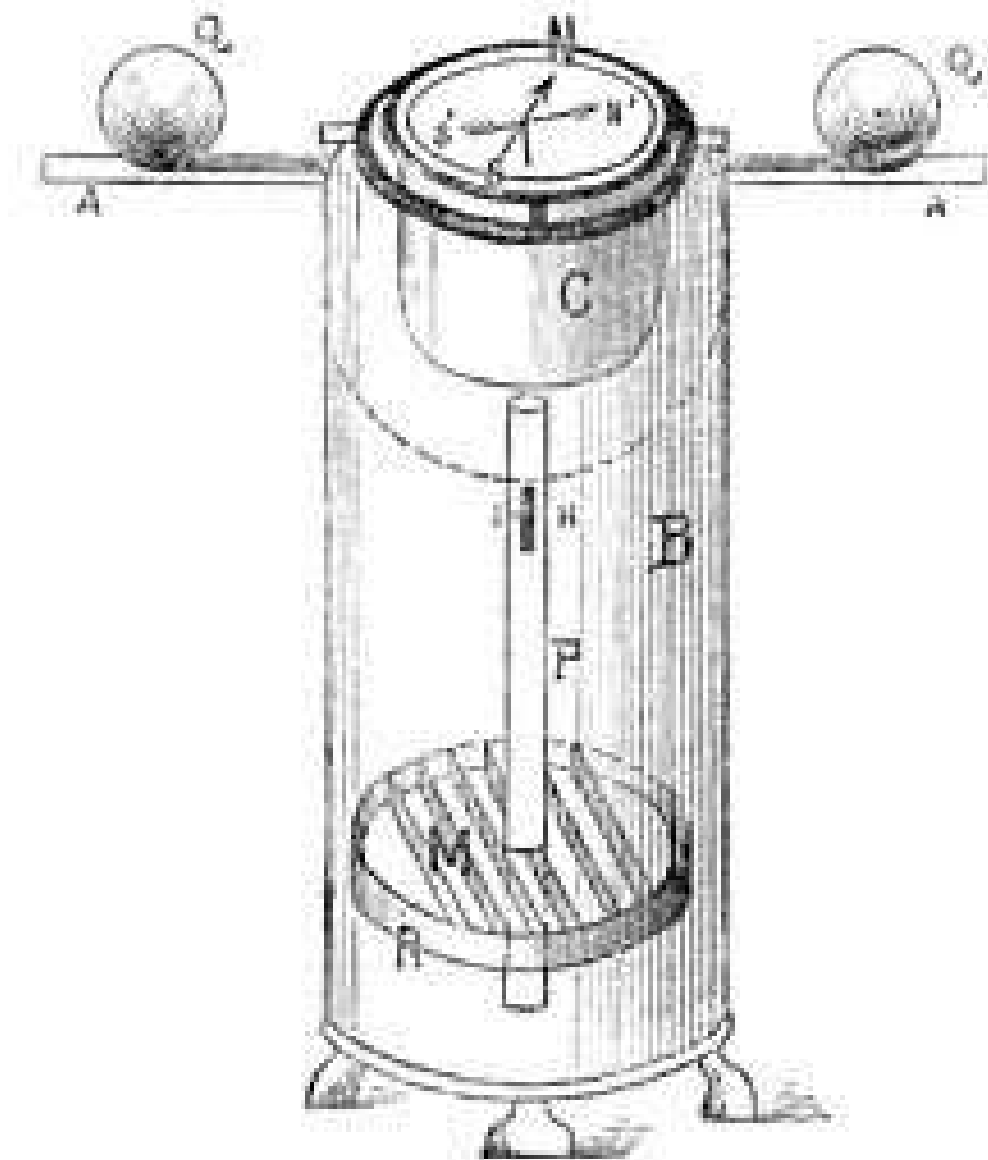


COMPASS ADJUSTER COURSE/ MAGNETISM EFFECT ON COMPASS

MAGNETIC COMPASS WITH BINNACLE



/

COMPASS ADJUSTER COURSE/ MAGNETISM EFFECT ON COMPASS

Course Information : This course is suitable for any nautical officer who has completed MASTER CoC as per the requirements of STCW as amended / or studying in B.Sc. Nautical Science to avail credit for credit bank; as minimum requirement.

It is of 4-week duration course to give a credit score of 1. This course will have supervised lecture hours, Practical hours and Project works.

Course- COMPASS-ADJUSTER

Academic year/ Batch number I

Credit 1 [15 hours interactive session] +examination.

Lecturer(s)

Lecturer

Coordinator

Contact

General Learning Objectives [GLO]

*1. MAGNETISM AND TYPE OF METALS

*2.GEO-MAGNETISM AND ITS IMPACT ON SHIP-VARIATION

*3.SHIP MAGNETISM and DEVIATION- FORCES P, Q, R

* 4.COEFFICIENTS: A, B, C,D,E

* 5.GAUSSIN ERROR/RETENTIVE ERROR

*6.COMPASS ADJUSTMENT AND CORRECTION—ANCILLARY INSTRUMENTS IN USE

Specific Learning Objectives (SLO)

1. GLO-Magnetism and type of metals-

Upon completion of the course, students should be able to:

1.1-Define the properties of magnetism

1.2-Explain Faraday's law of magnetism

1.3-Understand types of metal ;like ferromagnetic and others

1.4-Connect the shipboard materials and metals for bridge equipments and materials used onboard.

1.5- Box the compass and identify parts of compass.

2. GLO- Geo-magnetism and its impact on on SHIP'S COMPASS ERROR--"Variation"

Upon completion of the course, students should be able to:

/

COMPASS ADJUSTER COURSE/ MAGNETISM EFFECT ON COMPASS

- 2.1- Understand that earth acts as a magnet-- GEO MAGNETISM, TERRESTRIAL MAGNETISM
- 2.2- Define the terms ' VARIATION'/or MAGNETIC DECLINATION, ' ISOGONIC-LINES' , ' AGONIC LINES', ' ISALOGONIC LINES'.
- 2.3- Read Variation charts and to be able to pick up values from nautical charts/ECDIS
- 2.4- Apply the values in 'true course' for magnetic course and vice versa.

3. GLO-SHIP MAGNETISM and DEVIATION- FORCES P, Q, R

Upon completion of the course, students should be able to:

- 3.1 Explain how ship gets magnetised in earth field?
- 3.2 The resultant magnetic field of ship and its components 'P', 'Q', 'R'.
- 3.3 Describe the Permanent and Induced magnetism

4. GLO-COEFFICIENTS: A, B, C, D, E

Upon completion of the course, students should be able to:

- 4.1 Understand basic coefficients, A, B, C, D, E and brief knowledge of the impacts on different directions- 'headings of ship'--including heeling error.
- 4.2 Show Corrective mechanism adopted in Compass binnacle for controlling Permanent and induced magnetism.

5. GLO-GAUSSIN ERROR/RETENTIVE ERROR

Upon completion of the course, students should be able to:

- 5.1 Explain Gaussin effect and errors of semi permanent nature such as retentive error and their remedial understanding.
- 5.2 Read literatures connected to these effects—SOLAS Chapter V-19.2.1, HSC Code Ch 13/2000 IRS circular, AMSA Guidelines, IMO Resn A.382[XI], ISO-25862:2009

6. GLO-COMPASS ADJUSTMENT AND CORRECTION—ANCILLARY INSTRUMENTS IN USE

Upon completion of the course, students should be able to:

- 6.1 Define 'Compass adjustment' and When /Why to do adjustment? Who may do adjustment?
- 6.2 Understand Basic requirements - preparing ship for--'swinging the ship' and getting deviation curve.
- 6.3 List down the names of different instruments and to identify through pictures of 'VERTICAL FORCE INSTRUMENT', DEVIASCOPE etc.
- 6.4 Know uses and significance of different methods of compass adjustment--i.e.- 'Tentative', 'Analysis', 'Directive-force' methods.
- 6.5 Know about alternate and advanced means of Direction finding INSTRUMENTS—like Gyro/GPS compasses..

/

COMPASS ADJUSTER COURSE/ MAGNETISM EFFECT ON COMPASS

Content Synopsis:

Ship's compass gets affected due to earth's magnetism and ferromagnetic and paramagnetic substances on board ship or being carried by ship. Earth magnetism gives VARIATION and Ships' magnetism causes DEVIATION. Both are causal effect for the net compass error. Adjustment can not be done for earth magnetism; but deviation as caused by ship/cargo can be controlled by adjusting compass with permanent correctors and soft iron correctors.

Compass Adjustment is the knowledge and skill of analyzing and compensating for deviating forces of a vessel's magnetic compass. A magnetic compass should always align steadily pointing to magnetic north. However, steel, electronic instruments or equipment, and even the type of cargo carried, can cause the compass needle to point away, or deviate, from magnetic north.

Compass adjustment is necessary to compensate these deviating forces with correctors. The deviations on principle headings, typically N, E, S & W headings and quadrantal (NE, SE, SW & NW) headings are identified, and then correctors are employed to either completely remove or reduce the deviation.

Correctors may be permanent magnets or soft iron, which are placed adjacent to the compass. This creates equal, but opposing magnetic fields and the deviating fields around the compass gets reduced/to zero. Then compass starts pointing correctly and plotting of bearings on chart becomes as True direction ;if variation correction is applied in compass reading.. Now, the earth's magnetic field can pass through the compass without being deflected out of its normal path.

But due to innovative design, location and the vessel's unique magnetic properties, it is not possible to remove complete effect of deviation. The residual deviation is recorded on a deviation card as a table or a curve of deviation against the compass headings when vessel is swung at sea 360 degree for compass adjustment.

Objective- To follow-

1. SOLAS chapter V guidelines.
2. OCIMF Guideline
3. Panama Maritime authority guidelines.
4. AMSA requirements
5. IMO Guidelines-Performance standards
6. ISO 2269:1992/ Of 2009 –Standards for CLASS A COMPASS
9. Corrective measures if navigational aids; electronic or satellite based get cyber attacked/ malfunction.

/

COMPASS ADJUSTER COURSE/ MAGNETISM EFFECT ON COMPASS

Course Delivery

Instructional method	<ul style="list-style-type: none">• Lecture• Tutorial/Practical• Guided Self-Study
Course Assessments	<ul style="list-style-type: none">• Projects/Tests(30%)• Presentations(10%)Formative [F-40%] Total of above• Summative [S-60%]

Suggested Literature

1. OCIMF Guidelines

Mandatory reading -

- 1.SOLAS CH-V-REG 19
- 2.IMO PERFORMANCE STANDARDS
3. ISO STANDARDS

Notes:

- Attendance can be through direct contact or through online mode.
- Course attendance (100%) has to be completed within the stipulated time.
- Attendance to be maintained by Student & Lecturer.
- Students are encouraged to attend equivalent Courses (e.g., NPTEL Swayam; AICTE etc.) for their own benefit—for understanding Magnetism topic.

/

Timetable

Hours	Type	Topic	Reading(s)	Remarks
Week 1				
2	Lecture	GLO 1-2	IMO STANDARDS	
2	Tutorial	GLO1-2	Reference books	
1 to 2	Presentations /Questions	MCQ-QUIZ/ ppt*		
Week 2				
2	Lecture	GLO 3-4	ISO STANDARDS	
2	Tutorial	GLO3-4	SOLAS Ch-V/19	
1 to 2	Presentations /Questions	MCQ-QUIZ/ ppt		
Week 3				
2	Lecture	GLO5-6	AMSA/IRS CIRCULARS	
2	Tutorial	GLO5-6	OCIMF GUIDELINES	
1 to 2	Presentations /Questions	MCQ-QUIZ/ ppt		
Week 4				
3	Assessments: Presentations /Project work AND feedback session	Summative*		

- FORMATIVE [F] ASSESSMENTS—40% WEIGHTAGE
- SUMMATIVE[S] ASSESSMENTS--60% WEIGHTAGE
- TOTAL ASSESSMENT MARKS-100/PASS MARKS-60

Reference books/MATERIALS/LITERATURES-

1. 'Ship's Magnetic compass'—Capt. T.K, Joseph and Capt. SSS Rewari
2. <https://www.amsa.gov.au/about/regulations-and-standards/192016-maintenance-and-adjustment-magnetic-compasses>

-



SOLAS V_Reg19.pdf



A_X_Resolution_382.pdf



maintenance-and-adjustment-of-magnetic-compasses.pdf

IMU-MCC-SNS-REV 0-2022- MIHIR CHANDRA/ASP/21052022

Summative examination [S] QP Template

INDIAN MARITIME UNIVERSITY-MICRO CREDIT COURSE

Course title—Compass adjuster course /Ship's magnetic compass

Total marks-100

Time allowed- 3 hrs

Pass marks- F+S= 60%

Section A

All questions are compulsory—each Question is of 10 marks.

Q 1- Short Answer type-

Write down relevant standards/chapters/Resolution number/ Circular numbers related to Compass-

- A] ISO STANDARD ?
- B] IMO RESOLUTION?
- C] IRS CIRCULAR TITLE?
- D] HSC CODE chapter?
- E] Definition of AGONIC LINES

Q 2- State Faraday's laws of magnetism.

Section B

Answer any 4 Questions—Each Question carries 20 marks.

Q 3. Explain the characteristic that earth behaves as a magnet. Illustrate through neat sketch about earth's poles and lines of forces associated with.

Q4. Discuss the term 'Permanent correctors' and 'Soft iron correctors' and state how they are Positioned near compass?

Q5. What are various coefficients causing DEVIATION as a whole and how they impact compass on different ship's headings?

Q6. When it is needed to do compass adjustment? Explain any one method of doing the adjustment.

Q7. Sketch and Label different parts of Compass in Binnacle . Why Spare compass bowl is kept upside down on board ships and how the spare correctors be kept on board?