

Year 2003

Article of the month February

How much time is sundial time?

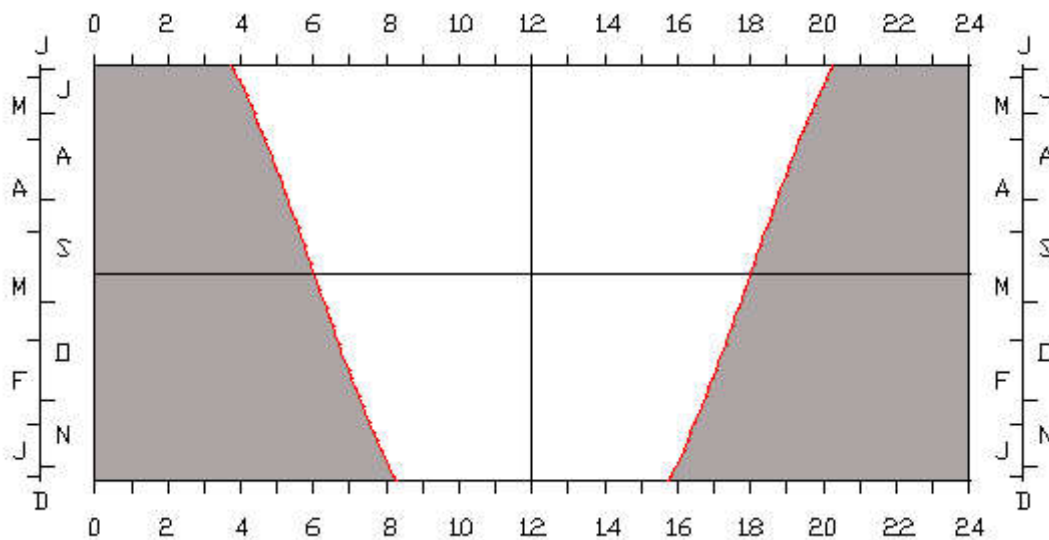
Whenever we design a sundial for an arbitrary plane, we will also have to determine which hour lines to add. This choice depends on two factors:

- The sun should be above the horizon where the sundial is located, i.e. it should be day
- The sun should be on the correct side of the dial plane

To solve for the first requirement is relatively easy.

Determine day length for every day of the year and construct a graph.

The figure below shows this, in apparent solar time, for a latitude of 52 degrees.



The second requirement is slightly more difficult, but using the complementary dial rule, it is also simple to solve graphically.

The complimentary dial rule:

Move the dial face over the surface of the earth, in the direction in which it is "looking", and without altering its attitude in space.

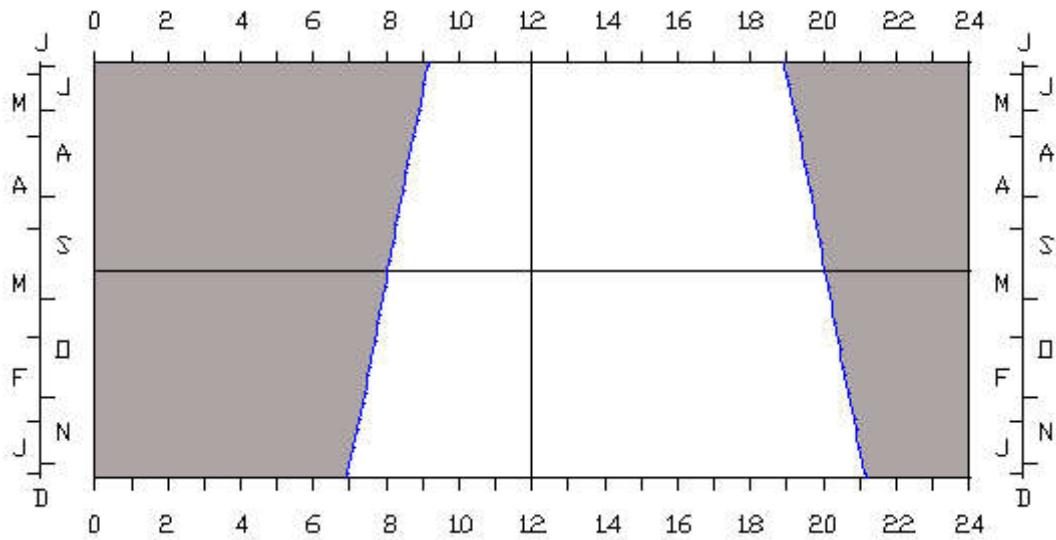
After quite a journey, it will become a horizontal plane in some other latitude and longitude.

Determine day lengths for the new latitude, but also shift the results by the amount corresponding to the difference in longitude.

As an example, for a vertical sundial for latitude 52 degrees north, declining 25 degrees from south to west, the new latitude would become 33.92 degrees south, and the longitude shift would be 30.62 degrees, or 2 hours, 2 minutes and 28 seconds.

The next figure shows the result.

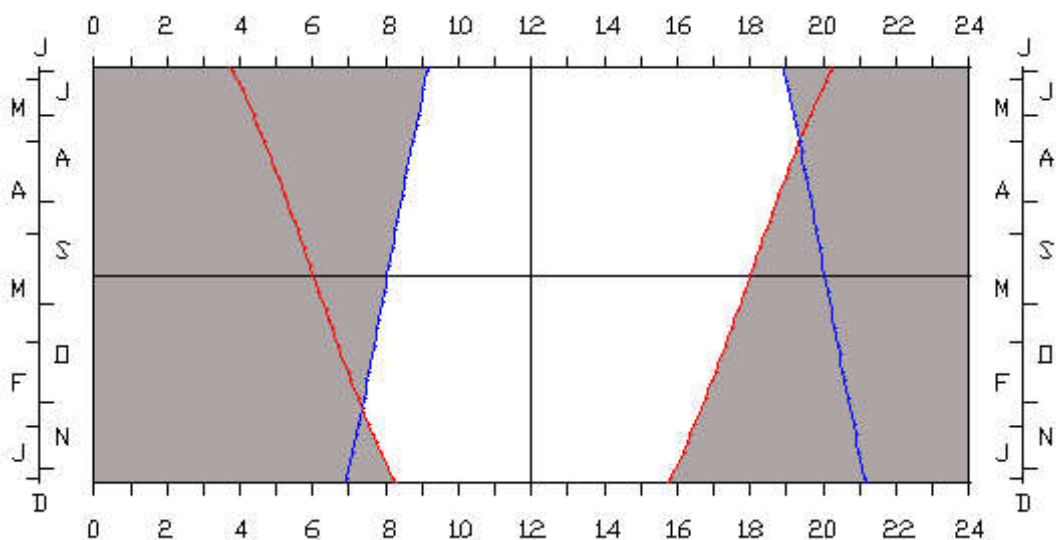
Notice the right shift of more than two hours.



Superposition of the two graphs then shows the true irradiation times of our sundial; the last figure shows this.

Maximum irradiation in this example is from shortly after seven in the morning to a little after seven in the evening, expressed in apparent solar time.

. Only hour lines for this period need to be drawn on the sundial.



The program ZW2000, available for download on this site, contains a procedure that will draw graphs like this directly.

It is possible to calculate irradiation times directly from equations, but this will not be described here.

To gain insight in these matters, it makes much more sense to draw such a graph yourself.

Fer de Vries.

For equations for direct calculation see: Compendium, the journal of the North American Sundial Society, vol. 2 nr. 1, March 1995.

Last Modified 01/27/2021 12:25:03

English translation: RH