

Explanation of The Nautical Almanac Daily Pages

1	Date and Time based on GMT/UT
2	Mer. pass- meridian passage of Aries at the Prime Meridian- Greenwich- 0°. Time figure is GMT/UT.
3	Planet or Moon GHA v value and planet or Moon declination d value. v- “The change in hour angle arising from v of the body at the time of the sight observation is accounted for with the <i>v correction</i> .” <i>Source- Bowditch 2017, Chapter 19- Sight Reduction p. 313.</i> The planet’s v is positive unless preceded by a minus sign which is sometimes the case with Venus. The sign of the Moon’s v is positive. d- “The change in declination of the body at the time of the sight observation is accounted for with the <i>d correction</i> .” <i>Source- Bowditch 2017, Chapter 19- Sight Reduction p. 313.</i> The sign of the Moon or planet’s d correction is determined by the declination trend- positive if successive declination values increase and negative if they decrease. Corrections for both v and d are found in the Increments and Corrections pages of The Nautical Almanac. To find the correction for either v or d enter the Increments and Corrections pages for the minutes in time of the observation and find the value in the v and d corr. columns Find the v , or d , value in the left side of one of the three columns. To the right of that value is the v , or d , correction. Be sure to add or subtract the values depending upon the <i>sign</i> of the value as mentioned above.
	Example for v & d correction- June 10, 2020 GMT- 21:19:10 Body- Moon
	GHA= 247° 20.6’ v = 12.1’ GHA increment 4° 34.4’ v- correction for 12.1’ + <u>0° 03.9’</u> GHA= 251° 58.9’ Dec= S 17° 43.8’ d= 8.9’ d- correction for 8.9’ <u>- 0° 02.9’</u> dec= S 17° 40.9’ <i>declination trend is decreasing so the sign of d correction is negative</i>
4	m- is the <i>magnitude</i> or brightness of the planet. A bright planet will have a <i>minus</i> sign beside the figure. A fainter planet will have no sign beside its magnitude figure.
5	Stars- SHA, Sidereal Hour Angle, and Declination. 59 stars are listed. Typically, only 57 stars are used for navigational purposes in both Northern and Southern Hemispheres. Here you’ll also find Polaris and Scheat. In the Northern Hemisphere Polaris is often used for determination of latitude.
6	Mer. pass- planet meridian passage time at the Prime Meridian- Greenwich- 0°. Time figure is GMT/UT.
7	SHA- planet SHA. Planet SHA is calculated by subtracting Aries GHA from planet GHA. If planet GHA figure is less than Aries GHA, add 360° to planet GHA and then subtract Aries GHA.
8	Horizontal parallax- for Venus and Mars. Horizontal parallax is the angle subtended by half the Earth’s diameter as viewed from the planet in minutes of arc.
9	SD- Semi-diameter of the Sun in minutes of arc. One half of the angular width of the Sun as observed on earth.
10	d- the daily average change, per hour, in the Sun’s declination in minutes of arc.

11	SD- Semi-diameter of the Moon in minutes of arc. Semi-diameter is one half of the angular width of the Moon, as observed on earth.
12	HP- the angle between two lines, one from the center of the Moon to the center of the Earth, the other from the center of the Moon to the edge of the Earth. This angle is about 56', but it changes slightly from day to day as the distance to the Moon changes along its elliptical path around the Earth. Source- <i>starpeth.com</i>
13	Sun- Eqn. of Time- Basically the Equation of Time (EoT) is the difference between clock time and time seen on a sundial. This is comparing "clock time", as a mechanical measurement of time, and the sundial being time determined by the position of the Sun at any given moment. The figures listed are for 00^h and 12^h. Using the EoT you can get fairly accurate determination of when Meridian Passage (Local Apparent Noon) occurs at your position. Unshaded EoT values are subtracted from 12:00 to get Meridian Passage. Shaded EoT values are added to 12:00 to get Meridian Passage. An Equation of Time chart (as a curve) is provided in each almanac on TheNauticalAlmanac.com Example- Meridian Passage on May 30, 2020 equals 12:00 – EoT of 2 minutes 21 seconds MP= 11:57:39 <i>Local Apparent Noon</i> Example- Meridian Passage on August 25, 2020 equals 12:00 + EoT of 1 minute 59 seconds MP= 12:01:59 <i>Local Apparent Noon</i>
14	Sun- Mer. Pass just to the right of the Eqn. of Time is the approximate GMT/UT when the Sun crosses The Prime Meridian (at Greenwich) for that specific date.
15	Moon- Mer. Pass- is the approximate GMT/UT when the Moon crosses The Prime Meridian (at Greenwich) or the 180° line of longitude. Upper means the GMT/UT when the Moon crosses The Prime Meridian (Greenwich). Lower means the GMT/UT when the Moon crosses the 180° line of longitude.
16	Moon- Age- this is the number of days past a new Moon. Typically, there are 29 days in a lunar month. Moon- %- the amount of the Moon's illumination. 100% would be a full moon. 49% would be about ½ of the Moon is illuminated. A 3 day range percentage is provided but only one graphic for the phase.
17* see notes at bottom	(morning) Twilight- Naut.- the approximate GMT/UT when morning Nautical Twilight begins. Nautical twilight is the time when the center of the sun is 12° below the horizon and the horizon is visible enough to be used for marine sextant observations. First locate your approximate Latitude in the Lat. column and then follow across horizontally to the right to find the time.
17* see notes at bottom	(morning) Twilight- Civil- the approximate GMT/UT of morning civil twilight starts when the geometric center of the sun is 6° below the horizon. First locate your approximate Latitude in the Lat. column and then follow across horizontally to the right to find the time.
17* see notes at bottom	Sunrise- the approximate GMT/UT when the Sun is 0° 50' (semi-diameter plus refraction) below the horizon. First locate your approximate Latitude in the Lat. column and then follow across horizontally to the right to find the time.

17* see notes at bottom	Sunset- the approximate GMT/UT when the Sun is 0° 50' (semi-diameter plus refraction) below the horizon. First locate your approximate Latitude in the Lat. column and then follow across horizontally to the right to find the time.
17* see notes at bottom	(evening) Twilight- Civil- the approximate GMT/UT of evening civil twilight that ends when the geometric center of the sun is 6° below the horizon. First locate your approximate Latitude in the Lat. column and then follow across horizontally to the right to find the time.
17* see notes at bottom	(evening) Twilight- Naut.- the approximate GMT/UT of when evening Nautical Twilight ends. Nautical twilight is the time when the center of the sun is 12° below the horizon and the horizon is no longer visible enough to be used for sextant observations. First locate your approximate Latitude in the Lat. column and then follow across horizontally to the right to find the time.
18* see notes at bottom	Moonrise- the approximate GMT/UT when the Moon is about 0° 05' to 0° 10' below the horizon. First locate your approximate Latitude in the Lat. column and then follow across horizontally to the right to find the time under the specific day.
18* see notes at bottom	Moonset- the approximate GMT/UT when the Moon is about 0° 05' to 0° 10' below the horizon. First locate your approximate Latitude in the Lat. column and then follow across horizontally to the right to find the time under the specific day.

* Note-

☐ means the Sun or Moon remains continuously above the horizon on that day.

—:— can also mean twilight lasts all night

■ means the Sun or Moon remains continuously below the horizon on that day.

—:— means Moon does not rise or set on that day but may have risen or set the previous day or following day.

* **Note-** Time of Sunrise, Sunset, Moonrise, Moonset and twilight is based on GMT/UT of the event at 0° (Greenwich) and can be considered as approximate LMT (Local Mean Time) with a tolerance of +/- 30 minutes depending on where you are within a time zone.

Wednesday, February 24, 2021

Explanation_of_The_Nautical_Almanac_Daily_Pages.odt

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2020 January 01 to Jan. 03

Sun				Moon			
Wed	GHA	Dec		GHA	v	Dec	HP
0	179° 13.7	S23° 03.5		110° 56.9	15.3'	S09° 58.5	10.7' 54.3'
1	194° 13.4	03.3		125° 31.3	15.4'	09° 47.8	10.7' 54.3'
2	209° 13.1	03.1		140° 05.7	15.4'	09° 37.1	10.7' 54.3'
3	224° 12.8	03.0		154° 40.1	15.5'	09° 26.3	10.8' 54.3'
4	239° 12.5	02.8		169° 14.6	15.5'	09° 15.5	10.8' 54.3'
5	254° 12.2	02.6		183° 49.1	15.5'	09° 04.7	10.8' 54.2'
6	269° 11.9	S23° 02.4		198° 23.6	15.6'	S08° 53.8	10.9' 54.2'
7	284° 11.6	02.2		212° 58.2	15.6'	08° 42.9	10.9' 54.2'
8	299° 11.3	02.0		227° 32.8	15.6'	08° 32.0	10.9' 54.2'
9	314° 11.0	01.8		242° 07.5	15.7'	08° 21.0	11.0' 54.2'
10	329° 10.7	01.6		256° 42.2	15.7'	08° 10.0	11.0' 54.2'
11	344° 10.4	01.4		271° 16.9	15.7'	07° 59.0	11.0' 54.2'
12	359° 10.1	S23° 01.2		285° 51.7	15.8'	S07° 48.0	11.1' 54.2'
13	14° 09.8	01.0		300° 26.4	15.8'	07° 36.9	11.1' 54.2'
14	29° 09.5	00.8		315° 01.2	15.8'	07° 25.8	11.1' 54.2'
15	44° 09.2	00.6		329° 36.1	15.9'	07° 14.7	11.1' 54.2'
16	59° 08.9	00.4		344° 10.9	15.9'	07° 03.5	11.2' 54.2'
17	74° 08.6	00.2		358° 45.8	15.9'	06° 52.3	11.2' 54.2'
18	89° 08.3	S23° 00.0		13° 20.7	15.9'	S06° 41.1	11.2' 54.2'
19	104° 08.0	22° 59.7		27° 55.7	16.0'	06° 29.9	11.2' 54.2'
20	119° 07.7	59.5		42° 30.7	16.0'	06° 18.7	11.3' 54.2'
21	134° 07.5	59.3		57° 05.6	16.0'	06° 07.4	11.3' 54.2'
22	149° 07.2	59.1		71° 40.6	16.0'	05° 56.1	11.3' 54.2'
23	164° 06.9	58.9		86° 15.7	16.0'	05° 44.8	11.3' 54.2'
SD.=16.3 d=0.2				S.D.=14.8			

Thu				Moon			
Thu	GHA	Dec		GHA	v	Dec	HP
0	179° 06.6	S22° 58.7		100° 50.7	16.1'	S05° 33.4	11.3' 54.2'
1	194° 06.3	58.5		115° 25.8	16.1'	05° 22.1	11.4' 54.2'
2	209° 06.0	58.3		130° 00.9	16.1'	05° 10.7	11.4' 54.2'
3	224° 05.7	58.1		144° 36.0	16.1'	04° 59.3	11.4' 54.2'
4	239° 05.4	57.9		159° 11.1	16.1'	04° 47.9	11.4' 54.2'
5	254° 05.1	57.6		173° 46.3	16.1'	04° 36.5	11.4' 54.2'
6	269° 04.8	S22° 57.4		188° 21.4	16.2'	S04° 25.0	11.5' 54.2'
7	284° 04.5	57.2		202° 56.6	16.2'	04° 13.5	11.5' 54.2'
8	299° 04.2	57.0		217° 31.7	16.2'	04° 02.1	11.5' 54.2'
9	314° 03.9	56.8		232° 06.9	16.2'	03° 50.6	11.5' 54.2'
10	329° 03.6	56.6		246° 42.1	16.2'	03° 39.0	11.5' 54.2'
11	344° 03.3	56.3		261° 17.3	16.2'	03° 27.5	11.5' 54.2'
12	359° 03.0	S22° 56.1		275° 52.6	16.2'	S03° 16.0	11.5' 54.2'
13	14° 02.8	55.9		290° 27.8	16.2'	03° 04.4	11.6' 54.2'
14	29° 02.5	55.7		305° 03.0	16.2'	02° 52.8	11.6' 54.2'
15	44° 02.2	55.5		319° 38.3	16.2'	02° 41.3	11.6' 54.2'
16	59° 01.9	55.2		334° 13.5	16.2'	02° 29.7	11.6' 54.2'
17	74° 01.6	55.0		348° 48.8	16.3'	02° 18.1	11.6' 54.2'
18	89° 01.3	S22° 54.8		3° 24.0	16.3'	S02° 06.5	11.6' 54.2'
19	104° 01.0	54.6		17° 59.3	16.3'	01° 54.8	11.6' 54.2'
20	119° 00.7	54.3		32° 34.5	16.3'	01° 43.2	11.6' 54.2'
21	134° 00.4	54.1		47° 09.8	16.3'	01° 31.6	11.6' 54.2'
22	149° 00.1	53.9		61° 45.0	16.3'	01° 19.9	11.7' 54.2'
23	163° 59.8	53.7		76° 20.3	16.3'	01° 08.2	11.7' 54.3'
SD.=16.3 d=0.2				S.D.=14.8			

Fri				Moon			
Fri	GHA	Dec		GHA	v	Dec	HP
0	178° 59.5	S22° 53.4		90° 55.5	16.2'	S00° 56.6	11.7' 54.3'
1	193° 59.3	53.2		105° 30.8	16.2'	00° 44.9	11.7' 54.3'
2	208° 59.0	53.0		120° 06.0	16.2'	00° 33.2	11.7' 54.3'
3	223° 58.7	52.7		134° 41.3	16.2'	00° 21.5	11.7' 54.3'
4	238° 58.4	52.5		149° 16.5	16.2'	00° 09.9	11.7' 54.3'
5	253° 58.1	52.3		163° 51.7	16.2'	N00° 01.8	11.7' 54.3'
6	268° 57.8	S22° 52.0		178° 26.9	16.2'	N00° 13.5	11.7' 54.3'
7	283° 57.5	51.8		193° 02.1	16.2'	00° 25.2	11.7' 54.3'
8	298° 57.2	51.6		207° 37.3	16.2'	00° 36.9	11.7' 54.3'
9	313° 56.9	51.3		222° 12.5	16.2'	00° 48.6	11.7' 54.3'
10	328° 56.6	51.1		236° 47.7	16.2'	01° 00.3	11.7' 54.3'
11	343° 56.4	50.8		251° 22.8	16.1'	01° 12.0	11.7' 54.4'
12	358° 56.1	S22° 50.6		265° 58.0	16.1'	N01° 23.7	11.7' 54.4'
13	13° 55.8	50.4		280° 33.1	16.1'	01° 35.4	11.7' 54.4'
14	28° 55.5	50.1		295° 08.2	16.1'	01° 47.1	11.7' 54.4'
15	43° 55.2	49.9		309° 43.3	16.1'	01° 58.8	11.7' 54.4'
16	58° 54.9	49.6		324° 18.4	16.1'	02° 10.5	11.7' 54.4'
17	73° 54.6	49.4		338° 53.4	16.0'	02° 22.2	11.7' 54.4'
18	88° 54.3	S22° 49.2		353° 28.4	16.0'	N02° 33.9	11.7' 54.4'
19	103° 54.0	48.9		8° 03.5	16.0'	02° 45.6	11.7' 54.4'
20	118° 53.8	48.7		22° 38.4	16.0'	02° 57.3	11.7' 54.4'
21	133° 53.5	48.4		37° 13.4	16.0'	03° 09.0	11.7' 54.5'
22	148° 53.2	48.2		51° 48.4	15.9'	03° 20.6	11.7' 54.5'
23	163° 52.9	47.9		66° 23.3	15.9'	03° 32.3	11.7' 54.5'
SD.=16.3 d=0.2				S.D.=14.8			

Lat.	Twilight		Sunrise	Sunset	Twilight	
	Naut.	Civil			Civil	Naut.
N 72°	08:23	10:41	■	■	13:27	15:45
N 70°	08:05	09:49	■	■	14:19	16:03
68°	07:50	09:16	■	■	14:52	16:18
66°	07:37	08:53	■	■	15:15	16:31
64°	07:26	08:34	■	■	15:34	16:41
62°	07:17	08:18	■	■	15:45	16:51
60°	07:09	08:05	■	■	15:06	16:59
N 58°	07:02	07:54	■	■	16:14	17:06
56°	06:56	07:44	■	■	16:24	17:12
54°	06:50	07:35	■	■	16:32	17:18
52°	06:44	07:28	■	■	16:40	17:24
50°	06:39	07:20	■	■	16:09	16:47
45°	06:28	07:05	■	■	16:29	17:03
N 40°	06:18	06:52	■	■	16:46	17:16
35°	06:08	06:40	■	■	17:00	17:28
30°	06:00	06:30	■	■	17:12	17:38
20°	05:44	06:11	■	■	17:32	17:56
N 10°	05:28	05:54	■	■	17:50	18:13
0°	05:11	05:38	■	■	18:08	18:30
S 10°	04:53	05:20	■	■	18:25	18:48
20°	04:31	05:00	■	■	18:43	19:08
30°	04:02	04:35	■	■	19:05	19:32
35°	03:44	04:20	■	■	19:17	19:47
40°	03:21	04:03	■	■	19:32	20:05
45°	02:52	03:41	■	■	19:50	20:27
S 50°	02:08	03:12	■	■	20:11	20:55
52°	01:42	02:57	■	■	20:22	21:10
54°	01:02	02:40	■	■	20:34	21:27
56°	□	02:19	■	■	20:47	21:48
58°	□	01:51	■	■	21:04	22:15
S 60°	□	01:08	■	■	21:23	22:58

Lat.	Moonrise			Moonset		
	Wed	Thu	Fri	Wed	Thu	Fri
N 72°	12:37	12:18	12:00	21:58	23:43	--
N 70°	12:26	12:13	12:02	22:06	23:44	--
68°	12:17	12:10	12:03	22:14	23:45	--
66°	12:09	12:07	12:04	22:20	23:46	--
64°	12:02	12:04	12:05	22:25	23:47	--
62°	11:57	12:02	12:06	22:29	23:48	--
60°	11:52	12:00	12:07	22:33	23:49	--
N 58°	11:48	11:58	12:08	22:36	23:49	--
56°	11:44	11:56	12:08	22:39	23:50	--
54°	11:40	11:55	12:09	22:42	23:50	--
52°	11:37	11:54	12:10	22:44	23:51	--
50°	11:34	11:52	12:10	22:46	23:51	--
45°	11:28	11:50	12:11	22:51	23:52	--
N 40°	11:23	11:48	12:12	22:55	23:52	--
35°	11:18	11:46	12:13	22:58	23:53	--
30°	11:14	11:44	12:14	23:01	23:54	--
20°	11:07	11:41	12:15	23:06	23:54	--
N 10°	11:01	11:39	12:16	23:11	23:55	--
0°	10:55	11:36	12:17	23:15	23:56	--
S 10°	10:49	11:34	12:18	23:19	23:57	--
20°	10:43	11:31	12:19	23:24	23:57	--
30°	10:36	11:28	12:20	23:29	23:58	--
35°	10:32	11:26	12:21	23:31	23:59	--
40°	10:27	11:25	12:22	23:35	23:59	--
45°	10:21	11:22	12:23	23:38	--	00:00
S 50°	10:15	11:20	12:24	23:43	--	00:00
52°	10:12	11:18	12:25	23:45	--	00:01
54°	10:08	11:17	12:25	23:47	--	00:01
56°	10:05	11:15	12:26	23:49	--	00:01
58°	10:01	11:14	12:27	23:52	--	00:02
S 60°	09:56	11:12	12:28	23:55	--	00:02

Day	Sun		Mer. Pass	Moon		Age 6-8 34-53%
	Eqn. of Time 00 ^h mm:ss	12 ^h mm:ss		Upper Mer. Pass. hh:mm	Lower Mer. Pass. hh:mm	
01	03:05	03:20	12:03	17:05	04:44	
02	03:34	03:48	12:04	17:46	05:26	
03	04:02	04:16	12:04	18:27	06:06	

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