THE SUN

EPHEMERIS FOR THE SUN

Sundial Correction

The **Greenwich Transit** time in the table opposite may be used to calculate the sundial correction at the observer's position. For example, to find the correction at New York on 2025 Jul. 18, determine the following: At Greenwich the Sun transits at 12:06:05 on Jul. 16 and at 12:06:23 on Jul. 20. Thus, to the nearest min, on Jul. 18 at both Greenwich and New York, the Sun will transit at 12:06 local mean solar time (LMT), or 12:02 Eastern Standard Time (EST) since New York has a longitude correction of –4 min (see the 3rd paragraph on p. 201). Thus a 6-min correction must be added to the reading of a simple sundial to obtain LMT (compare with the horizontal position of the light dot marking Jul. XX on the analemma, on the bottom right of the facing page). An additional 4 min must be subtracted to obtain EST, and 1 hour must be added for Eastern Daylight Time (EDT). Thus solar noon will occur at 1:02 PM EDT.

Even with these corrections, a sundial may still read incorrectly. For the horizontal sundial, the *gnomon* (vertical part) must be aligned to true north with the *dial* (horizontal part) level. The angle of the gnomon and the hour angles on the dial must be appropriate for the latitude. Beware of "consumer" sundials with poorly marked hour angles and crooked styles. (The *style* is the edge of the gnomon that casts the shadow.) Thick gnomons should taper to an edge, otherwise they have two styles, neither casting a shadow in the right place. The 6 a.m. and 6 p.m. hour angles should form a straight line perpendicular to the gnomon, meeting where the style meets the dial.

Orientation of the Sun

The table on the next page gives three angles that specify the orientation of the Sun.

P is the position angle of the axis of rotation, measured eastward in the observer's sky from the north point on the disk (i.e. counterclockwise). Note that P varies between +26° (solar north pole tilted eastward) and –26° (tilted westward) during the year. This tilt is associated mainly with the inclination of the ecliptic in the observer's sky, with a smaller contribution from the Sun's 7.2° inclination to the ecliptic (the longitude of the ascending node of the solar equator on the ecliptic is 76°).

***B*$_0$** is the heliographic latitude of the centre of the disk, and is the result of the Sun's 7.2° inclination to the ecliptic. Note that positive values of B_0 correspond to the solar equator passing south of the centre of the disk, with the solar north pole being tipped toward the observer.

***L*$_0$** is the heliographic longitude of the centre of the disk measured from Carrington's solar prime meridian in the direction of rotation. L_0 decreases about 13° per day. The dates during the year when $L_0 = 0°$ are given in the table below. The rotation period of the Sun depends upon heliographic latitude. The synodic and sidereal periods of rotation at the solar equator are 27.2753 days and 25.38 days, respectively.

Commencement (UT) of Numbered Synodic Solar Rotations

No.*	Commences	No	Commences	No	Commences	No	Commences
2292	'24 Dec. 21.93	2296	Apr. 9.24	2300	Jul. 27.11	2304	Nov. 13.18
2293	Jan. 18.27	2297	May 6.49	2301	Aug. 23.34	2305	Dec. 10.49
2294	Feb. 14.61	2298	Jun. 2.70	2302	Sep. 19.60	2306	'26 Jan. 6.82
2295	Mar. 12.94	2299	Jun. 29.90	2303	Oct. 16.88	2307	Feb. 3.16

*Based on R.C. Carrington's Greenwich photoheliocentric series in which rotation No. 1 commenced 1853 Nov. 9.

EPHEMERIS FOR THE SUN, 2025

Date	Apparent RA (2025)	Dec	Greenwich Transit	Orientation		
0h UT	h m	° ′	UT	*P*	*B*0	*L*0
Jan 1	18 47.0	–23 00	12:03:26	1.9	–3.0	76.7
5	19 04.7	–22 36	12:05:17	0.0	–3.5	24.0
9	19 22.1	–22 06	12:07:01	–1.9	–3.9	331.3
13	19 39.5	–21 28	12:08:35	–3.8	–4.4	278.6
17	19 56.7	–20 44	12:09:59	–5.7	–4.8	226.0
21	20 13.7	–19 54	12:11:13	–7.5	–5.1	173.3
25	20 30.5	–18 57	12:12:14	–9.3	–5.5	120.6
29	20 47.0	–17 55	12:13:03	–11.0	–5.8	68.0
Feb 2	21 03.4	–16 48	12:13:39	–12.7	–6.1	15.3
6	21 19.3	–15 36	12:14:02	–14.2	–6.4	322.6
10	21 35.5	–14 20	12:14:11	–15.7	–6.6	270.0
14	21 51.2	–13 00	12:14:08	–17.1	–6.8	217.3
18	22 06.7	–11 37	12:13:54	–18.4	–7.0	164.6
22	22 22.1	–10 11	12:13:28	–19.7	–7.1	112.0
26	22 37.3	–8 42	12:12:53	–20.8	–7.2	59.3
Mar 2	22 52.3	–7 12	12:12:09	–21.8	–7.2	6.6
6	23 07.2	–5 39	12:11:17	–22.7	–7.3	313.9
10	23 22.0	–4 06	12:10:18	–23.6	–7.2	261.2
14	23 36.7	–2 31	12:09:14	–24.3	–7.2	208.5
18	23 51.3	–0 56	12:08:06	–24.9	–7.1	155.7
22	0 05.9	+0 38	12:06:55	–25.4	–7.0	103.0
26	0 20.5	+2 13	12:05:43	–25.8	–6.8	50.3
30	0 35.1	+3 47	12:04:31	–26.1	–6.7	357.5
Apr 3	0 49.6	+5 19	12:03:20	–26.2	–6.4	304.7
7	1 04.3	+6 51	12:02:11	–26.3	–6.2	252.0
11	1 18.9	+8 20	12:01:06	–26.2	–5.9	199.2
15	1 33.7	+9 47	12:00:04	–26.0	–5.6	146.4
19	1 48.5	+11 11	11:59:09	–25.7	–5.3	93.5
23	2 03.5	+12 33	11:58:20	–25.3	–4.9	40.7
27	2 18.6	+13 51	11:57:40	–24.7	–4.6	347.9
May 1	2 33.8	+15 05	11:57:07	–24.1	–4.2	295.0
5	2 49.2	+16 16	11:56:42	–23.3	–3.8	242.1
9	3 04.7	+17 22	11:56:27	–22.4	–3.3	189.2
13	3 20.4	+18 24	11:56:20	–21.4	–2.9	136.4
17	3 36.2	+19 20	11:56:22	–20.3	–2.4	83.4
21	3 52.1	+20 12	11:56:34	–19.1	–2.0	30.5
25	4 08.2	+20 57	11:56:54	–17.8	–1.5	337.6
29	4 24.5	+21 37	11:57:23	–16.4	–1.0	284.7
Jun 2	4 40.8	+22 12	11:57:58	–15.0	–0.6	231.8
6	4 57.3	+22 39	11:58:39	–13.4	–0.1	178.8
10	5 13.8	+23 01	11:59:25	–11.8	0.4	125.9
14	5 30.4	+23 16	12:00:14	–10.1	0.9	72.9
18	5 47.0	+23 24	12:01:06	–8.4	1.4	20.0
22	6 03.7	+23 26	12:01:58	–6.7	1.8	327.0
26	6 20.3	+23 21	12:02:50	–4.9	2.3	274.1
30	6 36.9	+23 10	12:03:40	–3.1	2.8	221.2
Jul 4	6 53.5	+22 52	12:04:25	–1.2	3.2	168.2
8	7 09.9	+22 28	12:05:05	0.6	3.6	115.3
12	7 26.2	+21 58	12:05:39	2.4	4.0	62.3
16	7 42.4	+21 21	12:06:05	4.2	4.4	9.4
20	7 58.5	+20 39	12:06:23	5.9	4.8	316.5
24	8 14.4	+19 51	12:06:33	7.6	5.2	263.6
28	8 30.2	+18 58	12:06:33	9.3	5.5	210.6
Aug 1	8 45.8	+18 00	12:06:24	10.9	5.8	157.7
5	9 01.3	+16 57	12:06:04	12.4	6.1	104.8
9	9 16.5	+15 50	12:05:35	13.9	6.3	51.9
13	9 31.7	+14 39	12:04:56	15.4	6.5	359.1
17	9 46.7	+13 24	12:04:09	16.7	6.7	306.2
21	10 01.5	+12 06	12:03:14	18.0	6.9	253.3
25	10 16.2	+10 44	12:02:11	19.2	7.0	200.5
29	10 30.9	+9 20	12:01:02	20.3	7.1	147.6

Date	Apparent RA (2025)	Dec	Greenwich Transit	Orientation		
0h UT	h m	° ′	UT	*P*	*B*0	*L*0
Sep 2	10 45.4	+7 54	11:59:47	21.3	7.2	94.8
6	10 59.8	+6 25	11:58:28	22.3	7.3	41.9
10	11 14.2	+4 55	11:57:05	23.1	7.3	349.1
14	11 28.6	+3 24	11:55:40	23.9	7.2	296.3
18	11 42.9	+1 51	11:54:14	24.5	7.2	243.5
22	11 57.3	+0 18	11:52:49	25.1	7.1	190.7
26	12 11.6	–1 16	11:51:26	25.6	6.9	137.9
30	12 26.1	–2 49	11:50:05	25.9	6.8	85.1
Oct 4	12 40.6	–4 22	11:48:48	26.1	6.6	32.3
8	12 55.1	–5 54	11:47:37	26.2	6.4	339.6
12	13 09.8	–7 25	11:46:33	26.2	6.1	286.8
16	13 24.7	–8 54	11:45:37	26.1	5.8	234.0
20	13 39.7	–10 21	11:44:50	25.9	5.5	181.3
24	13 54.8	–11 46	11:44:14	25.5	5.1	128.5
28	14 10.2	–13 08	11:43:49	25.1	4.8	75.8
Nov 1	14 25.7	–14 26	11:43:36	24.4	4.4	23.0
5	14 41.5	–15 41	11:43:35	23.7	4.0	330.3
9	14 57.5	–16 52	11:43:48	22.9	3.5	277.5
13	15 13.7	–17 58	11:44:14	21.9	3.1	224.8
17	15 30.1	–18 59	11:44:54	20.8	2.6	172.1
21	15 46.8	–19 55	11:45:48	19.5	2.1	119.3
25	16 03.7	–20 45	11:46:54	18.2	1.6	66.6
29	16 20.8	–21 29	11:48:13	16.8	1.1	13.9
Dec 3	16 38.0	–22 06	11:49:42	15.2	0.6	321.2
7	16 55.4	–22 36	11:51:20	13.6	0.1	268.5
11	17 13.0	–23 00	11:53:06	11.9	–0.4	215.7
15	17 30.6	–23 16	11:54:59	10.1	–0.9	163.0
19	17 48.3	–23 25	11:56:57	8.3	–1.4	110.3
23	18 06.1	–23 26	11:58:56	6.4	–1.9	57.7
27	18 23.9	–23 19	12:00:55	4.5	–2.4	5.0
31	18 41.6	–23 06	12:02:52	2.5	–2.9	312.3