

'There is no time without distance'...

No matter how far apart the longitudinal arch is the time ratio is the same. The longitude arch is large at the equator and small near the poles. All Angles latitude, longitude, declination, sextant angle and local hour angle originate from the center of the Earth.

I. Lines of longitude (meridians) are measured in time by degrees of arch.

1 hour (60 minutes) = 15° of Longitude Arch

4 minutes of time = 1° (60' or 60 minutes) of Longitude Arch

1 minutes of time = 15' of Longitude Arch

4 seconds of time = 1' of Longitude Arch

II. Lines of latitude (parallels) are measurements of distance by degrees of arch: 1Nm is 6087 feet which is 1 minute of arch. 60 minutes of arch is one (1°) degree of latitude arch from the equator 0° to 90° North or to the South Pole. Your ship's latitude position becomes the N or S elevated pole. Local Hour Angle (LHA) is measured from your ships longitude westward to the stars Greenwich Hour Angle (GHA) position. Greenwich, England is 0° prime meridian longitude. 180° East or West is the International Date Line.

The original Nautical Almanac was written by Neville Maskelyne, 5th Astronomer Royal of His Majesty's Navy. He hated John Harrison, the carpenter and clock-maker, who was trying to win the prize money awarded by an Act of Parliament for the most practical way to determine Longitude at sea.

With a proper time piece in hand, Longitude can be found by using the formula:

$$\text{LHA} = \pm \cos^{-1} [(\text{Hosin} - \sin L * \sin d) \div (\cos L * \cos d)]$$

Where L=Latitude +N or -S; Latitude is the elevated pole of the observer and d=Declination +N or - S is Latitude of the body.

Then the LHA plus or minus the stars GHA becomes your Longitude.