

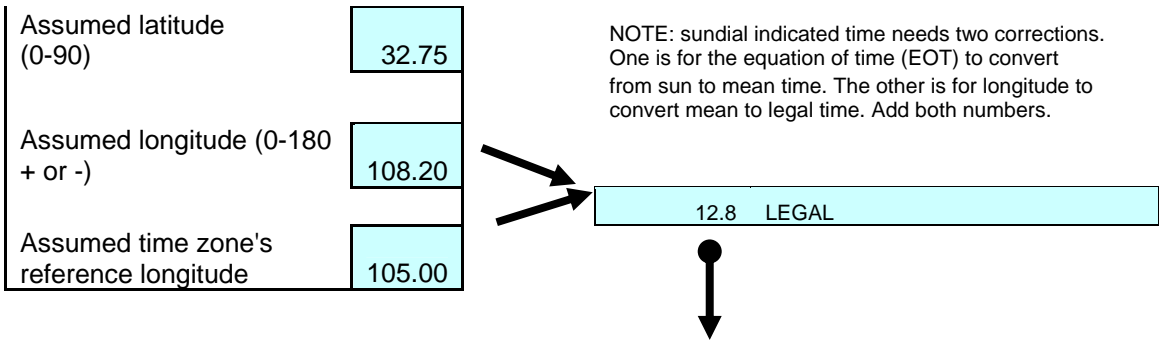
### A PORTABLE ENGRAVED HORIZONTAL DIAL

This project was an engraved dial, horizontal, longitude adjusted dial, designed for placing on a window sill.

This dial will be for Silver City, NM, whose coordinates are:

location lat: 32.75° N  
 location long: 108.2° W  
 magnetic declination: 10.6° E

The spreadsheet: [reference-spreadsheets.xls](#) which is on the [www.illustratingshadows.com](http://www.illustratingshadows.com) web site was used to provide the longitude corrected hour line angles.



TIME OF DAY		Hour line angles for simple dials	Horizontal hour line angles with long corr	
am	pm	HORIZONTAL	am	pm
12.00	12.00	0.00	1.73	-1.73
11.00	1.00	8.25	10.09	6.45
10.00	2.00	17.35	19.49	15.28
9.00	3.00	28.41	31.18	25.81
8.00	4.00	43.14	46.96	39.58
7.00	5.00	63.65	68.88	58.71
6.00	6.00	90.00	-84.10	84.10

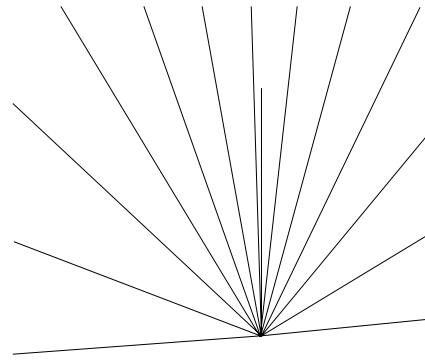
These have no longitude correction

These have longitude correction

\*\*\* END \*\*\*

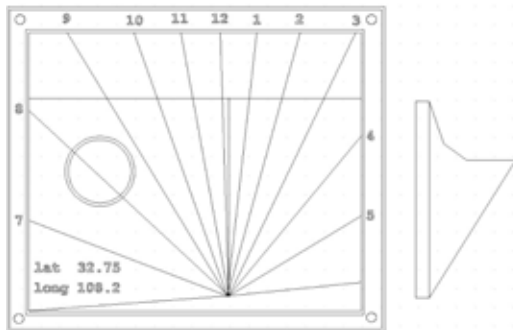
The engraving system used was a Roland EGX-20 which is the bottom of the line, attached by a parallel port to a lap top using Windows XP. As this was indoor dial, engraver's brass was used.

Using TurboCAD, a dial plate was drawn up, however any CAD system could be used. The CAD image is shown to the right.



Dr Engrave was then run, and the CAD picture was pasted in as a model. It can be moved, and with shift plus the mouse, it can also be resized.

Then a dial plate with gnomon was designed over the CAD image, although images as such can be imported into Dr Engrave. When the final dial plate looked appropriate, the original CAD image was discarded.



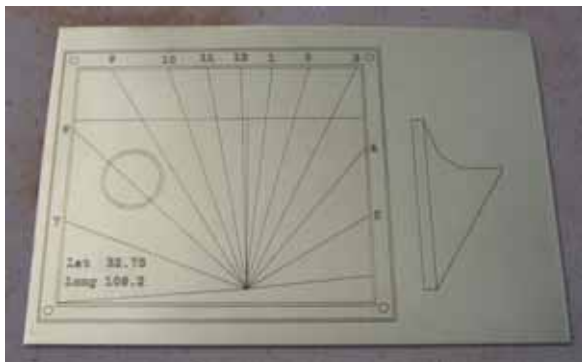
The Dr Engrave image is shown to the left.

A piece of engraver's brass was placed in the EGX-20 printer, and then the dial plate engraved.

The dial plate was engraved, but at this phase looks rather anemic.



The engraver's brass has a coating which the engraving process cuts through as it cuts into the metal.



The rotating bit doesn't just scrape, it has a diamond bit which cuts or burnished into the brass.

A brass blackening solution is used, and the end result is that the lines and letters now stand out.

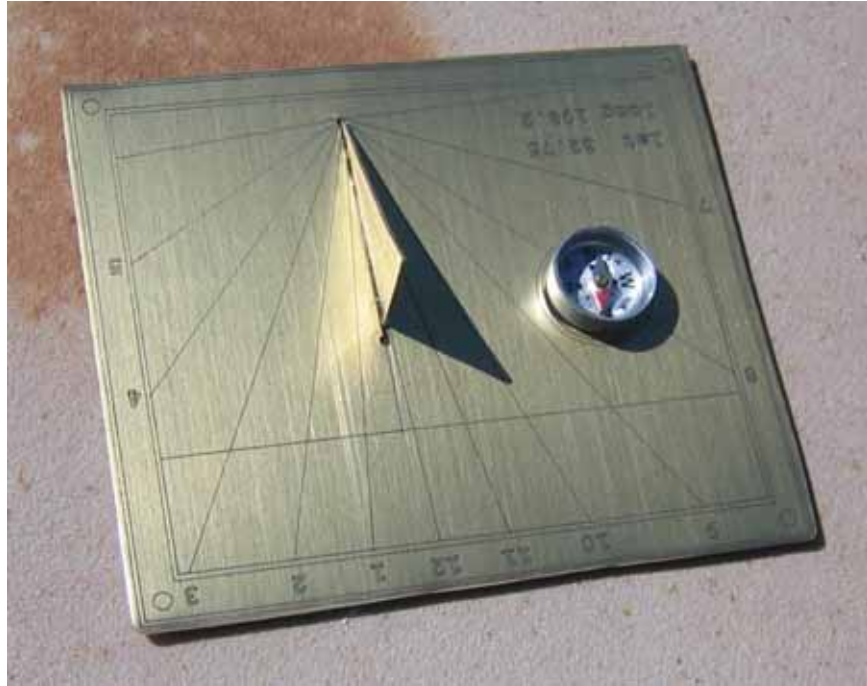
Two holes were drilled for the extremes of the sub-style, and on the back of the dial plate, a straight line was cut with a Dremel rotating blade.

The gnomon was cut, and bent at the bottom. Then with some epoxy on the bent base, the gnomon was pushed through the dial plate cut, and thus the gnomon was fastened.

For added measure a compass was added, which was unaffected by the brass.

The final dial is shown to the right, taken from the north looking south.

It should be clearly understood that the author is in no way adept at engraving, this was a by product of the author's desire to have engraved data plates and engraved EOT charts for use with his garden dials.

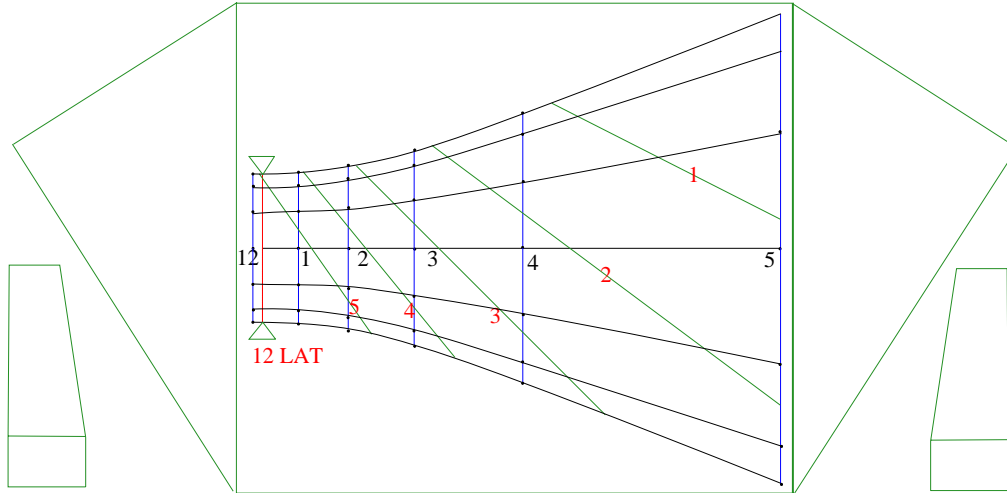


Dial plates can be engraved by other means, one such is the photo resist method using an acid bath. Some truly beautiful dial plates result.

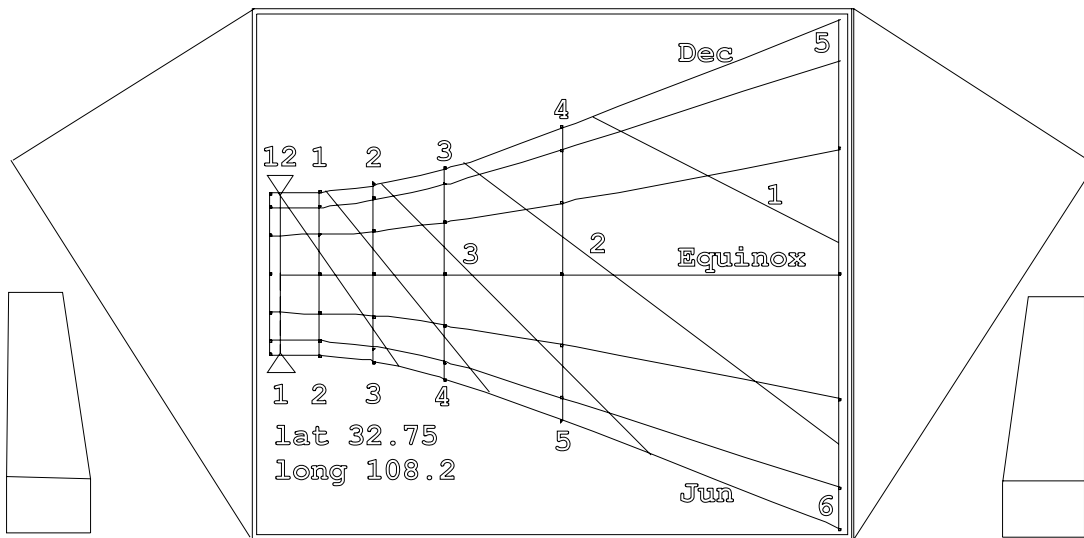
The entire process took less than a couple of hours, and the result is a dial to rest in a south facing office or sitting room.

Since there was some engraver's brass left over, why not build a polar dial.

Here the polar dial plate used in the case study using concrete pavers, and bricks for the column was used. It was opened in TurboCAD and then resized, with some data removed.



The figure was selected, copied, and then pasted into Dr Engrave.



Dr Engrave did not carry over the lettering, so that was done directly in Dr Engrave.

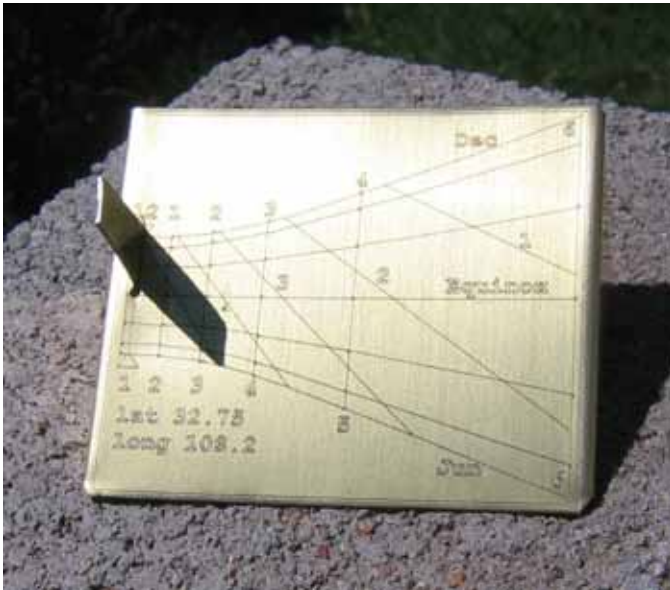
As before, the dial was engraved on an EGX-20, the low end engraver, and then a blackening solution used to bring out the engraving.

The engraving cuts through the brass protective layer and into the metal. The remaining protective layer ensures that only the engraved metal is blackened.

The brass dial plate was then cut and the two latitude triangles then folded. Then two holes were drilled at the extremities of the sub-style, and a Dremel rotary blade was used to complete the between them. The gnomon was cut out and angled near the sub-style engraved line. The back of the dial plate was sanded so the epoxy would bond to sanded brass, similarly with the small angled piece of the gnomon.

The gnomon was then fed through the line cut for it, and secured with epoxy.

This dial used existing dial plate information, so the process took less than an hour, and below the dial can be seen in use in the afternoon sun near the solstice at about 3:25 pm.



The dial plate has some added features. First at the winter solstice the engraved hours are standard time, at the summer solstice they are daylight saving time.

Those curves are marked Dec for December on the top curve, and Jun for the bottom curve. The equinox is also marked.

Several Italian lines are drawn, and three are marked from right to left as 1, 2, and 3 hours to sunset.

While this dial is longitude corrected, the EOT must be applied.

Since this is a dial made of brass, it is best kept indoors, and can rest where the afternoon sun catches it. This dial was designed for the afternoon hours for no reason other than the size of the dial plate which was engraved into spare engraver's brass lying around.

While engraving printers are not cheap, some experimentation with engraver's brass and templates or jigs could prove fruitful. Additionally, dial plates or other related material can be printed for engraving at a local trophy shop.

Expanding from a small in door dial plate to an outside garden fixture is not so easily done. Material must be capable of weathering, and the engraver lines and lettering must be large enough to be visible. This means that lines will be thicker and letters must be outlined and then filled. The author is in no way skilled with engraving, other media being his forte. However since the engraver was there for dial data plates and EOT tables, he thought a couple of hours might be productive. There are some beautiful engraved dials extant, perhaps if you are so inclined you may wish to pursue such production engraving.