

**Establish Longitude:** 360° in 24 Hours, 15° per Hour, 1° every 4 minutes

**Equation of Time:** Nautical Almanac, Daily Pages

**Local Apparent Noon:** Lat & Long at Noon?

**Mer Pass:** Meridian Passage- When the Sun is Directly overhead



## Establish Longitude by the use of Time.

The use of time at sea has for years been the panacea of ocean navigators. The problems of obtaining Longitude have puzzled man from Astronomers to Engineers. It was the genius of a carpenter, John Harrison, from Yorkshire that made the measurement of Longitude at sea possible. John Harrison worked for most of his life to solve the problems of a reliable time piece for use at sea.

### To find your Longitude at Noon using TIME;

You will need an accurate clock set to UTC, you will also need the time of Mer Pass at your D.R.

Find the time of Mer Pass using the daily pages of the Nautical Almanac (NP136).

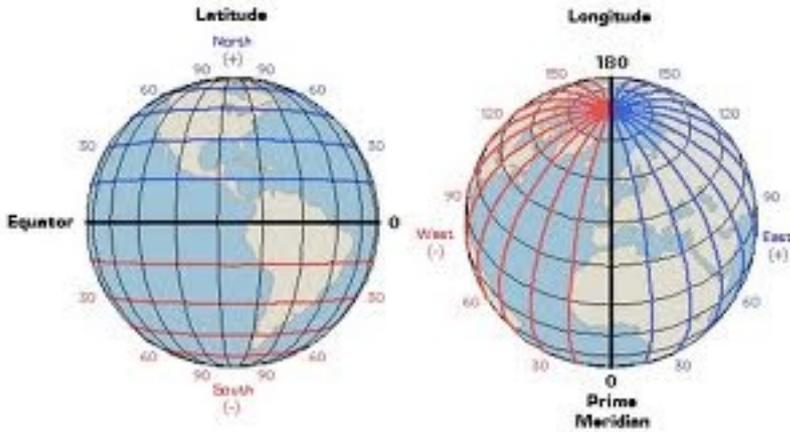
Establish the time of Mer Pass at your D.R. Position. The times for Mer Pass given in the Almanac are in UTC (what we used to call GMT). UTC is a 'Mean' Time, that is an average time, the average time that the Sun is overhead at Greenwich, London. Due to this being an average the actual time may vary by as much as 16 minutes.

To correct this variation we must apply the Equation of Time" figures to the time of Mer Pass give in the Almanac. If the Eqn of Time figure is in a shaded area we must subtract the value from the time of Mer Pass other wise add it to Mer Pass.

Once we have the times of Local Apparent Noon we may apply the corrected time of Mer Pass at Greenwich to it and find our Longitude via the 'Arc to Time' table.

### Longitude and John Harrison

- Longitude, Difficult at Sea
- £20,000 prize offered in 1741 (The Longitude Act)
- The winning solution must be "tried and found practicable and useful at sea"
- The first workable marine time keeper H1 in 1730
- 9 years later and harrison finishes H2
- H3 took Harrison a further 19 years
- 1755 - 59, H4 probably the most important time piece ever?
- H5 was delivered to the Royal Observatory in 1770
- Final Trial of the Harrison clocks was by Captain James Cook.
- Captain Cook referred to the clock as "Our trusty friend"



## LONGITUDE AND TIME

- The world rotates (spins) counter clockwise 360° in 24 hours.  
 $360^\circ / 24 \text{ hours} = 15^\circ \text{ per hour}$
- The world has 24 time zones, each 15° apart.

**THERE IS A 1 HOUR TIME DIFFERENCE FOR EVERY 15° OF LONGITUDE**

From the Daily Pages of the Nautical Almanac find the time of “Mer Pass” at Greenwich (bottom left corner of the facing page)  
 This time is given in UT(C)

The Eqn of Time gives the correction to the time Mer Pass for the date in question. If the value is in a shaded area then the value should be subtracted, otherwise the value should be added.

This gives you the corrected time of Mer Pass at Greenwich.  
 Move this data to the next but one box.

Having taken your “Noon Sight” of the Sun you will have noted the exact time of Local Apparent Noon (LAN), enter this into the next box.

Now Add or Subtract the corrected time of Mer Pass at Greenwich to / from this .

The difference between to two tome will be your Longitude once you have applied Arc to Time.

You now have your Longitude delivered by Time.

How Fabulous is that?

<b>Mer. Pass.</b>	H ‘ “
<b>Greenwich</b>	→
<b>Eqn. Of Time + or - If Eqn. Of Time is shaded then _</b>	H ‘ “
<b>Corrected Time of Mer. Pass. At Greenwich</b>	H ‘ “ ←
<b>Time of Local Apparent Noon (LAN)</b>	H ‘ “
<b>Subtract if WEST. Add if EAST</b>	H ‘ “
<b>Arc to Time</b>	H ‘ “
<b>Longitude (East or West)</b>	° ‘ .