The Construction and Use of the Astrolabe
A Workshop (September, 21, 2012)
BYU Museum of Art

Glen M. Cooper

In connection with the Beauty and Belief exhibit

(Astrolabe templates and some diagrams adapted from: Timothy Mitchell: http://www.astrolabeproject.com)
Assembly Instructions

Print out Front, Back, and Alidade/Rule pages on paper. Cut these out. Cut out posterboard or heavy paper backing in the shape of the astrolabe. Glue front and back to this posterboard sheet. Cut out alidade and double rule, and glue to posterboard. (Ignore the single rule).

Print out Rete page on transparency sheet. Cut this out along the outer circular edge ONLY.

Carefully drill/poke holes in the center of the astrolabe body, the center of the rete, and the centers of the alidade and the double rule.

Attach the parts together with the nut and bolt that I’ll provide. The rete goes over the front, and the double rule goes on top of the rete. The Alidade goes on the back.
Alidade

Double Rule

Use this double rule

Single Rule

Do not use this single rule
Major Components of the Astrolabe

Notes:
- The Alidade Rete and Rule are all designed to rotate freely.
- The Plates (also known as climates) of an astrolabe are specific to a given latitude. Therefore most astrolabes contained a set of climates, that could be swapped out as the user moved to different locations.
- The Astrolabe rule could be either single or double ended.

**DON'T LEARN THIS DIAGRAM**
The Front of the Astrolabe

Time Markings

Zenith

Horizon

Meridian

Twilight Line

Celestial North (Polaris)

Tropic of Cancer

Equator

Tropic of Capricorn

**LEARN THIS**
The Rete

Ecliptic - Path of the Sun
- Divided by Zodiac
  (Sun moves counter-clockwise)

Winter Solstice

Polaris

Spring Equinox

Summer Solstice

Fall Equinox

Major Stars

**LEARN THIS**
Astrolabe Use Instructions

To determine solar longitude:
1. Determine the day of interest (e.g. Jan 15)
2. On the back of the astrolabe, find Jan 15 on the calendar circle.
3. Turn the rule to line up with Jan 15.
4. Read the solar longitude from the ecliptic (or Zodiac) circle (Capricorn 25°)

To determine the Ascendant (= “the Sign and degree rising over the horizon at a given moment”):
1. Determine the day and time of interest (e.g. 3 PM Jun 15)
2. Determine the solar longitude for Jun 15 (Gemini 24°)
3. On the front of the astrolabe, turn the rule to the time of interest (here, 3 PM), and hold it there with one finger.
4. With the rest of your hand, turn the rete so that the sun (i.e. Gemini 24°) lines up with the rule and the time.
5. Look at the eastern horizon (on your left), and read the Sign and degree crossing the horizon that moment. (Scorpio 1°) That is the Ascendant.

To determine the Midheaven (= “the Sign and degree crossing the Meridian at a given moment”):
1. Follow steps 1-4 as for the Ascendant.
2. Look at the meridian, and read the Sign and degree that is crossing that time. (Leo 24°). That is the Midheaven.

To determine time of sunrise:
1. Determine the day of interest (e.g. Jun 15)
2. Determine the solar longitude for Jun 15 (Gemini 24°)
3. On the front of the astrolabe, align Gemini 24° with the eastern horizon (on the left side)
4. Align the rule with the sun and horizon, and read the time of sunrise from the outer circle. (4:35 AM)

To determine time of sunset:
1. Determine the day of interest (e.g. Jun 15)
2. Determine the solar longitude for Jun 15 (Gemini 24°)
3. On the front of the astrolabe, align Gemini 24° with the western horizon (on the right side)
4. Align the rule with the sun and horizon, and read the time of sunset from the outer circle. (7:30 PM)

To determine the time (day):
1. measure the sun’s altitude
2. find solar longitude for the current day on the back (e.g. Lib 25°)
3. Find this point on the zodiac circle on the front of the astrolabe
4. Line this point up with the altitude coordinate line on the front of the astrolabe
5. Align the rule with these two points, and read the time from the outer circle. This is the solar time for the moment in question.
6. To convert to clock time, add an hour (if DST is in effect); add the equation of time, and add the time zone correction. The result is clock time for your time zone.

To determine the time (night):
1. measure the altitude of a star on the rete
2. find solar longitude for the current day on the back (e.g. Lib 25°)
3. Find this point on the zodiac circle on the front
4. Line the star up with the altitude coordinate on the front
5. Align the rule with the sun’s position on the zodiac circle, and read the time from the outer circle. This is the solar time at night.
6. To convert to clock time, add an hour (if DST is in effect); add the equation of time, and add the time zone correction. The result is clock time for your time zone.
Bibliography


Jamieson, Laura and Montero, Maria, Stereographic Projection, Chaucer and the Astrolabe: http://www.math.ubc.ca/~cass/courses/m309-01a/montero/math309project.html


Morrison, James. The Astrolabe, Janus, 2007


Stoeffler, Johannes, Elucidatio Fabriquae Ususque Astrolabii, Oppenheim (1523). (available online - http://www.univie.ac.at/hwastro/)


Zotti, Georg. Tangible Heritage: Production of Astrolabes on a Laser Engraver
Astrolabe Resources

Websites: (I haven’t checked these lately)

http://astrolabes.org - James Morrison's Site
http://astrolabeproject.com –home of the Astrolabe Generator
http://www.astro.com/swisseph/swepha_e.htm - ephemeris source. PDF files
http://www.autodidacts.f2s.com/astro/index.html - Keith's Astrolabe
http://www.ted.com/talks/tom_wujec_demos_the_13th_century_astrolabe.html
http://www.mhs.ox.ac.uk/astrolabe/ - an online collection of astrolabes
http://www.puzzlering.net/astrolabe.html - Currently the only commercially available astrolabe of any quality.

Software:
The Astrolabe Generator – free and open-source. Generates custom PostScript (EPS) files allowing you to print out and build your own astrolabes -
http://astrolabeproject.com **This is where your astrolabe template came from. There’s a wealth of information there, and instructions on how to draw the parts by hand.


Shadows Pro – Sundial software that incorporates an astrolabe simulator –

Illustrating Shadows – Spreadsheets for calculating sundials and astrolabe plates
http://www.illustratingshadows.com/