Change of Altitude in Given Time from Meridian Transit

t, meridian angle in degrees-minutes and minutes

	0°05'	0°10'	0°15'	0°20'	0°25'	0°30'	0°35'	0°40'	0°45'	0°50'	0°55'	1°00'	1°05'	1°10'	1°15'	1°20'	1°25'	1°30'	1°35'	1°40'	1°45'	1°50'	1°55'	2°00'	
a	**5**	**10**	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**50**	**55**	**60**	**65**	**70**	**75**	**80**	**85**	**90**	**95**	**100**	**105**	**110**	**115**	**120**	***a***
0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	**0.1**
0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	**0.2**
0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	**0.3**
0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.4	**0.4**
0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.5	**0.5**
0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.6	0.6	**0.6**
0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.5	0.5	0.6	0.6	0.7	0.7	**0.7**
0.8	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.5	0.5	0.6	0.7	0.7	0.8	0.9	**0.8**
0.9	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.5	0.6	0.7	0.7	0.8	0.9	1.0	**0.9**
1.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.5	0.6	0.7	0.7	0.8	0.9	1.0	1.1	**1.0**
2.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.3	0.4	0.4	0.5	0.6	0.7	0.8	0.9	1.1	1.2	1.3	1.5	1.6	1.8	2.0	2.1	**2.0**
3.0	0.0	0.0	0.1	0.1	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.1	1.3	1.4	1.6	1.8	2.0	2.2	2.5	2.7	2.9	3.2	**3.0**
4.0	0.0	0.0	0.1	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.9	1.1	1.3	1.5	1.7	1.9	2.1	2.4	2.7	3.0	3.3	3.6	3.9	4.3	**4.0**
5.0	0.0	0.0	0.1	0.1	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.3	1.6	1.8	2.1	2.4	2.7	3.0	3.3	3.7	4.1	4.5	4.9	5.3	**5.0**
6.0	0.0	0.0	0.1	0.2	0.3	0.4	0.5	0.7	0.9	1.1	1.3	1.6	1.9	2.2	2.5	2.8	3.2	3.6	4.0	4.4	4.9	5.4	5.9	6.4	**6.0**
7.0	0.0	0.1	0.1	0.2	0.3	0.5	0.6	0.8	1.1	1.3	1.6	1.9	2.2	2.5	2.9	3.3	3.7	4.2	4.7	5.2	5.7	6.3	6.9	7.5	**7.0**
8.0	0.0	0.1	0.1	0.2	0.4	0.5	0.7	0.9	1.2	1.5	1.8	2.1	2.5	2.9	3.3	3.8	4.3	4.8	5.3	5.9	6.5	7.2	7.8	8.5	**8.0**
9.0	0.0	0.1	0.2	0.3	0.4	0.6	0.8	1.1	1.4	1.7	2.0	2.4	2.8	3.3	3.8	4.3	4.8	5.4	6.0	6.7	7.4	8.1	8.8	9.6	**9.0**
10.0	0.0	0.1	0.2	0.3	0.5	0.7	0.9	1.2	1.5	1.9	2.2	2.7	3.1	3.6	4.2	4.7	5.4	6.0	6.7	7.4	8.2	9.0	9.8	10.7	**10.0**
11.0	0.0	0.1	0.2	0.3	0.5	0.7	1.0	1.3	1.7	2.0	2.5	2.9	3.4	4.0	4.6	5.2	5.9	6.6	7.4	8.1	9.0	9.9	10.8	11.7	**11.0**
12.0	0.0	0.1	0.2	0.4	0.6	0.8	1.1	1.4	1.8	2.2	2.7	3.2	3.8	4.4	5.0	5.7	6.4	7.2	8.0	8.9	9.8	10.8	11.8	12.8	**12.0**
13.0	0.0	0.1	0.2	0.4	0.6	0.9	1.2	1.5	2.0	2.4	2.9	3.5	4.1	4.7	5.4	6.2	7.0	7.8	8.7	9.6	10.6	11.7	12.7	13.9	**13.0**
14.0	0.0	0.1	0.2	0.4	0.6	0.9	1.3	1.7	2.1	2.6	3.1	3.7	4.4	5.1	5.8	6.6	7.5	8.4	9.4	10.4	11.4	12.5	13.7	14.9	**14.0**
15.0	0.0	0.1	0.3	0.4	0.7	1.0	1.4	1.8	2.3	2.8	3.4	4.0	4.7	5.4	6.3	7.1	8.0	9.0	10.0	11.1	12.3	13.4	14.7	16.0	**15.0**
16.0	0.0	0.1	0.3	0.5	0.7	1.1	1.5	1.9	2.4	3.0	3.6	4.3	5.0	5.8	6.7	7.6	8.6	9.6	10.7	11.9	13.1	14.3	15.7	17.1	**16.0**
17.0	0.0	0.1	0.3	0.5	0.8	1.1	1.5	2.0	2.6	3.1	3.8	4.5	5.3	6.2	7.1	8.1	9.1	10.2	11.4	12.6	13.9	15.2	16.7	18.1	**17.0**
18.0	0.0	0.1	0.3	0.5	0.8	1.2	1.6	2.1	2.7	3.3	4.0	4.8	5.6	6.5	7.5	8.5	9.6	10.8	12.0	13.3	14.7	16.1	17.6	19.2	**18.0**
19.0	0.0	0.1	0.3	0.6	0.9	1.3	1.7	2.3	2.9	3.5	4.3	5.1	5.9	6.9	7.9	9.0	10.2	11.4	12.7	14.1	15.5	17.0	18.6	20.3	**19.0**
20.0	0.0	0.1	0.3	0.6	0.9	1.3	1.8	2.4	3.0	3.7	4.5	5.3	6.3	7.3	8.3	9.5	10.7	12.0	13.4	14.8	16.3	17.9	19.6	21.3	**20.0**
21.0	0.0	0.2	0.4	0.6	1.0	1.4	1.9	2.5	3.2	3.9	4.7	5.6	6.6	7.6	8.8	10.0	11.2	12.6	14.0	15.6	17.2	18.8	20.6		**21.0**
22.0	0.0	0.2	0.4	0.7	1.0	1.5	2.0	2.6	3.3	4.1	4.9	5.9	6.9	8.0	9.2	10.4	11.8	13.2	14.7	16.3	18.0	19.7	21.6		**22.0**
23.0	0.0	0.2	0.4	0.7	1.1	1.5	2.1	2.7	3.5	4.3	5.2	6.1	7.2	8.3	9.6	10.9	12.3	13.8	15.4	17.0	18.8	20.6			**23.0**
24.0	0.0	0.2	0.4	0.7	1.1	1.6	2.2	2.8	3.6	4.4	5.4	6.4	7.5	8.7	10.0	11.4	12.8	14.4	16.0	17.8	19.6	21.5			**24.0**
25.0	0.0	0.2	0.4	0.7	1.2	1.7	2.3	3.0	3.8	4.6	5.6	6.7	7.8	9.1	10.4	11.9	13.4	15.0	16.7	18.5	20.4				**25.0**
26.0	0.0	0.2	0.4	0.8	1.2	1.7	2.4	3.1	3.9	4.8	5.8	6.9	8.1	9.4	10.8	12.3	13.9	15.6	17.4	19.3					**26.0**
27.0	0.1	0.2	0.5	0.8	1.3	1.8	2.5	3.2	4.1	5.0	6.1	7.2	8.5	9.8	11.3	12.8	14.5	16.2	18.1	20.0					**27.0**
28.0	0.1	0.2	0.5	0.8	1.3	1.9	2.5	3.3	4.2	5.2	6.3	7.5	8.8	10.2											**28.0**

Change of Altitude in Given Time from Meridian Transit

t, meridian angle in degrees-minutes and minutes

	2°05'	2°10'	2°15'	2°20'	2°25'	2°30'	2°35'	2°40'	2°45'	2°50'	2°55'	3°00'	3°05'	3°10'	3°15'	3°20'	3°25'	3°30'	3°35'	3°40'	3°45'	3°50'	3°55'	4°00'	
a	**125**	**130**	**135**	**140**	**145**	**150**	**155**	**160**	**165**	**170**	**175**	**180**	**185**	**190**	**195**	**200**	**205**	**210**	**215**	**220**	**225**	**230**	**235**	**240**	***a***
0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	**0.1**
0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.8	0.9	**0.2**
0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.8	0.8	0.8	0.9	0.9	1.0	1.0	1.1	1.1	1.2	1.2	1.3	**0.3**
0.4	0.5	0.5	0.5	0.6	0.6	0.7	0.7	0.8	0.8	0.9	0.9	1.0	1.0	1.1	1.1	1.2	1.2	1.3	1.4	1.4	1.5	1.6	1.6	1.7	**0.4**
0.5	0.6	0.6	0.7	0.7	0.8	0.8	0.9	0.9	1.0	1.1	1.1	1.2	1.3	1.3	1.4	1.5	1.6	1.6	1.7	1.8	1.9	2.0	2.0	2.1	**0.5**
0.6	0.7	0.8	0.8	0.9	0.9	1.0	1.1	1.1	1.2	1.3	1.4	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	**0.6**
0.7	0.8	0.9	0.9	1.0	1.1	1.2	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.9	3.0	**0.7**
0.8	0.9	1.0	1.1	1.2	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.3	2.4	2.5	2.6	2.7	2.9	3.0	3.1	3.3	3.4	**0.8**
0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.2	2.3	2.4	2.5	2.7	2.8	2.9	3.1	3.2	3.4	3.5	3.7	3.8	**0.9**
1.0	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.3	2.4	2.5	2.7	2.8	3.0	3.1	3.3	3.4	3.6	3.8	3.9	4.1	4.3	**1.0**
2.0	2.3	2.5	2.7	2.9	3.1	3.3	3.6	3.8	4.0	4.3	4.5	4.8	5.1	5.3	5.6	5.9	6.2	6.5	6.8	7.2	7.5	7.8	8.2	8.5	**2.0**
3.0	3.5	3.8	4.1	4.4	4.7	5.0	5.3	5.7	6.1	6.4	6.8	7.2	7.6	8.0	8.5	8.9	9.3	9.8	10.3	10.8	11.3	11.8	12.3	12.8	**3.0**
4.0	4.6	5.0	5.4	5.8	6.2	6.7	7.1	7.6	8.1	8.6	9.1	9.6	10.1	10.7	11.3	11.9	12.5	13.1	13.7	14.3	15.0	15.7	16.4	17.1	**4.0**
5.0	5.8	6.3	6.8	7.3	7.8	8.3	8.9	9.5	10.1	10.7	11.3	12.0	12.7	13.4	14.1	14.8	15.6	16.3	17.1	17.9	18.8	19.6	20.5	21.3	**5.0**
6.0	6.9	7.5	8.1	8.7	9.3	10.0	10.7	11.4	12.1	12.8	13.6	14.4	15.2	16.0	16.9	17.8	18.7	19.6	20.5	21.5	22.5	23.5	24.5	25.6	**6.0**
7.0	8.1	8.8	9.5	10.2	10.9	11.7	12.5	13.3	14.1	15.0	15.9	16.8	17.7	18.7	19.7	20.7	21.8	22.9	24.0	25.1	26.3	27.4			**7.0**
8.0	9.3	10.0	10.8	11.6	12.5	13.3	14.2	15.2	16.1	17.1	18.1	19.2	20.3	21.4	22.5	23.7	24.9	26.1	27.4	28.7	30.0				**8.0**
9.0	10.4	11.3	12.2	13.1	14.0	15.0	16.0	17.1	18.2	19.3	20.4	21.6	22.8	24.1	25.4	26.7	28.0	29.4							**9.0**
10.0	11.6	12.5	13.5	14.5	15.6	16.7	17.8	19.0	20.2	21.4	22.7	24.0	25.4	26.7	28.2	29.6									**10.0**
11.0	12.7	13.8	14.9	16.0	17.1	18.3	19.6	20.9	22.2	23.5	25.0	26.4	27.9	29.4											**11.0**
12.0	13.9	15.0	16.2	17.4	18.7	20.0	21.4	22.8	24.2	25.7	27.2	28.8													**12.0**
13.0	15.0	16.3	17.6	18.9	20.2	21.7	23.1	24.7	26.2	27.8	29.5														**13.0**
14.0	16.2	17.5	18.9	20.3	21.8	23.3	24.9	26.5	28.2	30.0															**14.0**
15.0	17.4	18.8	20.3	21.8	23.4	25.0	26.7	28.4	30.3																**15.0**
16.0	18.5	20.0	21.6	23.2	24.9	26.7	28.5	30.3																	**16.0**
17.0	19.7	21.3	23.0	24.7	26.5	28.3	30.3																		**17.0**
18.0	20.8	22.5	24.3	26.1																					**18.0**
19.0	22.0	23.8																							**19.0**
20.0	23.1																								**20.0**

	4°05'	4°10'	4°15'	4°20'	4°25'	4°30'	4°35'	4°40'	4°45'	4°50'	4°55'	5°00'	5°05'	5°10'	5°15'	5°20'	5°25'	5°30'	5°35'	5°40'	5°45'	5°50'	5°55'	6°00'	
a	**245**	**250**	**255**	**260**	**265**	**270**	**275**	**280**	**285**	**290**	**295**	**300**	**305**	**310**	**315**	**320**	**325**	**330**	**335**	**340**	**345**	**350**	**355**	**360**	***a***
0.1	0.4	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	1.0	**0.1**
0.2	0.9	0.9	1.0	1.0	1.0	1.1	1.1	1.2	1.2	1.2	1.3	1.3	1.4	1.4	1.5	1.5	1.6	1.6	1.7	1.7	1.8	1.8	1.9	1.9	**0.2**
0.3	1.3	1.4	1.4	1.5	1.6	1.6	1.7	1.7	1.8	1.9	1.9	2.0	2.1	2.1	2.2	2.3	2.3	2.4	2.5	2.6	2.6	2.7	2.8	2.9	**0.3**
0.4	1.8	1.9	1.9	2.0	2.1	2.2	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	**0.4**
0.5	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.6	3.7	3.8	3.9	4.0	4.2	4.3	4.4	4.5	4.7	4.8	**0.5**
0.6	2.7	2.8	2.9	3.0	3.1	3.2	3.4	3.5	3.6	3.7	3.9	4.0	4.1	4.3	4.4	4.6	4.7	4.8	5.0	5.1	5.3	5.4	5.6	5.8	**0.6**
0.7	3.1	3.2	3.4	3.5	3.6	3.8	3.9	4.1	4.2	4.4	4.5	4.7	4.8	5.0	5.1	5.3	5.5	5.6	5.8	6.0	6.2	6.4	6.5	6.7	**0.7**
0.8	3.6	3.7	3.9	4.0	4.2	4.3	4.5	4.6	4.8	5.0	5.2	5.3	5.5	5.7	5.9	6.1	6.3	6.5	6.7	6.9	7.1	7.3	7.5	7.7	**0.8**
0.9	4.0	4.2	4.3	4.5	4.7	4.9	5.0	5.2	5.4	5.6	5.8	6.0	6.2	6.4	6.6	6.8	7.0	7.3	7.5	7.7	7.9	8.2	8.4	8.6	**0.9**
1.0	4.4	4.6	4.8	5.0	5.2	5.4	5.6	5.8	6.0	6.2	6.4	6.7	6.9	7.1	7.4	7.6	7.8	8.1	8.3	8.6	8.8	9.1	9.3	9.6	**1.0**
2.0	8.9	9.3	9.6	10.0	10.4	10.8	11.2	11.6	12.0	12.5	12.9	13.3	13.8	14.2	14.7	15.2	15.6	16.1	16.6	17.1	17.6	18.1	18.7	19.2	**2.0**
3.0	13.3	13.9	14.5	15.0	15.6	16.2	16.8	17.4	18.1	18.7	19.3	20.0	20.7	21.4	22.1	22.8	23.5	24.2	24.9	25.7	26.5	27.2	28.0	28.8	**3.0**
4.0	17.8	18.5	19.3	20.0	20.8	21.6	22.4	23.2	24.1	24.9	25.8	26.7	27.6	28.5	29.4	30.3	31.3								**4.0**
5.0	22.2	23.1	24.1	25.0	26.0	27.0	28.0	29.0																	**5.0**
6.0	26.7	27.8																							**6.0**

	6°05'	6°10'	6°15'	6°20'	6°25'	6°30'	6°35'	6°40'	6°45'	6°50'	6°55'	7°00'	7°05'	7°10'	7°15'	7°20'	7°25'	7°30'	7°35'	7°40'	7°45'	7°50'	7°55'	8°00'	
a	**365**	**370**	**375**	**380**	**385**	**390**	**395**	**400**	**405**	**410**	**415**	**420**	**425**	**430**	**435**	**440**	**445**	**450**	**455**	**460**	**465**	**470**	**475**	**480**	***a***
0.1	1.0	1.0	1.0	1.1	1.1	1.1	1.2	1.2	1.2	1.2	1.3	1.3	1.3	1.4	1.4	1.4	1.5	1.5	1.5	1.6	1.6	1.6	1.7	1.7	**0.1**
0.2	2.0	2.0	2.1	2.1	2.2	2.3	2.3	2.4	2.4	2.5	2.6	2.6	2.7	2.7	2.8	2.9	2.9	3.0	3.1	3.1	3.2	3.3	3.3	3.4	**0.2**
0.3	3.0	3.0	3.1	3.2	3.3	3.4	3.5	3.6	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0	5.1	**0.3**
0.4	3.9	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.9	5.0	5.1	5.2	5.4	5.5	5.6	5.7	5.9	6.0	6.1	6.3	6.4	6.5	6.7	6.8	**0.4**
0.5	4.9	5.1	5.2	5.3	5.5	5.6	5.8	5.9	6.1	6.2	6.4	6.5	6.7	6.8	7.0	7.2	7.3	7.5	7.7	7.8	8.0	8.2	8.4	8.5	**0.5**
0.6	5.9	6.1	6.3	6.4	6.6	6.8	6.9	7.1	7.3	7.5	7.7	7.8	8.0	8.2	8.4	8.6	8.8	9.0	9.2	9.4	9.6	9.8	10.0	10.2	**0.6**
0.7	6.9	7.1	7.3	7.5	7.7	7.9	8.1	8.3	8.5	8.7	8.9	9.1	9.4	9.6	9.8	10.0	10.3	10.5	10.7	11.0	11.2	11.5	11.7	11.9	**0.7**
0.8	7.9	8.1	8.3	8.6	8.8	9.0	9.2	9.5	9.7	10.0	10.2	10.5	10.7	11.0	11.2	11.5	11.7	12.0	12.3	12.5	12.8	13.1	13.4	13.7	**0.8**
0.9	8.9	9.1	9.4	9.6	9.9	10.1	10.4	10.7	10.9	11.2	11.5	11.8	12.0	12.3	12.6	12.9	13.2	13.5	13.8	14.1	14.4	14.7	15.0	15.4	**0.9**
1.0	9.9	10.1	10.4	10.7	11.0	11.3	11.6	11.9	12.2	12.5	12.8	13.1	13.4	13.7	14.0	14.3	14.7	15.0	15.3	15.7	16.0	16.4	16.7	17.1	**1.0**
2.0	19.7	20.3	20.8	21.4	22.0	22.5	23.1	23.7	24.3	24.9	25.5	26.1	26.8	27.4	28.0	28.7	29.3	30.0	30.7	31.3	32.0	32.7	33.4	34.1	**2.0**
3.0	29.6	30.4																							**3.0**