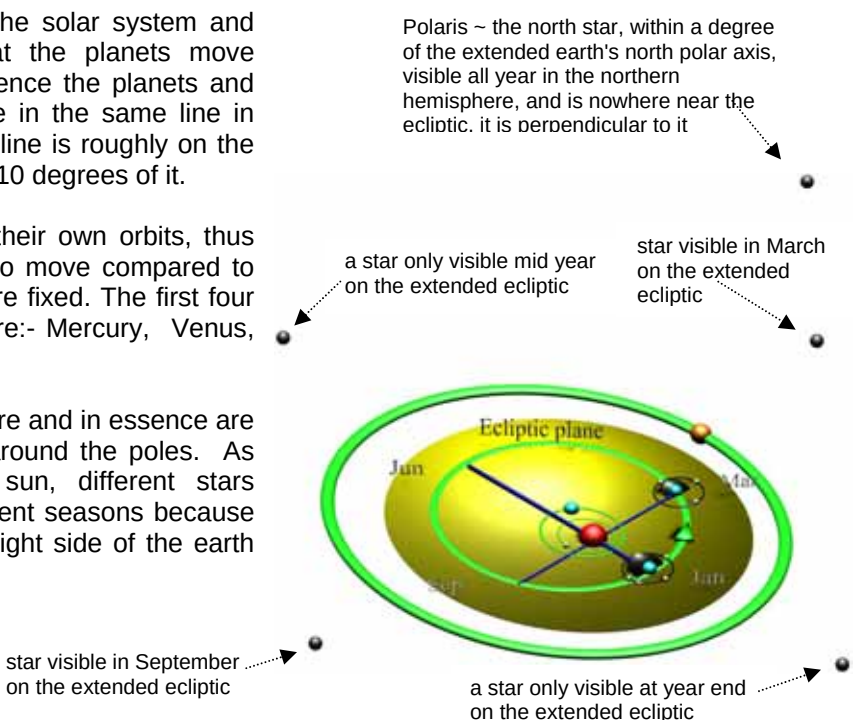
THE NOCTURNAL OR STAR CLOCK

Feb 2, 2006

The bigger picture of the solar system and it's planets shows that the planets move close to the ecliptic. Hence the planets and the moon generally are in the same line in the night sky. And that line is roughly on the ecliptic, or within about 10 degrees of it.

The planets move on their own orbits, thus their locations appear to move compared to the stars which are more fixed. The first four planets from the sun are:- Mercury, Venus, Earth, then Mars.

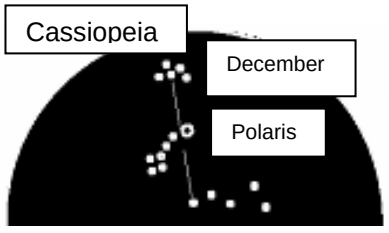
The stars are everywhere and in essence are fixed, merely rotating around the poles. As the earth orbits the sun, different stars become visible in different seasons because they are seen on the night side of the earth away from the sun.



The stars in the northern hemisphere seem to rotate around the north star, Polaris. They revolve 360 degrees in a night. And for any given time of night, they rotate 360 degrees in a year.

This all means that a 360 degree map of the stars can be drawn, and throughout the year some stars come into view, others leave. And similarly, in the evening, the stars for the season rotate 360 degrees in a day. Approximately. This means that should one know the month, then the time can be approximated, and this is the basis for a nocturnal dial. In fact, the chapter on determining true north showed such a star map. This section is not intended to be anything more than an overview of how a nocturnal time piece may be designed. Of course, the southern hemisphere has similar rules, however there is no Polaris, only an empty place which is however pointed to by some constellations. Some nocturnal dials use Ursa major and Ursa minor, some use Cassiopeia, this section uses Ursa Minor and Cassiopeia for good annual coverage.

All the stars visible for this date, or season … rotate daily and completion one rotation annually

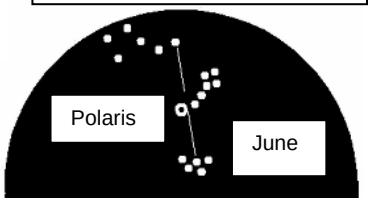


Stars rotate east to west above Polaris as the night passes – they rotate 360 degrees approximately in a 24 hour time frame.

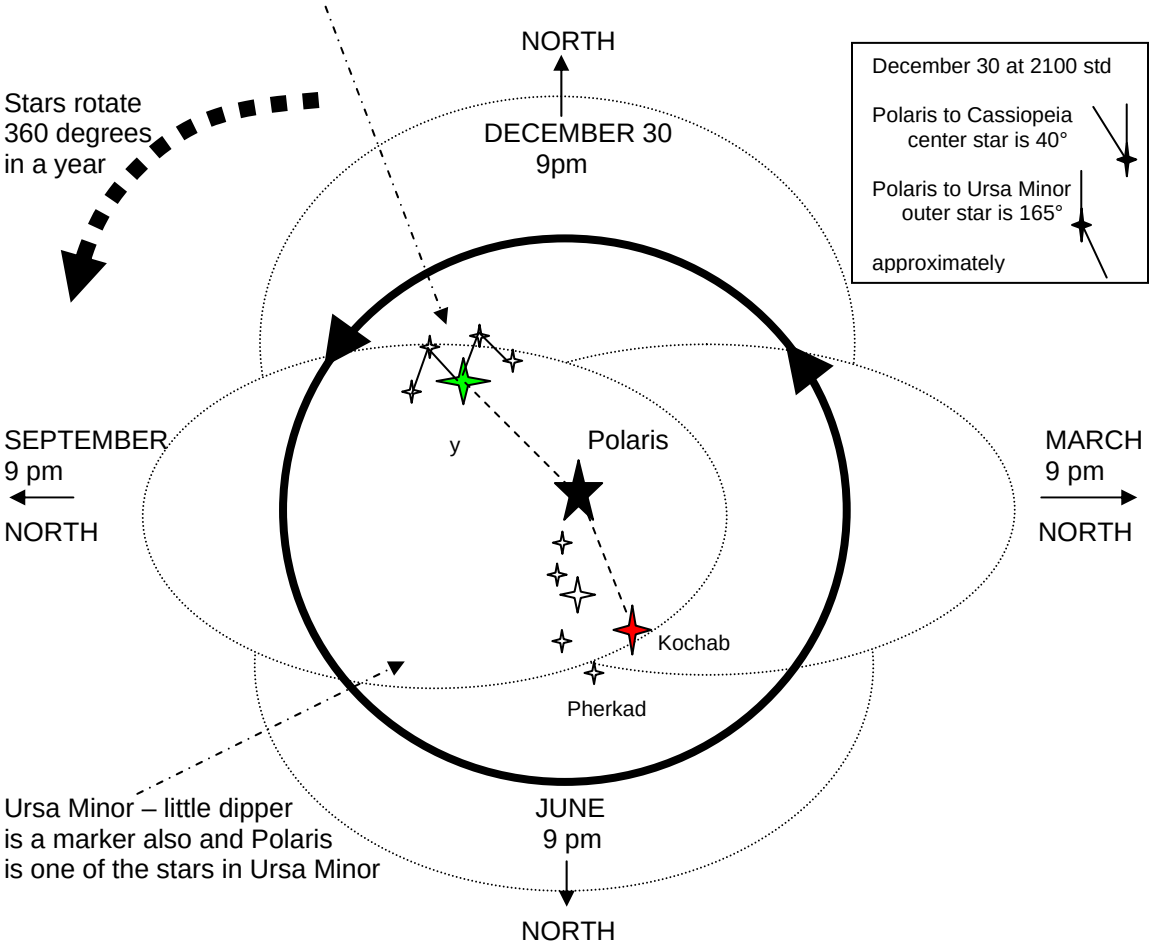
Stars rotate west to east below Polaris as the night passes.

LOOKING NORTH

The June view is rotated 180 degrees from the December view.



Cassiopeia – an upside down "W" in this pictorial is a marker for Polaris, the north star.



From any star map, such as in the book "Stars and Planets" by Ian Ridpath which has a monthly sky map with times for three differing dates, you select the stars you wish as markers. In this case the middle of the 5 stars in Cassiopeia and the last of the 7 stars in Ursa minor were chosen. They have an almost 155 degree relationship when connected to Polaris. Cassiopeia center is 40° from Polaris and Ursa Minor outer is 165° at 2100 on December 30, approximately.

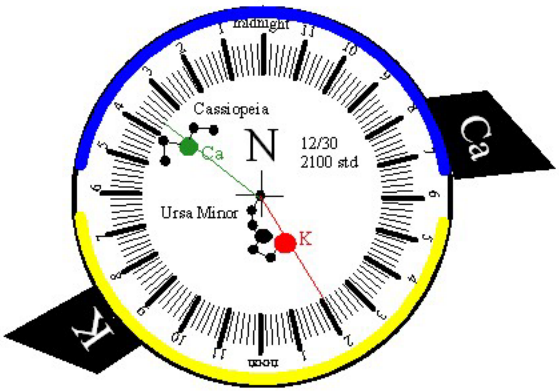
For Cassiopeia's central star being offset 40° from vertical at 2100 on December 30, an index is placed 40° back from 2100, which at 15°/hour is 2 hours 40 minutes, or at 1820. Similarly, for the last star in Ursa Minor, it is offset 165° from Polaris, which is 11 hours from 2100 but the other side, 0800. Thus a date plate can be drawn with an hour plate with 24 hours, and there will be an index at 6 pm for that Cassiopeia star and one at 8 am for that Ursa Minor star. The Cassiopeia 6 pm index was chosen because when 6 pm is placed on the date in question (December 30 e.g.), the cursor bar will indicate the correct standard time when using Cassiopeia. In other words the index is backed off as many hours as the reference star is ahead of the cursor, and vice versa. A star atlas is invaluable here. Some nocturnals use different hours for these same stars, this is not inconsistent, they are using a different date-wheel alignment, this uses December at the top, some use March . Similarly, some use different stars in Cassiopeia, and so on.

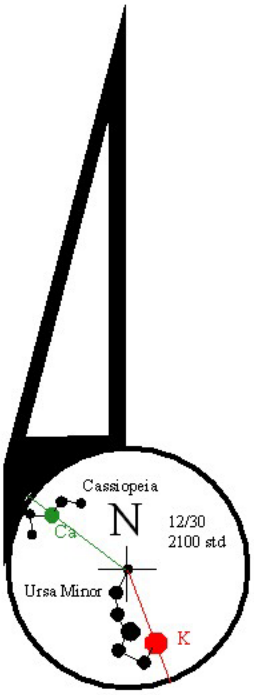
Set the desired star's cursor to the date. The dial center is held where Polaris is, some dials have a hole in the center attachment screw, relaxing the eyes to see double also works. Then tilt the dial to match the co-latitude because the stars revolve in a circle around Polaris, and Polaris is at latitude. This avoids distortion that would otherwise occur, especially at northern latitudes. The cursor is moved to the pointer star, and the standard time is read. Longitude corrections apply.

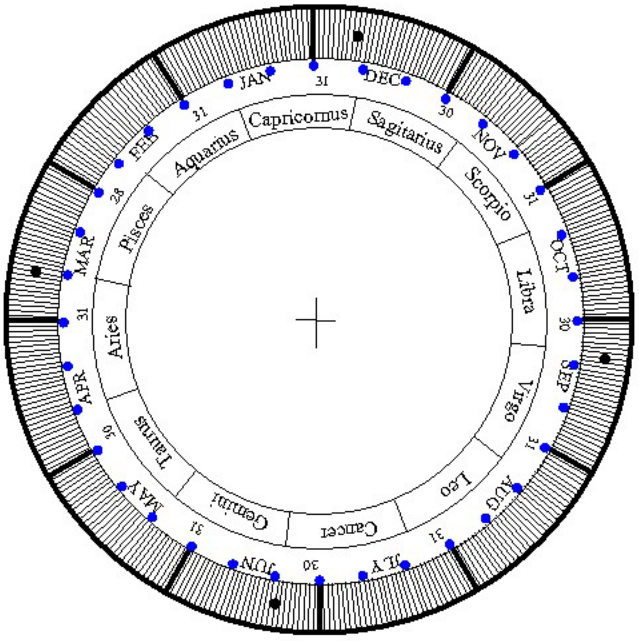
THE FINAL NOCTURNAL DIAL

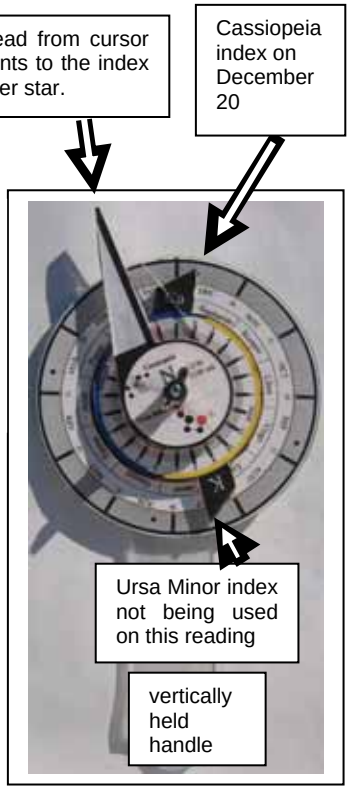
CASSIOPEA Nocturnal dial

Little Dipper Nocturnal dial









It would be beneficial to validate the hour points for the two indices K, and CA. Locate a star map, and prove they are correct. Also, develop another star index.

The nocturnal dial to the right is set for Cassiopeia, December 20th and shows a time of 8:30 pm standard time, to which the longitude correction is applied. The dial must be held vertical but tilted at co-latitude, because this is an hour angle dial.

This is not an all inclusive guide to nocturnal dials, rather a starting point from which to work, and that starting point is a working star clock or nocturnal dial.