

vDial PHX

latitude: 33.5
longitude: 112.1
legal: 105
mag decl: 10.8 E

from the main spreadsheet: illustratingShadows.xls
worksheet: SUNRISE SET hh hh

BABYLONIAN			
SUN RISE			
	winter solstice	equ	summer solstice
sunrise	7.6	6.5	5.4
+1	8.6	7.5	6.4
+2	9.6	8.5	7.4
+3	10.6	9.5	8.4
+4	11.6	10.5	9.4
+5	12.6	11.5	10.4
+6	13.6	12.5	11.4

ITALIAN LINES			
SUN SET			
	winter solstice	equ	summer solstice
sunset	17.4	18.5	19.6
-1	16.4	17.5	18.6
-2	15.4	16.5	17.6
-3	14.4	15.5	16.6
-4	13.4	14.5	15.6
-5	12.4	13.5	14.6
-6	11.4	12.5	13.6

SUNRISE/SUNSET time LEGAL hh.hh (decimal)

LAT	LONG	ref:long
33.50	112.10	105

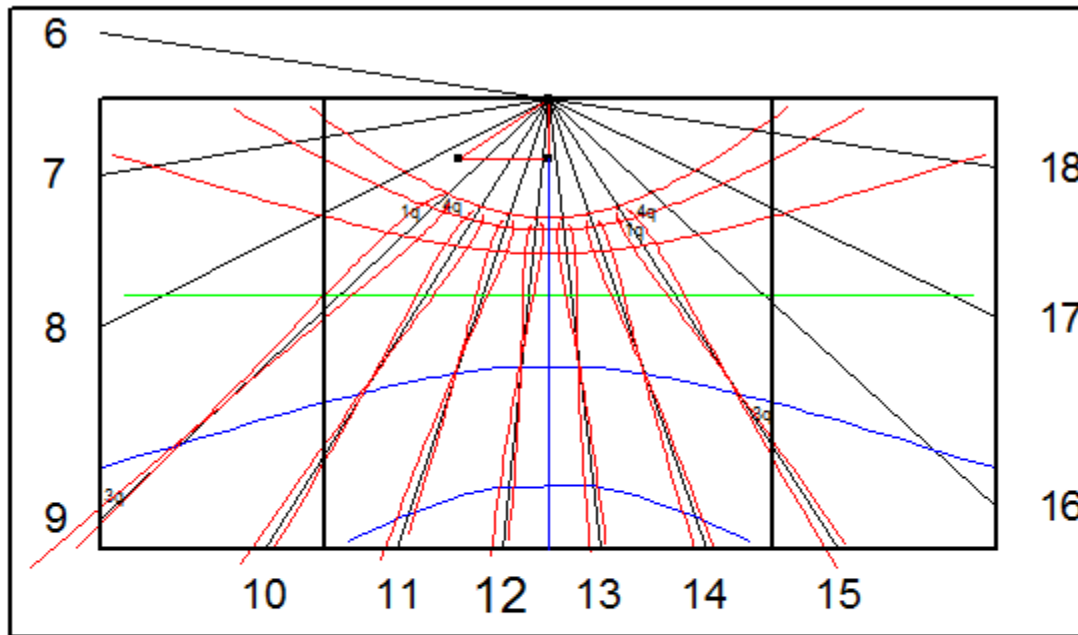
Summer time is not considered.

EOT mm.mm [4 yr astro avg] is used.

Date	Julian	decl	eot m.m	LEGAL TIME		Daylight duration	Sunrise azimuth	Noon altitude
				rise h.hh	set h.hh			
3/20	79	-0.5	7.6	6.6	18.6	11.96	89.4	56.0
6/21	172	23.5	1.7	5.4	19.6	14.22	118.5	80.0
9/22	265	0.6	-7.1	6.3	18.4	12.06	90.8	57.1
12/21	355	-23.4	-2.1	7.5	17.3	9.78	61.5	33.1
1/5	5	-22.7	5.1	7.63	17.49	9.86	62.4	33.8
1/15	15	-21.3	9.2	7.62	17.63	10.01	64.2	35.2
1/25	25	-19.2	12.2	7.56	17.79	10.23	66.8	37.3
2/5	36	-16.2	14.0	7.44	17.97	10.52	70.5	40.3
2/15	46	-13.0	14.2	7.29	18.13	10.83	74.4	43.5
2/25	56	-9.4	13.2	7.11	18.27	11.16	78.7	47.1
3/5	64	-6.3	11.6	6.95	18.38	11.44	82.4	50.2
3/15	74	-2.4	9.0	6.73	18.52	11.78	87.1	54.1
3/25	84	1.5	6.1	6.51	18.64	12.13	91.8	58.0
4/5	95	5.8	2.8	6.26	18.78	12.51	96.9	62.3
4/15	105	9.5	0.1	6.05	18.90	12.85	101.4	66.0
4/25	115	12.9	-2.0	5.86	19.02	13.16	105.6	69.4
5/5	125	16.0	-3.3	5.69	19.15	13.46	109.3	72.5
5/15	135	18.7	-3.7	5.55	19.27	13.72	112.6	75.2
5/25	145	20.8	-3.1	5.45	19.39	13.94	115.2	77.3
6/5	156	22.5	-1.6	5.39	19.51	14.12	117.3	79.0
6/15	166	23.3	0.4	5.38	19.58	14.21	118.3	79.8
6/25	176	23.4	2.5	5.40	19.63	14.22	118.5	79.9
7/5	186	22.9	4.5	5.47	19.63	14.16	117.8	79.4
7/15	196	21.7	5.9	5.56	19.59	14.03	116.3	78.2
7/25	206	19.8	6.5	5.66	19.50	13.84	114.0	76.3
8/5	217	17.2	6.0	5.79	19.36	13.58	110.8	73.7
8/15	227	14.3	4.6	5.90	19.20	13.30	107.2	70.8
8/25	237	11.0	2.2	6.02	19.00	12.99	103.3	67.5
9/5	248	7.1	-1.1	6.14	18.77	12.63	98.5	63.6
9/15	258	3.3	-4.6	6.25	18.54	12.30	94.0	59.8
9/25	268	-0.5	-8.1	6.36	18.31	11.95	89.4	56.0
10/5	278	-4.4	-11.4	6.48	18.09	11.61	84.7	52.1
10/15	288	-8.2	-14.1	6.60	17.87	11.27	80.1	48.3
10/25	298	-11.8	-15.9	6.74	17.68	10.94	75.8	44.7
11/5	309	-15.5	-16.5	6.90	17.50	10.59	71.4	41.0
11/15	319	-18.3	-15.5	7.06	17.37	10.31	67.9	38.2
11/25	329	-20.6	-13.2	7.21	17.29	10.08	65.0	35.9
12/5	339	-22.3	-9.6	7.36	17.27	9.90	63.0	34.2
12/15	349	-23.2	-5.1	7.49	17.29	9.80	61.8	33.3
12/25	359	-23.4	-0.1	7.58	17.36	9.78	61.6	33.1





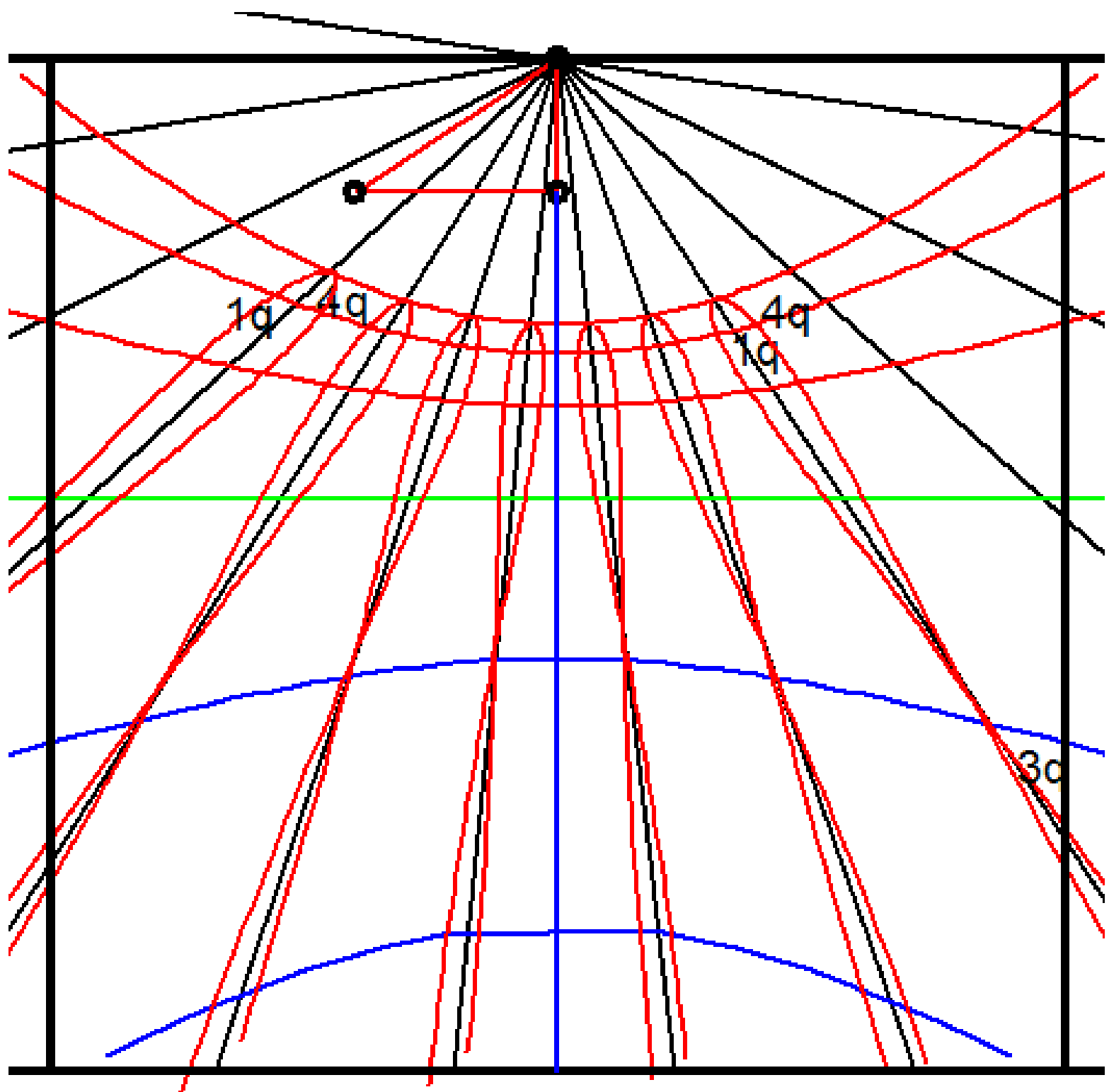


v-dial and calendar using gnomon linear height

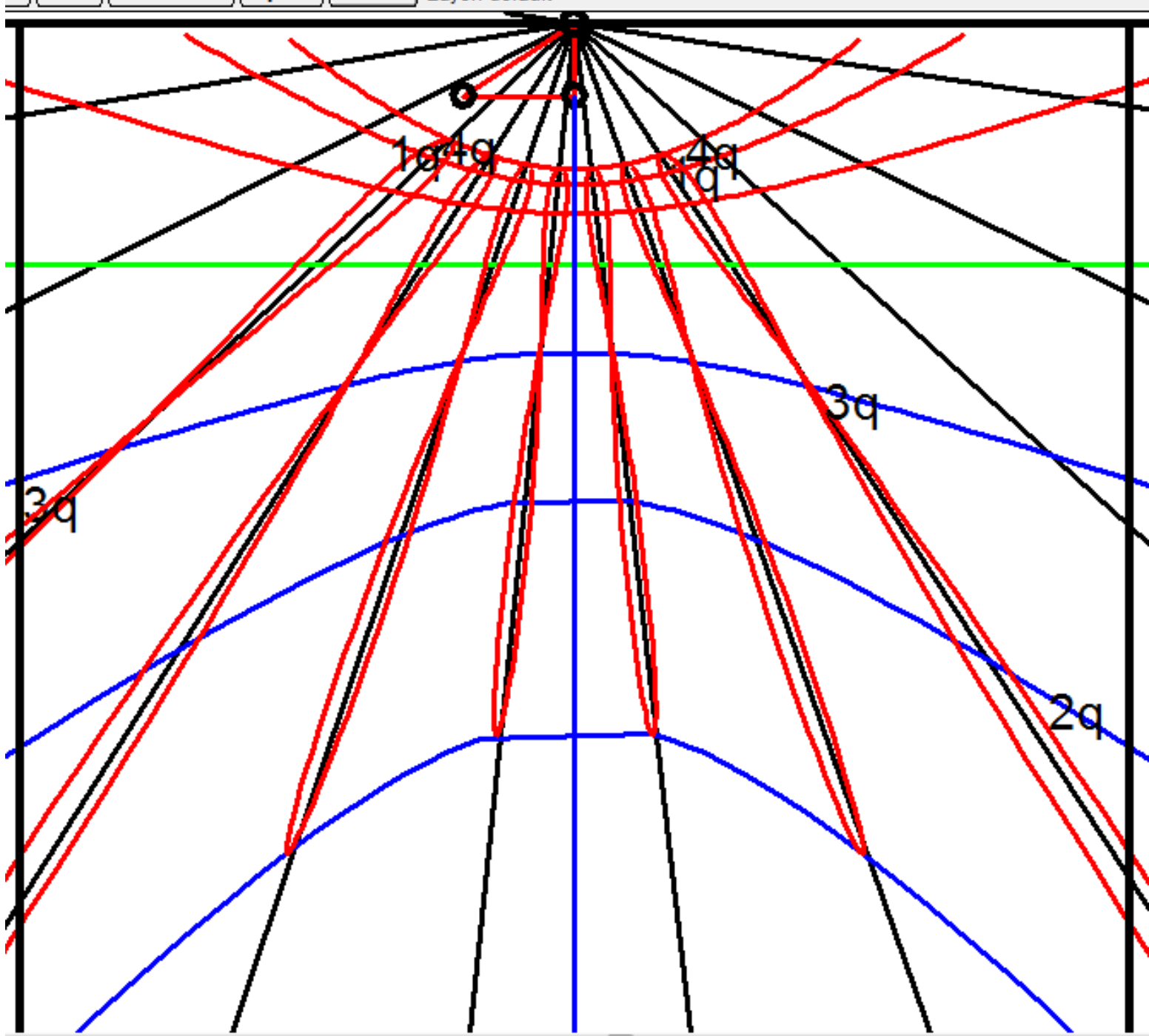
18	17	16	15	14	13	12	11	10	9	8	7	6
-81.5	-64.0	-47.8	-33.0	-19.4	-06.6	05.9	18.7	32.2	47.0	63.1	80.6	-81.5

Hours above horizontal use the 90 reference line below horizontal.

Lat: 33.5 Long: 112.1 co-lat [sh]: 056.5



11 12 13 14



Gnomon 0.1 in DeltaCAD choice 7 of MAIN-v-dials.bas

SUNRISE/SUNSET time LEGAL hh.hh (decimal)

LAT	LONG	ref
33.50	112.10	105

SUN RISE

EOT mm.mm [4 yr astro avg] is used.

Summer time is not considered.

Date	Julian	decl	eot m.m	LEGAL TIME		Daylight duration	Sunrise azimuth	Noon altitude	no EOT	EOT	no EOT	EOT	daylengt h
				rise h.hh	set h.hh				std	legal	std	legal	
3/20	79	-0.5	7.6	6.6	18.6	11.96	89.4	56.0	6.5	6.6	18.5	18.6	11.96
6/21	172	23.5	1.7	5.4	19.6	14.22	118.5	80.0	5.4	5.4	19.6	19.6	14.22
9/22	265	0.6	-7.1	6.3	18.4	12.06	90.8	57.1	6.4	6.3	18.5	18.4	12.06
12/21	355	-23.4	-2.1	7.5	17.3	9.78	61.5	33.1	7.6	7.5	17.4	17.3	9.78
1/5	5	-22.7	5.1	7.63	17.49	9.86	62.4	33.8	7.54	7.63	17.40	17.49	9.86
1/15	15	-21.3	9.2	7.62	17.63	10.01	64.2	35.2	7.47	7.62	17.48	17.63	10.01
1/25	25	-19.2	12.2	7.56	17.79	10.23	66.8	37.3	7.36	7.56	17.59	17.79	10.23
2/5	36	-16.2	14.0	7.44	17.97	10.52	70.5	40.3	7.21	7.44	17.74	17.97	10.52
2/15	46	-13.0	14.2	7.29	18.13	10.83	74.4	43.5	7.06	7.29	17.89	18.13	10.83
2/25	56	-9.4	13.2	7.11	18.27	11.16	78.7	47.1	6.89	7.11	18.05	18.27	11.16
3/5	64	-6.3	11.6	6.95	18.38	11.44	82.4	50.2	6.75	6.95	18.19	18.38	11.44
3/15	74	-2.4	9.0	6.73	18.52	11.78	87.1	54.1	6.58	6.73	18.37	18.52	11.78
3/25	84	1.5	6.1	6.51	18.64	12.13	91.8	58.0	6.41	6.51	18.54	18.64	12.13
4/5	95	5.8	2.8	6.26	18.78	12.51	96.9	62.3	6.22	6.26	18.73	18.78	12.51
4/15	105	9.5	0.1	6.05	18.90	12.85	101.4	66.0	6.05	6.05	18.90	18.90	12.85
4/25	115	12.9	-2.0	5.86	19.02	13.16	105.6	69.4	5.89	5.86	19.06	19.02	13.16
5/5	125	16.0	-3.3	5.69	19.15	13.46	109.3	72.5	5.74	5.69	19.20	19.15	13.46
5/15	135	18.7	-3.7	5.55	19.27	13.72	112.6	75.2	5.61	5.55	19.34	19.27	13.72
5/25	145	20.8	-3.1	5.45	19.39	13.94	115.2	77.3	5.50	5.45	19.44	19.39	13.94
6/5	156	22.5	-1.6	5.39	19.51	14.12	117.3	79.0	5.41	5.39	19.53	19.51	14.12

6/15	166	23.3	0.4	5.38	19.58	14.21	118.3	79.8	5.37	5.38	19.58	19.58	14.21	
6/25	176	23.4	2.5	5.40	19.63	14.22	118.5	79.9	5.36	5.40	19.58	19.63	14.22	
7/5	186	22.9	4.5	5.47	19.63	14.16	117.8	79.4	5.39	5.47	19.55	19.63	14.16	
7/15	196	21.7	5.9	5.56	19.59	14.03	116.3	78.2	5.46	5.56	19.49	19.59	14.03	
7/25	206	19.8	6.5	5.66	19.50	13.84	114.0	76.3	5.55	5.66	19.39	19.50	13.84	
8/5	217	17.2	6.0	5.79	19.36	13.58	110.8	73.7	5.69	5.79	19.26	19.36	13.58	
8/15	227	14.3	4.6	5.90	19.20	13.30	107.2	70.8	5.83	5.90	19.12	19.20	13.30	
8/25	237	11.0	2.2	6.02	19.00	12.99	103.3	67.5	5.98	6.02	18.97	19.00	12.99	
9/5	248	7.1	-1.1	6.14	18.77	12.63	98.5	63.6	6.16	6.14	18.79	18.77	12.63	
9/15	258	3.3	-4.6	6.25	18.54	12.30	94.0	59.8	6.33	6.25	18.62	18.54	12.30	
9/25	268	-0.5	-8.1	6.36	18.31	11.95	89.4	56.0	6.50	6.36	18.45	18.31	11.95	
10/5	278	-4.4	-11.4	6.48	18.09	11.61	84.7	52.1	6.67	6.48	18.28	18.09	11.61	
10/15	288	-8.2	-14.1	6.60	17.87	11.27	80.1	48.3	6.84	6.60	18.11	17.87	11.27	
10/25	298	-11.8	-15.9	6.74	17.68	10.94	75.8	44.7	7.00	6.74	17.94	17.68	10.94	
11/5	309	-15.5	-16.5	6.90	17.50	10.59	71.4	41.0	7.18	6.90	17.77	17.50	10.59	
11/15	319	-18.3	-15.5	7.06	17.37	10.31	67.9	38.2	7.32	7.06	17.63	17.37	10.31	
11/25	329	-20.6	-13.2	7.21	17.29	10.08	65.0	35.9	7.43	7.21	17.51	17.29	10.08	
12/5	339	-22.3	-9.6	7.36	17.27	9.90	63.0	34.2	7.52	7.36	17.42	17.27	9.90	
12/15	349	-23.2	-5.1	7.49	17.29	9.80	61.8	33.3	7.57	7.49	17.37	17.29	9.80	
12/25	359	-23.4	-0.1	7.58	17.36	9.78	61.6	33.1	7.58	7.58	17.36	17.36	9.78	
										sun rise time		sun set time		

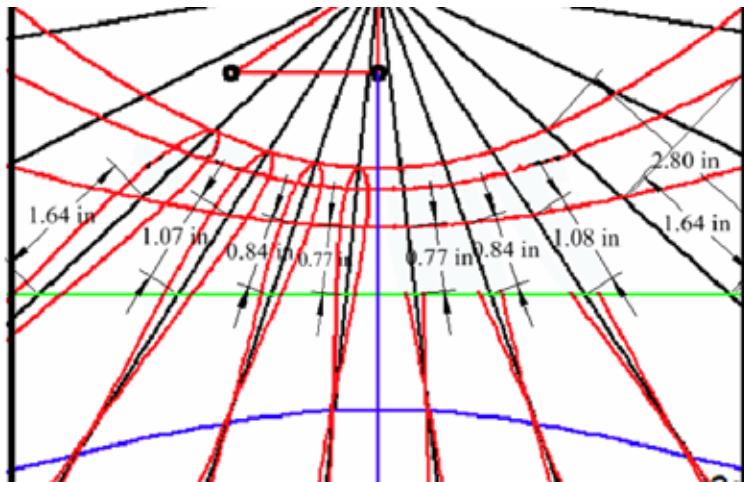
What to do if you forgot something, like a declination curve?

Looking at the picture of the dial, the October and February declination or calendar curve is missing.



The solution was to place a sheet of paper over the dial, trace the hour and calendar curves, import them into a .JPG and from thence into a CAD that can measure things. One measurement was made on the 4pm hour line, between the winter solstice and the equinox, and it was found to be 2.8 inches. A parallel measure was made in CAD, and the drawing and measurement were scaled until the measurement was also 2.8 inches.

Then the all the hour lines were measures from the equinox line, up to the October curve.



The dial is located 28.4 minutes west of the legal meridian, so the noon line is almost as far left of the vertical noon LAT line, as is the 1 pm line to the right.

16	15	14	13	12	11	10	9
-47.8	-33.0	-19.4	-06.6	05.9	18.7	32.2	47.0

In fact there is about a 0.8 degrees difference, thus the distances from the equinox to the missing October declination curve will be almost the same, and the above confirms this:-

1600	47.8	0900	47.0	equ to Oct curve	1.64 inches in both cases
1500	33.0	1000	32.2	“ “ “ “	1.08 and 1.07 inches respectively
1400	19.4	1100	18.7	“ “ “ “	0.84 inches in both cases
1300	6.6	1200	5.9	“ “ “ “	0.77 inches in both cases

These distances were then marked on the dial, connected with a flexible ruler, and then engraved and finished.

It is not so much whether a mistake happens, rather, it is how the mistake is handled. At least, that is what I always used to tell my boss.