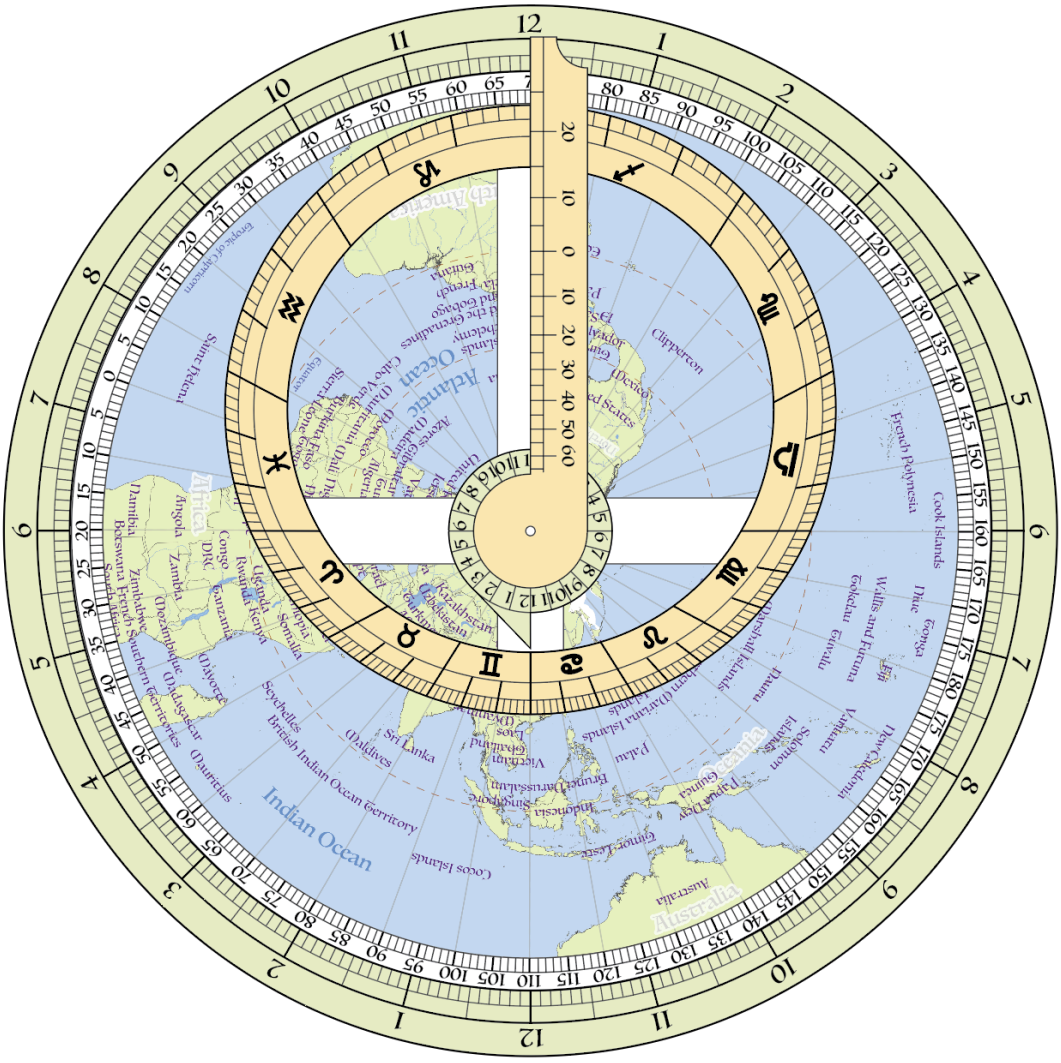
The Cosmographic Mirror

This volvelle was first published as part of Peter Apian's *Cosmographia* in 1524. He called it the *Speculum Cosmographicum*, translated as the Cosmographic Mirror. Through simple rotation of its parts, this instrument can solve problems relating to the complementary spheres of the Earth and the Sun—the primary focus of the then-prevalent field of cosmography.

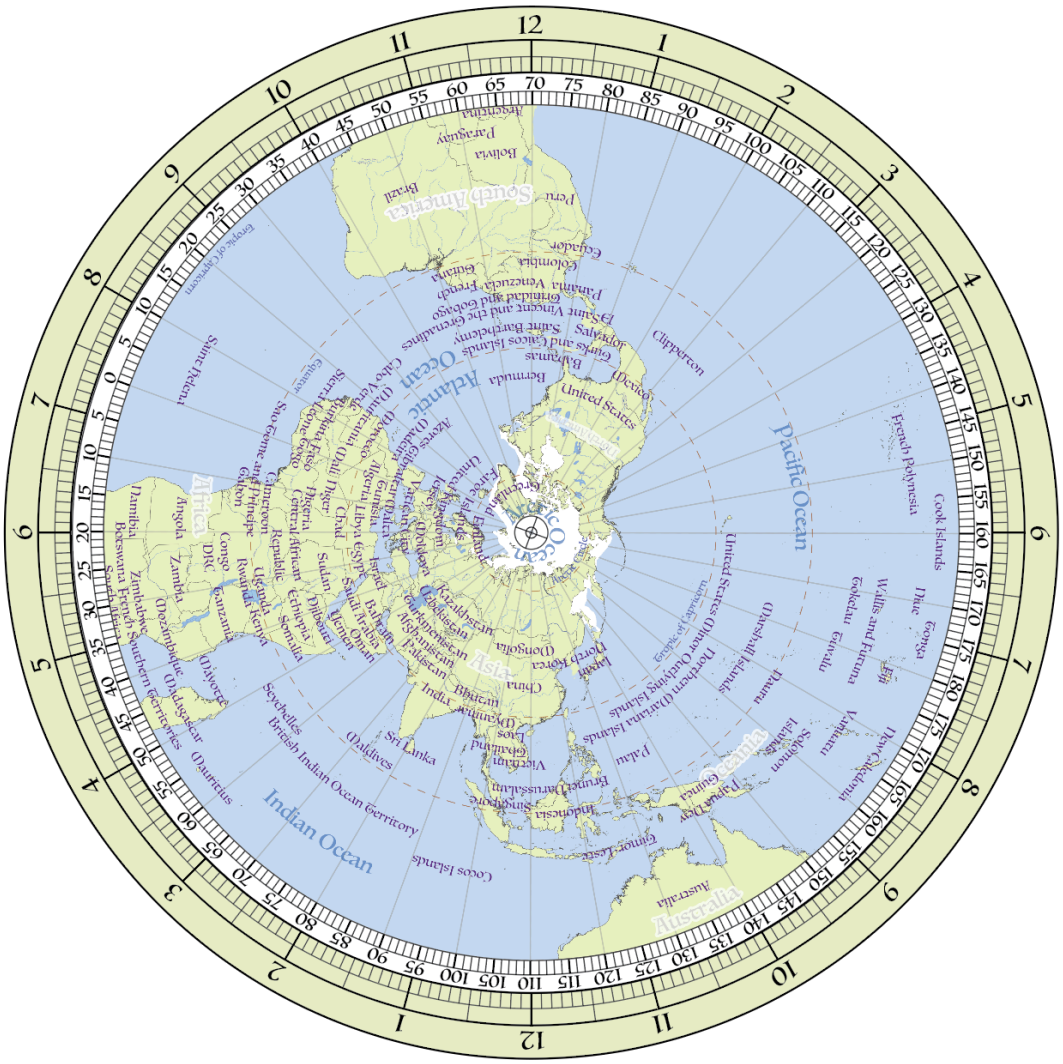
Assembling the volvelle:

The image below shows the completed volvelle and can act as a guide for your assembly. Once each component has been cut out with a hole punched through its center, they can be secured together in this configuration using a brass fastener. In order of assembly, from back to front, the components proceed as follows: limb, stereographic projection, ecliptic, hour circle, rule.

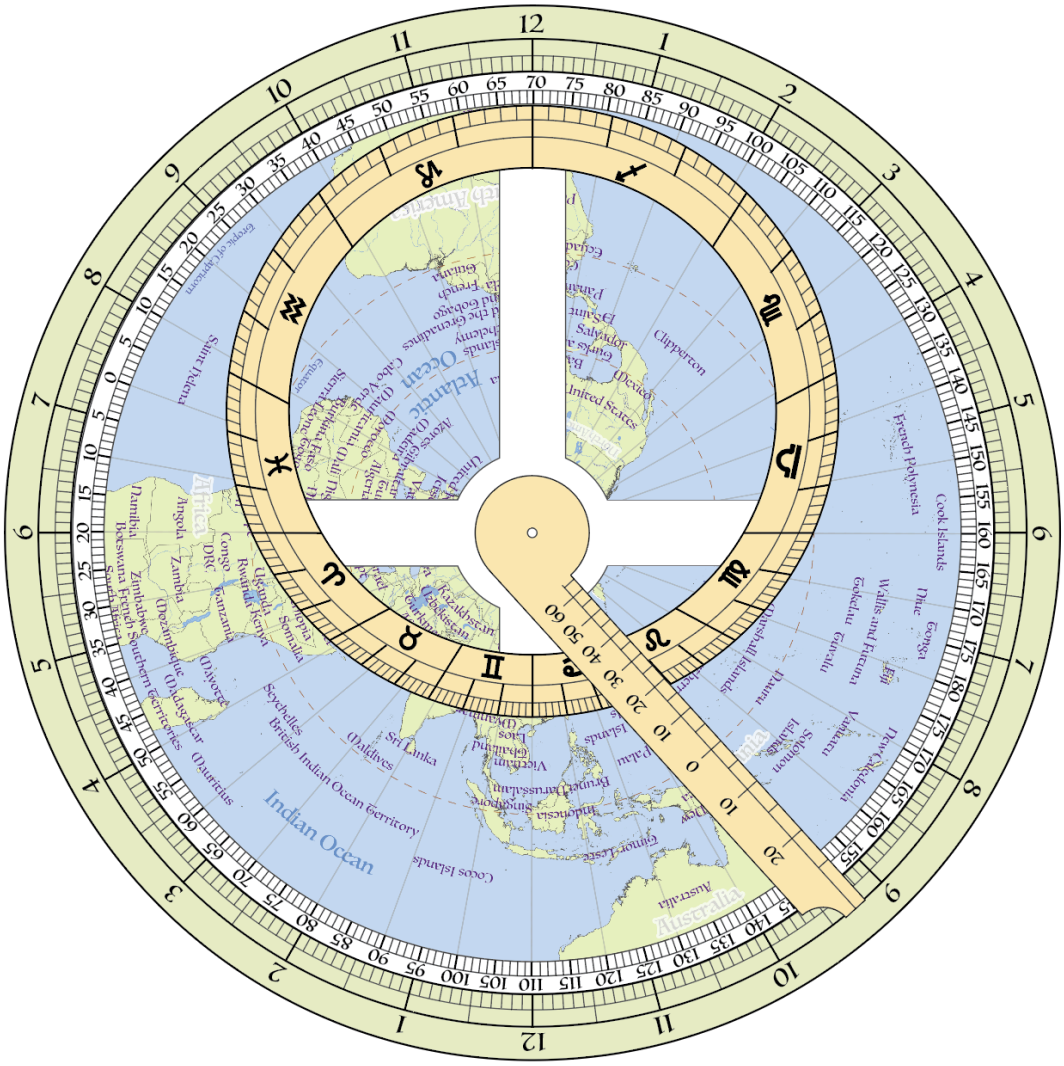


Using the volvelle:

Step 1: set your longitude to the noon position. Your meridian should be facing straight up. In the example shown below, 70º W is set to noon.



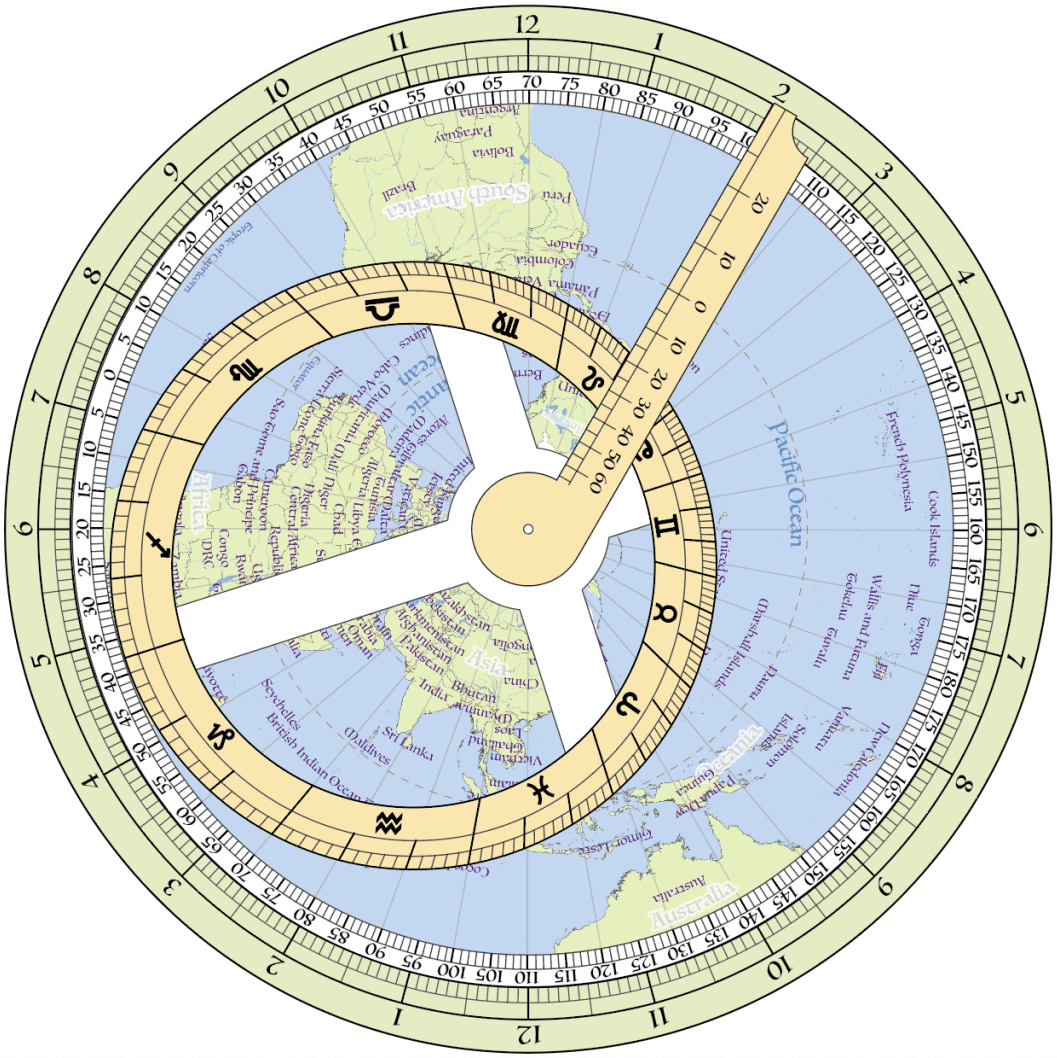
Step 2: set the inner edge of the rule to the sun's position along the ecliptic.
If you don't know the current ecliptic position of the sun, it can be found here under "sky right now" https://www.bcgnomonics.com/planesphericastrolabe.
In the example shown below, the rule is set to 10º of Leo.



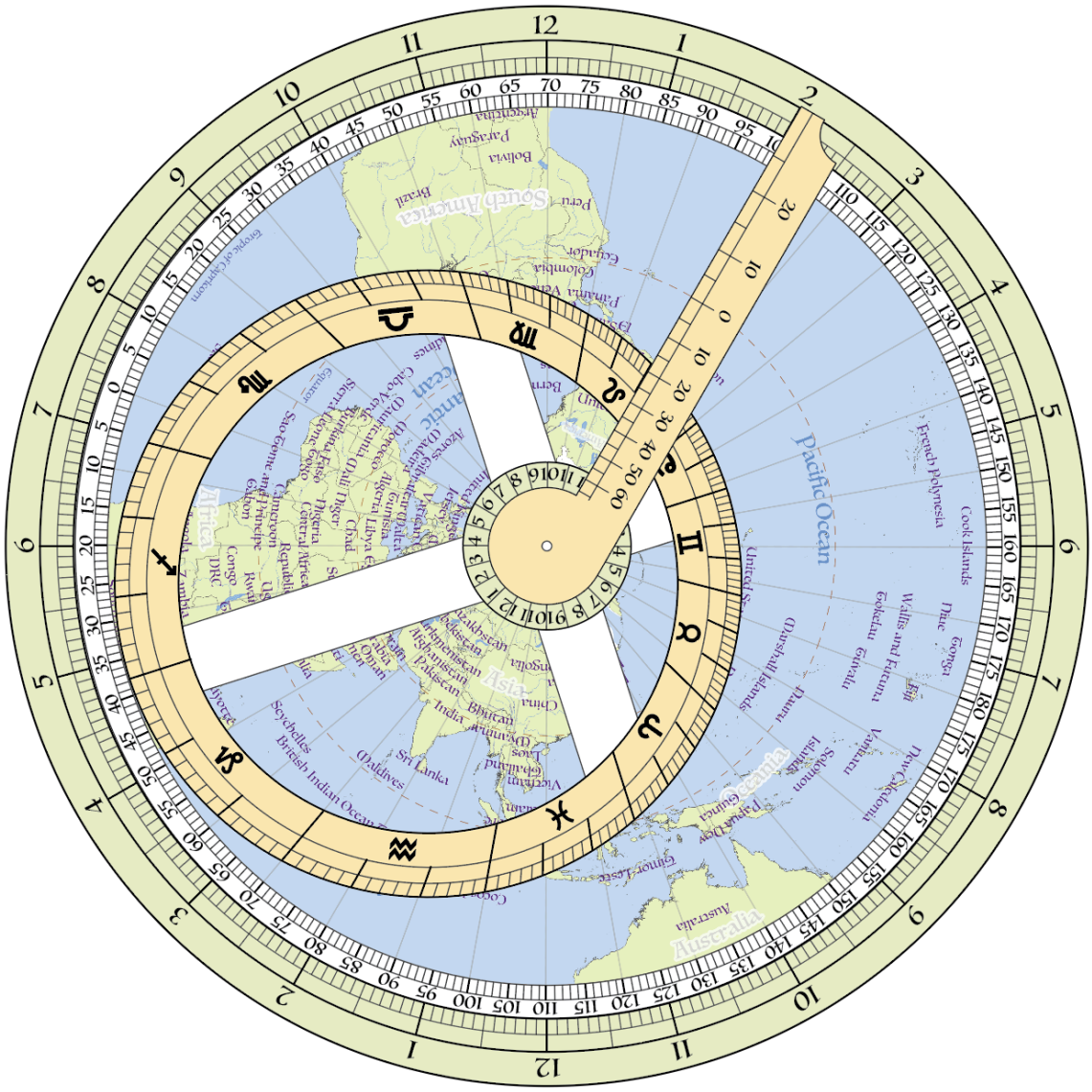
Step 3: Rotate the rule and ecliptic together to indicate local time.

In the example shown below, the rule is set to 2:00 pm.

Note: this volvelle works under the assumption of solar time. For precise results, you will need to convert your time inputs to solar time. The solar time to clock time conversion for your location can be found here under "Solar → Clock" https://www.gnomoni.ca/sdn/index.htm. Reverse the sign of this addition when converting from clock time to solar time.



Step 4: Line up the hour circle's noon index with the rule.



Reading the volvelle:

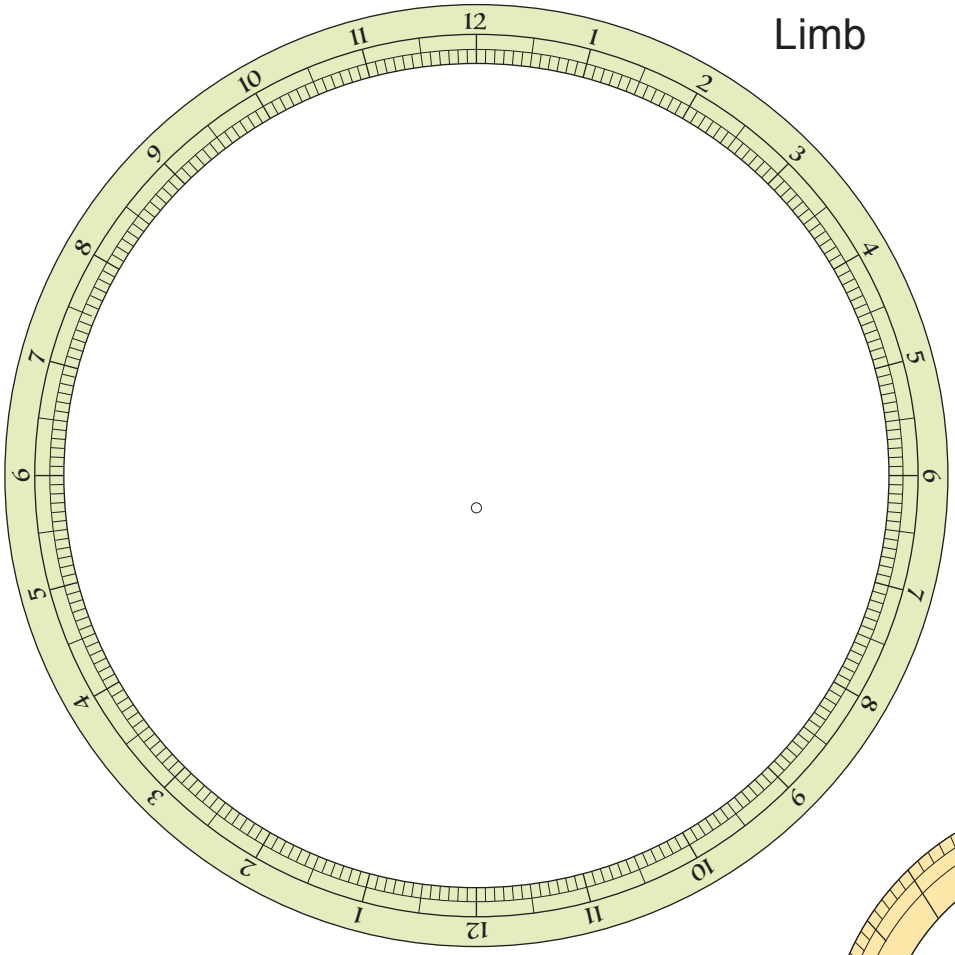
In this orientation, the Cosmographic Mirror can tell us a number of things. To read these outputs, it is first important to understand that:

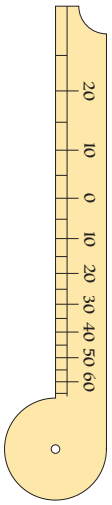
1. The point where the rule's inner edge and the ecliptic intersect represents the sun.
2. At any given time, the meridian beneath the sun is experiencing solar noon.
3. Clockwise rotation of the rule and ecliptic (together) represents the advance of time.
4. The rule's increments represent both terrestrial latitude and solar declination, and they can be used to measure either.
5. Any time output will be local solar time. For precise results, refer to the conversion guide found here https://www.bcgnomonics.com/localapparenttime.

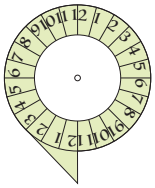
When set for a given date and time, as in the example above, the volvelle can tell us:

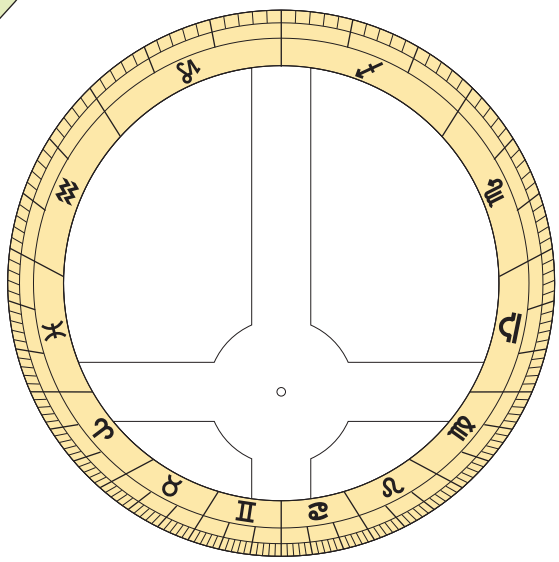
1. The location at which the sun is directly overhead (the intersection point of the rule and ecliptic).
2. The local solar time at this sub-solar point and all locations (read from the hour circle).
3. The difference between your local time and local time at the location where the sun is currently directly overhead (read from the limb).

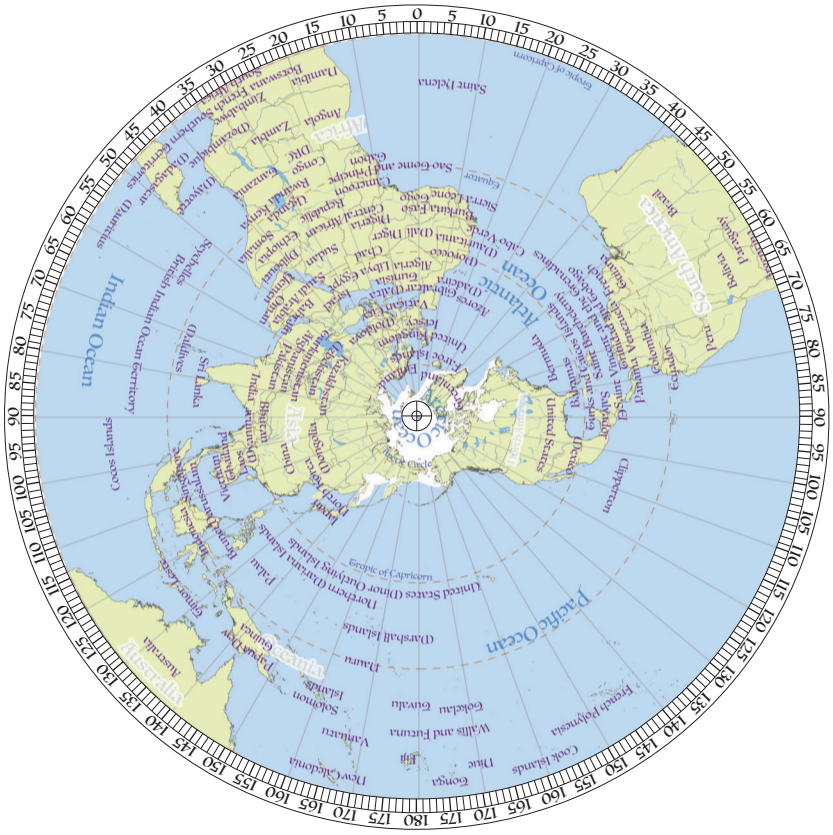
The inputs used to set this orientation do not need to be your actual local values. Additional problems may be solved by setting another meridian to noon and/or setting the volvelle to a date and time of your choosing in the past or future.











Speculum Cosmographicum