

Prepare the following information:

- Ships Gyro Heading and Magnetic Heading
- Gyrocompass and magnetic bearing of celestial body (i.e. sun). Use gyrocompass repeater with azimuth circle to get the gyro compass bearing. *(Note: After getting the gyro bearing, you can easily get the magnetic bearing by applying the difference between gyro and magnetic heading)*
- The latitude and longitude of the ship (GPS)
- Time in UTC
- Variation of the area (from chart or you can get it from GPS unit also)
- Scientific calculator

Get the latest Nautical Almanac

- Take note the value GHA (based on the current date and hour)
- Take note the declination value (Dec)
- d' correction (can be found at the bottom of the document)
- Increments value in the increments table (based on the minutes of the time in UTC)
- d' correction equivalent value

Calculation

- If, Long East, $LHA = GHA + LONG$ (- 360° as necessary)
- If, Long West, $LHA = GHA - LONG$ (+ 360° as necessary)
- **p = LHA**; ($360-LHA$, if LHA is more than 180°)

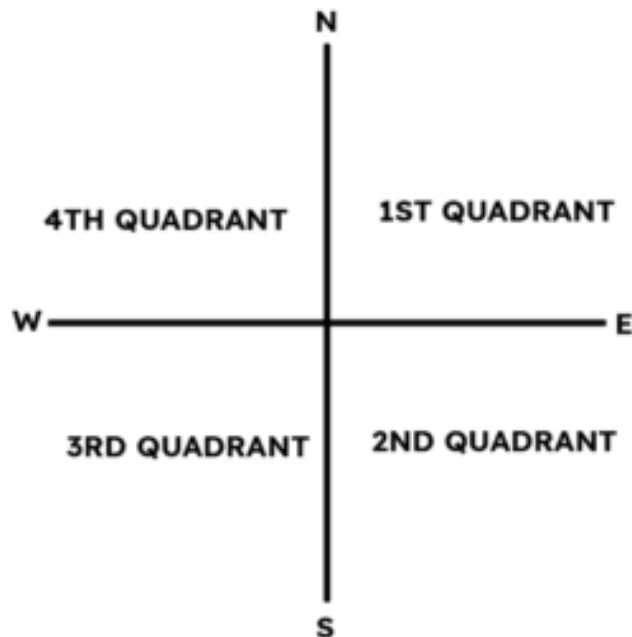
A,B,and C values

- **A=tan Latitude / tan p**; (same name with Latitude only if LHA is between 90-270°, otherwise, it will be opposite name with latitude.)
- **B = sin declination / tan p**; (same name as declination)
- **C= A+- B**; (**add** if A and B are same name, **subtract** if different name; and name will follow to the bigger values).

Find the True Azimuth value

Find first the azimuth angle.

- **tan azimuth angle (Zn) = 1 / (C x cos latitude)**; (Naming will depend on what quadrant is the value of your gyro bearing. For example, if your gyro bearing is 125° which is in the second quadrant and your azimuth angle is 30°, then the naming will look like this, S30E. Refer to the below diagram.



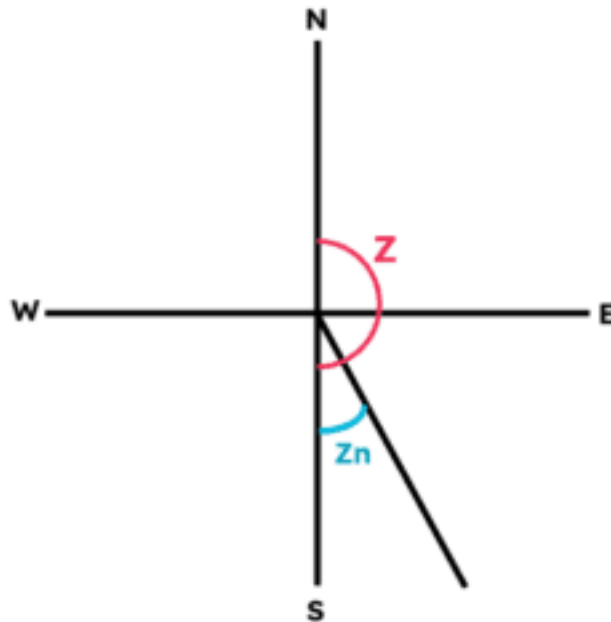
1st quadrant : N _E

2nd quadrant : S _E

3rd quadrant : S _W

4th quadrant : N _W

Let say if the $Z_n = S30^\circ E$, then the diagram will look like this.



Then, in this example the **True Azimuth (Z) = 150°** .

Compare True Azimuth (Z) to Gyro bearing to get the Gyro Error

Gyro Error = Z-Gyro bearing; (Name **low** if gyro bearing is less than True azimuth and **high** if gyro bearing is greater than the true azimuth.)

Compare the True azimuth to Magnetic bearing to get the Magnetic Error(ME)

- **ME = True azimuth – Magnetic bearing ;** (Name the error **W** if Magnetic bearing is more than true azimuth, otherwise it is name **E**.)

Compare Magnetic error to Variation to get the Deviation

- **Make the name of variation opposite** (*i.e. if it is 5°W make it 5°E*)
- **Deviation = Magnetic Error +- Variation;** (*add if same name or subtract if different name, then deviation name will be the bigger value.*)

COMPASS ERROR and DEVIATION CALCULATION SHEET

Date: _____

Time in UTC: _____

Latitude: _____

Longitude: _____

Gyro Heading: _____

Magnetic Heading: _____

Gyro Bearing : _____

Magnetic Bearing: _____

GHA : _____

Declination: _____

Increments: _____

d' correction: _____

GHA (corrected) : _____

Declination(corrected): _____

d' : _____

GHA (corrected) : _____

A : _____

Longitude: _____

B: _____

LHA: _____

C: _____

p: _____

Azimuth angle (Zn) : _____

True Azimuth : _____

Gyro Bearing : _____

Magnetic Bearing: _____

True Azimuth : _____

True Azimuth : _____

Gyro Error: _____

Magnetic Error: _____

Magnetic Error: _____

Variation: _____

Deviation: _____