http://www.siranah.de/html/sail008d.htm

Celestial Navigation: Special Techniques

Noon Sight

At local noon in an earth-bound position the Geographical Position (GP) of the Sun crosses the local meridian of this position. This event is called Culmination or Meridian Transit. At the moment of Culmination, the Azimuth of the Sun at this position is either 0° or 180° (North or South).

This means that a Line of Position for the Sun, taken at this time, will have constant Latitude (it will be in an East-West direction).

The navigator can take advantage of this event to check the Latitude of his position. The Longitude can also be calculated, although with lower accuracy.

These are the different steps for the Noon Sight procedure:

- Determine the approximate time of local noon: from the Nautical Almanac the exact time of local noon for the Prime Meridian of Greenwich can be retrieved. To obtain the time of local noon, the Estimated Longitude converted to time (1 hour corresponds to 15° longitude) is added (East Longitude) or subtracted (West Longitude) to the Greenwich local noon time.
  For the conversion of Longitude to time difference, the Time - Hour-Angle Conversion Table can be used.
- About one hour before local noon, the time and Altitude of the Sun (UT_1 and H1) is recorded. The Altitude of the Sun will be increasing further until Culmination.
- About 5 to 10 minutes before the estimated Culmination Time, the Sun is observed and the maximum Altitude (Hmax) is recorded. The time to start this observation, depends on how precise the Estimated Latitude is and also on the distance travelled since the first measurement.
  Around the moment of Culmination, the Sun will appear to "hang"

at a constant Altitude for about one or two minutes. No time record is made for this observation, only the Altitude Hmax is recorded. After Culmination, the Altitude of the Sun will start to decrease.

- Next, the sextant is reset exactly to the Altitude of the first measurement (H1).
- About one hour after local noon, the Sun's Altitude (using the same limb used for the first measurement) is observed with the sextant **while the altitude setting remains at H1**.
  The time at which this preset Altitude is reached is recorded as UT_2.
- The Culmination Time at the local position is the "average" of the two times recorded with equal Altitude (before and after culmination): UT_culmination = (UT_1 + UT_2) / 2
- From the measured local Culmination Time and the Culmination Time for the Prime Meridian of Greenwich found in the Nautical Almanac, the Longitude of the local position can be determined.
  The Latitude of the local position is determined from the maximum Altitude (Hmax) and the Declination of the Sun for the time of local Culmination (Nautical Almanac).
- Additionally, two Lines of Position can be obtained from the two measurements with equal Altitude (before and after culmination).

There is a Worksheet available containing the necessary record sections and calculation schemes for this Noon Sight technique.

If the position between the three measurements is changed, the UT_1 and UT_2 times will have to refer to the position at local noon!
Remember that 15° of Latitude corresponds to 1 hour of time or one minute-of-arc of Latitude corresponds to 4 seconds of time.
Alternatively the Time - Hour-Angle Conversion Tables and the Interpolation Tables for Celestial Navigation can be used for converting longitude into time and vice-versa.

Especially in tropical regions where the Altitude of the sun can reach 90° and the Lines of Position all end up running almost North-South, the determination of Latitude using the Noon Sight is very important.