

**TABLE 1**  
MERIDIAN PASSAGE AND DECLINATION  
OF THE SUN AT 12<sup>h</sup> UT

**TABLES 2 and 3**  
DEPRESSION OF SUN  
AT VARIOUS HEIGHTS

D a y	January		February		March		April		May		June		Height	TABLE 2 AT SUNRISE AND SUNSET		TABLE 3 AT CIVIL TWILIGHT	
	Mer. Pass.	Dec	Mer. Pass.	Dec	Mer. Pass.	Dec	Mer. Pass.	Dec	Mer. Pass.	Dec	Mer. Pass.	Dec		Feet	Depression	Diff. from 0°8	Depression
	12 <sup>h</sup> m	°	12 <sup>h</sup> m	°	12 <sup>h</sup> m	°	12 <sup>h</sup> m	°	12 <sup>h</sup> m	°	12 <sup>h</sup> m	°					
1	+04	S23.0	+14	S17.0	+12	S 7.5	+04	N 4.6	-03	N15.2	-02	N22.1					
2	+04	22.9	+14	16.7	+12	7.1	+04	5.0	-03	15.5	-02	22.2					
3	+04	22.8	+14	16.4	+12	6.7	+03	5.4	-03	15.8	-02	22.3					
4	+05	22.7	+14	16.1	+12	6.3	+03	5.8	-03	16.0	-02	22.5					
5	+05	22.6	+14	15.8	+11	6.0	+03	6.2	-03	16.3	-01	22.6					
6	+06	S22.5	+14	S15.5	+11	S 5.6	+02	N 6.6	-03	N16.6	-01	N22.7					
7	+06	22.3	+14	15.2	+11	5.2	+02	6.9	-03	16.9	-01	22.8					
8	+07	22.2	+14	14.9	+11	4.8	+02	7.3	-03	17.2	-01	22.9	0	0.8	—	6.0	5.2
9	+07	22.1	+14	14.6	+11	4.4	+02	7.7	-04	17.4	-01	23.0	500	1.3	0.5	6.0	5.2
10	+08	21.9	+14	14.3	+10	4.0	+01	8.0	-04	17.7	-01	23.0					
11	+08	S21.8	+14	S13.9	+10	S 3.6	+01	N 8.4	-04	N18.0	00	N23.1	1 000	1.5	0.7	6.0	5.2
12	+08	21.6	+14	13.6	+10	3.2	+01	8.8	-04	18.2	00	23.2	2 000	1.7	0.9	6.1	5.3
13	+09	21.4	+14	13.3	+09	2.8	+01	9.1	-04	18.5	00	23.2	3 000	1.9	1.1	6.1	5.3
14	+09	21.3	+14	12.9	+09	2.4	00	9.5	-04	18.7	00	23.3	4 000	2.1	1.3	6.1	5.3
15	+09	21.1	+14	12.6	+09	2.0	00	9.9	-04	18.9	+01	23.3	5 000	2.2	1.4	6.2	5.4
16	+10	S20.9	+14	S12.2	+09	S 1.6	00	N10.2	-04	N19.2	+01	N23.4	6 000	2.4	1.6	6.2	5.4
17	+10	20.7	+14	11.9	+08	1.2	00	10.6	-04	19.4	+01	23.4	7 000	2.5	1.7	6.2	5.4
18	+10	20.5	+14	11.5	+08	0.8	-01	10.9	-04	19.6	+01	23.4	8 000	2.6	1.8	6.3	5.5
19	+11	20.3	+14	11.2	+08	0.5	-01	11.3	-04	19.8	+01	23.4	9 000	2.7	1.9	6.3	5.5
20	+11	20.1	+14	10.8	+07	S 0.1	-01	11.6	-03	20.0	+02	23.4	10 000	2.8	2.0	6.3	5.5
21	+11	S19.8	+14	S10.5	+07	N 0.3	-01	N11.9	-03	N20.2	+02	N23.4					
22	+12	19.6	+13	10.1	+07	0.7	-01	12.3	-03	20.4	+02	23.4	15 000	3.2	2.4	6.5	5.7
23	+12	19.4	+13	9.7	+07	1.1	-02	12.6	-03	20.6	+02	23.4	20 000	3.6	2.8	6.6	5.8
24	+12	19.1	+13	9.4	+06	1.5	-02	13.0	-03	20.8	+02	23.4	25 000	3.9	3.1	6.8	6.0
25	+12	18.9	+13	9.0	+06	1.9	-02	13.3	-03	21.0	+03	23.4	30 000	4.2	3.4	6.9	6.1
													35 000	4.4	3.6	7.1	6.3
26	+12	S18.6	+13	S 8.6	+06	N 2.3	-02	N13.6	-03	N21.2	+03	N23.3					
27	+13	18.4	+13	8.2	+05	2.7	-02	13.9	-03	21.3	+03	23.3	40 000	4.7	3.9	7.2	6.4
28	+13	18.1	+12	S 7.9	+05	3.1	-02	14.2	-03	21.5	+03	23.3	45 000	4.9	4.1	7.3	6.5
29	+13	17.9			+05	3.5	-03	14.5	-03	21.7	+04	23.2	50 000	5.1	4.3	7.5	6.7
30	+13	17.6			+04	3.9	-03	N14.9	-02	21.8	+04	N23.2	55 000	5.3	4.5	7.6	6.8
31	+13	S17.3			+04	N 4.3			-02	N22.0			60 000	5.5	4.7	7.7	6.9

An alternative method to those given on pages A12–A14 is to use the graphs to give the corrections to the tabulated times of sunrise and sunset at ground level; in this case it is adequate to use the graphs for the *nearest* tabular latitude and declination. The difference in hour angle is found between the hour angle for zero depression and the hour angle at the tabular depression minus 0°8. The difference in hour angle so found is then applied to the time of sunrise or sunset. The result will be less than 5<sup>m</sup> in error if the declination curve cuts all the depression lines.

*Example.* To find the times of sunrise and sunset on 2022 April 19 in latitude N65° 17', longitude W35° 15', at a height of 37 000 feet. From Table 1, Dec = N11°3; Table 2, Depression diff. from 0°8 = 3°7.

	Sunrise	Sunset
	h m	h m
Page A134, N65° 17'	04 08	19 52
Page A147, Lat 66°, Dec 11° (same); diff. in HA from depression 0° to 3°7	—45	+45
LMT	03 23	20 37
Longitude W35° 15'	2 21	2 21
UT	05 44	22 58

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MERIDIAN PASSAGE AND DECLINATION  
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**TABLES 2 and 3**  
DEPRESSION OF SUN  
AT VARIOUS HEIGHTS

D a y	July		August		September		October		November		December		Height	TABLE 2 AT SUNRISE AND SUNSET		TABLE 3 AT CIVIL TWILIGHT	
	Mer. Pass.	Dec	Mer. Pass.	Dec	Mer. Pass.	Dec	Mer. Pass.	Dec	Mer. Pass.	Dec	Mer. Pass.	Dec		Feet	Depression	Diff. from 0:8	Depression
	12 <sup>h</sup> m	°	12 <sup>h</sup> m	°	12 <sup>h</sup> m	°	12 <sup>h</sup> m	°	12 <sup>h</sup> m	°	12 <sup>h</sup> m	°		°	°	°	°
1	+04	N23.1	+06	N17.9	00	N 8.2	-10	S 3.3	-16	S14.5	-11	S21.8					
2	+04	23.0	+06	17.7	00	7.8	-11	3.7	-16	14.8	-11	22.0					
3	+04	22.9	+06	17.4	-01	7.4	-11	4.1	-16	15.1	-10	22.1					
4	+04	22.8	+06	17.2	-01	7.1	-11	4.5	-16	15.5	-10	22.3					
5	+05	22.8	+06	16.9	-01	6.7	-12	4.8	-16	15.8	-09	22.4					
6	+05	N22.7	+06	N16.6	-02	N 6.3	-12	S 5.2	-16	S16.1	-09	S22.5					
7	+05	22.6	+06	16.3	-02	6.0	-12	5.6	-16	16.4	-09	22.6					
8	+05	22.4	+06	16.1	-02	5.6	-12	6.0	-16	16.6	-08	22.7	0	0.8	—	6.0	5.2
9	+05	22.3	+06	15.8	-03	5.2	-13	6.4	-16	16.9	-08	22.8	500	1.3	0.5	6.0	5.2
10	+05	22.2	+05	15.5	-03	4.8	-13	6.7	-16	17.2	-07	22.9					
11	+06	N22.1	+05	N15.2	-03	N 4.5	-13	S 7.1	-16	S17.5	-07	S23.0	1 000	1.5	0.7	6.0	5.2
12	+06	21.9	+05	14.9	-04	4.1	-14	7.5	-16	17.8	-06	23.1	2 000	1.7	0.9	6.1	5.3
13	+06	21.8	+05	14.6	-04	3.7	-14	7.9	-16	18.0	-06	23.2	3 000	1.9	1.1	6.1	5.3
14	+06	21.6	+05	14.3	-04	3.3	-14	8.2	-16	18.3	-05	23.2	4 000	2.1	1.3	6.1	5.3
15	+06	21.5	+05	14.0	-05	2.9	-14	8.6	-15	18.5	-05	23.3	5 000	2.2	1.4	6.2	5.4
16	+06	N21.3	+04	N13.6	-05	N 2.5	-14	S 9.0	-15	S18.8	-04	S23.3	6 000	2.4	1.6	6.2	5.4
17	+06	21.1	+04	13.3	-05	2.2	-15	9.3	-15	19.0	-04	23.4	7 000	2.5	1.7	6.2	5.4
18	+06	21.0	+04	13.0	-06	1.8	-15	9.7	-15	19.3	-03	23.4	8 000	2.6	1.8	6.3	5.5
19	+06	20.8	+04	12.7	-06	1.4	-15	10.1	-15	19.5	-03	23.4	9 000	2.7	1.9	6.3	5.5
20	+06	20.6	+03	12.4	-07	1.0	-15	10.4	-14	19.7	-02	23.4	10 000	2.8	2.0	6.3	5.5
21	+06	N20.4	+03	N12.0	-07	N 0.6	-15	S10.8	-14	S20.0	-02	S23.4					
22	+06	20.2	+03	11.7	-07	N 0.2	-16	11.1	-14	20.2	-01	23.4	15 000	3.2	2.4	6.5	5.7
23	+07	20.0	+03	11.3	-08	S 0.2	-16	11.5	-14	20.4	-01	23.4	20 000	3.6	2.8	6.6	5.8
24	+07	19.8	+02	11.0	-08	0.6	-16	11.8	-13	20.6	00	23.4	25 000	3.9	3.1	6.8	6.0
25	+07	19.6	+02	10.7	-08	1.0	-16	12.2	-13	20.8	00	23.4	30 000	4.2	3.4	6.9	6.1
													35 000	4.4	3.6	7.1	6.3
26	+07	N19.4	+02	N10.3	-09	S 1.3	-16	S12.5	-13	S21.0	+01	S23.4					
27	+07	19.1	+02	10.0	-09	1.7	-16	12.9	-12	21.2	+01	23.3	40 000	4.7	3.9	7.2	6.4
28	+07	18.9	+01	9.6	-09	2.1	-16	13.2	-12	21.3	+02	23.3	45 000	4.9	4.1	7.3	6.5
29	+07	18.7	+01	9.3	-10	2.5	-16	13.5	-12	21.5	+02	23.2	50 000	5.1	4.3	7.5	6.7
30	+06	18.4	+01	8.9	-10	S 2.9	-16	13.9	-11	S21.7	+02	23.1	55 000	5.3	4.5	7.6	6.8
31	+06	N18.2	00	N 8.5			-16	S14.2			+03	S23.1	60 000	5.5	4.7	7.7	6.9

An example of the use of the above tables is given on page A151.