

Celestial Navigation - Intercept Method

In astronomical navigation, the intercept method, also known as Marcq St. Hilaire method, is a method of calculating an observer's position on Earth (geopositioning). It was originally called the azimuth intercept method because the process involves drawing a line which intercepts the azimuth line. This name was shortened to intercept method and the intercept distance was shortened to 'intercept'.

Helpful links and references:

[2024 Nautical Almanac](#), [Night Sky over San Antonio](#), [UTC time](#), [time zone map](#), [Sight Reduction - Wikipedia](#), [Intercept method](#)

INSTRUCTIONS to derive computed altitude Hc:

Use the UTC of the moment when the altitude was measured with the sextant, nautical almanac, DR lat., and DR long. to derive the altitude Hc of the observed body based on where you think you are.

Determine Universal Coordinated Time (UTC) at the moment of sextant sighting.

Use UTC to locate GHA, declination, and SHA in the [The Online Nautical Almanac](#) or [2024 Nautical Almanac](#) for the moment you take your sextant sighting.

GHA - Global/Greenwich Hour Angle of observed body

decl - declination of observed body

SHA - sidereal hour angle of observed star

Enter your estimated DR latitude and longitude.

The lat/lon of San Antonio is shown.

Click button to derive computed altitude Hc.

Take sextant sighting and derive Observed altitude Ho.

INSTRUCTIONS to derive observed altitude Ho:

What was the actual observed altitude Ho you measured with the sextant?

Enter the index error of sextant.

Enter the height of eye above sea level.

Enter the sextant altitude measurement.

Parallax is in the [2024 Nautical Almanac](#).

Semi-diameter is in the [2024 Nautical Almanac](#).

Compare Hc to Ho and convert difference (in minutes of a degree) to nautical miles toward or away

from the observed body.
1' degree minute = 1 nautical mile.

How to test computed altitude Hc:

Use the night sky map at timeanddate.com to locate a body

(Moon, planet, or star) in the San Antonio area.

Note the time and altitude for the body from the website.

Select the CST (Dallas) time zone from the tzone pulldown.

Click the UTC Time button to calculate the current UTC time.

Use the time to obtain GHA, declination [& SHA] from [The Online Nautical Almanac](#).

Enter the GHA, declination [& SHA] almanac data for the

current and next UTC hour into the web form.

Use the provided DR lat. and long. (29.424349 N, 98.491142 W) for San Antonio, TX.

Click the Calc Hc button to compute computed altitude Hc.

Compare your Hc findings with the altitude listed at www.TimeandDate.com [Night Sky over San Antonio](#) web page.

Refresh the page to make sure the altitude is accurate.

body: Sun ▼ limb: upper ▼ (Sun / Moon) name: Sun ▼

UTC Time scroll dn

yyyy: mm: dd: hh: mi: ss:

Observer's Time Zone: UTC-6 - Dallas (CST) ▼ normal time.

Verify UTC at: [Current UTC time](#) or [WORLD TIME ZONE MAP](#)

Computed Altitude (Hc)

Calculate altitude based on nautical almanac

Use [The Online Nautical Almanac](#) to fill in the data below

based on the UTC time the sextant sight was taken.

Hc INPUT

Enter Global Hour Angle (GHA)

GHA: (deg/min) hour ---
GHA: (deg/min) next hour

Observed Altitude (Ho)

Calculate altitude based on sextant observation

Ho INPUT

Enter Sextant Data

index error (ie):	0 <input type="text"/>	(-ie/+ie deg-mins -on/+off the arc)
height of eye (he):	5.4 <input type="text"/>	<input type="radio"/> feet <input checked="" type="radio"/> meters

Note: Use GHA Aries (listed next to planets) for stars.
GHA (star) = GHA(Aries) + SHA(star)

Enter Declination

decl: (deg/min) hour ---
decl: (deg/min) next hour*
☐ north (+) ☐ south (-)
* leave blank for star sightings

Enter Sidereal Hour Angle (SHA)
(stars only)

SHA: (deg/min)

Enter Dead Reckoning latitude and longitude
(San Antonio lat/long displayed)

DR lat: 29.424349 (deg/min)
☒ north ☐ south
DR long: 98.491142 (deg/min)
☐ east ☒ west

Calc Hc scroll up

Night Sky over San Antonio

Hc OUTPUT	
hh_part:	---
GHA diff:	---
GHA real:	---
decl: diff:	---
decl real:	---
total gha:	---
lha:	---
raw lha:	---
sin(decl):	---
cos(decl)*cos(LHA):	---
hc:	---
hc_deg:	---
x:	---

sextant altitude (hs):	<input type="text"/> 3.3367	deg	<input type="text"/>	mins
Enter Environment Data				
temp (t):	<input type="text"/> -3	+/- degrees Celcius		
pressure (p):	<input type="text"/> 982	millibars		
Enter parallax and semidiameter data located in The Online Nautical Almanac (applies to Sun, Moon, Venus and Mars)				
parallax (hp):	<input type="text"/> 0.0024	(deg-mins req'd for Moon/planet)		
semi-diameter (sd):	<input type="text"/> 15.8	(deg-mins req'd for Moon/Sun)		

Calc Ho scroll dn

Calc Ho scroll up

Ho OUTPUT	
dip:	0.06808704722632639
hs:	3.3367
ic:	0
ha:	3.268612952773674
r:	0.22976462834511266
hp:	0.0024
pa:	0.0023960956819439314
sd:	-0.2633333333333333
Compare Hc degrees to Ho degrees. Convert degrees to nautical miles by multiplying by 60.	
ho_deg:	2.7779110867771717
p:	undefined

a:	---
a_deg:	---
z:	---
LEFT	RIGHT

scroll up

nmi:	undefined
t/a:	Away
LEFT	RIGHT

Coast Guard Academy - Computed Greater Away

Computed sight reduction based on formulas from:
NAUTICAL ALMANAC 2021 COMMERCIAL EDITION,
 pp 277-283
 Paradise Cay Publications, Inc.
www.paracay.com
 ISBN: 9781951116255