ASTRONOMY 2020
Supplementary Information
MELBOURNE

Quasar Publishing
Version 1.0

This year for our thirtieth edition we have made some changes. As part of this we have removed some data from the yearbook.

To decide what could be taken out we reviewed how the people, who value our book, participate in the hobby and how has this evolved over the years. For the true beginners with little more than a sense of wonder and a thirst to know, we believe they are well catered for in Astronomy 2020. Telescope users have become polarised into two camps. There are those we call the pure observers who, with some knowledge, spend their money on the optics, taking a more low cost approach to their mounts. Then there are the people who ride the back of the technology revolution turning to computer controlled scopes, now much more affordable instruments, that can automatically slew to an object selected from its database.

Keeping this in mind, we had a hard look at the sea of numbers in Part II. Printed rise and set times for all the planets are not used by the beginner or pure observer and not needed by the techies. Besides, no one observes the planets (or anything) close to the horizon unless they have to. For this reason we believe the approximate times given in the Rise–Set charts in Part I should suffice. Often the transit times for the outer planets are more valuable, when the planet is high in the northern sky with minimal atmospheric turbulence. Using the same reasoning, the position tables of the Sun, Moon and planets are either not used or not necessary.

When we started these books in 1990 there was no internet (believe it or not!), so some of the information we supplied wasn't easily obtainable elsewhere. Today a lot is available either online, from computer programmes or through cheap (or free) astronomy/planetarium apps on mobile devices. The lunar occultation tables are no longer included as the Occult software (written by Australian David Herald) is readily available for download and it can tailor event times for your location. Nevertheless, if you still need this information it is now available here.

The data on the following pages (available for download from our web site) is supplementary to the yearbook ASTRONOMY 2020 that we published in October 2019. Note there is a separate PDF for each capital city in Australia.

www.quasarastronomy.com.au/downloads---2020.html

In the event you are reading this and don't know what the yearbook we are referring to is, have a look here.
www.quasarastronomy.com.au/order.html

GEOCENTRIC POSITION of the SUN

(0 hr UT, Epoch 2000.0)

	JANUARY		FEBRUARY		MARCH		APRIL		MAY		JUNE	
	RA	Dec.	RA	Dec	RA	Dec	RA	Dec	RA	Dec	RA	Dec
	hh mm.m	° '	hh mm.m	° '	hh mm.m	° '	hh mm.m	° '	hh mm.m	° '	hh mm.m	° '
1	18 42.4	-23 04.8	20 55.0	-17 23.1	22 48.4	-07 35.6	00 42.1	+04 31.9	02 33.6	+15 04.1	04 36.4	+22 02.9
2	18 46.8	-23 00.1	20 59.1	-17 06.2	22 52.1	-07 12.8	00 45.8	+04 55.0	02 37.4	+15 22.1	04 40.5	+22 10.8
3	18 51.2	-22 54.9	21 03.2	-16 49.0	22 55.8	-06 49.8	00 49.4	+05 18.0	02 41.2	+15 39.9	04 44.6	+22 18.4
4	18 55.6	-22 49.3	21 07.2	-16 31.5	22 59.6	-06 26.8	00 53.1	+05 40.9	02 45.1	+15 57.4	04 48.7	+22 25.6
5	19 00.0	-22 43.2	21 11.3	-16 13.7	23 03.3	-06 03.7	00 56.7	+06 03.8	02 48.9	+16 14.6	04 52.8	+22 32.4
6	19 04.4	-22 36.7	21 15.3	-15 55.6	23 07.0	-05 40.4	01 00.4	+06 26.5	02 52.8	+16 31.6	04 57.0	+22 38.8
7	19 08.8	-22 29.7	21 19.3	-15 37.3	23 10.7	-05 17.2	01 04.0	+06 49.1	02 56.6	+16 48.3	05 01.1	+22 44.8
8	19 13.2	-22 22.3	21 23.3	-15 18.7	23 14.4	-04 53.8	01 07.7	+07 11.6	03 00.5	+17 04.7	05 05.2	+22 50.4
9	19 17.5	-22 14.4	21 27.3	-14 59.8	23 18.1	-04 30.4	01 11.4	+07 33.9	03 04.4	+17 20.9	05 09.4	+22 55.6
10	19 21.9	-22 06.1	21 31.3	-14 40.7	23 21.8	-04 06.9	01 15.0	+07 56.2	03 08.3	+17 36.7	05 13.5	+23 00.4
11	19 26.3	-21 57.4	21 35.3	-14 21.3	23 25.5	-03 43.4	01 18.7	+08 18.3	03 12.2	+17 52.3	05 17.6	+23 04.8
12	19 30.6	-21 48.3	21 39.2	-14 01.7	23 29.1	-03 19.8	01 22.4	+08 40.3	03 16.1	+18 07.5	05 21.8	+23 08.7
13	19 34.9	-21 38.7	21 43.2	-13 41.9	23 32.8	-02 56.2	01 26.1	+09 02.1	03 20.1	+18 22.5	05 25.9	+23 12.3
14	19 39.3	-21 28.7	21 47.1	-13 21.8	23 36.5	-02 32.5	01 29.8	+09 23.8	03 24.0	+18 37.1	05 30.1	+23 15.5
15	19 43.6	-21 18.3	21 51.0	-13 01.5	23 40.2	-02 08.9	01 33.5	+09 45.3	03 28.0	+18 51.4	05 34.2	+23 18.3
16	19 47.9	-21 07.5	21 54.9	-12 41.0	23 43.8	-01 45.2	01 37.2	+10 06.7	03 31.9	+19 05.4	05 38.4	+23 20.6
17	19 52.2	-20 56.3	21 58.8	-12 20.3	23 47.5	-01 21.5	01 40.9	+10 27.9	03 35.9	+19 19.1	05 42.5	+23 22.6
18	19 56.4	-20 44.6	22 02.7	-11 59.4	23 51.1	-00 57.7	01 44.6	+10 48.9	03 39.9	+19 32.5	05 46.7	+23 24.1
19	20 00.7	-20 32.6	22 06.5	-11 38.3	23 54.8	-00 34.0	01 48.3	+11 09.7	03 43.8	+19 45.5	05 50.9	+23 25.2
20	20 05.0	-20 20.2	22 10.4	-11 17.1	23 58.4	-00 10.3	01 52.0	+11 30.4	03 47.8	+19 58.2	05 55.0	+23 25.9
21	20 09.2	-20 07.4	22 14.2	-10 55.6	00 02.1	+00 13.4	01 55.8	+11 50.9	03 51.8	+20 10.6	05 59.2	+23 26.2
22	20 13.4	-19 54.2	22 18.1	-10 34.0	00 05.7	+00 37.1	01 59.5	+12 11.2	03 55.8	+20 22.6	06 03.4	+23 26.1
23	20 17.7	-19 40.7	22 21.9	-10 12.2	00 09.4	+01 00.8	02 03.3	+12 31.3	03 59.9	+20 34.3	06 07.5	+23 25.5
24	20 21.9	-19 26.8	22 25.7	-09 50.2	00 13.0	+01 24.4	02 07.0	+12 51.1	04 03.9	+20 45.6	06 11.7	+23 24.6
25	20 26.1	-19 12.5	22 29.5	-09 28.1	00 16.6	+01 48.1	02 10.8	+13 10.8	04 07.9	+20 56.5	06 15.8	+23 23.2
26	20 30.2	-18 57.9	22 33.3	-09 05.9	00 20.3	+02 11.6	02 14.6	+13 30.3	04 12.0	+21 07.1	06 20.0	+23 21.4
27	20 34.4	-18 42.9	22 37.1	-08 43.5	00 23.9	+02 35.2	02 18.4	+13 49.5	04 16.0	+21 17.3	06 24.1	+23 19.3
28	20 38.6	-18 27.6	22 40.8	-08 21.0	00 27.6	+02 58.6	02 22.1	+14 08.5	04 20.1	+21 27.2	06 28.3	+23 16.7
29	20 42.7	-18 12.0	22 44.6	-07 58.4	00 31.2	+03 22.0	02 25.9	+14 27.3	04 24.2	+21 36.7	06 32.4	+23 13.6
30	20 46.8	-17 56.0			00 34.8	+03 45.4	02 29.8	+14 45.8	04 28.3	+21 45.8	06 36.6	+23 10.2
31	20 50.9	-17 39.7			00 38.5	+04 08.7			04 32.3	+21 54.5		

	JULY		AUGUST		SEPTEMBER		OCTOBER		NOVEMBER		DECEMBER	
1	06 40.7	+23 06.4	08 45.5	+18 01.3	10 41.4	+08 17.5	12 29.4	-03 10.3	14 25.4	-14 24.8	16 29.0	-21 47.5
2	06 44.8	+23 02.2	08 49.3	+17 46.1	10 45.0	+07 55.7	12 33.0	-03 33.5	14 29.4	-14 43.9	16 33.4	-21 56.6
3	06 49.0	+22 57.6	08 53.2	+17 30.6	10 48.7	+07 33.7	12 36.6	-03 56.7	14 33.3	-15 02.7	16 37.7	-22 05.3
4	06 53.1	+22 52.5	08 57.1	+17 14.8	10 52.3	+07 11.7	12 40.2	-04 19.9	14 37.2	-15 21.3	16 42.0	-22 13.6
5	06 57.2	+22 47.1	09 00.9	+16 58.7	10 55.9	+06 49.5	12 43.9	-04 43.0	14 41.2	-15 39.7	16 46.4	-22 21.5
6	07 01.3	+22 41.3	09 04.7	+16 42.3	10 59.5	+06 27.2	12 47.5	-05 06.0	14 45.2	-15 57.8	16 50.7	-22 28.9
7	07 05.4	+22 35.1	09 08.6	+16 25.7	11 03.1	+06 04.8	12 51.2	-05 29.0	14 49.2	-16 15.7	16 55.1	-22 35.9
8	07 09.5	+22 28.5	09 12.4	+16 08.8	11 06.7	+05 42.3	12 54.8	-05 51.9	14 53.2	-16 33.2	16 59.5	-22 42.4
9	07 13.6	+22 21.5	09 16.2	+15 51.7	11 10.3	+05 19.8	12 58.5	-06 14.8	14 57.2	-16 50.5	17 03.9	-22 48.6
10	07 17.7	+22 14.1	09 20.0	+15 34.3	11 13.9	+04 57.1	13 02.2	-06 37.5	15 01.2	-17 07.6	17 08.2	-22 54.2
11	07 21.8	+22 06.4	09 23.8	+15 16.6	11 17.5	+04 34.3	13 05.8	-07 00.2	15 05.3	-17 24.3	17 12.6	-22 59.4
12	07 25.9	+21 58.2	09 27.6	+14 58.7	11 21.1	+04 11.5	13 09.5	-07 22.8	15 09.3	-17 40.7	17 17.1	-23 04.2
13	07 29.9	+21 49.7	09 31.3	+14 40.6	11 24.7	+03 48.5	13 13.2	-07 45.3	15 13.4	-17 56.8	17 21.5	-23 08.5
14	07 34.0	+21 40.8	09 35.1	+14 22.2	11 28.3	+03 25.6	13 16.9	-08 07.6	15 17.5	-18 12.6	17 25.9	-23 12.3
15	07 38.0	+21 31.6	09 38.8	+14 03.6	11 31.8	+03 02.5	13 20.7	-08 29.9	15 21.6	-18 28.1	17 30.3	-23 15.7
16	07 42.1	+21 22.0	09 42.6	+13 44.8	11 35.4	+02 39.4	13 24.4	-08 52.1	15 25.7	-18 43.3	17 34.7	-23 18.6
17	07 46.1	+21 12.0	09 46.3	+13 25.7	11 39.0	+02 16.2	13 28.1	-09 14.1	15 29.8	-18 58.1	17 39.2	-23 21.0
18	07 50.1	+21 01.6	09 50.0	+13 06.5	11 42.6	+01 53.0	13 31.9	-09 36.0	15 34.0	-19 12.6	17 43.6	-23 23.0
19	07 54.1	+20 50.9	09 53.8	+12 47.0	11 46.2	+01 29.8	13 35.6	-09 57.7	15 38.1	-19 26.8	17 48.0	-23 24.5
20	07 58.2	+20 39.9	09 57.5	+12 27.3	11 49.8	+01 06.5	13 39.4	-10 19.3	15 42.3	-19 40.6	17 52.5	-23 25.5
21	08 02.2	+20 28.5	10 01.2	+12 07.4	11 53.4	+00 43.2	13 43.2	-10 40.8	15 46.5	-19 54.0	17 56.9	-23 26.1
22	08 06.1	+20 16.7	10 04.9	+11 47.4	11 57.0	+00 19.8	13 46.9	-11 02.1	15 50.7	-20 07.1	18 01.4	-23 26.2
23	08 10.1	+20 04.6	10 08.6	+11 27.1	12 00.5	-00 03.5	13 50.7	-11 23.2	15 54.9	-20 19.8	18 05.8	-23 25.8
24	08 14.1	+19 52.2	10 12.2	+11 06.7	12 04.1	-00 26.9	13 54.5	-11 44.2	15 59.1	-20 32.1	18 10.2	-23 25.0
25	08 18.0	+19 39.4	10 15.9	+10 46.1	12 07.7	-00 50.3	13 58.4	-12 04.9	16 03.4	-20 44.1	18 14.7	-23 23.6
26	08 22.0	+19 26.4	10 19.6	+10 25.3	12 11.3	-01 13.6	14 02.2	-12 25.5	16 07.6	-20 55.7	18 19.1	-23 21.8
27	08 25.9	+19 13.0	10 23.2	+10 04.4	12 14.9	-01 37.0	14 06.0	-12 45.9	16 11.9	-21 06.8	18 23.5	-23 19.6
28	08 29.9	+18 59.2	10 26.9	+09 43.3	12 18.5	-02 00.3	14 09.9	-13 06.1	16 16.1	-21 17.6	18 28.0	-23 16.9
29	08 33.8	+18 45.2	10 30.5	+09 22.1	12 22.1	-02 23.7	14 13.8	-13 26.1	16 20.4	-21 28.0	18 32.4	-23 13.7
30	08 37.7	+18 30.9	10 34.2	+09 00.7	12 25.8	-02 47.0	14 17.6	-13 45.9	16 24.7	-21 37.9	18 36.8	-23 10.0
31	08 41.6	+18 16.2	10 37.8	+08 39.1			14 21.5	-14 05.4			18 41.3	-23 05.9

GEOCENTRIC POSITION of the MOON

(0 hr UT, Epoch 2000.0)

	JANUARY		FEBRUARY		MARCH		APRIL		MAY		JUNE	
	RA	Dec.	RA	Dec	RA	Dec	RA	Dec	RA	Dec	RA	Dec
	hh mm.m	° '	hh mm.m	° '	hh mm.m	° '	hh mm.m	° '	hh mm.m	° '	hh mm.m	° '
1	23 15.7	-10 04.9	01 56.6	+06 46.5	03 13.9	+14 13.4	06 27.4	+23 37.5	09 04.4	+20 22.1	12 27.9	+02 40.0
2	00 00.0	-05 39.9	02 41.8	+11 10.9	04 02.4	+17 50.3	07 24.8	+23 29.6	10 00.8	+16 43.7	13 20.9	-03 14.0
3	00 43.6	-01 03.0	03 29.3	+15 13.3	04 53.8	+20 44.1	08 23.3	+22 00.0	10 56.2	+12 02.6	14 14.9	-09 00.5
4	01 27.4	+03 37.9	04 19.7	+18 41.7	05 48.4	+22 41.2	09 21.9	+19 08.2	11 50.9	+06 33.8	15 10.8	-14 17.5
5	02 12.2	+08 14.3	05 13.5	+21 21.6	06 45.9	+23 27.7	10 19.9	+15 01.0	12 45.4	+00 36.4	16 08.8	-18 42.6
6	02 58.9	+12 36.6	06 10.9	+22 57.1	07 45.6	+22 52.3	11 17.0	+09 52.2	13 40.4	-05 27.3	17 08.8	-21 55.9
7	03 48.4	+16 32.8	07 11.0	+23 13.3	08 46.2	+20 49.4	12 13.3	+04 01.5	14 36.7	-11 12.9	18 09.6	-23 43.8
8	04 41.2	+19 48.4	08 12.5	+22 00.9	09 46.5	+17 21.9	13 09.3	-02 06.9	15 34.6	-16 15.6	19 09.8	-24 02.0
9	05 37.5	+22 06.7	09 14.0	+19 19.3	10 45.6	+12 42.2	14 05.6	-08 07.1	16 34.0	-20 13.3	20 07.9	-22 55.6
10	06 36.8	+23 11.7	10 14.1	+15 18.9	11 43.2	+07 10.3	15 02.7	-13 33.5	17 34.5	-22 50.0	21 02.9	-20 37.3
11	07 37.9	+22 51.3	11 12.0	+10 18.5	12 39.5	+01 11.1	16 00.8	-18 03.9	18 34.7	-23 58.3	21 54.4	-17 22.6
12	08 39.2	+21 02.1	12 08.0	+04 41.5	13 35.1	-04 49.5	16 59.7	-21 21.6	19 33.2	-23 40.2	22 42.8	-13 26.7
13	09 39.1	+17 50.8	13 02.3	-01 07.9	14 30.6	-10 27.0	17 58.6	-23 17.3	20 29.0	-22 05.5	23 28.6	-09 02.9
14	10 36.8	+13 32.8	13 55.9	-06 47.5	15 26.5	-15 20.4	18 56.5	-23 49.5	21 21.6	-19 27.6	00 12.8	-04 22.1
15	11 32.1	+08 28.0	14 49.5	-11 57.8	16 23.0	-19 13.5	19 52.5	-23 03.5	22 11.1	-16 00.8	00 56.1	+00 26.6
16	12 25.5	+02 57.6	15 43.6	-16 22.9	17 19.9	-21 55.2	20 45.9	-21 09.2	22 57.8	-11 58.2	01 39.4	+05 14.5
17	13 17.8	-02 38.4	16 38.5	-19 49.7	18 16.7	-23 20.0	21 36.5	-18 18.6	23 42.5	-07 31.0	02 23.8	+09 53.1
18	14 09.8	-08 01.8	17 34.1	-22 08.9	19 12.5	-23 28.1	22 24.4	-14 43.9	00 26.1	-02 48.7	03 10.0	+14 12.4
19	15 02.4	-12 56.1	18 29.9	-23 14.9	20 06.7	-22 24.3	23 10.1	-10 36.4	01 09.3	+01 59.7	03 58.7	+18 00.8
20	15 56.0	-17 06.2	19 25.1	-23 07.2	20 58.7	-20 17.3	23 54.3	-06 06.4	01 52.9	+06 45.4	04 50.2	+21 04.8
21	16 51.0	-20 18.9	20 18.9	-21 49.9	21 48.3	-17 17.4	00 37.7	-01 23.3	02 37.9	+11 18.8	05 44.7	+23 10.3
22	17 47.1	-22 23.5	21 10.6	-19 31.1	22 35.6	-13 35.9	01 21.1	+03 23.6	03 24.8	+15 29.0	06 41.5	+24 04.3
23	18 43.4	-23 14.0	22 00.0	-16 21.4	23 21.1	-09 23.8	02 05.0	+08 04.8	04 14.1	+19 03.7	07 39.6	+23 38.2
24	19 39.1	-22 49.7	22 47.2	-12 32.6	00 05.2	-04 51.5	02 50.3	+12 30.2	05 06.2	+21 49.4	08 37.6	+21 49.9
25	20 33.1	-21 16.0	23 32.5	-08 16.0	00 48.6	-00 08.9	03 37.6	+16 28.6	06 00.8	+23 33.3	09 34.6	+18 45.0
26	21 24.7	-18 42.6	00 16.5	-03 42.4	01 32.0	+04 34.4	04 27.2	+19 48.1	06 57.2	+24 04.5	10 29.7	+14 35.2
27	22 13.8	-15 21.4	00 59.9	+00 58.4	02 16.2	+09 09.0	05 19.3	+22 16.3	07 54.4	+23 17.1	11 23.2	+09 35.8
28	23 00.6	-11 24.8	01 43.4	+05 37.4	03 01.7	+13 24.9	06 13.9	+23 41.2	08 51.4	+21 10.8	12 15.4	+04 04.1
29	23 45.5	-07 04.2	02 27.8	+10 05.5	03 49.2	+17 11.4	07 10.1	+23 53.3	09 47.3	+17 51.6	13 07.3	-01 42.1
30	00 29.3	-02 29.6			04 39.3	+20 17.2	08 07.3	+22 47.1	10 41.8	+13 30.3	13 59.6	-07 24.5
31	01 12.7	+02 10.1			05 32.1	+22 29.9			11 35.2	+08 20.9		

	JULY		AUGUST		SEPTEMBER		OCTOBER		NOVEMBER		DECEMBER	
1	14 53.4	-12 43.9	18 28.3	-24 00.6	21 54.1	-17 18.8	00 01.8	-05 14.6	02 45.6	+12 43.1	04 57.9	+22 18.2
2	15 49.2	-17 20.6	19 26.7	-23 51.1	22 42.7	-13 17.1	00 45.3	-00 19.1	03 31.8	+16 48.1	05 50.7	+24 11.0
3	16 47.1	-20 55.7	20 23.5	-22 22.0	23 29.0	-08 45.8	01 28.6	+04 35.7	04 20.2	+20 14.3	06 45.4	+24 54.3
4	17 46.7	-23 13.6	21 17.7	-19 44.1	00 13.6	-03 57.6	02 12.3	+09 19.8	05 10.9	+22 50.0	07 40.9	+24 21.8
5	18 46.8	-24 05.1	22 08.8	-16 12.1	00 57.2	+00 56.7	02 57.2	+13 43.6	06 03.8	+24 24.7	08 36.2	+22 32.7
6	19 45.7	-23 30.1	22 57.0	-12 01.1	01 40.5	+05 47.0	03 43.7	+17 36.9	06 58.3	+24 49.3	09 30.6	+19 31.4
7	20 42.3	-21 36.9	23 42.9	-07 25.1	02 24.5	+10 24.0	04 32.5	+20 49.1	07 53.7	+23 58.5	10 23.8	+15 26.4
8	21 35.7	-18 39.5	00 27.1	-02 36.1	03 09.8	+14 38.6	05 23.8	+23 09.2	08 49.1	+21 51.0	11 15.8	+10 29.3
9	22 25.8	-14 54.0	01 10.5	+02 15.7	03 57.1	+18 20.9	06 17.4	+24 26.3	09 43.9	+18 30.6	12 07.2	+04 54.1
10	23 12.9	-10 35.3	01 54.0	+07 01.3	04 47.0	+21 19.9	07 12.9	+24 31.1	10 37.9	+14 05.1	12 58.9	-01 03.6
11	23 58.0	-05 56.3	02 38.5	+11 32.0	05 39.7	+23 23.8	08 09.4	+23 17.4	11 31.3	+08 46.5	13 51.9	-07 05.0
12	00 41.7	-01 07.5	03 24.7	+15 38.6	06 35.1	+24 20.4	09 06.2	+20 43.7	12 24.6	+02 50.2	14 47.1	-12 48.5
13	01 25.0	+03 42.0	04 13.3	+19 10.4	07 32.4	+23 59.5	10 02.6	+16 54.1	13 18.7	-03 24.0	15 45.1	-17 49.6
14	02 08.8	+08 24.0	05 05.0	+21 55.3	08 30.8	+22 14.9	10 58.3	+11 58.7	14 14.3	-09 32.7	16 46.1	-21 43.2
15	02 54.0	+12 49.4	05 59.7	+23 39.4	09 29.2	+19 07.3	11 53.5	+06 13.3	15 12.3	-15 09.2	17 49.3	-24 08.5
16	03 41.5	+16 48.1	06 57.1	+24 10.0	10 26.7	+14 44.7	12 48.6	-00 01.2	16 12.7	-19 46.6	18 52.8	-24 54.2
17	04 31.8	+20 07.9	07 56.1	+23 17.3	11 23.1	+09 22.8	13 44.3	-06 20.0	17 15.2	-23 01.8	19 54.6	-24 01.7
18	05 25.3	+22 34.9	08 55.4	+20 58.5	12 18.6	+03 22.6	14 41.3	-12 16.3	18 18.2	-24 40.7	20 53.1	-21 44.1
19	06 21.6	+23 54.7	09 53.9	+17 19.4	13 13.6	-02 51.4	15 40.0	-17 23.6	19 20.1	-24 41.1	21 47.5	-18 20.5
20	07 20.1	+23 55.6	10 50.8	+12 33.7	14 09.0	-08 53.9	16 40.4	-21 19.2	20 19.2	-23 12.2	22 37.9	-14 10.3
21	08 19.2	+22 31.6	11 46.1	+07 01.1	15 05.2	-14 20.6	17 41.6	-23 47.8	21 14.6	-20 30.1	23 25.1	-09 30.6
22	09 17.8	+19 44.9	12 40.1	+01 03.9	16 02.8	-18 50.4	18 42.4	-24 43.4	22 06.0	-16 52.9	00 09.9	-04 35.0
23	10 14.7	+15 45.9	13 33.7	-04 55.0	17 01.4	-22 07.1	19 41.4	-24 09.4	22 54.1	-12 37.0	00 53.4	+00 25.9
24	11 09.7	+10 50.9	14 27.5	-10 34.0	18 00.6	-24 00.4	20 37.5	-22 17.0	23 39.6	-07 56.2	01 36.5	+05 23.0
25	12 03.1	+05 19.3	15 22.3	-15 33.4	18 59.1	-24 27.6	21 30.2	-19 20.6	00 23.3	-03 01.7	02 20.2	+10 07.9
26	12 55.4	-00 29.0	16 18.5	-19 35.8	19 56.1	-23 32.8	22 19.6	-15 35.4	01 06.4	+01 56.9	03 05.3	+14 31.4
27	13 47.7	-06 14.5	17 16.0	-22 27.6	20 50.5	-21 25.7	23 06.4	-11 15.3	01 49.5	+06 50.7	03 52.6	+18 23.3
28	14 40.7	-11 38.3	18 14.3	-23 59.6	21 42.0	-18 18.9	23 51.1	-06 32.3	02 33.6	+11 30.4	04 42.5	+21 31.8
29	15 35.1	-16 22.3	19 12.2	-24 08.5	22 30.8	-14 26.1	00 34.6	-01 37.2	03 19.4	+15 45.9	05 35.0	+23 44.2
30	16 31.4	-20 09.7	20 08.6	-22 58.0	23 17.2	-10 00.6	01 17.6	+03 20.2	04 07.4	+19 25.8	06 29.8	+24 48.7
31	17 29.4	-22 45.8	21 02.7	-20 37.1	00 01.8	-05 14.6	02 01.1	+08 10.3	04 57.9	+22 18.2	07 26.0	+24 36.8

GEOCENTRIC POSITION OF PLANETS (& Pluto) (0 hr UT, Epoch 2000.0)

	MERCURY		VENUS		MARS		JUPITER		SATURN		URANUS		NEPTUNE		PLUTO	
	RA	Dec	RA	Dec	RA	Dec	RA	Dec	RA	Dec	RA	Dec	RA	Dec	RA	Dec
	h m s	° ' "	h m s	° ' "	h m s	° ' "	h m s	° ' "	h m s	° ' "	h m s	° ' "	h m s	° ' "	h m s	° ' "
Jan 4	18 39.0	–24 39.3	21 23.3	–17 12.7	15 52.1	–19 51.1	18 30.9	–23 09.8	19 32.8	–21 40.5	02 01.5	+11 50.5	23 10.3	–06 26.8	19 36.4	–22 15.2
11	19 28.5	–23 50.7	21 56.7	–14 18.8	16 11.8	–20 50.9	18 37.8	–23 04.7	19 36.3	–21 33.1	02 01.4	+11 50.2	23 10.8	–06 23.0	19 37.4	–22 13.5
18	20 18.2	–21 48.3	22 29.0	–11 06.9	16 31.8	–21 42.5	18 44.7	–22 58.5	19 39.9	–21 25.4	02 01.5	+11 50.9	23 11.5	–06 18.7	19 38.5	–22 11.8
25	21 07.3	–18 30.3	23 00.2	–07 41.5	16 52.1	–22 25.3	18 51.5	–22 51.4	19 43.3	–21 17.4	02 01.7	+11 52.4	23 12.2	–06 13.9	19 39.5	–22 10.2
Feb 1	21 53.6	–14 04.8	23 30.7	–04 07.1	17 12.7	–22 58.9	18 58.2	–22 43.3	19 46.8	–21 09.3	02 02.1	+11 54.8	23 13.0	–06 08.7	19 40.4	–22 08.5
8	22 31.9	–09 07.6	00 00.5	–00 28.0	17 33.4	–23 22.8	19 04.7	–22 34.5	19 50.2	–21 01.2	02 02.7	+11 58.0	23 13.9	–06 03.2	19 41.4	–22 06.9
15	22 51.6	–05 11.8	00 29.8	+03 11.7	17 54.4	–23 36.7	19 10.9	–22 25.0	19 53.4	–20 53.0	02 03.4	+12 02.0	23 14.8	–05 57.4	19 42.3	–22 05.5
22	22 43.1	–04 24.4	00 58.7	+06 48.0	18 15.4	–23 40.5	19 16.9	–22 15.1	19 56.6	–20 45.0	02 04.3	+12 06.8	23 15.7	–05 51.5	19 43.1	–22 04.1
29	22 16.6	–06 54.7	01 27.5	+10 17.1	18 36.5	–23 34.0	19 22.7	–22 05.0	19 59.5	–20 37.2	02 05.2	+12 12.2	23 16.7	–05 45.4	19 43.9	–22 02.9
Mar 7	21 59.4	–09 54.2	01 56.2	+13 35.3	18 57.5	–23 17.4	19 28.0	–21 54.7	20 02.3	–20 29.7	02 06.4	+12 18.2	23 17.7	–05 39.2	19 44.7	–22 01.9
14	22 02.4	–11 22.4	02 24.6	+16 38.8	19 18.5	–22 50.8	19 33.1	–21 44.7	20 04.9	–20 22.7	02 07.6	+12 24.7	23 18.7	–05 33.0	19 45.3	–22 01.1
21	22 21.0	–11 07.3	02 52.9	+19 24.4	19 39.4	–22 14.5	19 37.7	–21 34.9	20 07.3	–20 16.2	02 08.9	+12 31.7	23 19.7	–05 26.9	19 45.9	–22 00.4
28	22 49.2	–09 24.9	03 20.7	+21 49.4	20 00.1	–21 28.9	19 41.9	–21 25.8	20 09.4	–20 10.4	02 10.3	+12 39.1	23 20.6	–05 21.0	19 46.3	–22 00.1
Apr 4	23 23.4	–06 29.9	03 47.7	+23 51.3	20 20.6	–20 34.5	19 45.6	–21 17.5	20 11.2	–20 05.3	02 11.7	+12 46.8	23 21.5	–05 15.2	19 46.7	–22 00.0
11	00 01.8	–02 32.7	04 13.2	+25 28.4	20 40.9	–19 32.0	19 48.8	–21 10.2	20 12.7	–20 01.1	02 13.2	+12 54.6	23 22.4	–05 09.8	19 47.0	–22 00.1
18	00 44.4	+02 17.6	04 36.4	+26 40.0	21 00.8	–18 22.0	19 51.5	–21 04.1	20 14.0	–19 57.8	02 14.7	+13 02.6	23 23.3	–05 04.6	19 47.1	–22 00.5
25	01 31.7	+07 50.0	04 56.3	+27 26.0	21 20.5	–17 05.3	19 53.6	–20 59.5	20 14.9	–19 55.4	02 16.3	+13 10.6	23 24.0	–04 59.9	19 47.2	–22 01.2
May 2	02 24.8	+13 43.4	05 11.5	+27 46.6	21 39.9	–15 42.9	19 55.1	–20 56.6	20 15.5	–19 54.2	02 17.9	+13 18.6	23 24.8	–04 55.5	19 47.2	–22 02.1
9	03 23.7	+19 13.9	05 20.4	+27 41.1	21 58.9	–14 15.5	19 55.9	–20 55.3	20 15.8	–19 54.0	02 19.4	+13 26.4	23 25.4	–04 51.7	19 47.0	–22 03.2
16	04 24.4	+23 18.6	05 21.5	+27 07.1	22 17.5	–12 44.2	19 56.1	–20 55.8	20 15.7	–19 54.8	02 20.9	+13 34.1	23 26.0	–04 48.4	19 46.8	–22 04.6
23	05 20.1	+25 20.9	05 14.1	+26 00.1	22 35.8	–11 09.8	19 55.7	–20 58.2	20 15.3	–19 56.7	02 22.4	+13 41.5	23 26.4	–04 45.7	19 46.5	–22 06.3
30	06 06.1	+25 33.0	04 59.5	+24 17.8	22 53.8	–09 33.5	19 54.6	–21 02.3	20 14.6	–19 59.7	02 23.8	+13 48.6	23 26.8	–04 43.5	19 46.1	–22 08.1
Jun 6	06 39.5	+24 28.5	04 41.6	+22 09.9	23 11.3	–07 56.2	19 52.9	–21 08.1	20 13.6	–20 03.6	02 25.2	+13 55.3	23 27.1	–04 42.0	19 45.6	–22 10.1
13	06 58.5	+22 42.5	04 26.1	+20 02.4	23 28.5	–06 19.0	19 50.6	–21 15.3	20 12.4	–20 08.3	02 26.5	+14 01.6	23 27.3	–04 41.1	19 45.1	–22 12.2
20	07 01.5	+20 47.2	04 16.9	+18 23.5	23 45.2	–04 43.0	19 47.8	–21 23.7	20 10.8	–20 13.8	02 27.7	+14 07.3	23 27.4	–04 40.8	19 44.5	–22 14.5
27	06 50.2	+19 13.3	04 15.6	+17 26.6	00 01.4	–03 09.3	19 44.6	–21 33.0	20 09.1	–20 19.8	02 28.8	+14 12.5	23 27.4	–04 41.1	19 43.8	–22 16.8
Jul 4	06 32.8	+18 28.6	04 21.4	+17 09.8	00 17.0	–01 38.9	19 41.1	–21 42.8	20 07.1	–20 26.4	02 29.7	+14 17.1	23 27.3	–04 42.1	19 43.1	–22 19.2
11	06 22.3	+18 46.7	04 33.2	+17 23.4	00 32.1	–00 12.8	19 37.3	–21 52.7	20 05.1	–20 33.2	02 30.6	+14 21.0	23 27.1	–04 43.6	19 42.4	–22 21.6
18	06 28.2	+19 53.3	04 49.9	+17 55.9	00 46.3	+01 07.9	19 33.5	–22 02.3	20 03.0	–20 40.1	02 31.3	+14 24.3	23 26.8	–04 45.8	19 41.7	–22 24.0
25	06 53.3	+21 07.1	05 10.5	+18 36.6	00 59.7	+02 22.0	19 29.7	–22 11.5	20 00.8	–20 46.9	02 31.8	+14 26.9	23 26.5	–04 48.4	19 41.0	–22 26.4
Aug 1	07 36.3	+21 29.3	05 34.1	+19 16.3	01 12.0	+03 28.7	19 26.2	–22 19.8	19 58.7	–20 53.6	02 32.2	+14 28.7	23 26.0	–04 51.5	19 40.3	–22 28.6
8	08 31.7	+20 02.7	06 00.2	+19 48.0	01 23.0	+04 27.1	19 22.9	–22 27.1	19 56.6	–20 59.9	02 32.5	+14 29.7	23 25.5	–04 55.1	19 39.7	–22 30.8
15	09 30.1	+16 34.8	06 28.3	+20 05.7	01 32.6	+05 16.2	19 20.1	–22 33.2	19 54.7	–21 05.7	02 32.6	+14 30.1	23 24.9	–04 59.0	19 39.0	–22 32.8
22	10 24.1	+11 47.0	06 58.0	+20 04.8	01 40.2	+05 55.1	19 17.7	–22 38.2	19 53.0	–21 10.9	02 32.5	+14 29.6	23 24.3	–05 03.2	19 38.5	–22 34.7
29	11 12.1	+06 26.7	07 28.8	+19 42.1	01 45.8	+06 23.2	19 16.0	–22 41.9	19 51.4	–21 15.4	02 32.3	+14 28.4	23 23.6	–05 07.6	19 38.0	–22 36.4
Sep 5	11 54.8	+01 03.9	08 00.3	+18 55.7	01 48.9	+06 40.0	19 14.9	–22 44.2	19 50.2	–21 19.2	02 31.9	+14 26.5	23 22.9	–05 12.2	19 37.5	–22 37.9
12	12 33.6	–04 04.4	08 32.3	+17 44.7	01 49.4	+06 45.4	19 14.5	–22 45.4	19 49.2	–21 22.1	02 31.4	+14 23.9	23 22.2	–05 16.8	19 37.2	–22 39.1
19	13 09.2	–08 47.4	09 04.4	+16 09.4	01 47.1	+06 39.4	19 14.7	–22 45.3	19 48.6	–21 24.2	02 30.7	+14 20.7	23 21.5	–05 21.4	19 36.9	–22 40.2
26	13 41.5	–12 54.4	09 36.5	+14 11.3	01 42.1	+06 23.7	19 15.6	–22 43.9	19 48.3	–21 25.4	02 29.9	+14 16.9	23 20.8	–05 25.8	19 36.8	–22 41.0
Oct 3	14 09.0	–16 10.7	10 08.4	+11 52.4	01 35.0	+06 00.9	19 17.2	–22 41.3	19 48.3	–21 25.7	02 29.0	+14 12.5	23 20.2	–05 30.0	19 36.7	–22 41.6
10	14 27.7	–18 09.8	10 40.2	+09 15.3	01 26.4	+05 34.8	19 19.4	–22 37.4	19 48.6	–21 25.1	02 28.1	+14 07.7	23 19.5	–05 34.0	19 36.7	–22 41.9
17	14 29.5	–17 59.0	11 11.7	+06 23.3	01 17.5	+05 09.9	19 22.2	–22 32.2	19 49.3	–21 23.6	02 27.0	+14 02.6	23 18.9	–05 37.6	19 36.9	–22 42.0
24	14 07.8	–14 31.1	11 43.1	+03 19.9	01 09.3	+04 51.3	19 25.6	–22 25.7	19 50.4	–21 21.2	02 25.9	+13 57.2	23 18.4	–05 40.7	19 37.1	–22 41.8
31	13 41.2	–09 38.2	12 14.5	+00 09.1	01 02.7	+04 42.8	19 29.5	–22 17.8	19 51.7	–21 18.0	02 24.8	+13 51.8	23 18.0	–05 43.4	19 37.5	–22 41.5
Nov 7	13 41.6	–08 15.6	12 46.1	–03 05.4	00 58.3	+04 46.6	19 33.8	–22 08.5	19 53.4	–21 13.8	02 23.7	+13 46.3	23 17.6	–05 45.5	19 37.9	–22 40.8
14	14 07.3	–10 30.8	13 18.0	–06 19.4	00 56.4	+05 03.1	19 38.6	–21 57.8	19 55.4	–21 08.8	02 22.6	+13 40.9	23 17.4	–05 47.0	19 38.4	–22 40.0
21	14 44.5	–14 09.0	13 50.5	–09 28.5	00 57.0	+05 32.0	19 43.8	–21 45.6	19 57.6	–21 03.0	02 21.5	+13 35.7	23 17.2	–05 47.9	19 39.1	–22 39.0
28	15 26.5	–17 49.8	14 23.6	–12 28.3	01 00.0	+06 12.3	19 49.3	–21 32.0	20 00.1	–20 56.4	02 20.5	+13 30.9	23 17.1	–05 48.1	19 39.8	–22 37.8
Dec 5	16 10.9	–20 59.1	14 57.6	–15 14.3	01 05.0	+07 02.1	19 55.1	–21 16.8	20 02.8	–20 49.0	02 19.6	+13 26.6	23 17.1	–05 47.7	19 40.5	–22 36.4
12	16 57.2	–23 20.8	15 32.5	–17 42.0	01 11.8	+07 59.7	20 01.2	–21 00.1	20 05.6	–20 40.9	02 18.8	+13 22.8	23 17.3	–05 46.6	19 41.4	–22 34.9
19	17 45.1	–24 45.0	16 08.4	–19 46.9	01 20.2	+09 03.7	20 07.5	–20 42.0	20 08.7	–20 32.1	02 18.2	+13 19.6	23 17.5	–05 44.9	19 42.3	–22 33.3
26	18 34.2	–25 03.9	16 45.1	–21 24.9	01 29.9	+10 12.6	20 13.9	–20 22.5	20 11.9	–20 22.7	02 17.7	+13 17.2	23 17.9	–05 42.5	19 43.2	–22 31.5

RISE and SET times for MELBOURNE (EST)

	SUN				MERCURY		VENUS		MARS		JUPITER		SATURN		URANUS		NEPTUNE		PLUTO	
	Twi Beg	Rise	Set	Twi End	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set
Jan 4	03:10	05:03	19:46	21:39	04:40	19:36	07:53	21:50	02:13	16:29	04:40	19:19	05:47	20:15	14:04	00:57	10:16	23:00	05:49	20:21
11	03:18	05:10	19:45	21:36	05:05	19:54	08:09	21:46	02:01	16:25	04:19	18:59	05:24	19:51	13:37	00:29	09:49	22:32	05:22	19:54
18	03:28	05:17	19:43	21:31	05:36	20:08	08:25	21:40	01:51	16:21	03:59	18:37	05:00	19:26	13:09	23:58	09:23	22:05	04:56	19:28
25	03:39	05:25	19:39	21:24	06:09	20:17	08:39	21:32	01:41	16:16	03:39	18:16	04:37	19:02	12:42	23:31	08:56	21:38	04:29	19:01
Feb 1	03:50	05:33	19:34	21:16	06:44	20:19	08:54	21:24	01:31	16:11	03:18	17:55	04:13	18:37	12:15	23:03	08:30	21:11	04:03	18:34
8	04:01	05:41	19:27	21:06	07:11	20:13	09:07	21:15	01:23	16:06	02:58	17:33	03:49	18:12	11:48	22:36	08:03	20:44	03:37	18:08
15	04:12	05:48	19:19	20:55	07:16	19:52	09:20	21:05	01:15	16:00	02:37	17:11	03:26	17:48	11:22	22:09	07:37	20:17	03:10	17:41
22	04:22	05:56	19:10	20:44	06:43	19:12	09:33	20:55	01:09	15:54	02:16	16:49	03:02	17:23	10:55	21:42	07:11	19:51	02:44	17:14
29	04:32	06:03	19:01	20:32	05:42	18:27	09:45	20:45	01:02	15:47	01:55	16:26	02:38	16:58	10:29	21:15	06:45	19:24	02:17	16:47
Mar 7	04:40	06:10	18:51	20:21	04:47	17:52	09:57	20:35	00:57	15:39	01:34	16:04	02:13	16:32	10:03	20:49	06:18	18:57	01:50	16:20
14	04:48	06:17	18:40	20:09	04:17	17:33	10:08	20:26	00:52	15:31	01:12	15:40	01:49	16:07	09:37	20:22	05:52	18:30	01:23	15:54
21	04:56	06:24	18:30	19:58	04:08	17:24	10:19	20:17	00:48	15:22	00:50	15:17	01:24	15:41	09:11	19:55	05:26	18:03	00:56	15:27
28	05:03	06:30	18:19	19:46	04:14	17:19	10:28	20:08	00:44	15:12	00:27	14:53	00:59	15:16	08:46	19:29	05:00	17:36	00:29	14:59
Apr 4	05:10	06:37	18:09	19:36	04:30	17:16	10:35	20:00	00:40	15:01	00:04	14:29	00:34	14:50	08:20	19:02	04:33	17:09	23:58	14:32
11	05:16	06:43	17:59	19:26	04:53	17:15	10:39	19:52	00:37	14:50	23:36	14:04	00:08	14:23	07:54	18:36	04:07	16:42	23:31	14:05
18	05:22	06:49	17:49	19:16	05:23	17:15	10:40	19:42	00:33	14:38	23:12	13:39	23:38	13:57	07:29	18:09	03:41	16:15	23:04	13:38
25	05:27	06:56	17:40	19:08	06:00	17:17	10:35	19:31	00:30	14:25	22:47	13:13	23:12	13:30	07:03	17:43	03:14	15:48	22:36	13:10
May 2	05:33	07:02	17:32	19:01	06:45	17:24	10:24	19:17	00:26	14:12	22:21	12:47	22:45	13:03	06:38	17:17	02:48	15:21	22:09	12:43
9	05:38	07:08	17:24	18:54	07:35	17:37	10:05	18:59	00:23	13:59	21:54	12:20	22:18	12:36	06:12	16:50	02:21	14:54	21:41	12:15
16	05:43	07:14	17:18	18:49	08:24	17:55	09:36	18:34	00:19	13:45	21:27	11:53	21:50	12:08	05:47	16:24	01:54	14:27	21:13	11:48
23	05:48	07:20	17:13	18:45	09:00	18:15	08:57	18:04	00:15	13:30	20:58	11:25	21:22	11:40	05:21	15:57	01:27	14:00	20:45	11:20
30	05:52	07:25	17:10	18:43	09:19	18:32	08:08	17:28	00:11	13:15	20:30	10:56	20:53	11:12	04:55	15:31	01:00	13:33	20:17	10:52
Jun 6	05:56	07:30	17:08	18:42	09:21	18:42	07:15	16:51	00:06	13:00	20:00	10:28	20:25	10:44	04:29	15:04	00:33	13:05	19:49	10:24
13	05:59	07:33	17:07	18:41	09:05	18:40	06:24	16:16	00:00	12:44	19:30	09:58	19:56	10:16	04:03	14:38	00:06	12:38	19:21	09:56
20	06:01	07:35	17:08	18:42	08:34	18:21	05:41	15:46	23:54	12:29	18:59	09:28	19:26	09:47	03:37	14:11	23:34	12:11	18:52	09:28
27	06:02	07:36	17:10	18:44	07:49	17:48	05:09	15:20	23:47	12:12	18:27	08:58	18:57	09:18	03:11	13:44	23:07	11:43	18:24	09:00
Jul 4	06:02	07:36	17:13	18:47	07:02	17:05	04:46	15:00	23:40	11:56	17:56	08:28	18:27	08:49	02:45	13:18	22:39	11:15	17:56	08:32
11	06:01	07:34	17:17	18:50	06:25	16:27	04:31	14:43	23:32	11:39	17:24	07:57	17:57	08:20	02:19	12:51	22:11	10:48	17:27	08:04
18	05:58	07:31	17:22	18:54	06:07	16:02	04:21	14:31	23:23	11:21	16:52	07:27	17:27	07:51	01:52	12:24	21:44	10:20	16:59	07:36
25	05:55	07:26	17:27	18:59	06:08	15:55	04:17	14:21	23:12	11:03	16:20	06:56	16:57	07:21	01:25	11:57	21:15	09:52	16:31	07:08
Aug 1	05:50	07:20	17:33	19:03	06:25	16:10	04:15	14:15	23:00	10:44	15:49	06:25	16:26	06:52	00:58	11:29	20:47	09:25	16:02	06:40
8	05:44	07:13	17:39	19:08	06:47	16:44	04:15	14:12	22:47	10:25	15:17	05:55	15:57	06:23	00:31	11:02	20:19	08:57	15:34	06:12
15	05:36	07:05	17:45	19:13	07:06	17:28	04:17	14:11	22:31	10:04	14:47	05:25	15:27	05:54	00:00	10:35	19:51	08:29	15:06	05:44
22	05:28	06:56	17:51	19:18	07:16	18:10	04:19	14:14	22:13	09:42	14:16	04:56	14:57	05:25	23:32	10:07	19:22	08:01	14:37	05:16
29	05:19	06:46	17:56	19:24	07:19	18:47	04:21	14:18	21:52	09:19	13:47	04:27	14:28	04:56	23:04	09:39	18:54	07:33	14:09	04:48
Sep 5	05:09	06:36	18:02	19:29	07:18	19:19	04:22	14:25	21:28	08:54	13:18	03:58	13:59	04:28	22:36	09:11	18:26	07:05	13:41	04:20
12	04:58	06:25	18:08	19:35	07:13	19:46	04:22	14:34	21:01	08:26	12:50	03:30	13:30	03:59	22:08	08:44	17:57	06:37	13:13	03:52
19	04:47	06:14	18:14	19:42	07:06	20:09	04:21	14:44	20:31	07:57	12:23	03:03	13:02	03:31	21:40	08:16	17:29	06:09	12:45	03:25
26	04:35	06:03	18:20	19:48	06:57	20:27	04:19	14:55	19:58	07:25	11:56	02:36	12:34	03:04	21:11	07:48	17:00	05:41	12:18	02:57
Oct 3	04:23	05:52	18:26	19:56	06:46	20:37	04:15	15:07	19:22	06:52	11:31	02:10	12:06	02:36	20:42	07:19	16:32	05:13	11:50	02:29
10	04:11	05:42	18:33	20:04	06:31	20:34	04:11	15:20	18:44	06:17	11:06	01:44	11:39	02:09	20:14	06:51	16:03	04:45	11:23	02:02
17	03:59	05:32	18:39	20:12	06:06	20:06	04:06	15:33	18:07	05:42	10:41	01:19	11:13	01:42	19:45	06:23	15:35	04:17	10:55	01:35
24	03:48	05:23	18:46	20:22	05:29	19:03	04:00	15:46	17:30	05:07	10:17	00:55	10:46	01:15	19:16	05:55	15:07	03:49	10:28	01:07
31	03:37	05:14	18:54	20:32	04:51	17:54	03:54	16:00	16:56	04:34	09:54	00:30	10:20	00:49	18:47	05:26	14:39	03:22	10:01	00:40
Nov 7	03:26	05:07	19:01	20:42	04:27	17:25	03:48	16:14	16:24	04:02	09:32	00:07	09:55	00:23	18:18	04:58	14:11	02:54	09:34	00:13
14	03:17	05:00	19:09	20:53	04:18	17:31	03:42	16:28	15:56	03:31	09:10	23:40	09:29	23:53	17:49	04:30	13:43	02:26	09:07	23:42
21	03:09	04:56	19:16	21:04	04:15	17:53	03:37	16:43	15:30	03:03	08:48	23:17	09:05	23:28	17:20	04:01	13:15	01:58	08:40	23:15
28	03:03	04:53	19:24	21:14	04:17	18:21	03:33	16:59	15:08	02:36	08:27	22:54	08:40	23:02	16:51	03:33	12:48	01:31	08:13	22:48
Dec 5	02:59	04:51	19:30	21:23	04:22	18:49	03:30	17:15	14:48	02:11	08:06	22:31	08:15	22:37	16:23	03:05	12:20	01:03	07:47	22:21
12	02:57	04:51	19:36	21:31	04:32	19:17	03:28	17:31	14:30	01:47	07:46	22:09	07:51	22:12	15:54	02:37	11:53	00:36	07:20	21:55
19	02:58	04:53	19:41	21:36	04:46	19:43	03:29	17:46	14:15	01:24	07:25	21:46	07:27	21:47	15:26	02:09	11:26	00:08	06:53	21:28
26	03:02	04:57	19:44	21:39	05:06	20:05	03:32	18:02	14:00	01:03	07:06	21:24	07:04	21:22	14:58	01:41	10:59	23:37	06:27	21:01

LUNAR OCCULTATIONS for MELBOURNE (37° 50' S, 145° 00' E)

INTRODUCTION From month to month the Moon does not occult the same stars. In fact over a number of years it drifts in declination between plus and minus 28°. The brighter stars that the Moon occults are listed in the Zodiacal Catalogue (ZC). There are about 3500 stars in the ZC.

The Moon moves from west to east, so it rises and sets later each day. From just after New Moon to just before Full Moon, stars being occulted disappear behind part of the dark limb and reappear from the bright limb. The limb is another term for the edge of the Moon. After Full Moon a star disappears on the bright limb and reappears on the dark limb. There is no dark limb at Full Moon.

Dark limb events, in particular disappearances, are the easiest to observe. Following a star until it *winks out* is much easier than scanning the lunar limb, waiting for it to suddenly reappear. The brighter the star, the more spectacular the event. The table here present the easier to observe occultations for this year as predicted Both events, the disappearance and reappearance, are not necessarily included. An event may not be present because:

1. The Moon is in daylight.
2. The Moon is too close to or below the horizon.
3. For faint stars, events on a bright limb (in particular reappearances) are difficult to observe and have been omitted.

TELESCOPE REQUIREMENTS. These vary greatly with the brightness of the star being observed, the brightness of the Moon (how close to Full Moon) and whether the event is on a bright or dark limb. Disappearances of first magnitude stars on the dark limb can be observed with the naked eye.

www.lunar-occultations.com/iota/iotandx.htm
www.occultations.org.nz

The faintest stars, which have occultation predictions, are about 6.5 magnitude. The criteria for selection are complex involving the Sun and Moon altitude, star magnitude and whether it is a bright or dark limb event.

EST the date and time of the occultation, hr and min are in EST

OBJECT n, nn, nnn, nnnn ZC catalogue number
ggg ccc Greek letter and constellation abbreviation
n ccc Flamsteed number and constellation
name of planet, satellite or deep sky object.

PD event, consisting of two letters.
The first letter is the Event type: D = Disappearance and R = Reappearance. The 2nd letter represents: D = Dark limb, B = a bright limb event. G indicates a graze at or near the location. M means a miss with a graze nearby.

Mag magnitude of the star.

Elg elongation or separation of the Moon from the Sun as measured in degrees.

Alt altitude of the Moon during the occultation.

PA position angle is the position the event occurs on the limb of the Moon (measured as degrees east of north).

A coefficient of longitude (see below)

B coefficient of latitude (see below)
NB. For some stars, close to grazing, A and B values would be useless, and no values are shown.

CALCULATING EVENT TIME FOR OTHER LOCATIONS

Unless the event is close to a graze (PA is close to 0° or 180°) this method will give a good approximation for any location within about 500 km of this city. The predicted time at your location is given by:

Predicted Time = Time from Table + ($A \times n$) + ($B \times p$)

where A and B are taken from the table below and n and p are given by (convert to decimal degrees)

n = your longitude – reference longitude
p = reference latitude – your latitude

you need to preserve the signs of n and p , that is, whether they are positive or negative and it is best to use your closest city.

EST		Object	PD	Mag	Elg°	Alt°	PA°	A	B
Jan 01	21:33	3478	DD	6.4	71	24	86	0.8	1.5
Jan 08	20:26	105 Tau	DD	5.8	150	25	96	2.0	-1.0
Jan 09	01:18	108 Tau	DD	6.3	152	18	60	1.6	1.7
Jan 10	02:31	8 Gem	DD	6.1	165	14	36	2.2	3.0
Jan 10	02:37	9 Gem	DD	6.2	165	14	93	1.2	1.0
Jan 20	03:02	Eta Lib	DB	5.4	62	19	143	-0.1	-2.1
Jan 20	03:56	Eta Lib	RD	5.4	61	30	266	0.8	-1.1
Jan 23	12:53	Jupiter	DB	-1.7	21	62	70	1.7	1.7
Jan 23	14:05	Ganymed	RD	5.4	21	48	276	1.5	0.8
Jan 23	14:12	Jupiter	RD	-1.7	21	47	276	1.4	0.9
Jan 28	20:52	Psi 2 Aqr	RB	4.4	39	9	199	-0.3	2.6
Feb 05	22:06	859	DD	6.6	130	27	44	2.1	1.7
Feb 05	22:46	865	DD	6.2	130	25	81	1.9	0.9
Feb 08	21:00	Gam Cnc	DD	4.7	168	18	173	2.4	-5.7
Feb 08	21:19	Gam Cnc	RD	4.7	168	21	203	0.8	3.4
Feb 11	23:03	Xi Vir	RD	4.8	148	21	359	0.5	-3.6
Feb 17	03:29	Chi Oph	DB	4.2	79	40	60	1.8	0.0
Feb 17	04:10	Chi Oph	RD	4.2	79	48	347	-0.1	-3.7
Feb 18	02:31	Xi Oph	DB	4.4	68	20	102	0.1	-1.4
Feb 18	03:32	Xi Oph	RD	4.4	67	32	293	0.4	-1.7
Feb 18	04:23	2509	DB	5.8	67	41	113	0.8	-1.8
Feb 29	19:38	38 Ara	DD	5.2	62	23	91	1.5	1.2
Mar 04	22:07	8 Gem	DD	6.1	109	20	102	1.6	0.6
Mar 04	23:04	9 Gem	DD	6.2	110	13	177	9.9	9.9
Mar 05	20:09	48 Gem	DD	5.9	121	28	115	2.2	-0.8
Mar 06	20:17	1239	DD	6.6	134	26	63	2.0	0.1
Mar 13	05:12	2043	RD	6.5	137	51	268	1.9	0.9
Mar 15	04:37	2316	RD	6.4	110	70	218	5.3	7.5
Mar 17	02:08	2595	DB	5.7	86	30	139	-0.1	-2.4
Mar 17	03:03	2595	RD	5.7	86	41	249	1.4	-0.5
Mar 18	00:50	Nu 1 Sgr	RD	4.9	75	6	340	-1.3	-3.2
Mar 18	01:53	2754	RD	5.9	74	17	244	0.4	-0.5

EST		Object	PD	Mag	Elg°	Alt°	PA°	A	B
Apr 09	01:25	1965	RD	6.5	171	57	265	2.4	0.5
Apr 12	01:39	2401	DB	5.6	130	58	67	2.3	0.3
Apr 12	02:34	2401	RD	5.6	130	67	336	0.8	-3.4
Apr 12	23:37	52 Oph	RD	6.5	118	26	296	0.1	-1.7
Apr 14	00:48	2706	DB	5.8	105	29	127	0.1	-2.1
Apr 14	01:48	2706	RD	5.8	105	41	253	1.3	-0.6
May 07	01:54	2043	DD	6.5	168	48	103	1.6	0.3
May 07	02:17	2047	DD	6.6	168	44	115	1.3	0.0
May 09	00:25	2316	RD	6.4	164	67	294	1.7	-1.3
May 14	02:12	3081	RD	6.5	100	38	231	1.3	0.4
May 26	17:49	52 Gem	DD	5.8	42	18	55	2.2	2.1
May 27	19:03	1239	DD	6.6	54	17	183	-2.1	-5.1
May 29	19:34	Eta Leo	MB	3.5	80	31	209	9.9	9.9
May 31	23:54	1739	DD	6.4	108	18	133	0.5	-0.3
Jun 07	20:36	2706	RD	5.8	158	22	282	0.1	-1.4
Jun 07	22:03	26 Sgr	RD	6.2	157	38	236	1.4	0.1
Jun 13	03:31	Psi 3 Aqr	DB	5.0	95	44	35	1.2	1.4
Jun 13	04:49	Psi 3 Aqr	RD	5.0	95	56	266	2.3	-0.5
Jun 28	21:09	1813	DD	5.7	91	36	129	1.1	-0.4
Jun 28	22:16	1813	RB	5.7	91	25	294	0.8	0.3
Jun 30	23:36	2072	DD	6.6	119	37	94	1.2	1.0
Jul 01	23:14	30 Lib	DD	6.5	132	54	127	1.5	-0.7
Jul 02	19:20	2331	DD	6.3	144	52	97	1.4	-1.2
Jul 11	04:22	3506	DB	6.1	114	58	38	1.4	1.9
Jul 11	05:46	3506	RD	6.1	114	56	251	2.1	1.2
Jul 13	01:01	33 Cet	RD	6.0	93	9	266	0.4	-1.2
Jul 13	05:29	89 Psc	DB	5.1	91	47	26	1.0	2.0
Jul 13	06:48	89 Psc	RD	5.1	91	48	260	2.5	0.7
Jul 15	03:31	38 Ara	DB	5.2	70	14	50	0.4	0.1
Jul 15	04:43	38 Ara	RD	5.2	70	26	248	1.2	-0.3
Jul 30	01:52	2316	DD	6.4	117	13	68	-0.1	1.8
Jul 31	01:13	2457	DD	6.3	130	32	98	0.8	0.9

EST		Object	PD	Mag	Elg°	Alt°	PA°	A	B
Aug 03	00:24	2921	DD	6.0	167	72	62	1.9	1.6
Aug 03	01:52	2928	DD	6.4	167	58	62	1.3	1.9
Aug 11	02:00	Xi Ari	RD	5.5	101	21	252	1.0	-0.6
Aug 26	18:54	2394	DD	6.3	98	73	65	2.6	1.6
Aug 26	19:57	2394	RB	6.3	98	66	329	1.7	-2.6
Aug 28	21:17	26 Sgr	DD	6.2	124	73	50	2.0	2.6
Aug 29	21:03	53 Sgr	DD	6.4	136	75	68	2.2	0.9
Aug 29	21:14	2875	DD	6.0	136	75	70	2.2	0.9
Sep 03	05:00	Psi 2 Aqr	DB	4.4	173	27	77	0.7	1.6
Sep 03	06:02	Psi 2 Aqr	RD	4.4	172	15	226	0.1	2.0
Sep 12	05:24	977	RD	6.4	73	22	270	1.9	-0.8
Sep 22	19:14	Psi Oph	DD	4.5	68	52	121	1.6	-0.4
Sep 22	20:23	Psi Oph	RB	4.5	68	39	263	1.0	1.4
Sep 25	00:32	24 Sgr	DD	5.5	96	16	114	0.3	0.6
Sep 25	21:06	49 Sgr	DD	5.5	107	65	93	2.0	0.6
Sep 25	22:23	49 Sgr	RB	5.5	107	50	242	1.0	2.0
Oct 01	21:08	49	DD	6.1	174	36	28	0.8	1.5
Oct 07	01:18	Ome 2 Tau	DB	4.9	128	23	66	1.4	-0.2
Oct 07	02:44	Ome 2 Tau	RD	4.9	127	30	242	1.9	0.4
Oct 21	19:24	2602	RB	5.4	63	49	194	-0.7	8.4
Oct 21	22:53	1 Sgr	DD	5.0	64	10	38	-0.8	2.4
Oct 25	00:00	3081	DD	6.5	102	26	79	0.4	1.5
Oct 28	02:33	3478	DD	6.4	137	16	80	0.4	1.5
Oct 28	23:32	128661	DD	6.6	147	50	17	0.7	2.9
Nov 20	22:22	17 Cap	DD	5.9	70	22	102	0.5	0.9
Nov 23	23:57	Psi 2 Aqr	DD	4.4	105	23	350	-1.0	4.4
Nov 24	00:19	Psi 2 Aqr	RB	4.4	105	19	311	1.5	-0.6
Dec 05	03:35	Lam Cnc	RD	5.9	131	28	280	2.2	-0.3
Dec 06	01:58	1373	RD	6.5	119	20	240	1.6	-0.2
Dec 27	21:17	Ome 2 Tau	DD	4.9	150	30	129	4.3	-3.0
Dec 27	21:55	Ome 2 Tau	RB	4.9	150	32	180	-0.1	3.7
Dec 27	23:01	53 Tau	DD	5.5	151	30	46	1.9	1.4