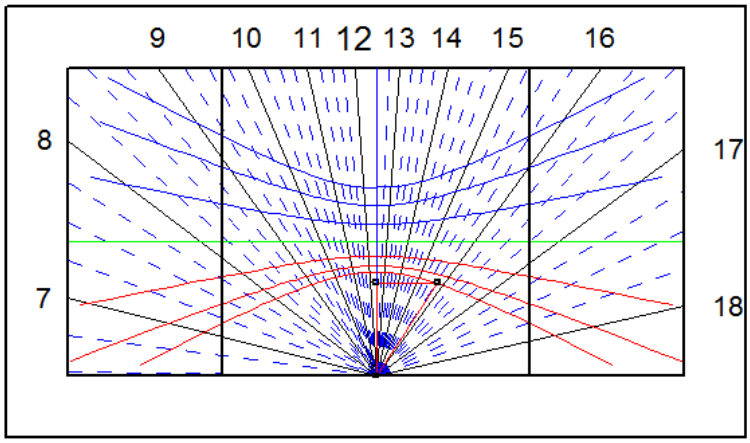
Phoenix, AZ h-Dial



h-dial and calendar using gnomon linear height

check 11-1 Lat: 33.5 d.Long: 07.1

6	7	8	9	10	11	12	13	14	15	16	17	18
77.3	-75.9	-52.6	-35.3	-22.7	-12.6	-03.9	04.4	13.1	23.3	36.1	53.7	77.3

Hours below horizontal use the 90 reference line below horizontal.

Declinations used are: 0, 10, 18, 23.44

latitude: 33.5 longitude: 112.1 legal: 105

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

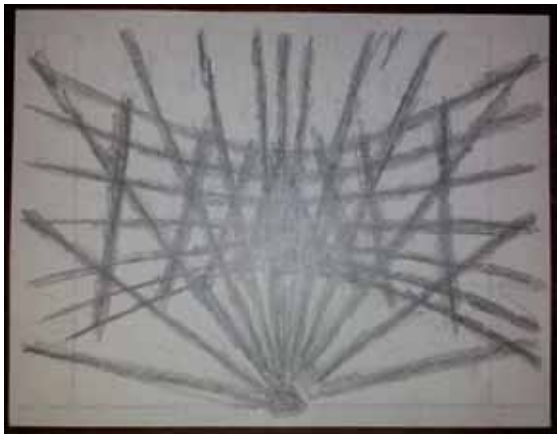
	winter solstice	equ	summer solstice
sunset	17.4	18.5	19.6
-1	16.4	17.5	18.6
-2	15.4	16.5	17.6
-3	14.4	15.5	16.6
-4	13.4	14.5	15.6
-5	12.4	13.5	14.6
-6	11.4	12.5	13.6

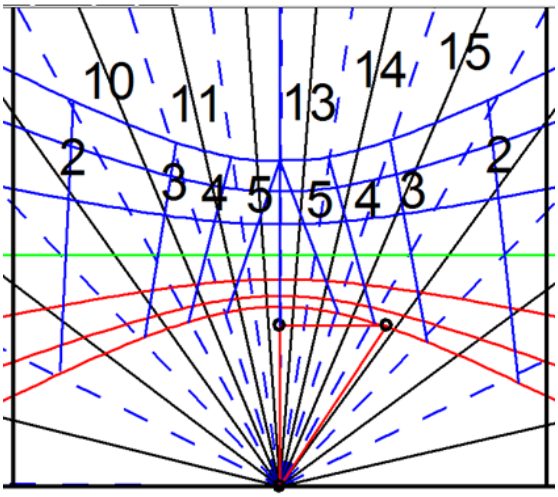
NOTE: Saltillo tile must be well sealed and even then may flake with humidity and freeze thaw cycles.

Phoenix, Arizona
PHX hdial.doc
March 21, 2012

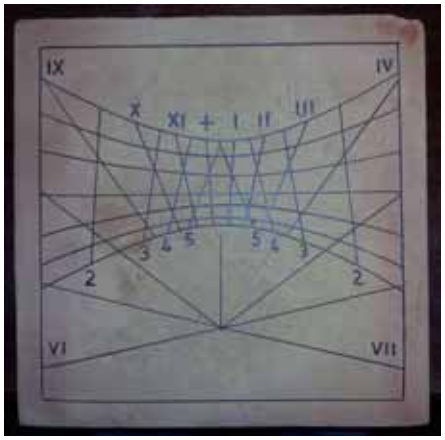
www.illustratingshadows.com

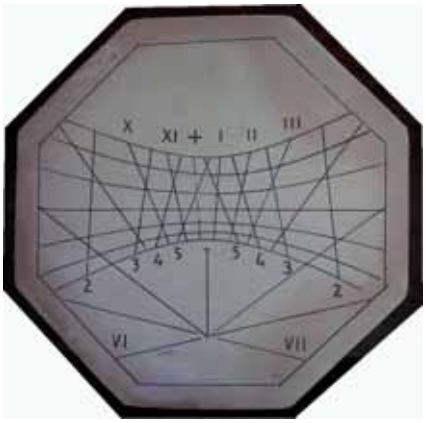
The dial plate was printed and Babylonian and Italian hour lines added.





The back of that layout was marked with a pencil which would probably transfer better than some of the carbon paper lying around the workshop. (see above left) Then the lines were traced to a dial plate, Saltillo tile, in this case. Then the tracings were highlighted with a permanent marker so they would be easier to see when engraving.





Tools and materials for engraving, and setting the final plate

vibrating tool for tight curves

tools to size the gnomon

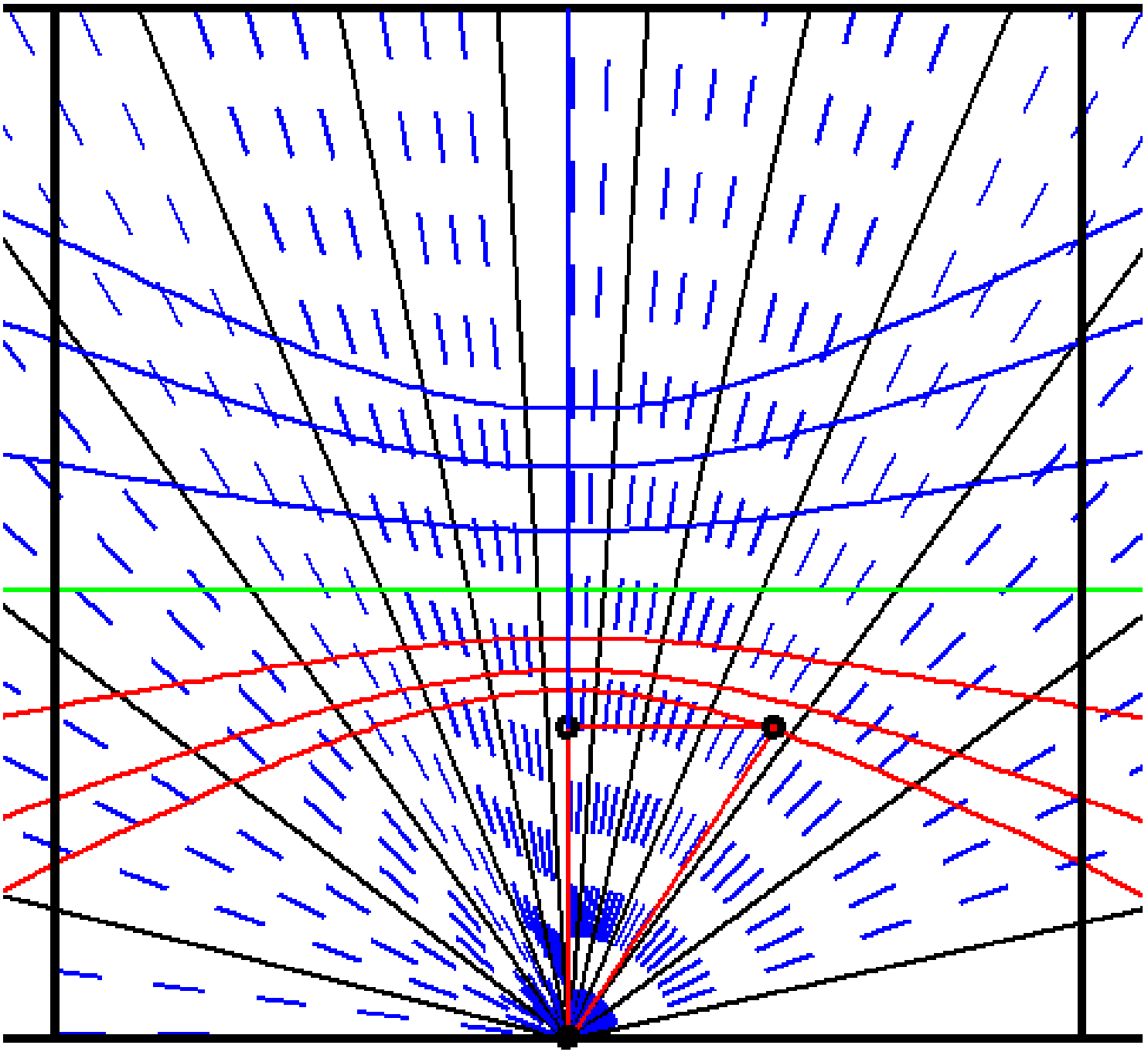
large diamond saw for thick lines

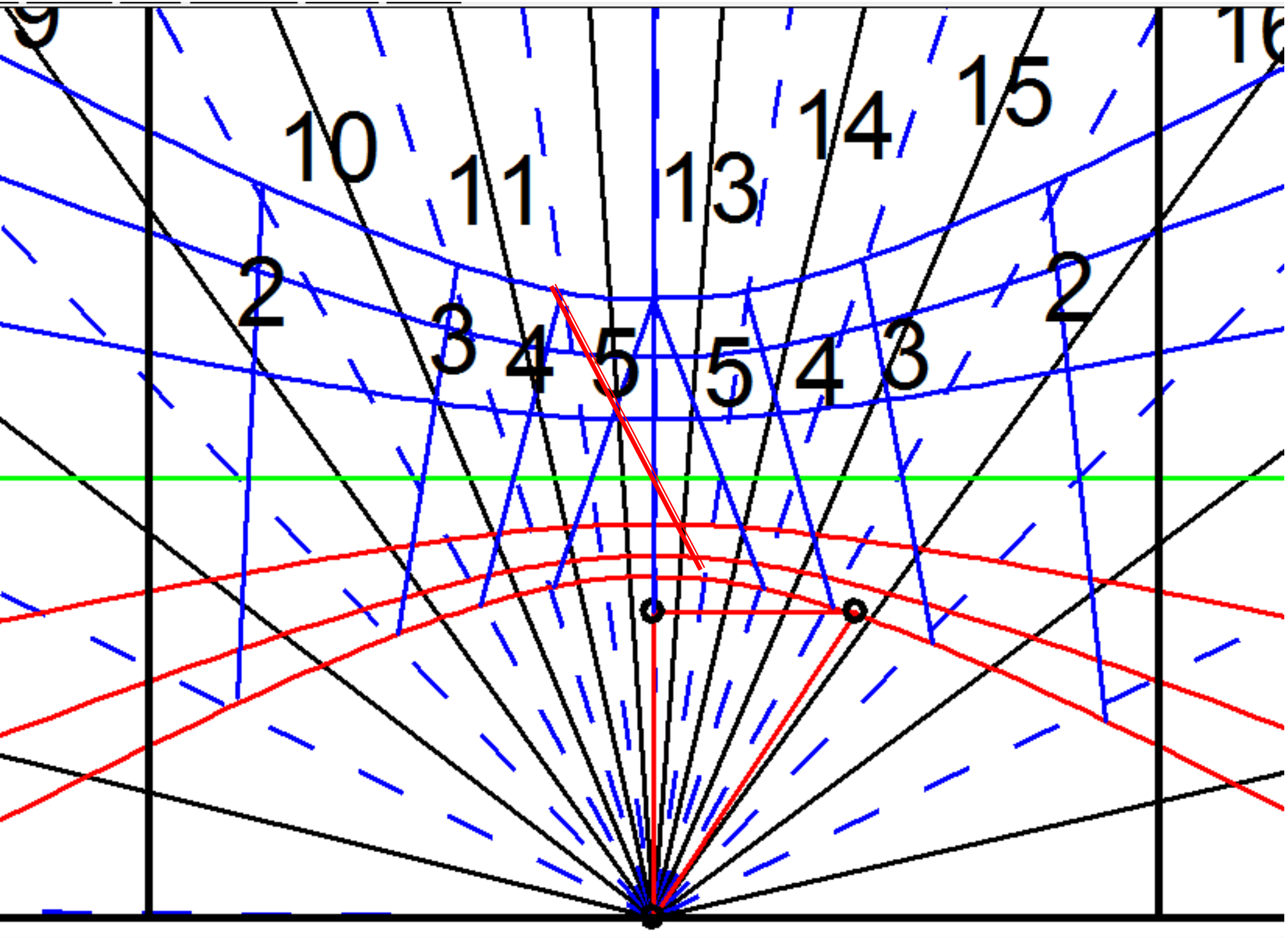
The column was founded on a concrete slab supported a 12 by 12 inch paver, then one layer of four bricks, then a series of two bricks, crowned by another layer of four bricks supporting another 12 inch square paver.

The tool used to help shape the base of the gnomon is shown, and the gnomon is affixed with epoxy into a slit cut for it, and held vertical (see below) with a couple on 90 degree 1 inch elbows.

The final dial.

10 11 12 13 14 15




9
10
11
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14
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16
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3
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5
5
4
3
2

SUNRISE/SUNSET time LEGAL hh.hh (decimal)

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LAT	LNG	at
33.50	112.10	105

Summer time is not considered.

SUNRISE/SUNSET time LEGAL hh.hh (decimal)

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

									BABYLONIAN LINES			ITALIAN LINES		
									SUN RISE			SUN SET		
									sun rise	no EOT	EOT	no EOT	EOT	
										std	legal	std	legal	
Date	Julian	decl	eot m.m	LEGAL TIME rise h.hh	LEGAL TIME set h.hh	Day length	rise azi	Noon alt	STD ha	rise h.hh	rise plus eot h.hh	set set h.hh	set plus eot h.hh	day length h.hh
3/20	79	-0.5	7.6	6.6	18.6	11.96	89.4	56.0	97.4	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	80.4	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	96.7	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	113.8	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	113.2	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	112.0	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	110.4	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	108.2	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	105.9	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	103.4	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	101.3	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	98.7	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	96.1	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	93.3	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	90.8	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	88.4	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	86.1	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	84.2	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	82.5	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	81.2	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	80.5	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	80.4	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	80.9	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	81.9	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	83.3	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	85.3	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	87.4	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	89.7	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	92.4	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	94.9	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	97.5	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	100.0	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	102.6	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	105.1	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	107.6	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	109.7	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	111.5	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	112.8	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	113.6	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	113.7	7.58	7.58		17.36	17.36		9.78
										sun rise time			sun set time			

SAME DIAL PLATE LAYOUT ~ different design

Another variation, one on a square Saltillo tile, another with an EOT on an octagonal Saltillo...