

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 -; 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:

***** 2013 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 NOAO 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 John.Thorstensen@dartmouth.edu

[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 2013, 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 13 1 42	Dec 19 22 20	Dec 28 3 23	Jan 04 20 59
Jan 11 12 45	Jan 18 16 46	Jan 26 21 40	Feb 03 6 58
Feb 10 0 23	Feb 17 13 31	Feb 25 13 29	Mar 04 14 55
Mar 11 12 54	Mar 19 10 28	Mar 27 2 30	Apr 02 21 39
Apr 10 2 39	Apr 18 5 33	Apr 25 13 00	May 02 4 17
May 09 17 32	May 17 21 36	May 24 21 27	May 31 12 00
Jun 08 8 59	Jun 16 10 25	Jun 23 4 34	Jun 29 21 55
Jul 08 0 16	Jul 15 20 20	Jul 22 11 17	Jul 29 10 45
Aug 06 14 52	Aug 14 3 58	Aug 20 18 45	Aug 28 2 36
Sep 05 4 36	Sep 12 10 10	Sep 19 4 13	Sep 26 20 56
Oct 04 17 34	Oct 11 16 04	Oct 18 16 38	Oct 26 16 42
Nov 03 5 50	Nov 09 22 59	Nov 17 8 17	Nov 25 12 30
Dec 02 17 22	Dec 09 8 13	Dec 17 2 29	Dec 25 6 50
Jan 01 4 15	Jan 07 20 40	Jan 15 21 54	Jan 23 22 21

***** 2013 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) (2013 at start)	JDmid (-2450000)	LMSTmid	----- Sun: -----				LST twilight:		----- Moon: -----				
			set	twi.end	twi.beg	rise	eve	morn	rise	set	%illum	RA	Dec
Tue Jan 01/Wed Jan 02	6294.8	6 21 55	17 39	19 01	6 00	7 22	1 22	12 23	21 46	.....	78	10 30.7	3 46
Wed Jan 02/Thu Jan 03	6295.8	6 25 52	17 39	19 01	6 00	7 22	1 26	12 27	22 44	.....	69	11 19.2	- 0 50
Thu Jan 03/Fri Jan 04	6296.8	6 29 48	17 40	19 02	6 01	7 22	1 31	12 31	23 43	.....	59	12 08.6	- 5 29
Fri Jan 04/Sat Jan 05	6297.8	6 33 45	17 41	19 03	6 01	7 23	1 36	12 36	0 45	.....	48	12 59.9	- 9 59
Sat Jan 05/Sun Jan 06	6298.8	6 37 41	17 42	19 03	6 01	7 23	1 40	12 40	1 48	.....	37	13 53.7	-14 04
Sun Jan 06/Mon Jan 07	6299.8	6 41 38	17 42	19 04	6 01	7 23	1 45	12 44	2 54	.....	26	14 50.5	-17 27
Mon Jan 07/Tue Jan 08	6300.8	6 45 35	17 43	19 05	6 01	7 23	1 50	12 48	4 00	.....	17	15 50.4	-19 52
Tue Jan 08/Wed Jan 09	6301.8	6 49 31	17 44	19 06	6 01	7 23	1 54	12 52	5 05	.....	9	16 52.6	-21 01
Wed Jan 09/Thu Jan 10	6302.8	6 53 28	17 45	19 06	6 01	7 23	1 59	12 56	6 06	15 50	3	17 55.8	-20 46
Thu Jan 10/Fri Jan 11	6303.8	6 57 24	17 46	19 07	6 01	7 23	2 04	13 00	7 01	16 57	1	18 58.3	-19 06
Fri Jan 11/Sat Jan 12	6304.8	7 01 21	17 47	19 08	6 01	7 23	2 08	13 04	7 50	18 05	0	19 58.7	-16 12
Sat Jan 12/Sun Jan 13	6305.8	7 05 17	17 47	19 09	6 01	7 22	2 13	13 08	.....	19 13	3	20 56.2	-12 21
Sun Jan 13/Mon Jan 14	6306.8	7 09 14	17 48	19 09	6 01	7 22	2 18	13 12	.....	20 19	8	21 50.6	- 7 55
Mon Jan 14/Tue Jan 15	6307.8	7 13 10	17 49	19 10	6 01	7 22	2 23	13 15	.....	21 22	15	22 42.3	- 3 12
Tue Jan 15/Wed Jan 16	6308.8	7 17 07	17 50	19 11	6 01	7 22	2 27	13 19	.....	22 23	23	23 32.0	1 31
Wed Jan 16/Thu Jan 17	6309.8	7 21 04	17 51	19 12	6 01	7 22	2 32	13 23	.....	23 21	33	0 20.4	6 00
Thu Jan 17/Fri Jan 18	6310.8	7 25 00	17 52	19 12	6 01	7 21	2 37	13 27	.....	0 18	42	1 08.3	10 07
Fri Jan 18/Sat Jan 19	6311.8	7 28 57	17 53	19 13	6 01	7 21	2 41	13 31	.....	1 14	52	1 56.3	13 41
Sat Jan 19/Sun Jan 20	6312.8	7 32 53	17 54	19 14	6 01	7 21	2 46	13 34	.....	2 08	62	2 44.9	16 37
Sun Jan 20/Mon Jan 21	6313.8	7 36 50	17 55	19 15	6 00	7 20	2 51	13 38	.....	3 01	71	3 34.3	18 48
Mon Jan 21/Tue Jan 22	6314.8	7 40 46	17 56	19 16	6 00	7 20	2 56	13 42	.....	3 53	79	4 24.6	20 09
Tue Jan 22/Wed Jan 23	6315.8	7 44 43	17 56	19 16	6 00	7 20	3 00	13 46	.....	4 41	86	5 15.6	20 35
Wed Jan 23/Thu Jan 24	6316.8	7 48 39	17 57	19 17	6 00	7 19	3 05	13 49	.....	5 28	92	6 07.1	20 04
Thu Jan 24/Fri Jan 25	6317.8	7 52 36	17 58	19 18	5 59	7 19	3 10	13 53	15 56	6 11	96	6 58.4	18 37
Fri Jan 25/Sat Jan 26	6318.8	7 56 33	17 59	19 19	5 59	7 18	3 15	13 56	16 50	6 51	99	7 49.3	16 15
Sat Jan 26/Sun Jan 27	6319.8	8 00 29	18 00	19 20	5 58	7 18	3 19	14 00	17 46	7 28	100	8 39.6	13 07
Sun Jan 27/Mon Jan 28	6320.8	8 04 26	18 01	19 20	5 58	7 17	3 24	14 03	18 43	8 04	98	9 29.1	9 18
Mon Jan 28/Tue Jan 29	6321.8	8 08 22	18 02	19 21	5 58	7 17	3 29	14 07	19 40	.....	95	10 18.3	5 01
Tue Jan 29/Wed Jan 30	6322.8	8 12 19	18 03	19 22	5 57	7 16	3 34	14 10	20 39	.....	90	11 07.4	0 25
Wed Jan 30/Thu Jan 31	6323.8	8 16 15	18 04	19 23	5 57	7 16	3 38	14 14	21 38	.....	82	11 57.2	- 4 16
Thu Jan 31/Fri Feb 01	6324.8	8 20 12	18 05	19 24	5 56	7 15	3 43	14 17	22 38	.....	74	12 48.1	- 8 48

***** 2013 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) (2013 at start)	JDmid (-2450000)	LMSTmidn	----- Sun: ----- set twi.end twi.beg rise				LST twilight: eve morn		----- Moon: ----- rise set %illum RA Dec					
Fri Feb 01/Sat Feb 02	6325.8	8 24 08	18 06	19 24	5 56	7 14	3 48	14 21	23 40	.....	63	13	40.9	-12 58
Sat Feb 02/Sun Feb 03	6326.8	8 28 05	18 06	19 25	5 55	7 14	3 53	14 24	0 44	.....	52	14	36.0	-16 31
Sun Feb 03/Mon Feb 04	6327.8	8 32 02	18 07	19 26	5 54	7 13	3 57	14 27	1 48	.....	41	15	33.6	-19 10
Mon Feb 04/Tue Feb 05	6328.8	8 35 58	18 08	19 27	5 54	7 12	4 02	14 31	2 51	.....	30	16	33.4	-20 41
Tue Feb 05/Wed Feb 06	6329.8	8 39 55	18 09	19 28	5 53	7 11	4 07	14 34	3 51	.....	20	17	34.4	-20 56
Wed Feb 06/Thu Feb 07	6330.8	8 43 51	18 10	19 28	5 52	7 11	4 11	14 37	4 47	.....	12	18	35.5	-19 50
Thu Feb 07/Fri Feb 08	6331.8	8 47 48	18 11	19 29	5 52	7 10	4 16	14 40	5 38	.....	6	19	35.4	-17 30
Fri Feb 08/Sat Feb 09	6332.8	8 51 44	18 12	19 30	5 51	7 09	4 21	14 44	6 24	16 51	2	20	33.2	-14 06
Sat Feb 09/Sun Feb 10	6333.8	8 55 41	18 13	19 31	5 50	7 08	4 26	14 47	7 05	17 57	0	21	28.6	- 9 57
Sun Feb 10/Mon Feb 11	6334.8	8 59 37	18 14	19 31	5 50	7 07	4 30	14 50	7 43	19 02	1	22	21.5	- 5 22
Mon Feb 11/Tue Feb 12	6335.8	9 03 34	18 14	19 32	5 49	7 06	4 35	14 53	.....	20 05	5	23	12.5	- 0 37
Tue Feb 12/Wed Feb 13	6336.8	9 07 31	18 15	19 33	5 48	7 05	4 40	14 56	.....	21 05	10	0	02.2	4 01
Wed Feb 13/Thu Feb 14	6337.8	9 11 27	18 16	19 34	5 47	7 05	4 44	14 59	.....	22 04	17	0	51.1	8 20
Thu Feb 14/Fri Feb 15	6338.8	9 15 24	18 17	19 34	5 46	7 04	4 49	15 03	.....	23 02	26	1	39.7	12 09
Fri Feb 15/Sat Feb 16	6339.8	9 19 20	18 18	19 35	5 45	7 03	4 54	15 06	.....	23 58	35	2	28.6	15 20
Sat Feb 16/Sun Feb 17	6340.8	9 23 17	18 19	19 36	5 44	7 02	4 59	15 09	.....	0 52	44	3	17.9	17 48
Sun Feb 17/Mon Feb 18	6341.8	9 27 13	18 19	19 37	5 44	7 01	5 03	15 12	.....	1 44	53	4	07.9	19 27
Mon Feb 18/Tue Feb 19	6342.8	9 31 10	18 20	19 37	5 43	7 00	5 08	15 15	.....	2 34	63	4	58.5	20 12
Tue Feb 19/Wed Feb 20	6343.8	9 35 06	18 21	19 38	5 42	6 59	5 13	15 18	.....	3 21	72	5	49.4	20 03
Wed Feb 20/Thu Feb 21	6344.8	9 39 03	18 22	19 39	5 41	6 58	5 17	15 21	.....	4 05	80	6	40.3	18 57
Thu Feb 21/Fri Feb 22	6345.8	9 43 00	18 23	19 40	5 40	6 56	5 22	15 24	.....	4 47	87	7	31.2	16 57
Fri Feb 22/Sat Feb 23	6346.8	9 46 56	18 24	19 40	5 39	6 55	5 27	15 27	.....	5 25	93	8	21.6	14 08
Sat Feb 23/Sun Feb 24	6347.8	9 50 53	18 24	19 41	5 38	6 54	5 31	15 29	16 32	6 02	97	9	11.8	10 34
Sun Feb 24/Mon Feb 25	6348.8	9 54 49	18 25	19 42	5 37	6 53	5 36	15 32	17 30	6 37	99	10	01.7	6 25
Mon Feb 25/Tue Feb 26	6349.8	9 58 46	18 26	19 43	5 35	6 52	5 41	15 35	18 29	7 12	100	10	51.8	1 52
Tue Feb 26/Wed Feb 27	6350.8	10 02 42	18 27	19 43	5 34	6 51	5 45	15 38	19 29	.....	97	11	42.5	- 2 52
Wed Feb 27/Thu Feb 28	6351.8	10 06 39	18 27	19 44	5 33	6 50	5 50	15 41	20 31	.....	93	12	34.4	- 7 33
Thu Feb 28/Fri Mar 01	6352.8	10 10 35	18 28	19 45	5 32	6 49	5 55	15 44	21 33	.....	86	13	27.9	-11 54

***** 2013 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) (2013 at start)	JDmid (-2450000)	LMSTmidn	----- Sun: -----				LST twilight:		----- Moon: -----				
			set	twi.end	twi.beg	rise	eve	morn	rise	set	%illum	RA	Dec
Fri Mar 01/Sat Mar 02	6353.8	10 14 32	18 29	19 46	5 31	6 48	5 59	15 46	22 37	.....	77	14 23.3	-15 39
Sat Mar 02/Sun Mar 03	6354.8	10 18 29	18 30	19 46	5 30	6 46	6 04	15 49	23 41	.....	67	15 20.9	-18 32
Sun Mar 03/Mon Mar 04	6355.8	10 22 25	18 31	19 47	5 29	6 45	6 09	15 52	0 44	.....	56	16 20.0	-20 19
Mon Mar 04/Tue Mar 05	6356.8	10 26 22	18 31	19 48	5 28	6 44	6 14	15 55	1 44	.....	45	17 20.1	-20 52
Tue Mar 05/Wed Mar 06	6357.8	10 30 18	18 32	19 49	5 26	6 43	6 18	15 58	2 40	.....	34	18 20.1	-20 09
Wed Mar 06/Thu Mar 07	6358.8	10 34 15	18 33	19 49	5 25	6 42	6 23	16 00	3 31	.....	24	19 18.9	-18 12
Thu Mar 07/Fri Mar 08	6359.8	10 38 11	18 34	19 50	5 24	6 40	6 28	16 03	4 18	.....	15	20 15.9	-15 13
Fri Mar 08/Sat Mar 09	6360.8	10 42 08	18 34	19 51	5 23	6 39	6 32	16 06	5 00	.....	8	21 10.7	-11 25
Sat Mar 09/Sun Mar 10	6361.8	10 46 04	18 35	19 52	5 21	6 38	6 37	16 08	5 38	16 46	3	22 03.4	- 7 05
Sun Mar 10/Mon Mar 11	6362.8	10 50 01	18 36	19 52	5 20	6 37	6 42	16 11	6 15	17 48	0	22 54.5	- 2 29
Mon Mar 11/Tue Mar 12	6363.8	10 53 58	18 36	19 53	5 19	6 35	6 46	16 14	6 50	18 49	0	23 44.3	2 08
Tue Mar 12/Wed Mar 13	6364.8	10 57 54	18 37	19 54	5 18	6 34	6 51	16 16	7 26	19 49	2	0 33.5	6 33
Wed Mar 13/Thu Mar 14	6365.8	11 01 51	18 38	19 55	5 16	6 33	6 56	16 19	.....	20 47	6	1 22.4	10 32
Thu Mar 14/Fri Mar 15	6366.8	11 05 47	18 39	19 55	5 15	6 32	7 00	16 22	.....	21 45	12	2 11.5	13 58
Fri Mar 15/Sat Mar 16	6367.8	11 09 44	18 39	19 56	5 14	6 30	7 05	16 24	.....	22 40	19	3 01.0	16 41
Sat Mar 16/Sun Mar 17	6368.8	11 13 40	18 40	19 57	5 12	6 29	7 10	16 27	.....	23 34	27	3 51.0	18 37
Sun Mar 17/Mon Mar 18	6369.8	11 17 37	18 41	19 58	5 11	6 28	7 14	16 29	.....	0 25	36	4 41.2	19 41
Mon Mar 18/Tue Mar 19	6370.8	11 21 33	18 41	19 58	5 10	6 27	7 19	16 32	.....	1 14	45	5 31.7	19 50
Tue Mar 19/Wed Mar 20	6371.8	11 25 30	18 42	19 59	5 08	6 25	7 24	16 35	.....	1 59	55	6 22.1	19 05
Wed Mar 20/Thu Mar 21	6372.8	11 29 27	18 43	20 00	5 07	6 24	7 29	16 37	.....	2 41	64	7 12.3	17 28
Thu Mar 21/Fri Mar 22	6373.8	11 33 23	18 43	20 01	5 06	6 23	7 33	16 40	.....	3 20	73	8 02.2	15 00
Fri Mar 22/Sat Mar 23	6374.8	11 37 20	18 44	20 01	5 04	6 21	7 38	16 42	.....	3 58	82	8 51.8	11 46
Sat Mar 23/Sun Mar 24	6375.8	11 41 16	18 45	20 02	5 03	6 20	7 43	16 45	.....	4 33	89	9 41.5	7 54
Sun Mar 24/Mon Mar 25	6376.8	11 45 13	18 45	20 03	5 01	6 19	7 47	16 48	.....	5 09	95	10 31.6	3 32
Mon Mar 25/Tue Mar 26	6377.8	11 49 09	18 46	20 04	5 00	6 18	7 52	16 50	17 15	5 44	98	11 22.5	- 1 10
Tue Mar 26/Wed Mar 27	6378.8	11 53 06	18 47	20 04	4 59	6 16	7 57	16 53	18 17	6 22	100	12 14.8	- 5 56
Wed Mar 27/Thu Mar 28	6379.8	11 57 02	18 48	20 05	4 57	6 15	8 02	16 55	19 20	7 02	99	13 09.1	-10 30
Thu Mar 28/Fri Mar 29	6380.8	12 00 59	18 48	20 06	4 56	6 14	8 06	16 58	20 25	.....	95	14 05.6	-14 34
Fri Mar 29/Sat Mar 30	6381.8	12 04 56	18 49	20 07	4 54	6 12	8 11	17 00	21 31	.....	89	15 04.4	-17 48
Sat Mar 30/Sun Mar 31	6382.8	12 08 52	18 50	20 08	4 53	6 11	8 16	17 03	22 36	.....	81	16 04.9	-19 56
Sun Mar 31/Mon Apr 01	6383.8	12 12 49	18 50	20 08	4 52	6 10	8 21	17 05	23 38	.....	71	17 06.2	-20 48

***** 2013 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) (2013 at start)	JDmid (-2450000)	LMSTmidn	----- Sun: -----				LST twilight:		----- Moon: -----				
			set	twi.end	twi.beg	rise	eve	morn	rise	set	%illum	RA	Dec
Mon Apr 01/Tue Apr 02	6384.8	12 16 45	18 51	20 09	4 50	6 09	8 25	17 08	0 36	.....	60	18 07.1	-20 21
Tue Apr 02/Wed Apr 03	6385.8	12 20 42	18 52	20 10	4 49	6 07	8 30	17 10	1 29	.....	48	19 06.5	-18 39
Wed Apr 03/Thu Apr 04	6386.8	12 24 38	18 52	20 11	4 47	6 06	8 35	17 13	2 16	.....	37	20 03.5	-15 55
Thu Apr 04/Fri Apr 05	6387.8	12 28 35	18 53	20 12	4 46	6 05	8 40	17 15	2 58	.....	27	20 58.1	-12 21
Fri Apr 05/Sat Apr 06	6388.8	12 32 31	18 54	20 13	4 45	6 04	8 45	17 18	3 37	.....	18	21 50.4	- 8 13
Sat Apr 06/Sun Apr 07	6389.8	12 36 28	18 54	20 13	4 43	6 02	8 49	17 20	4 13	.....	10	22 40.9	- 3 47
Sun Apr 07/Mon Apr 08	6390.8	12 40 25	18 55	20 14	4 42	6 01	8 54	17 23	4 48	.....	5	23 30.1	0 44
Mon Apr 08/Tue Apr 09	6391.8	12 44 21	18 56	20 15	4 40	6 00	8 59	17 25	5 23	17 37	1	0 18.8	5 08
Tue Apr 09/Wed Apr 10	6392.8	12 48 18	18 56	20 16	4 39	5 59	9 04	17 28	5 59	18 36	0	1 07.3	9 12
Wed Apr 10/Thu Apr 11	6393.8	12 52 14	18 57	20 17	4 38	5 57	9 09	17 31	6 36	19 33	1	1 56.1	12 46
Thu Apr 11/Fri Apr 12	6394.8	12 56 11	18 58	20 18	4 36	5 56	9 13	17 33	.....	20 29	3	2 45.3	15 41
Fri Apr 12/Sat Apr 13	6395.8	13 00 07	18 58	20 19	4 35	5 55	9 18	17 36	.....	21 24	8	3 35.1	17 51
Sat Apr 13/Sun Apr 14	6396.8	13 04 04	18 59	20 20	4 33	5 54	9 23	17 38	.....	22 17	14	4 25.3	19 11
Sun Apr 14/Mon Apr 15	6397.8	13 08 00	19 00	20 21	4 32	5 53	9 28	17 41	.....	23 06	21	5 15.5	19 37
Mon Apr 15/Tue Apr 16	6398.8	13 11 57	19 01	20 21	4 31	5 51	9 33	17 43	.....	23 53	29	6 05.6	19 10
Tue Apr 16/Wed Apr 17	6399.8	13 15 54	19 01	20 22	4 29	5 50	9 38	17 46	.....	0 36	38	6 55.2	17 51
Wed Apr 17/Thu Apr 18	6400.8	13 19 50	19 02	20 23	4 28	5 49	9 43	17 48	.....	1 16	47	7 44.4	15 42
Thu Apr 18/Fri Apr 19	6401.8	13 23 47	19 03	20 24	4 26	5 48	9 47	17 51	.....	1 53	57	8 33.1	12 49
Fri Apr 19/Sat Apr 20	6402.8	13 27 43	19 03	20 25	4 25	5 47	9 52	17 54	.....	2 29	67	9 21.7	9 16
Sat Apr 20/Sun Apr 21	6403.8	13 31 40	19 04	20 26	4 24	5 46	9 57	17 56	.....	3 04	76	10 10.5	5 11
Sun Apr 21/Mon Apr 22	6404.8	13 35 36	19 05	20 27	4 22	5 45	10 02	17 59	.....	3 39	84	11 00.2	0 41
Mon Apr 22/Tue Apr 23	6405.8	13 39 33	19 05	20 28	4 21	5 44	10 07	18 01	.....	4 15	91	11 51.5	- 4 01
Tue Apr 23/Wed Apr 24	6406.8	13 43 29	19 06	20 29	4 20	5 43	10 12	18 04	.....	4 54	97	12 44.9	- 8 42
Wed Apr 24/Thu Apr 25	6407.8	13 47 26	19 07	20 30	4 18	5 41	10 17	18 07	18 06	5 36	100	13 41.2	-13 02
Thu Apr 25/Fri Apr 26	6408.8	13 51 23	19 08	20 31	4 17	5 40	10 22	18 09	19 13	6 24	100	14 40.4	-16 43
Fri Apr 26/Sat Apr 27	6409.8	13 55 19	19 08	20 32	4 16	5 39	10 27	18 12	20 20	.....	97	15 42.2	-19 22
Sat Apr 27/Sun Apr 28	6410.8	13 59 16	19 09	20 33	4 15	5 38	10 32	18 15	21 26	.....	91	16 45.7	-20 43
Sun Apr 28/Mon Apr 29	6411.8	14 03 12	19 10	20 34	4 13	5 37	10 36	18 17	22 28	.....	83	17 49.1	-20 40
Mon Apr 29/Tue Apr 30	6412.8	14 07 09	19 10	20 35	4 12	5 36	10 41	18 20	23 24	.....	73	18 51.0	-19 15
Tue Apr 30/Wed May 01	6413.8	14 11 05	19 11	20 36	4 11	5 35	10 46	18 23	0 14	.....	63	19 50.3	-16 41

***** 2013 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) (2013 at start)	JDmid (-2450000)	LMSTmidn	----- Sun: -----				LST twilight:		----- Moon: -----				
			set	twi.end	twi.beg	rise	eve	morn	rise	set	%illum	RA	Dec
Wed May 01/Thu May 02	6414.8	14 15 02	19 12	20 37	4 10	5 35	10 51	18 25	0 58	.....	51	20 46.4	-13 13
Thu May 02/Fri May 03	6415.8	14 18 58	19 13	20 38	4 08	5 34	10 56	18 28	1 38	.....	40	21 39.6	- 9 10
Fri May 03/Sat May 04	6416.8	14 22 55	19 13	20 39	4 07	5 33	11 01	18 31	2 15	.....	30	22 30.4	- 4 47
Sat May 04/Sun May 05	6417.8	14 26 52	19 14	20 40	4 06	5 32	11 06	18 34	2 50	.....	21	23 19.5	- 0 18
Sun May 05/Mon May 06	6418.8	14 30 48	19 15	20 41	4 05	5 31	11 11	18 36	3 24	.....	13	0 07.7	4 05
Mon May 06/Tue May 07	6419.8	14 34 45	19 15	20 42	4 04	5 30	11 16	18 39	3 59	.....	7	0 55.6	8 11
Tue May 07/Wed May 08	6420.8	14 38 41	19 16	20 43	4 03	5 29	11 21	18 42	4 35	17 25	3	1 43.7	11 50
Wed May 08/Thu May 09	6421.8	14 42 38	19 17	20 44	4 02	5 28	11 26	18 45	5 14	18 21	1	2 32.4	14 54
Thu May 09/Fri May 10	6422.8	14 46 34	19 18	20 45	4 00	5 28	11 31	18 48	5 55	19 16	0	3 21.7	17 15
Fri May 10/Sat May 11	6423.8	14 50 31	19 18	20 46	3 59	5 27	11 36	18 51	.....	20 10	1	4 11.6	18 48
Sat May 11/Sun May 12	6424.8	14 54 27	19 19	20 47	3 58	5 26	11 41	18 53	.....	21 00	5	5 01.6	19 29
Sun May 12/Mon May 13	6425.8	14 58 24	19 20	20 48	3 57	5 25	11 46	18 56	.....	21 48	9	5 51.6	19 17
Mon May 13/Tue May 14	6426.8	15 02 21	19 20	20 49	3 56	5 25	11 51	18 59	.....	22 32	15	6 41.1	18 12
Tue May 14/Wed May 15	6427.8	15 06 17	19 21	20 50	3 55	5 24	11 56	19 02	.....	23 13	23	7 29.9	16 19
Wed May 15/Thu May 16	6428.8	15 10 14	19 22	20 51	3 54	5 23	12 00	19 05	.....	23 51	31	8 17.9	13 41
Thu May 16/Fri May 17	6429.8	15 14 10	19 23	20 52	3 54	5 23	12 05	19 08	.....	0 27	41	9 05.5	10 25
Fri May 17/Sat May 18	6430.8	15 18 07	19 23	20 53	3 53	5 22	12 10	19 11	.....	1 01	51	9 52.9	6 37
Sat May 18/Sun May 19	6431.8	15 22 03	19 24	20 54	3 52	5 21	12 15	19 14	.....	1 35	61	10 40.8	2 23
Sun May 19/Mon May 20	6432.8	15 26 00	19 25	20 55	3 51	5 21	12 20	19 18	.....	2 10	71	11 29.9	- 2 08
Mon May 20/Tue May 21	6433.8	15 29 56	19 25	20 56	3 50	5 20	12 25	19 21	.....	2 46	80	12 21.1	- 6 44
Tue May 21/Wed May 22	6434.8	15 33 53	19 26	20 57	3 49	5 20	12 30	19 24	.....	3 26	88	13 15.0	-11 12
Wed May 22/Thu May 23	6435.8	15 37 50	19 27	20 57	3 49	5 19	12 35	19 27	.....	4 11	95	14 12.4	-15 11
Thu May 23/Fri May 24	6436.8	15 41 46	19 27	20 58	3 48	5 19	12 40	19 30	17 57	5 01	99	15 13.3	-18 22
Fri May 24/Sat May 25	6437.8	15 45 43	19 28	20 59	3 47	5 18	12 44	19 33	19 05	5 58	100	16 17.2	-20 23
Sat May 25/Sun May 26	6438.8	15 49 39	19 29	21 00	3 46	5 18	12 49	19 37	20 11	.....	98	17 22.6	-20 58
Sun May 26/Mon May 27	6439.8	15 53 36	19 29	21 01	3 46	5 18	12 54	19 40	21 12	.....	93	18 27.6	-20 03
Mon May 27/Tue May 28	6440.8	15 57 32	19 30	21 02	3 45	5 17	12 59	19 43	22 06	.....	86	19 30.3	-17 48
Tue May 28/Wed May 29	6441.8	16 01 29	19 30	21 03	3 45	5 17	13 04	19 47	22 55	.....	76	20 29.8	-14 28
Wed May 29/Thu May 30	6442.8	16 05 25	19 31	21 04	3 44	5 17	13 09	19 50	23 37	.....	66	21 25.7	-10 25
Thu May 30/Fri May 31	6443.8	16 09 22	19 32	21 04	3 44	5 16	13 13	19 54	0 16	.....	55	22 18.5	- 5 58
Fri May 31/Sat Jun 01	6444.8	16 13 19	19 32	21 05	3 43	5 16	13 18	19 57	0 52	.....	44	23 08.9	- 1 24

***** 2013 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) (2013 at start)	JDmid (-2450000)	LMSTmidn	----- Sun: -----				LST twilight:		----- Moon: -----				
			set	twi.end	twi.beg	rise	eve	morn	rise	set	%illum	RA	Dec
Sat Jun 01/Sun Jun 02	6445.8	16 17 15	19 33	21 06	3 43	5 16	13 23	20 01	1 27	.....	34	23 57.7	3 05
Sun Jun 02/Mon Jun 03	6446.8	16 21 12	19 33	21 07	3 42	5 16	13 27	20 04	2 01	.....	25	0 45.7	7 16
Mon Jun 03/Tue Jun 04	6447.8	16 25 08	19 34	21 07	3 42	5 15	13 32	20 08	2 36	.....	17	1 33.6	11 02
Tue Jun 04/Wed Jun 05	6448.8	16 29 05	19 34	21 08	3 42	5 15	13 37	20 11	3 14	.....	10	2 21.9	14 13
Wed Jun 05/Thu Jun 06	6449.8	16 33 01	19 35	21 09	3 41	5 15	13 41	20 15	3 53	.....	5	3 10.7	16 45
Thu Jun 06/Fri Jun 07	6450.8	16 36 58	19 35	21 09	3 41	5 15	13 46	20 19	4 36	18 05	2	4 00.1	18 29
Fri Jun 07/Sat Jun 08	6451.8	16 40 54	19 36	21 10	3 41	5 15	13 51	20 22	5 22	18 56	0	4 49.9	19 23
Sat Jun 08/Sun Jun 09	6452.8	16 44 51	19 36	21 11	3 40	5 15	13 55	20 26	6 11	19 45	0	5 39.8	19 24
Sun Jun 09/Mon Jun 10	6453.8	16 48 48	19 37	21 11	3 40	5 15	14 00	20 30	.....	20 31	2	6 29.3	18 33
Mon Jun 10/Tue Jun 11	6454.8	16 52 44	19 37	21 12	3 40	5 15	14 04	20 34	.....	21 13	6	7 18.1	16 53
Tue Jun 11/Wed Jun 12	6455.8	16 56 41	19 38	21 12	3 40	5 15	14 09	20 37	.....	21 52	11	8 06.1	14 27
Wed Jun 12/Thu Jun 13	6456.8	17 00 37	19 38	21 13	3 40	5 15	14 13	20 41	.....	22 28	18	8 53.3	11 23
Thu Jun 13/Fri Jun 14	6457.8	17 04 34	19 38	21 13	3 40	5 15	14 17	20 45	.....	23 02	26	9 39.9	7 47
Fri Jun 14/Sat Jun 15	6458.8	17 08 30	19 39	21 14	3 40	5 15	14 22	20 49	.....	23 35	35	10 26.6	3 46
Sat Jun 15/Sun Jun 16	6459.8	17 12 27	19 39	21 14	3 40	5 15	14 26	20 53	.....	0 09	45	11 13.9	- 0 33
Sun Jun 16/Mon Jun 17	6460.8	17 16 23	19 39	21 15	3 40	5 15	14 30	20 57	.....	0 43	55	12 02.6	- 5 00
Mon Jun 17/Tue Jun 18	6461.8	17 20 20	19 40	21 15	3 40	5 15	14 35	21 01	.....	1 20	66	12 53.5	- 9 23
Tue Jun 18/Wed Jun 19	6462.8	17 24 17	19 40	21 15	3 40	5 15	14 39	21 05	.....	2 01	76	13 47.6	-13 30
Wed Jun 19/Thu Jun 20	6463.8	17 28 13	19 40	21 15	3 41	5 16	14 43	21 09	.....	2 47	85	14 45.3	-17 00
Thu Jun 20/Fri Jun 21	6464.8	17 32 10	19 41	21 16	3 41	5 16	14 47	21 13	.....	3 39	93	15 46.8	-19 34
Fri Jun 21/Sat Jun 22	6465.8	17 36 06	19 41	21 16	3 41	5 16	14 52	21 18	17 49	4 39	98	16 51.3	-20 53
Sat Jun 22/Sun Jun 23	6466.8	17 40 03	19 41	21 16	3 41	5 16	14 56	21 22	18 53	5 44	100	17 57.2	-20 43
Sun Jun 23/Mon Jun 24	6467.8	17 43 59	19 41	21 16	3 42	5 17	15 00	21 26	19 52	.....	99	19 02.4	-19 03
Mon Jun 24/Tue Jun 25	6468.8	17 47 56	19 41	21 16	3 42	5 17	15 04	21 30	20 45	.....	95	20 05.3	-16 06
Tue Jun 25/Wed Jun 26	6469.8	17 51 52	19 41	21 16	3 42	5 17	15 08	21 35	21 31	.....	88	21 04.8	-12 11
Wed Jun 26/Thu Jun 27	6470.8	17 55 49	19 41	21 16	3 43	5 18	15 12	21 39	22 13	.....	79	22 00.8	- 7 41
Thu Jun 27/Fri Jun 28	6471.8	17 59 46	19 42	21 16	3 43	5 18	15 16	21 43	22 51	.....	70	22 53.9	- 2 57
Fri Jun 28/Sat Jun 29	6472.8	18 03 42	19 42	21 16	3 44	5 18	15 20	21 48	23 28	.....	59	23 44.7	1 43
Sat Jun 29/Sun Jun 30	6473.8	18 07 39	19 42	21 16	3 44	5 19	15 23	21 52	0 03	.....	49	0 34.1	6 06
Sun Jun 30/Mon Jul 01	6474.8	18 11 35	19 42	21 16	3 45	5 19	15 27	21 57	0 38	.....	39	1 22.8	10 04

***** 2013 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) (2013 at start)	JDmid (-2450000)	LMSTmidn	Sun: -----				LST twilight:		Moon: -----				
			set	twi.end	twi.beg	rise	eve	morn	rise	set	%illum	RA	Dec
Mon Jul 01/Tue Jul 02	6475.8	18 15 32	19 42	21 16	3 45	5 19	15 31	22 01	1 15	.....	29	2 11.4	13 27
Tue Jul 02/Wed Jul 03	6476.8	18 19 28	19 41	21 16	3 46	5 20	15 35	22 06	1 54	.....	21	3 00.2	16 09
Wed Jul 03/Thu Jul 04	6477.8	18 23 25	19 41	21 16	3 46	5 20	15 38	22 10	2 35	.....	14	3 49.5	18 06
Thu Jul 04/Fri Jul 05	6478.8	18 27 21	19 41	21 15	3 47	5 21	15 42	22 15	3 20	.....	8	4 39.2	19 13
Fri Jul 05/Sat Jul 06	6479.8	18 31 18	19 41	21 15	3 48	5 21	15 46	22 19	4 07	17 42	4	5 29.0	19 28
Sat Jul 06/Sun Jul 07	6480.8	18 35 15	19 41	21 15	3 48	5 22	15 49	22 24	4 57	18 29	1	6 18.5	18 50
Sun Jul 07/Mon Jul 08	6481.8	18 39 11	19 41	21 14	3 49	5 22	15 53	22 29	5 50	19 12	0	7 07.6	17 23
Mon Jul 08/Tue Jul 09	6482.8	18 43 08	19 41	21 14	3 50	5 23	15 57	22 33	.....	19 52	1	7 55.8	15 09
Tue Jul 09/Wed Jul 10	6483.8	18 47 04	19 40	21 13	3 50	5 23	16 00	22 38	.....	20 30	4	8 43.2	12 15
Wed Jul 10/Thu Jul 11	6484.8	18 51 01	19 40	21 13	3 51	5 24	16 03	22 43	.....	21 05	8	9 29.8	8 47
Thu Jul 11/Fri Jul 12	6485.8	18 54 57	19 40	21 12	3 52	5 24	16 07	22 47	.....	21 38	14	10 16.2	4 54
Fri Jul 12/Sat Jul 13	6486.8	18 58 54	19 39	21 12	3 53	5 25	16 10	22 52	.....	22 11	22	11 02.7	0 44
Sat Jul 13/Sun Jul 14	6487.8	19 02 50	19 39	21 11	3 53	5 26	16 14	22 57	.....	22 45	31	11 50.0	- 3 36
Sun Jul 14/Mon Jul 15	6488.8	19 06 47	19 39	21 11	3 54	5 26	16 17	23 02	.....	23 20	41	12 38.9	- 7 54
Mon Jul 15/Tue Jul 16	6489.8	19 10 44	19 38	21 10	3 55	5 27	16 20	23 06	.....	23 58	51	13 30.1	-11 58
Tue Jul 16/Wed Jul 17	6490.8	19 14 40	19 38	21 09	3 56	5 27	16 24	23 11	.....	0 40	62	14 24.4	-15 36
Wed Jul 17/Thu Jul 18	6491.8	19 18 37	19 37	21 09	3 57	5 28	16 27	23 16	.....	1 27	73	15 22.2	-18 28
Thu Jul 18/Fri Jul 19	6492.8	19 22 33	19 37	21 08	3 58	5 29	16 30	23 21	.....	2 22	83	16 23.4	-20 19
Fri Jul 19/Sat Jul 20	6493.8	19 26 30	19 36	21 07	3 59	5 29	16 33	23 26	.....	3 22	91	17 27.2	-20 51
Sat Jul 20/Sun Jul 21	6494.8	19 30 26	19 36	21 06	3 59	5 30	16 36	23 31	17 34	4 28	97	18 31.9	-19 56
Sun Jul 21/Mon Jul 22	6495.8	19 34 23	19 35	21 06	4 00	5 31	16 40	23 35	18 30	5 37	100	19 35.9	-17 37
Mon Jul 22/Tue Jul 23	6496.8	19 38 19	19 35	21 05	4 01	5 31	16 43	23 40	19 20	.....	99	20 37.7	-14 07
Tue Jul 23/Wed Jul 24	6497.8	19 42 16	19 34	21 04	4 02	5 32	16 46	23 45	20 05	.....	96	21 36.6	- 9 48
Wed Jul 24/Thu Jul 25	6498.8	19 46 13	19 34	21 03	4 03	5 32	16 49	23 50	20 46	.....	91	22 32.6	- 5 02
Thu Jul 25/Fri Jul 26	6499.8	19 50 09	19 33	21 02	4 04	5 33	16 52	23 55	21 25	.....	83	23 26.1	- 0 11
Fri Jul 26/Sat Jul 27	6500.8	19 54 06	19 32	21 01	4 05	5 34	16 55	24 00	22 01	.....	74	0 17.7	4 29
Sat Jul 27/Sun Jul 28	6501.8	19 58 02	19 32	21 00	4 06	5 34	16 58	0 05	22 38	.....	64	1 08.1	8 43
Sun Jul 28/Mon Jul 29	6502.8	20 01 59	19 31	20 59	4 07	5 35	17 01	0 09	23 15	.....	54	1 58.0	12 23
Mon Jul 29/Tue Jul 30	6503.8	20 05 55	19 30	20 58	4 08	5 36	17 04	0 14	23 53	.....	44	2 47.7	15 21
Tue Jul 30/Wed Jul 31	6504.8	20 09 52	19 29	20 57	4 09	5 36	17 07	0 19	0 34	.....	35	3 37.5	17 33
Wed Jul 31/Thu Aug 01	6505.8	20 13 48	19 29	20 56	4 10	5 37	17 09	0 24	1 18	.....	26	4 27.4	18 54

***** 2013 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) (2013 at start)	JDmid (-2450000)	LMSTmidn	----- Sun: -----				LST twilight:		----- Moon: -----				
			set	twi.end	twi.beg	rise	eve	morn	rise	set	%illum	RA	Dec
Thu Aug 01/Fri Aug 02	6506.8	20 17 45	19 28	20 55	4 11	5 38	17 12	0 29	2 04	.....	18	5 17.3	19 24
Fri Aug 02/Sat Aug 03	6507.8	20 21 42	19 27	20 54	4 12	5 38	17 15	0 34	2 53	.....	12	6 07.0	19 01
Sat Aug 03/Sun Aug 04	6508.8	20 25 38	19 26	20 53	4 13	5 39	17 18	0 39	3 45	.....	6	6 56.3	17 47
Sun Aug 04/Mon Aug 05	6509.8	20 29 35	19 25	20 52	4 13	5 40	17 21	0 44	4 38	17 52	3	7 44.9	15 46
Mon Aug 05/Tue Aug 06	6510.8	20 33 31	19 24	20 50	4 14	5 40	17 23	0 49	5 32	18 30	1	8 32.7	13 03
Tue Aug 06/Wed Aug 07	6511.8	20 37 28	19 24	20 49	4 15	5 41	17 26	0 54	6 27	19 06	0	9 19.8	9 44
Wed Aug 07/Thu Aug 08	6512.8	20 41 24	19 23	20 48	4 16	5 42	17 29	0 58	.....	19 41	2	10 06.5	5 57
Thu Aug 08/Fri Aug 09	6513.8	20 45 21	19 22	20 47	4 17	5 42	17 32	1 03	.....	20 14	6	10 53.1	1 51
Fri Aug 09/Sat Aug 10	6514.8	20 49 17	19 21	20 46	4 18	5 43	17 34	1 08	.....	20 48	11	11 40.2	- 2 25
Sat Aug 10/Sun Aug 11	6515.8	20 53 14	19 20	20 44	4 19	5 44	17 37	1 13	.....	21 22	18	12 28.4	- 6 40
Sun Aug 11/Mon Aug 12	6516.8	20 57 11	19 19	20 43	4 20	5 44	17 40	1 18	.....	21 59	27	13 18.4	-10 44
Mon Aug 12/Tue Aug 13	6517.8	21 01 07	19 18	20 42	4 21	5 45	17 42	1 23	.....	22 39	37	14 10.7	-14 24
Tue Aug 13/Wed Aug 14	6518.8	21 05 04	19 17	20 41	4 22	5 46	17 45	1 28	.....	23 23	48	15 05.8	-17 24
Wed Aug 14/Thu Aug 15	6519.8	21 09 00	19 16	20 39	4 23	5 46	17 48	1 33	.....	0 13	59	16 03.8	-19 31
Thu Aug 15/Fri Aug 16	6520.8	21 12 57	19 15	20 38	4 24	5 47	17 50	1 37	.....	1 09	70	17 04.4	-20 30
Fri Aug 16/Sat Aug 17	6521.8	21 16 53	19 14	20 37	4 25	5 48	17 53	1 42	.....	2 11	80	18 06.6	-20 12
Sat Aug 17/Sun Aug 18	6522.8	21 20 50	19 12	20 35	4 26	5 48	17 56	1 47	.....	3 17	89	19 09.0	-18 32
Sun Aug 18/Mon Aug 19	6523.8	21 24 46	19 11	20 34	4 26	5 49	17 58	1 52	.....	4 24	95	20 10.5	-15 39
Mon Aug 19/Tue Aug 20	6524.8	21 28 43	19 10	20 33	4 27	5 50	18 01	1 57	17 55	5 32	99	21 10.1	-11 46
Tue Aug 20/Wed Aug 21	6525.8	21 32 40	19 09	20 31	4 28	5 50	18 03	2 02	18 38	6 39	100	22 07.4	- 7 13
Wed Aug 21/Thu Aug 22	6526.8	21 36 36	19 08	20 30	4 29	5 51	18 06	2 06	19 18	.....	98	23 02.7	- 2 21
Thu Aug 22/Fri Aug 23	6527.8	21 40 33	19 07	20 28	4 30	5 52	18 08	2 11	19 56	.....	93	23 56.2	2 28
Fri Aug 23/Sat Aug 24	6528.8	21 44 29	19 06	20 27	4 31	5 52	18 11	2 16	20 34	.....	87	0 48.4	6 59
Sat Aug 24/Sun Aug 25	6529.8	21 48 26	19 04	20 26	4 32	5 53	18 13	2 21	21 11	.....	79	1 39.9	10 58
Sun Aug 25/Mon Aug 26	6530.8	21 52 22	19 03	20 24	4 33	5 54	18 16	2 26	21 50	.....	70	2 31.0	14 17
Mon Aug 26/Tue Aug 27	6531.8	21 56 19	19 02	20 23	4 33	5 54	18 18	2 31	22 31	.....	60	3 22.0	16 47
Tue Aug 27/Wed Aug 28	6532.8	22 00 15	19 01	20 21	4 34	5 55	18 21	2 35	23 14	.....	50	4 12.7	18 27
Wed Aug 28/Thu Aug 29	6533.8	22 04 12	19 00	20 20	4 35	5 55	18 24	2 40	24 00	.....	41	5 03.3	19 13
Thu Aug 29/Fri Aug 30	6534.8	22 08 09	18 58	20 18	4 36	5 56	18 26	2 45	0 48	.....	32	5 53.4	19 06
Fri Aug 30/Sat Aug 31	6535.8	22 12 05	18 57	20 17	4 37	5 57	18 29	2 50	1 38	.....	23	6 43.0	18 07
Sat Aug 31/Sun Sep 01	6536.8	22 16 02	18 56	20 16	4 38	5 57	18 31	2 54	2 31	.....	16	7 31.9	16 21

***** 2013 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) (2013 at start)	JDmid (-2450000)	LMSTmidn	----- Sun: ----- set twi.end twi.beg rise				LST twilight: eve morn		----- Moon: ----- rise set %illum RA Dec				
Sun Sep 01/Mon Sep 02	6537.8	22 19 58	18 55	20 14	4 38	5 58	18 34	2 59	3 24	.....	10	8 20.0	13 50
Mon Sep 02/Tue Sep 03	6538.8	22 23 55	18 53	20 13	4 39	5 59	18 36	3 04	4 19	17 05	5	9 07.6	10 42
Tue Sep 03/Wed Sep 04	6539.8	22 27 51	18 52	20 11	4 40	5 59	18 39	3 09	5 15	17 41	2	9 54.7	7 03
Wed Sep 04/Thu Sep 05	6540.8	22 31 48	18 51	20 10	4 41	6 00	18 41	3 13	6 11	18 15	0	10 41.8	3 02
Thu Sep 05/Fri Sep 06	6541.8	22 35 44	18 50	20 08	4 42	6 00	18 43	3 18	.....	18 49	1	11 29.3	- 1 13
Fri Sep 06/Sat Sep 07	6542.8	22 39 41	18 48	20 07	4 42	6 01	18 46	3 23	.....	19 24	4	12 17.8	- 5 29
Sat Sep 07/Sun Sep 08	6543.8	22 43 38	18 47	20 05	4 43	6 02	18 48	3 27	.....	20 01	8	13 07.8	- 9 37
Sun Sep 08/Mon Sep 09	6544.8	22 47 34	18 46	20 04	4 44	6 02	18 51	3 32	.....	20 40	15	13 59.7	-13 21
Mon Sep 09/Tue Sep 10	6545.8	22 51 31	18 44	20 03	4 45	6 03	18 53	3 37	.....	21 23	24	14 53.9	-16 29
Tue Sep 10/Wed Sep 11	6546.8	22 55 27	18 43	20 01	4 45	6 04	18 56	3 42	.....	22 11	34	15 50.5	-18 47
Wed Sep 11/Thu Sep 12	6547.8	22 59 24	18 42	20 00	4 46	6 04	18 58	3 46	.....	23 04	45	16 49.2	-20 01
Thu Sep 12/Fri Sep 13	6548.8	23 03 20	18 40	19 58	4 47	6 05	19 01	3 51	.....	0 02	56	17 49.2	-20 04
Fri Sep 13/Sat Sep 14	6549.8	23 07 17	18 39	19 57	4 48	6 05	19 03	3 56	.....	1 05	67	18 49.5	-18 52
Sat Sep 14/Sun Sep 15	6550.8	23 11 13	18 38	19 55	4 48	6 06	19 06	4 00	.....	2 10	78	19 49.2	-16 29
Sun Sep 15/Mon Sep 16	6551.8	23 15 10	18 36	19 54	4 49	6 07	19 08	4 05	.....	3 15	87	20 47.5	-13 05
Mon Sep 16/Tue Sep 17	6552.8	23 19 07	18 35	19 52	4 50	6 07	19 11	4 10	.....	4 21	93	21 44.3	- 8 55
Tue Sep 17/Wed Sep 18	6553.8	23 23 03	18 34	19 51	4 50	6 08	19 13	4 14	17 12	5 25	98	22 39.4	- 4 17
Wed Sep 18/Thu Sep 19	6554.8	23 27 00	18 32	19 50	4 51	6 08	19 16	4 19	17 50	6 29	100	23 33.2	0 30
Thu Sep 19/Fri Sep 20	6555.8	23 30 56	18 31	19 48	4 52	6 09	19 18	4 24	18 28	.....	99	0 26.2	5 09
Fri Sep 20/Sat Sep 21	6556.8	23 34 53	18 30	19 47	4 53	6 10	19 21	4 28	19 06	.....	96	1 18.6	9 23
Sat Sep 21/Sun Sep 22	6557.8	23 38 49	18 28	19 45	4 53	6 10	19 24	4 33	19 45	.....	91	2 10.7	13 01
Sun Sep 22/Mon Sep 23	6558.8	23 42 46	18 27	19 44	4 54	6 11	19 26	4 37	20 25	.....	84	3 02.8	15 52
Mon Sep 23/Tue Sep 24	6559.8	23 46 42	18 26	19 43	4 55	6 12	19 29	4 42	21 08	.....	76	3 54.7	17 52
Tue Sep 24/Wed Sep 25	6560.8	23 50 39	18 24	19 41	4 55	6 12	19 31	4 47	21 53	.....	67	4 46.2	18 58
Wed Sep 25/Thu Sep 26	6561.8	23 54 36	18 23	19 40	4 56	6 13	19 34	4 51	22 41	.....	58	5 37.2	19 09
Thu Sep 26/Fri Sep 27	6562.8	23 58 32	18 22	19 39	4 57	6 13	19 36	4 56	23 31	.....	48	6 27.4	18 27
Fri Sep 27/Sat Sep 28	6563.8	0 02 29	18 21	19 37	4 57	6 14	19 39	5 01	0 22	.....	39	7 16.7	16 55
Sat Sep 28/Sun Sep 29	6564.8	0 06 25	18 19	19 36	4 58	6 15	19 42	5 05	1 15	.....	30	8 05.1	14 39
Sun Sep 29/Mon Sep 30	6565.8	0 10 22	18 18	19 34	4 59	6 15	19 44	5 10	2 09	.....	21	8 52.7	11 44
Mon Sep 30/Tue Oct 01	6566.8	0 14 18	18 17	19 33	4 59	6 16	19 47	5 14	3 04	.....	14	9 39.9	8 16

***** 2013 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) (2013 at start)	JDmid (-2450000)	LMSTmidn	Sun: -----				LST twilight:		Moon: -----				
			set	twi.end	twi.beg	rise	eve	morn	rise	set	%illum	RA	Dec
Tue Oct 01/Wed Oct 02	6567.8	0 18 15	18 15	19 32	5 00	6 17	19 49	5 19	4 00	.....	8	10 27.1	4 22
Wed Oct 02/Thu Oct 03	6568.8	0 22 11	18 14	19 31	5 01	6 17	19 52	5 24	4 58	16 47	3	11 14.8	0 11
Thu Oct 03/Fri Oct 04	6569.8	0 26 08	18 13	19 29	5 01	6 18	19 55	5 28	5 56	17 22	1	12 03.5	- 4 07
Fri Oct 04/Sat Oct 05	6570.8	0 30 05	18 12	19 28	5 02	6 19	19 57	5 33	6 57	17 59	0	12 53.8	- 8 20
Sat Oct 05/Sun Oct 06	6571.8	0 34 01	18 10	19 27	5 03	6 19	20 00	5 38	.....	18 38	2	13 46.1	-12 14
Sun Oct 06/Mon Oct 07	6572.8	0 37 58	18 09	19 25	5 03	6 20	20 03	5 42	.....	19 21	6	14 40.7	-15 34
Mon Oct 07/Tue Oct 08	6573.8	0 41 54	18 08	19 24	5 04	6 21	20 05	5 47	.....	20 08	12	15 37.5	-18 05
Tue Oct 08/Wed Oct 09	6574.8	0 45 51	18 07	19 23	5 05	6 21	20 08	5 51	.....	21 01	21	16 36.2	-19 34
Wed Oct 09/Thu Oct 10	6575.8	0 49 47	18 05	19 22	5 05	6 22	20 11	5 56	.....	21 58	31	17 35.9	-19 53
Thu Oct 10/Fri Oct 11	6576.8	0 53 44	18 04	19 21	5 06	6 23	20 14	6 01	.....	22 59	42	18 35.6	-18 58
Fri Oct 11/Sat Oct 12	6577.8	0 57 40	18 03	19 19	5 07	6 23	20 16	6 05	.....	0 02	53	19 34.4	-16 54
Sat Oct 12/Sun Oct 13	6578.8	1 01 37	18 02	19 18	5 07	6 24	20 19	6 10	.....	1 06	64	20 31.6	-13 51
Sun Oct 13/Mon Oct 14	6579.8	1 05 34	18 01	19 17	5 08	6 25	20 22	6 14	.....	2 10	75	21 27.1	-10 00
Mon Oct 14/Tue Oct 15	6580.8	1 09 30	17 59	19 16	5 09	6 25	20 25	6 19	.....	3 13	84	22 21.1	- 5 39
Tue Oct 15/Wed Oct 16	6581.8	1 13 27	17 58	19 15	5 09	6 26	20 28	6 24	.....	4 15	91	23 13.9	- 1 02
Wed Oct 16/Thu Oct 17	6582.8	1 17 23	17 57	19 14	5 10	6 27	20 30	6 28	16 24	5 17	97	0 06.1	3 34
Thu Oct 17/Fri Oct 18	6583.8	1 21 20	17 56	19 13	5 11	6 28	20 33	6 33	17 01	6 17	99	0 58.0	7 54
Fri Oct 18/Sat Oct 19	6584.8	1 25 16	17 55	19 12	5 11	6 28	20 36	6 38	17 40	7 16	100	1 50.0	11 45
Sat Oct 19/Sun Oct 20	6585.8	1 29 13	17 54	19 11	5 12	6 29	20 39	6 42	18 19	.....	98	2 42.3	14 55
Sun Oct 20/Mon Oct 21	6586.8	1 33 09	17 53	19 10	5 13	6 30	20 42	6 47	19 01	.....	94	3 34.8	17 15
Mon Oct 21/Tue Oct 22	6587.8	1 37 06	17 52	19 09	5 13	6 31	20 45	6 51	19 46	.....	89	4 27.1	18 42
Tue Oct 22/Wed Oct 23	6588.8	1 41 03	17 51	19 08	5 14	6 31	20 48	6 56	20 33	.....	82	5 19.0	19 12
Wed Oct 23/Thu Oct 24	6589.8	1 44 59	17 50	19 07	5 15	6 32	20 51	7 01	21 22	.....	74	6 10.1	18 48
Thu Oct 24/Fri Oct 25	6590.8	1 48 56	17 48	19 06	5 16	6 33	20 54	7 05	22 13	.....	65	7 00.1	17 32
Fri Oct 25/Sat Oct 26	6591.8	1 52 52	17 47	19 05	5 16	6 34	20 57	7 10	23 05	.....	56	7 48.9	15 31
Sat Oct 26/Sun Oct 27	6592.8	1 56 49	17 47	19 04	5 17	6 35	21 00	7 15	23 58	.....	46	8 36.7	12 49
Sun Oct 27/Mon Oct 28	6593.8	2 00 45	17 46	19 03	5 18	6 35	21 03	7 19	0 52	.....	37	9 23.7	9 33
Mon Oct 28/Tue Oct 29	6594.8	2 04 42	17 45	19 02	5 18	6 36	21 06	7 24	1 47	.....	28	10 10.5	5 50
Tue Oct 29/Wed Oct 30	6595.8	2 08 38	17 44	19 01	5 19	6 37	21 09	7 29	2 43	.....	19	10 57.6	1 46
Wed Oct 30/Thu Oct 31	6596.8	2 12 35	17 43	19 01	5 20	6 38	21 12	7 33	3 41	.....	12	11 45.7	- 2 29
Thu Oct 31/Fri Nov 01	6597.8	2 16 32	17 42	19 00	5 21	6 39	21 15	7 38	4 41	.....	6	12 35.4	- 6 44

***** 2013 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) (2013 at start)	JDmid (-2450000)	LMSTmidn	----- Sun: -----				LST twilight:		----- Moon: -----				
			set	twi.end	twi.beg	rise	eve	morn	rise	set	%illum	RA	Dec
Fri Nov 01/Sat Nov 02	6598.8	2 20 28	17 41	18 59	5 21	6 39	21 19	7 43	5 43	16 31	2	13 27.3	-10 48
Sat Nov 02/Sun Nov 03	6599.8	2 24 25	17 40	18 58	5 22	6 40	21 22	7 47	6 47	17 13	0	14 21.9	-14 24
Sun Nov 03/Mon Nov 04	6600.8	2 28 21	17 39	18 58	5 23	6 41	21 25	7 52	7 52	18 00	1	15 19.2	-17 16
Mon Nov 04/Tue Nov 05	6601.8	2 32 18	17 39	18 57	5 23	6 42	21 28	7 57	.....	18 51	4	16 18.8	-19 08
Tue Nov 05/Wed Nov 06	6602.8	2 36 14	17 38	18 56	5 24	6 43	21 32	8 01	.....	19 49	10	17 19.7	-19 48
Wed Nov 06/Thu Nov 07	6603.8	2 40 11	17 37	18 56	5 25	6 44	21 35	8 06	.....	20 50	18	18 20.7	-19 11
Thu Nov 07/Fri Nov 08	6604.8	2 44 07	17 36	18 55	5 26	6 44	21 38	8 11	.....	21 55	28	19 20.7	-17 22
Fri Nov 08/Sat Nov 09	6605.8	2 48 04	17 36	18 54	5 26	6 45	21 42	8 15	.....	22 59	38	20 18.6	-14 30
Sat Nov 09/Sun Nov 10	6606.8	2 52 01	17 35	18 54	5 27	6 46	21 45	8 20	.....	0 04	50	21 14.3	-10 50
Sun Nov 10/Mon Nov 11	6607.8	2 55 57	17 34	18 53	5 28	6 47	21 48	8 25	.....	1 06	61	22 07.9	- 6 38
Mon Nov 11/Tue Nov 12	6608.8	2 59 54	17 34	18 53	5 29	6 48	21 52	8 29	.....	2 08	71	22 59.9	- 2 09
Tue Nov 12/Wed Nov 13	6609.8	3 03 50	17 33	18 52	5 29	6 49	21 55	8 34	.....	3 08	81	23 51.0	2 22
Wed Nov 13/Thu Nov 14	6610.8	3 07 47	17 32	18 52	5 30	6 50	21 59	8 39	.....	4 08	88	0 41.8	6 42
Thu Nov 14/Fri Nov 15	6611.8	3 11 43	17 32	18 51	5 31	6 50	22 02	8 43	.....	5 06	94	1 32.8	10 39
Fri Nov 15/Sat Nov 16	6612.8	3 15 40	17 31	18 51	5 32	6 51	22 06	8 48	16 16	6 04	98	2 24.2	14 00
Sat Nov 16/Sun Nov 17	6613.8	3 19 36	17 31	18 51	5 32	6 52	22 09	8 53	16 57	7 00	100	3 16.2	16 38
Sun Nov 17/Mon Nov 18	6614.8	3 23 33	17 30	18 50	5 33	6 53	22 13	8 58	17 40	7 54	100	4 08.5	18 24
Mon Nov 18/Tue Nov 19	6615.8	3 27 30	17 30	18 50	5 34	6 54	22 17	9 02	18 26	.....	97	5 00.8	19 14
Tue Nov 19/Wed Nov 20	6616.8	3 31 26	17 30	18 50	5 35	6 55	22 20	9 07	19 14	.....	93	5 52.6	19 09
Wed Nov 20/Thu Nov 21	6617.8	3 35 23	17 29	18 49	5 35	6 56	22 24	9 12	20 05	.....	87	6 43.4	18 10
Thu Nov 21/Fri Nov 22	6618.8	3 39 19	17 29	18 49	5 36	6 57	22 28	9 16	20 57	.....	81	7 32.9	16 23
Fri Nov 22/Sat Nov 23	6619.8	3 43 16	17 28	18 49	5 37	6 57	22 31	9 21	21 49	.....	72	8 21.1	13 54
Sat Nov 23/Sun Nov 24	6620.8	3 47 12	17 28	18 49	5 38	6 58	22 35	9 26	22 42	.....	64	9 08.2	10 49
Sun Nov 24/Mon Nov 25	6621.8	3 51 09	17 28	18 49	5 38	6 59	22 39	9 30	23 36	.....	54	9 54.6	7 16
Mon Nov 25/Tue Nov 26	6622.8	3 55 05	17 28	18 48	5 39	7 00	22 43	9 35	0 30	.....	45	10 40.9	3 22
Tue Nov 26/Wed Nov 27	6623.8	3 59 02	17 27	18 48	5 40	7 01	22 46	9 40	1 26	.....	35	11 27.8	- 0 46
Wed Nov 27/Thu Nov 28	6624.8	4 02 59	17 27	18 48	5 41	7 02	22 50	9 45	2 23	.....	25	12 16.0	- 4 59
Thu Nov 28/Fri Nov 29	6625.8	4 06 55	17 27	18 48	5 41	7 03	22 54	9 49	3 23	.....	17	13 06.3	- 9 06
Fri Nov 29/Sat Nov 30	6626.8	4 10 52	17 27	18 48	5 42	7 03	22 58	9 54	4 26	.....	10	13 59.3	-12 54
Sat Nov 30/Sun Dec 01	6627.8	4 14 48	17 27	18 48	5 43	7 04	23 02	9 59	5 31	15 47	4	14 55.4	-16 08

***** 2013 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) (2013 at start)	JDmid (-2450000)	LMSTmidn	----- Sun: ----- set twi.end twi.beg rise				LST twilight: eve morn		----- Moon: ----- rise set %illum RA Dec				
Sun Dec 01/Mon Dec 02	6628.8	4 18 45	17 27	18 48	5 44	7 05	23 06	10 03	6 36	16 36	1	15 54.6	-18 28
Mon Dec 02/Tue Dec 03	6629.8	4 22 41	17 27	18 48	5 44	7 06	23 10	10 08	7 40	17 32	0	16 56.3	-19 40
Tue Dec 03/Wed Dec 04	6630.8	4 26 38	17 27	18 48	5 45	7 07	23 14	10 13	.....	18 33	2	17 59.0	-19 33
Wed Dec 04/Thu Dec 05	6631.8	4 30 34	17 27	18 48	5 46	7 07	23 18	10 17	.....	19 39	7	19 01.3	-18 06
Thu Dec 05/Fri Dec 06	6632.8	4 34 31	17 27	18 49	5 46	7 08	23 22	10 22	.....	20 46	15	20 01.7	-15 29
Fri Dec 06/Sat Dec 07	6633.8	4 38 28	17 27	18 49	5 47	7 09	23 26	10 26	.....	21 53	24	20 59.6	-11 56
Sat Dec 07/Sun Dec 08	6634.8	4 42 24	17 27	18 49	5 48	7 10	23 30	10 31	.....	22 59	34	21 54.8	- 7 47
Sun Dec 08/Mon Dec 09	6635.8	4 46 21	17 27	18 49	5 48	7 10	23 35	10 36	.....	0 02	45	22 47.7	- 3 18
Mon Dec 09/Tue Dec 10	6636.8	4 50 17	17 27	18 49	5 49	7 11	23 39	10 40	.....	1 03	56	23 39.0	1 14
Tue Dec 10/Wed Dec 11	6637.8	4 54 14	17 28	18 50	5 50	7 12	23 43	10 45	.....	2 02	67	0 29.4	5 37
Wed Dec 11/Thu Dec 12	6638.8	4 58 10	17 28	18 50	5 50	7 13	23 47	10 50	.....	3 01	76	1 19.6	9 38
Thu Dec 12/Fri Dec 13	6639.8	5 02 07	17 28	18 50	5 51	7 13	23 51	10 54	.....	3 58	84	2 10.1	13 07
Fri Dec 13/Sat Dec 14	6640.8	5 06 03	17 28	18 51	5 52	7 14	23 56	10 59	.....	4 54	91	3 01.1	15 57
Sat Dec 14/Sun Dec 15	6641.8	5 10 00	17 29	18 51	5 52	7 14	0 00	11 03	15 37	5 48	96	3 52.7	17 58
Sun Dec 15/Mon Dec 16	6642.8	5 13 57	17 29	18 51	5 53	7 15	0 04	11 08	16 22	6 40	99	4 44.6	19 07
Mon Dec 16/Tue Dec 17	6643.8	5 17 53	17 29	18 52	5 53	7 16	0 09	11 12	17 09	7 28	100	5 36.4	19 21
Tue Dec 17/Wed Dec 18	6644.8	5 21 50	17 30	18 52	5 54	7 16	0 13	11 17	17 59	8 13	99	6 27.6	18 40
Wed Dec 18/Thu Dec 19	6645.8	5 25 46	17 30	18 52	5 54	7 17	0 17	11 21	18 50	.....	96	7 17.8	17 09
Thu Dec 19/Fri Dec 20	6646.8	5 29 43	17 31	18 53	5 55	7 17	0 22	11 26	19 42	.....	92	8 06.7	14 52
Fri Dec 20/Sat Dec 21	6647.8	5 33 39	17 31	18 53	5 56	7 18	0 26	11 30	20 35	.....	86	8 54.3	11 58
Sat Dec 21/Sun Dec 22	6648.8	5 37 36	17 32	18 54	5 56	7 18	0 31	11 35	21 28	.....	79	9 40.9	8 34
Sun Dec 22/Mon Dec 23	6649.8	5 41 32	17 32	18 54	5 56	7 19	0 35	11 39	22 22	.....	71	10 27.0	4 48
Mon Dec 23/Tue Dec 24	6650.8	5 45 29	17 33	18 55	5 57	7 19	0 40	11 43	23 16	.....	62	11 13.0	0 47
Tue Dec 24/Wed Dec 25	6651.8	5 49 26	17 33	18 56	5 57	7 20	0 44	11 48	0 11	.....	52	11 59.8	- 3 21
Wed Dec 25/Thu Dec 26	6652.8	5 53 22	17 34	18 56	5 58	7 20	0 49	11 52	1 08	.....	42	12 48.1	- 7 27
Thu Dec 26/Fri Dec 27	6653.8	5 57 19	17 34	18 57	5 58	7 20	0 53	11 56	2 07	.....	32	13 38.6	-11 19
Fri Dec 27/Sat Dec 28	6654.8	6 01 15	17 35	18 57	5 59	7 21	0 58	12 01	3 09	.....	22	14 32.1	-14 45
Sat Dec 28/Sun Dec 29	6655.8	6 05 12	17 36	18 58	5 59	7 21	1 02	12 05	4 13	.....	14	15 28.9	-17 28
Sun Dec 29/Mon Dec 30	6656.8	6 09 08	17 36	18 58	5 59	7 21	1 07	12 09	5 17	.....	7	16 28.9	-19 13
Mon Dec 30/Tue Dec 31	6657.8	6 13 05	17 37	18 59	6 00	7 22	1 11	12 14	6 20	16 11	2	17 31.2	-19 45
Tue Dec 31/Wed Jan 01	6658.8	6 17 01	17 38	19 00	6 00	7 22	1 16	12 18	7 19	17 15	0	18 34.5	-18 56