

# Building a Model Astrolabe

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This document describes the electronic file archive which accompanies the author's paper of the same title in the Journal of the British Astronomical Association. It also contains images of all of the components which need to be printed out to build a model astrolabe tailored for a latitude of  $85^{\circ}\text{N}$ <sup>2</sup>. The astrolabe presented in this document is a slightly modernised version of that described in Geoffrey Chaucer's c. 1391 *Treatise on the Astrolabe*, and has been constructed following a prescription similar to that described in Eisner (1975, 1976a, 1976b).

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This document can be downloaded from the British Astronomical Association website, at

<http://www.britastro.org/astrolabe>, or from

<http://dcford.org.uk/astrolabe/index.html> (index page),

and the accompanying files may be downloaded from

<http://dcford.org.uk/astrolabe/astrolabe.zip> (zip archive).

## Assembly Instructions

To build a model astrolabe tailored for a latitude of  $85^{\circ}\text{N}$ , Figures 1, 2 and 3 should be printed out onto paper, or more preferably onto thin card. Figure 4 should be printed onto a sheet of transparent acetate. The two sides of the *mother* (Figures 1 and 2) should be glued rigidly back-to-back, perhaps sandwiching a piece of rigid card. The *rete*, printed onto transparent acetate<sup>3</sup>, should be placed over the *climate*, which for simplicity is incorporated into the front of the mother in this document.

The *rule* and the *alidade* should be placed on either side of the astrolabe: the rule, marked out with a declination scale, should rotate over the front of the mother; the alidade should rotate over the back of the mother. The two tabs on the side of the alidade should be folded out to form a sight used for measuring

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<sup>2</sup>Alternative versions of this document prepared for other latitudes are available from the author's website: <http://dcford.org.uk/astrolabe/index.html>

<sup>3</sup>Historically, the rete would have been made of the same material as the rest of the astrolabe and marked with arrows showing the positions of prominent stars. As much of the material of the rete as possible would then have been cut away to allow the climate below to be seen. We use transparent plastic here because it is so much more practical than the traditional form of rete.

the altitudes of celestial and terrestrial objects. The whole construction may then finally be fastened together by placing a split-pin paper fastener through the centre.

## Astrolabes for Other Latitudes

The components needed to build astrolabes tailored for latitudes other than 85°N can be found in the accompanying electronic file archive, which can be downloaded from the British Astronomical Association website, at

<http://www.britastro.org/astrolabe>, or from the author's website at

<http://dcford.org.uk/astrolabe/index.html> (index page) or

<http://dcford.org.uk/astrolabe/astrolabe.zip> (zip archive).

The simplest option is to use an alternative version of this document prepared for another latitudes; these are stored in the **astrolabes** folder of the archive.

Alternatively, individual images of the various parts of the astrolabe model are stored in the **astrolabe\_parts** folder of the archive, and each is available in PDF format, or as a GIF bitmap image (.gif). If these are used, then all of the required components must be printed at exactly the same scale in order to be of consistent sizes when fitted together. For example, the option to enlarge each of the PDF documents to fit the page size must *not* be selected in the printer setup options in Adobe Acrobat Reader, and the GIF images must be printed at a common dots-per-inch resolution.

For latitudes in the northern hemisphere, the following images **astrolabe\_parts** folder should be printed:

- **mother\_back.??? –** The back of the mother of the astrolabe. This image also appears in Figure 1, and is not latitude dependent.
- **mother\_front\_north.??? –** The front of the mother of a northern-hemisphere astrolabe. Note that, in contrast to Figure 2, the rete is not incorporated into the mother here. The hours advance clockwise around the edge of the mother.
- **rule\_north.??? –** The rule and the alidade of a northern-hemisphere astrolabe.
- **rete\_north.??? –** The rete of a northern-hemisphere astrolabe.
- **climate\_xxN.??? –** The climate of the astrolabe, customised to the required latitude xx°N.

For latitudes in the southern hemisphere, the following images should be printed. Note that a different rete is required, showing the southern sky, and that the declination scale on the rule also changes sign:

- **mother\_back.??? –** The back of the mother of the astrolabe. This image also appears in Figure 1, and is not latitude dependent.
- **mother\_front\_south.??? –** The front of the mother of a southern-hemisphere astrolabe. Note that, in contrast to Figure 2, the rete is not incorporated into the mother here. The hours advance anticlockwise around the edge of the mother.
- **rule\_south.??? –** The rule and the alidade of a southern-hemisphere astrolabe.

- `rete_south.???` – The rete of a southern-hemisphere astrolabe.
- `climate_xxS.???` – The climate of the astrolabe, customised to the required latitude `xx°S`.

## Customised Astrolabes

The astrolabe images presented here were produced using PyXPlot, an open-source vector graphics scripting language developed by the same author. PyXPlot has a website<sup>4</sup> with extensive documentation, and is available as a standard package in a number of Linux distributions including Ubuntu, Debian and Gentoo. Unfortunately, it is not available for Microsoft Windows at the present time.

The PyXPlot scripts used to generate the images in this document are included in the accompanying file archive and may be modified to generate customised astrolabes. For example, to produce an astrolabe with your own choice of saints' days or birthdays on the back of the mother, the file `RawData/Saints-Days.dat` should be modified. A `Makefile` is included which rebuilds all of the image files shipped in the `astrolabe_parts` folder.

## References

- [1] Ford, D.C., *J. Brit. astr. Ass.*, 131(1), 33 (2012).
- [2] Chaucer, G., *Treatise on the Astrolabe*, in *The Riverside Chaucer*, ed. L.D. Benson (Boston, 1987)
- [3] Eisner, S., *J. Brit. astr. Ass.*, **86**(1), 18-29 (1975)
- [4] Eisner, S., *J. Brit. astr. Ass.*, **86**(2), 125-132 (1976a)
- [5] Eisner, S., *J. Brit. astr. Ass.*, **86**(3), 219-227 (1976b)

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<sup>4</sup><http://www.pyxplot.org.uk>



Figure 1: The back of the mother of the astrolabe.

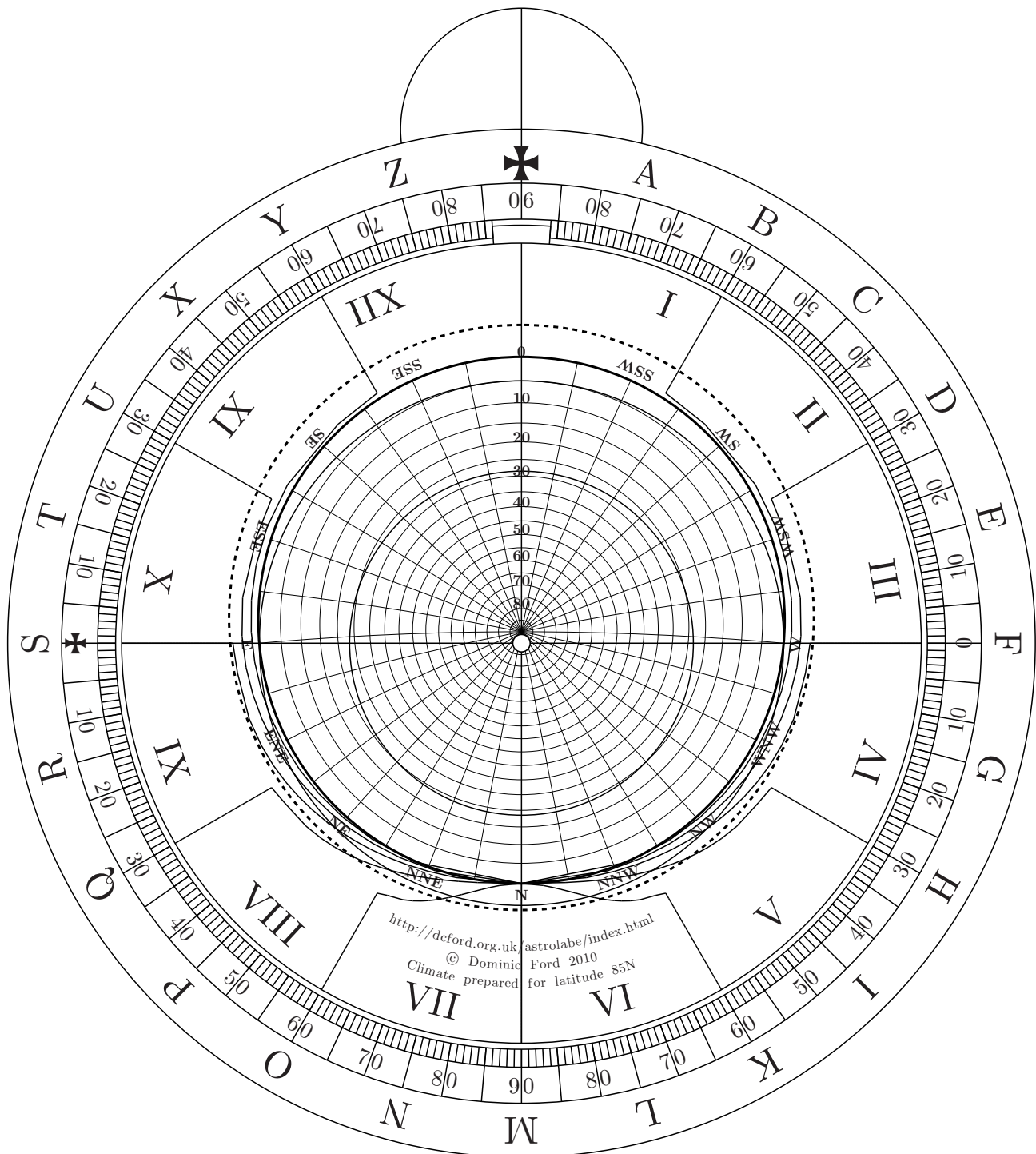


Figure 2: The front of the mother of the astrolabe, with combined climate. Should a climate for a different latitude be required, the accompanying file archive should be downloaded. This includes alternative versions of this document for any latitude on the Earth at 5° intervals.

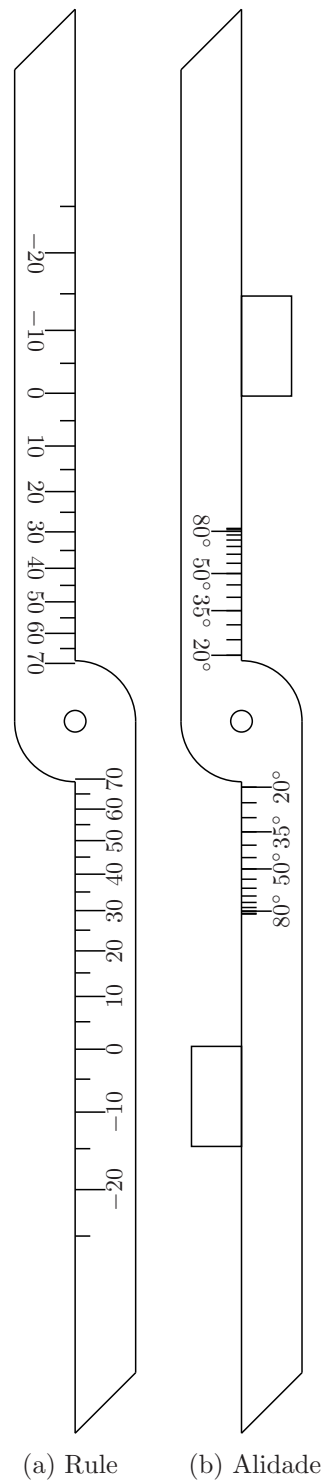


Figure 3: Left: The rule, which should be mounted on the front of the astrolabe. Right: The alidade, which should be mounted on the back of the astrolabe.

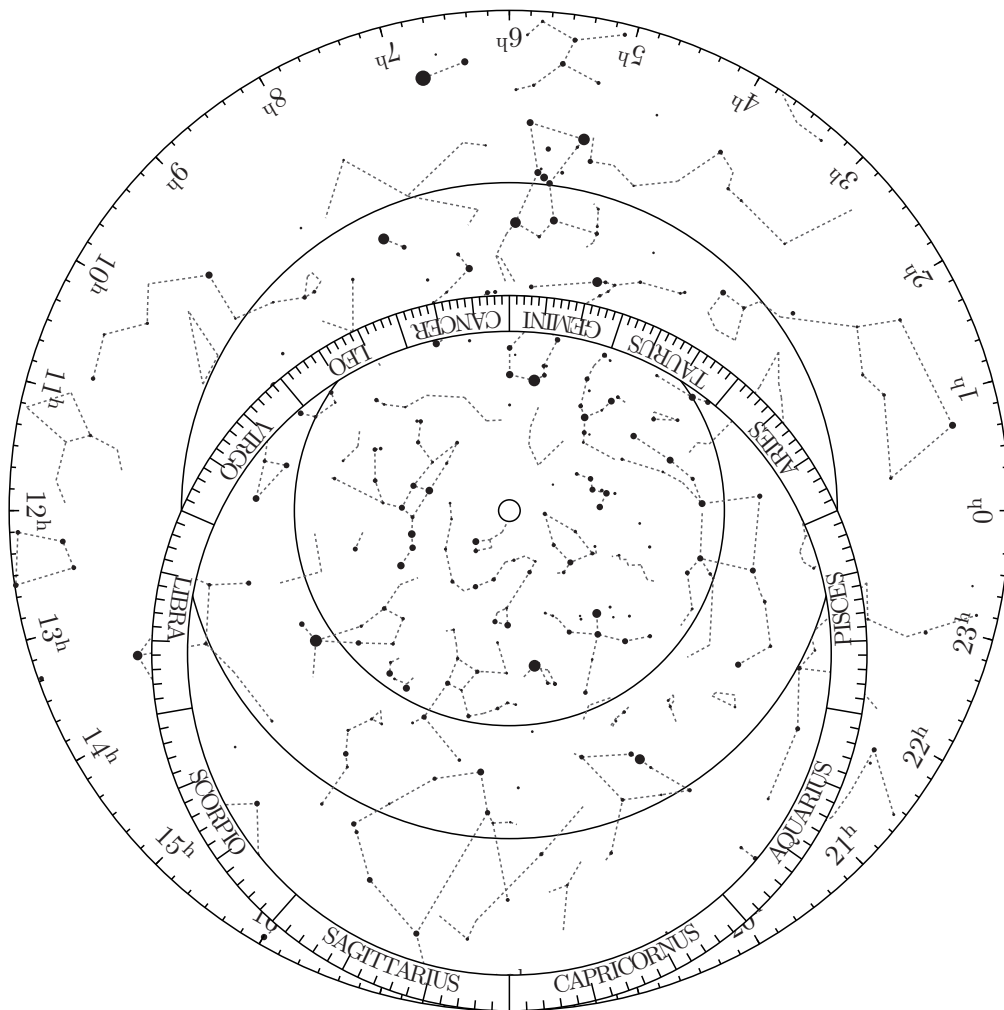


Figure 4: The rete of the astrolabe, showing the stars of the night sky. This should be printed onto a piece of transparent plastic; most stationers should be able to provide acetate sheets for use on overhead projectors, which are ideal for this purpose.