	35	21
19	298	24	51	210	47	09	317	08	06	336	52	55	312	03	28	177	26	29	21	38	06
20	299	25	56	224	06	37	317	56	51	338	05	12	312	50	49	177	25	07	21	40	57
21	300	27	01	237	06	28	318	37	19	339	17	25	313	38	11	177	23	33	21	43	55
22	301	28	05	249	49	08	319	08	37	340	29	32	314	25	33	177	21	47	21	46	58
23	302	29	10	262	17	12	319	29	59	341	41	35	315	12	57	177	19	51	21	50	07
24	303	30	13	274	33	13	319	40	42	342	53	33	316	00	22	177	17	42	21	53	22
25	304	31	16	286	39	28	319	40	15	344	05	26	316	47	47	177	15	23	21	56	43
26	305	32	18	298	38	06	319	28	19	345	17	13	317	35	13	177	12	52	22	00	10
27	306	33	20	310	31	06	319	04	53	346	28	55	318	22	40	177	10	10	22	03	43
28	307	34	20	322	20	26	318	30	19	347	40	31	319	10	07	177	07	16	22	07	21
29	308	35	20	334	08	12	317	45	18	348	52	01	319	57	35	177	04	12	22	11	05
30	309	36	18	345	56	48	316	50	58	350	03	25	320	45	02	177	00	56	22	14	55
31	310	37	16	357	48	59	315	48	49	351	14	43	321	32	31	176	57	30	22	18	50

LONGITUDE OF SUN, MOON AND PLANETS, 2028

APPARENT GEOCENTRIC LONGITUDE FOR $5^h\ 29^m.0$ I.S.T.

Date	Sun			Moon			Mercury			Venus			Mars			Jupiter			Saturn		
	°	'	"	°	'	"	°	'	"	°	'	"	°	'	"	°	'	"	°	'	"
Feb. 1	311	38	12	9	47	56	314	40	39	352	25	55	322	19	59	176	53	53	22	22	50
2	312	39	07	21	57	16	313	28	30	353	36	59	323	07	27	176	50	06	22	26	56
3	313	40	00	34	20	55	312	14	32	354	47	57	323	54	56	176	46	08	22	31	07
4	314	40	53	47	02	56	311	00	52	355	58	47	324	42	25	176	42	00	22	35	24
5	315	41	44	60	07	10	309	49	31	357	09	31	325	29	54	176	37	42	22	39	46
6	316	42	34	73	36	44	308	42	13	358	20	06	326	17	23	176	33	14	22	44	13
7	317	43	22	87	33	22	307	40	27	359	30	34	327	04	51	176	28	37	22	48	45
8	318	44	09	101	56	48	306	45	20	0	40	54	327	52	20	176	23	50	22	53	22
9	319	44	54	116	44	06	305	57	40	1	51	05	328	39	48	176	18	53	22	58	04
10	320	45	38	131	49	23	305	17	57	3	01	08	329	27	16	176	13	47	23	02	51
11	321	46	21	147	04	13	304	46	25	4	11	02	330	14	44	176	08	32	23	07	43
12	322	47	02	162	18	34	304	23	03	5	20	48	331	02	12	176	03	08	23	12	39
13	323	47	42	177	22	22	304	07	43	6	30	24	331	49	39	175	57	35	23	17	40
14	324	48	21	192	07	06	304	00	08	7	39	51	332	37	06	175	51	53	23	22	46
15	325	48	58	206	26	55	303	59	55	8	49	09	333	24	32	175	46	04	23	27	56
16	326	49	35	220	19	01	304	06	40	9	58	17	334	11	59	175	40	06	23	33	11
17	327	50	10	233	43	27	304	19	57	11	07	16	334	59	25	175	34	00	23	38	30
18	328	50	44	246	42	22	304	39	18	12	16	05	335	46	50	175	27	47	23	43	53
19	329	51	17	259	19	20	305	04	17	13	24	44	336	34	15	175	21	26	23	49	21
20	330	51	49	271	38	30	305	34	30	14	33	13	337	21	40	175	14	58	23	54	54
21	331	52	20	283	44	12	306	09	31	15	41	31	338	09	04	175	08	24	24	00	30
22	332	52	49	295	40	30	306	48	59	16	49	38	338	56	28	175	01	42	24	06	11
23	333	53	16	307	31	02	307	32	32	17	57	34	339	43	51	174	54	54	24	11	55
24	334	53	42	319	18	52	308	19	53	19	05	18	340	31	12	174	48	00	24	17	44
25	335	54	07	331	06	33	309	10	43	20	12	50	341	18	34	174	41	01	24	23	36
26	336	54	30	342	56	12	310	04	47	21	20	11	342	05	54	174	33	55	24	29	33
27	337	54	51	354	49	39	311	01	51	22	27	18	342	53	13	174	26	45	24	35	33
28	338	55	10	6	48	37	312	01	41	23	34	13	343	40	31	174	19	30	24	41	36
29	339	55	27	18	54	53	313	04	08	24	40	55	344	27	48	174	12	10	24	47	44

LONGITUDE OF SUN, MOON AND PLANETS, 2028

APPARENT GEOCENTRIC LONGITUDE FOR $5^h\ 29^m.0$ I.S.T.

Date	Sun	Moon	Mercury	Venus	Mars	Jupiter	Saturn
	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "
Mar. 1	340 55 43	31 10 31	314 08 59	25 47 22	345 15 04	174 04 46	24 53 54
2	341 55 56	43 37 56	315 16 06	26 53 36	346 02 19	173 57 18	25 00 09
3	342 56 08	56 19 54	316 25 22	27 59 35	346 49 32	173 49 47	25 06 27
4	343 56 17	69 19 30	317 36 38	29 05 19	347 36 45	173 42 13	25 12 48
5	344 56 25	82 39 44	318 49 48	30 10 48	348 23 56	173 34 35	25 19 12
6	345 56 30	96 23 07	320 04 46	31 16 01	349 11 05	173 26 56	25 25 40
7	346 56 33	110 31 04	321 21 28	32 20 57	349 58 13	173 19 14	25 32 11
8	347 56 34	125 03 01	322 39 48	33 25 35	350 45 20	173 11 30	25 38 44
9	348 56 33	139 55 48	323 59 43	34 29 57	351 32 24	173 03 44	25 45 21
10	349 56 30	155 03 15	325 21 10	35 34 00	352 19 28	172 55 58	25 52 00
11	350 56 24	170 16 35	326 44 05	36 37 44	353 06 29	172 48 10	25 58 42
12	351 56 17	185 25 26	328 08 27	37 41 10	353 53 29	172 40 22	26 05 27
13	352 56 08	200 19 39	329 34 13	38 44 15	354 40 28	172 32 33	26 12 15
14	353 55 57	214 51 00	331 01 21	39 47 01	355 27 25	172 24 45	26 19 05
15	354 55 45	228 54 19	332 29 49	40 49 27	356 14 20	172 16 57	26 25 58
16	355 55 30	242 27 49	333 59 38	41 51 31	357 01 14	172 09 09	26 32 53
17	356 55 14	255 32 39	335 30 45	42 53 14	357 48 06	172 01 23	26 39 51
18	357 54 57	268 12 10	337 03 10	43 54 35	358 34 57	171 53 38	26 46 51
19	358 54 38	280 30 58	338 36 53	44 55 33	359 21 46	171 45 55	26 53 53
20	359 54 16	292 34 15	340 11 52	45 56 07	0 08 33	171 38 14	27 00 58
21	0 53 54	304 27 16	341 48 08	46 56 17	0 55 18	171 30 35	27 08 05
22	1 53 29	316 14 53	343 25 42	47 56 02	1 42 01	171 22 59	27 15 14
23	2 53 02	328 01 22	345 04 32	48 55 21	2 28 42	171 15 25	27 22 25
24	3 52 34	339 50 14	346 44 40	49 54 14	3 15 22	171 07 56	27 29 37
25	4 52 03	351 44 15	348 26 06	50 52 39	4 01 59	171 00 29	27 36 52
26	5 51 31	3 45 23	350 08 50	51 50 35	4 48 34	170 53 07	27 44 08
27	6 50 56	15 54 59	351 52 54	52 48 02	5 35 08	170 45 49	27 51 26
28	7 50 20	28 13 55	353 38 17	53 44 59	6 21 39	170 38 36	27 58 46
29	8 49 41	40 42 53	355 25 01	54 41 24	7 08 08	170 31 27	28 06 08
30	9 49 01	53 22 39	357 13 06	55 37 16	7 54 34	170 24 24	28 13 31
31	10 48 18	66 14 17	359 02 33	56 32 35	8 40 59	170 17 27	28 20 55

LONGITUDE OF SUN, MOON AND PLANETS, 2028

APPARENT GEOCENTRIC LONGITUDE FOR $5^h\ 29^m.0$ I.S.T.

Date	Sun			Moon			Mercury			Venus			Mars			Jupiter			Saturn		
	°	'	"	°	'	"	°	'	"	°	'	"	°	'	"	°	'	"	°	'	"
Apr. 1	11	47	33	79	19	14	0	53	22	57	27	18	9	27	21	170	10	35	28	28	21
2	12	46	45	92	39	20	2	45	33	58	21	25	10	13	40	170	03	50	28	35	48
3	13	45	55	106	16	31	4	39	07	59	14	53	10	59	57	169	57	11	28	43	16
4	14	45	03	120	12	20	6	34	04	60	07	42	11	46	12	169	50	38	28	50	46
5	15	44	08	134	27	19	8	30	22	60	59	51	12	32	24	169	44	13	28	58	16
6	16	43	11	149	00	14	10	28	01	61	51	16	13	18	34	169	37	54	29	05	48
7	17	42	12	163	47	27	12	27	00	62	41	58	14	04	40	169	31	42	29	13	20
8	18	41	11	178	42	46	14	27	14	63	31	54	14	50	45	169	25	38	29	20	53
9	19	40	07	193	37	55	16	28	43	64	21	02	15	36	46	169	19	42	29	28	27
10	20	39	01	208	23	48	18	31	20	65	09	22	16	22	45	169	13	54	29	36	01
11	21	37	54	222	52	01	20	35	00	65	56	50	17	08	42	169	08	13	29	43	37
12	22	36	44	236	56	16	22	39	38	66	43	27	17	54	36	169	02	42	29	51	13
13	23	35	33	250	33	12	24	45	03	67	29	09	18	40	28	168	57	18	29	58	50
14	24	34	20	263	42	27	26	51	06	68	13	54	19	26	17	168	52	04	30	06	27
15	25	33	05	276	26	08	28	57	36	68	57	42	20	12	04	168	46	58	30	14	05
16	26	31	49	288	48	13	31	04	19	69	40	28	20	57	48	168	42	01	30	21	43
17	27	30	31	300	53	42	33	10	59	70	22	12	21	43	29	168	37	13	30	29	22
18	28	29	11	312	48	02	35	17	21	71	02	51	22	29	08	168	32	34	30	37	00
19	29	27	49	324	36	41	37	23	07	71	42	22	23	14	44	168	28	05	30	44	39
20	30	26	26	336	24	45	39	27	57	72	20	43	24	00	18	168	23	46	30	52	18

SUN AND MOON, 2028

DECLINATION OF SUN, LATITUDE AND DECLINATION OF MOON FOR $5^h\ 29^m.0$ I.S.T.

Date	Declination of Sun		Latitude of Moon		Declination of Moon		Date	Declination of Sun		Latitude of Moon		Declination of Moon	
	°	′	°	′	°	′		°	′	°	′	°	′
Jan. 0	-23	07.7	+1	02.8	-15	40.3	Feb. 1	-17	17.6	+4	53.2	+8	22.3
1	23	03.3	2	04.9	11	00.8	2	17	00.6	5	12.0	13	22.3
2	22	58.4	3	01.6	5	58.5	3	16	43.3	5	16.9	17	56.1
3	22	53.1	3	50.9	-0	42.9	4	16	25.7	5	06.7	21	49.3
4	22	47.3	4	30.7	+4	36.9	5	16	07.8	4	40.6	24	44.5
5	22	41.1	4	59.2	9	51.7	6	15	49.6	3	58.4	26	22.5
6	22	34.4	5	14.4	14	50.7	7	15	31.2	3	01.0	26	25.9
7	22	27.3	5	14.8	19	19.8	8	15	12.5	1	50.6	24	44.2
8	22	19.7	4	58.8	23	01.4	9	14	53.5	+0	31.0	21	18.9
9	22	11.7	4	25.6	25	34.2	10	14	34.3	-0	52.2	16	24.3
10	22	03.3	3	35.5	26	36.6	11	14	14.9	2	12.5	10	24.6
11	21	54.5	2	30.4	25	52.7	12	13	55.2	3	23.2	+3	48.6
12	21	45.2	+1	13.8	23	19.1	13	13	35.3	4	18.9	-2	54.9
13	21	35.5	-0	08.8	19	07.6	14	13	15.1	4	56.1	9	19.8
14	21	25.3	1	31.1	13	41.4	15	12	54.8	5	13.5	15	04.1
15	21	14.8	2	46.7	7	28.9	16	12	34.2	5	11.9	19	50.4
16	21	03.9	3	50.0	+0	58.0	17	12	13.4	4	53.0	23	25.7
17	20	52.5	4	37.3	-5	27.1	18	11	52.5	4	19.5	25	41.3
18	20	40.7	5	06.7	11	26.1	19	11	31.3	3	34.3	26	34.0
19	20	28.6	5	17.7	16	42.1	20	11	10.0	2	40.1	26	05.7
20	20	16.1	5	11.3	21	01.1	21	10	48.5	1	39.7	24	22.8
21	20	03.2	4	48.9	24	11.5	22	10	26.8	-0	35.7	21	35.5
22	19	49.9	4	12.6	26	05.0	23	10	04.9	+0	29.2	17	55.2
23	19	36.2	3	25.0	26	37.4	24	9	42.9	1	32.4	13	33.9
24	19	22.2	2	28.7	25	50.1	25	9	20.8	2	31.5	8	43.0
25	19	07.8	1	26.3	23	49.6	26	8	58.5	3	24.2	-3	33.4
26	18	53.0	-0	20.8	20	46.3	27	8	36.0	4	08.1	+1	44.5
27	18	37.9	+0	45.1	16	52.5	28	8	13.5	4	41.5	7	00.6
28	18	22.5	1	48.7	12	20.9	29	-7	50.8	+5	02.5	+12	04.1
29	18	06.8	2	47.5	7	23.3							
30	17	50.7	3	39.2	-2	10.4							
31	-17	34.3	+4	21.7	+3	08.0							

SUN AND MOON, 2028

DECLINATION OF SUN, LATITUDE AND DECLINATION OF MOON FOR $5^h\ 29^m.0$ I.S.T.

Date	Declination of Sun		Latitude of Moon		Declination of Moon		Date	Declination of Sun		Latitude of Moon		Declination of Moon	
	°	'	°	'	°	'		°	'	°	'	°	'
Mar. 1	-7	28.0	+5	10.1	+16	43.2	Apr. 1	+4	39.7	+3	14.5	+26	14.3
2	7	05.1	5	03.2	20	44.7	2	5	02.8	2	15.5	25	40.1
3	6	42.2	4	41.5	23	53.4	3	5	25.8	+1	07.6	23	33.9
4	6	19.1	4	05.1	25	53.0	4	5	48.7	-0	05.7	20	00.7
5	5	55.9	3	14.6	26	28.3	5	6	11.5	1	20.3	15	12.8
6	5	32.7	2	11.6	25	28.4	6	6	34.2	2	31.1	9	27.4
7	5	09.3	+0	58.9	22	50.5	7	6	56.8	3	32.9	+3	05.9
8	4	45.9	-0	19.4	18	41.3	8	7	19.3	4	20.6	-3	28.4
9	4	22.5	1	38.1	13	16.9	9	7	41.6	4	50.5	9	50.2
10	3	59.0	2	51.1	7	00.1	10	8	03.8	5	00.7	15	34.8
11	3	35.5	3	52.3	+0	17.5	11	8	25.9	4	51.2	20	19.1
12	3	11.9	4	36.7	-6	23.2	12	8	47.8	4	24.0	23	45.0
13	2	48.2	5	01.5	12	35.5	13	9	09.6	3	42.5	25	41.8
14	2	24.6	5	06.0	17	56.1	14	9	31.2	2	50.2	26	07.2
15	2	00.9	4	51.7	22	06.7	15	9	52.7	1	50.8	25	07.5
16	1	37.2	4	21.2	24	55.1	16	10	14.0	-0	47.8	22	54.4
17	1	13.5	3	37.9	26	15.8	17	10	35.1	+0	16.1	19	41.7
18	0	49.7	2	45.1	26	10.6	18	10	56.1	1	18.3	15	43.0
19	0	26.0	1	46.0	24	46.9	19	11	16.9	2	16.5	11	10.2
20	-0	02.3	-0	43.3	22	15.6	20	+11	37.5	+3	08.8	-6	13.9
21	+0	21.4	+0	20.3	18	49.0							
22	0	45.1	1	22.4	14	39.2							
23	1	08.8	2	20.8	9	57.4							
24	1	32.4	3	13.1	-4	53.9							
25	1	56.1	3	57.2	+0	21.4							
26	2	19.6	4	31.2	5	38.4							
27	2	43.1	4	53.2	10	46.1							
28	3	06.6	5	01.9	15	32.3							
29	3	30.0	4	56.3	19	43.4							
30	3	53.3	4	36.3	23	04.2							
31	+4	16.6	+4	02.0	+25	19.1							

PLANETS, 2028

GEOCENTRIC LATITUDE AND DECLINATION FOR $5^h\ 29^m.0$ I.S.T.

Date	Mercury				Venus				Mars				Jupiter				Saturn			
	Latitude		Declination		Latitude		Declination		Latitude		Declination		Latitude		Declination		Latitude		Declination	
	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′
Jan. 0	-2	10.3	-24	05.8	-1	51.2	-18	27.7	-1	06.4	-21	49.0	+1	15.6	+2	14.5	-2	33.2	+5	51.1
2	2	09.2	23	33.7	1	50.0	17	43.2	1	06.5	21	30.3	1	16.1	2	13.3	2	32.6	5	52.3
4	2	05.9	22	55.5	1	48.5	16	56.8	1	06.5	21	10.6	1	16.7	2	12.4	2	32.0	5	53.6
6	2	00.3	22	11.5	1	46.7	16	08.5	1	06.6	20	50.0	1	17.2	2	11.8	2	31.5	5	55.1
8	1	52.1	21	21.8	1	44.4	15	18.6	1	06.6	20	28.4	1	17.8	2	11.5	2	30.9	5	56.8
10	1	41.0	20	27.1	1	41.9	14	27.2	1	06.6	20	05.9	1	18.3	2	11.5	2	30.3	5	58.6
12	1	26.7	19	28.2	1	38.9	13	34.2	1	06.5	19	42.6	1	18.9	2	11.8	2	29.8	6	00.6
14	1	08.9	18	26.2	1	35.6	12	39.9	1	06.5	19	18.3	1	19.5	2	12.4	2	29.2	6	02.8
16	0	47.4	17	22.7	1	32.0	11	44.3	1	06.4	18	53.3	1	20.0	2	13.3	2	28.7	6	05.1
18	-0	22.0	16	19.8	1	28.0	10	47.5	1	06.3	18	27.4	1	20.6	2	14.5	2	28.1	6	07.5
20	+0	07.1	15	20.2	1	23.6	9	49.7	1	06.1	18	00.7	1	21.1	2	16.0	2	27.6	6	10.1
22	0	39.7	14	27.1	1	18.9	8	50.9	1	05.9	17	33.2	1	21.7	2	17.9	2	27.0	6	12.8
24	1	14.8	13	43.8	1	13.8	7	51.3	1	05.7	17	04.9	1	22.2	2	20.0	2	26.5	6	15.7
26	1	50.8	13	13.5	1	08.4	6	50.9	1	05.5	16	36.0	1	22.8	2	22.4	2	26.0	6	18.7
28	2	25.5	12	58.3	1	02.6	5	49.9	1	05.2	16	06.3	1	23.3	2	25.1	2	25.5	6	21.8
30	2	56.0	12	59.1	0	56.5	4	48.3	1	04.9	15	36.0	1	23.8	2	28.1	2	25.0	6	25.1
Feb. 1	3	19.7	13	14.6	0	50.1	3	46.2	1	04.6	15	05.0	1	24.3	2	31.4	2	24.5	6	28.5
3	3	34.3	13	41.5	0	43.4	2	43.8	1	04.2	14	33.5	1	24.8	2	34.9	2	24.0	6	32.0
5	3	39.1	14	15.9	0	36.4	1	41.2	1	03.8	14	01.3	1	25.3	2	38.7	2	23.5	6	35.6
7	3	34.6	14	53.4	0	29.1	-0	38.4	1	03.4	13	28.6	1	25.8	2	42.7	2	23.0	6	39.4
9	3	22.4	15	30.6	0	21.5	+0	24.4	1	03.0	12	55.3	1	26.2	2	47.0	2	22.6	6	43.3
11	3	04.4	16	05.0	0	13.6	1	27.3	1	02.6	12	21.6	1	26.7	2	51.5	2	22.1	6	47.2
13	2	42.8	16	35.2	-0	05.5	2	29.9	1	02.1	11	47.4	1	27.1	2	56.3	2	21.7	6	51.3
15	2	18.9	17	00.1	+0	02.9	3	32.4	1	01.6	11	12.7	1	27.5	3	01.2	2	21.2	6	55.5
17	1	54.2	17	19.5	0	11.5	4	34.5	1	01.0	10	37.6	1	27.9	3	06.4	2	20.8	6	59.8
19	1	29.4	17	33.1	0	20.3	5	36.3	1	00.5	10	02.1	1	28.3	3	11.7	2	20.4	7	04.1
21	1	05.0	17	40.9	0	29.3	6	37.6	0	59.9	9	26.3	1	28.6	3	17.2	2	20.0	7	08.6
23	0	41.6	17	42.8	0	38.5	7	38.3	0	59.3	8	50.1	1	28.9	3	22.9	2	19.6	7	13.1
25	+0	19.2	17	39.0	0	47.9	8	38.4	0	58.6	8	13.6	1	29.3	3	28.7	2	19.2	7	17.7
27	-0	01.9	-17	29.5	+0	57.5	+9	37.7	-0	57.9	-7	36.8	+1	29.5	+3	34.6	-2	18.8	+7	22.4

PLANETS, 2028

GEOCENTRIC LATITUDE AND DECLINATION FOR $5^h\ 29^m.0$ I.S.T.

Date	Mercury		Venus		Mars		Jupiter		Saturn	
	Latitude	Declination	Latitude	Declination	Latitude	Declination	Latitude	Declination	Latitude	Declination
	° '	°	° '	° '	° '	° '	° '	° '	° '	° '
Feb. 27	-0 01.9	-17 29.5	+0 57.5	+9 37.7	-0 57.9	-7 36.8	+1 29.5	+3 34.6	-2 18.8	+7 22.4
29	0 21.7	17 14.3	1 07.2	10 36.1	0 57.3	6 59.8	1 29.8	3 40.6	2 18.5	7 27.2
Mar. 2	0 40.0	16 53.6	1 17.0	11 33.6	0 56.6	6 22.5	1 30.0	3 46.7	2 18.2	7 32.0
4	0 56.9	16 27.4	1 26.9	12 30.2	0 55.8	5 45.1	1 30.3	3 52.9	2 17.8	7 36.9
6	1 12.3	15 55.8	1 36.8	13 25.6	0 55.1	5 07.5	1 30.4	3 59.1	2 17.5	7 41.9
8	1 26.1	15 18.9	1 46.9	14 19.8	0 54.3	4 29.7	1 30.6	4 05.4	2 17.2	7 46.9
10	1 38.4	14 36.8	1 56.9	15 12.8	0 53.5	3 51.9	1 30.7	4 11.6	2 16.9	7 52.0
12	1 49.1	13 49.5	2 07.0	16 04.5	0 52.7	3 13.9	1 30.8	4 17.9	2 16.6	7 57.1
14	1 58.2	12 57.1	2 17.1	16 54.7	0 51.8	2 35.9	1 30.9	4 24.2	2 16.3	8 02.3
16	2 05.7	11 59.7	2 27.2	17 43.4	0 51.0	1 57.8	1 31.0	4 30.4	2 16.1	8 07.5
18	2 11.5	10 57.3	2 37.2	18 30.7	0 50.1	1 19.8	1 31.0	4 36.5	2 15.8	8 12.7
20	2 15.6	9 50.1	2 47.1	19 16.3	0 49.2	0 41.7	1 31.0	4 42.6	2 15.6	8 18.0
22	2 17.9	8 38.1	2 56.9	20 00.2	0 48.2	-0 03.7	1 31.0	4 48.6	2 15.4	8 23.3
24	2 18.3	7 21.4	3 06.6	20 42.4	0 47.3	+0 34.3	1 31.0	4 54.5	2 15.2	8 28.6
26	2 17.0	6 00.1	3 16.1	21 22.8	0 46.3	1 12.1	1 30.9	5 00.3	2 15.0	8 34.0
28	2 13.7	4 34.3	3 25.4	22 01.3	0 45.3	1 49.9	1 30.8	5 05.9	2 14.8	8 39.3
30	2 08.5	3 04.3	3 34.5	22 38.0	0 44.3	2 27.5	1 30.7	5 11.4	2 14.6	8 44.7
Apr. 1	2 01.3	-1 30.0	3 43.3	23 12.7	0 43.3	3 04.9	1 30.5	5 16.7	2 14.5	8 50.1
3	1 52.0	+0 08.1	3 51.9	23 45.5	0 42.3	3 42.2	1 30.4	5 21.8	2 14.3	8 55.5
5	1 40.8	1 49.8	4 00.1	24 16.2	0 41.3	4 19.3	1 30.2	5 26.8	2 14.2	9 00.9
7	1 27.4	3 34.6	4 07.9	24 44.9	0 40.2	4 56.1	1 30.0	5 31.5	2 14.1	9 06.3
9	1 12.2	5 22.0	4 15.4	25 11.5	0 39.1	5 32.6	1 29.8	5 36.0	2 14.0	9 11.7
11	0 55.0	7 11.3	4 22.4	25 36.1	0 38.0	6 08.9	1 29.5	5 40.3	2 13.9	9 17.1
13	0 36.2	9 01.5	4 28.9	25 58.5	0 36.9	6 44.9	1 29.2	5 44.3	2 13.8	9 22.5
15	-0 15.9	10 51.3	4 34.8	26 18.9	0 35.8	7 20.5	1 29.0	5 48.1	2 13.7	9 27.9
17	+0 05.4	12 39.4	4 40.2	26 37.2	0 34.6	7 55.8	1 28.7	5 51.6	2 13.7	9 33.3
19	0 27.2	14 24.2	4 44.8	26 53.3	0 33.5	8 30.8	1 28.3	5 54.9	2 13.6	9 38.6
21	+0 49.0	+16 03.9	+4 48.7	+27 07.4	-0 32.3	+9 05.3	+1 28.0	+5 58.0	-2 13.6	+9 44.0

URANUS, NEPTUNE AND PLUTO, 2028

APPARENT GEOCENTRIC LONGITUDE FOR $5^h\ 29^m.0$ I.S.T.

Date	Uranus	Neptune	Pluto	Date	Uranus	Neptune	Pluto
	° ' "	° ' "	° ' "		° ' "	° ' "	° ' "
Jan. 0	66 43 39	3 55 22	305 56 11	Feb. 25	65 59 44	5 12 36	307 38 58
2	66 39 41	3 56 31	305 59 40	27	66 01 07	5 16 42	307 42 21
4	66 35 50	3 57 49	306 03 11	29	66 02 43	5 20 51	307 45 42
6	66 32 08	3 59 14	306 06 44	Mar. 2	66 04 31	5 25 04	307 48 58
8	66 28 36	4 00 47	306 10 21	4	66 06 32	5 29 20	307 52 12
10	66 25 13	4 02 29	306 13 59	6	66 08 45	5 33 39	307 55 22
12	66 21 59	4 04 19	306 17 39	8	66 11 10	5 38 00	307 58 27
14	66 18 56	4 06 16	306 21 21	10	66 13 46	5 42 23	308 01 29
16	66 16 02	4 08 20	306 25 04	12	66 16 35	5 46 49	308 04 25
18	66 13 19	4 10 32	306 28 49	14	66 19 34	5 51 16	308 07 18
20	66 10 47	4 12 52	306 32 34	16	66 22 46	5 55 44	308 10 06
22	66 08 26	4 15 18	306 36 20	18	66 26 08	6 00 15	308 12 50
24	66 06 17	4 17 53	306 40 08	20	66 29 42	6 04 46	308 15 28
26	66 04 20	4 20 34	306 43 55	22	66 33 26	6 09 18	308 18 02
28	66 02 34	4 23 21	306 47 42	24	66 37 21	6 13 50	308 20 30
30	66 01 00	4 26 15	306 51 30	26	66 41 26	6 18 23	308 22 52
Feb. 1	65 59 38	4 29 16	306 55 16	28	66 45 41	6 22 55	308 25 09
3	65 58 29	4 32 23	306 59 03	30	66 50 06	6 27 28	308 27 21
5	65 57 32	4 35 36	307 02 49	Apr. 1	66 54 41	6 32 01	308 29 27
7	65 56 48	4 38 55	307 06 33	3	66 59 26	6 36 33	308 31 28
9	65 56 17	4 42 20	307 10 17	5	67 04 19	6 41 03	308 33 22
11	65 55 59	4 45 50	307 13 59	7	67 09 21	6 45 33	308 35 10
13	65 55 52	4 49 25	307 17 40	9	67 14 31	6 50 01	308 36 52
15	65 55 59	4 53 05	307 21 18	11	67 19 49	6 54 27	308 38 28
17	65 56 18	4 56 50	307 24 55	13	67 25 15	6 58 52	308 39 58
19	65 56 51	5 00 40	307 28 30	15	67 30 50	7 03 15	308 41 21
21	65 57 36	5 04 35	307 32 02	17	67 36 31	7 07 36	308 42 39
23	65 58 34	5 08 33	307 35 32	19	67 42 19	7 11 53	308 43 49
25	65 59 44	5 12 36	307 38 58	21	67 48 14	7 16 09	308 44 53

EXPLANATION

In the following pages, a short explanation of the terms used in this Ephemeris has been given and the scope and limitations of the information furnished have been stated in a concise form. The values of the different constants and other data upon which the tabulated quantities are based have also been given in some cases in order to facilitate the use of this Ephemeris. It is not intended to furnish here any detailed explanation about the compilation of the tabular matter for which the reader is referred to the relevant literature.

Many changes have been incorporated in this publication from time to time including several recomendations of IAU at its General Assembly.

THE STANDARD EPOCH AND TIME SCALES

There are two classes of time scales used in Astronomy, one based on the Systeme International (SI) - the atomic second, the other based on the rotation of the Earth. Time scales based on the SI second include TAI and TT for practical applications. Time scale based on the rotation of the Earth include mean and apparent sidereal time and UT1. Because of irregularites in the Earth's rotation and its tidal deceleration, Earth's rotation based time scales do not advance at a uniform rate, and they increasingly lag behind the SI-second-based time scales. The widely disseminated time scale UTC is a hybrid, it advances by SI seconds but is subjct to one-second corrections (leap seconds) to keep it within $0^{s}.9$ of UT1.

The standard epoch J 2000.0 corresponds to 2000 January 1, 12^{h} TT (JD 245 1545.0 TT). A date may be expressed in years as a Julian epoch or for some purposes as a Besselian epoch.

Julian epoch = J [2000.0 + (JD − 245 1545.0)/ 365.25]
Where the quantity in the denominator is the Julian year.

Besselian epoch= B [1900.0 + (JD − 241 5020.313 52)/ 365.242 198 781]
Where the quantity in the denominator is the length of tropical year.

Prefixes J and B stand for the Julian and Besselian epochs respectively.

Various time systems used in this publication and their inter-relationships are described below :

Sidereal time system is derived from the Earth's rotation with respect to the stars. Local sidereal time is defined as the local hour angle of the vernal equinox. It is 0^{h} at the instant when the vernal equinox is at the upper transit of the local meridian. It is determined from observation of meridian transits of known stars. As the equinox oscillates about its mean position due to the effect of nutation, it gives rise to two kinds of sidereal time : the apparent sidereal time which is the hour angle of the true equinox of date and the mean sidereal time which is the hour angle of the mean equinox of date. The relation between the two is:

Apparent sidereal time = Mean sidereal time + Equation of Equinoxes

Equation of equinoxes is the total nutation in longitude multiplied by the cosine of the obliquity of the ecliptic. Its value varies within $\pm$ 1.2 seconds of time in a period of about 18.6 years.

Sidereal time on the geographic meridian of Greenwich is known as Greenwich sidereal time. Local sidereal time is related to Greenwich sidereal time (mean or apparent as appropriate) as follows:

Local sidereal time = Greenwich sidereal time + λ, where λ is the observer's longitude measured positively to the east (from 1985 onwards the sign convention for east terrestrial longitude to be positive has been adopted).

International Atomic Time (TAI) is a highly precise time scale given by atomic clocks. It is now being used as a standard in astronomy as it is independent of the Earth's rotation. Its fundamental unit, the SI second, is

defined as the duration of 9 192 631 770 cycles of the radiation corresponding to the transition between two hyperfine levels of the ground state of the Cesium 133 atom. This time scale results from analysis of data from atomic time standards of many countries carried out at the Bureau International de l · Heure in Paris.

Universal Time (UT) is used for civil time keeping. It is an outgrowth of the mean solar time system derived from the Earth's rotation with respect to the Sun. It has been formally defined through a strict relationship with the Greenwich mean sidereal time and is, therefore, determined from observation of star transits. The universal time directly derived from observation is designated UT_o. It contains nonuniformities due to variations in the rotation of the Earth and is peculiar to the observer's geographic location because of polar motion. When UT_o is corrected for Earth's polar motion, it is called UT1. When UT1 is further corrected for seasonal variation in the Earth's rotation, it is called UT2. Both UT_o and UT2 are not for general usage. Instead, the national time services provide what is known as co-ordinated universal time (UTC). It is a smoothed version of UT2 and differs from TAI by an integral number of seconds. It contains step adjustments of exactly one second (leap seconds) in order to keep it always within 0.90 seconds of UT1. Beginning with 1972, the step adjustments are usually inserted after the 60^{th} second of the last minute of December 31 or June 30. In this publication, UT1 has been used in computations relating to hour angles, etc., unless otherwise stated.

Dynamical Time replaces ephemeris time (ET) as argument of ephemerides with effect from 1985 in this publication. The concept of different dynamical times for observers in different frames of reference arises out of general theory of relativity. In this publication, terrestrial time (TT) is the tabular argument of the fundamental geocentric ephemerides and barycentric dynamical time (TDB) is the arguments of ephemerides referred to the barycentre of the solar system. The former corresponds to proper time and the latter to co-ordinate time in terms of the general theory of relativity. Both TT and TDB are independent of the Earth's rotation. These scales are so defined that the difference between them is purely periodic. Their difference is given by:-

$TDB = TT + 0^s.001\,657 \sin g + 0^s.000\,022 \sin (L - L_J)$, where higher order terms have been neglected. Here g is the mean anomaly of the Earth in its orbit around the Sun and is given by:-

$$g = 357^\circ.53 + 0^\circ.985\,600\,28\,(JD - 245\,1545.0)$$
$$L - L_J = 246^\circ.11 + 0.902\,517\,92\,(JD - 245\,1545.0)$$

Where $L - L_J$ is the difference in the mean longitude of the Sun and Jupiter.

Relationship Between universal time and sidereal time

Universal time is defined in terms of Greenwich mean sidereal time by:

$$GMST \text{ at } 0^h \text{ UT1} = 6^h\,41^m\,50^s.549\,377 + 864\,018\,4^s.704\,478\,T_u + 0^s.092\,772\,T_u^2 - 2^s.93 \times 10^{-8}\,T_u^3 - 1^s.997 \times 10^{-6}\,T_u^4 - 2^s.5 \times 10^{-9}\,T_u^5$$

where T_u is the number of Julian centuries of 36525 days of universal time elapsed since 1 January, 2000, 12^h UT (JD 245 154 5.0). In other words,

$$T_u = (JD - 245\,1545.0)/36525$$

The above expression implies that the ratio of UT1 to GMST at the epoch J2000.0 is 0.997 269 566 329 084 and its inverse is 1.002 737 909 350 795.

The following relationship holds during 2027:

On day of year d at t^h UT1 $GMST = 6^h.629\,099 + 0^h.065\,709\,8246\,d + 1^h.002\,737\,91\,t$

where day of the year d is tabulated on pages 4 to 12.

EXPLANATION

In 2027 :

1 mean solar day = 1.002 737 909 35 mean sidereal days
= $24^h\ 03^m\ 56^s.555\ 37$ of mean sidereal time

1 mean sidereal day = 0.997 269 566 33 mean solar days
= $23^h\ 56^m\ 04^s.090\ 53$ of mean solar time

Conversion of local mean time to local sidereal time

Calculate local sidereal time at $15^h\ 54^m\ 42^s$ L.M.T. on 2027 January 1, for Delhi longitude,

$\lambda = 77° 13' 00''$ East ($5^h\ 08^m\ 52^s$)

		h	m	s
1.	Universal time = Local mean time − λ	10	45	50
2.	Greenwich mean sidereal time at 0^h U.T. on January 1, 2027 (Page 13).	6	43	41.312
		h	m	s
3.	Add equivalent mean sidereal time for 10 45 50 (UT × 1.002 737 9093).	10	47	36.094
4.	Greenwich mean sidereal time at desired L.M.T.	17	29	17.406
5.	Add equation of equinoxes at $UT=0^d.45$ (second order interpolation may be used).			0.6457
6.	Greenwich apparent sidereal time	17	29	18.051
7.	Add longitude (east positive)	5	08	52.000
8.	Local apparent sidereal time	22	38	10.051

For local mean sidereal time, the above process may be repeated by neglecting the equation of equinoxes.

Conversion of local sidereal time to local mean time

Calculate local mean time at $22^h\ 38^m$ 10.051 local apparent sidereal time on 2027 January 1, for Delhi longitude, $\lambda = 77° 13' 00''$ East ($5^h\ 08^m\ 52^s$)

		h	m	s
1.	Local apparent sidereal time	22	38	10.051
2.	Subtract longitude (east positive)	5	08	52.000
3.	Greenwich apparent sidereal time	17	29	18.051
4.	Subtract equation of equinox at 0^h U.T.			0.6455
5.	Greenwich mean sidereal time (provisional)	17	29	17.406
6.	Subtract Greenwich mean sidereal time at 0^h U.T.	6	41	41.312
7.	Mean sidereal time interval (provisional) M.S.T. (P)	10	47	36.094

7.	Mean sidereal time interval (provisional) M.S.T. (P)	10	47	36.094
8.	Mean time interval in days corresponding to (7) above = (M.S.T. (P) × 0.997 269 566) = $0^d.45$ (UT). Subtract the increment to equation of equinoxes for $0^d.45$ UT (using second order interpolation)	(-)		0.0004
9.	Mean sidereal time	10	47	36.094
10.	Equivalent UT (MST × 0.997 269 566)	10	45	49.999
11.	Local mean time = UT + λ	15	54	41.999

The mean time from the local mean sidereal time may be worked out on similar lines as above by neglecting the equation of equinoxes.

Notation for time-scales and related quantities

UT1	Universal time (also UT); counted from 0^h (mid night); unit is second of mean solar time, affected by iregularities in the Earth's rate of rotation.
UT0	local approximation to universal time; not corrected for polar motion (rarely used).
GMST	Greenwich mean sidereal time; GHA of mean equinox of date.
GAST	Greenwich apparent sidereal time; GHA of true Eqinox of date.
TAI	international atomic time; unit is the SI second of geoid.
UTC	coordinated universal time; differs from TAI by an integral number of seconds, and is the basis of most radio time signals and national and/ or legal time systems.
ΔUT	= UT1 – UTC; increment to be applied to UTC to give UT1
TDB	barycentric dynamical time; used as time-scale of ephemerides, referred to the barycentre of the solar system.
T_{eph}	the independent variable of the equations of motion used by the JPL ephemerides, in particular DE405/LE405. T_{eph} and TDB may be considered to be equivalent.
TT	terrestrial time; used as time-scale of ephemerides for observations from the Earth's surface (geoid).
TT	= TAI + $32^s.184$.
ΔT	= TT – UT1; increment to be applied to UT1 to give TT.
	= TAI + $32^s.184$ – UT1
ΔAT	= TAI –UT1; increment to be applied to UTC to give TAI; an integral number of seconds.
ΔTT	= TT – UTC = ΔAT + $32^s.184$; increment to be applied to UTC to give TT.
UT1 - UT0	= – (x sin λ + y cosλ) tanϕ/15
	where λ and ϕ are usual geodetic longitude and latitude of the place, and x and y are the co-ordinates of the pole with respect to the geodetic system, in arcseconds.
GAST	= GMST + ε_γ/15 , ε_γ is equation of equinox.

In order to convert the tabulations for 0^h TT to 0^h UT, one may interpolate to $\Delta T\ \delta_{1/2}$/ h where h is the tabular interval and $\delta_{1/2}$ is the first difference of the tabular values.

REDUCTION OF TIME SCALES, 1620-1644

ΔT = ET - UT

Year	ΔT	Year	ΔT	Year	ΔT	Year	ΔT	Year	ΔT
	s		s		s		s		s
1620.0	+ 124	1625.0	+ 102	1630.0	+ 85	1635.0	+ 72	1640.0	+ 62
1621	119	1626	98	1631	82	1636	70	1641	60
1622	115	1627	95	1632	79	1637	67	1642	58
1623	110	1628	91	1633	77	1638	65	1643	57
1624	+ 106	1629	+ 88	1634	+ 74	1639	+ 63	1644	+ 55

REDUCTION OF TIME SCALES, 1645-1819

$\Delta T = ET - UT$

Year	ΔT	Year	ΔT	Year	ΔT	Year	ΔT	Year	ΔT
	s		s		s		s		s
1645.0	+ 54	1680.0	+ 16	1715.0	+ 10	1750.0	+ 13	1785.0	+ 17
1646	53	1681	15	1716	10	1751	14	1786	17
1647	51	1682	14	1717	11	1752	14	1787	17
1648	50	1683	14	1718	11	1753	14	1788	17
1649	49	1684	13	1719	11	1754	14	1789	17
1650.0	+ 48	1685.0	+ 12	1720.0	+ 11	1755.0	+ 14	1790.0	+ 17
1651	47	1686	12	1721	11	1756	14	1791	17
1652	46	1687	11	1722	11	1757	14	1792	16
1653	45	1688	11	1723	11	1758	15	1793	16
1654	44	1689	10	1724	11	1759	15	1794	16
1655.0	+ 43	1690.0	+ 10	1725.0	+ 11	1760.0	+ 15	1795.0	+ 16
1656	42	1691	10	1726	11	1761	15	1796	15
1657	41	1692	9	1727	11	1762	15	1797	15
1658	40	1693	9	1728	11	1763	15	1798	14
1659	38	1694	9	1729	11	1764	15	1799	14
1660.0	+ 37	1695.0	+ 9	1730.0	+ 11	1765.0	+ 16	1800.0	+ 13.7
1661	36	1696	9	1731	11	1766	16	1801	13.4
1662	35	1697	9	1732	11	1767	16	1802	13.1
1663	34	1698	9	1733	11	1768	16	1803	12.9
1664	33	1699	9	1734	12	1769	16	1804	12.7
1665.0	+ 32	1700.0	+ 9	1735.0	+ 12	1770.0	+ 16	1805.0	+ 12.6
1666	31	1701	9	1736	12	1771	16	1806	12.5
1667	30	1702	9	1737	12	1772	16	1807	12.5
1668	28	1703	9	1738	12	1773	16	1808	12.5
1669	27	1704	9	1739	12	1774	16	1809	12.5
1670.0	+ 26	1705.0	+ 9	1740.0	+ 12	1775.0	+ 17	1810.0	+ 12.5
1671	25	1706	9	1741	12	1776	17	1811	12.5
1672	24	1707	9	1742	12	1777	17	1812	12.5
1673	23	1708	10	1743	12	1778	17	1813	12.5
1674	22	1709	10	1744	13	1779	17	1814	12.5
1675.0	+ 21	1710.0	+ 10	1745.0	+ 13	1780.0	+ 17	1815.0	+ 12.5
1676	20	1711	10	1746	13	1781	17	1816	12.5
1677	19	1712	10	1747	13	1782	17	1817	12.4
1678	18	1713	10	1748	13	1783	17	1818	12.3
1679	+ 17	1714	+ 10	1749	+ 13	1784	+ 17	1819	+ 12.2

This table is based on an adopted value of $-26''/cy^2$ for the tidal term ($\dot{n}$) in the mean motion of the Moon from the results of analyses of observations of lunar occultations of stars, eclipses of the Sun and transits of Mercury. (see F.R. Stephenson and L.V. Morrison, 1984 *PhD* Trans, R, Soc. London, Ser A, 313, 47-70).

To calculate the values of ΔT for a different value of the tidal term ($\dot{n}'$), add $-0.000\,091\,(\dot{n}' + 26)\,(\text{year} - 1955)^2$ seconds to the tabulated values of ΔT.

EXPLANATION

REDUCTION OF TIME SCALES FROM 1820

1820 - 1983, ΔT = ET − UT. **From 1984, ΔT = TDT - UT.**
2001, ΔT = TT - UT.

Year	ΔT	Year	ΔT	Year	ΔT	Year	ΔT	Year	ΔT
	s		s		s		s		s
1820.0	+ 12.0	1863	6.97	1906	5.37	1949	28.71	1992	58.31
1821	11.7	1864	6.40	1907	6.14	1950.0	+ 29.15	1993	58.12
1822	11.4	1865.0	6.02	1908	7.75	1951	29.57	1994	59.98
1823	11.1	1866	5.41	1909	9.13	1952	29.97	1995.0	60.78
1824	10.6	1867	4.10	1910.0	+ 10.46	1953	30.36	1996	61.63
1825.0	10.2	1868	2.92	1911	11.53	1954	30.72	1997	62.29
1826	9.60	1869	1.82	1912	13.36	1955.0	31.07	1998	62.97
1827	9.10	1870.0	+ 1.61	1913	14.65	1956	31.35	1999	63.47
1828	8.60	1871	+ 0.10	1914	16.01	1957	31.68	2000.0	+ 63.83
1829	8.00	1872	− 1.02	1915.0	17.20	1958	32.18	2001	64.09
1830.0	+ 7.50	1873	1.28	1916	18.24	1959	32.68	2002	64.30
1831	7.00	1874	2.69	1917	19.06	1960.0	+ 33.15	2003	64.47
1832	6.60	1875.0	3.24	1918	20.25	1961	33.59	2004	64.57
1833	6.30	1876	3.64	1919	20.95	1962	34.00	2005.0	+ 64.69
1834	6.00	1877	4.54	1920.0	+ 21.16	1963	34.47	2006	64.85
1835.0	5.80	1878	4.71	1921	22.25	1964	35.03	2007	65.15
1836	5.70	1879	5.11	1922	22.41	1965.0	35.73	2008	65.46
1837	5.60	1880.0	− 5.40	1923	23.03	1966	36.54	2009	65.78
1838	5.60	1881	5.42	1924	23.49	1967	37.43	2010.0	+ 66.07
1839	5.60	1882	5.20	1925.0	23.62	1968	38.29	2011	66.32
1840.0	+ 5.70	1883	5.46	1926	23.86	1969	39.20	2012	66.60
1841	5.80	1884	5.46	1927	24.49	1970.0	+ 40.18	2013	66.91
1842	5.90	1885.0	5.79	1928	24.34	1971	41.17	2014	67.28
1843	6.10	1886	5.63	1929	24.08	1972	42.23	2015.0	67.64
1844	6.20	1887	5.64	1930.0	+ 24.02	1973	43.37	2016	68.10
1845.0	6.30	1888	5.80	1931	24.00	1974	44.49	2017	68.59
1846	6.50	1889	5.66	1932	23.87	1975.0	45.48	2018	68.97
1847	6.60	1890.0	− 5.87	1933	23.95	1976	46.46	2019	69.22
1848	6.80	1891	6.01	1934	23.86	1977	47.52	2020.0	+ 69.36
1849	6.90	1892	6.19	1935.0	23.93	1978	48.53	2021	69.36
1850.0	+ 7.10	1893	6.64	1936	23.73	1979	49.59	2022	69.29
1851	7.20	1894	6.44	1937	23.92	1980.0	+ 50.54	2023	69.20
1852	7.30	1895.0	6.47	1938	23.96	1981	51.38	2024	69.18
1853	7.40	1896	6.09	1939	24.02	1982	52.17		
1854	7.50	1897	5.76	1940.0	+ 24.33	1983	52.96		
1855.0	7.60	1898	4.66	1941	24.83	1984	53.79		
1 856	7.70	1899	3.74	1942	25.30	1985.0	54.34		
1857	7.70	1900.0	− 2.72	1943	25.70	1986	54.87		
1858	7.80	1901	1.54	1944	26.24	1987	55.32		
1859	7.80	1902	− 0.02	1945.0	26.77	1988	55.82		
1860.0	+ 7.88	1903	+ 1.24	1946	27.28	1989	56.30		
1861	7.82	1904	2.64	1947	27.78	1990.0	+ 56.86		
1862	7.54	1905.0	3.86	1948	28.25	1991	57.57		

Extrapolated Values

2025	+ 69.20	2027	+ 69	2029	+ 69
2026	+ 69	2028	+ 69		

EXPLANATION

Difference TAI – UTC = ΔAT

Date	ΔAT s	Date	ΔAT s	Date	ΔAT s	Date	ΔAT s
1972 Jul.1	+ 11.00	1979 Jan.1	+ 18.00	1990 Jan.1	+ 25.00	1999 Jan. 1	+ 32.00
1973 Jan.1	+ 12.00	1980 Jan.1	+ 19.00	1991 Jan.1	+ 26.00	2006 Jan. 1	+ 33.00
1974 Jan.1	+ 13.00	1981 Jul.1	+ 20.00	1992 Jul.1	+ 27. 00	2009 Jan. 1	+ 34.00
1975 Jan.1	+ 14.00	1982 Jul.1	+ 21.00	1993 Jul.1	+ 28.00	2012 Jul. 1	+ 35.00
1976 Jan.1	+ 15.00	1983 Jul.1	+ 22.00	1994 Jul.1	+ 29.00	2015 Jul. 1	+ 36.00
1977 Jan.1	+ 16.00	1985 Jul.1	+ 23.00	1996 Jan.1	+ 30.00	2017 Jan. 1	+ 37.00
1978 Jan.1	+ 17.00	1988 Jan.1	+ 24.00	1997 Jul.1	+ 31.00	In critical cases descend	
1979 Jan.1		1990 Jan.1		1999 Jan.1		$\Delta ET = \Delta AT + 32^s.184$	
						ΔTT	

From 1990 onwards, ΔT is for Jan. 1 0^h UTC.

See page 2 for a summary of the notation for time-scales.

Astronomical Reference System and Reference Frames

A reference system is the complete specification of how a celestial coordinate system is to be formed. Both the origin and the orientation of the fundamental planes (or axes) are defined. A reference system also incorporates a specification of the fundamental models needed to construct the system; that is, the basis for the algorithms used to transform between observable quantities and reference data in the system. A reference frame, on the other hand, consists of a set of identifiable fiducial points on the sky along with their coordinates, which serves as the practical realization of a reference system.

For example, the fundamental plane of an astronomical reference system has conventionally been the extension of the Earth's equatorial plane, at some date, to infinity. Declination is the angular distance north or south of this plane, and right ascension is the angular distance measured eastward along the equator from some defined reference point. This reference point, the right asscension origin, has traditionally been the Equinox: the point at which the Sun, in its yearly circuit of the celestial sphere, crosses the equatorial plane moving from south to north. The Sun's apparent yearly motion lies in the ecliptic, the plane of the Earth's orbit. The equinox, therefore, is a direction in the space along the nodal line defined by the intersection of the ecliptic and equatorial planes; equivalently, on the celestial sphere, the equinox is at one of the two intersections of the great circles representing these planes. Because both of these planes are moving, the coordinate systems that they define must have a date associated with them; such a reference system must therefore be specified as "the equator and equinox of (some date)".

Of course, such a reference system is an idealization, because the theories of motion of the Earth that define how the two planes move are imperfect. In fact, the very definations of these planes are problematic for high precession work. Even if the fundamental planes of a reference system are defined without any reference to the motions of the Earth, there is no way magically to paint them on the celestial sphere at any particular time. Therefore, in practice, we use a specific reference frame - a set of fiducial objects with assigned coordinates - as the practical representation of an astronomical reference system. The scheme is completely analogous to how terrestrial reference systems are established using survey control stations (geodetic reference point) on the Earth's surface.

Most commonly, a reference frame consists of a catalog of precise positions (and motions, if measurable) of stars or extragalactic objects as seen from the solar system barycenter at a specific epoch (now usually "J2000.0", which is 12h TT on January 2000). Each object's instantaneous position, expressed as right ascension and declination, indicates the object's angular distance from the catalog's equator and origin of right ascension. Any two such objects in the catalog (if they are not coicident or antipodal) therefore uniquely orient a spherical coordinate system on the sky - a reference frame.

EXPLANATION

A modern astrometric catalog contains data on a large number of objects (N), so the coordinate system is vastly overdetermined. The quality of the reference frame defined by a catalog depends on the extent to which the coordinates of all possible pairs of objects ($N^2/2$) serve to the identical equator and right ascesion origin, within the expected random errors. Typically, every catalog contains systematic errors, that is, errors in position that are similar for objects that are in the same area of the sky, or are of the same magnitude (flux) or color (spectral index). Systematic errors mean that the reference frame is warped, or is effectively different for different classes of objects. Obviously, minimizing systematic errors when a catalog is constructed is at least as important as minimizing the random errors.

To be useful, a reference frame must be implemented at the time of actual observations, and this requires the computation of the apparent coordinates of the catalog objects at arbitrary dates and times. The accuracy with which we know the motions of the objects accross the sky is an essential factor in this computation. Astrometric star catalogs list proper motions, which are the projection of each star's space motion onto the celestial sphere, expressed as an angular rate in right ascension and declination per unit time. Because the tabulated proper motions are never perfect, any celesial reference frame deteriorates with time. Moreover, systematic errors in the proper motions can produce time-dependent warpings and spurious rotations of the frame. Therefore, the accuracy and consistency of the proper motions are critical to the overall quality, utility, and longevity of reference frames defined by stars. Even reference frames defined by extragalactic objects, which are usually considered to have zero proper motion, may deteriorate, because many of these objects show small apparent motions that are artifacts of their emission mechanisms.

The position of solar system objects can also be used to define a reference frame. For each solar system body involved, an ephemeris is used, which is simply a table of the celestial coordinates of the body as a funtion of time (or an algorithm that yields such a table). A reference frame defined by the ephemerides of one or more solar system bodies is called a dynamical reference frame. Because the ephemerides used incorporate the motion of the Earth as well as that of the other solar system bodies, dynamical reference frames embody in a very fundamental way the moving equator and ecliptic, hence the equinox. They have therefore been used to correct the orientation of star catalog reference frames (the star positions were systematically adjusted) on the basis of simultaneous observations of star and planets. In a sense, the solar system is used as a gyrocompass. However, dynamical reference frames are not very practical for establishing a coordinate system for day to day astronomical observations.

Descriptions of reference frames and reference systems often refer to three coordinate axes, which are simply the set of right-handed cartesian axes that correspond to the usual celestial spherical coordinate system. The xy-plane is the equator, the z-axis points toward the north celestial pole, and the x-axis points toward the origin of right ascension. Although in principal this allows us to specify the position of any celestial object in rectangular coordinates, the distance scale (based on stellar parallaxes) is not established to high precession beyond the solar system. What a reference system actually defines is the way in which the two coventional astronomical angular coordinates, right ascension and declination, overlay real observable points in the sky.

The fundamental celestial reference system for astronomical application is now the International Celestial Reference System (ICRS) as provided in resolution B2 of 1997. The "realization" of of the ICRS, called the International Celestial Reference Frame (ICRF), is a set of high accuracy positions of extragalactic radio sources measured by very long baseline interferometry.

The IAU Working Group on nomenclature for Fundamental Astronomy has recomended the following definations for ICRS and ICRF:

I**nternational Celestial Reference System (ICRS):** The idealized barycetric co-ordinate system to which celestial positions are referred. It is kinematically non-rotating with respect to the ensemble of distant extragalactic objects. It has no intrinsic orientation but was aligned close to the mean equator and dynamical equinox of J2000.0 for continuity with previous fundamental reference systems. Its orientation is independent of epoch, ecliptic or equator and is realized by a list of adopted coordinates of extragalactic sources.

International Celestial Reference Frame (ICRF): A set of extragalactic objects whose adopted positions and uncertainties realize the ICRS axes and give the uncertainties of the axes. It is also the name of radio catalogue whose 212 defining sources are currently the most accurate realization of the ICRS. The orientation of the ICRF catalogue was carried over from earlier IERS radio catalogs and was within the errors of the standard stellar and dynamical frames at the time of adoption. Successive revision of the ICRF are intended to minimize rotation from its original orientation.

EXPLANATION

Some important reference systems and their designations as per IAU 2000 resolution B1.6, B1.7 and B1.8, and IAU 2006 resolutions 1 and 2 are listed below:

(i) Barycentric Celestial Reference System (BCRS): a system of barycentric space-time coordinates for the solar system within the framework of General Relativity. For all practical applications, the BCRS is assumed to be oriented according to the ICRS axes, the directions of which are realized by the International Celestial Reference Frame. The ICRS is not identical to the system defined by the dynamical mean equator and equinox of J2000.0, although the difference in orientation is only about $0''.02$.

(ii) The Geocentric Celestial Reference System (GCRS): is a system of geocentric space-time coordinates within the framework of General Relativity. The directions of the GCRS axes are obtained from those of the BCRS (ICRS) by a relativistic transformation. Positions of stars obtained from ICRS reference data, corrected for proper motion, parallax, light-bending, and aberration (for a geocentric observer) are with respect to the GCRS. The same is true for planetary positions, although the corrections are somewhat different.

(iii) The J2000.0 dynamical reference system: mean equator and equinox of J2000.0; a geocentric system where the origin of right ascension is the intersection of the mean ecliptic and equator of J2000.0; the system in which the IAU 2000 precession-nutation is defined. For precise applications a small rotation (frame bias) should be made to GCRS positions before precession and nutation are applied. The J2000.0 system may also be barycentric, for example as the reference system for catalogues.

(iv) The true system of date (t); true equator and equinox of date: a geocentric system of date, the pole of which is the celestial intermediate pole (CIP), with the origin of right ascension at the equinox on the true equator of date (intermediate equator). It is a system "between" the GCRS and the Terrestrial Intermediate Reference System that seperates the components labelled precession-nutation and polar motion.

(v) The Celestial Intermediate Reference System (i): the IAU recomended geocentric system of date, the pole of which is the celestial intermediate pole (CIP), with the origin of right ascension at the celestial intermediate origin (CIO) which is located on the intermediate equator (true equator of date). It is a system "between" (intermeiate) the GCRS and the Terrestrial Intermediate Reference System that seperates the components labelled precession-nutation and polar motion.

Precession and Nutation

The algorithms for precession were based on the IAU (1976) value for the rate of general precession in ecliptic longitude. Nutation was given by the 1980 IAU Theory of Nutation. However, IAU (1976) rate of precession had been overestimated by approximately 3 milliarcseconds per year. Further observations also revealed periodic errors of a few milliarcseconds in the 1980 IAU Theory of Nutation.

As part of the 2000 IAU resolutions, the IAU 2000A precession-nutation model was introduced, based on an updated value for the rate of precession and a completely new nutation theory. As before, the model actually consists of two parts, a precession algorithm describing the smooth secular motion of the celestial pole and a nutation algorithm describing the small periodic variations in the pole's position. The precession algorithm consists of short polynomial series for the values of certain angles. The sines and cosines of these angles, in combination, then define the elements of a precession matrix, **P**. The nutation algorithm consists of a rather long series expansion in Fourier terms for the angular offsets, in ecliptic longitude and latitude, of the actual celestial pole (as modeled) from the precession-only pole (true pole - mean pole). The sines and cosines of these offsets, in combination, then define the elements of a nutation matrix, **N.** The **P** and **N** matrices are applied to the coordinates of celestial objects, expressed as 3-vectors, to transform them from the equator and equinox of one epoch to the equator and equinox of another.

EXPLANATION

A precession transformation is applied to celestial coordinates to convert them from the mean equator and equinox of J2000.0 to the mean equator and equinox of another date, t. Nutation is applied to the resulting coordinates to transform them to the true equator and equinox of t. Generally we will start with celestial coordinates in the GCRS, which are obtained from basic ICRS data by applying the usual algoriths for proper place. Therefore before we apply precession and nutation - we must first apply the frame bias correction to transform the GCRS coordinates to the dynamical mean equator and equinox of J2000.0. Schematically,

GCRS => frame bias = mean equator & equinox of J2000.0 = precession =>

mean equator & equinox of t = nutation => true equator & equinox of t.

The reduction from a geocentric position **r** with respect to the Geocentric Celestial Reference System (GCRS) to a position $\mathbf{r}_t$ with respect to equator and equinox of date, and vice versa, is given by;

$$\mathbf{r}_t = \mathbf{M}\,\mathbf{r} \quad \text{and} \quad \mathbf{r} = \mathbf{M}^{-1}\mathbf{r}_t$$

Using the 4-rotation Fukishma-Williams (F-W) method, the rotation matrix **M** may be witten as

$$\mathbf{M} = \mathbf{N}\,\mathbf{P}\,\mathbf{B}$$

Since the rotation to orient the GCRS to J2000.0 system are small the following approximate matrix **B** is called frame bias matrix, accurate to $2'' \times 10^{-9}$ (1×10^{-14} radians), may be used:

$$\mathbf{B} = \begin{bmatrix} 1 & d\alpha_0 & -\xi_0 \\ -d\alpha_0 & 1 & -\eta_0 \\ \xi_0 & \eta_0 & 1 \end{bmatrix}$$

where $d\alpha_0 = -14.6$ mas, $\xi_0 = -16.6170$ mas, and $\eta_0 = -6.8192$ mas, all converted to radians (divide by 206 264 806.247).

Precession

The time argument T is given by

$T = (t - 2000.0)/100 = (JD_{TT} - 2451545.0)/36525$, which is a function of TT.

The Capitine *et al.* method, the formulation of which seperates precession of the equator from precession of the ecliptic, is via the precession angles χ_A, ω_A, ψ_A, which are

$$\psi_A = 5038''.481\,507\,T - 1''.079\,0069\,T^2 - 0''.001\,140\,45\,T^3 + 0''.000\,132\,851\,T^4 - 9''.51 \times 10^{-8}\,T^5$$

$$\omega_A = \varepsilon_0 - 0''.025\,754\,T + 0''.051\,2623\,T^2 - 0''.007\,725\,03\,T^3 - 0''.000\,000\,467\,T^4 + 33''.37 \times 10^{-8}\,T^5$$

$$\chi_A = 10''.556\,403\,T - 2''.381\,4292\,T^2 - 0''.001\,211\,97\,T^3 + 0''.000\,170\,663\,T^4 - 5''.60 \times 10\text{-}8\,T^5$$

The mean obliquity of the ecliptic at J2000.0 (or the equivalent TDB date) is $\varepsilon_0 = 84381''.406$

(i) A rotation from the mean equator and equinox of J2000.0 to the mean ecliptic and equinox of J2000.0. This is simply a rotation around the x-axis (the direction toward the mean equinox of J2000.0) by the angle ε_0, the mean obliquity of J2000.0. After the rotation, the fundamental plane is the ecliptic of J2000.0

(ii) A rotation around the new z-axis (the direction toward the ecliptic pole of J2000.0) by the angle $-\psi_A$, the amount of precession of the equator from J2000.0 to t.

(iii) A rotation around the new x-axis (the direction along the intersection of the mean equator of t with the ecliptic of J2000.0) by the angle $-\omega_A$, the obliquity of the mean equator of t with respect to the ecliptic of J2000.0. After the rotation, the fundamental plane is the mean equator of t.

EXPLANATION

(iv) A rotation around the new z-axis (the direction toward the mean celestial pole of t) by the angle χ_A, accounting for the precession of the ecliptic along the mean equator of t. After the rotation, the new x-axis is in the direction of the mean equinox of date.

$$\mathbf{P} = \begin{bmatrix} C_4C_2 - S_2S_4C_3 & C_4S_2C_1 + S_4C_3C_2C_1 - S_1S_4S_3 & C_4S_2S_1 + S_4C_3C_2S_1 + C_1S_4S_3 \\ -S_4C_2 - S_2C_4C_3 & -S_4S_2C_1 + C_4C_3C_2C_1 - S_1C_4S_3 & -S_4S_2S_1 + C_4C_3C_2S_1 + C_1C_4S_3 \\ S_2S_3 & -S_3C_2C_1 - S_1C_3 & -S_3C_2S_1 + C_3C_1 \end{bmatrix}$$

where $S_1 = \sin \varepsilon_0$ $S_2 = \sin(-\psi_A)$ $S_3 = \sin(-\omega_A)$ $S_4 = \sin \chi_A$
$C_1 = \cos \varepsilon_0$ $C_2 = \cos(-\psi_A)$ $C_3 = \cos(-\omega_A)$ $C_4 = \cos \chi_A$

Existing applications that use the 3-angle precession formulation of Newcomb and Lieske can be easily modified for the IAU 2000A precession, by replacing the current polynomials for the angles ζ_A, Z_A and θ_A with the following:

$$\zeta_A = 2''.650545 + 2306''.083227\,T + 0''.2988499\,T^2 + 0''.01801828\,T^3 - 0''.000005971\,T^4 - 0''.0000003173\,T^5$$

$$Z_A = -2''.650545 + 2306''.077181\,T + 1''.0927348\,T^2 + 0''.01826837\,T^3 - 0''.000028596\,T^4 - 0''.0000002904\,T^5$$

$$\theta_A = 2004''.191903\,T - 0''.4294934\,T^2 - 0''.04182264\,T^3 - 0''.000007089\,T^4 - 0''.0000001274\,T^5$$

The centennial (per Julian century) rates of general precession in right ascension and declination are given by :

$$m = 4612''.604\,08 + 2''.783\,169\,4\,T + 0''.108\,859\,95\,T^2 - 0''.000\,138\,268\,T^3 \text{ and}$$

$$n = 2004''.191\,903 - 0''.858\,986\,8\,T - 0''.125\,467\,92\,T^2 - 0''.000\,028\,356\,T^3$$

The elements of the matrix **P** given in terms of ζ_A, Z_A, θ_A are as follows:

$$\mathbf{P} = \begin{bmatrix} \cos\zeta_A \cos\theta_A \cos Z_A - \sin\zeta_A \sin Z_A & -\sin\zeta_A \cos\theta_A \cos Z_A - \cos\zeta_A \sin Z_A & -\sin\theta_A \cos Z_A \\ \cos\zeta_A \cos\theta_A \sin Z_A + \sin\zeta_A \cos Z_A & -\sin\zeta_A \cos\theta_A \sin Z_A + \cos\zeta_A \cos Z_A & -\sin\theta_A \sin Z_A \\ \cos\zeta_A \sin\theta_A & -\sin\zeta_A \sin\theta_A & \cos\theta_A \end{bmatrix}$$

The formula for reduction of precession in right ascension and declination are as follows :

$$\begin{aligned} \sin(\alpha - Z_A)\cos\delta &= \sin(\alpha_o + \zeta_A)\cos\delta_o. \\ \cos(\alpha - Z_A)\cos\delta &= \cos(\alpha_o + \zeta_A)\cos\theta_A \cos\delta_o - \sin\theta_A \sin\delta_o \\ \sin\delta &= \cos(\alpha_o + \zeta_A)\sin\theta_A \cos\delta_o + \cos\theta_A \sin\delta_o \end{aligned}$$

$$\begin{aligned} \sin(\alpha_o + \zeta_A)\cos\delta_o &= \sin(\alpha - Z_A)\cos\delta \\ \cos(\alpha_o + \zeta_A)\cos\delta_o &= \cos(\alpha - Z_A)\cos\theta_A \cos\delta + \sin\theta_A \sin\delta \\ \sin\delta_o &= -\cos(\alpha - Z_A)\sin\theta_A \cos\delta + \cos\theta_A \sin\delta \end{aligned}$$

EXPLANATION

Values of the angles ζ_A, Z_A, θ_A and of the elements of the matrix P for reduction from the standard epoch J 2000.0 to epoch of year are as follows:

Epoch J 2027.5 — Rotation matrix P for reduction to epoch J 2027.5

$$\zeta_A = +636''.846 = +0^\circ.176\,902$$

$$Z_A = +631''.604 = +0^\circ.175\,445$$

$$\theta_A = +551''.119 = +0^\circ.153\,089$$

$$\mathbf{P} = \begin{bmatrix} +0.999\,977\,52 & -0.006\,149\,57 & -0.002\,671\,89 \\ +0.006\,149\,57 & +0.999\,981\,09 & -0.000\,008\,18 \\ +0.002\,671\,89 & -0.000\,008\,25 & +0.999\,996\,43 \end{bmatrix}$$

The obliquity of the ecliptic of date (with respect to the mean equator of date) is given by:

$$\varepsilon = \varepsilon_0 - 46''.836\,769 T - 0''.000\,183\,1\,T^2 + 0''.002\,003\,4\,T^3 - 0''.000\,000\,576\,T^4 - 0''.000\,000\,043\,4\,T^5$$

where $\varepsilon_0 = 84381''.406$

The precessional motion of the ecliptic specified by the inclination (π_A) and longitude of the node (Π_A) of the ecliptic of date with respect to the ecliptic and equinox of J 2000.0 are given by:

$$\text{Sin } \pi_A \sin \Pi_A = +4''.199\,094\,T + 0''.193\,987\,T^2 - 0''.000\,224\,66\,T^3$$
$$\text{Sin } \pi_A \cos \Pi_A = -46''.811\,015\,T + 0''.051\,028\,T^2 + 0''.000\,524\,13\,T^3$$

For epoch J 2027.5

$$\varepsilon = 23^\circ\,26'\,9''.93 = 23^\circ.436\,092$$
$$\pi_A = +11''.513 = 0^\circ.003\,198$$
$$\Pi_A = 174^\circ\,48'.9 = 174^\circ.815$$

Approximate formulae for the reduction of precession in co-ordinates and orbital elements referred to the mean equinox and equator or ecliptic of date (t) are as follows :

Reduction to J 2000.0		Reduction from J 2000.0	
α_o	$= \alpha - M - N \sin \alpha_m \tan \delta_m$	α	$= \alpha_o + M + N \sin \alpha_m \tan \delta_m$
δ_o	$= \delta - N \cos \alpha_m$	δ	$= \delta_o + N \cos \alpha_m$
λ_o	$= \lambda - a + b \cos(\lambda + c') \tan \beta_o$	λ	$= \lambda_o + a - b \cos(\lambda_o + c) \tan\beta$
β_o	$= \beta - b \sin(\lambda + c')$	β	$= \beta_o + b \sin(\lambda_o + c)$
Ω_o	$= \Omega - a + b \sin(\Omega + c') \cot i_o$.	Ω	$= \Omega_o + a - b \sin(\Omega_o + c) \cot i$
i_o	$= i - b \cos(\Omega + c')$	i	$= i_o + b \cos(\Omega_o + c)$
ω_o	$= \omega - b \sin(\Omega + c') \operatorname{cosec} i_o$	ω	$= \omega_o + b \sin(\Omega_o + c) \operatorname{cosec} i$

The precessional constants M, N etc. are given by :

$$M = 1^\circ.281\,155\,668\,9\,T + 0^\circ.000\,386\,551\,31\,T^2 + 0^\circ.000\,010\,079\,T^3$$
$$N = 0^\circ.556\,719\,973\,1\,T - 0^\circ.000\,119\,303\,72\,T^2 - 0^\circ.000\,011\,617\,4\,T^3$$
$$a = 1^\circ.396\,887\,83\,T + 0^\circ.000\,307\,065\,22\,T^2$$
$$b = 0^\circ.013\,055\,270\,3\,T - 0^\circ.000\,009\,303\,50\,T^2$$
$$c = 5^\circ.125\,890\,67 + 0^\circ.818\,993\,58\,T + 0^\circ.000\,104\,256\,09\,T^2 - 0^\circ.000\,104\,155\,607\,T^3$$
$$c' = 5^\circ.125\,890\,67 - 0^\circ.577\,894\,252\,T - 0^\circ.000\,164\,504\,28\,T^2 - 0^\circ.000\,104\,177\,728\,T^3$$

where $T = (t - 2000.0)/100 = (JD_{TT} - 245\,1545.0)/36525$

EXPLANATION

Formulae for the reduction from the mean equinox and equator or ecliptic of the middle of year (t_1) to date (t) are as follows :

$$\alpha = \alpha_1 + \tau\,(m + n \sin \alpha_1 \tan \delta_1) \qquad \delta = \delta_1 + \tau\, n \cos \alpha_1$$

$$\lambda = \lambda_1 + \tau\,\{p - \pi \cos (\lambda_1 + 6^\circ) \tan \beta\} \qquad \beta = \beta_1 + \tau\, \pi \sin (\lambda_1 + 6^\circ)$$

$$\Omega = \Omega_1 + \tau\,\{\rho - \pi \sin (\Omega_1 + 6^\circ) \cot i\} \qquad i = i_1 + \tau\, \pi \cos (\Omega_1 + 6^\circ)$$

$$\omega = \omega_1 + \tau\, \pi \sin (\Omega_1 + 6^\circ) \operatorname{cosec} i$$

where $\tau = t - t_1$ and π is the annual rate of rotation of the ecliptic. The precessional constants p, m, etc. are as follows :

	Epoch J 2027.5
Annual general precession	$p = + 0^\circ.013\,971\,41$
Annual precession in R.A.	$m = + 0^\circ.012\,814\,46$
Annual precession in Dec.	$n = + 0^\circ.005\,566\,88$
Annual rate of rotation	$\pi = + 0^\circ.000\,130\,51$
Longitude of axis	$\Pi = + 175^\circ.127\,7$

$$\gamma = 180^\circ - \Pi = + 4^\circ.872\,3$$

Where Π is the longitude of the instantaneous rotation axis of the ecliptic, measured from the mean equinox of date.

Nutation

The changes in the amplitudes of the nutation components are also not directly taken from the observations; instead a new nutation theory is developed and fit to observations by allowing a small number of geophysical constants to be free parameters. These parameters are constants in a “transfer function” that modifies the amplitudes of the terms from a rigid- Earth nutation development. Since there are fewer solved-for geophysical constants than the number of terms with observed amplitudes, the fit cannot be perfect. For the IAU 2000A model, 7 geophysical parameters were determined based on the observed amplitudes of 21 nutation terms (prograde and retrograde amplitudes for each) together with the apparent change in the rate of precession in longitude. Note that the number of free parameters in the model are both quite small compared to the 1365 terms in the new, full nutation serirs.

Nutation is conventionally expressed as two small angles, $\Delta\psi$ the nutation in longitude, and $\Delta\varepsilon$, the nutation in obliquity. These angles are measured in the Ecliptic system of date, which is developed as a part of precession formulation. The angle $\Delta\psi$ is the small change in the position of the equinox along the ecliptic due to nutation, so effect of nutation on the ecliptic coordinates of a fixed point in the sky is simply to add $\Delta\psi$ to its ecliptic longitude. The angle $\Delta\varepsilon$ is the small change in the obliquity of the ecliptic due to nutation. The true obliquity of date is $\varepsilon' = \varepsilon + \Delta\varepsilon$. Nutation in obliquity reflects the orientation of the equator in space and does not affect the ecliptic coordinates of a fixed point on the sky.

Formulas for Nutation

l is the mean anomaly of the Moon.

l′ is the mean anomaly of the Sun (Earth).

Ω is the longitude of the ascending node of the Moon’s mean orbit on the ecliptic, measured from the mean equinox of date.

D is the mean elongation of the Moon from the Sun.

F is the difference $L - \Omega$, where L is the mean longitude of the Moon.

$\varepsilon = \varepsilon_0 - 46''.836\,769\,T - 0''.000\,183\,1\,T^2 + 0''.002\,003\,4\,T^3 - 0''.000\,000\,576\,T^4 - 0''.000\,000\,043\,4\,T^5$

where $\varepsilon_0 = 84381''.406$

EXPLANATION

The fundamental arguments are given by:

The five arguments are the same fundamental luni - solar arguments used in previous nutation theories, but with updated expressions.

$l = 485\,868''.249\,036 + (1325^r + 715\,923''.2178)\,T + 31''.8792\,T^2 + 0''.051\,635\,T^3 - 0''.000\,244\,70\,T^4$

$l' = 128\,7104''.793\,04 + (99^r + 129\,2581''.048)\,T - 0''.5532\,T^2 - 0''.000\,136\,T^3 - 0''.000\,011\,49\,T^4$

$F = 335\,779''.526\,232 + (1342^r + 295\,262''.8478)\,T - 12''.7512\,T^2 - 0''.001\,037\,T^3 + 0''.000\,004\,17\,T^4$

$D = 107\,2260''.703\,69 + (1236^r + 110\,5601''.209)\,T - 6''.3706\,T^2 + 0''.006\,593\,T^3 - 0''.000\,031\,69\,T^4$

$\Omega = 450\,160''.398\,036 - (5^r + 482\,890''.5431)\,T + 7''.722\,T^2 + 0''.007\,702\,T^3 - 0''.000\,059\,39\,T^4$

where $1^r = 360^o = 129\,6000''$

Reduction for nutation - rigorous formulae

Nutation in longitude ($\Delta\psi$) and obliquity ($\Delta\varepsilon$) have been calculated using IAU 2000A series definitions (order of 1 μas) with the following adjustments which are required for use at the highest precession with the IAU 2006 precession, viz:

$$\Delta\psi = \Delta\psi_{2000A} + (0.4697 \times 10^{-6} - 2.7774 \times 10^{-6} T)\,\Delta\psi_{2000A}$$

$$\Delta\varepsilon = \Delta\varepsilon_{2000A} - 2.7774 \times 10^{-6}\, T\, \Delta\varepsilon_{2000A}$$

where T is measured in Julian centuries from 245 1545.0 TT. $\Delta\psi$ and $\Delta\varepsilon$ together with the true obliquity of the ecliptic (ε') are tabulated daily at 0^h TT, on page 18 to 32.

Once the nutation series has been evaluated and the values of $\Delta\psi$ and $\Delta\varepsilon$ are available, the nutation matrix can be constructed.

A mean place ($\mathbf{r}_m$) may be transformed to a true place ($\mathbf{r}_t$) and vice versa, as follows:

$\mathbf{r}_t = \mathbf{N}\,\mathbf{r}_m \qquad \mathbf{r}_m = N^{-1}\,\mathbf{r}_t$

where $\mathbf{N} = \mathbf{R}_1(-\varepsilon')\,\mathbf{R}_3(-\Delta\psi)\,\mathbf{R}_1(+\varepsilon)$

$\varepsilon' = \varepsilon + \Delta\varepsilon$

$\mathbf{R}_1$ and $\mathbf{R}_3$ are the standard rotations about the x and z axes respectively.

(i) A rotation from the mean equator and equinox of t to the mean ecliptic and equinox of t. This is simply a rotation around the x - axis (the direction toward the mean equinox of t) by the angle ε , the mean obliquity of t.

(ii) A rotation around the new z-axis (the direction toward the ecliptic pole of t) by the angle - $\Delta\psi$, the amount of nutation in longitude at t. After the rotation, the new x- axis is in the direction of true equinox of t.

(iii) A rotation around the new x-axis (the direction toward true equinox of t by the angle $-\varepsilon'$, the true oliquity of t. After the rotation, the fundamental plane is the true equator of t, orthogonal to the computed position of the CIP at t.

The nutation matrix can be written:

$$\mathbf{N} = \begin{bmatrix} C_2 & S_2C_1 & S_2S_1 \\ -S_2C_3 & C_3C_2C_1 - S_1S_3 & C_3C_2S_1 + C_1S_3 \\ S_2S_3 & -S_3C_2C_1 - S_1C_3 & -S_3C_2S_1 + C_3C_1 \end{bmatrix}$$

where $S_1 = \sin(\varepsilon)$ $\quad S_2 = \sin(-\Delta\psi)$ $\quad S_3 = \sin(-\varepsilon - \Delta\varepsilon)$

$C_1 = \cos(\varepsilon)$ $\quad C_2 = \cos(-\Delta\psi)$ $\quad C_3 = \cos(-\varepsilon - \Delta\varepsilon)$

Approximate reduction for nutation for converting mean place to true place can be done with the help of the following formulae :

$\Delta\alpha = (\cos\varepsilon + \sin\varepsilon \sin\alpha \tan\delta)\,\Delta\psi - \cos\alpha \tan\delta\,\Delta\varepsilon$

$\Delta\delta = \sin\varepsilon \cos\alpha\,\Delta\psi + \sin\alpha\,\Delta\varepsilon$

$\Delta\lambda = \Delta\psi; \qquad \Delta\beta = 0$

where $\Delta\psi$ and $\Delta\varepsilon$ are nutations in longitude and obliquity respectively. Mean rectangular coordinates (x, y, z) can be converted to true rectangular co-ordinates with the help of the following :

$$\Delta x = -(y \cos\varepsilon + z \sin\varepsilon)\,\Delta\psi$$
$$\Delta y = +x\,\Delta\psi\cos\varepsilon - z\,\Delta\varepsilon$$
$$\Delta z = +x\,\Delta\psi\sin\varepsilon + y\,\Delta\varepsilon$$

where both $\Delta\psi$ and $\Delta\varepsilon$ are in radians.

The elements of the corresponding rotation matrix are:

$$\mathbf{N} = \begin{bmatrix} 1 & -\Delta\psi\cos\varepsilon & -\Delta\psi\sin\varepsilon \\ +\Delta\psi\cos\varepsilon & 1 & -\Delta\varepsilon \\ +\Delta\psi\sin\varepsilon & +\Delta\varepsilon & 1 \end{bmatrix}$$

Daily values of $\Delta\psi$ and $\Delta\varepsilon$ during 2027 are tabulated on pages 18 to 32.

Approximate reduction for precession and nutation in right ascension and declination from the standard equinox and equator of J 2000.0 to the true equinox and equator of date during 2027 can be done using the following formulae and table :

$$\alpha = \alpha_o + f + g \sin(G + \alpha_o)\,\tan\delta_o$$
$$\delta = \delta_o + g \cos(G + \alpha_o)$$

where the units of the correction to α_o and δ_o are in second of time and minutes of arc respectively.

Date 2027		*f* s	*g* s	, *g* ′	*G* h	m	Date 2027		*f* s	*g* s	*g* ′	*G* h	m
Jan.	**- 5**	+83.6	36.3	9.08	23	58	**July**	**4**	+85.4	37.1	9.27	23	58
	5*	+83.7	36.4	9.09	23	58		**14*†**	+85.5	37.1	9.28	23	58
	15	+83.8	36.4	9.11	23	58		**24**	+85.6	37.2	9.29	23	58
	25	+84.0	36.5	9.12	23	58	**Aug.**	**3**	+85.7	37.2	9.31	23	58
Feb	**4***	+84.1	36.5	9.13	23	58		**13**	+85.8	37.3	9.32	23	58
	14	+84.1	36.5	9.14	23	58		**23***	+85.8	37.3	9.32	23	58
	24	+84.2	36.6	9.15	23	58	**Sept.**	**2**	+85.9	37.3	9.33	23	58
Mar.	**6**	+84.3	36.6	9.16	23	58		**12**	+86.0	37.4	9.34	23	58
	16*	+84.3	36.7	9.16	23	58		**22**	+86.0	37.4	9.35	23	58
	26	+84.4	36.7	9.17	23	58	**Oct.**	**2***	+86.1	37.4	9.35	23	58
Apr.	**5**	+84.5	36.7	9.18	23	58		**12**	+86.2	37.4	9.36	23	58
	15	+84.6	36.7	9.19	23	58		**22**	+86.3	37.5	9.37	23	58
	25*	+84.6	36.8	9.19	23	58	**Nov.**	**1**	+86.3	37.5	9.38	23	58
May	**5**	+84.7	36.8	9.20	23	58		**11***	+86.4	37.5	9.39	23	58
	15	+84.8	36.9	9.21	23	58		**21**	+86.5	37.6	9.40	23	59
	25	+84.9	36.9	9.22	23	58	**Dec.**	**1**	+86.6	37.6	9.41	23	59
June	**4***	+85.0	36.9	9.23	23	58		**11**	+86.7	37.7	9.42	23	59
	14	+85.1	37.0	9.25	23	58		**21***	+86.9	37.7	9.43	23	59
	24	+85.3	37.0	9.26	23	58		**31**	+87.0	37.8	9.45	23	59
July	**4**	+85.4	37.1	9.27	23	58		**41**	+87.1	37.8	9.46	23	59

* 40 - day date

† 400 day date for osculation epoch

EXPLANATION

Differential Precession and Nutation can be applied to obtain the differences in the mean place of an object relative to a comparison star for a standard epoch (J 2000.0) using the following formulae:

correction to R.A. : $e \tan \delta \, \Delta\alpha - f \sec^2 \delta \, \Delta\delta$

correction to declination : $f \, \Delta\alpha$

where $\Delta\alpha$ and $\Delta\delta$ are the observed differences in right ascension and declination of the object relative to the comparison star and

$e = - \cos \alpha \, (n\,t + \sin \varepsilon \, \Delta\psi) - \sin \alpha \, \Delta\varepsilon$

$f = + \sin \alpha \, (n\,t + \sin \varepsilon \, \Delta\psi) - \cos \alpha \, \Delta\varepsilon$

$\varepsilon = 23^\circ.44, \sin \varepsilon = 0.398$

$n = 0.000\,0972$ radian for epoch J 2027.5

t is the time in years from the standard epoch to the time of observation.

$\Delta\psi$, $\Delta\varepsilon$ are nutations in longitude and obliquity at the time of observation expressed in radians, (1" = 0.000 004 8481 rad).

Aberration

Aberration is the displacement of the position of a celestial object due to finite speed of light. The actual velocity of light in space c is the vectorial sum of its velocity relative to the observer c_r and the velocity V of the observer. Although the special theory of relativity has no provision of breaking up aberration of light into components, total effects of aberration in astronomy are broken into stellar, annual, elliptic, secular and planetary aberration for convenience of computation. In case of stars, all that can be determined is the displacement in their positions caused by the motion of the observer alone. It is calculated on the basis of the actual instantaneous motion of the Earth round the barycentre of the solar system.

Earlier, the practice was to resolve the stellar aberration into two components; one contributed by the circular motion of the Earth moving with a constant mean velocity round the Sun, and the other, a nearly constant displacement perpendicular to the major axis of the orbit arising due to ellipticity of the orbit of the Earth. The latter, known as the E-terms of aberration was included in the mean position of the stars as given in star catalogues and was omitted in the computation of day numbers. As a result, the mean places of stars differed from the catalogue mean places. This procedure was adopted to minimise the computation work for the user of star catalogues. However, this practice has caused much confusion lately because the accurate total velocity of the Earth referred to the barycentre of the solar system could not be used in computing stellar aberration. In accordance with a decision of the IAU in 1976, this occasion has been used to simplify this procedure by removing the E terms of aberration from the mean places and to include them in the reduction from mean to apparent place so that the apparent places remain unchanged. Thus, the mean places of FK5 are free from E terms. In other words, they will be the positions of the stars at epoch J 2000.0 as viewed from the barycentre of the solar system, in the co-ordinate system defined by the Earth's mean equator and equinox of J 2000.0.

The conversion of 1950.0 star catalogue positions (α,δ) to actual mean places ($\alpha+\Delta\alpha$, $\delta+\Delta\delta$) can be accomplished by :

$$\Delta\alpha = 0^s.0227 \sin (\alpha + 11^h.25) \sec \delta$$

$$\Delta\delta = 0".341 \cos (\alpha + 11^h.25) \sin \delta + 0".029 \cos \delta$$

For solar system objects, the displacement of the light source during the time (Δt) taken by light to travel from it to the Earth combined with the effect of relative motion of the Earth and the light is known as planetary aberration. Its computation requires a knowledge of the distance and motion of the light source and can be accomplished as follows. First, the barycentric position of the body at time t- Δt is combined with the barycentric position of the Earth at time t and then the correction for annual aberration is applied. Planetary aberration may also be

computed by interpolating the geometric (geocentric) ephemeris of the body to the time $t - \Delta t$. The light time Δt is given by:

$$\Delta t \text{ (in days)} = 0.005\ 7755 \times \text{distance in a.u.}$$

Annual aberration for reduction from a geometric place (α_0, δ_0) to an apparent geocentric place (α, δ) is given by :

$$\alpha = \alpha_0 + (-\dot{X} \sin \alpha_0 + \dot{Y} \cos \alpha_0) / (c \cos \delta_0)$$

$$\delta = \delta_0 + (-\dot{X} \cos \alpha_0 \sin \delta_0 - \dot{Y} \sin \alpha_0 \sin \delta_0 + \dot{Z} \cos \delta_0)/ c,$$ where c = 173.14 a.u./day and $\dot{X}, \dot{Y}, \dot{Z}$ are the velocity components of the Earth (pages 256 to 270).

The reduction of observations of the radial velocity to a common origin at the barycentre is given by adding the component of the Earth's velocity in the direction (α_0, δ_0) of the object :

$$\dot{X} \cos \alpha_0 \cos \delta_0 + \dot{Y} \sin \alpha_0 \cos \delta_0 + \dot{Z} \sin \delta_0$$

Differential annual aberration corrections to be added to the observed differences of right ascension and declination (in the sense moving object minus star) to give true differences are:

(R.A.) a $\Delta\alpha + b\,\Delta\delta$ (in units of $0^s.001$) ; (declination) c $\Delta\alpha + d\,\Delta\delta$ (in units of $0''.01$)

Here $\Delta\alpha$ is to be taken in units of 1^m and $\Delta\delta$ in units of 1'. The coefficients a, b, c and d are defined by:

$a = -5.701 \cos (H+\alpha) \sec \delta$

$b = -0.380 \sin (H+\alpha) \sec \delta \tan \delta$

$c = +8.552 \sin (H+\alpha) \sin \delta$

$d = -0.570 \cos (H+\alpha) \cos \delta$

$H^h = 23.4 - (\text{day of year}/15.2)$

(The day of year is tabulated on pages 4 to 12)

Annual parallax correction can be calculated approximately for reduction from the catalogue place (α_0, δ_0) to the geocentric place (α, δ) using the following formulae;

$$\alpha = \alpha_0 + (\pi / 15 \cos \delta_0)(X \sin \alpha_0 - Y \cos \alpha_0) \text{ and } \delta = \delta_0 + \pi(X \cos \alpha_0 \sin \delta_0 + Y \sin \alpha_0 \sin \delta_0 - Z \cos \delta_0)$$

where π is the annual parallax and X, Y, Z, are the coordinates of the Earth as given on pages 256 to 270.

Deflection of light in the gravitational field of the Sun may significantly affect the apparent direction of a star or of a body in the solar system. The elongation (E) from the centre of the Sun is increased by an amount that, for a star, depends on the elongation in the following manner:

$$\Delta E = 0''.004\ 07 / \tan (E/2)$$

E	0°.25	0°.5	1°	2°	5°	10°	20°	50°	90°
ΔE	1".866	0".933	0".466	0".233	0".093	0".047	0".023	0".009	0".004

The body disappears behind the Sun when E is less than the limmiting grazing value of about 8°.25. The effects in right ascension and declination may be calculated approximately from;

$$\cos E = \sin \delta \sin \delta_0 + \cos \delta \cos \delta_0 \cos (\alpha - \alpha_0)$$

$$\Delta\alpha = 0^s.000\ 271 \cos\delta_0 \sin (\alpha - \alpha_0) / (1 - \cos E) \cos \delta$$

$$\Delta\delta = 0''.004\ 07\ [(\sin \delta \cos \delta_0 \cos (\alpha - \alpha_0) - \cos \delta \sin \delta_0] / (1 - \cos E)$$

where α, δ refer to the star, and α_0, δ_0 to the Sun.

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TABULAR DATA

PART-I -TIME SCALES AND EPHEMERIDES

Dates of year beginning in 2027 of various Indian and important foreign chronological eras are listed on page 3 followed by Gregorian calendar for the current year (pages 4 to 12). The calendar contains, besides the usual information, a count of Julian Day (JD) number for each date. The system of Julian day numbers maintains a continuous count of astronomical days, beginning with JD = 0 on 1 January 4713 B.C., Julian proleptic calendar. Julian Day numbers for other years can be found from the table on page 363. Various time scales used in this publication, their inter -relationships (as given on page 2) and the basis for computation of sidereal time as tabulated on pages 13 to 16; have been discussed above under the section on time scales. The concept of equation of time defined as the difference between local apparent solar time and local mean solar time (in the sense apparent minus mean) is no longer used in astronomy and therefore, it is no more tabulated in this publication. It can, however, be obtained to a precision of about 1 second using the following relation :

Equation of time at 12^h U.T. = 12^h – tabulated value of TT of Sun's ephemeris transit (pages 19 to 33).

In this publication, the ephemeridies of the Sun and planets were reported earlier based on computation jointly made by USNO and JPL by simultaneous numerical integration designated as DE 200/ LE 200. A more recent JPL ephemeris, DE 405/ LE 405 has now come into widespread use, provide barycentric equatorial rectangular coordinates for the period 1600 to 2201. The reference frame for basic ephemerides is the ICRF; the alignment onto this frame has an estimated accuracy of 1 - 2 arcseconds. The JPL DE 405/ LE 405 ephemerides have been developed in a barycentric reference system using a barycentric coordinate time scale $T_{eph.}$. The present edition use the DE 405/ LE 405 ephemeridies data on the positions of the Sun, Moon and planets. The value of some astronomical constants based on previously used DE200/ LE200 ephemeridies and currently used DE 405/ LE 405 ephemerides are given below.

Constant	DE 405 Value	DE 200/ LE 200 Value
Light-time for unit distance, τ_A	499.004 783 84 s	499.004 7837……..s
Geocentric gravitational constant, GE	3.986 004 418 x 10^{14} m^3s^{-2}	3.986 004 48……x 10^{14} m^3s^{-2}
Heliocentric gravitational constant, GS	1.327 124 42 099 x 10^{20} m^3s^{-2}	1.327 124 40……x 10^{20} m^3s^{-2}
Ratio of mass of Sun to that of Earth, (GS)/ (GE)	332 946.0 487	332 946.038…….
Ratio of mass of Moon to that of Earth, μ	0.012 300 0371	0.012 300 034
Obliquity of the ecliptic at J2000.0, ε	23° 26′ 21″.406	23° 26′ 21″.4119….
Unit distance, A	1.495 978 707 x 10^{11} m	1.495 978 7066 x 10^{11} m
Ratio of mass of Sun to that of Earth + Moon	328 900.5596	328 900.55
Ratio of mass of Sun to mass of each planet :		
Jupiter	1047.348 644	1047.350
Saturn	3497.9018	3498.0
Uranus	229 02.98	229 60
Pluto	1.365 66 x 10^8	1.3 x 10^8
Pallas	9.709 x 10^9	9.247 x 10^9
Vesta	7.407 x 10^9	7.253 x 10^9

EXPLANATION

The Sun

Mean elements of the orbit of the Sun can be calculated with the help of the following expressions for use during 2027 only :

Geometric mean longitude	:	$L = 279^\circ.442\,243\,80 + 0.985\,647\,36\,d$
Mean longitude of perigee	:	$\Gamma = 283^\circ.401\,567\,40 + 0.000\,047\,08\,d$
Mean anomaly	:	$g = 356^\circ.040\,676\,40 + 0.985\,600\,28\,d$
Eccentricity	:	$e = 0^\circ.016\,697\,32 - 0.000\,000\,001\,d$
Obliquity of the ecliptic w.r.t. mean equator of date	:	$\varepsilon = 23^\circ.435\,764\,20 - 0.000\,000\,36\,d$

where d is the interval in days from 2027 January 0 at 0^h TT and is given by

d = JD – 246 1406.5 = day of the year (pages 4 to 12) + fraction of day from 0^h TT.

The above angular elements are referred to the mean equinox and ecliptic of date. The position of ecliptic of date with respect to the ecliptic of the standard epoch J 2000.0 is given by the formulae given under *Precession.*

The length of the principal years at 2027.0 as derived from the Sun's mean motion are given on page 2.

Geometric longitude of the Sun with respect to the mean equinox of date is tabulated on even numbered pages 18 to 32. Apparent longitude and latitude are with respect to the true equinox and ecliptic of date respectively. The two longitudes are related as follows :

Apparent longitude = Geometric longitude + nutation in longitude – 20".4955/ R.

Aberration has been computed by dividing 20".4955 by the true distance to the Sun. Precession in longitude is the total precessional displacement of a point along the ecliptic since the epoch J 2027.5. Revised value of the annual general precession p = 0°. 013 971 41 (for J 2027.5) has been used to compute this quantity. Components of nutation are the results of summation of the revised series of nutation. The sum of the terms with period shorter than 35 days is separately tabulated under Besselian Day numbers (pages 244 to 251).

Apparent Right Ascension and true distance (radius vector), declination (tabulated on odd numbered pages 19 to 33) of the Sun have been computed from the original barycentric rectangular co-ordinates. Although the apparent right ascension and declination have been corrected for light time, the radius vector or the true geocentric distance in astronomical units is the geometric distance at the tabular time.

The Semidiameter is based on a value of 16′ 01″.18 at unit distance being inclusive of an allowance for irradiation of 1″.55. The tabular value is obtained by dividing 16′ 01″.18 by the radius vector.

Ephemeris Transit is the TT of the transit of the Sun over the ephemeris meridian which according to its definition, is 1.002 7379 ΔT east of the Greenwich meridian. Here ΔT is the difference TT − UT. This transit time. This transit time can be interpolated to other meridians with an interpolating factor *p,* as follows:

$$p = -\lambda/360 + 1.002\,7379 \times \Delta T/86400$$

where λ is the longitude (east positive). The interpolated TT can be converted into UT by subtracting ΔT from TT.

Equatorial rectangular co-ordinates (geocentric) of the Sun, referred to the ICRS axes, are given in a.u. on pages 34 to 41. The direction of these axes have been defined by the IAU and realized in practice by the coordinates of several hundred extra galactic radio sources.

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Horizontal parallax (page 17) of the Sun is the angle subtended at the Sun by the equatorial radius of the Earth. The new value of the Solar parallax $\Pi_\circ = 8''.794\ 148$ has been used to compute the horizontal parallax.

Mean longitude and mean anomaly (page 17) of the Sun have been computed using revised expressions for the mean motion of the Earth around the Sun as given on page 451.

Heliographic co-ordinates given on pages 42 to 45 for 0^h UT include the position angle P of the northern extremity of the axis of rotation measured eastward from the north point of the disc and the heliographic latitude $B_\circ$ and longitude $L_\circ$ of the central point of the disc.

The observed angular distance ρ_1 from the centre of the disc of the Sun of a feature on the Sun's surface, as seen from the Earth, can be converted into its heliocentric angular distance ρ from the centreof the Sun's disc as follows :

$$\sin (\rho + \rho_1) = \rho_1 / S,$$ where S is the semi diameter of the Sun.

The observed position (ρ, θ) of a feature (Sunspot, etc.) with respect to the centre of Sun's disc can be converted into heliographic co-ordinates (L, B) as follows :

$$\sin B = \sin B_\circ \cos \rho + \cos B_\circ \sin \rho \cos (P - \theta)$$
$$\cos B \sin (L - L_\circ) = \sin \rho \sin (P - \theta)$$
$$\cos B \cos (L - L_\circ) = \cos \rho \cos B_\circ - \sin B_\circ \sin \rho \cos (P - \theta)$$

The physical ephemeris of the Sun has been calculated from the elements determined by R. C. Carrington (observation of the spots on the Sun, 1863).

The Synodic rotation numbers are given below according to R. C. Carrington's Greenwich photoheliographic series which commenced on 9 November, 1853 with number 1. The standard solar meridian from which heliographic longitudes on the surface of the Sun are measured (positive towards the west) is that which passes through the ascending node of the solar equator on the ecliptic on 1854 January 1, Greenwich mean noon. The beginning of each synodic rotation is the instant at which the standard solar meridian passes through the central point of the apparent disc of the Sun, i.e., when the heliographic longitude $L_\circ$ of this central point is zero.

SYNODIC ROTATION NUMBERS, 2027

Number		Date of Commencement		Number		Date of Commencement		Number		Date of Commencement	
2319	2026	Dec.	16.93	2324		May	2.51	2329		Sept.	15.61
2320	2027	Jan.	13.27	2325		May	29.73	2330		Oct.	12.88
2321		Feb.	9.61	2326		June	25.93	2331		Nov.	9.18
2322		Mar.	8.94	2327	2027	July	23.13	2332		Dec.	6.49
2323		Apr.	5.25	2328		Aug.	19.35	2333	2028	Jan.	2.82

At the date of commencement of each synodic rotation period, the value of $L_\circ$ is zero ; that is, the prime meridian passes through the central point of the disk.

The mean rotational elements of the Sun during 2027 are as follows :

Longitude of the ascending node of the solar equator on the ecliptic of date is $76^\circ.01$, and on the mean equator of date $16^\circ.16$. Inclination of the solar equator on the ecliptic of date is $7^\circ.25$, and on the mean equator of date $26^\circ.10$. The mean position of the pole on the solar equator is at right ascension $286^\circ.16$ and declination $63^\circ.90$. Sidereal period of rotation of the prime meridian is $14^\circ.18\ 44$ per day and its mean synodic period of rotation is 27.2753 days.

EXPLANATION

The Moon

The ephemerides of the Moon reported in this publication are based on the fundamental arguments developed by Simon et. al (1994). The angular elements are referred to the mean equinox and ecliptic of date. Mean elements of the mean equator and of the orbit of the Moon (page 47) can be computed during 2027 with the help of the following expressions :-

The inclination i of the mean equator of the Moon to the true equator of the Earth is given by :

$$i = 22^\circ.235\,098\,10 + 0.000\,966\,94\,d + 0.000\,000\,69\,d^2$$

The arc of the mean equator of the Moon from its ascending node on the true equator of the Earth to its ascending node on the ecliptic of date :

$$\Delta = 140^\circ.541\,497\,80 - 0.056\,114\,28\,d + 0.000\,000\,28\,d^2$$

The arc of the true equator of the Earth from the true equinox of date to the ascending node of the mean equator of the Moon :

$$\Omega' = 2^\circ.554\,452\,90 + 0.003\,436\,46\,d + 0.000\,000\,30\,d^2$$

The inclination *(I)* of the mean equator of the Moon to the ecliptic $= 1^\circ\,32'\,33''.6$.

The ascending node of the mean lunar equator on the ecliptic is at the descending node of the mean lunar orbit on the ecliptic that is at longitude $\Omega + 180^\circ$.

The above expressions give the mean elements with respect to the true equator of the Earth to a precision of about $0^\circ.001$.

The following expressions for the mean elements of the orbit of the Moon Γ', Ω mean longitude of the Moon L' and elongation D are referred to the mean equinox and ecliptic of date.

Mean longitude of the Moon, measured along the ecliptic to the mean ascending node and then along the mean orbit :

$$L' = 184^\circ.173\,964\,50 + 13.176\,396\,45\,d$$

Mean longitude of the Moon's perigee measured in the same way as L' :

$$\Gamma' = 101^\circ.846\,921\,40 + 0.111\,403\,38\,d$$

Mean longitude of the mean ascending node of the lunar orbit on the ecliptic :

$$\Omega = 322^\circ.894\,104\,80 - 0.052\,953\,74\,d$$

Mean elongation of the Moon from the Sun :

$$D = L' - L = 264^\circ.731\,720\,43 + 12.190\,749\,09\,d$$

Mean inclination of the lunar orbit to the ecliptic $= 5^\circ.1566898$

The above expressions are valid for use in 2027 only.

In all the above expressions, the time argument d is the interval in days since 0^h TT January 0, 2027 and is given by $d = \mathrm{JD} - 2461406.5$

The length of the principal mean months at 2027.0 as derived from the above mean orbital elements of the Moon are given on page 2.

The apparent geocentric longitude and latitude of the Moon (pages 48 to 63) are referred to the true equinox and ecliptic of date. The true distance between the centres of the Earth and the Moon is given in a.u. Semi-diameter is derived from the horizontal parallax by $S = \mathrm{Sin}^{-1}(k \sin\pi)$ where $k = 0.272\,5076$. The semi-diameter at mean distance is taken to be $15'\,32''.58$ without making any correction for irradiation.

EXPLANATION

The right ascension and declination given on pages 64 to 79 for 0 hour & 12 hour of TT are referred to the true equator and equinox of date.

Horizontal parallax is tabulated at twelve hourly intervals on pages 64 to 79. It is derived from $\sin^{-1}(1/r)$ where r is the true distance in units of the Earth's equatorial radius. The tabulated R.A. and declination have been corrected for light time while the horizontal parallax is the geometric value for the tabular time.

The times of New Moon, First Quarter, Full Moon and Last Quarter are the moments at which the excess of the Moon's apparent longitude over that of the Sun is 0°, 90°, 180° and 270° respectively. Moon at Apogee and Perigee are the times when the Moon is at the greatest and least distance from the Earth. The timings are given in U.T. The corresponding timings in U.T. of the phases of the Moon are also given in the calendar portion on pages 4 to 12. For more precise values of the moments of New Moon and Full Moon, a reference may be made to Part VI - Indian Calendar where the times are given in I.S.T.

Moon's Age, given for 0^h TT, is the number of days elapsed since the preceding New Moon (conjunction). The times of Moon's upper and lower transit are given in TT for the ephemeris meridian. Interpolation to any other meridian by means of differences given and with the help of the ephemeris longitude will yield the local mean time of transit. The apparent geocentric declination given for the time of ephemeris transit can also be similarly interpolated.

Physical ephemeris of the Moon (pages 88 to 95) has been computed using the formulae and constants of D. Eckhardt (*The Moon and the Planets, 25 3, 1981; High precision Earth Rotation and Earth-Moon Dynamics, ed. O. Calame, pages 193-198, 1982)* with inclination I as given above (IAU value).

In case of the Moon, selenographic longitudes are measured for a point on the surface of the Moon from the lunar meridian that passes through the mean central point of the visible disc positive towards the west towards Mare Crisium. Selenographic latitudes are reckoned positive towards the north limb. The mean central point of the disc is defined as the point on the lunar surface intersected by the radius of the Moon directed towards the Earth, when the Moon is simultaneously at the ascending node and coincident with the mean longitude.

The Moon presents roughly the same hemisphere to the Earth. However, due to non uniformity of the revolution of the Moon around the Earth (optical libration) and an oscillation of the actual rotational motion of the Moon about its mean rotation (physical libration), about 59% of the Moon's surface can be seen from the Earth. The contribution to the Earth's selenographic longitude and latitude due to physical libration has been tabulated separately. These are geocentric values.

The tabular selenographic longitude and latitude of the Earth are the selenographic co-ordinates of the apparent central point of the Moon from which point the Earth is in selenographic zenith. These co-ordinates are the total librations (sums of optical and physical librations) in longitude and latitude respectively. When the libration in longitude, i.e. the selenographic longitude of the Earth, is positive, the mean central point of the disc is displaced eastward exposing to view a region on the west limb. When the libration in latitude, i.e. the selenographic latitude of the Earth, is positive, a region on the north limb is exposed to view.

The selenographic co-ordinates of the point on the lunar surface where the Sun is in the Zenith are the selenographic co-ordinates of the Sun. The selenographic co-longitude of the Sun tabulated in the ephemeris is obtained by subtracting the selenographic longitude of the Sun from 90° or 450° ; it is approximately 270°, 0°, 90° and 180° at new-moon, first quarter, full-moon and last quarter respectively.

The position angle of the axis is the angle that the lunar meridian through the apparent central point of the disc towards the north lunar pole forms with the declination circle through the central point, reckoned counter clockwise from the north point of the disc.

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The position angle of the bright limb is the position angle of the mid point of the illuminated limb, reckoned eastward from the north point of the disc. The position angle of the two cusps may be obtained by adding $\pm$ 90° to that of the bright limb.

The expression for calculating the selenographic altitude (a) of the Sun (above the lunar horizon) at a point at selenographic longitude l and latitude b is as follows :

$\sin a = \sin b_\circ \sin b + \cos b_\circ \cos b \sin (c_\circ + l)$, where $(c_\circ, b_\circ)$ are the Sun's co-longitude and latitude at the time.

The following expressions can be used to compute the differential corrections to be applied to the tabular geocentric librations to form the topocentric librations :

$\Delta l = -\pi' \sin (Q - C) \sec b$

$\Delta b = +\pi' \cos (Q - C)$

$\Delta C = +\sin (b + \Delta b)\, \Delta l - \pi' \sin Q \tan \delta$, where Q is the geocentric parallactic angle of the Moon and π' is the topocentric horizontal parallax. The latter is obtained from the geocentric horizontal parallax (π) (pages 64 to 79) by using :

$\pi' = \pi (\sin z + 0.0084 \sin 2z)$

where z is the geocentric zenith distance of the Moon. The values of z and Q may be calculated from the geocentric R.A. (α) and declination (δ) of the Moon by using :

$$\sin z \sin Q = \cos \phi \sin h$$
$$\sin z \cos Q = \cos \delta \sin \phi - \sin \delta \cos \phi \cos h$$
$$\cos z = \sin \delta \sin \phi + \cos \delta \cos \phi \cos h$$

where ϕ is the geocentric latitude of the observer and h is the local hour angle of the Moon given by :

h = local apparent sidereal time $- \alpha$

Second differences in the tabular values of the geocentric librations must be taken into account in interpolation for the time of observation.

Major Planets

The heliocentric and geocentric positions of the major planets given on pages 96 to 197 have been derived directly from the numerical integration mentioned on page 449.

The heliocentric longitude and latitude are referred to the mean equinox and ecliptic of date. The tabular argument of heliocentric ephemeris is barycentric dynamical time (TDB).

The apparent geocentric longitude and latitude are referred to the true equinox and ecliptic of date and are planetary aberration. The apparent right ascension and declination are also corrected for planetary aberration and referred to the true equinox and equator of date. The tabular argument for both the terrestrial dynamical time (TDT). The TDT of transit over the ephemeris meridian has been furnished, which may be interpolated to any other meridian to obtain the LMT of transit.

As regards Pluto, in addition to the usual data, figures have been furnished for reduction of the apparent right ascension and apparent declination to the corresponding astrometric places referred to the mean equinox and equator of J 2000.0. The astrometric ephemeris is obtained by first adding the usual planetary aberration to the

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planet's true geocentric places referred to the standard equinox J 2000.0 and then subtracting the stellar aberration pertinent to the position occupied by the planet. The astrometric place is thus affected by the amount of the terms in the aberration dependent on the longitude of the Earth's perihelion as are the catalogue mean places of stars in the neighbourhood. The astrometric ephemeris is, therefore, rigorously comparable with photographic observations that are referred to catalogue mean places J 2000.0 of neighbouring stars, it being only necessary to correct the observations for geocentric parallax in case of the planets and proper motion in case of the stars.

The tabular true distance from the Earth is the actual geocentric distance at the tabulated time and not at the instant when the light left the planet.

The horizontal parallax of planets is 8".794 143 divided by the geocentric distance. As regards the semi-diameter, the tabulated value is the value at unit distance divided by the geocentric distance. The semi-diameters at unit distance are as follows : Mercury 3".36, Venus 8".34, Mars 4".68, Jupiter 98".57 (Equatorial) and 92".12 (Polar), Saturn 83".13 (Equatorial) and 74".96 (Polar), Uranus 35".24, Neptune 34".14 and Pluto 2".07.

The heliocentric osculating elements of the orbits of the major planets, including Pluto, are given at intervals of 40 days on pages 200 to 201. The osculating elements are the elements of the instantaneous ecliptic orbit of the planet around the Sun determined by its actual position and velocity components for the instant, and as such the elements are affected by the attractions of other planets. The true place of a planet deduced from these elements is thus inclusive of the planetary perturbations, which need not, therefore, be considered separately in such a deduction.

The osculating elements for the Earth refer to the Earth/Moon barycentre. The correction in ecliptic rectangular co-ordinates in conversion from the Earth/Moon barycentre to the Earth's centre is given by :

$$\text{Earth's Centre} = (\text{Earth / Moon barycentre}) - (0.000\,0312\cos L,\ 0.000\,2865\sin L,\ 0.0000124\sin L,$$
$$-0.00000718\sin L, 0.00000657\cos L,\ 0.00000285\cos L)$$

where $L = 218^\circ + 481\,268^\circ\ T$, with T measured in Julian centuries from JD 245 1545.0 to 5 decimals; the co-ordinates are in a.u. with reference to mean equinox and ecliptic of date.

PART II - STARS

The mean places of 482 stars, apparent places of 68 stars at 10-day intervals. daily apparent place of *Polaris* and tables for finding latitude of place from altitude of polaris and azimuth of polaris are given in this section. The ecliptic co-ordinates (mean longitude and latitude) of 451 stars have also been given. To facilitate reduction from mean to apparent place of a star, Besselian Day Numbers as well as the barycentric position and velocity components of the Earth alongwith rotation matrix elements for precession and nutation have been tabulated.

Mean Places of Stars (pages 215 to 226)

Beginning with the issue for 1988, calculation of the mean and apparent places are based directly on the basic-FK5 compiled by the A.R.I., Heidelberg.

The table for mean places of stars includes all stars of magnitude upto 3.9 as well as the component stars of the different lunar asterisms of the Hindus, Chinese and Arabian even when those are fainter than magnitude 3.9.

In case double or multiple stars, *m* denotes the mean position of the centre of gravity (*c.g.*) of the system; *p* the preceding component having less right ascension, *f* the following component and *A* the brighter component of the system. The magnitude of the binary stars is the integrated value for the two components.

EXPLANATION

The mean longitude and latitude of 445 important stars have been computed using the conversion from equatorial mean positions to ecliptic co-ordinates. Similarly, annual variations in longitude and latitude, etc., are the differentials of the conversion formulae. All quantities relate to the middle of the current Julian year.

Apparent Places of Stars (pages 227 to 243)

The apparent places of 68 selected stars are reported under this section. These positions are completely based on the FK5 beginning with the issue for 1988.

Smaller aberration has been computed from the total velocity of the Earth referred to the barycentre of the solar system. The E-terms of aberration are no longer included in the mean places in the FK5, but rather in the reduction from mean to apparent places.

Reductions to apparent places have been computed rigorously and directly without the intermediary of the mean place for the begining of the year. The rigorous computation also includes effects of relativistic light deflection. Because of this, the apparent places of a star when approaching very closely the Sun cannot be interpolated by the user, but these cases are of no practical interest in normal applications.

Apparent places of 68 bright stars with annual variation and annual proper motion at 10-day interval have been given on pages 227 to 243. The number, name, are taken generally from the FK5, magnitude and spectrum are taken from SIMBAD data base. Corrections for parallax have been applied where appreciable.

The right ascension and declination are referred to the true equator and equinox of date but with the omission of the short period terms of nutation. After interpolating the given apparent places to date and longitude of the station, the following corrections for the effect of short period terms of nutation are to be applied :

$$\Delta\alpha = a\, d\psi + b\, d\varepsilon \quad \text{seconds of time}$$
$$\Delta\delta = a'\, d\psi + b'\, d\varepsilon \quad \text{seconds of arc}$$

where $d\psi$ and $d\varepsilon$ are short period terms of nutation as tabulated on pages 244 to 251. The values of a, b, a' and b' are given for each star under the apparent place.

The Apparent places of Polaris for each day of the year (pages 272 to 274) have been computed rigorously.

Besselian Day Numbers (pages 244 to 251)

All stellar data tabulations are now for the standard epoch at the middle of the current Julian year rather than the beginning of the Besselian year and accordingly the Besselian Day Numbers and second order day numbers are referred to the mean equator and equinox of the epoch, J 2027.5. Although for full precision the reduction to the apparent place has to be computed rigorously as described below, Besselian Day Numbers can still be used for less precision.

In the tabulated data, τ is the fraction of the Julian year since the standard epoch J 2024.5 A, B and E are Besselian Day Numbers designed to incorporate corrections to the position of a star on account of precession and nutation. In this case, the correction due to precession is measured from the middle of the year, and this is secured by incorporating in A the value of the precision corresponding to τ.The terms of short-period in nutation are included in A and B, which are also shown separately on pages 244 to 251.

The Besselian Day Numbers C and D, designed to include the effect of aberration, are now computed based on the total velocity of the Earth.

Second order day numbers, needed only for high declination stars for high accuracy, have been tabulated on pages 252 to 255.

EXPLANATION

The barycentric position and velocity components of the Earth and rotation matrix elements for rigorous reduction of precesision and nutation have been tabulated on pages 256 to 270. Use of these data with examples is discussed below :-

Apparent place reduction with full precision (rigorous method)

Conversion of the barycentric co-ordinates of a star for the standard equinox and equator of J 2000.0 (TDB) to its apparent geocentric co-ordinates referred to the true equinox and equator of date (TT) can be done rigorously as follows:

The geocentric vector **P** of the star at the required epoch (ignoring the distinction between TDB and TT for the stellar case) is given be by:

$$\mathbf{P} = \mathbf{q} + T\mathbf{m} - \pi\mathbf{E_B} \quad \text{.....(1)}$$

Here **q** is the barycentric direction of the star at epoch J 2000.0 referred to the standard equinox and equator of J2000.0 and is given by :-

$$\mathbf{q} = (\cos\alpha_0 \cos\delta_0,\ \sin\alpha_0 \cos\delta_0,\ \sin\delta_0)$$

where α_0 and δ_0 are the right ascension and declination for the equator, equinox and epoch of J 2000.0.

The space motion vector $\mathbf{m} = (m_x, m_y, m_z)$ of the star in equation (1), expressed in radians/century, is given by :

$$m_x = -\mu_\alpha \cos\delta_0 \sin\alpha_0 - \mu_\delta \sin\delta_0 \cos\alpha_0 + \nu\pi \cos\delta_0 \cos\alpha_0$$
$$m_y = \mu_\alpha \cos\delta_0 \cos\alpha_0 - \mu_\delta \sin\delta_0 \sin\alpha_0 + \nu\pi \cos\delta_0 \sin\alpha_0$$
$$m_z = \mu_\delta \cos\delta_0 + \nu\pi \sin\delta_0$$

where these expressions take into account the radial velocity (v) in au/century (1 km/s = 21.094 952 75 a.u./ century), measured positively away from the Earth as well as proper motion(μ_α, μ_δ) in right ascension and declination in radian/century and π is the parallax in radians.

T is the interval in Julian centuries from J2000.0, given by T = (JD – 245 1545.0)/ 36525; $\mathbf{E}_B$ and $\dot{\mathbf{E}}_B$ in a.u. per day are Earth's barycentric position and velocity vectors at co-ordinate time t = TDB referred to the equator and equinox of J 2000.0 (pages 256 to 270).

The heliocentric position of the Earth **E** is given by

$$\mathbf{E} = \mathbf{E}_B - \mathbf{S}_B \quad \text{.....(2)}$$

Where $\mathbf{S_B}$ is the barycentric position of the Sun at time t. This can be obtained from the heliocentric position of the barycentre tabulated on page 202 by reversing the sign of the respective x, y, and z.

The geocentric direction **p** of the star and the unit vector **e** can be computed from $\mathbf{p} = \mathbf{P}/|\mathbf{P}|$ and $\mathbf{e} = \mathbf{E}/|\mathbf{E}|$

The geocentric direction $\mathbf{p_1}$ of the star after applying the correction for light deflection in the natural frame is obtained as follows:

$$\mathbf{p_1} = \mathbf{p} + (2\ \mu/c^2 E)\,(\mathbf{e} - (\mathbf{p}.\mathbf{e})\,\mathbf{p})/(1 + \mathbf{p}.\mathbf{e}) \text{.....(3)}$$

EXPLANATION

Where $\mu/c^2 = 9.87 \text{ X } 10^{-9}$ a.u and $E = |\mathbf{E}|$, the vector $\mathbf{p}_1$ is a unit vector to the order of μ/c^2 and dot (.) indicates scalar product.

The proper direction $\mathbf{p}_2$ in the geocentric inertial frame, that is moving with the instantaneous velocity **V** of the Earth relative to the natural frame, is given by:

$$\mathbf{p}_2 = (\beta^{-1}\mathbf{p}_1 + (1 + \mathbf{p}_1.\mathbf{V})/(1+\beta^{-1}))\mathbf{V})/(1+\mathbf{p}_1.\mathbf{V}) \ldots\ldots\ldots\ldots\ldots(4)$$

Where $\mathbf{V} = \dot{\mathbf{E}}_B/c = 0.0057755\,\dot{\mathbf{E}}_B$ and $\beta = (1 - V^2)^{-1/2}$; the velocity **V** expressed in units of velocity of light and is equal to the Earth's velocity in the barycentric frame to the order of V^2.

The apparent geocentric direction $\mathbf{p}_3$ is obtained by applying precession and nutation to the proper direction $\mathbf{p}_2$ by multiplying it row by column with the rotation matrix M=NPB (given on pages 257 to 271) as follows:

$$\mathbf{p}_3 = \mathrm{M}\,\mathbf{p}_2 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

The above direction $\mathbf{p}_3$ is in rectangular co- ordinates (ξ, η, ζ). It can be converted into spherical co- ordinates (α, δ) using :

$$\alpha = \tan^{-1}(\eta/\xi) \quad \text{and} \quad \delta = \tan^{-1}(\zeta/\beta) \ldots\ldots\ldots\ldots\ldots\ldots(6)$$

Where $\beta = (\xi^2 + \eta^2)^{1/2}$

where the quadrant of α can be determined by the signs of ξ and η.

Correction for polar motion :

The apparent geocentric direction $\mathbf{p}_3$, given by equation (5) above, is for the true equator and equinox with the z axis pointing towards the celestial ephemeris pole. A further correction for polar motion may be applied to $\mathbf{p}_3$ to obtain $\mathbf{p}_4$ i.e. the direction relative to the conventional terrestrial reference system in which the z-axis is in the direction of the adopted mean position of the pole, as follows :

$$\mathbf{p}_4 = \mathbf{R}_2(-\mathrm{x})\,\mathbf{R}_1(-\mathrm{y})\,\mathbf{R}_3(\mathrm{GAST})\,\mathbf{p}_3$$

where GAST is the Greenwich apparent sidereal time at the corresponding instant of UT and

$$\mathbf{R}_1(\theta) = \begin{bmatrix} 1 & 0 & 0 \\ 0 & \cos\theta & \sin\theta \\ 0 & -\sin\theta & \cos\theta \end{bmatrix} \qquad \mathbf{R}_2(\theta) = \begin{bmatrix} \cos\theta & 0 & -\sin\theta \\ 0 & 1 & 0 \\ \sin\theta & 0 & \cos\theta \end{bmatrix}$$

$$\mathbf{R}_3(\theta) = \begin{bmatrix} \cos\theta & \sin\theta & 0 \\ -\sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

are the standard matrices that produce rotations through an angle θ about the x, y and z - axes respectively.

Polar motion is described by x and y, the co- ordinates of the celestial ephemeris pole with respect to the adopted origin; x and y are measured in seconds of arc from the origin along the meridians at longitudes 0° and 270°. Current values for the reduction of observations are published by the International Polar Motion Service and the Bureau International de l' Heure.

EXPLANATION

Example of stellar reduction :

Calculation of apparent position of a fictitious star on 2027, January 1 at 0^h TT from the catalogue data, mean right ascension (α_0), declination (δ_0), centennial proper motion (μ_α, μ_δ) in right ascension and declination, parallax (π) and radial velocity (ν) of a fictitious star for the standard equinox and equator of J 2000.0 (TDB) as given below:

$\alpha_0 = 14^h\ 39^m\ 36^s.087$ $\qquad$ $\mu_\alpha = -49.486$ s/ century
$= -0.00359872$ rad/century

$\delta_0 = -60°\ 50'\ 07''.14$ $\qquad$ $\mu_\delta = +69''.60$ s/ century
$= +0.0003374$ rad/ century

$\pi = 0''.752$
$= 3.646 \text{ X } 10^{-6}$ rad $\qquad$ $\nu = -22.2$ km/ s
$\nu\pi = -0.0017074$ rad/ century

The barycentric position vector of the Sun and the position and velocity vectors of the Earth referred to J2000.0 on 2027 January 1, 0^h TDB (pages 202, 256 to 270) are :

Vector	Julian date	Barycentric Rectangular Components		
		x	y	z
$\mathbf{E_B}$	246 1406.5	−0.170 535 07	+ 0.884 162 36	+ 0.383 359 31
$\dot{\mathbf{E}}_\mathbf{B}$	246 1406.5	−0.017 222 57	−0.002 777 55	−0.001 203 70
$\mathbf{S_B}$	246 1406.5	−0.000 705 44	−0.004 503 23	−0.001 862 06

In order to calculate the geocentric vector **P** of the star at J 2000.0, using equation (1), the vectors **q** and **m** may be computed using positional data of the star.

q = (−0.373 854 09, −0.312 594 57, −0.873 222 62)
m = (−0.000 712 68, +0.001 690 10, +0.001 655 34)
T = (246 1406.5 − 245 1545.0)/ 36525 = +0.27

The geocentric vector **P** may be computed from equation (1) by substituting the vectors **q, m** and $\mathbf{E_B}$ and time **T**.

P = (−0.374 045 89, −0.312 138 25, −0.872 775 69) and | **P** | = 0.999 538 91

The heliocentric position vector **E** of earth may be obtained using equation (2)

E = (−0.169 829 63, +0.888 665 59, +0.385 221 37) and | **E** | = 0.983 343 35

The unit vectors **p** and **e** in the direction of **P** and **E** respectively are as follows :

p = (−0.374 218 45, −0.312 282 24, −0.873 178 31)

e = (−0.172 706 34, +0.903 718 52, +0.391 746 55)

The scalar product **p. e** = −0.559 649 93 and $2\mu/c^2 = 1.974 \text{ X } 10^{-8}$ a. u. The second term in the equation (3) represents the correction for the light deflection in the natural frame, and is given by the following vector :

$(2\mu/c^2\,\mathbf{E})(\mathbf{e} - (\mathbf{p}.\mathbf{e})\,\mathbf{p})/(1+\mathbf{p}.\mathbf{e}) = (-0.000\,000\,017,\ +0.000\,000\,032,\ -0.000\,000\,004)$

EXPLANATION

Addition of the above correction to the unit vector **p** gives geocentric direction $\mathbf{p_1}$ of the star :

$\mathbf{p_1}$ = (– 0.374 218 462, – 0.312 282 210, – 0.873 178 313)

The velocity vector **V** = 0.000 100 994 $\dot{\mathbf{E}}_{\mathbf{B}}$ and $\beta^{-1} = (1 - V^2)^{1/2}$ are as follows:

V = (– 0.000 099 469, – 0.000 016 042, – 0.000 006 952)

β^{-1} = 0.999 999 995

The scalar product $\mathbf{p_1}.\mathbf{V}$ = + 0.000 048 303

Now substituting quantities computed above in the equation (4), the proper direction is obtained as:

$\mathbf{p_2}$ = (– 0.374 299 852, – 0.312 283 160, – 0.873 143 085)

The precession and nutation matrix (**M**) from page 257 is as follows:

$$\mathbf{M} = \begin{bmatrix} +0.999\,977\,994 & -0.006\,084\,620 & -0.002\,643\,514 \\ +0.006\,084\,529 & +0.999\,981\,488 & -0.000\,041\,136 \\ +0.002\,643\,715 & +0.000\,025\,051 & +0.999\,996\,505 \end{bmatrix}$$

Finally the apparent geocentric direction $\mathbf{p_3}$ is obtained by multiplying the proper direction $\mathbf{p_2}$ to the precession and nutation matrix as given by the equation (5).

Thus $\mathbf{p_3}$ = (– 0.370 083 326, – 0.314 518 900, – 0.874 137 399) and the apparent right ascension and declination:

$\alpha = \tan^{-1}(\eta/\xi) = 14^{h}\ 41^{m}\ 26^{s}.369$; $\delta = \tan^{-1}(\zeta/\beta) = -60^{\circ}\ 56''\ 34'.98$

EXPLANATION

PART III - Tables of Sunrise, Sunset, Twilight and Moonrise, Moonset

The times of Sunrise, Sunset and Twilight, which can be obtained immediately from the given tables by simple interpolation for the desired latitude within the scope of the tables, are in local mean time of the place. Strictly speaking, the timings of these events are for places on the meridian of Greenwich. By simple interpolation for longitude, the correct time (L.M.T.) for the station can be obtained, which can thereafter be reduced to the zonal standard time by applying correction of time pertinent to the place.

At the given times of Sunrise and Sunset, the upper limb of the Sun is on the horizon; the true zenith distance of the Sun's center is then taken as 90° 50′, allowing 16′ for semi- diameter and 34′ for horizontal refraction.

The timings of the beginning of morning twilight and ending of evening twilight relate to the instants when the center of the Sun is 18° below the horizon. This is now known as astronomical twilight. The period of twilight has been divided into three parts – Civil when the Sun is 6° below the horizon, Nautical when 12° and Astronomical when 18° and their duration have been given.

The timings of rising and setting in U.T. of a body with right ascension α, declination δ and zenith distance z at latitude ϕ and east longitude λ may be computed from

$$UT = 0.99727\,[\alpha - \lambda \pm \cos^{-1}\{(\cos z - \sin\phi \sin\delta)/(\cos\phi \cos\delta)\} - \text{GAST at } 0^h\,UT],$$

where each term is expressed in time measure and GAST at 0^h UT as tabulated on page 13. The negative sign in the expression corresponds to rising and positive sign to setting. If the quantity $\{(\cos z - \sin\phi \sin\delta)/(\cos\phi \cos\delta)$ is numerically greater than one, there is no phenomenon. However, the tabulated timings of Moonrise and Moonset have been computed by inverse by interpolation for the zenith distance at $z = 90° 34'.001 - 0.72755\,\pi$, where π is the horizontal parallax of the Moon at the time of phenomena. The above value includes semi- diameter and the effect of refraction.

The Sunrise and Sunset times for certain stations in India (Kolkata, Varanasi, Chennai, Delhi, Mumbai) have been separately computed and given in Indian Standard Time. In these calculations the amount of horizontal refraction has been taken as 31′, the value derived from consideration of the atmospheric conditions in India, and consequently the zenith distance of the Sun's center is 90° 47′ at the times given. In the section on Indian Calendar, the Sunrise and Sunset times which have been given for latitude 23° 11′ North and Central Meridian of India, also relates to the times when upper limb of the Sun is on the horizon as in the general tables.

The Moonrise and Moonset times given for certain latitudes relate to the local mean time calculated for the Central Meridian of India. By simple interpolation with the help of a table given on page 313, the local mean time for any other latitude can easily be obtained. At the time given, the Moon's upper limb is on the horizon and so the true geocentric zenith distance of the Moon's center is 90° 34′ *plus* semi- diameter of the Moon *minus* the horizontal parallax, where 34′ has been allowed for horizontal refraction. Taking the mean values of the semi- diameter and the parallax, the zenith distance of the Moon at the moment is about 89° 52′, which varies from 89° 55′ to 89° 49′ as the parallax increases from 53′.6 to 61′.9.

The times of Moonrise and Moonset for certain stations in India (Kolkata, Chennai, Delhi and Mumbai) are separately calculated and given in I.S.T.

The times of Sunrise, Sunset and Moonrise, Moonset given are for an observer on the surface of the Earth considered to be a flat surface around that point without any obstruction in the directions of rising or setting. For an observer stationed at some elevation above the surface, the rising will be further accelerated and the setting retarded according to the height of the observer. The additional arc of depression to be considered on this account is $2'.10\sqrt{h}$ where h is the height of the observer in meters above the ground level. The dip of the sensible horizon is however $1'.77\ \sqrt{h}$. The effect of atmospheric refraction is included in the above results, without which both the terms would have got reduced to the same value of $1'.93\ \sqrt{h}$.

EXPLANATION

The values of the arc of depression according to height of the observer are given below:

Height	Depression	Height	Depression	Height	Depression	Height	Depression
Meters	′	Meters	′	Meters	′	Meters	′
0	0.0	40	13.3	300	36	2000	94
2	3.0	50	14.8	400	42	3000	115
5	4.7	75	18.2	500	47	4000	133
10	6.6	100	21.0	750	58	5000	148
20	9.4	150	25.7	1000	66	6000	163
30	11.5	200	29.7	1500	81	7000	176
40	13.3	300	36.4	2000	94	8000	188

The correction to the rising and setting times due to the above height of the observer may be obtained by multiplying the arc of depression given in the table by the figures from the table below:

Latitude of Station

Decli. of Sun	0°	10°	20°	30°	35°	40°	45°	50°	52°	54°	56°	58°	60°
° ′	m	m	m	m	m	m	m	m	m	m	m	m	m
0	.067	.068	.071	.077	.082	.087	.094	.104	.108	.113	.119	.126	.133
5	.067	.068	.071	.077	.082	.088	.095	.105	.109	.115	.121	.127	.135
10	.068	.069	.072	.079	.083	.089	.097	.108	.113	.119	.126	.133	.142
15	.069	.070	.074	.081	.086	.093	.101	.113	.119	.127	.134	.144	.156
20	.071	.072	.076	.084	.090	.097	.108	.123	.130	.139	.151	.165	.183
23 27	.073	.074	.078	.087	.093	.102	.114	.132	.142	.155	.171	.192	.223

The deviation of the rising or the setting point on the horizon (i.e., amplitude) on account of the above arc of depression h (obtained after adding to it the normal depression at rising or setting) may be found as h tan ϕ sec A, deviation being towards the north in the northern hemisphere and south in the southern hemisphere. Here A, the amplitude of the rising of setting point measured from the east or west point of the horizon, is obtained from sin A – sinδ secϕ. The values of the amplitude for certain latitudes and declinations are given in a table on page 373.

PART IV — ECLIPSES AND OCCULTATIONS

Eclipses and Occultations have been calculated on the basis of the tabulated positions of the Sun and the Moon. The semi-diameters of the Sun and the Moon used in these calculations exclude irradiation. The Sun's tabular semi-diameter which includes irradiation is diminished by 1."55 for this purpose.

The semi-diameter of the Moon given by sin $s = k \sin \pi$, where π is the Moon's horizontal parallax is based on the adopted constant $k = 0.272\ 5076$ to account for the irregularities of the lunar limb. It corresponds to the mean radius of Watt's datum as determined by observations of occultations and to the adopted radius of the Earth, introduced in 1982 and is consistent with the IAU system of Astronomical constants (1976). It is used with effect from 1986 in this publication. Refraction is neglected in calculation of eclipses of both the Sun and the Moon.

EXPLANATION

The circumstances of the phenomena are given provisionally in Universal Time, using ΔT (A) = + $70^s.0$ and the points on the Earth's surface are also expressed in terms of geographic longitude measured positively to the east.

Lunar Eclipses

In the calculation of lunar eclipses, the semi-diameter of the shadow -cone has been increased by one-fiftieth to take account of the influence of the atmosphere in absorbing Sun's rays passing through it . In the calculation of rising and setting limits, the time when the centre of the Moon becomes visible on the horizon has been considered as rising or setting. Elsewhere in this book the upper limb visible on the horizon is taken as the criterion for rising or setting. The horizontal refraction used in these calculations of rising and setting is 31′.

The method of computation of a lunar eclipse is detailed below :

Let α, δ be the right ascension and declination of the Moon at an instant T_0 at or very near to the moment of opposition, and let α', δ' be the corresponding co-ordinates of the centre of the Earth's shadow (α'= R. A. of Sun + 12^h, δ' = Sun's declination). Let π, s be parallax and semi-diameter of the Moon and π', s' be parallax and semi-diameter of the Sun.

As the Earth is not a perfect sphere, its shadow will differ slightly from a cone. It would however, be sufficient for our purpose if we use a mean radius for the Earth, which is equivalent to submitting for π a parallax π_1, reduced to latitude 45°, so that $\pi_1 = 0.9983\ 33\ \pi$.

The radius of the shadow-cone at Moon's distance is $1.02\ (\pi_1 + \pi' - s')$ for umbra, and $1.02\ (\pi_1 + \pi' + s')$ for penumbra.

Let L be the angle between the centre of the Moon and that of the shadow-cone at the desired circumstance of the eclipse, so that

$L_1 = 1.02\ (\pi_1 + \pi' - s') + s$ . . . . . for first and last contacts

$L_2 = 1.02\ (\pi_1 + \pi' - s') - s$ . . . . . for second and third contacts

For the penumbral eclipse,

$L' = 1.02\ (\pi_1 + \pi' + s') + s$ . . . . . for first and last contacts

The Besselian elements x, y may be computed with sufficient accuracy with the following :

$x = (\alpha - \alpha') \cos \delta$ $\quad$ x' = hourly variation of $(\alpha - \alpha') \cos \delta$

$y = (\delta - \delta')$ $\quad$ y' = hourly variation of $(\delta - \delta')$

Let $m \sin M = x$, and $m \cos M = y$, so that $\tan M = x/y$, and $m^2 = x^2 + y^2$. The quantity m, taken always positive at all times, represents the angular distance between the centre of the Moon and of the shadow cone. The angle M may take any value from 0° to 360°.

Again, let $n \sin N = x'$, and $n \cos N = y'$, so that $n^2 = x'^2 + y'^2$, and $\tan N = x'/y'$. The angle N lies in the first or the second quadrant according as y' is positive or negative. The value of n is positive.

The time of greatest obscuration or middle of the eclipse is given by

$T_0 - 1/n \{ m \cos (M - N) \}$ or $T_0 - (x x' + y y')/n^2$ (hours)

EXPLANATION

The auxiliary angle ψ is given by :

$\sin \psi = \{ m \sin (M - N) \} / L = (x y' - y x') / nL$. The value of either L_1, L_2 or L' should be used or L according to the circumstances of the eclipse under consideration.

Then, time of the beginning or ending = time of middle + (1/n) ($L \cos \psi$).

The value of ψ should be so taken that cos ψ may be negative for the beginning and positive for the ending of the phase. In other words, when sin ψ is positive, i.e., when $(M - N)$ falls in the 1st or the 2nd quadrant, ψ would be in the second quadrant for the beginning and in the first quadrant for the ending; and when sin ψ is negative, i.e., when $(M - N)$ is in the 3rd or the 4th quadrant, ψ would be in the third quadrant for the beginning and fourth quadrant for the ending.

If greater accuracy is desired, the computations may be repeated using the times obtained above as initial times.

The magnitude of the eclipse, the Moon's diameter being unity, is $(L_1 - \Delta) / 2s$,

where $\Delta = m \sin (M - N)$ is taken positive. When the computations are repeated for greater accuracy, the average values of L_1, Δ and s for the first and last umbral contacts or those corresponding to the time of greatest obscurations should be used.

When Δ becomes less than L_2, the eclipse is a total one. The computations of the beginning and ending of the total phase may be done in the same way as above using the value of L_2.

The position angle of contact P on the Moon's limb, measured from the north point in the direction N.E.S.W. is $180^\circ + N + \psi$ for the first and last contacts both with umbra and penumbra as the case may be, and is $N + \psi$ for the second and third contacts in case of a total eclipse.

When M is calculated for the exact time of the phenomena, i.e., beginning or ending, then P may be obtained by considering $N + \psi = M$, i.e., $P = M + 180^\circ$ or $P = M$ as the case may be.

Solar Eclipses

Computation of the elements and circumstances of solar eclipses has been done following the method of Bessel. The geometric position of the shadow of the Moon relative to the Earth is described by the Besselian elements in a system of geocentric rectangular co-ordinates. In this system, the geocentric plane perpendicular to the axis of the shadow is taken as the *xy* plane and called the fundamental plane. The *x*-axis is the intersection of the fundamental plane with the plane of equator and is positive towards east. The *y*-axis is positive towards the north. The *z*-axis is parallel to the axis of the shadow and is positive towards the Moon. The tabular values of x and y are the co-ordinates of the axis of the shadow on the fundamental plane in units of the Earth's equatorial radius. The quantities d and μ specify the declination and hour angle of the point on the celestial sphere towards which the axis of the shadow is directed.

The elements l_1 and l_2 are the radii of the penumbral and umbral cones on the fundamental plane. The elements l_2 is regarded as positive for an annular eclipse and negative for a total eclipse. The elements f_1 and f_2 are the angles between the axis of the shadow and the generators of the penumbral and umbral cones respectively.

The Besselian elements x, y, sin d, cos d, μ, l_1 and l_2 are computed and tabulated at an interval of 10 minutes to facilitate the accurate computation of the circumstances of the eclipse. The given eclipse maps show the path of the eclipse, beginning and ending times of the eclipse, the area of visibility and rising and setting limits of the eclipse.

EXPLANATION

The method of computation of the local circumstances of the solar eclipse is given below :

The approximate time (U.T.) of the beginning and ending of a solar eclipse may be obtained from the corresponding eclipse map and used as estimated initial time. To obtain the geocentric rectangular co-ordinates, ξ, η, ζ of the observer located on the surface of the Earth in geographic longitude λ (measured east positive) and latitude ϕ in terms of the Besselian elements, we have;

$$\xi = \rho \cos \phi' \sin H$$

$$\eta = \rho \sin \phi' \cos d - \rho \cos \phi' \sin d \cos H$$

$$\zeta = \rho \sin \phi' \sin d + \rho \cos \phi' \cos d \cos H$$

and their variations per minute as :

$$\xi' = \mu' \rho \cos \phi' \cos H$$

$$\eta' = \mu' \xi \sin d - \zeta d'$$

where $H = \mu + \lambda$ and μ' is variation per minute in hour angle. In most of the cases, the variation ζ' is not needed and may be neglected. The values of $\rho \cos \phi'$ and $\rho \sin \phi'$ used above may be found for the observer's latitude ϕ using Table – XI.

The eclipse begins or ends at the station when $(x - \xi)^2 + (y - \eta)^2 = (l_1 - \zeta \tan f_1)^2$.

Now let $m \sin M = x - \xi$, $m \cos M = y - \eta$ so that $\tan M = (x - \xi)/(y - \eta)$ and $m^2 = (x - \xi)^2 + (y - \eta)^2$. The angle M may have any value from 0° to 360° and m is always positive.

Again let $n \sin N = x' - \xi'$, $n \cos N = y' - \eta'$ so that $\tan N = (x' - \xi')/(y' - \eta')$ and $n^2 = (x' - \xi')^2 + (y' - \eta')^2$. The angle N is in the first two quadrants and n is positive.

The radius of the shadow at a height ζ above the fundamental plane may be determined by $L_1 = l_1 - \zeta \tan f_1$ or $L_2 = l_2 - \zeta \tan f_2$ as the case may be.

Now the required time of the event will be obtained by applying a correction τ to the adopted initial time concerned, given by

$$\tau = -\{m \cos (M - N)\}/n + (L \cos \psi)/n \text{ (in minutes)}, \quad \text{where } \sin \psi = \{m \sin (M - N)\}/L$$

The value of ψ for which $\cos \psi$ is negative should be taken for the beginning of the eclipse for the beginning of the annular phase or the end of the total phase, and the value of ψ for which $\cos \psi$ is positive is to be taken for the end of the eclipse, for the end of the annular phase or the beginning of the total phase. When $M - N$ falls within 0º to 180º, ψ is in the 2nd or the 1st quadrant according to the required phase of the eclipse, for the other half it is in the 3rd or the 4th quadrant according to the phase.

If the correction τ obtained above exceeds 3 or 4 minutes and greater accuracy is desired, the computation should be repeated using the new times now obtained as initial times.

For finding the time of greatest phase , the calculations should be started adopting a new assumed time midway between the beginning and ending times. The correction to this adopted time is given by:

$$\tau = -\{m \cos (M - N)\}/n \text{ (in minutes).}$$

EXPLANATION

The magnitude of greatest partial eclipse is the fraction of the Sun's diameter obscured by the Moon at the time of greatest phase, and is given by : $M_1 = (L_1 - \Delta) / (2 L_1 - 0.5459)$ where Δ, the minimum distance between the centres of the two bodies, is given by $m \sin (M - N)$ and is to be taken positive.

The magnitude of the central phase, in the same units, is $M_2 = (0.5459) / (2 L_1 - 0.5459)$.

The position angle of the point of contact measured from the north point of the Sun in the direction N. E. S. W. (i.e. clockwise direction) may be obtained from $P = N + \psi$ or if, measured from the vertex, from $V = P - C$ where C, the parallactic angle, is given by $\tan C = (\xi / \eta)$.

Occultations

The occultations of visible planets and certain bright stars (*Aldebaran , Regulas, Spica and Antares)* by the Moon are given whenever they occur, together with the time, area of visibility and the Besselian elements. The area of visibility includes also the regions from which the occultations is visible even during day light hours. The two times given in the first table for the occultations are the times of first and last contact of the shadow cylinder with the Earth and as such the occultation may be expected to be visible only within the period between these times.

The elements are similar to those for solar eclipses and are given for T_0, the instant of conjunction in R.A. when x = 0. The common geocentric hour angle of the bodies, or more precisely of the line passing through the center of the Earth parallel to the line joining the center of the two bodies for the Greenwich meridians is H_0 and its hourly variation is about $60^m.16$ or $15^o.04$. Y is the value of y for the instant of conjunction and x', y' are the hourly variations of x and y. For a place where an occultation is visible, the times of immersion and emersion can be computed with the help of these elements by a method similar to that used in computing the local circumstances of a solar eclipse as explained below:

Let φ and λ be respectively the latitude and longitude of the place. The longitude of place is to be taken in hours and minutes and as usual measured positively towards east of Greenwich.

For night visibility of an occultation, the necessary conditions are as follows:

(1) The Sun must not be much more than an hour above the horizon at the local mean time $T_0 + \lambda$ (and it must be below the horizon at time $T_0 + \lambda + t$).

(2) The Moon must be above the horizon by an appreciable amount, i.e., the quantity $H_0 + \lambda$, taken without regard to sign for this purpose, must be less than the semidiurnal are of the star of planet by at least one hour.

For prediction of an occultation, find the approximate time (U.T.) of local apparent connection by applying to the given T_0 a correction t (in hours) taken from the following table*:

$H_0 + \lambda$

	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
φ	0-00	0-30	1-00	1-30	2-00	2-30	3-00	3-30	4-00	4-30	5-00	5-30	6-00
	h	h	h	h	h	h	h	h	h	h	h	h	h
0°	0.00	0.41	0.77	1.08	1.32	1.50	1.62	1.69	1.72	1.73	1.71	1.65	1.58
10°	0.00	0.40	0.75	1.06	1.29	1.47	1.59	1.66	1.70	1.70	1.69	1.63	1.56
20°	0.00	0.37	0.70	0.99	1.21	1.38	1.51	1.58	1.62	1.63	1.61	1.56	1.50
30°	0.00	0.32	0.62	0.87	1.08	1.24	1.36	1.44	1.49	1.50	1.50	1.45	1.40
40°	0.00	0.26	0.51	0.73	0.92	1.07	1.18	1.26	1.30	1.32	1.32	1.30	1.26
50°	0.00	0.20	0.40	0.58	0.73	0.86	0.96	1.03	1.08	1.11	1.11	1.10	1.07
60°	0.00	0.15	0.29	0.42	0.53	0.63	0.72	0.78	0.83	0.85	0.87	0.86	0.85

*The value of t has the same sign as that of sin ($H_0 + \lambda$).

The Besselian elements x and y at the time of local conjunctions $T_0 + t$ may be calculated as follows :

$x = x' t$, and $y = Y + y' t$.

EXPLANATION

Occultations for which y - η for the time local conjunction is not within ± 0.35 will not be visible at the place. In order to decide this, an estimated value of η may be used as an approximation for which the following tables are given indicating the minimum and maximum values of η.

Limiting value of η (when on meridian i.e., when $H_0 + \lambda = 0$)

φ - d	0°	10°	20°	30°	40°	50°	60°
η	0.00	0.17	0.34	0.50	0.64	0.76	0.86

The values of η has the same sign as that of φ - d.

(* The table has been constructed taking $x' = 0.5773$; for other values of x' the figures will vary inversely. For this purpose the figures of the table may be multiplied by 1.15 for $x' = 0.50$, by 1.05 for $x' = 0.55$, by 0.95 or $x' = 0.60$ and by 0.89 for $x' = 0.65$)

Limiting value of η (when rising or setting i.e. when $H_0 + \lambda + t$ = S.D. arc)

	Latitude (φ)						
d	0°	10°	20°	30°	40°	50°	60°
0°	0.00	0.17	0.34	0.50	0.64	0.76	0.86
± 9	0.00	0.17	0.34	0.50	0.65	0.77	0.87
± 18	0.00	0.18	0.36	0.52	0.67	0.80	0.91
± 27	0.00	0.19	0.38	0.56	0.72	0.86	0.97

The value of η has the same sign that of φ

For the instant $T_0 + t$, compute the following quantities in addition to x and y :

Let H = (H + λ) + $a\,t$ (converted into arc). The value of a has been given for planets under elements; it is 1.027 for stars. The observer's position on the fundamental plane is given by:

$$\xi = \rho \cos \varphi' \sin H \text{ and } \eta = \rho \sin \varphi' \cos d - \rho \cos \varphi' \sin d \cos H$$

and the hourly variations ;

$$\xi' = 0.2618\, a\, \rho \cos \varphi' \cos H, \quad \eta' = 0.2618\, a\, \xi \sin d.$$

The value of the co-efficient 0.2618 a is 0.2625 for stars.

Let $u = x - \xi$, $v = y - \eta$, $u' = x' - \xi'$, $v' = y' - \eta'$ so that $n^2 = u'^2 + v'^2$.

Now $\sin \psi = (uv' - vu') / nl$, where l = 0.2725, for stars, and for planets, it will be found under elements.

The correction τ to the time of immersion and emersion is given by :

$$\tau = -(60/n^2)(uu' + vv') \mp (60\, l / n) \cos \psi$$

The negative sign in the second term is to be taken for immersion or the first contact and the positive sign for emersion or the last contact.

Instant of immersion or emersion = $T_0 + t + \tau$.

If greater accuracy is desired, a second set of calculations may be done in the following way using the new times now obtained as initial times. For the revised time of immersion or emersion T , compute H = (H + λ + at) + $a\tau$, x, y, ξ , η, ξ', η' ; u, v, u', v' and D = $uu' + vv'$. The second correction t′ is given by : $t' = (30/D)\times [l^2 - (u^2 + v^2)]$ in mins. of time.

The final time of immersion or emersion = $T + t'$.

The angles of contact on the Moon's limb:

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$P = M + 180°$, where $\tan M = (u + u't') / (v + v't')$,

$V = P - C$, where $\tan C = (\xi + \xi' t') / (\eta + \eta' t')$,

where t′ is to be taken in hours.

PART V – Miscellaneous Tables

Phenomena

The stellar magnitudes of planets together with their elongations from the Sun have been given under 'phenomena' at suitable intervals of days. The computation in the next portion of the phenomena has been based on longitude and that in the Astronomical Diary mainly on right ascension, with the exception that the conjunctions, squares and oppositions of planets with the Sun included in the latter have been calculated on the basis of longitudes. In the case of conjunctions in right ascension, the differences in declination between the planets or the Moon and the planet have also been given. The dates of heliacal visibility of planets (Mercury to Saturn) have also been given and these are based on the method given on page 471.

Interpolation

Interpolation Coefficients have been given on pages 359 to 362 according to the formula of both Bessel and Everett, for each hundredth part of the time-interval.

Let the tabular value of a function given at equal intervals be represented by f and the first and second differences by Δ with relevant dashes and subscripts as shown below. It is required to determine the value of the function at some intermediate point.

Function	First difference	Second difference
f_{-1}		
	$\Delta'_{-½}$	
f_0		Δ''_0
	$\Delta'_{½}$	
f_1		Δ''_1
	$\Delta'_{1½}$	
f_2		

The epochs for which the values of the function are to be taken should be so chosen that the time for which the value of the function is required may fall within the interval f_0 and f_2 and let n be the time interval from f_0 up to the moment for which the value of the function is required. It is expressed as a fraction of the interval at which the given values of the function are tabulated. Let f_n be the value of the function for the desired time which is now required to be determined.

The two formulae for interpolation which are generally used for the purpose are as follows :

$f_n = f_0 + n\,\Delta'_{½} + B''(\Delta''_0 + \Delta''_1)$……Bessel

$f_n = f_0 + n\,\Delta'_{½} + E_0''\Delta''_0 + E_1''\Delta''_1$……Everett

in which $f_0 + n\Delta'_{½}$ may be replaced by $(1-n)f_0 + nf_1$, if necessary, and where

$$B'' = n(n-1)/4,\quad E_0'' = -n(n-1)(n-2)/6 \text{ and } E_1'' = n(n+1)(n-1)/6$$

It will be noted that in Bessel's formula the value of $\Delta''_0 + \Delta''_1$ is the same as $\Delta'_{1½} - \Delta'_{-½}$. The value of the coefficients B'', E_0" and E_1", all of which are negative within the range f_0 to f_1 , will be obtained from the table on page 359 to 362 for the given value of n.

EXPLANATION

Bessel's method of interpolation is more simple, but greater accuracy is yielded by Everett's formula on account of the fact that it includes the effect of third differences also.

The more complete formula of Bessel is as follows :

$$f_n = f_0 + n\Delta'_{½} + \{n(n-1)(\Delta''_0 + \Delta''_1)\}/4 + \{n(n-1)(n-½)\Delta'''_{½}\}/6 + \cdots\cdots$$

The rate of variation of the function at a point, i.e., the instantaneous motion per unit of time interval may be obtained by the following formula :

$$\text{Motion} = \Delta'_{½} + C\Delta_0'' + D\Delta_1'', \qquad \text{where } C = -(3n^2 - 6n + 2)/6 \text{ and } D = (3n^2 - 1)/6$$

When $n = 0$, the motion $f_0' = \{(\Delta'_{-½} + \Delta'_{½})/2\} - (\Delta_1'' - \Delta_0'')/6$,

when $n = ½$, $f'_{½} = \Delta'_{½} - \{(\Delta_1'' - \Delta_0'')/24\}$ and when $n = 1$, $f_1' = \{(\Delta'_{½} + \Delta'_{1½})/2\} - (\Delta_1'' - \Delta_0'')/6$

The stationary point (i.e., when $f' = 0$) occurs when $n = ½ - (\Delta'_{½}/\Delta''_1)$ or $½ - (\Delta'_{-½}/\Delta''_0)$.

Geocentric Co-ordinates and other Constants

The tables given on pages 367 and 368 are for computing the geocentric co-ordinates of a place for which the geodetic, i.e., geographic or common latitude φ is known. From the first table, the values of ρ sin φ′ and ρ cos φ′ can be directly obtained, while the second table gives the values of the geocentric latitude φ′ and the radius of the Earth ρ separately

The constants used for these tables and the others given below are the 1976 I.A.U. System of astronomical constants introduced in this publication with effect from the 1985 issue.

Equatorial radius (a) = 637 8140 m = 3963.20 miles.
Polar radius (b) = 635 6755 m = 3949.91 miles.
Flattening of the Earth (f) = (a-b)/a = 1/298.257 = 0.003 353 64.
Ellipticity or eccentricity (e) = 0.081 8192, e^2 = 0.006 694 39.

The following expressions are obtained from the above values of flattening and radius of the Earth.

$S = 0.994\,9743 - 0.001\,6708 \cos 2\varphi + 0.000\,0021 \cos 4\varphi$

$C = 1.001\,6799 - 0.001\,6820 \cos 2\varphi + 0.000\,0021 \cos 4\varphi$

$\rho = 0.998\,3271 + 0.001\,6764 \cos 2\varphi - 0.000\,0035 \cos 4\varphi$

$\varphi' = \varphi - 11' 32''.726 \sin 2\varphi + 1''.163 \sin 4\varphi - 0''.003 \sin 6\varphi$

One degree of longitude (in km.) = $111.4133 \cos \varphi - 0.0935 \cos 3\varphi$

One degree of latitude (in km.) = $111.1334 - 0.5598 \cos 2\varphi + 0.0012 \cos 4\varphi$

g (cm/sec²) = $978.031 + 5.1859 \sin^2 \varphi - 0.0057 \sin^2 2\varphi - 0.000\,308H$. where H is the elevation in meters above sea level.

Period of Earth satellite of negligible mass = 84.489 09 $d^{3/2}$ mins., where d is the mean distance of the satellite from the Earth's center measured in units of 6378140 m (Earth's equatorial radius).

Invariable plane of the solar system; $\Omega = 106°35' 01'' + 3452''T$, $I = 1° 34' 59'' - 18''T$

Pole of galactic plane (1950); $\alpha = 12^h\ 49^m.0$, $\delta = +27° 24'$

Solar apex (1950).. $\alpha = 18^h\ 06^m$, $\delta = +30°$

Solar motion = 20.0 km. or 12.4 miles per sec.

Speed of the Earth moving around the Sun = 29.79 km. or 18.51 miles per sec.

EXPLANATION

Heliacal Rising and Setting of Planets

The planets Mercury to Saturn (as well as the Moon) remain invisible to the naked eyes for some days at the time of conjunction with the Sun. This phenomenon of planet's invisibility due to its proximity to the Sun is known as combust or heliacal setting of the planets, and it plays an important part in Indian Calendar. The dates of heliacal setting and rising of the planets marking the period or invisibility have been calculated assuming that the phenomenon occurs when, at the given station, the Sun attains a Zenith distance of $90°+h$ at the time when the zenith distance of the planet is 90°. The values of h for different planets adopted for the purpose are as follows :

Mercury 10° (Direct) and 11° (Retrograde)
Venus 6°, Mars 14,° Jupiter 8°.5 , and Saturn 12°

The day of the first visibility of the lunar crescent after a new-moon day has also been determined in a somewhat similar way on the basis of the following values of the limiting altitude of the Moon above the horizon corresponding to its azimuth difference from the Sun, when the zenith distance of the Sun is 90°.

Azimuth difference	0°	5°	10°	15°	20°
Altitude	10°.4	10°.0	9°.3	8°.0	6°.2

When the altitude of the Moon at sunset exceeds the above limit, the Moon is likely to be visible in that evening and when the excess is more than a degree, the Moon is sure to be visible. The beginning dates of the months of the Islamic Calendar have been determined on the basis of the above calculations and indicated on the date following that of the first visibility of the Moon.

In the above calculations, the atmospheric refraction and the horizontal parallax of the Moon are neglected.

The computations of heliacal rising and setting of planets and determination of the dates of first visibility of the Moon have been done for the central station of India.

ASTRONOMICAL CONSTANTS*

Units : The units meter (m), kilogram (kg.) and second (s) are the units of length, mass and time in the International System of Unit (SI).

The astronomical unit of time is a time interval of one (D) of 86400 seconds. An interval of 36525 days is one Julian century.

The astronomical unit of mass is the mass of the Sun (S).

The astronomical unit of length is that length (A) for which the Gaussian gravitational constant (k) takes the value of 0.01720209895 when the units of measurement are the astronomical unit of length, mass and time. The dimensions of k^2 are those of the constant of gravitational (G), i.e. $L^3M^{-1}T^{-2}$. The term "unit distance" is also used for the length A.

Defining Constants :

1. Gaussian gravitational constant $k = 0.017\ 202\ 098\ 95$
2. Speed of light $c = 299\ 792\ 458\ ms^{-1}$

EXPLANATION

Primary Constants :

3.	Light-time for unit distance	τ_A = 499.004 78384 s
4.	Equatorial radius for Earth	a_e = 637 8136.6 m
	[IUGG value	a_e = 637 8137 m]
5.	Dynamical form-factor for Earth	J_2 = 0.001 082 6359
6.	Geocentric gravitational constant	GE = 3.986 004 418 X 10^{14} m^3 s^{-2}
7.	Constant of Gravitation	G = 6.674 28 X 10^{-11} m^3 kg^{-1} s^{-2}
8.	Ratio of mass of Moon to that of Earth	μ = 0.012 300 0371
9.	General precession in longitude, per Julian century, at standard epoch J 2000.0	P = 5028".796195
10.	Obliquity of the ecliptic, at standard epoch J2000.0	ε = 23° 26' 21".406

Derived Constants

11.	Constant of nutation at standard epoch J2000.0	N = 9".2052 331
12.	Unit distance	$c\tau_A = A$ =1.495 978 707 x 10^{11}m
13.	Solar parallax	arc sin (a_e/A) = $\pi\odot$ = 8".794143
14.	Constant of aberration for standard Epoch J2000.0	k = 20".49551
15.	Flattening factor for the Earth	f = 0.003 352 82 = 1/298.25642
16.	Heliocentric gravitational constant	$A^3 k^2/D^2 = GS$ = 1.327 124 42099 x 10^{20} m^3 s^{-2}
17.	Ratio of mass of Sun to that of the Earth	$(GS)/(GE) = S/E$ = 332 946.0487
18.	Ratio of mass of Sun to that of Earth + Moon	(S/E)/(1+μ) = 328 900.5596
19.	Mass of the Sun	(GS)/G = S = 1.9884 x 10^{30} kg
20.	System of planetary masses : (Ratios of mass of Sun to those of the planets etc.)	

Mercury	6023600	Jupiter	1047.348644
Venus	408523.719	Saturn	3497.9018
Earth + Moon	328900.5596	Uranus	22902.98
Mars	3098703.59	Neptune	19412.26
		Pluto	136566000

Other quantities for use in the preparation of ephemerides :

It is recommended that the values given in the following list should normally be used in the preparation of new ephemerides.

21. Masses of minor planets in unit of the solar mass :

(1) Ceres	4.72 x 10^{-10}
(2) Pallas	1.03 x 10^{-10}
(3) Vesta	1.35 x 10^{-10}

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*See page 442 also for some of the constants actually used in preparation of the ephemerides reported in the publication.

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22. Masses of satellites in unit of the planet's mass :

Jupiter	Io	4.704×10^{-5}
	Europa	2.528×10^{-5}
	Ganymede	7.805×10^{-5}
	Callisto	5.667×10^{-5}
Saturn	Titan	2.366×10^{-4}
Neptune	Triton	2.089×10^{-4}

23. Equatorial radii in km.

Mercury	2439.7	Jupiter	71492	Pluto	1195
Venus	6051.8	Saturn	60268		
Earth	6378.1366	Uranus	25559	Moon	1737.4
Mars	3396.19	Neptune	24764	Sun	696000

24. Gravity fields of the planets.

	J_2	J_3	J_4
Earth	$+ 1.08263 \times 10^{-3}$	$- 2.54 \times 10^{-6}$	$- 1.61 \times 10^{-6}$
Mars	$+ 1.964 \times 10^{-3}$	$+ 36 \times 10^{-6}$	
Jupiter	$+ 14.75 \times 10^{-3}$		$- 580 \times 10^{-6}$
Saturn	$+ 16.45 \times 10^{-3}$		$- 1000 \times 10^{-6}$
Uranus	$+ 12 \times 10^{-3}$		
Neptune	$+ 4 \times 10^{-3}$		

25. Gravity field of the Moon.

$\gamma = (B-A)/C = 0.000\ 2278$
$\beta = (C-B)/B = 0.000\ 6313$
$C/MR^2 = 0".392$
$I = 5552".7 = 1^{\circ}\ 32'\ 32.7"$

$C_{20} = - 0.000\ 2027$	$C_{30} = - 0.000\ 006$	$C_{32} = + 0.000\ 0048$
$C_{22} = + 0.000\ 0223$	$C_{31} = + 0.000\ 029$	$S_{32} = + 0.000\ 0017$
	$S_{31} = + 0.000\ 004$	$C_{33} = + 0.000\ 0018$
		$S_{33} = - 0.000\ 001$

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