

HOW THE COMPASS WORKS

The compass functions as an indicator to "magnetic north" because the magnetic bar at the heart of the compass aligns itself to one of the lines of the Earth's magnetic field. Depending on where the compass is situated on the surface of the Earth the variance between geographic north or "true north" will increase the farther one is from the prime meridian of the Earth's magnetic field. It should be noted that the geographic North Pole and the magnetic north pole are not coincident on the surface of the Earth. The Magnetic North Pole drifts in a circle with a radius of approximately 1600 km south of geographic north. It takes roughly 960 years for the magnetic pole to complete one cycle of drift across the Arctic Ocean. It is thought that the cause of this magnetic pole drift is the circulation of the magma inside the Earth.

Limitations of the compass

The compass is very stable in areas close to the equator, which is far from "magnetic north". As the compass is moved closer and closer to one of the magnetic poles of the Earth, the compass becomes more sensitive to crossing its magnetic field lines.

At some point close to the magnetic pole the compass will not indicate any particular direction but will begin to drift. Also, the needle starts to point up or down when getting closer to the poles, because of the so-called magnetic inclination. Cheap compasses with bad bearings may get stuck because of this and therefore indicate a wrong direction.

A compass is also subject to errors when the compass is accelerated or decelerated in an airplane or automobile. Depending on which of the Earth's hemispheres the compass is located and if the force is acceleration or deceleration the compass will increase the indicated heading or decrease the indicated heading.

Another error of the compass is turning error. When one turns from a heading of east or west the compass will lag behind the turn or lead ahead of the turn.

Source: <http://web.ua.es/docivis/magnet/compass.html>