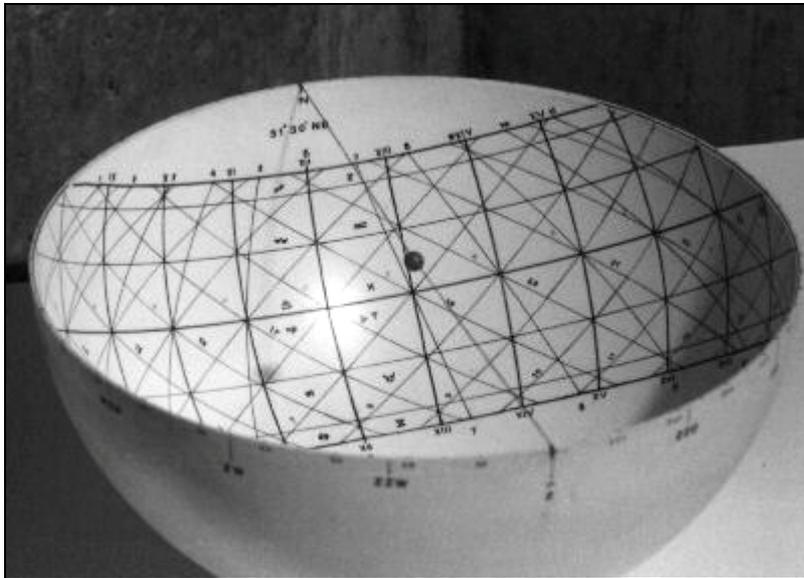


Construction of Hemispherium

by fer j. de vries, netherlands



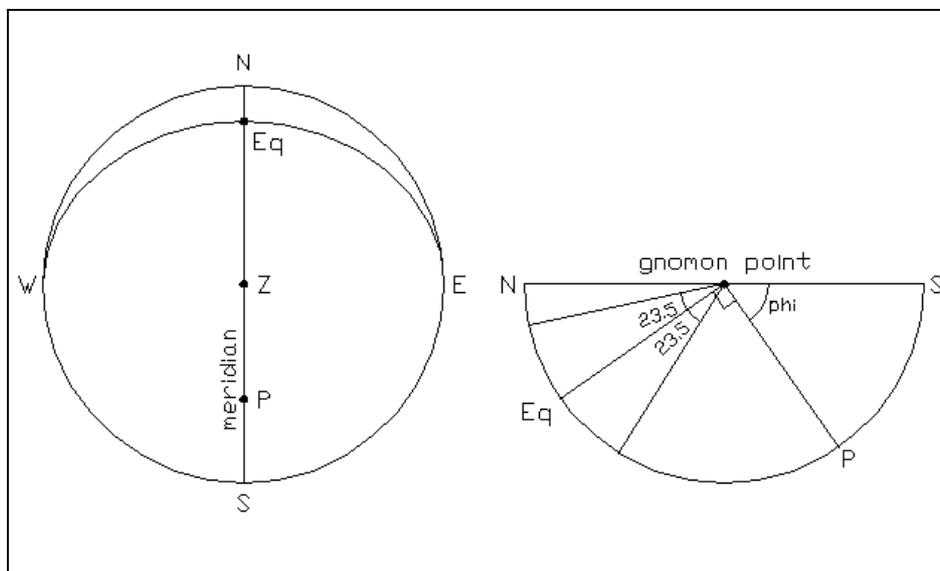
Example of hemispherium in a plastic bowl, with :

- *lines for suntime*
- *antique hourlines*
- *Babylonian hourlines*
- *Italian hourlines*
- *Zodiac lines*

The hemispherium has a radius R .

When I write $V2$ I mean the square root out of 2 = 1.41...

When I write "arc E-RV2" I mean draw an arc with center at E and radius RV2 or $1.41R$.



With a pair of compasses open to $RV2$ draw the four cardinal points on the horizontal edge of the hemispherium. These are the points N, S, E and W.

Draw arc E-RV2 or arc W-RV2. This gives the meridian and has to intersect the points N and S.

The meridian may be removed later.

Draw a small arc N-RV2 or S-RV2 to find the mirror of the zenith point Z on the meridian line.

Draw a small arc S- $2R\sin(0.5\phi)$ to find the pole P on the meridian line.

Draw arc P-RV2 as the equator. The equator must intersect the points E and W on the horizon.

Draw six arcs $P-2R\sin(0.5(90 - \text{decl}))$ as the other zodiac lines in the hemisphere.

Decl in the range -23.5, -20, -11.5, 11.5, 20, 23.5

Divide the equator in 12 equal parts. These points on the equator are the hourpoints H for the hours 6 to 18 suntime with 6 and 18 on the horizon.

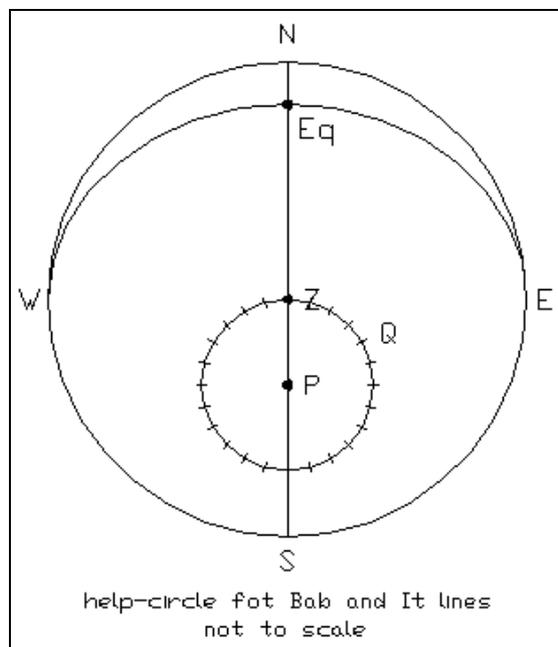
Draw from each H arc H-RV2 to get the hourlines for all the hours.

These lines have to be drawn only between the zodiac lines for summer and winter, but they all pass through point P.

Now you have your hemispherium ready for our suntime and for the zodiac lines.

Divide the winter and summer zodiac line into 12 parts. (and if you want the other zodiac lines also).

With trial and error draw arcs for the antique or unequal hours but they must intersect the hourpoints H on the equator.



To draw the Babylonian and Italian hours draw a circle $P-2R\sin(0.5(90 - \phi))$.

The circle intersects the zenith point Z.

This circle is just for the construction and has to be removed later.

Divide this circle into 24 parts to get a number of centerpoints Q.

Draw arcs Q-RV2 through the hourpoints H on the equator for all the Babylonian and Italian hours.

Think of it that the intersection of a Babylonian and an Italian hourline coincides with a whole suntime hour line.

In this way you can see how precise you are working.

For the sidereal hourlines the procedure is like for the Babylonian and Italian hours,

but now draw a circle $P-2R\sin(0.5*23.5)$ and divide this circle in 24 centerpoints Q.

This circle thus is concentric with the circle for the Babylonian and Italian hours.

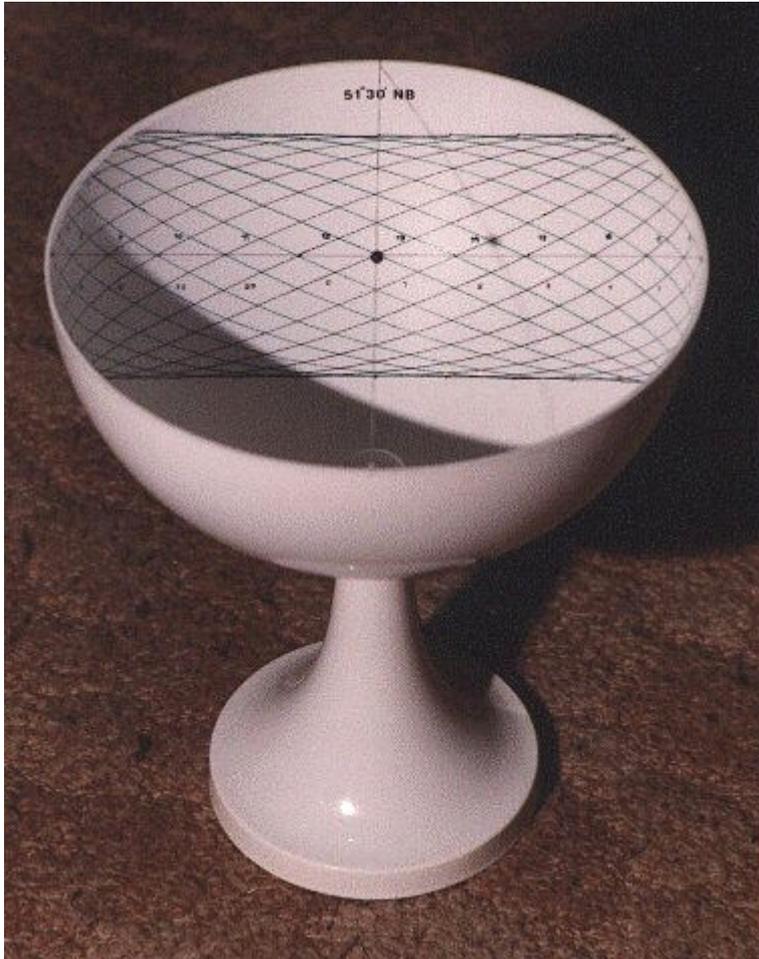
Draw arcs Q-RV2 between the tropics.

It is advisable to use two colours, one for each half of a year.

You see in all the constructions how important the value $RV2$ ($1.41..R$) is and how easy it is to construct a hemispherium.

The method described here is based on an article in the bulletin nr. 3 of "De Zonnewijzerkring", (the Dutch Sundial Society), published in 1979.

That article is based on the Dutch book by Johann Hermann Knoop, 1761.



*Hemispherium with sidereal lines.
For each half year a series of lines is drawn.*