ASTRONOMY 2020
Supplementary Information
HOBART

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

LUNAR OCCULTATIONS for HOBART (42° 48' S, 147° 13' 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	21:28	3478	DD	6.4	71	23	97	0.8	1.4
Jan 08	20:37	105 Tau	DD	5.8	150	22	112	2.2	-1.4
Jan 09	01:13	108 Tau	DD	6.3	152	14	68	1.4	1.5
Jan 16	02:01	11 Vir	RD	5.7	114	29	10	-0.4	-4.3
Jan 20	03:12	Eta Lib	DB	5.4	62	23	150	-0.1	-2.3
Jan 20	04:02	Eta Lib	RD	5.4	61	33	258	1.0	-1.0
Jan 23	12:50	Jupiter	DB	-1.7	21	59	88	1.7	1.0
Jan 23	14:02	Ganymed	RD	5.4	21	46	260	1.1	1.6
Jan 23	14:09	Jupiter	RD	-1.7	21	45	260	1.1	1.6
Jan 28	20:37	Psi 2 Aqr	RB	4.4	39	10	185	-0.4	3.1
Feb 05	22:03	859	DD	6.6	130	22	54	1.9	1.2
Feb 05	22:45	865	DD	6.2	130	19	89	1.7	0.8
Feb 11	23:19	Xi Vir	RD	4.8	148	23	347	0.6	-2.6
Feb 17	03:34	Chi Oph	DB	4.2	79	41	71	1.5	-0.7
Feb 17	04:27	Chi Oph	RD	4.2	79	51	334	0.4	-3.0
Feb 18	02:39	Xi Oph	DB	4.4	68	24	109	0.2	-1.7
Feb 18	03:42	Xi Oph	RD	4.4	67	35	285	0.6	-1.6
Feb 18	04:35	2509	DB	5.8	67	45	122	0.7	-2.1
Feb 29	19:35	38 Ara	DD	5.2	62	19	100	1.4	1.2
Mar 04	22:07	8 Gem	DD	6.1	109	15	109	1.3	0.6
Mar 05	20:17	48 Gem	DD	5.9	121	23	124	1.9	-0.8
Mar 06	20:21	1239	DD	6.6	134	23	72	1.8	-0.2
Mar 17	02:21	2595	DB	5.7	86	34	150	-0.2	-3.0
Mar 17	03:07	2595	RD	5.7	86	43	236	1.7	0.1
Mar 17	03:50	2604	RD	6.7	85	50	267	1.4	-1.0
Mar 18	01:01	Nu 1 Sgr	RD	4.9	75	11	325	-0.7	-2.5
Mar 18	01:56	2754	RD	5.9	74	21	232	0.7	-0.2
Apr 09	01:26	1965	RD	6.5	171	52	250	2.6	1.4
Apr 09	23:46	2089	RD	6.7	159	50	324	0.8	-2.1
Apr 12	01:44	2401	DB	5.6	130	58	80	1.8	-0.4
Apr 12	02:50	2401	RD	5.6	130	66	320	1.2	-2.3
Apr 12	23:46	52 Oph	RD	6.5	118	30	288	0.3	-1.6

EST		Object	PD	Mag	Elg°	Alt°	PA°	A	B
Apr 14	01:00	2706	DB	5.8	105	33	138	0.0	-2.7
Apr 14	01:53	2706	RD	5.8	105	43	240	1.5	-0.1
Apr 14	02:01	2709	RD	6.7	105	44	320	0.4	-3.0
May 07	01:57	2043	DD	6.5	168	43	118	1.2	0.0
May 07	02:21	2047	DD	6.6	168	40	130	1.0	-0.4
May 09	00:34	2316	RD	6.4	164	64	282	1.7	-0.8
May 09	03:01	2331	RD	6.3	163	58	328	1.4	-1.9
May 10	20:08	2595	RD	5.7	139	6	280	-0.3	-1.2
May 11	22:45	2793	RD	6.7	125	23	343	-1.1	-4.4
May 14	00:23	Eta Cap	DB	4.9	100	19	32	0.9	0.9
May 14	01:03	Eta Cap	RD	4.9	100	27	314	0.0	-3.4
May 14	02:11	3081	RD	6.5	100	39	211	1.4	1.5
May 26	17:44	52 Gem	DD	5.8	41	14	65	1.8	1.7
May 29	19:36	Eta Leo	MB	3.5	80	26	208	9.9	9.9
May 31	23:57	1739	DD	6.4	108	14	150	0.2	-0.7
Jun 06	19:32	52 Oph	RD	6.5	171	23	325	-0.3	-2.3
Jun 07	20:44	2706	RD	5.8	158	26	273	0.3	-1.3
Jun 07	22:04	26 Sgr	RD	6.2	157	40	219	1.9	1.2
Jun 13	03:30	Psi 3 Aqr	DB	5.0	95	43	55	1.3	0.3
Jun 13	04:53	Psi 3 Aqr	RD	5.0	95	53	247	1.8	0.4
Jun 28	21:13	1813	DD	5.7	91	31	142	0.8	-0.7
Jun 30	23:35	2072	DD	6.6	119	34	111	1.0	0.5
Jul 01	23:21	30 Lib	DD	6.5	132	48	145	1.2	-1.3
Jul 02	19:30	2331	DD	6.3	144	53	106	1.3	-1.4
Jul 11	05:44	3506	RD	6.1	114	51	236	1.6	1.6
Jul 13	01:07	33 Cet	RD	6.0	93	11	247	0.4	-0.7
Jul 13	01:56	35 Cet	RD	6.6	93	19	193	0.2	1.9
Jul 13	05:24	89 Psc	DB	5.1	91	43	43	1.4	1.2
Jul 13	06:48	89 Psc	RD	5.1	91	43	246	1.9	1.1
Jul 15	03:34	38 Ara	DB	5.2	70	14	68	0.7	-0.7
Jul 15	04:46	38 Ara	RD	5.2	70	24	231	0.9	0.1
Jul 30	01:44	2316	DD	6.4	117	14	86	0.0	1.4

EST		Object	PD	Mag	Elg°	Alt°	PA°	A	B
Jul 31	01:11	2457	DD	6.3	130	31	116	0.8	0.5
Aug 03	00:22	2921	DD	6.0	167	67	80	1.8	0.9
Aug 03	01:47	2928	DD	6.4	167	55	79	1.4	1.3
Aug 11	02:03	Xi Ari	RD	5.5	101	20	234	0.8	-0.1
Aug 26	18:54	2394	DD	6.3	98	67	83	2.1	0.5
Aug 26	20:09	2394	RB	6.3	98	60	309	1.7	-1.0
Aug 28	21:12	26 Sgr	DD	6.2	124	69	70	1.9	1.3
Aug 29	21:06	53 Sgr	DD	6.4	136	71	86	2.0	0.1
Aug 29	21:17	2875	DD	6.0	136	71	88	2.0	0.1
Sep 03	04:14	Psi 1 Aqr	DD	4.2	173	32	2	-0.3	3.4
Sep 03	04:50	Psi 1 Aqr	RD	4.2	173	26	299	1.4	0.6
Sep 03	04:54	Psi 2 Aqr	DB	4.4	173	26	87	0.8	1.5
Sep 03	05:52	Psi 2 Aqr	RD	4.4	172	15	217	0.0	2.2
Sep 22	19:20	Psi Oph	DD	4.5	68	48	141	1.4	-1.1
Sep 22	20:15	Psi Oph	RB	4.5	68	38	242	0.7	2.4
Sep 25	00:31	24 Sgr	DD	5.5	96	16	132	0.5	0.2
Sep 25	21:09	49 Sgr	DD	5.5	107	61	113	2.0	-0.2
Sep 25	22:13	49 Sgr	RB	5.5	107	50	224	0.6	2.7
Oct 01	21:05	49	DD	6.1	174	35	48	1.0	0.4
Oct 04	22:29	31 Ara	RD	5.6	150	18	292	1.8	-2.8
Oct 07	01:24	Ome 2 Tau	DB	4.9	128	21	81	1.6	-0.7
Oct 07	02:45	Ome 2 Tau	RD	4.9	127	26	229	1.5	0.6
Oct 21	22:41	1 Sgr	DD	5.0	64	13	56	-0.4	1.8
Oct 24	23:54	3081	DD	6.5	102	26	92	0.5	1.4
Oct 28	02:26	3478	DD	6.4	137	15	89	0.4	1.5
Oct 28	23:21	128661	DD	6.6	146	46	31	1.0	2.2
Nov 20	22:19	17 Cap	DD	5.9	70	21	117	0.6	0.7
Nov 23	23:39	Psi 2 Aqr	DD	4.4	105	24	9	-0.2	2.9
Nov 24	00:19	Psi 2 Aqr	RB	4.4	105	17	293	0.7	1.0
Dec 05	03:42	Lam Cnc	RD	5.9	131	23	274	2.0	0.0
Dec 06	02:01	1373	RD	6.5	119	18	228	1.5	0.1
Dec 27	22:58	53 Tau	DD	5.5	150	25	55	1.8	1.1