

Open CPN Celestial Plugin Calculation Issues
 Open CPN version 2.4.41.
 Tested in Windows 10, and MAC OS.

Problem Calculation of Altitude (Hc) which is shown in the “Find Celestial Body” form is off by 3 - 6 nm. The goal in Celestial Navigation is that your EP or Fix be less than 3 nm. I will show 3 examples. Open CPN’s Hc (Find Celestial Body form) is wrong by 3-8 nm. It leads to a position, 8 nm away from EP or Fix.

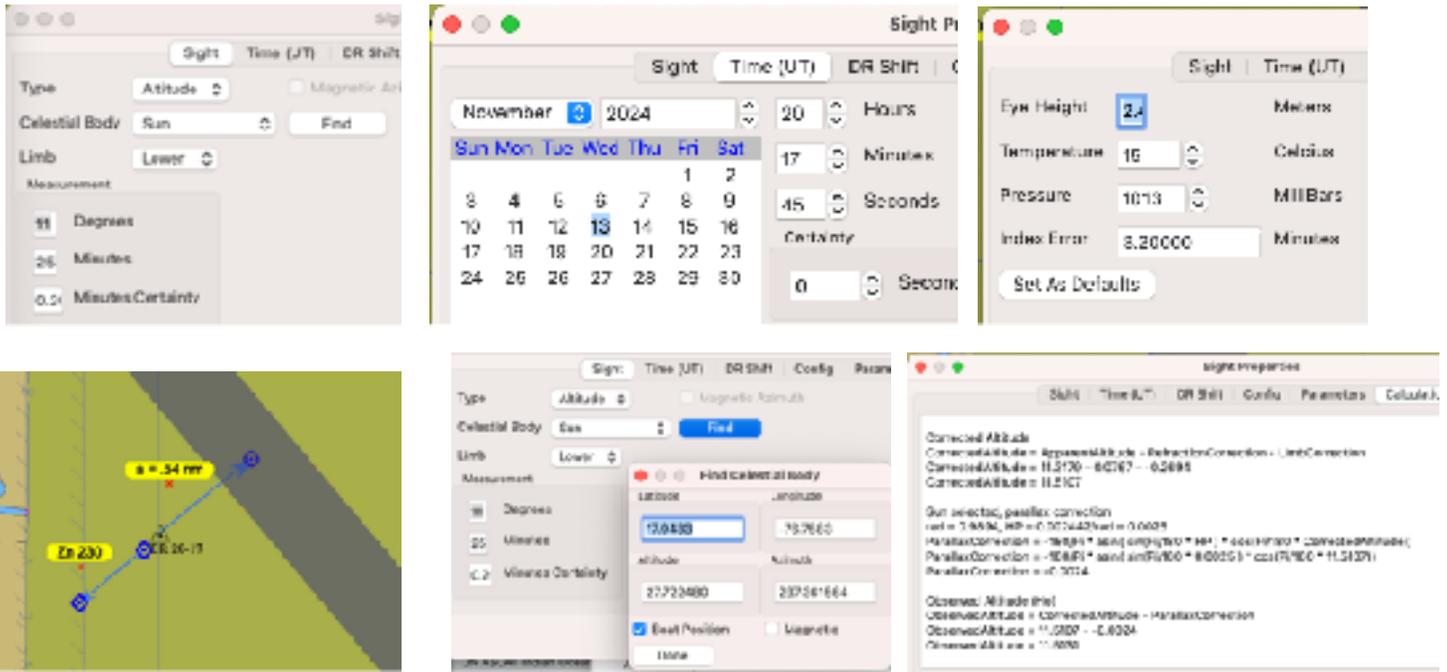
Example 1 Sun LL.

Nov 13, 2024 at UT 20-17-45. On this date, the Sun LL GHA, Dec, and LHA exactly the same for Nautical Almanac tables and Open CPN calculation.

	Nautical Almanac Table and manual calculation	Open CPN	
Hs (sight)	11°25.0'	Same	
Temp	15° C	Same	
Pressure	1013 mb	Same	
Height of Eye	2.4 m	Same	
IE	3.2 ‘	Same	
DR Location	N 45° ; W76°	Same	
Main Correction	11.6 ‘	11.8 ‘	Note - I didn’t add Sun Parallax in NA manual calculation. This accounts for most of the difference. It won’t affect Hc or Zn calculation
Ho	11° 30.6’	11° 30.8’ (11.5131°)	Ho difference due to Main Correction. It won’t affect Hc or Zn calculation
GHA of Sun LL	128° 20.5’	Same	
Declination	S 18° 15.2’	Same	
LHA	52° 20.5’	Probably the same	
Hc (Altitude from Find Bodies form)	11° 31.5’ (11.52451)	11.637293 (11° 38.2’)	DIFFERENCE 6.7 NM
Zn	230.1	230.275	Close enough for navigating.
Intercept (Hc - Ho)	Hc - Ho = 0.9nm Away	Approx 0.6nm Away measuring the LOP chart Intercept calculated is 7.4 nm away. (11° 38.2 minus 11° 30.8’)	The intercept charted is inconsistent with intercept calculated by Hc-Ho.

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Almanac Data For Sun
GeographicalPosition (lat, lon) = -19.2637 -128.2100
GHA-AST = 357 52.4'
SHA = 130 28.1'
GHA = 128 20.5'
Dec = S 18 15.2'
SD = 16.2'
HP = 0.1'
  
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Example 2: Venus.

DR 17 degrees 56.6 N; 76 degrees 45.5 W. Ht of eye 4.9M. IE +0.5
 Date: 28 Dec 2024; UT 22-45-10
 Temp 13 C, Pressure 1013 mb
 Hs: 42 degrees 19.4'

	Nautical Almanac	Open CPN	
GHA of Body	111° 54.9'	111° 55.0'	Close enough
Ho	42° 14.1'	42°14.0'	Close enough
Hc (FIND Celestial Body form)	42°15.5'	42°18.8'	OCPN off by 3.3' or 3.3 nm.
a (intercept)	1.4' or 1.4 nm	1.3' or 1.3 nm (measuring the LOP)	Close enough
Zn	229	228.94	Close enough

Example 3: Regulus. In this example, I am using a sight reduction example found in the 2025 Nautical Almanac, page 283.

The example starts with the bottom line Ho, so I made up the Sextant Sight, Sight parameters so that the Ho Open CPN calculates matches the example's Ho.

Date: July 4, 2025 UT 20:39:23 (page 283)
 Latitude: 31.9062 N, Longitude 14.9225 W (page 282)
 Hs:28 degrees 58.8 minutes (HOE 4.9m, 9C, 1018mb, IE 0.5)

Page 283	Nautical Almanac	Open CPN	
Ho	26.8753 or 26°52.5	26.8753 or 26°52.5	

GHA of Regulus	80.5232 or 80°31.4	80°31.2'	Not complaining about .2 minutes.
GHA of Aries	232°57.2	Same	
SHA of Regulus	207° 34.2	207° 34.0	SHA difference is due to GHA of the Body
Azimuth (Zn)	267.4653 (267°27.9')	267.567341 (267° 34.0')	Open CPN off by 6.1'. Azimuth (Bearing) for both is 267° whole degrees close enough.
Hc (Altitude)	26.8522 (26° 51.1')	26.747086 (26° 44.8')	Open CPN off by 6.3'
Intercept (Hc - Ho)	-1.4 nm (towards)	-7.7 nm (towards)	Open CPN Altitude is wrong. LOP charted line is 1.3 NM towards.