

Mag-01H for use in Compass Safe Distance Testing

Objectives

Make equipment compliant with international regulations, and to help ensure reliable navigation, by ascertaining the level of interference that the a particular item of equipment causes to a compass.

Instrumentation

- Mag-01H single axis fluxgate magnetometer
- Mag B probe

Application

Electromagnetic compatibilty (EMC) testing of equipment for use near magnetic compasses onboard ships and aircraft.

Background

Compasses align with the Earth's geomagnetic field (magnetic North). Any object or equipment that has its own magnetic field will interact locally with the geomagnetic field. If this occurs near a compass then the compass will be diverted away from North, along the line of the resultant field from the interaction.

International regulations stipulate that equipment must adhere to the EMC Directive.¹ Part of EMC testing is compass safe distance measurement. This testing determines the minimum distance at which equipment does not cause unacceptable deviation of a compass' direction.

¹ <http://ec.europa.eu/enterprise/sectors/electrical/emc/>

The acceptable level of deviation must not exceed $5.4/H^\circ$ for a ship's standard compass and $18/H^\circ$ for steering, standby steering and emergency compasses, where H° is the horizontal geomagnetic field maximum.

Method

The equipment under test (EUT) is tested three times:

1. Switched off.
2. Degaussed and switched off.
3. Switched on.

Each time, the unit is rotated to determine which orientation provides the maximum deviation. The Mag B probe is then aligned along the H-field with 0° deviation. The value of H is displayed on the Mag-01H. The field value for the minimum distance can then be calculated using the equations:

$$\tan \theta = H_{\text{EUT}} [\mu\text{T}] / H_{\text{Earth}} [\mu\text{T}]$$

$$H_{\text{EUT}} = H_{\text{Earth}} \times \tan \theta [\mu\text{T}]$$

$$H_{\text{EUT}} = H_{\text{Earth}} \times \tan(5.4 / H_{\text{Earth}}) [\mu\text{T}]$$

Once the field value limit has been calculated, the EUT is placed along the axis perpendicular to the Mag B probe, and moved towards the probe until the calculated field value limit is reached on the Mag-01H display. This distance is noted.

The largest distance acquired in the three tests is taken as the EUT compass safe distance.

