http://www.subsim.com/radioroom/showthread.php?t=206103

# [TEC] Real navigation Tutorials

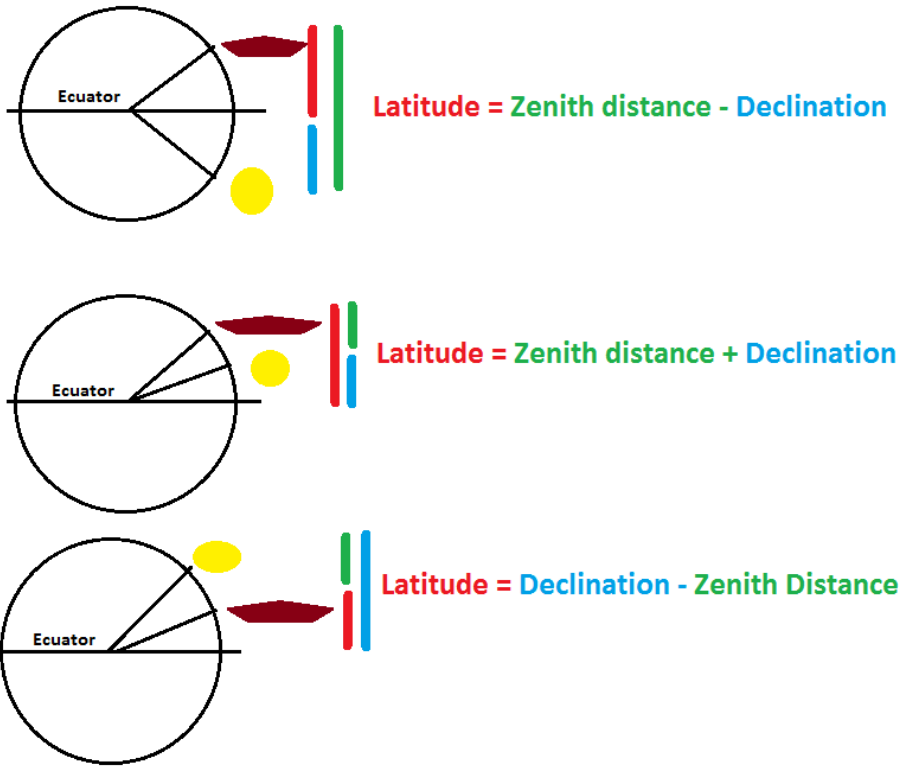
in this thread i will try to show u how to fix your position on the map without using the navigator From the game with **TDW's UI and MagUI** when DrJones will release the new version of the **MagUI**.
The math and others calculation are same with both UI's but there are difrent sextant.
**Remember**

we don't have a real sextant to calculate the sextant index error and make some other correction so we can be 100% accurate

**First Tutorial:**

## 1. Noon Latitude

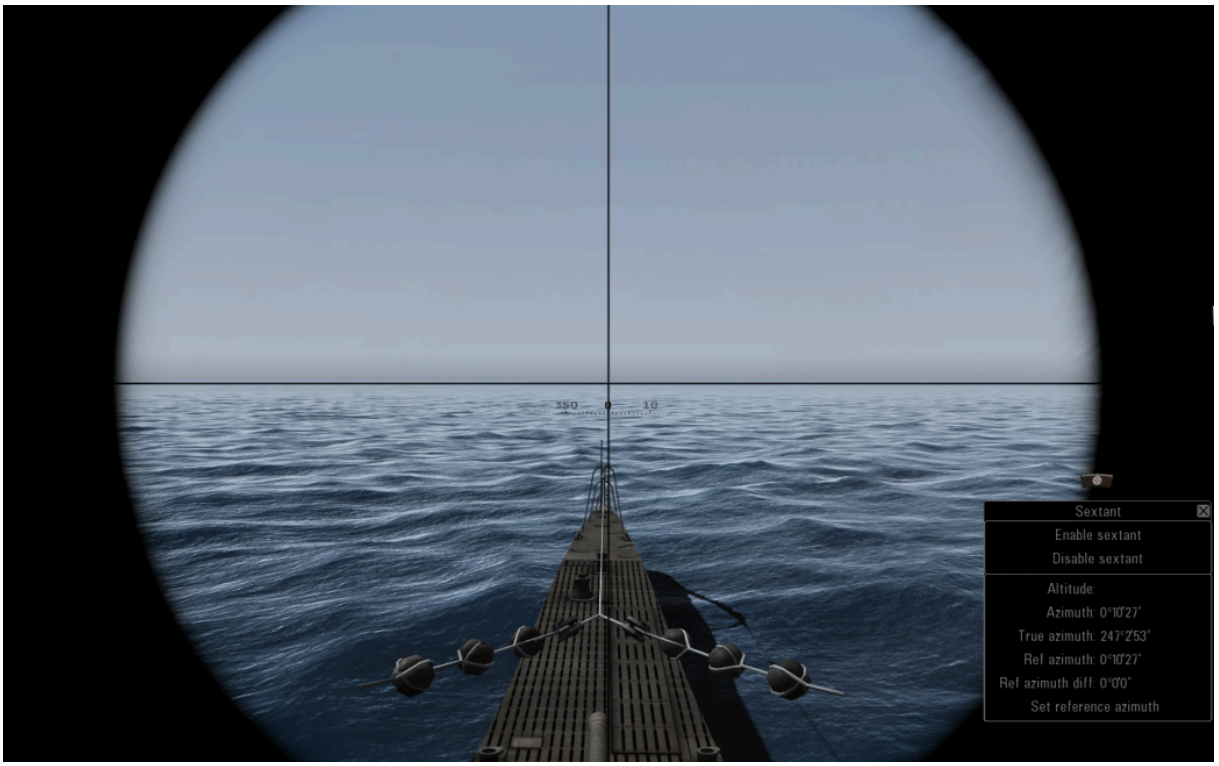
"Local Noon" is the exact time when the Sun reaches its highest point in the sky. This is also the time that it crosses the vertical, imaginary line, that astronomers call the "meridian".
This is a very simple method enabling the observer to determine latitude by measuring the maximum altitude of the sun (or any other object).
No accurate time measurement is required. The altitude of the sun passes through a flat maximum approximately(see noon longitude) at the moment of upper meridian passage (local apparent noon, LAN) when the
GP of the sun has the same longitude as the observer and is either north or south of him, depending on the declination of the sun and observer's geographic latitude. The observer's latitude is easily calculated by forming the algebraic sum or
difference of the declination and observed zenith distance **z** (90°-Ho) of the sun, depending on whether the sun is north or south of the observer.



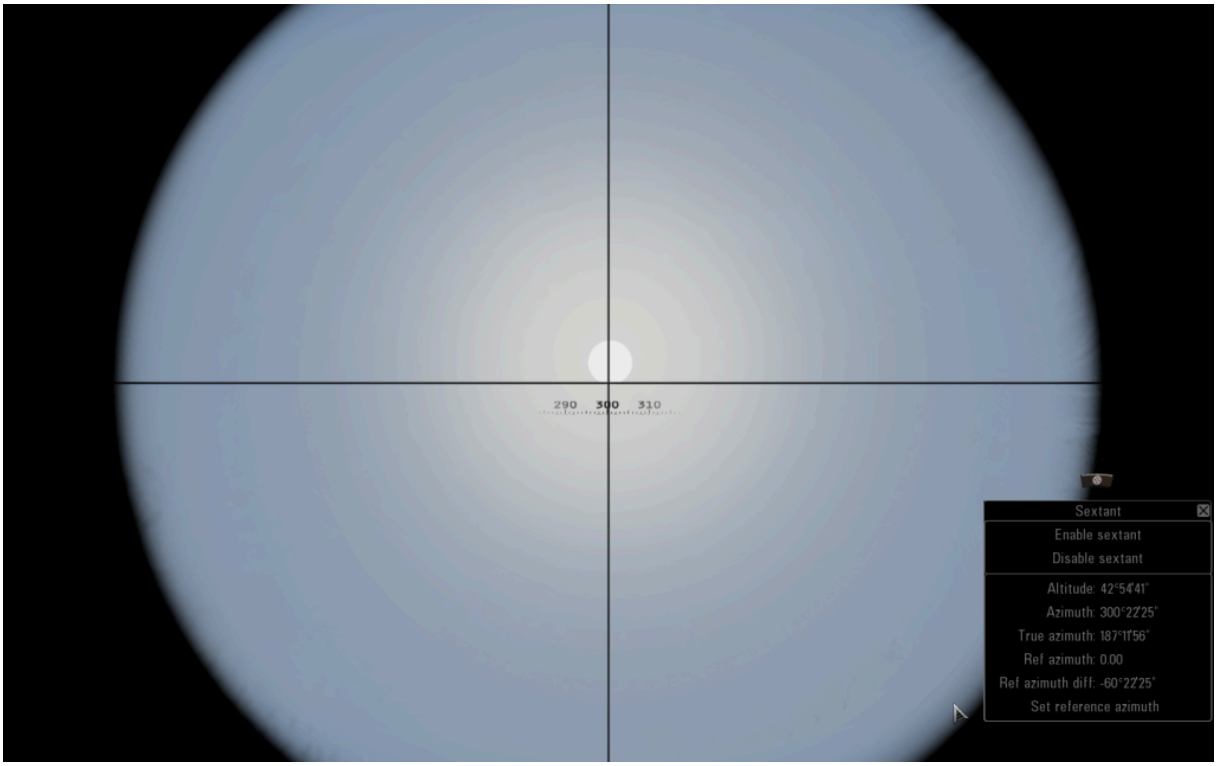
now let's see this in game all what wee need is the alamanac from 1939 - 1945
an online almanac can be found here Click

to measure the sun angle click on the navigator the sextant and u will see the screen


after that click on Enable Sextant and align the te sextant to the water line ( horizont )




now search for the sun and measure the angle of the sun




as we see we have the sun at 42.54 degree no let's do some math to find the latitude
first we need to find **Zenith Distance = 90** - 42.54 we convert the **90 degree to 89.60** - 42.54 = **47.06** is the **Zenith Distance**
now let's see the sun declination at 1939. sept. 01 12:00 PM

Sun declination is N 8. 31 so now let's see we are in the same hemisphere ( N ) but the sun is belove us so we apply the
**Latitude = Zenith Distance + Declination**
**Latitude = 47.06 + 8.31**
**Latitude = 55.37**

now let's what the navigator say about our latitude


whoop **55.37 N** pretty nice ha ?

if u find your latitude then u can find your way home or your destination at sea

when **DrJones** will finis the **MagUI** new version i will show u also with that UI mod.

**PS.**

**if somebody have an 1939 - 1945 .PDF almanac and can share it with use i really apreciate it thx.**

## Second Tutorial

## Remember

we don't have a real sextant to calculate the sextant index error and make some other correction so we can be 100% accurate

Let's start with measuring the sun angle


Now we do the math to find the Lat.

**Zenith distance** = 89.6 – 42.51 **= 47.09**

**Lat. = Zenith Distance + Declination**

**Lat. = 47.09 + 8.31 = 55.40N**

| | A | B | C |
|---|---|---|---|
| 1 | Friday | 1 September 1939 | DD/MM/YY |
| 2 | Hour | 12 | GMT / UCT |
| 3 | Minutes | 0 | |
| 4 | Seconds | 0 | |
| 5 | GHA | 359° 57.20' | |
| 6 | Declination | 8° 31' North | SAME |
| 7 | Assumed Latitude° | 55N | Degrees N or S |
| 8 | Assumed Longitude° | 20E | Degrees E or W |
| 9 | Assumed Longitude' | 2.80 | mm.dd |
| 10 | LHA | 20° 00.00' | |
| 11 | Sextant Altitude° | 42 | Degrees |
| 12 | Sextant minutes' | 51.00 | mm.ddd |
| 13 | Index error mm.ddd | 0.00 | −ON the arc +OFF the arc |
| 14 | Limb observed | 0 | 1 Lower −1 Upper 0 Centre |
| 15 | Height of eye (m) | 2.00 | Enter 0 for Artificial Horizon |
| 16 | Temperature | 0 | DegC |
| 17 | Barometric Pressure | 0 | mBar |
| 18 | Calculated Altitude° Hc | 40° 52.27' | |
| 19 | Observed Altitude° Ho | 42° 48.62' | Hc < Ho = Towards |
| 20 | **Azimuth** | **206.6°** | **True** |
| 21 | **Intercept** | **116.3 Miles** | **Towards** |

input the date in this case is 1 sept. 1939

Input the hour in this case is 12:00

Input the minutes in this case 0

Here we will have the sun declination in this chase 8.31 North

Input the Assumed Latitude in this case is 55N cos we have made a DR

Input the Assumed Longitude in this case is 20E same as above

Input the sextant angle in this case is 42

Input the sextan minutes in this case is 51.00

Input here the height of the eye i put here 2m

u can download this spreadsheet from here Download

Each degree on the game map is 120 km.


Now let's see how to market on the map without the navigator help
Each degree on the game map is 120 km.
We do again some math 120 : 60 = 2km
We know that assumed Lat. is 55 but how we find that 40 simple 40 x 2 = 80km
**( when u draw from the bottom to the top u multiply and when u draw it from the top to the bottom u divide )**
Let's draw that 80 km on the map.


Now let's find the Long
Open that excel work sheet and look at GHA there is 259.57 and to LHA where is 20.00
359.57 – 20 = 339.57 – 360 = -20.43
Long = 20.43E
We know that we are at Long. 20E now 43:2 = 26.5km let's draw it on the map
**( When u draw it from the west to east left side to right side u multiply and when u draw it from east to the west right to the left u divide)**


Now let's see what the navigator say as u see the navigator calculation is

Lat. 55.41N and Long. 20.47E so we are not far as i said we can't be 100% accurate cos we don't know the sextant index error and dip and other correction


**this can be my error or the game error so we can not chek where is the u-boat to see wich one is correct but i think that is pretty good and give more realism**

**to the game.**

I think that the navigator can be removed from the game if somebody wanna play hardcore and mark his position on the Map :P
on bad weather and fogy day u are really lost at the sea if u play hardcore**.**