ASTRONOMY 2020
Supplementary Information
SYDNEY

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

LUNAR OCCULTATIONS for SYDNEY (33° 54' S, 151° 15' 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 21:43	3478	DD	6.4	71	18	84	0.5	1.4
Jan 08 20:36	105 Tau	DD	5.8	150	32	96	2.4	-0.7
Jan 09 01:36	108 Tau	DD	6.3	152	14	45	1.6	2.4
Jan 09 20:16	1 Gem	RB	4.3	163	23	212	0.6	1.1
Jan 10 02:49	9 Gem	DD	6.2	165	11	77	1.2	1.4
Jan 20 02:54	Eta Lib	DB	5.4	62	23	128	0.1	-1.8
Jan 20 03:55	Eta Lib	RD	5.4	61	35	283	0.9	-1.4
Jan 23 13:10	Jupiter	DB	-1.7	21	55	61	1.4	2.1
Jan 23 14:23	Jupiter	RD	-1.7	21	40	280	1.3	0.7
Jan 28 20:13	Psi 1 Aqr	RB	4.2	39	11	278	0.3	1.0
Jan 28 20:15	Psi 2 Aqr	DD	4.4	39	11	105	0.4	0.8
Feb 05 23:02	865	DD	6.2	130	24	71	1.9	1.4
Feb 08 01:22	82 Gem	DD	6.3	157	21	148	0.5	-1.0
Feb 08 20:57	Gam Cnc	DD	4.7	168	24	159	2.0	-3.4
Feb 08 21:37	Gam Cnc	RB	4.7	168	29	220	1.9	1.5
Feb 18 02:28	Xi Oph	DB	4.4	68	24	85	0.5	-1.0
Feb 18 03:27	Xi Oph	RD	4.4	67	36	311	0.3	-2.2
Feb 18 04:24	2509	DB	5.8	67	47	94	1.3	-1.1
Feb 29 19:52	38 Ara	DD	5.2	62	19	85	1.2	1.4
Mar 03 19:48	108 Tau	DD	6.3	96	31	121	2.3	-0.5
Mar 04 22:19	8 Gem	DD	6.1	109	18	88	1.5	1.0
Mar 04 22:55	9 Gem	DD	6.2	110	13	140	0.4	-0.7
Mar 05 20:20	48 Gem	DD	5.9	121	32	107	2.3	-0.4
Mar 17 02:00	2595	DB	5.7	86	33	119	0.4	-1.9
Mar 17 03:08	2595	RD	5.7	86	47	270	1.4	-1.0
Mar 18 01:52	2754	RD	5.9	74	21	263	0.4	-0.9
Apr 09 01:39	1965	RD	6.5	171	58	288	1.9	-0.3
Apr 12 23:30	52 Oph	RD	6.5	118	29	314	0.0	-2.1
Apr 14 00:42	2706	DB	5.8	105	32	107	0.5	-1.6
Apr 14 01:52	2706	RD	5.8	105	47	273	1.3	-1.1
Apr 14 02:54	26 Sgr	DB	6.2	104	59	158	0.4	-5.3
Apr 14 03:35	26 Sgr	RD	6.2	104	67	216	3.1	3.6

EST	Object	PD	Mag	Elg°	Alt°	PA°	A	B
May 01 18:16	1393	DD	6.5	96	36	155	1.4	-2.1
May 07 02:08	2043	DD	6.5	168	43	82	1.6	1.4
May 09 00:29	2316	RD	6.4	164	73	314	1.5	-2.0
May 14 02:21	3081	RD	6.5	100	45	249	1.5	-0.2
May 19 05:06	26 Cet	DB	6.1	43	22	129	2.0	-5.7
May 19 05:32	26 Cet	RD	6.1	43	27	170	-0.7	5.9
May 29 19:15	Eta Leo	DD	3.5	80	34	164	0.4	-2.0
May 29 20:09	Eta Leo	RB	3.5	80	27	255	2.2	1.7
May 31 23:57	1739	DD	6.4	108	14	114	0.5	0.3
Jun 02 20:09	1965	DD	6.5	134	60	197	-2.1	-6.5
Jun 05 21:50	2394	DD	6.3	176	62	138	1.1	-2.4
Jun 07 20:31	2706	RD	5.8	158	25	300	0.1	-1.8
Jun 07 22:10	26 Sgr	RD	6.2	157	45	259	1.4	-0.6
Jun 08 21:13	53 Sgr	RD	6.4	145	22	230	0.9	0.3
Jun 08 21:22	2875	RD	6.0	145	24	230	1.0	0.3
Jun 10 01:28	17 Cap	DB	5.9	131	61	137	2.0	-4.6
Jun 10 02:14	17 Cap	RD	5.9	131	69	198	1.8	4.7
Jun 12 02:52	56 Aqr	RD	6.4	107	54	190	1.1	4.3
Jun 13 03:46	Psi 3 Aqr	DB	5.0	95	53	26	1.3	2.3
Jun 13 05:03	Psi 3 Aqr	RD	5.0	95	64	269	2.9	-0.4
Jun 28 21:15	1813	DD	5.7	91	33	108	1.2	0.3
Jun 30 23:49	2072	DD	6.6	119	30	76	1.0	1.8
Jul 01 23:22	30 Lib	DD	6.5	132	49	110	1.6	0.1
Jul 02 19:29	2331	DD	6.3	144	60	74	2.4	0.0
Jul 11 04:39	3506	DB	6.1	114	62	38	1.5	2.1
Jul 13 00:59	33 Cet	RD	6.0	93	14	279	0.7	-1.7
Jul 13 02:08	35 Cet	RD	6.6	93	27	225	0.8	0.7
Jul 13 05:45	89 Psc	DB	5.1	91	53	28	1.3	2.2
Jul 15 03:35	38 Ara	DB	5.2	70	21	45	0.6	0.5
Jul 15 04:51	38 Ara	RD	5.2	70	33	249	1.6	-0.1
Jul 31 01:21	2457	DD	6.3	130	25	91	0.5	1.0
Aug 03 00:42	2921	DD	6.0	167	67	55	1.6	2.1

EST	Object	PD	Mag	Elg°	Alt°	PA°	A	B
Aug 03 02:07	2928	DD	6.4	167	50	60	1.0	2.0
Aug 06 20:17	Psi 3 Aqr	RD	5.0	147	6	265	0.0	-1.0
Aug 11 02:05	Xi Ari	RD	5.5	101	29	255	1.4	-0.5
Aug 21 18:46	1739	DD	6.4	30	12	68	0.8	2.4
Aug 26 19:29	2394	DD	6.3	98	69	28	9.9	9.9
Aug 26 19:47	2394	RB	6.3	98	66	3	9.9	9.9
Aug 28 21:41	26 Sgr	DD	6.2	124	68	35	1.4	4.1
Aug 29 21:23	53 Sgr	DD	6.4	136	79	56	2.2	1.9
Aug 29 21:33	2875	DD	6.0	136	78	59	2.1	1.8
Sep 03 05:10	Psi 2 Aqr	DB	4.4	173	20	76	0.5	1.5
Sep 13 04:54	57 Gem	DB	5.0	62	18	56	1.0	0.0
Sep 22 19:23	Psi Oph	DD	4.5	68	46	108	1.4	0.3
Sep 22 20:33	Psi Oph	RB	4.5	68	31	273	0.8	1.0
Sep 25 00:35	24 Sgr	DD	5.5	96	9	112	0.1	0.5
Sep 25 21:20	49 Sgr	DD	5.5	107	58	88	1.8	0.9
Sep 25 22:36	49 Sgr	RB	5.5	107	43	245	0.8	1.8
Oct 01 21:20	49	DD	6.1	174	45	21	0.9	2.2
Oct 07 01:28	Ome 2 Tau	DB	4.9	128	30	67	1.8	0.0
Oct 07 02:59	Ome 2 Tau	RD	4.9	127	36	241	2.2	0.8
Oct 10 01:39	37 Gem	RD	5.7	94	8	293	1.4	-1.9
Oct 21 19:06	2602	DD	5.4	62	48	145	2.3	-2.3
Oct 21 19:44	2602	RB	5.4	63	40	209	-0.1	4.1
Oct 25 00:07	3081	DD	6.5	102	19	79	0.2	1.3
Nov 20 22:28	17 Cap	DD	5.9	70	15	102	0.2	0.8
Nov 24 00:09	Psi 2 Aqr	DD	4.4	105	16	346	-1.4	5.6
Nov 24 00:23	Psi 2 Aqr	RB	4.4	105	13	318	1.5	-2.1
Dec 05 03:48	Lam Cnc	RD	5.9	131	32	292	2.2	-0.4
Dec 06 02:08	1373	RD	6.5	119	28	249	2.1	-0.2
Dec 27 21:33	Ome 2 Tau	DD	4.9	150	36	132	4.8	-3.2
Dec 27 22:12	Ome 2 Tau	RB	4.9	150	35	180	0.2	4.5
Dec 27 23:19	53 Tau	DD	5.5	150	31	43	2.1	1.9
Dec 28 02:08	651	DD	6.0	151	8	145	-0.1	-1.5