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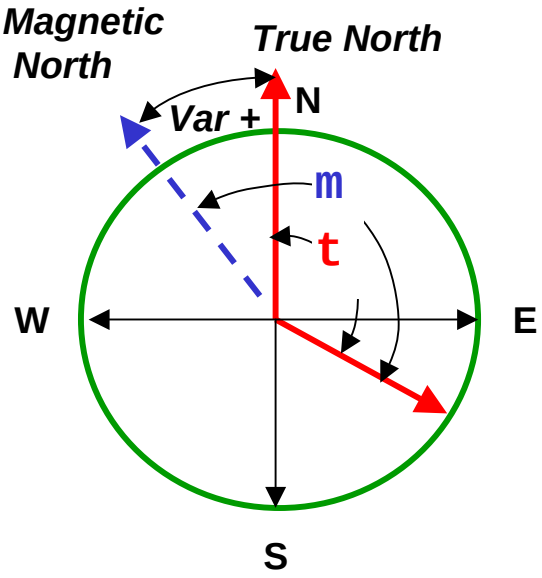
COMPASS ERRORS – Variation and Deviation

Variation

Variation is due to the differing positions of the Geographic North Pole and the Magnetic North Pole. The compass points to the Magnetic Pole, but all bearings on a chart relate to True North.

Around UK coasts Variation is around 4° West to 7° West. In other parts of the world it can reach more than 50° (East or West).



In this case the Magnetic Bearing ***m*** is greater than the True Bearing **t.**
(West Variation)

Because the Magnetic North Pole moves the variation changes from year to year. The compass rose on the chart gives the annual change, around 7' East per year.

Although all bearings and lines on a chart will be True directions, the bearings you obtain from a hand bearing compass are Magnetic. Similarly the bearing for a course to sail will be a Magnetic course.

We therefore have to convert our True bearings into Magnetic and vice versa.

A simple way to remember the conversion is that whenever the Variation is West, the Magnetic bearing will be greater than True (see diagram above), ie you have to add West Variation to the True bearing. If Variation is East, you subtract.

"Variation West, Magnetic Best"

"Variation East, Magnetic Least"

Deviation

Boats themselves can also affect compasses due to their construction, steel engines, keel, ferro-magnetism, electromagnetism, (loudspeakers, mobile phones, hand held VHF). This effect is called Deviation, and can vary with the heading of the boat. You

can plot a graph of the effect of change in boat heading on the Deviation, and apply this to to a Magnetic bearing to get a Compass bearing.
There is an example of a Deviation curve at the back of your Practice Navigation Tables. You only need to be aware of deviation and its causes at this stage. Deviation can be checked by 'swinging the compass', that is, checking the compass reading when the boat is on a known heading, round a 360° series of headings.

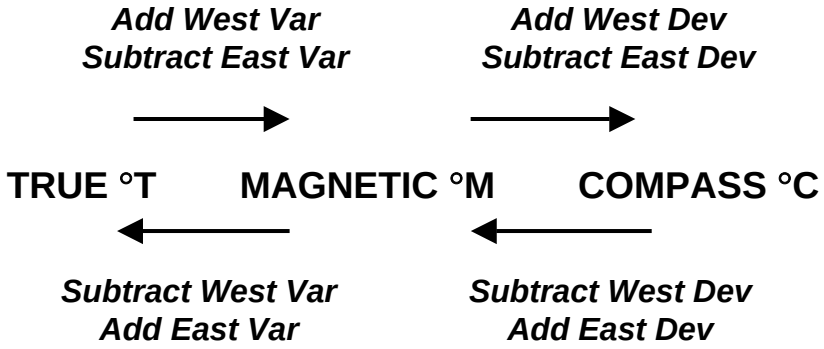
Further errors are caused by boat heel, and the difficulty of reading a compass when on a moving platform.
Hand bearing compasses usually show very small deviation effects.

Deviation can also be East or West, but the same logic applies:

"Deviation West, Compass Best"

"Deviation East, Compass Least"

Summary:



Examples:

True bearing	= 273° (T)
Var	= 5° W
Magnetic bearing	= 278° (M)

True bearing	= 008° (T)
Var	= 13° E
Magnetic bearing	= 355° (M)

Magnetic bearing	= 273° (M)
Var	= 7° (W)
True bearing	= 266° (T)