

Nighttime astronomical calendar program. Select a site: *SELECT SITE* - Enter single-character code: n .. new site (enter all parameters). x .. exit without change (current: Kitt Peak) k .. Kitt Peak s .. Shattuck Observatory c .. Cambridge, MA - Harvard Coll. Obs. h .. Mt. Hopkins, AZ (MMT, FLWO) p .. Palomar Observatory t .. Tololo (Cerro Tololo Interamerican Obs.) r .. Roque de los Muchachos, La Palma, Canary Is. b .. Black Moshannon Obs., Penn State U. d .. Dominion Astrophysical Obs., Victoria, BC m .. Mauna Kea, Hawaii l .. Lick Observatory Any other char .. OTHER (You'll be prompted for params.) Your answer -j The site you've selected is: Kitt Peak. Type 0 for ordinary text, 1 for TeX-style output with one month per page, or 2 for TeX-style output with two months per page: You'll have to edit the TeX output ... look for 'CUT HERE'

This program takes a while to run and produces wide and voluminous output. You probably want to run it in background. See source code or documentation for details of what program will expect. To exit now, give a negative year at the next prompt. Year to print, negative to abort:

***** 2028 Night-time Astronomical Calendar for Kitt Peak *****

By John Thorstensen, Dartmouth College

This calendar is designed to provide information useful for the planning of nighttime observations. The format should minimize confusion; each line gives the phenomena for a single (local!) night, and each line is labeled with both evening and morning (local) day and date. Note that all times given are LOCAL CIVIL (zone) times.

The rise/set times printed are the times at which the center of the object is 50 arcminutes below the geometrical horizon. At the given twilight, the center of the sun is 18.0 degrees below the geometrical horizon.

The moon positions (and rise/set times) are generated by an implementation of the Low-Precision formulae in the Astronomical Almanac. The Almanac states that the error seldom exceeds 0.3 degrees. Topocentric corrections are included. Comparisons with tables for Kitt Peak in the NAOA Newsletter indicate that the rise-set times are good to +/- 2 min or so. The moon's RA, Dec, and illuminated fraction are given for local midnight, regardless of whether the moon is actually up at that time. Note that the moonrise and moonset times are not printed if they occur near mid-day.

The LST at evening and morning twilight are tabulated. This gives an accurate idea of the range of RA's accessible during the night.

The JD is given (severely rounded off) for local midnight. Again, this avoids any ambiguity.

Some credits: The sidereal time and Julian date routines were originally coded in PL/I by Steve Maker of Dartmouth College. The algorithms originated in the old American Ephemeris. The routine to convert JD back to calendar date is adapted from Numerical Recipes in C, by Press et al.

CAUTIONS: I believe that the program which generates these tables is reasonably accurate. However, it has not been exhaustively tested, so you should be sure to run 'sanity checks' on the results. Also, in view of the approximations used, the results should not be used when high precision is needed. Extension to dates far from the present (1990) should be done with great caution. The code has not been tested for the eastern or southern hemishpheres. Rise/set times are slightly inaccurate and rather confusing at circumpolar latitudes, where the concept of a 'night' is blurry.

The daylight savings time conventions (if used) are quite specific (to U. S., post-1986) and subject to change. I know that the code has many infelicities; if you should find actual errors, please notify

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[This output comes from a (hopefully) portable, completely self-contained program in the c language. It is available from the author and may be used freely for scientific or educational purposes. If you use it for profit, please contact the author to arrange a (modest!) fee. Source code is copyright John Thorstensen, 1990.]

MOON PHASES FOR 2028, at Kitt Peak

Times and dates are given in local time, zone = 7 hr West.
They are generally better than +/- 2 minutes.

The end of the previous year and the beginning of the next
are included for continuity.

NEW	1ST	FULL	LAST
Dec 27 13 14	Jan 04 18 41	Jan 11 21 05	Jan 18 12 28
Jan 26 8 14	Feb 03 12 11	Feb 10 8 05	Feb 17 1 10
Feb 25 3 39	Mar 04 2 03	Mar 10 18 07	Mar 17 16 25
Mar 25 21 33	Apr 02 12 16	Apr 09 3 27	Apr 16 9 39
Apr 24 12 49	May 01 19 27	May 08 12 49	May 16 3 44
May 24 1 18	May 31 0 38	Jun 06 23 10	Jun 14 21 29
Jun 22 11 29	Jun 29 5 13	Jul 06 11 12	Jul 14 13 59
Jul 21 20 03	Jul 28 10 42	Aug 05 1 12	Aug 13 4 48
Aug 20 3 45	Aug 26 18 37	Sep 03 16 50	Sep 11 17 48
Sep 18 11 25	Sep 25 6 10	Oct 03 9 27	Oct 11 4 58
Oct 17 19 57	Oct 24 21 53	Nov 02 2 19	Nov 09 14 27
Nov 16 6 19	Nov 23 17 14	Dec 01 18 42	Dec 08 22 40
Dec 15 19 07	Dec 23 14 45	Dec 31 9 50	Jan 07 6 28

***** 2028 JANUARY *****

Calendar for Kitt Peak, west longitude (h.m.s) = 7 26 24, latitude (d.m) = 31 57.8

Note that each line lists events of one night, spanning two calendar dates. Rise/set times are given in Mountain time (7 hr W), for 900 m above surroundings, in standard time all year.

Moon coords. and illum. are for local midnight, even if moon is down. Program: John Thorstensen, Dartmouth College.

Date (eve/morn) (2028 at start)	JDmid (-2460000)	LMSTmidn	----- Sun: -----				LST twilight:		----- Moon: -----				
			set	twi.end	twi.beg	rise	eve	morn	rise	set	%illum	RA	Dec
Sat Jan 01/Sun Jan 02	1772.8	6 19 26	17 38	19 00	6 00	7 22	1 19	12 20	.....	22 14	24	22 41.6	- 4 54
Sun Jan 02/Mon Jan 03	1773.8	6 23 22	17 39	19 01	6 00	7 22	1 23	12 25	.....	23 08	32	23 23.9	0 22
Mon Jan 03/Tue Jan 04	1774.8	6 27 19	17 40	19 02	6 00	7 22	1 28	12 29	.....	0 02	42	0 06.8	5 41
Tue Jan 04/Wed Jan 05	1775.8	6 31 15	17 40	19 02	6 01	7 22	1 33	12 33	.....	0 59	51	0 51.4	10 54
Wed Jan 05/Thu Jan 06	1776.8	6 35 12	17 41	19 03	6 01	7 23	1 37	12 37	.....	1 58	61	1 38.8	15 48
Thu Jan 06/Fri Jan 07	1777.8	6 39 08	17 42	19 04	6 01	7 23	1 42	12 41	.....	3 00	71	2 30.1	20 10
Fri Jan 07/Sat Jan 08	1778.8	6 43 05	17 43	19 04	6 01	7 23	1 47	12 45	.....	4 05	80	3 26.0	23 39
Sat Jan 08/Sun Jan 09	1779.8	6 47 01	17 44	19 05	6 01	7 23	1 51	12 49	.....	5 11	89	4 26.7	25 53
Sun Jan 09/Mon Jan 10	1780.8	6 50 58	17 44	19 06	6 01	7 23	1 56	12 53	.....	6 14	95	5 31.0	26 28
Mon Jan 10/Tue Jan 11	1781.8	6 54 55	17 45	19 07	6 01	7 23	2 01	12 57	.....	7 11	99	6 36.9	25 12
Tue Jan 11/Wed Jan 12	1782.8	6 58 51	17 46	19 07	6 01	7 23	2 05	13 01	.....	8 01	100	7 41.9	22 04
Wed Jan 12/Thu Jan 13	1783.8	7 02 48	17 47	19 08	6 01	7 22	2 10	13 05	.....	18 34	98	8 43.9	17 22
Thu Jan 13/Fri Jan 14	1784.8	7 06 44	17 48	19 09	6 01	7 22	2 15	13 09	.....	19 47	93	9 42.4	11 33
Fri Jan 14/Sat Jan 15	1785.8	7 10 41	17 49	19 10	6 01	7 22	2 19	13 13	.....	20 58	86	10 37.6	5 07
Sat Jan 15/Sun Jan 16	1786.8	7 14 37	17 50	19 10	6 01	7 22	2 24	13 17	.....	22 06	76	11 30.4	- 1 28
Sun Jan 16/Mon Jan 17	1787.8	7 18 34	17 50	19 11	6 01	7 22	2 29	13 21	.....	23 13	66	12 22.1	- 7 48
Mon Jan 17/Tue Jan 18	1788.8	7 22 30	17 51	19 12	6 01	7 22	2 34	13 25	.....	0 18	55	13 13.5	-13 34
Tue Jan 18/Wed Jan 19	1789.8	7 26 27	17 52	19 13	6 01	7 21	2 38	13 28	.....	1 22	44	14 05.7	-18 30
Wed Jan 19/Thu Jan 20	1790.8	7 30 24	17 53	19 14	6 01	7 21	2 43	13 32	.....	2 26	34	14 59.0	-22 25
Thu Jan 20/Fri Jan 21	1791.8	7 34 20	17 54	19 14	6 00	7 21	2 48	13 36	.....	3 27	24	15 53.5	-25 08
Fri Jan 21/Sat Jan 22	1792.8	7 38 17	17 55	19 15	6 00	7 20	2 53	13 39	.....	4 25	16	16 48.6	-26 33
Sat Jan 22/Sun Jan 23	1793.8	7 42 13	17 56	19 16	6 00	7 20	2 57	13 43	.....	5 18	10	17 43.4	-26 39
Sun Jan 23/Mon Jan 24	1794.8	7 46 10	17 57	19 17	6 00	7 20	3 02	13 47	.....	6 05	5	18 36.9	-25 29
Mon Jan 24/Tue Jan 25	1795.8	7 50 06	17 58	19 17	5 59	7 19	3 07	13 50	.....	6 45	2	19 28.3	-23 10
Tue Jan 25/Wed Jan 26	1796.8	7 54 03	17 59	19 18	5 59	7 19	3 12	13 54	.....	7 21	0	20 17.2	-19 54
Wed Jan 26/Thu Jan 27	1797.8	7 57 59	17 59	19 19	5 59	7 18	3 16	13 58	.....	7 52	0	21 03.6	-15 52
Thu Jan 27/Fri Jan 28	1798.8	8 01 56	18 00	19 20	5 58	7 18	3 21	14 01	.....	19 14	2	21 47.9	-11 16
Fri Jan 28/Sat Jan 29	1799.8	8 05 53	18 01	19 21	5 58	7 17	3 26	14 05	.....	20 08	6	22 30.7	- 6 17
Sat Jan 29/Sun Jan 30	1800.8	8 09 49	18 02	19 21	5 57	7 16	3 31	14 08	.....	21 01	11	23 12.8	- 1 05
Sun Jan 30/Mon Jan 31	1801.8	8 13 46	18 03	19 22	5 57	7 16	3 35	14 12	.....	21 55	18	23 55.0	4 10
Mon Jan 31/Tue Feb 01	1802.8	8 17 42	18 04	19 23	5 56	7 15	3 40	14 15	.....	22 50	25	0 38.3	9 20

***** 2028 FEBRUARY *****

Calendar for Kitt Peak, west longitude (h.m.s) = 7 26 24, latitude (d.m) = 31 57.8

Note that each line lists events of one night, spanning two calendar dates. Rise/set times are given in Mountain time (7 hr W), for 900 m above surroundings, in standard time all year.

Moon coords. and illum. are for local midnight, even if moon is down. Program: John Thorstensen, Dartmouth College.

Date (eve/morn) (2028 at start)	JDmid (-2460000)	LMSTmidn	----- Sun: -----				LST twilight:		----- Moon: -----				
			set	twi.end	twi.beg	rise	eve	morn	rise	set	%illum	RA	Dec
Tue Feb 01/Wed Feb 02	1803.8	8 21 39	18 05	19 24	5 56	7 15	3 45	14 18	.....	23 47	34	1 23.7	14 15
Wed Feb 02/Thu Feb 03	1804.8	8 25 35	18 06	19 25	5 55	7 14	3 49	14 22	.....	0 46	44	2 12.1	18 40
Thu Feb 03/Fri Feb 04	1805.8	8 29 32	18 07	19 25	5 55	7 13	3 54	14 25	.....	1 48	54	3 04.4	22 23
Fri Feb 04/Sat Feb 05	1806.8	8 33 28	18 08	19 26	5 54	7 13	3 59	14 29	.....	2 52	65	4 01.0	25 02
Sat Feb 05/Sun Feb 06	1807.8	8 37 25	18 09	19 27	5 53	7 12	4 04	14 32	.....	3 54	75	5 01.7	26 19
Sun Feb 06/Mon Feb 07	1808.8	8 41 22	18 09	19 28	5 53	7 11	4 08	14 35	.....	4 53	84	6 05.3	25 56
Mon Feb 07/Tue Feb 08	1809.8	8 45 18	18 10	19 29	5 52	7 10	4 13	14 38	.....	5 46	92	7 09.7	23 44
Tue Feb 08/Wed Feb 09	1810.8	8 49 15	18 11	19 29	5 51	7 09	4 18	14 42	.....	6 32	97	8 12.9	19 48
Wed Feb 09/Thu Feb 10	1811.8	8 53 11	18 12	19 30	5 51	7 09	4 23	14 45	.....	7 13	100	9 13.7	14 26
Thu Feb 10/Fri Feb 11	1812.8	8 57 08	18 13	19 31	5 50	7 08	4 27	14 48	.....	7 50	99	10 11.6	8 06
Fri Feb 11/Sat Feb 12	1813.8	9 01 04	18 14	19 32	5 49	7 07	4 32	14 51	.....	19 44	95	11 07.3	1 19
Sat Feb 12/Sun Feb 13	1814.8	9 05 01	18 15	19 32	5 48	7 06	4 37	14 54	.....	20 54	89	12 01.5	- 5 26
Sun Feb 13/Mon Feb 14	1815.8	9 08 57	18 16	19 33	5 48	7 05	4 41	14 57	.....	22 02	81	12 55.2	-11 42
Mon Feb 14/Tue Feb 15	1816.8	9 12 54	18 16	19 34	5 47	7 04	4 46	15 01	.....	23 10	71	13 49.3	-17 09
Tue Feb 15/Wed Feb 16	1817.8	9 16 51	18 17	19 35	5 46	7 03	4 51	15 04	.....	0 16	60	14 44.2	-21 32
Wed Feb 16/Thu Feb 17	1818.8	9 20 47	18 18	19 35	5 45	7 02	4 56	15 07	.....	1 20	50	15 40.0	-24 39
Thu Feb 17/Fri Feb 18	1819.8	9 24 44	18 19	19 36	5 44	7 01	5 00	15 10	.....	2 20	40	16 36.0	-26 25
Fri Feb 18/Sat Feb 19	1820.8	9 28 40	18 20	19 37	5 43	7 00	5 05	15 13	.....	3 15	30	17 31.5	-26 49
Sat Feb 19/Sun Feb 20	1821.8	9 32 37	18 21	19 38	5 42	6 59	5 10	15 16	.....	4 03	22	18 25.6	-25 55
Sun Feb 20/Mon Feb 21	1822.8	9 36 33	18 21	19 38	5 41	6 58	5 14	15 19	.....	4 45	14	19 17.4	-23 51
Mon Feb 21/Tue Feb 22	1823.8	9 40 30	18 22	19 39	5 40	6 57	5 19	15 22	.....	5 22	8	20 06.7	-20 48
Tue Feb 22/Wed Feb 23	1824.8	9 44 26	18 23	19 40	5 39	6 56	5 24	15 25	.....	5 54	4	20 53.5	-16 57
Wed Feb 23/Thu Feb 24	1825.8	9 48 23	18 24	19 41	5 38	6 55	5 28	15 28	.....	6 24	17 08	1 21 38.1	-12 29
Thu Feb 24/Fri Feb 25	1826.8	9 52 20	18 25	19 41	5 37	6 54	5 33	15 30	.....	6 51	18 02	0 22 21.2	- 7 36
Fri Feb 25/Sat Feb 26	1827.8	9 56 16	18 25	19 42	5 36	6 53	5 38	15 33	.....	7 17	18 56	1 23 03.4	- 2 27
Sat Feb 26/Sun Feb 27	1828.8	10 00 13	18 26	19 43	5 35	6 52	5 42	15 36	.....	7 43	19 50	3 23 45.6	2 47
Sun Feb 27/Mon Feb 28	1829.8	10 04 09	18 27	19 44	5 34	6 51	5 47	15 39	.....	20 45	7	0 28.5	7 58
Mon Feb 28/Tue Feb 29	1830.8	10 08 06	18 28	19 44	5 33	6 49	5 52	15 42	.....	21 41	13	1 13.1	12 53
Tue Feb 29/Wed Mar 01	1831.8	10 12 02	18 29	19 45	5 32	6 48	5 57	15 45	.....	22 39	20	2 00.0	17 23

***** 2028 MARCH *****

Calendar for Kitt Peak, west longitude (h.m.s) = 7 26 24, latitude (d.m) = 31 57.8
 Note that each line lists events of one night, spanning two calendar dates. Rise/set times are given
 in Mountain time (7 hr W), for 900 m above surroundings, in standard time all year.
 Moon coords. and illum. are for local midnight, even if moon is down. Program: John Thorstensen, Dartmouth College.

Date (eve/morn) (2028 at start)	JDmid (-2460000)	LMSTmidn	----- Sun: -----				LST twilight:		----- Moon: -----				
			set	twi.end	twi.beg	rise	eve	morn	rise	set	%illum	RA	Dec
Wed Mar 01/Thu Mar 02	1832.8	10 15 59	18 29	19 46	5 31	6 47	6 01	15 47	.....	23 39	28	2 50.2	21 12
Thu Mar 02/Fri Mar 03	1833.8	10 19 55	18 30	19 47	5 29	6 46	6 06	15 50	.....	0 40	38	3 44.0	24 06
Fri Mar 03/Sat Mar 04	1834.8	10 23 52	18 31	19 47	5 28	6 45	6 11	15 53	.....	1 41	48	4 41.3	25 47
Sat Mar 04/Sun Mar 05	1835.8	10 27 49	18 32	19 48	5 27	6 44	6 15	15 56	.....	2 40	59	5 41.5	26 00
Sun Mar 05/Mon Mar 06	1836.8	10 31 45	18 32	19 49	5 26	6 42	6 20	15 59	.....	3 33	70	6 43.1	24 35
Mon Mar 06/Tue Mar 07	1837.8	10 35 42	18 33	19 50	5 25	6 41	6 25	16 01	.....	4 21	80	7 44.6	21 31
Tue Mar 07/Wed Mar 08	1838.8	10 39 38	18 34	19 50	5 23	6 40	6 29	16 04	.....	5 04	89	8 44.7	16 56
Wed Mar 08/Thu Mar 09	1839.8	10 43 35	18 34	19 51	5 22	6 39	6 34	16 07	.....	5 42	95	9 42.9	11 09
Thu Mar 09/Fri Mar 10	1840.8	10 47 31	18 35	19 52	5 21	6 37	6 39	16 09	17 17	6 17	99	10 39.4	4 36
Fri Mar 10/Sat Mar 11	1841.8	10 51 28	18 36	19 53	5 20	6 36	6 43	16 12	18 28	6 52	100	11 34.7	- 2 15
Sat Mar 11/Sun Mar 12	1842.8	10 55 24	18 37	19 53	5 18	6 35	6 48	16 15	19 38	7 27	97	12 29.9	- 8 55
Sun Mar 12/Mon Mar 13	1843.8	10 59 21	18 37	19 54	5 17	6 34	6 53	16 17	20 48	.....	92	13 25.6	-14 57
Mon Mar 13/Tue Mar 14	1844.8	11 03 18	18 38	19 55	5 16	6 32	6 57	16 20	21 57	.....	85	14 22.4	-19 58
Tue Mar 14/Wed Mar 15	1845.8	11 07 14	18 39	19 56	5 15	6 31	7 02	16 23	23 05	.....	76	15 20.1	-23 42
Wed Mar 15/Thu Mar 16	1846.8	11 11 11	18 39	19 56	5 13	6 30	7 07	16 25	0 08	.....	66	16 18.2	-26 00
Thu Mar 16/Fri Mar 17	1847.8	11 15 07	18 40	19 57	5 12	6 29	7 11	16 28	1 07	.....	56	17 15.7	-26 49
Fri Mar 17/Sat Mar 18	1848.8	11 19 04	18 41	19 58	5 11	6 27	7 16	16 30	1 59	.....	46	18 11.5	-26 15
Sat Mar 18/Sun Mar 19	1849.8	11 23 00	18 42	19 59	5 09	6 26	7 21	16 33	2 44	.....	37	19 04.8	-24 27
Sun Mar 19/Mon Mar 20	1850.8	11 26 57	18 42	19 59	5 08	6 25	7 26	16 36	3 22	.....	28	19 55.2	-21 37
Mon Mar 20/Tue Mar 21	1851.8	11 30 53	18 43	20 00	5 06	6 23	7 30	16 38	3 56	.....	20	20 42.7	-17 56
Tue Mar 21/Wed Mar 22	1852.8	11 34 50	18 44	20 01	5 05	6 22	7 35	16 41	4 26	.....	13	21 27.9	-13 38
Wed Mar 22/Thu Mar 23	1853.8	11 38 47	18 44	20 02	5 04	6 21	7 40	16 43	4 54	.....	7	22 11.3	- 8 52
Thu Mar 23/Fri Mar 24	1854.8	11 42 43	18 45	20 02	5 02	6 20	7 44	16 46	5 20	16 51	3	22 53.8	- 3 48
Fri Mar 24/Sat Mar 25	1855.8	11 46 40	18 46	20 03	5 01	6 18	7 49	16 48	5 47	17 45	1	23 36.1	1 25
Sat Mar 25/Sun Mar 26	1856.8	11 50 36	18 46	20 04	5 00	6 17	7 54	16 51	6 14	18 39	0	0 19.0	6 36
Sun Mar 26/Mon Mar 27	1857.8	11 54 33	18 47	20 05	4 58	6 16	7 59	16 54	6 43	19 35	1	1 03.4	11 35
Mon Mar 27/Tue Mar 28	1858.8	11 58 29	18 48	20 06	4 57	6 15	8 03	16 56	.....	20 33	4	1 50.0	16 10
Tue Mar 28/Wed Mar 29	1859.8	12 02 26	18 48	20 06	4 55	6 13	8 08	16 59	.....	21 33	9	2 39.5	20 08
Wed Mar 29/Thu Mar 30	1860.8	12 06 22	18 49	20 07	4 54	6 12	8 13	17 01	.....	22 34	16	3 32.1	23 12
Thu Mar 30/Fri Mar 31	1861.8	12 10 19	18 50	20 08	4 53	6 11	8 18	17 04	.....	23 34	24	4 27.9	25 08
Fri Mar 31/Sat Apr 01	1862.8	12 14 16	18 50	20 09	4 51	6 09	8 22	17 06	.....	0 33	33	5 26.1	25 42

***** 2028 APRIL *****

Calendar for Kitt Peak, west longitude (h.m.s) = 7 26 24, latitude (d.m) = 31 57.8
 Note that each line lists events of one night, spanning two calendar dates. Rise/set times are given
 in Mountain time (7 hr W), for 900 m above surroundings, in standard time all year.
 Moon coords. and illum. are for local midnight, even if moon is down. Program: John Thorstensen, Dartmouth College.

Date (eve/morn) (2028 at start)	JDmid (-2460000)	LMSTmidn	----- Sun: ----- set twi.end twi.beg rise				LST twilight: eve morn		----- Moon: ----- rise set %illum RA Dec				
Sat Apr 01/Sun Apr 02	1863.8	12 18 12	18 51	20 10	4 50	6 08	8 27	17 09	.....	1 27	44	6 25.6	24 46
Sun Apr 02/Mon Apr 03	1864.8	12 22 09	18 52	20 10	4 48	6 07	8 32	17 11	.....	2 15	55	7 24.9	22 17
Mon Apr 03/Tue Apr 04	1865.8	12 26 05	18 53	20 11	4 47	6 06	8 37	17 14	.....	2 58	66	8 23.1	18 22
Tue Apr 04/Wed Apr 05	1866.8	12 30 02	18 53	20 12	4 45	6 04	8 42	17 16	.....	3 36	77	9 19.7	13 14
Wed Apr 05/Thu Apr 06	1867.8	12 33 58	18 54	20 13	4 44	6 03	8 46	17 19	.....	4 12	86	10 14.8	7 12
Thu Apr 06/Fri Apr 07	1868.8	12 37 55	18 55	20 14	4 43	6 02	8 51	17 21	.....	4 46	93	11 09.2	0 39
Fri Apr 07/Sat Apr 08	1869.8	12 41 51	18 55	20 15	4 41	6 01	8 56	17 24	17 13	5 20	98	12 03.5	- 6 00
Sat Apr 08/Sun Apr 09	1870.8	12 45 48	18 56	20 16	4 40	5 59	9 01	17 26	18 23	5 56	100	12 58.8	-12 18
Sun Apr 09/Mon Apr 10	1871.8	12 49 45	18 57	20 16	4 38	5 58	9 06	17 29	19 33	6 36	99	13 55.7	-17 50
Mon Apr 10/Tue Apr 11	1872.8	12 53 41	18 57	20 17	4 37	5 57	9 10	17 31	20 42	.....	95	14 54.3	-22 13
Tue Apr 11/Wed Apr 12	1873.8	12 57 38	18 58	20 18	4 36	5 56	9 15	17 34	21 50	.....	89	15 54.0	-25 11
Wed Apr 12/Thu Apr 13	1874.8	13 01 34	18 59	20 19	4 34	5 55	9 20	17 37	22 53	.....	81	16 53.8	-26 37
Thu Apr 13/Fri Apr 14	1875.8	13 05 31	18 59	20 20	4 33	5 53	9 25	17 39	23 49	.....	72	17 52.1	-26 32
Fri Apr 14/Sat Apr 15	1876.8	13 09 27	19 00	20 21	4 31	5 52	9 30	17 42	0 38	.....	63	18 47.8	-25 04
Sat Apr 15/Sun Apr 16	1877.8	13 13 24	19 01	20 22	4 30	5 51	9 35	17 44	1 20	.....	53	19 40.3	-22 28
Sun Apr 16/Mon Apr 17	1878.8	13 17 20	19 01	20 23	4 29	5 50	9 39	17 47	1 56	.....	44	20 29.4	-18 59
Mon Apr 17/Tue Apr 18	1879.8	13 21 17	19 02	20 24	4 27	5 49	9 44	17 49	2 27	.....	35	21 15.7	-14 48
Tue Apr 18/Wed Apr 19	1880.8	13 25 14	19 03	20 25	4 26	5 48	9 49	17 52	2 56	.....	26	21 59.8	-10 09
Wed Apr 19/Thu Apr 20	1881.8	13 29 10	19 04	20 26	4 25	5 47	9 54	17 55	3 23	.....	18	22 42.6	- 5 09
Thu Apr 20/Fri Apr 21	1882.8	13 33 07	19 04	20 26	4 23	5 45	9 59	17 57	3 49	.....	12	23 25.0	0 00
Fri Apr 21/Sat Apr 22	1883.8	13 37 03	19 05	20 27	4 22	5 44	10 04	18 00	4 16	.....	6	0 07.8	5 11
Sat Apr 22/Sun Apr 23	1884.8	13 41 00	19 06	20 28	4 21	5 43	10 09	18 02	4 44	17 27	3	0 52.0	10 13
Sun Apr 23/Mon Apr 24	1885.8	13 44 56	19 06	20 29	4 19	5 42	10 14	18 05	5 16	18 25	0	1 38.4	14 55
Mon Apr 24/Tue Apr 25	1886.8	13 48 53	19 07	20 30	4 18	5 41	10 19	18 08	5 52	19 24	0	2 27.6	19 02
Tue Apr 25/Wed Apr 26	1887.8	13 52 49	19 08	20 31	4 17	5 40	10 24	18 10	6 34	20 26	2	3 20.1	22 19
Wed Apr 26/Thu Apr 27	1888.8	13 56 46	19 09	20 32	4 15	5 39	10 28	18 13	.....	21 28	6	4 15.6	24 30
Thu Apr 27/Fri Apr 28	1889.8	14 00 43	19 09	20 33	4 14	5 38	10 33	18 16	.....	22 28	12	5 13.6	25 21
Fri Apr 28/Sat Apr 29	1890.8	14 04 39	19 10	20 34	4 13	5 37	10 38	18 18	.....	23 23	20	6 12.6	24 43
Sat Apr 29/Sun Apr 30	1891.8	14 08 36	19 11	20 35	4 12	5 36	10 43	18 21	.....	0 13	30	7 11.4	22 34
Sun Apr 30/Mon May 01	1892.8	14 12 32	19 11	20 36	4 10	5 35	10 48	18 24	.....	0 57	40	8 08.7	19 03

***** 2028 MAY *****

Calendar for Kitt Peak, west longitude (h.m.s) = 7 26 24, latitude (d.m) = 31 57.8

Note that each line lists events of one night, spanning two calendar dates. Rise/set times are given in Mountain time (7 hr W), for 900 m above surroundings, in standard time all year.

Moon coords. and illum. are for local midnight, even if moon is down. Program: John Thorstensen, Dartmouth College.

Date (eve/morn) (2028 at start)	JDmid (-2460000)	LMSTmidn	----- Sun: -----				LST twilight:		----- Moon: -----				
			set	twi.end	twi.beg	rise	eve	morn	rise	set	%illum	RA	Dec
Mon May 01/Tue May 02	1893.8	14 16 29	19 12	20 37	4 09	5 34	10 53	18 26	.....	1 35	52	9 04.1	14 21
Tue May 02/Wed May 03	1894.8	14 20 25	19 13	20 38	4 08	5 33	10 58	18 29	.....	2 11	63	9 57.7	8 46
Wed May 03/Thu May 04	1895.8	14 24 22	19 14	20 39	4 07	5 32	11 03	18 32	.....	2 44	74	10 50.3	2 36
Thu May 04/Fri May 05	1896.8	14 28 18	19 14	20 40	4 06	5 31	11 08	18 35	.....	3 17	83	11 42.8	- 3 47
Fri May 05/Sat May 06	1897.8	14 32 15	19 15	20 41	4 05	5 31	11 13	18 37	.....	3 51	91	12 36.1	-10 02
Sat May 06/Sun May 07	1898.8	14 36 12	19 16	20 42	4 03	5 30	11 18	18 40	.....	4 28	97	13 31.1	-15 46
Sun May 07/Mon May 08	1899.8	14 40 08	19 17	20 43	4 02	5 29	11 23	18 43	18 21	5 10	99	14 28.4	-20 34
Mon May 08/Tue May 09	1900.8	14 44 05	19 17	20 44	4 01	5 28	11 28	18 46	19 29	5 57	99	15 27.8	-24 07
Tue May 09/Wed May 10	1901.8	14 48 01	19 18	20 45	4 00	5 27	11 33	18 49	20 35	.....	97	16 28.3	-26 12
Wed May 10/Thu May 11	1902.8	14 51 58	19 19	20 46	3 59	5 27	11 38	18 52	21 35	.....	92	17 28.4	-26 41
Thu May 11/Fri May 12	1903.8	14 55 54	19 19	20 47	3 58	5 26	11 43	18 55	22 28	.....	86	18 26.5	-25 42
Fri May 12/Sat May 13	1904.8	14 59 51	19 20	20 48	3 57	5 25	11 48	18 58	23 14	.....	78	19 21.4	-23 26
Sat May 13/Sun May 14	1905.8	15 03 47	19 21	20 49	3 56	5 24	11 52	19 00	23 52	.....	70	20 12.7	-20 09
Sun May 14/Mon May 15	1906.8	15 07 44	19 21	20 50	3 55	5 24	11 57	19 03	0 26	.....	60	21 00.7	-16 06
Mon May 15/Tue May 16	1907.8	15 11 41	19 22	20 51	3 54	5 23	12 02	19 06	0 56	.....	51	21 46.0	-11 32
Tue May 16/Wed May 17	1908.8	15 15 37	19 23	20 52	3 53	5 23	12 07	19 10	1 24	.....	42	22 29.4	- 6 36
Wed May 17/Thu May 18	1909.8	15 19 34	19 24	20 53	3 52	5 22	12 12	19 13	1 50	.....	33	23 12.0	- 1 29
Thu May 18/Fri May 19	1910.8	15 23 30	19 24	20 54	3 52	5 21	12 17	19 16	2 17	.....	24	23 54.7	3 41
Fri May 19/Sat May 20	1911.8	15 27 27	19 25	20 55	3 51	5 21	12 22	19 19	2 44	.....	16	0 38.5	8 45
Sat May 20/Sun May 21	1912.8	15 31 23	19 26	20 56	3 50	5 20	12 27	19 22	3 15	.....	10	1 24.2	13 33
Sun May 21/Mon May 22	1913.8	15 35 20	19 26	20 57	3 49	5 20	12 32	19 25	3 49	.....	5	2 12.8	17 50
Mon May 22/Tue May 23	1914.8	15 39 16	19 27	20 58	3 48	5 19	12 37	19 28	4 29	18 14	1	3 04.7	21 23
Tue May 23/Wed May 24	1915.8	15 43 13	19 28	20 59	3 48	5 19	12 41	19 31	5 17	19 17	0	4 00.1	23 53
Wed May 24/Thu May 25	1916.8	15 47 10	19 28	21 00	3 47	5 18	12 46	19 35	6 12	20 18	1	4 58.3	25 05
Thu May 25/Fri May 26	1917.8	15 51 06	19 29	21 01	3 46	5 18	12 51	19 38	.....	21 17	4	5 58.1	24 47
Fri May 26/Sat May 27	1918.8	15 55 03	19 30	21 01	3 46	5 18	12 56	19 41	.....	22 09	10	6 57.7	22 56
Sat May 27/Sun May 28	1919.8	15 58 59	19 30	21 02	3 45	5 17	13 01	19 45	.....	22 56	18	7 55.8	19 40
Sun May 28/Mon May 29	1920.8	16 02 56	19 31	21 03	3 44	5 17	13 06	19 48	.....	23 36	27	8 51.7	15 11
Mon May 29/Tue May 30	1921.8	16 06 52	19 31	21 04	3 44	5 17	13 10	19 51	.....	0 12	38	9 45.3	9 48
Tue May 30/Wed May 31	1922.8	16 10 49	19 32	21 05	3 43	5 16	13 15	19 55	.....	0 46	49	10 37.3	3 51
Wed May 31/Thu Jun 01	1923.8	16 14 45	19 33	21 05	3 43	5 16	13 20	19 58	.....	1 18	61	11 28.5	- 2 21

***** 2028 JUNE *****

Calendar for Kitt Peak, west longitude (h.m.s) = 7 26 24, latitude (d.m) = 31 57.8

Note that each line lists events of one night, spanning two calendar dates. Rise/set times are given in Mountain time (7 hr W), for 900 m above surroundings, in standard time all year.

Moon coords. and illum. are for local midnight, even if moon is down. Program: John Thorstensen, Dartmouth College.

Date (eve/morn)		JDmid	LMSTmidn	----- Sun: -----				LST twilight:		----- Moon: -----				
(2028 at start)		(-2460000)		set	twi.end	twi.beg	rise	eve	morn	rise	set	%illum	RA	Dec
Thu Jun 01/Fri Jun 02	1924.8	16 18 42	19 33	21 06	3 43	5 16	13 24	20 02	.....	1 51	72	12 20.0	- 8 28
Fri Jun 02/Sat Jun 03	1925.8	16 22 39	19 34	21 07	3 42	5 16	13 29	20 05	.....	2 26	81	13 12.9	-14 11
Sat Jun 03/Sun Jun 04	1926.8	16 26 35	19 34	21 08	3 42	5 15	13 34	20 09	.....	3 05	89	14 08.0	-19 10
Sun Jun 04/Mon Jun 05	1927.8	16 30 32	19 35	21 08	3 41	5 15	13 38	20 13	.....	3 48	95	15 05.4	-23 04
Mon Jun 05/Tue Jun 06	1928.8	16 34 28	19 35	21 09	3 41	5 15	13 43	20 16	18 19	4 38	99	16 04.8	-25 38	
Tue Jun 06/Wed Jun 07	1929.8	16 38 25	19 36	21 10	3 41	5 15	13 48	20 20	19 21	5 33	100	17 04.8	-26 42	
Wed Jun 07/Thu Jun 08	1930.8	16 42 21	19 36	21 10	3 41	5 15	13 52	20 24	20 17	.....	99	18 03.9	-26 14
Thu Jun 08/Fri Jun 09	1931.8	16 46 18	19 37	21 11	3 40	5 15	13 57	20 27	21 06	.....	95	19 00.5	-24 23
Fri Jun 09/Sat Jun 10	1932.8	16 50 14	19 37	21 12	3 40	5 15	14 01	20 31	21 48	.....	90	19 53.8	-21 24
Sat Jun 10/Sun Jun 11	1933.8	16 54 11	19 37	21 12	3 40	5 15	14 06	20 35	22 24	.....	84	20 43.6	-17 32
Sun Jun 11/Mon Jun 12	1934.8	16 58 08	19 38	21 13	3 40	5 15	14 10	20 39	22 56	.....	76	21 30.4	-13 03
Mon Jun 12/Tue Jun 13	1935.8	17 02 04	19 38	21 13	3 40	5 15	14 15	20 43	23 24	.....	67	22 14.8	- 8 09
Tue Jun 13/Wed Jun 14	1936.8	17 06 01	19 39	21 13	3 40	5 15	14 19	20 47	23 51	.....	58	22 57.9	- 3 03
Wed Jun 14/Thu Jun 15	1937.8	17 09 57	19 39	21 14	3 40	5 15	14 23	20 51	0 17	.....	49	23 40.5	2 08
Thu Jun 15/Fri Jun 16	1938.8	17 13 54	19 39	21 14	3 40	5 15	14 28	20 55	0 44	.....	39	0 23.8	7 14
Fri Jun 16/Sat Jun 17	1939.8	17 17 50	19 40	21 15	3 40	5 15	14 32	20 59	1 13	.....	30	1 08.6	12 06
Sat Jun 17/Sun Jun 18	1940.8	17 21 47	19 40	21 15	3 40	5 15	14 36	21 03	1 45	.....	21	1 56.0	16 32
Sun Jun 18/Mon Jun 19	1941.8	17 25 43	19 40	21 15	3 40	5 16	14 41	21 07	2 23	.....	14	2 46.6	20 20
Mon Jun 19/Tue Jun 20	1942.8	17 29 40	19 40	21 16	3 41	5 16	14 45	21 11	3 07	.....	7	3 40.9	23 11
Tue Jun 20/Wed Jun 21	1943.8	17 33 37	19 41	21 16	3 41	5 16	14 49	21 15	3 59	18 04	3	4 38.6	24 50	
Wed Jun 21/Thu Jun 22	1944.8	17 37 33	19 41	21 16	3 41	5 16	14 53	21 19	4 59	19 04	0	5 38.6	25 00	
Thu Jun 22/Fri Jun 23	1945.8	17 41 30	19 41	21 16	3 41	5 16	14 57	21 23	6 05	20 01	0	6 39.5	23 36	
Fri Jun 23/Sat Jun 24	1946.8	17 45 26	19 41	21 16	3 42	5 17	15 01	21 28	.....	20 50	3	7 39.3	20 39
Sat Jun 24/Sun Jun 25	1947.8	17 49 23	19 41	21 16	3 42	5 17	15 05	21 32	.....	21 34	8	8 36.9	16 22
Sun Jun 25/Mon Jun 26	1948.8	17 53 19	19 41	21 16	3 42	5 17	15 09	21 36	.....	22 12	16	9 32.0	11 05
Mon Jun 26/Tue Jun 27	1949.8	17 57 16	19 42	21 16	3 43	5 18	15 13	21 41	.....	22 47	25	10 25.0	5 10
Tue Jun 27/Wed Jun 28	1950.8	18 01 12	19 42	21 16	3 43	5 18	15 17	21 45	.....	23 20	36	11 16.6	- 1 03
Wed Jun 28/Thu Jun 29	1951.8	18 05 09	19 42	21 16	3 44	5 18	15 21	21 50	.....	23 53	47	12 07.8	- 7 11
Thu Jun 29/Fri Jun 30	1952.8	18 09 06	19 42	21 16	3 44	5 19	15 25	21 54	.....	0 27	58	12 59.8	-12 57
Fri Jun 30/Sat Jul 01	1953.8	18 13 02	19 42	21 16	3 45	5 19	15 29	21 58	.....	1 04	69	13 53.3	-18 02

***** 2028 JULY *****

Calendar for Kitt Peak, west longitude (h.m.s) = 7 26 24, latitude (d.m) = 31 57.8
 Note that each line lists events of one night, spanning two calendar dates. Rise/set times are given
 in Mountain time (7 hr W), for 900 m above surroundings, in standard time all year.
 Moon coords. and illum. are for local midnight, even if moon is down. Program: John Thorstensen, Dartmouth College.

Date (eve/morn) (2028 at start)	JDmid (-2460000)	LMSTmidn	----- Sun: ----- set twi.end twi.beg rise				LST twilight: eve morn		----- Moon: ----- rise set %illum RA Dec				
Sat Jul 01/Sun Jul 02	1954.8	18 16 59	19 42	21 16	3 45	5 20	15 32	22 03	.....	1 45	79	14 48.9	-22 10
Sun Jul 02/Mon Jul 03	1955.8	18 20 55	19 41	21 16	3 46	5 20	15 36	22 07	.....	2 32	87	15 46.5	-25 03
Mon Jul 03/Tue Jul 04	1956.8	18 24 52	19 41	21 15	3 47	5 21	15 40	22 12	.....	3 24	93	16 45.4	-26 32
Tue Jul 04/Wed Jul 05	1957.8	18 28 48	19 41	21 15	3 47	5 21	15 44	22 17	18 09	4 21	98	17 44.0	-26 33
Wed Jul 05/Thu Jul 06	1958.8	18 32 45	19 41	21 15	3 48	5 22	15 47	22 21	19 00	5 20	100	18 41.1	-25 09
Thu Jul 06/Fri Jul 07	1959.8	18 36 41	19 41	21 15	3 48	5 22	15 51	22 26	19 44	6 20	100	19 35.4	-22 31
Fri Jul 07/Sat Jul 08	1960.8	18 40 38	19 41	21 14	3 49	5 23	15 54	22 30	20 22	.....	98	20 26.5	-18 55
Sat Jul 08/Sun Jul 09	1961.8	18 44 35	19 41	21 14	3 50	5 23	15 58	22 35	20 55	.....	94	21 14.5	-14 35
Sun Jul 09/Mon Jul 10	1962.8	18 48 31	19 40	21 13	3 51	5 24	16 01	22 40	21 25	.....	88	21 59.9	- 9 45
Mon Jul 10/Tue Jul 11	1963.8	18 52 28	19 40	21 13	3 51	5 24	16 05	22 44	21 52	.....	81	22 43.6	- 4 40
Tue Jul 11/Wed Jul 12	1964.8	18 56 24	19 40	21 12	3 52	5 25	16 08	22 49	22 19	.....	73	23 26.5	0 32
Wed Jul 12/Thu Jul 13	1965.8	19 00 21	19 39	21 12	3 53	5 25	16 12	22 54	22 45	.....	65	0 09.5	5 41
Thu Jul 13/Fri Jul 14	1966.8	19 04 17	19 39	21 11	3 54	5 26	16 15	22 59	23 13	.....	55	0 53.5	10 38
Fri Jul 14/Sat Jul 15	1967.8	19 08 14	19 39	21 11	3 55	5 26	16 18	23 03	23 43	.....	45	1 39.5	15 12
Sat Jul 15/Sun Jul 16	1968.8	19 12 10	19 38	21 10	3 55	5 27	16 22	23 08	0 17	.....	36	2 28.4	19 11
Sun Jul 16/Mon Jul 17	1969.8	19 16 07	19 38	21 09	3 56	5 28	16 25	23 13	0 57	.....	26	3 20.8	22 22
Mon Jul 17/Tue Jul 18	1970.8	19 20 04	19 37	21 08	3 57	5 28	16 28	23 18	1 45	.....	18	4 16.7	24 27
Tue Jul 18/Wed Jul 19	1971.8	19 24 00	19 37	21 08	3 58	5 29	16 31	23 23	2 41	.....	10	5 15.7	25 12
Wed Jul 19/Thu Jul 20	1972.8	19 27 57	19 36	21 07	3 59	5 30	16 34	23 28	3 45	17 46	4	6 16.5	24 23
Thu Jul 20/Fri Jul 21	1973.8	19 31 53	19 36	21 06	4 00	5 30	16 38	23 32	4 54	18 39	1	7 17.3	21 58
Fri Jul 21/Sat Jul 22	1974.8	19 35 50	19 35	21 05	4 01	5 31	16 41	23 37	6 06	19 27	0	8 16.7	18 05
Sat Jul 22/Sun Jul 23	1975.8	19 39 46	19 35	21 05	4 02	5 31	16 44	23 42	.....	20 08	2	9 13.9	13 00
Sun Jul 23/Mon Jul 24	1976.8	19 43 43	19 34	21 04	4 03	5 32	16 47	23 47	.....	20 46	7	10 08.8	7 06
Mon Jul 24/Tue Jul 25	1977.8	19 47 39	19 33	21 03	4 03	5 33	16 50	23 52	.....	21 20	14	11 02.0	0 47
Tue Jul 25/Wed Jul 26	1978.8	19 51 36	19 33	21 02	4 04	5 33	16 53	23 57	.....	21 54	23	11 54.4	- 5 32
Wed Jul 26/Thu Jul 27	1979.8	19 55 33	19 32	21 01	4 05	5 34	16 56	0 02	.....	22 28	33	12 46.9	-11 31
Thu Jul 27/Fri Jul 28	1980.8	19 59 29	19 31	21 00	4 06	5 35	16 59	0 06	.....	23 05	44	13 40.4	-16 50
Fri Jul 28/Sat Jul 29	1981.8	20 03 26	19 31	20 59	4 07	5 35	17 02	0 11	.....	23 45	56	14 35.6	-21 12
Sat Jul 29/Sun Jul 30	1982.8	20 07 22	19 30	20 58	4 08	5 36	17 05	0 16	.....	0 30	66	15 32.3	-24 23
Sun Jul 30/Mon Jul 31	1983.8	20 11 19	19 29	20 57	4 09	5 37	17 08	0 21	.....	1 20	76	16 30.2	-26 12
Mon Jul 31/Tue Aug 01	1984.8	20 15 15	19 28	20 56	4 10	5 37	17 10	0 26	.....	2 14	84	17 28.1	-26 36

***** 2028 AUGUST *****

Calendar for Kitt Peak, west longitude (h.m.s) = 7 26 24, latitude (d.m) = 31 57.8

Note that each line lists events of one night, spanning two calendar dates. Rise/set times are given in Mountain time (7 hr W), for 900 m above surroundings, in standard time all year.

Moon coords. and illum. are for local midnight, even if moon is down. Program: John Thorstensen, Dartmouth College.

Date (eve/morn) (2028 at start)	JDmid (-2460000)	LMSTmidn	----- Sun: -----				LST twilight:		----- Moon: -----				
			set	twi.end	twi.beg	rise	eve	morn	rise	set	%illum	RA	Dec
Tue Aug 01/Wed Aug 02	1985.8	20 19 12	19 28	20 55	4 11	5 38	17 13	0 31	.....	3 12	91	18 24.8	-25 36
Wed Aug 02/Thu Aug 03	1986.8	20 23 08	19 27	20 54	4 12	5 39	17 16	0 36	17 42	4 11	96	19 19.3	-23 21
Thu Aug 03/Fri Aug 04	1987.8	20 27 05	19 26	20 52	4 13	5 39	17 19	0 41	18 22	5 10	99	20 10.9	-20 02
Fri Aug 04/Sat Aug 05	1988.8	20 31 02	19 25	20 51	4 14	5 40	17 22	0 46	18 56	6 07	100	20 59.6	-15 56
Sat Aug 05/Sun Aug 06	1989.8	20 34 58	19 24	20 50	4 15	5 41	17 25	0 50	19 27	.....	99	21 45.8	-11 15
Sun Aug 06/Mon Aug 07	1990.8	20 38 55	19 23	20 49	4 16	5 41	17 27	0 55	19 55	.....	96	22 30.1	- 6 12
Mon Aug 07/Tue Aug 08	1991.8	20 42 51	19 22	20 48	4 17	5 42	17 30	1 00	20 22	.....	92	23 13.3	- 1 00
Tue Aug 08/Wed Aug 09	1992.8	20 46 48	19 21	20 46	4 18	5 43	17 33	1 05	20 48	.....	86	23 56.3	4 11
Wed Aug 09/Thu Aug 10	1993.8	20 50 44	19 20	20 45	4 19	5 43	17 35	1 10	21 15	.....	79	0 40.0	9 12
Thu Aug 10/Fri Aug 11	1994.8	20 54 41	19 19	20 44	4 20	5 44	17 38	1 15	21 44	.....	71	1 25.1	13 53
Fri Aug 11/Sat Aug 12	1995.8	20 58 37	19 18	20 43	4 20	5 45	17 41	1 20	22 16	.....	61	2 12.6	18 03
Sat Aug 12/Sun Aug 13	1996.8	21 02 34	19 17	20 41	4 21	5 45	17 43	1 25	22 53	.....	51	3 03.1	21 28
Sun Aug 13/Mon Aug 14	1997.8	21 06 31	19 16	20 40	4 22	5 46	17 46	1 30	23 36	.....	41	3 56.9	23 55
Mon Aug 14/Tue Aug 15	1998.8	21 10 27	19 15	20 39	4 23	5 47	17 49	1 34	0 26	.....	31	4 53.8	25 09
Tue Aug 15/Wed Aug 16	1999.8	21 14 24	19 14	20 37	4 24	5 47	17 51	1 39	1 25	.....	22	5 52.9	24 57
Wed Aug 16/Thu Aug 17	2000.8	21 18 20	19 13	20 36	4 25	5 48	17 54	1 44	2 31	.....	13	6 53.0	23 12
Thu Aug 17/Fri Aug 18	2001.8	21 22 17	19 12	20 35	4 26	5 49	17 56	1 49	3 41	17 15	6	7 52.7	19 56
Fri Aug 18/Sat Aug 19	2002.8	21 26 13	19 11	20 33	4 27	5 49	17 59	1 54	4 53	17 59	2	8 50.9	15 19
Sat Aug 19/Sun Aug 20	2003.8	21 30 10	19 10	20 32	4 28	5 50	18 02	1 59	6 05	18 39	0	9 47.3	9 40
Sun Aug 20/Mon Aug 21	2004.8	21 34 06	19 09	20 31	4 29	5 51	18 04	2 03	.....	19 16	1	10 42.1	3 23
Mon Aug 21/Tue Aug 22	2005.8	21 38 03	19 08	20 29	4 30	5 51	18 07	2 08	.....	19 51	5	11 36.0	- 3 07
Tue Aug 22/Wed Aug 23	2006.8	21 42 00	19 06	20 28	4 30	5 52	18 09	2 13	.....	20 26	12	12 29.9	- 9 25
Wed Aug 23/Thu Aug 24	2007.8	21 45 56	19 05	20 27	4 31	5 53	18 12	2 18	.....	21 03	20	13 24.5	-15 06
Thu Aug 24/Fri Aug 25	2008.8	21 49 53	19 04	20 25	4 32	5 53	18 14	2 23	.....	21 43	30	14 20.4	-19 52
Fri Aug 25/Sat Aug 26	2009.8	21 53 49	19 03	20 24	4 33	5 54	18 17	2 28	.....	22 27	41	15 17.7	-23 26
Sat Aug 26/Sun Aug 27	2010.8	21 57 46	19 02	20 22	4 34	5 54	18 19	2 32	.....	23 17	52	16 15.8	-25 38
Sun Aug 27/Mon Aug 28	2011.8	22 01 42	19 00	20 21	4 35	5 55	18 22	2 37	.....	0 10	62	17 13.8	-26 23
Mon Aug 28/Tue Aug 29	2012.8	22 05 39	18 59	20 19	4 35	5 56	18 24	2 42	.....	1 07	72	18 10.6	-25 44
Tue Aug 29/Wed Aug 30	2013.8	22 09 35	18 58	20 18	4 36	5 56	18 27	2 47	.....	2 06	80	19 05.3	-23 49
Wed Aug 30/Thu Aug 31	2014.8	22 13 32	18 57	20 17	4 37	5 57	18 29	2 51	.....	3 04	88	19 57.1	-20 49
Thu Aug 31/Fri Sep 01	2015.8	22 17 29	18 55	20 15	4 38	5 58	18 32	2 56	.....	4 01	93	20 46.1	-16 58

***** 2028 SEPTEMBER *****

Calendar for Kitt Peak, west longitude (h.m.s) = 7 26 24, latitude (d.m) = 31 57.8

Note that each line lists events of one night, spanning two calendar dates. Rise/set times are given in Mountain time (7 hr W), for 900 m above surroundings, in standard time all year.

Moon coords. and illum. are for local midnight, even if moon is down. Program: John Thorstensen, Dartmouth College.

Date (eve/morn) (2028 at start)	JDmid (-2460000)	LMSTmidn	----- Sun: -----				LST twilight:		----- Moon: -----				
			set	twi.end	twi.beg	rise	eve	morn	rise	set	%illum	RA	Dec
Fri Sep 01/Sat Sep 02	2016.8	22 21 25	18 54	20 14	4 39	5 58	18 34	3 01	17 30	4 57	97	21 32.7	-12 29
Sat Sep 02/Sun Sep 03	2017.8	22 25 22	18 53	20 12	4 39	5 59	18 37	3 06	17 59	5 51	99	22 17.3	- 7 34
Sun Sep 03/Mon Sep 04	2018.8	22 29 18	18 52	20 11	4 40	5 59	18 39	3 10	18 26	6 45	100	23 00.8	- 2 25
Mon Sep 04/Tue Sep 05	2019.8	22 33 15	18 50	20 09	4 41	6 00	18 42	3 15	18 52	.....	98	23 44.0	2 47
Tue Sep 05/Wed Sep 06	2020.8	22 37 11	18 49	20 08	4 42	6 01	18 44	3 20	19 19	.....	95	0 27.6	7 52
Wed Sep 06/Thu Sep 07	2021.8	22 41 08	18 48	20 06	4 43	6 01	18 47	3 25	19 47	.....	90	1 12.5	12 39
Thu Sep 07/Fri Sep 08	2022.8	22 45 04	18 46	20 05	4 43	6 02	18 49	3 29	20 18	.....	84	1 59.3	16 58
Fri Sep 08/Sat Sep 09	2023.8	22 49 01	18 45	20 03	4 44	6 03	18 52	3 34	20 52	.....	76	2 48.7	20 35
Sat Sep 09/Sun Sep 10	2024.8	22 52 58	18 44	20 02	4 45	6 03	18 54	3 39	21 32	.....	67	3 41.0	23 18
Sun Sep 10/Mon Sep 11	2025.8	22 56 54	18 43	20 01	4 46	6 04	18 57	3 43	22 19	.....	57	4 36.0	24 53
Mon Sep 11/Tue Sep 12	2026.8	23 00 51	18 41	19 59	4 46	6 04	18 59	3 48	23 13	.....	47	5 33.3	25 10
Tue Sep 12/Wed Sep 13	2027.8	23 04 47	18 40	19 58	4 47	6 05	19 02	3 53	0 13	.....	36	6 31.7	24 00
Wed Sep 13/Thu Sep 14	2028.8	23 08 44	18 39	19 56	4 48	6 06	19 04	3 57	1 19	.....	26	7 30.1	21 23
Thu Sep 14/Fri Sep 15	2029.8	23 12 40	18 37	19 55	4 49	6 06	19 07	4 02	2 29	.....	17	8 27.7	17 23
Fri Sep 15/Sat Sep 16	2030.8	23 16 37	18 36	19 53	4 49	6 07	19 09	4 07	3 39	.....	9	9 23.9	12 14
Sat Sep 16/Sun Sep 17	2031.8	23 20 33	18 35	19 52	4 50	6 07	19 12	4 11	4 50	17 08	3	10 18.9	6 16
Sun Sep 17/Mon Sep 18	2032.8	23 24 30	18 33	19 51	4 51	6 08	19 14	4 16	6 01	17 44	0	11 13.3	- 0 10
Mon Sep 18/Tue Sep 19	2033.8	23 28 27	18 32	19 49	4 51	6 09	19 17	4 21	7 12	18 20	1	12 07.8	- 6 37
Tue Sep 19/Wed Sep 20	2034.8	23 32 23	18 31	19 48	4 52	6 09	19 19	4 25	.....	18 57	4	13 03.2	-12 41
Wed Sep 20/Thu Sep 21	2035.8	23 36 20	18 29	19 46	4 53	6 10	19 22	4 30	.....	19 37	9	14 00.1	-17 56
Thu Sep 21/Fri Sep 22	2036.8	23 40 16	18 28	19 45	4 53	6 11	19 24	4 35	.....	20 21	17	14 58.4	-22 01
Fri Sep 22/Sat Sep 23	2037.8	23 44 13	18 27	19 44	4 54	6 11	19 27	4 39	.....	21 10	26	15 57.8	-24 44
Sat Sep 23/Sun Sep 24	2038.8	23 48 09	18 25	19 42	4 55	6 12	19 30	4 44	.....	22 03	36	16 57.1	-25 56
Sun Sep 24/Mon Sep 25	2039.8	23 52 06	18 24	19 41	4 56	6 12	19 32	4 48	.....	23 01	47	17 55.1	-25 41
Mon Sep 25/Tue Sep 26	2040.8	23 56 02	18 23	19 39	4 56	6 13	19 35	4 53	.....	23 59	57	18 50.7	-24 05
Tue Sep 26/Wed Sep 27	2041.8	23 59 59	18 21	19 38	4 57	6 14	19 37	4 58	.....	0 58	66	19 43.4	-21 22
Wed Sep 27/Thu Sep 28	2042.8	0 03 56	18 20	19 37	4 58	6 14	19 40	5 02	.....	1 56	75	20 32.9	-17 45
Thu Sep 28/Fri Sep 29	2043.8	0 07 52	18 19	19 35	4 58	6 15	19 42	5 07	.....	2 52	83	21 19.9	-13 29
Fri Sep 29/Sat Sep 30	2044.8	0 11 49	18 17	19 34	4 59	6 16	19 45	5 12	.....	3 47	90	22 04.8	- 8 44
Sat Sep 30/Sun Oct 01	2045.8	0 15 45	18 16	19 33	5 00	6 16	19 48	5 16	.....	4 40	95	22 48.4	- 3 41

***** 2028 OCTOBER *****

Calendar for Kitt Peak, west longitude (h.m.s) = 7 26 24, latitude (d.m) = 31 57.8
 Note that each line lists events of one night, spanning two calendar dates. Rise/set times are given
 in Mountain time (7 hr W), for 900 m above surroundings, in standard time all year.
 Moon coords. and illum. are for local midnight, even if moon is down. Program: John Thorstensen, Dartmouth College.

Date (eve/morn) (2028 at start)	JDmid (-2460000)	LMSTmidn	----- Sun: ----- set twi.end twi.beg rise				LST twilight: eve morn		----- Moon: ----- rise set %illum RA Dec				
Sun Oct 01/Mon Oct 02	2046.8	0 19 42	18 15	19 31	5 00	6 17	19 50	5 21	16 56	5 34	98	23 31.7	1 29
Mon Oct 02/Tue Oct 03	2047.8	0 23 38	18 14	19 30	5 01	6 18	19 53	5 25	17 23	6 28	100	0 15.3	6 35
Tue Oct 03/Wed Oct 04	2048.8	0 27 35	18 12	19 29	5 02	6 18	19 56	5 30	17 51	7 23	99	1 00.1	11 27
Wed Oct 04/Thu Oct 05	2049.8	0 31 31	18 11	19 28	5 02	6 19	19 58	5 35	18 21	.....	97	1 46.7	15 54
Thu Oct 05/Fri Oct 06	2050.8	0 35 28	18 10	19 26	5 03	6 19	20 01	5 39	18 54	.....	94	2 35.8	19 43
Fri Oct 06/Sat Oct 07	2051.8	0 39 25	18 09	19 25	5 04	6 20	20 04	5 44	19 33	.....	88	3 27.6	22 40
Sat Oct 07/Sun Oct 08	2052.8	0 43 21	18 07	19 24	5 04	6 21	20 06	5 48	20 17	.....	81	4 21.9	24 32
Sun Oct 08/Mon Oct 09	2053.8	0 47 18	18 06	19 23	5 05	6 22	20 09	5 53	21 08	.....	72	5 18.2	25 08
Mon Oct 09/Tue Oct 10	2054.8	0 51 14	18 05	19 21	5 06	6 22	20 12	5 58	22 05	.....	62	6 15.5	24 23
Tue Oct 10/Wed Oct 11	2055.8	0 55 11	18 04	19 20	5 06	6 23	20 15	6 02	23 07	.....	51	7 12.8	22 13
Wed Oct 11/Thu Oct 12	2056.8	0 59 07	18 02	19 19	5 07	6 24	20 17	6 07	0 12	.....	41	8 09.1	18 45
Thu Oct 12/Fri Oct 13	2057.8	1 03 04	18 01	19 18	5 08	6 24	20 20	6 12	1 20	.....	30	9 04.1	14 08
Fri Oct 13/Sat Oct 14	2058.8	1 07 00	18 00	19 17	5 08	6 25	20 23	6 16	2 28	.....	20	9 58.0	8 38
Sat Oct 14/Sun Oct 15	2059.8	1 10 57	17 59	19 16	5 09	6 26	20 26	6 21	3 37	.....	11	10 51.3	2 32
Sun Oct 15/Mon Oct 16	2060.8	1 14 54	17 58	19 14	5 10	6 26	20 29	6 25	4 46	.....	5	11 44.8	- 3 48
Mon Oct 16/Tue Oct 17	2061.8	1 18 50	17 57	19 13	5 10	6 27	20 31	6 30	5 57	16 49	1	12 39.4	- 9 58
Tue Oct 17/Wed Oct 18	2062.8	1 22 47	17 56	19 12	5 11	6 28	20 34	6 35	7 09	17 27	0	13 35.8	-15 34
Wed Oct 18/Thu Oct 19	2063.8	1 26 43	17 54	19 11	5 12	6 29	20 37	6 39	.....	18 09	2	14 34.3	-20 12
Thu Oct 19/Fri Oct 20	2064.8	1 30 40	17 53	19 10	5 12	6 29	20 40	6 44	.....	18 57	7	15 34.4	-23 30
Fri Oct 20/Sat Oct 21	2065.8	1 34 36	17 52	19 09	5 13	6 30	20 43	6 48	.....	19 50	13	16 35.3	-25 18
Sat Oct 21/Sun Oct 22	2066.8	1 38 33	17 51	19 08	5 14	6 31	20 46	6 53	.....	20 48	21	17 35.2	-25 32
Sun Oct 22/Mon Oct 23	2067.8	1 42 29	17 50	19 07	5 14	6 32	20 49	6 58	.....	21 48	31	18 32.8	-24 20
Mon Oct 23/Tue Oct 24	2068.8	1 46 26	17 49	19 06	5 15	6 32	20 52	7 02	.....	22 49	40	19 27.2	-21 54
Tue Oct 24/Wed Oct 25	2069.8	1 50 23	17 48	19 05	5 16	6 33	20 55	7 07	.....	23 48	50	20 18.1	-18 31
Wed Oct 25/Thu Oct 26	2070.8	1 54 19	17 47	19 04	5 17	6 34	20 58	7 12	.....	0 45	60	21 06.0	-14 25
Thu Oct 26/Fri Oct 27	2071.8	1 58 16	17 46	19 04	5 17	6 35	21 01	7 16	.....	1 40	69	21 51.4	- 9 49
Fri Oct 27/Sat Oct 28	2072.8	2 02 12	17 45	19 03	5 18	6 36	21 04	7 21	.....	2 34	77	22 35.2	- 4 53
Sat Oct 28/Sun Oct 29	2073.8	2 06 09	17 44	19 02	5 19	6 36	21 07	7 26	.....	3 28	85	23 18.4	0 12
Sun Oct 29/Mon Oct 30	2074.8	2 10 05	17 43	19 01	5 19	6 37	21 10	7 30	.....	4 21	91	0 01.7	5 17
Mon Oct 30/Tue Oct 31	2075.8	2 14 02	17 42	19 00	5 20	6 38	21 13	7 35	.....	5 16	96	0 46.2	10 12
Tue Oct 31/Wed Nov 01	2076.8	2 17 58	17 42	18 59	5 21	6 39	21 17	7 40	16 22	6 12	99	1 32.6	14 46

***** 2028 NOVEMBER *****

Calendar for Kitt Peak, west longitude (h.m.s) = 7 26 24, latitude (d.m) = 31 57.8
 Note that each line lists events of one night, spanning two calendar dates. Rise/set times are given
 in Mountain time (7 hr W), for 900 m above surroundings, in standard time all year.
 Moon coords. and illum. are for local midnight, even if moon is down. Program: John Thorstensen, Dartmouth College.

Date (eve/morn) (2028 at start)	JDmid (-2460000)	LMSTmidn	----- Sun: ----- set twi.end twi.beg rise				LST twilight: eve morn		----- Moon: ----- rise set %illum RA Dec				
Wed Nov 01/Thu Nov 02	2077.8	2 21 55	17 41	18 59	5 21	6 40	21 20	7 44	16 55	7 10	100	2 21.4	18 46
Thu Nov 02/Fri Nov 03	2078.8	2 25 52	17 40	18 58	5 22	6 40	21 23	7 49	17 33	.....	99	3 13.1	21 59
Fri Nov 03/Sat Nov 04	2079.8	2 29 48	17 39	18 57	5 23	6 41	21 26	7 54	18 15	.....	96	4 07.6	24 08
Sat Nov 04/Sun Nov 05	2080.8	2 33 45	17 38	18 57	5 24	6 42	21 30	7 58	19 05	.....	91	5 04.2	25 03
Sun Nov 05/Mon Nov 06	2081.8	2 37 41	17 37	18 56	5 24	6 43	21 33	8 03	20 00	.....	85	6 01.8	24 35
Mon Nov 06/Tue Nov 07	2082.8	2 41 38	17 37	18 55	5 25	6 44	21 36	8 08	21 01	.....	76	6 59.2	22 44
Tue Nov 07/Wed Nov 08	2083.8	2 45 34	17 36	18 55	5 26	6 45	21 39	8 12	22 05	.....	67	7 55.3	19 35
Wed Nov 08/Thu Nov 09	2084.8	2 49 31	17 35	18 54	5 27	6 46	21 43	8 17	23 10	.....	56	8 49.8	15 19
Thu Nov 09/Fri Nov 10	2085.8	2 53 27	17 35	18 54	5 27	6 46	21 46	8 22	0 16	.....	45	9 42.7	10 10
Fri Nov 10/Sat Nov 11	2086.8	2 57 24	17 34	18 53	5 28	6 47	21 50	8 26	1 21	.....	34	10 34.6	4 24
Sat Nov 11/Sun Nov 12	2087.8	3 01 21	17 33	18 53	5 29	6 48	21 53	8 31	2 28	.....	23	11 26.3	- 1 41
Sun Nov 12/Mon Nov 13	2088.8	3 05 17	17 33	18 52	5 30	6 49	21 57	8 36	3 36	.....	14	12 19.0	- 7 44
Mon Nov 13/Tue Nov 14	2089.8	3 09 14	17 32	18 52	5 30	6 50	22 00	8 40	4 45	.....	7	13 13.4	-13 25
Tue Nov 14/Wed Nov 15	2090.8	3 13 10	17 32	18 51	5 31	6 51	22 04	8 45	5 56	15 59	2	14 10.1	-18 20
Wed Nov 15/Thu Nov 16	2091.8	3 17 07	17 31	18 51	5 32	6 52	22 07	8 50	7 06	16 44	0	15 09.3	-22 08
Thu Nov 16/Fri Nov 17	2092.8	3 21 03	17 31	18 50	5 33	6 53	22 11	8 55	.....	17 34	1	16 10.2	-24 32
Fri Nov 17/Sat Nov 18	2093.8	3 25 00	17 30	18 50	5 33	6 53	22 14	8 59	.....	18 31	4	17 11.2	-25 22
Sat Nov 18/Sun Nov 19	2094.8	3 28 56	17 30	18 50	5 34	6 54	22 18	9 04	.....	19 32	9	18 10.7	-24 40
Sun Nov 19/Mon Nov 20	2095.8	3 32 53	17 29	18 49	5 35	6 55	22 22	9 09	.....	20 34	16	19 07.3	-22 37
Mon Nov 20/Tue Nov 21	2096.8	3 36 50	17 29	18 49	5 36	6 56	22 25	9 13	.....	21 35	24	20 00.3	-19 29
Tue Nov 21/Wed Nov 22	2097.8	3 40 46	17 29	18 49	5 36	6 57	22 29	9 18	.....	22 34	33	20 49.8	-15 33
Wed Nov 22/Thu Nov 23	2098.8	3 44 43	17 28	18 49	5 37	6 58	22 33	9 23	.....	23 31	42	21 36.3	-11 03
Thu Nov 23/Fri Nov 24	2099.8	3 48 39	17 28	18 49	5 38	6 59	22 36	9 27	.....	0 26	52	22 20.7	- 6 13
Fri Nov 24/Sat Nov 25	2100.8	3 52 36	17 28	18 48	5 39	6 59	22 40	9 32	.....	1 19	61	23 03.9	- 1 12
Sat Nov 25/Sun Nov 26	2101.8	3 56 32	17 28	18 48	5 39	7 00	22 44	9 37	.....	2 13	70	23 46.9	3 51
Sun Nov 26/Mon Nov 27	2102.8	4 00 29	17 27	18 48	5 40	7 01	22 48	9 42	.....	3 07	79	0 30.7	8 47
Mon Nov 27/Tue Nov 28	2103.8	4 04 25	17 27	18 48	5 41	7 02	22 52	9 46	.....	4 03	86	1 16.2	13 27
Tue Nov 28/Wed Nov 29	2104.8	4 08 22	17 27	18 48	5 42	7 03	22 56	9 51	.....	5 00	92	2 04.2	17 38
Wed Nov 29/Thu Nov 30	2105.8	4 12 19	17 27	18 48	5 42	7 04	23 00	9 56	.....	5 59	97	2 55.2	21 06
Thu Nov 30/Fri Dec 01	2106.8	4 16 15	17 27	18 48	5 43	7 04	23 04	10 00	16 11	6 58	99	3 49.4	23 37

***** 2028 DECEMBER *****

Calendar for Kitt Peak, west longitude (h.m.s) = 7 26 24, latitude (d.m) = 31 57.8

Note that each line lists events of one night, spanning two calendar dates. Rise/set times are given in Mountain time (7 hr W), for 900 m above surroundings, in standard time all year.

Moon coords. and illum. are for local midnight, even if moon is down. Program: John Thorstensen, Dartmouth College.

Date (eve/morn)		JDmid	LMSTmidn	Sun: -----				LST twilight:		Moon: -----				
(2028 at start)		(-2460000)		set	twi.end	twi.beg	rise	eve	morn	rise	set	%illum	RA	Dec
Fri Dec 01/Sat Dec 02	2107.8	4 20 12	17 27	18 48	5 44	7 05	23 08	10 05	16 59	7 56	100	4 46.4	24 56	
Sat Dec 02/Sun Dec 03	2108.8	4 24 08	17 27	18 48	5 45	7 06	23 12	10 10	17 53	.....	98	5 45.0	24 51
Sun Dec 03/Mon Dec 04	2109.8	4 28 05	17 27	18 48	5 45	7 07	23 16	10 14	18 53	.....	94	6 43.8	23 19
Mon Dec 04/Tue Dec 05	2110.8	4 32 01	17 27	18 48	5 46	7 08	23 20	10 19	19 57	.....	88	7 41.4	20 24
Tue Dec 05/Wed Dec 06	2111.8	4 35 58	17 27	18 49	5 47	7 08	23 24	10 24	21 03	.....	80	8 37.0	16 18
Wed Dec 06/Thu Dec 07	2112.8	4 39 54	17 27	18 49	5 47	7 09	23 28	10 28	22 09	.....	71	9 30.6	11 17
Thu Dec 07/Fri Dec 08	2113.8	4 43 51	17 27	18 49	5 48	7 10	23 32	10 33	23 14	.....	60	10 22.5	5 39
Fri Dec 08/Sat Dec 09	2114.8	4 47 48	17 27	18 49	5 49	7 11	23 36	10 37	0 19	.....	49	11 13.6	- 0 18
Sat Dec 09/Sun Dec 10	2115.8	4 51 44	17 27	18 49	5 49	7 11	23 40	10 42	1 24	.....	37	12 04.8	- 6 15
Sun Dec 10/Mon Dec 11	2116.8	4 55 41	17 28	18 50	5 50	7 12	23 45	10 47	2 31	.....	27	12 57.3	-11 55
Mon Dec 11/Tue Dec 12	2117.8	4 59 37	17 28	18 50	5 51	7 13	23 49	10 51	3 38	.....	17	13 51.8	-16 56
Tue Dec 12/Wed Dec 13	2118.8	5 03 34	17 28	18 50	5 51	7 13	23 53	10 56	4 47	.....	10	14 48.8	-21 00
Wed Dec 13/Thu Dec 14	2119.8	5 07 30	17 28	18 51	5 52	7 14	23 57	11 00	5 54	.....	4	15 47.9	-23 49
Thu Dec 14/Fri Dec 15	2120.8	5 11 27	17 29	18 51	5 52	7 15	0 02	11 05	6 57	16 15	1	16 48.2	-25 11	
Fri Dec 15/Sat Dec 16	2121.8	5 15 23	17 29	18 51	5 53	7 15	0 06	11 09	7 53	17 14	0	17 48.1	-25 02	
Sat Dec 16/Sun Dec 17	2122.8	5 19 20	17 29	18 52	5 54	7 16	0 10	11 14	.....	18 16	2	18 45.9	-23 26
Sun Dec 17/Mon Dec 18	2123.8	5 23 17	17 30	18 52	5 54	7 16	0 15	11 18	.....	19 18	5	19 40.6	-20 39
Mon Dec 18/Tue Dec 19	2124.8	5 27 13	17 30	18 53	5 55	7 17	0 19	11 23	.....	20 20	11	20 31.8	-16 56
Tue Dec 19/Wed Dec 20	2125.8	5 31 10	17 31	18 53	5 55	7 18	0 23	11 27	.....	21 18	18	21 19.8	-12 34
Wed Dec 20/Thu Dec 21	2126.8	5 35 06	17 31	18 54	5 56	7 18	0 28	11 32	.....	22 15	26	22 05.2	- 7 47
Thu Dec 21/Fri Dec 22	2127.8	5 39 03	17 32	18 54	5 56	7 18	0 32	11 36	.....	23 09	34	22 48.8	- 2 48
Fri Dec 22/Sat Dec 23	2128.8	5 42 59	17 32	18 55	5 57	7 19	0 37	11 41	.....	0 03	43	23 31.8	2 15
Sat Dec 23/Sun Dec 24	2129.8	5 46 56	17 33	18 55	5 57	7 19	0 41	11 45	.....	0 57	53	0 15.0	7 12
Sun Dec 24/Mon Dec 25	2130.8	5 50 52	17 33	18 56	5 57	7 20	0 46	11 49	.....	1 51	62	0 59.3	11 55
Mon Dec 25/Tue Dec 26	2131.8	5 54 49	17 34	18 56	5 58	7 20	0 50	11 54	.....	2 47	71	1 45.7	16 14
Tue Dec 26/Wed Dec 27	2132.8	5 58 46	17 35	18 57	5 58	7 21	0 55	11 58	.....	3 45	80	2 35.0	19 56
Wed Dec 27/Thu Dec 28	2133.8	6 02 42	17 35	18 57	5 59	7 21	0 59	12 02	.....	4 44	87	3 27.7	22 49
Thu Dec 28/Fri Dec 29	2134.8	6 06 39	17 36	18 58	5 59	7 21	1 04	12 07	.....	5 43	93	4 23.6	24 36
Fri Dec 29/Sat Dec 30	2135.8	6 10 35	17 37	18 59	5 59	7 21	1 08	12 11	15 41	6 40	98	5 22.2	25 04	
Sat Dec 30/Sun Dec 31	2136.8	6 14 32	17 37	18 59	6 00	7 22	1 13	12 15	16 39	7 32	100	6 22.0	24 02	
Sun Dec 31/Mon Jan 01	2137.8	6 18 28	17 38	19 00	6 00	7 22	1 18	12 19	17 44	8 19	100	7 21.5	21 31	