



MARITIME AND TECHNICAL ENGLISH

FOR DECK OFFICERS (vol.1)

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elisa
Livraria

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Introduction

Who is this book for?

This book was designed for Deck Officers or Naval Officers who have an interest on improving their Maritime English knowledge, Marine Sciences students, Naval students, shipping business officers and all those who are interested in Maritime English.

Although there are some other materials dedicated to Maritime English, this book aims to be slightly different and is mainly focused on the professional needs of officers working on the bridge of a ship. Those who are responsible for navigation, bridge resource management, communications, safety management, cargo loading and unloading operations will find here the most common situations lived by a deck officer.

The book covers a wide range of professional and most common situations experienced by a Deck officer on board a ship. Nowadays most ships are manned by multilingual crews and the need for fluency in Maritime and Technical English is of utmost importance. However, it is also crucial to be acquainted and train the standard language used at sea – the Standard Marine Communication Phrases.

The structure and the topics of this book also aims to be in accordance with the contents of section 2 of the IMO Model course 3.17, which concerns Specialized Maritime English.

The guiding level of this book is Intermediate (B2) once it is considered to be the adequate level for an officer to be able to perform his (her) duties.

How this book is organized

PART I – Topics: Reading, terminology, professional situations, SMCP and role playing examples (with audio files)

PART II – Role playing exercises (with audio files)

PART III – Maritime English Grammar and Use of Language

PART IV - Key to the exercises

Part I is the main part of the book and it is divided in **Units**. Each unit is dedicated to a topic, considered relevant for the Deck officer. There are texts which comprise a great deal of maritime and technical terminology and short descriptions. Some of the information is also presented in tables for a quicker understanding.

Each unit is then divided in five sections, from A to E, each of them with a specific purpose such as:

- A- **terminology** and basic knowledge of the topic;
- B- list of **professional situations** related to the topic ;
- C- the **Standard Marine Communication Phrases** (SMCP) related to the topic;
- D- **Role playing** examples of **realistic situations** lived on board;
- E- **Use of English** and **Grammar** revision considered necessary within the topic and its use in professional situations.

Part II comprises Role Playing exercises, with the corresponding audio files.

Part III covers some topics of English grammar which are considered important for the subjects in Part I and situations presented. For instance, the use of passive voice when reporting or describing a malfunction of an equipment.

Part IV contains the key to the exercises.

The characters

Captain Cristina and 2nd mate Nuno will lead you throughout the book with their explanations, recommendations and advices. These characters were inspired in real deck officers whom I met on board when I was at sea. For me, they were an example of competence and professionalism.

The other characters are purely fictional. They are:

Chief mate: Tiago Martins (portuguese)
2nd mate: Nuno Gomes (portuguese)
Deck cadet: Gonçalo (portuguese)
Bosun: Mariuz Magellan (filipino)
1st AB seaman: Reza Divedra (filipino)
2nd AB seaman: Pasipo Sirenha (filipino)
Chief engineer: José Diaz Ballena (spanish)
2nd engineer: Adam Duprinski (polish)
Electrician: Manolo Gomez (spanish)

The author:
Elisa Bandeira

Contents

Volume 1

| | Unit | A | B | C | D | E | |
|------|---|---|---|--|---|---|-----------------|
| Unit | Topic | Subsidiary topics (reading / terminology) | Professional situations related to topic | SMCP covered | Role-playing (listening / speaking) | Use of language Grammar Revision | Model Course |
| 1 | The bridge and aids to navigation | The bridge Aids to navigation Technical manuals and Operating instructions | Presentation of bridge resources; Explain how an equipment is used and operated; Understand equipment's technical manuals and report failures and malfunctions in writing and orally Operate electronic navigational aids and explain their working condition and operation | B1/1 B1/2 | Presentation of bridge resources to a new crew member; Explaining a malfunction of the radar to the master Explaining the preventive maintenance procedures to bridge electronic equipment to a colleague | Explaining function and use Use of passive voice in technical descriptions and reports Prepositions | |
| 2 | Safety on board | Fire detection and fighting Life Saving Appliances ISM | Safety drills on board Checking and maintenance of fire-fighting systems and equipment Checking and maintenance of LSA Safety drills | A2/3 B2/1 B2/2 B2/3 | Briefing to crew members in a cargo vessel, during an "Abandoning ship" drill Fire party drill | Verb tenses: reporting past events Report writing – reported speech | |

| | | | | | | | |
|-----------------|--|---|--|----------------------|--|--|--|
| <p>3</p> | <p>Navigation</p> | <p>Navigation techniques Buoyage Colregs Meteorology</p> | <p>Use charts and other nautical publications – understand and explain their contents Understand buoyage system worldwide Understand and comply with Colregs</p> | | <p>Explaining how to take a bearing with the bearing marker to the deck cadet Meeting with bosun and deal with equipment for anchoring operations Maintenance on deck</p> | <p>Verb tenses: continuous forms</p> | |
| <p>4</p> | <p>Seamanship</p> | <p>Working on deck Anchoring Berthing and unberthing</p> | <p>Maintenance on deck - working with bosun and seamen Know terminology related to machinery and tools for working on deck</p> | | | | |
| <p>5</p> | <p>Keeping a navigational watch</p> | <p>Handing over the watch Situational awareness and risk assessment</p> | <p>Understand meteorological information (weather forecasts) and messages (warnings) concerning ship's safety and operation Hand over the watch</p> | <p>A1/4 B2/2</p> | <p>Handing over the watch Giving instructions to bosun (boatswain) for checking and reinforcing containers lashing, due to bad weather Communication with another ship approaching</p> | <p>Relative clauses Modal verbs</p> | |

| | | | | | | | |
|---|-----------------------------|---|--|-------------------------|--|--|--|
| 6 | Emergencies on board | <p>Emergencies on board</p> <p>Safe working practices</p> <p>Accidents at sea</p> | <p>Person overboard</p> <p>Fire in the engine room</p> <p>Accident during manoeuvres</p> <p>Overflow during bunkering</p> <p>Grounding</p> <p>Cargo shifting and dangerous list</p> <p>Collision with pilot on board</p> | <p>B2/1</p> <p>B2/4</p> | <p>Procedures by OOW following a MOB situation</p> <p>Fire on board - Distress situation</p> <p>Collision when entering a port</p> | <p>Giving instructions – the use of the imperative</p> | |
|---|-----------------------------|---|--|-------------------------|--|--|--|

Volume 2 will cover the following topics:

1. Radio communications
2. Approaching port and manoeuvres
3. International regulations and ship's documents
4. The voyage plan and passage plan
5. In port

Being a Deck Officer



Hello! I am **Captain Cristina** and I have been a Deck Officer for over 30 years. I have served on board different types of ships and have been in many places all over the world.

Being a seafarer is not always easy but the good news is that it can be a great adventure!

If you choose to become a Deck officer, soon you will feel like a world citizen and the sea will be your country! But for all this, fluency in English is of utmost importance!

I'll be your guide throughout this book and I hope you'll find it useful. Come along!

According to the STCW (Seafarers Training Certification and Watchkeeping) Convention , as amended, it is expected from an Officer in charge of a navigational watch, *"to show adequate knowledge of the English language to enable the officer perform his (her) duties, namely to use charts and other nautical publications, to understand meteorological information and messages concerning ship's safety and operation, to communicate with other ships, coast stations and VTS centres and to perform the officer's duties also with a multilingual crew, including the ability to use and understand the IMO Standard Marine Communication Phrases (IMO SMCP)"*

TABLE STCW: A-II/1 (according to latest amendments Manila 2010) – also specifies the following:

Knowledge, comprehension and necessary skills for internal and external communications on board.

Acquisition of competencies to perform the following functions:

- *Maintain a safe navigational watch*
- *Monitor the loading, stowage, securing, care during the voyage and the unloading of cargoes*
- *Inspect and report defects and damage to cargo spaces, hatch covers and ballast tanks*
- *Application of leadership and team working skills*
- *Use of the IMO Standard Marine Communication Phrases*

Effective communication in English is also required according to different situations on board, as follows:

- A)** Knowledge of bridge resource management principles, including effective communication
- B)** Ability to establish and maintain effective communications during loading and unloading operations
- C)** Knowledge and ability to explain where to look for damage and defects most commonly encountered
namely: - C1. Ability to state which parts of the ship shall be inspected each time in order to cover all parts within a given period of time
 C2. State the causes of corrosion in cargo spaces and ballast tanks and how corrosion can be identified and prevented
 C3. - Ability to explain how to ensure reliable detection of defects and damages
- D)** Knowledge and ability to apply effective resource management, including effective communication onboard and ashore
- E)** The use of reporting in accordance with the General Principles for Ship Reporting Systems and with VTS Procedures.

Here are some examples of professional situations which require fluency in English, from a Deck Officer:

On voyage

Passage planning (reading and understanding nautical publications)

On watch –

- Use charts and other nautical publications – understand and explain the contents
- Understand meteorological information (weather forecasts) and messages (warnings) concerning ship's safety and operation
- Operate electronic navigational aids and explain their working condition and operation
- Communicate on VHF with other ships and shore stations (VTS centres)
- Hand over the watch
- Ballast operations management

Use the radio communications equipment (emergency and routine communications)

Understand equipment's technical manuals and report failures and malfunctions in writing and orally

Onboard communication during manoeuvres

On board communication with pilot

Check and maintenance of fire detection and fire fighting systems

Carry out safety drills and briefings during drills

ISM reports

Check and maintenance of Life saving Appliances

Work on deck with Bosun and ratings

Socializing with crew members of other nationalities

Interacting with passengers

In port:

Meetings with shipping agents, port authorities, etc
Meetings with cargo handling personnel
Supervising loading and unloading operations
Interaction with stevedores and ship planners
Internal/External audits; Port State Control; Flag Inspections;
Familiarization for new crewmembers.
Ballast operations management.

PART I - Topics

Unit 1 - The bridge and Aids to Navigation

Summary:

1.A. Reading - Terminology

- 1.A.1. The bridge of a ship
- 1.A.2. Aids to Navigation (AtoN)

1.B. Professional situations related to topic:

Read and understand nautical publications

- Read and understand technical manuals
- Explain how equipment works and how it should be used
- Report failures either orally or in writing

1.C. SMCP

- Introduction to SMCP; B1/1; B1/2

1.D. Role playing

- RP no.1: Explain the position of equipment and devices; RP no.2: Explain how an equipment works; RP no.3: Explain a failure in an equipment; RP no.4: Explaining the preventive maintenance procedures

1.E. Use of English / Grammar

- Describe purpose, function and means
- Verb tenses – Simple Present and Present Continuous
- Relative clauses

1.A.1. The bridge of a ship

The **bridge (or command bridge)** of a ship is the room from which the ship can be commanded.

The bridge of a ship is usually divided into two different operational areas which are the **wheelhouse** and the **chartroom**.

There is also a third area with the radio communications console, which is in fact the ship's **radio station**.

Wheelhouse

The **wheelhouse** is the enclosed part of a bridge which holds the ship's **steering wheel**. Today, ships' bridges do not have a separate wheelhouse. They are usually an open space.

When a ship is underway the bridge **is manned** by an OOW (officer of the watch) and by an AB (able seaman) acting as a **lookout**. The wheel is usually operated automatically by an electronic aid to navigation called the **Auto Pilot**.

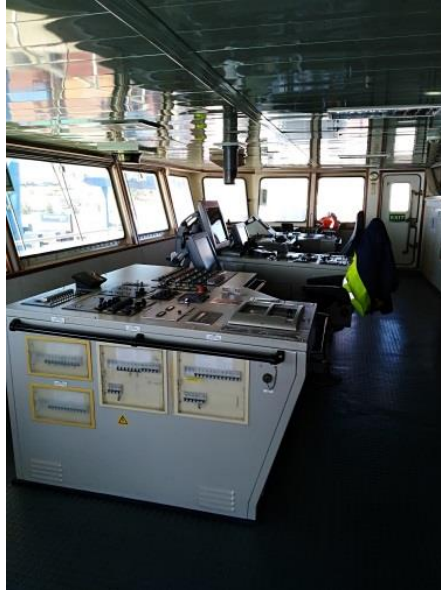


Figure 1: An overview of a ship's bridge.

When the ship is manoeuvring, the wheel is operated manually by the **helmsman** (an AB seaman) who receives **helm orders** from the captain, the pilot or the Officer of the Watch. The **helm** (or wheel) is part of the **steering gear** which controls the **rudder** or a set of **propellers**. The steering gear is located near the engine room in an independent compartment.

In case the helm fails, it is possible to steer the ship from this room by following the orders transmitted from the bridge.

When the orders are given to the helmsman, he (or she) must repeat them twice – 1) when the order is received and 2) when the order is executed.

The **engine remote control**, positioned on the **bridge console**, is usually operated by another deck officer. **The engine commands** are given by the captain or the pilot. They are according to the desired speed and direction of the ship.



Figure 2: The conning position on the bridge.

The **conning position** is said to be the position in front of the bridge console, from where the ship can be commanded. A position where the officer or pilot can have access to all the resources which are necessary for the command. It is also a position with a good view of the external area around the ship.

The bridge also **comprises** two external areas, one on each side (starboard and port) which are the **bridge wings**. This external area is very important because it **enables** the deck officers or the pilot to have a better view of the ship's side, especially during manoeuvres.

On each bridge wing there is usually a small console with remote controls of the engine and the **steering wheel**, among others. This small console is quite useful for the pilot or the ship's officers to **manoeuvre** the ship during **berthing** and **unberthing**.

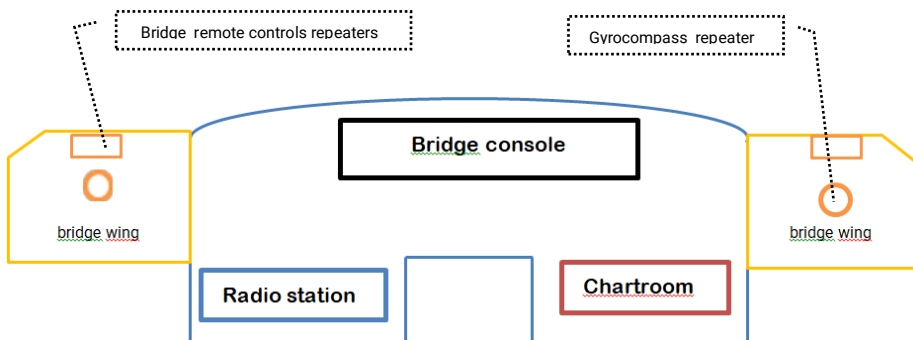


Figure 3: Operational areas on the bridge.



Figure 4: Ship's controls.



Figure 5: Command console on the bridge wing.

The Chartroom

The **chartroom** is a separate open area where the chart table is situated and obviously the paper navigational charts on it. Some equipment is also mounted over this table, namely a GPS receiver, an electronic chart display, a NAVTEX receiver, among others.



Figure 6: Chartroom or chart table.

The Radio station

The **radio station** or **radio communications console** is situated on one side of the bridge but at the rear part of the navigational area. An officer, being engaged in communications, will not be able to carry out a proper lookout.

The console comprises all the equipment which is required for the radio station according to chapter IV from SOLAS convention and the sea area where the ship operates (carriage requirements from GMDSS).



Figure 7: Radio communications console

Specific Terminology

| Keywords and Expressions | | | |
|----------------------------------|----------------------|----------------------------------|----------------------|
| English (in alphabetic order) | <i>Your language</i> | English (in alphabetic order) | <i>Your language</i> |
| bridge | | identification | |
| bridge wings | | information systems | |
| chart room | | locating | |
| charting | | lookout | |
| conning position | | navigation system | |
| crew | | navigational chart | |
| crew member | | officer of the watch | |
| data exchange | | propeller | |
| direction | | remote control | |
| divider | | rudder | |
| electronic chart | | screen | |
| engine orders | | shipborne system | |
| engine orders | | speed | |
| helm orders | | steering gear | |
| helmsman | | steering wheel | |

| Verbs | | | |
|------------------------|----------------------|--------------|----------------------|
| English | <i>Your language</i> | English | <i>Your language</i> |
| to be underway | | to manoeuvre | |
| to have the con | | to monitor | |
| to comprise | | to sail | |
| to enable | | to track | |
| to locate | | | |
| Verbs (in the passive) | | | |

| | | | |
|------------------|--|----------------|--|
| to be commanded | | to be manned | |
| to be displayed | | to be operated | |
| to be executed | | to be relayed | |
| to be integrated | | | |

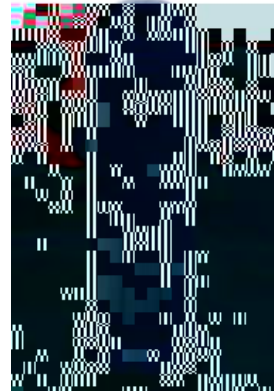
1.A.2. Aids to Navigation

The magnetic compass

The **magnetic compass** is an aid to navigation **device** which has been used by seamen since ancient times. It contains a magnet that aligns itself with the earth's magnetic field to point the magnetic poles. It indicates the north but with a constant error called the **magnetic declination**. The magnetic declination or **magnetic variation** is an angle in relation to the true north.

The magnetic declination varies according to the different points on the earth, and changes with time. Close to the equator, the magnetic declination is no more than a few degrees, but in Arctic and Antarctic latitudes it can be much greater.

The frame of reference defines the four **cardinal directions** (or **points**) – North, South, East, and West. The **intermediate directions** are also defined (Northwest, Southwest, Northeast and Southeast). Usually, a diagram called a **compass rose**, which shows the directions (with their names usually abbreviated to initials), is marked on the compass.



Presently, this aid to navigation is only used as a back-up in case the gyrocompass fails. However, according to IMO regulations (SOLAS convention), it is compulsory to have it installed on board,

The gyro compass and autopilot



Figure 9: Gyrocompass - the sphere with gyroscope

The **gyro compass** is an electronic device which principle of operation is based on the gyroscope. Unlike the magnetic compass it indicates the **true North**.

A gyro compass is a non-magnetic compass that finds true north by using an electrically powered fast-spinning gyroscope inside a sphere, filled with a special liquid which function is to minimize friction forces.

Gyro compasses are widely used on ships. They have two main advantages over magnetic compasses:

they find **true North**, i.e., the direction of Earth's rotational axis, as opposed to magnetic North, they are not affected by ferromagnetic metal (including iron, steel, cobalt, nickel, and various alloys) in a ship's hull.

Figure 10: Gyro compass repeater with a bearing marker on it.

Figure 11: Deck officer taking a bearing with a bearing marker

Auto Pilot

The Auto-Pilot system is an electronic navigational equipment which function is to automatically **maintain**

The Auto-Pilot system is functionally dependent on the Gyro Compass. If there is any error or fluctuation in the gyro heading, there will be an equivalent change in the course steered by the Autopilot. In case of **gyro failure**, the system will lose track on its **heading** and will be unable to steer the required course.



Figure 12: The auto pilot console with steering wheel and gyro compass repeater.

The GPS

The GPS (Global Positioning System) receiver is a navigation equipment which is used for indicating the ship's position. It is a radio receiver and its principle of operation is based on the reception of signals from orbiting satellites. The equipment then calculates and displays the position of the ship, by means of its microprocessor.

The calculated position, shown on the display is quite accurate, with an error less than 20 meters.



Figure 13: Two GPS receivers

AIS (Automatic Identification System)

The **Automatic Identification System (AIS)** is a system used by ships and Vessel Traffic Services (VTS) for locating and identifying vessels within VHF range, approximately 50 nautical miles.

This equipment allows ships to be tracked and monitored by maritime authorities. It is also very useful for ships to exchange data such as identification, position, course, and speed, with other nearby ships and VTS stations.

The information, which is very useful for deck officers, can be displayed on a screen or chart plotter. It works by integrating a VHF transceiver system with an electronic navigation system, usually a Global Positioning System receiver as well as and other navigational aids on board ship (gyrocompass, speed indicator, etc.).



Figure 14: AIS display unit (Source: [www. Kelvinhugues.com](http://www.Kelvinhugues.com))

The deck officer can have access to ships' particulars as well as the cargo they carry, port of origin and port of destination, etc.

ECDIS

An Electronic Chart Display and Information System (ECDIS) is a **computer-based** navigation information system that can be used instead of paper navigational charts in some areas.



Figure 15: Electronic chart display.

There are two types of Electronic charts:

Raster chart – a **scan of a paper chart**, similar to those charts that mariners have been accustomed to. What makes navigation with raster charts appealing is that the updating is automated and GPS position can be overlaid to give real time **situational awareness**;

Vector chart - a **computer generated representation** of the chart which uses detailed data. Objects on a vector chart can be selected and then obtain more details. The data contained within the chart can be accessed by the ECDIS for further features to be activated.

(adapted from Marine Insight; www.marineinsight.com)

ECDIS carriage requirements

The amendment to SOLAS regulation V/19 requires all newly built passenger ships of 500 gross tonnage and upwards, as well as newly built cargo ships, including tankers, of 3,000 gross tonnage and upwards engaged on international voyages to be fitted with ECDIS. For existing ships, phase-in introduction of fitting requirements are being introduced for all ships of certain size engaged on international voyages.

(www.imo.org - See SOLAS regulation V/19.2.10 for details).

The Echo Sounder

The Echo sounder is an instrument which is used for measuring the depth of the water under the **keel** of the ship. Its **principle of operation** is based on the technique of transmitting and receiving **sound pulses**. By knowing the speed of sound in the water and the **time interval** between the transmission of a pulse and the reception of its **echo** it is possible to calculate the depth (distance from the keel and the **seabed** reflecting surface).

The result by multiplying half the time from the signal's outgoing pulse to its return by the speed of sound in the water (approximately 1.5 kilometres per second) is the depth of the water under the keel.

This information can also be used for navigation purposes, especially in **shallow waters**, or in order to obtain depths for **charting** purposes.

Echo sounding can also refer to **hydro acoustic** "echo sounders" (**sonar**) used for detecting fish in different depths of sea water. Fishing vessels are usually fitted with highly sophisticated echo sounders for that purpose.

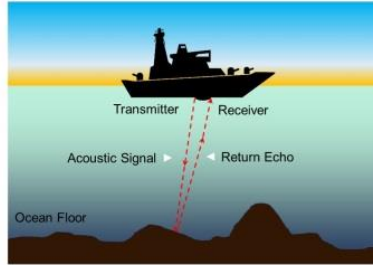


Figure 16: Echo sounder - principle of operation



Figure 17: Display of an Echo sounder.

The NAVTEX Receiver

The **NAVTEX Receiver** is a navigational aid which function is to receive **Navigational Warnings** (Navwngs) or **Notices to Mariners**. It is mandatory on board as a GMDSS (Global Maritime Distress and Safety System) equipment for all **SOLAS ships**.

NAVTEX is an international automated **medium frequency** direct-printing service (NBDP) for the transmission of Maritime Safety Information (MSI), i.e. **navigational** and **meteorological warnings** and **forecasts**, as well as urgent maritime safety information to ships.

It was developed to provide a simple, and **automated means** of receiving this information aboard ships at sea within an average of 200 nautical miles from shore (MF range).



Figure 19: A Navtex receiver

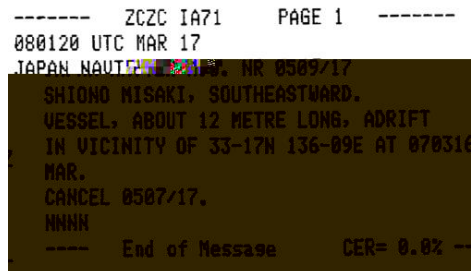


Figure 18: Example of a Navigational Warning.

The Radar

A **Marine Radar** is a **shipborne equipment** which is used for detecting other ships or obstacles in the **ship's vicinity**.

Its principle of operation is based on the characteristic of a radio wave to be reflected by the surface of an object (target). Knowing the **propagation speed** (approx. 300 000 Km/s) and the time that a transmitted signal takes to be received as an echo by the radar receiver, the distance between the radar (or the ship) and the **target** can be calculated.

The Radar is a vital instrument for safety at sea and near the shore. Mariners need to be able to manoeuvre their ships in the worst weather conditions especially in intense fog and at night.

In commercial ships, they are integrated in a full system of marine instruments including electronic charts, echo-sounders and radio communication devices.

Depending on their working frequency, **Marine radars** are **x-band** or **s-band**. The bridge of a ship is usually fitted with two marine radars working on different frequency bands (x-band and s-band) to avoid interference.

There are two basic marine radar frequencies commonly known as "X" and "S" band. The **"X" band**, of frequency 9 GHz, provides a **higher resolution** and a better image on the **screen** while the **"S" band** radar, of frequency 3 GHz is less affected by rain and fog.

In most situations larger vessels are fitted with both "X" and "S" band radars while smaller vessels will only have an "X" band. Vessels in excess of 300 gross tons are required to have two operational marine radars and one of those radars must be an ARPA.

| Radar frequency band | Characteristics |
|----------------------------|---|
| X-band (approx.. 9 MHz) | Short wavelength – better directivity Signal attenuation in precipitation (greater than on S-band) Small, light-weight antennas |
| S-band (approx. 3 MHz) | Long wavelength – longer range Good penetration of precipitation for excellent performance in rough weather Large antenna |

Table 1: Radar frequency band.

(table adapted from: Furuno-radar-guide-min.pdf)

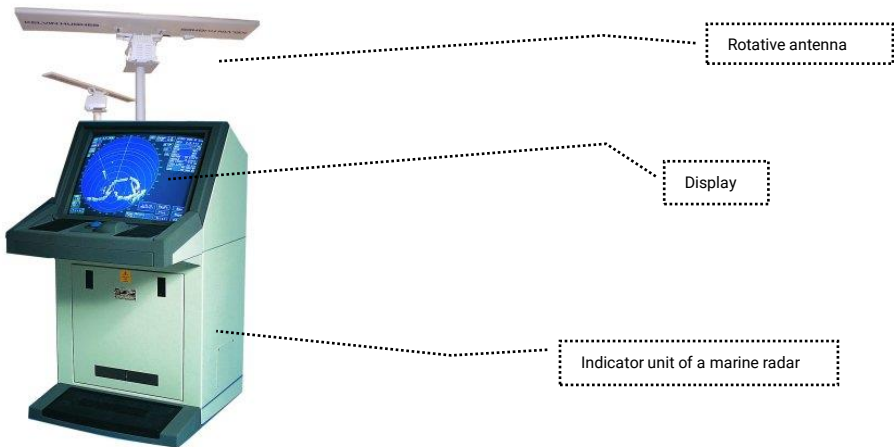


Figure 20: A marine Radar – indicator unit.

A radar installation usually comprises 4 main units which are positioned in different places and connected by cables.

They are:

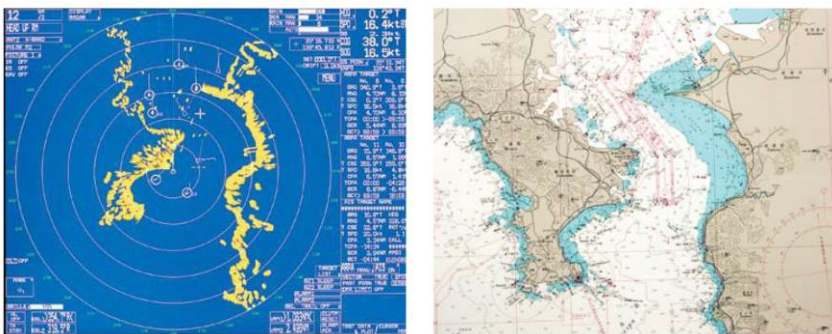
The **aerial unit (or antenna)** – mounted on the navigation lights mast, above the bridge

The **indicator unit** – mounted on the bridge

The **transceiver unit** (transmitter + receiver) – in a compartment near the bridge

The **power supply** – in the same compartment as the transceiver

Nowadays, marine radars are fitted with ARPA (Automatic Radar Plotting Aid), a combination of radar and computerized technology which highly increases safety in watch standing in order to avoid collisions at sea.



(source: Furuno-radar-guide-min.pdf)

Figure 21: Navigational chart and the corresponding image on the radar.

Presentation Modes

Without a compass input, the display is “unstabilized” and is shown with the ship’s heading marker vertically upwards indicating straight ahead movement (Head-Up mode).

Head-Up (Unstabilised display) – The ship’s heading marker is always shown vertically upwards indicating straight ahead movement.

Data from the compass can be processed to produce a correct “stabilized” display”.

There are two types of stabilized display available, North-Up and Course-Up.

North-Up (Stabilised display) – The bearing scale shows 000° at the top of the video circle (assumed to be true north). The ship’s heading marker is shown at the appropriate bearing.

Course-Up (Stabilised display) – On selection of Course- Up mode, the ship’s bearing is shown at the top of the video circle with 000° elsewhere on the circle, still representing true north.

When operating the radar, the currently selected Presentation Mode is displayed, as in the following figure.

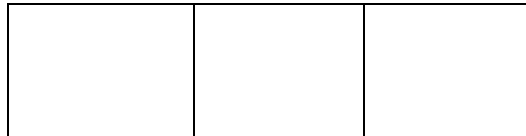


Figure 22: Presentation modes - Head-Up, North-Up and Course-Up.

Specific terminology

| Nouns and expressions | | | |
|-----------------------|---------------|-------------------|---------------|
| English | Your language | English | Your language |
| Aids to navigation | | Electronic chart | |
| Bearing | | Gyro compass | |
| Bearing marker | | Gyroscope | |
| Data exchange | | Identification | |
| Depth | | Locating | |
| Direction | | Navigation system | |
| Display | | | |

| | | | |
|-------------------------------------|--|--------------------|--|
| to repair | | to switch on / off | |
| to adjust | | to disassemble | |
| to set | | to reset | |
| to assemble | | to test | |
| | | to tune | |
| Verbs (in the passive voice) | | | |
| to be adjusted | | to be mounted on | |
| to be detected | | to be operated | |
| to be fitted with | | to be relayed | |
| to be integrated | | to be set | |
| to be installed | | to be tuned | |

Terminology related to Technical manuals

| Nouns and expressions | | | |
|------------------------------|----------------------|----------------|----------------------|
| English | Your language | English | Your language |
| control panel | | power supply | |
| press button | | amplifier | |
| knob | | gain | |
| block diagram | | rear panel | |
| schematic diagram | | front panel | |
| troubleshooting | | coaxial cable | |
| fault / failure | | plug | |
| fault finding | | socket | |
| dropdown menu | | rated power | |
| malfunction | | output power | |
| indicator led | | | |
| key pad | | | |
| key board | | | |
| screen | | | |
| soft keys | | | |

| Verbs | | | |
|----------------|----------------------|--------------------|----------------------|
| English | Your language | English | Your language |
| to adjust | | to repair | |
| to assemble | | to replace | |
| to check | | to reset | |
| to configurate | | to test | |
| to disassemble | | to tune | |
| to install | | to turn on /off | |
| to mount | | to switch on / off | |
| to set | | to radiate | |

| Verbs (in the passive voice) | | | |
|------------------------------|--|--------------------|--|
| to be assembled | | to be repaired | |
| to be checked | | to be replaced | |
| to be disassembled | | to be synchronized | |
| to be installed | | to be unplugged | |
| to be mounted | | | |

1.B. Professional situations related to topic

- Showing the bridge to a deck cadet and explain the position of equipment.
- Presentation of bridge resources;
- Explain how an equipment is used and operated;
- Understand equipment's technical manuals
- Report failures and malfunctions in writing and orally
- Operate electronic navigational aids and explain their working condition and operation
- Read and understand operating instructions and technical manuals
- Explaining to someone how an equipment works
- Explaining a failure or a malfunction in an equipment
- Writing a technical report
- Send an email to maintenance company asking for repair to a given equipment.
- Summarize and translate basic operating or maintenance instructions.

1.C. SMCP

Introduction to Standard Marine Communication Phrases

(extract from IMO Standard Marine Communication Phrases -IMO Resolution A.918(22))

The increasing number of international trade vessels with multi-national crews speaking different languages has created problems of communication leading to misunderstandings which have caused numerous incidents putting human life at risk as well as the vessel.

The IMO Resolution A.918(22), also known "Standard Marine Communication Phrases" is particularly important for navigational and safety communications from ship to shore and vice versa, from ship to ship, and on board ship. must be brief, clear and unambiguous so as to avoid confusion and error, there is a need to standardize the language used.

Basic communicative features

The IMO SMCP builds on a basic knowledge of the English language. It was drafted intentionally in a simplified version of maritime English in order to reduce grammatical, lexical and idiomatic varieties to a tolerable minimum, using standardized structures for the sake of its function aspects, i.e. reducing misunderstanding in safety-related verbal communications, thereby attempting to reflect present maritime English language usage on board vessels and in ship-to-shore/ship-to-ship communications.

This means that in phrases offered for use in emergency and other situations developing under considerable pressure of time or psychological stress, as well as in navigational warnings, a block language is applied which uses sparingly or omits the function words *the, a/an, is/are*, as done in seafaring practice. Users, however, may be flexible in this respect.

Further communicative features may be summarized as follows:

avoiding synonyms

avoiding contracted forms

providing fully worded answers to "yes/no"-questions and basic alternative answers to sentence questions

providing one phrase for one event (as far as possible)

Standard organizational phrases

| Situation | Standard Phrase | Example |
|---|---|--|
| Calling a station "How do you read (me)?" | I read you ... bad/ with signal strength 1 poor/ with signal strength 2 fair/ with signal strength 3 good/ with signal strength 4 excellent/five with signal strength five | |
| When it is advisable to remain on a VHF Channel / frequency, say: | Stand by on VHF Channel ... / frequency | |
| When it is accepted to remain on the VHF channel / frequency indicated, say: | Standing by on VHF Channel ... / frequency | |
| When it is advisable to change to another VHF Channel / frequency, say: | " Change to VHF Channel ... / frequency" | |
| When the changing of a VHF Channel / frequency is accepted, say: | Changing to VHF Channel ... / frequency" | |
| Corrections When a mistake is made in a message, say: | " Mistake ..." followed by the word: " Correction ..." plus the corrected part of the message. | "My present speed is 14 knots - mistake ... correction , my present speed is 12, one-two, knots." |
| Readiness | To be ready | " I am/ I am not ready to receive your message." |
| Repetition If any part of the message is considered sufficiently important to need safeguarding, say: | " Repeat ..." - followed by the corresponding part of the message. | "My draft is 12.6 repeat one-two decimal 6 metres." "Do not overtake - repeat - do not overtake." |
| When a message is not properly | " Say again (please)." | |

| | | |
|-------------|--|--|
| heard, say: | | |
|-------------|--|--|

Table 2: Standard organizational phrases for radio communication.

| | | |
|--------------------------|--|--|
| Numbers | Numbers are to be spoken in separate digits. (Note: For rudder angles, e.g. to give wheel orders, say: "Fifteen" for 15 or "Twenty" for 20, etc.) | <i>"One-five-zero" for 150 "Two decimal five" or "Two point five" for 2.5</i> |
| Positions | When latitude and longitude are used, these shall be expressed in degrees and minutes (and decimals of a minute if necessary), North or South of the Equator and East or West of Greenwich. | <i>"WARNING. Dangerous wreck in position 15 degrees 34 minutes North 061 degrees 29 minutes West."</i> |
| | When the position is related to a mark, the mark shall be a well-defined charted object. The bearing shall be in the 360 degrees notation from true north and shall be that of the position FROM the mark. | <i>"Your position bearing 137 degrees from Big Head lighthouse distance 2.4 nautical miles."</i> |
| Bearings | The bearing of the mark or vessel concerned is the bearing in the 360 degree notation from north (true north unless otherwise stated), except in the case of relative bearings. Bearings may be either FROM the mark or FROM the vessel. | <i>"Pilot boat is bearing 215 degrees from you."</i> |
| Relative bearings | Relative bearings can be expressed in degrees relative to the vessel's head. More frequently this is in relation to the port or starboard bow. | <i>"Buoy 30 degrees on your port bow."</i> |
| Courses | Always to be expressed in 360 degree notation from north (true north unless otherwise stated). Whether this is to TO or FROM a mark can be stated. | <i>"Our present course is 165."</i> |
| Distances | To be expressed in nautical miles or cables (tenths of a mile) and the unit must be stated. | <i>"My position is 15 nautical miles from you. My ETA is 1 hour"</i> |
| Speed | To be expressed in knots : without further notation, meaning speed through the water; or, "ground speed" , meaning speed over the ground . | <i>"Our present speed is 18 knots."</i> |
| Times | Times should be expressed in the 24 hour UTC notation; if local time will be used in ports or harbours it should clearly be stated. | <i>"Our ETA to Buoy no.1 is 1200 LT."</i> |

| | | |
|---------------------------|--|--|
| Geographical names | Place names used should be those on the chart or in Sailing Directions in use. Should these not be understood, latitude and longitude should be given. | |
|---------------------------|--|--|

Table 3: SMCP – Words and numbers.

Ambiguous words

Some words have different meanings depending on the context. Misunderstandings have happened, especially in VTS communications, and have led to accidents. Such words are: The conditionals "may", "might", "should" and "could".

| | Do not say: | You should say |
|---------------|--|---|
| May | May I enter the fairway?" | <i>QUESTION. Do I have permission to enter the fairway?</i> |
| | "You may enter the fairway." | <i>ANSWER. You have permission to enter the fairway.</i> |
| Might | "I might enter the fairway." | <i>INTENTION. I will enter the fairway.</i> |
| Should | "You should anchor in anchorage site B 3." | <i>ADVICE. Anchor in anchorage site B 3.</i> |
| Could | "You could be running into danger." | <i>WARNING. You are running into danger.</i> |

Table 4: Ambiguous words in radio communications.

(adapted from IMO Resolution A.918(22))

Briefing on navigational aids and equipment status

| | |
|-------------------------------|---|
| OOW handing over the watch | Port side radar is at 6 miles range scale. |
| Officer taking over the watch | Is the other on stand by? |
| OOW handing over the watch | The radar is relative head-up / north-up / course-up. |
| Officer taking over the watch | Understood. |
| OOW handing over the watch | The radar is true-motion course-up. |
| Officer taking over the watch | ... by master's orders or your decision? |
| OOW handing over the watch | Echo sounder is at 50. metres range scale. The echo sounder recordings are unreliable. They do not match the values on the chart. |
| Officer taking over the watch | Is the chart updated? Have you checked the position? |

| | |
|-------------------------------|---|
| OOW handing over the watch | I changed to manual steering at .1230.(UTC), because there were several fishing vessels in the area. Keep a sharp lookout. |
| Officer taking over the watch | Is the master advised? |

1.D. Role playing



Hi, I'm the Second mate Nuno.
Welcome aboard!

Unit 1 -Role playing no. 1:

Showing the bridge to a deck cadet and explain the position of equipment and then a brief description of how it is used. (Audio file: Unit 1- Role-playing no.1)

| | |
|---|---|
| Situation | |
| <p>The bulk carrier "Port Estoril" is in Baltimore, alongside a bulk cargo terminal. The ship is loading soya beans. Loading operations have been suspended due to rain. The officer on watch is the 2nd mate, Nuno. Once there are no loading operations, he's on the bridge, making some arrangements before the ship's departure.</p> <p>The deck cadet, Gonçalo, who embarked the ship some hours ago, goes to the bridge to meet the 2nd mate.</p> | |
| Character | Dialogue |
| Deck cadet | <i>Hi! I'm the new deck cadet, Gonçalo. Nice to meet you!</i> |

| | |
|---------------------------|--|
| Gonçalo | |
| 2 nd mate Nuno | <i>Nuno, 2nd mate. Nice to meet you too, Gonçalo! Is this your first time on board?</i> |
| Deck cadet, Gonçalo | <i>Yes, it is. I finished my degree 3 weeks ago and here I am. The chief mate told me to join you on your watch today. After the ship leaves, I'll be with him on the bridge.</i> |
| 2 nd mate Nuno | <i>Good! Now I have some spare time. I don't think there will be more loading today. It's raining heavily. Let me show you around!</i> |
| 2 nd mate Nuno | <i>Here is the bridge console with all the controls for operating most shipborne systems. These screens are the 2 radars and the ECDIS. This is the X-band radar and this one is the S-band. This is the AIS display but it is also connected to this radar here. Now, here is the engine remote control and this is the steering wheel, the gyro and the auto pilot.</i> |
| Deck cadet, Gonçalo | <i>And this screen here?</i> |
| 2 nd mate Nuno | <i>That is the echo sounder. We use it when we are approaching shore and, of course, navigating in restricted waters. We use different range scales according to the depth.</i> |
| Deck cadet, Gonçalo | <i>Ok. I understand.</i> |
| Deck cadet, Gonçalo | <i>Then here are all the controls for navigation lights, alarms, ballast tanks and others. I will explain them to you later. On each bridge wing there are two smaller consoles with repeaters of some of these systems, namely the engine remote control and the gyro compass. It is used when the ship is berthing and we need to see the ship approaching the quay and control it at the same time.</i> |
| Deck cadet, Gonçalo | <i>And when do you use the consoles on the bridge wings?</i> |
| 2 nd mate Nuno | <i>During berthing and unberthing manoeuvres.</i> |
| Deck cadet, Gonçalo | <i>Ok.</i> |
| 2 nd mate Nuno | <i>Now, this is the chart table. We mostly use electronic charts but the master wants us to use paper charts as well, when we are approaching the shore. This is the GPS and the NAVTEX receiver. I suggest you read some of the Operating instructions especially those which are more complicated to operate. I suggest you start with the radar manual.</i> |
| Deck cadet, Gonçalo | <i>And where are the manuals?</i> |
| 2 nd mate Nuno | <i>They're all here on this shelf. You can take them to your cabin but leave a note so that we know where they are. Ok? By the way, the first device you have to know how to operate is the coffee</i> |

| | |
|------------------------|--|
| | <i>machine. There's nothing better than a coffee served by a cadet. Right?</i> |
| Deck cadet, Gonçalo | <i>Right. I'm sure I'll be an expert soon.</i> |

Unit 1 -Role playing no.2

Explain how an equipment works and how it is operated

(listen to audio file: Unit 1, Role-playing no.2)

| | |
|---|---|
| Situation | |
| <p>The ship departed from Baltimore and is now heading to Lisbon, Portugal. It's the day after departure.</p> <p>It is 1630 (ship's time) and the deck cadet is on watch with the Chief Mate, Paul Williams. There is also an AB seaman on the bridge, acting as a lookout.</p> <p>The Chief mate is now explaining the basics of the radar operation to Gonçalo, the Deck cadet.</p> | |
| Character | |
| Chief mate, Paul Williams | <i>Gonçalo, come here! Let me explain how to use the radars. Are you familiar with these models?</i> |
| Deck cadet, Gonçalo | <i>No, sir. We practiced in the simulator and there was also a real equipment which was different from this one.</i> |
| Chief mate | <i>Well, the basics is quite the same but you have to work on it for a while, to familiarize yourself to this one.</i> |
| Deck cadet, Gonçalo | <i>Yes, of course!</i> |
| Chief mate | <i>At sea, we only have one radar ON. The other is usually on stand-by. The main radar is the one with ARPA, of course.</i> |
| Deck cadet, Gonçalo | <i>And when do you have the 2 radars working at the same time?</i> |
| Chief mate | <i>Mainly, when we are approaching port and in reduced visibility.</i> |
| Deck cadet, Gonçalo | <i>Ok.</i> |
| Chief mate | <p><i>Look! Now I switch to Transmit mode, with the cursor on the Transmit soft key and I select 12 miles range scale.</i></p> <p><i>We usually have the radar set up for North Up.</i></p> <p><i>Today we have clear skies so, I do not set the Rain or the Sea clutter. Any questions?</i></p> |
| Deck cadet, Gonçalo | <i>And what about the ARPA? When do you use it?</i> |
| Chief mate | <i>The ARPA is always used. The settings may be different but basically you have to input the ship's speed and then the CPA and TCPA and adjust the vector</i> |

| | |
|------------------------|---|
| | <i>according to the required timeframe. You have to check it out in the radar manual.</i> |
| Deck cadet, Gonçalo | <i>And what is the CPA?</i> |
| Chief mate | <i>It's 6 miles.</i> |

Unit 1 -Role playing no.3

Explaining a malfunction in the radar to the master

(Audio file: Unit 1- Role-playing no.3)

| | |
|---|--|
| Situation | |
| During his watch the Chief mate notices that the main radar is not working. It is turned OFF. He turns it ON again and nothing happens. He checks the Technical Manual for Troubleshooting. When the master arrives on the bridge, he explains her what is happening. | |
| Character | Dialogue |
| Chief Mate | <i>Hi captain! Good evening!</i> |
| Master, Cristina | <i>Hi Tiago! Everything's ok?</i> |
| Chief Mate | <i>Almost! The main radar is not working. It's inoperative. Suddenly, I noticed that the radar was OFF. I turned it ON again and nothing happened. Then I checked the fuses in the power supply and they were ok. The antenna is not rotating so, it must be the main power supply in the transceiver. In fact, it smells like burnt rubber.</i> |
| Master | <i>Did you check for a spare unit?</i> |
| Chief Mate | <i>Yes. We have one. I've asked the electrician to replace it as soon as possible. The other radar is working and there's no traffic in the area. The electrician said he would be here in 10 minutes.</i> |
| Master | <i>Where's the spare unit?</i> |
| Chief Mate | <i>It's right here. I got from the spare parts cabinet. I hope it will solve the problem otherwise we have to require repairs in the next port.</i> |
| Master | <i>Yes, of course.</i> |
| Chief Mate | <i>I think it will be solved by replacing the power supply unit.</i> |
| Master | <i>Let's hope. By the way, how's the cadet going?</i> |
| Chief Mate | <i>So far so good! He's eager to learn and I like his attitude but I think it's still too</i> |

| | |
|------------|--|
| | <i>early to see the whole picture! He's only been here for a week!</i> |
| Master | <i>Yeah, that was my impression too. I'm going now. Let me know about the radar, ok?</i> |
| Chief Mate | <i>Ok. Don't worry.</i> |

Role playing no. 4:

Explaining the preventive maintenance procedures to bridge electronic equipment to a colleague
(Audio file: Unit 1- Role-playing no.4)

| Situation | |
|---|--|
| The 2 nd mate explains some tests and preventive maintenance procedures for the electronic equipment on the bridge to the 3 rd mate, who is new on board. | |
| Character | Dialogue |
| 2 nd mate | <i>Every day we test the radio communications equipment one by one. We also check the batteries of the emergency VHF radios. The EPIRB and the SART are checked once a week. We always register these tasks on the Radio log.</i> |
| 3 rd mate | <i>Do you follow a check list for this?</i> |
| 2 nd mate | <i>Yes, of course. It's in this file here. You can have a look. All the tests and maintenance tasks must be registered here. They are requirements from the SMS (Safety Management System).</i> |
| 3 rd mate | <i>Yeah, I know.</i> |
| 2 nd mate | <i>The batteries are in a locker abaft the bridge wing. You have to check them every 2 weeks. I have built an excel with an extensive list of all the maintenance tasks. It's much easier for you to complete them. Any questions?</i> |
| 3 rd mate | <i>No. It's ok for me.</i> |

1.E. Use of language and Grammar revision

Describing function, purpose and means

Describing Function

What does it do?

It + verb in present tense

An echo sounder measures the depth of the water under the keel.

The function of an echo-sounder is to measure the depth of the water under the keel.

Describing Purpose

What is it used for?

It is used for + gerund of verb

An echo sounder is used for measuring the depth of the water under the keel.

Lubricating oil is used for preventing wear in mechanical parts.

Describing Means

How does it do?

It does by + gerund of verb

A voltmeter measures voltage by connecting the two leads across the terminals of the component

The tuning control changes the frequency by adjusting the variable capacitor.

Verb tenses



REMEMBER

Verbs illustrate actions!

When you **describe** or **report** an event
use the correct tense.

**MAKE SURE THAT
PEOPLE UNDERSTAND WHAT YOU SAY!**

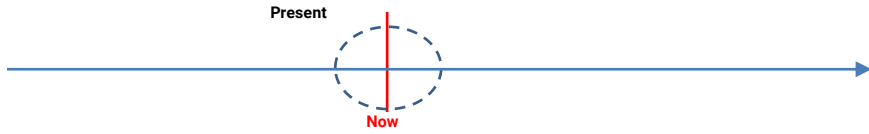


Figure 23: The Time line

| | If someone asks you: | You may answer: |
|--------------------|----------------------------------|--|
| Simple Present | What time are you on watch? | <i>I'm usually on watch from 8 am till noon and from 8 pm till midnight.</i> |
| | What is our present course? | <i>Our present course is 225°.</i> |
| | What radar do you usually use? | <i>We use the main x-band radar.</i> |
| | What ports does this ship call? | <i>The ship always calls Lisbon and Sines but whenever there is cargo, the ship calls Rotterdam and Antwerp.</i> |
| Present Continuous | What's happening? | <i>The steering wheel is not responding!</i> |
| | What's happening? | <i>There is a ship crossing our bow!</i> |
| | What is the cadet doing on deck? | <i>He's helping the bosun and learning how to check the lashings.</i> |

Relative clauses – Defining and non-Defining

Defining Relative Clauses

To give essential information about something (or someone). The clause is introduced by a relative pronoun - **who, that, which, whose** and **whom**.

The defining relative clause comes immediately after the noun it describes and NO commas are used (in writing).

Examples:

He is a man **whose** interests are only focused on his career.

The echo sounder is an equipment **which** is used for measuring the depth of the water.

This is the master **who** was the first female deck officer in portuguese merchant ships.

Note:

In informal speaking, the pronoun **that** is more often used instead of *who, whom* or *which*.

"He's the cadet **that** I told you about".

"Here is the mooring plan **that** the master suggested".

Non-Defining relative clauses

To give extra information about something (or someone). The clause is introduced by a relative pronoun - **who, that, which, whose** and **whom**.

In writing, the commas are used around the non-defining relative clause.

Note:

We don't use **that** to introduce a non-defining relative clause.

Examples:

Captain Cristina, who was the first female deck officer in portuguese merchant ships, is an expert in shipping business.

The echo sounder, which is mainly used for navigation in restricted waters, is quite an important resource in fishing vessels.

End of Unit 1 - Check your knowledge

Exercise 1:

Answer the following questions but make sure you use the correct verb for defining the function or the use of the equipment. The first one is done for you.

1. What is a gyrocompass and what is it used for?
A gyro compass is an electronic device which indicates the true north and it is used for navigating.
(Note: this is good example of a Defining Relative clause!)
2. What is the echo sounder and what is it used for?
3. What is the principle of operation of the echo sounder?
4. How important is the NAVTEX equipment on board a ship?
5. Why is the radar so important for the safety of navigation?
6. What is the meaning of AIS? What is its function as an AtoN??

Unit 2 Safety

Summary:

2.A. - Reading - Terminology

- 2.A.1. Fire prevention, detection and fighting
- 2.A.2. Life Saving Appliances

2.B. Professional situations related to topic:

Reading and understanding the Fire control plan
 Giving instructions to fire party – briefing during drills
 Checking and maintenance of fire detection and firefighting equipment;
 Safety drills on board - Drill for abandoning ship;
 Checking and maintenance of LSA
 Reading and understanding ISM code and company's SMS

2.C. SMCP

- A2/3 ; B2/1; B2/2; B2/3

2.D. Role playing

- Fire in the engine room
- Fire protection - Checking status of equipment
- Briefing during a safety drill.

2.E. Use of English / Grammar

- Verb tenses- Simple Past tense, Present perfect and Past Continuous
- Reported speech
- Report writing

2.A. Fire prevention, detection and fighting

Fire is one of the most common and dangerous emergency situations on board ships and has led to serious results including loss of property and life.

On board a ship there are huge quantities of liquid fuel, there is electrical equipment, air-conditioning plants, engines, boilers, stores of **flammable material** and accommodation areas (the galley, mess rooms, lounges, cabins, etc.). In cargo vessels, the commodities also consist of solid and liquid goods that are flammable or at least combustible, and often of a dangerous nature. In passenger ships the load consists of accommodation and entertainment facilities for the passengers, which are also flammable.

In order to fight a fire, it is essential to understand how it works but also to be aware of how dangerous it is.

The **triangle of fire** is the combination of three elements (air, fuel and heat) that causes fire to take place. This can be easily understood by looking at the Fire Triangle shown below:

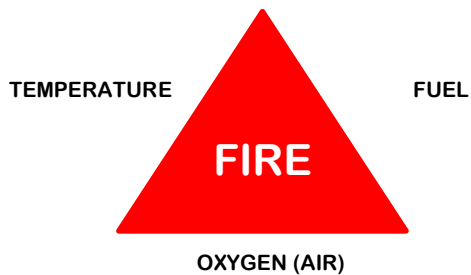


Figure 24: Triangle of fire.

Fire extinguishing means the elimination of at least one of the three elements.

When the three elements get together and there is fire. Its detection should take place as soon as possible. Fire detection can be a great challenge on board a ship and in order **to ensure safety** of people and goods, there are international rules which must be followed.

Fire prevention

Fire prevention comprises all the possible actions to prevent that combination to take place.

Fire detection

On board a ship Fire Detection can be made manually or automatically.

Manual detection is carried out by:

- regular rounds by ship's personnel
- alert and competent ship's crew
- special attention to running machinery for abnormal noise or working temperatures etc.,
- monitoring through Closed Circuit TV (CCTV)

Automatic detection is done by electrical Fire Alarm Control Panel consisting of:

- Smoke and Heat Detectors placed in different parts of the ship
- Heat detectors
- Heat detectors in sprinkler system



Figure 25: Smoke detector.

Fire Fighting

Fire can be easily extinguished if at least one of the three elements is isolated (fuel, heat or air)

- ❖ Removal of fuel is called ➡ **Starving**
- ❖ Removal of heat is called ➡ **Cooling**
- ❖ Removal of air is called ➡ **Smothering**

1) Early stages of fire can be extinguished by:

Portable Fire **Extinguishers** available according to the Fire Plans of the ships.

According to the type of fire, related to the type of materials which are **burning**, so is the type of extinguisher to be used.

There are several types of fire extinguishers, such as:

- Water type extinguishers – for class A (general) fire;
- Foam type extinguishers – for class B (oil) fire;
- CO2 extinguishers – for class C (electrical) fire;
- DCP (Dry Chemical Powder) extinguishers – for class A, B and C fires



Figure 26: Classification of fires.



Figure 27: A Fire extinguisher / fighting a fire with an extinguisher.

2) **Advanced stages of fire can be extinguished by:**

Fire mains and hose reel system (manual actuation) provided in the ship:



Figure 28: Hose reel and IMO Safety sign.

CO2 flooding system (manual or automatic actuation) for machinery compartments

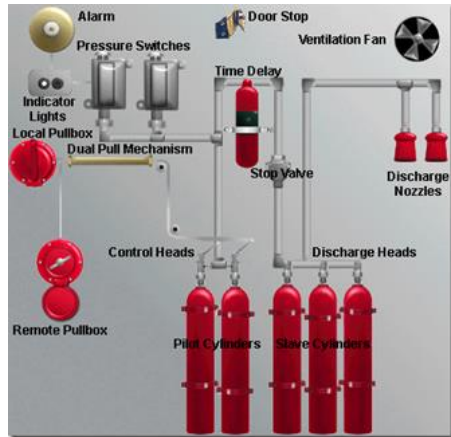


Figure 29: Fixed firefighting system.

Sprinkler system (automatic detection and fighting)

The **sprinkler system** is a shipborne system which can detect, **activate** an alarm and fight the fire.

This system **consists of** a **pressurized** water tank, a **pipng system** leading water to various compartments and the sprinkler heads. The sprinkler heads **are fitted with** temperature detectors, which may be of different types.

When there is an outbreak of fire and the temperature increases suddenly, the **glass detectors** break, the alarm sounds and the **sprinkler heads** spray water onto the surrounding area.



Figure 30: Sprinkler heads.

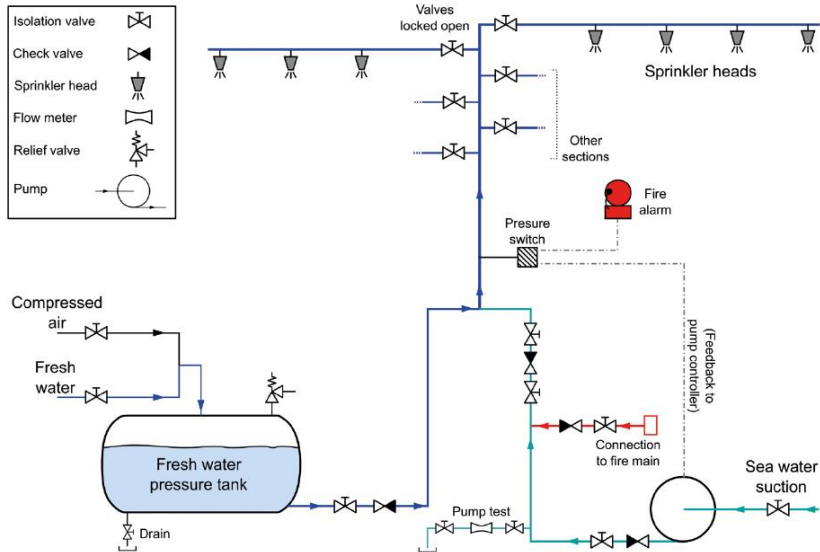


Figure 31: Schematic diagram of a sprinkler system.

Main firefighting system

The ship's main firefighting system integrates a certain number of **fire hydrants, pumps and hoses**.

The fire hydrants and hoses are located in strategic positions on board the vessel and their quantity is determined according to the type of ship and under the requirements of international conventions, namely SOLAS convention. The number of pumps and their capacity is also dependent on the type and tonnage of the vessel. They are dedicated to this emergency system and should not be used for a different purpose.

Hydrants:

The **hydrant outlets** are provided with standard size **flanges** for the **hoses** to be connected. The hoses have **nozzles** attached to them and they can be of two types - **jet** and **spray**, which are meant to be used according with the type of **discharge** required. The **flow** and the type of spray can be easily adjusted by the user (the fireman).



Figure 32: Fire hydrant, on deck.



Figure 33: Fire hose nozzle.

Dedicated pumps:

The pumps **are powered** by the ship's energy supply. However, it is mandatory to have an **emergency fire pump**, with its own independent power supply (to be used in case of main power failure). These pumps are connected to the **main sea water connection**. For safety reasons, the **valves** supplying water to these pumps are always kept open for a constant supply of sea water.

The main firefighting system should only be used on fire **Type A**.

The Fire Control Plan

Chapter II-2 of SOLAS convention describes the requirements and procedures related to the Safety system, also known as Fire Safety System Code (FSS code).

The Fire Control Plan is a mandatory requirement of SOLAS convention described in Regulation 15 of Chapter II. It provides information about the location of the different fire stations and it also explains the type of fire detection system and firefighting systems available on board.

The Fire Control Plan provides a detailed list of equipment and procedures for the **preventing, detecting and fighting** fire on board.

The Fire Control Plan contains information about various **fire alarm systems, sprinkler installation, extinguishing appliances**, means of **escape** to different compartments and decks, and **ventilation system** including particulars of remote operation of **dampers and fans** as well as their **position and marking**.

The Chief Engineer is the head of the Fire Department and responsible for the implementation of the Fire Plan.

The details of the Fire plan are described in a booklet and a copy of it should be supplied to each officer onboard and also easily accessible for everybody. These plans should be kept **up to date**. The fire plan must be available in the **working language** of the crew on board and also in English.

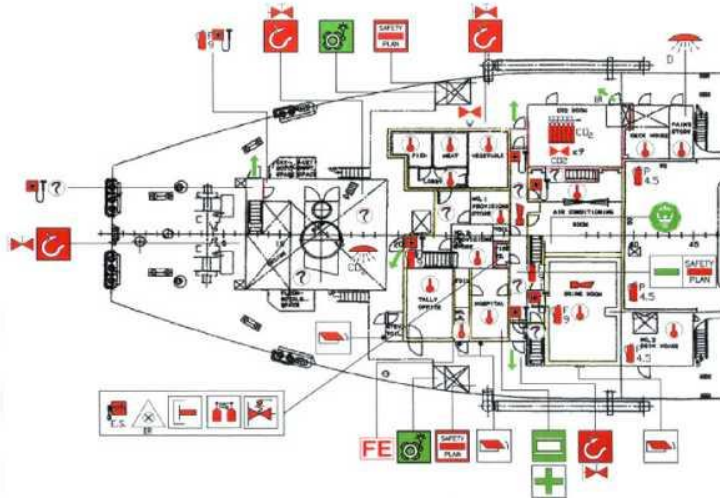


Figure 34: Fire control plan– diagram to be displayed on public locations on board.

(source: <http://www.firesys.com.au>)



Figure 35: Fire alarm panel.

Specific terminology

| Nouns and expressions | | | |
|-----------------------|---------------|------------|---------------|
| English | Your language | English | Your language |
| closed circuit | | fuel | |
| co2 flooding system | | hose | |
| cooling | | hose reel | |
| detection | | hydrant | |
| extinguisher | | nozzle | |
| flammable material I | | prevention | |
| flange | | risk | |
| pipng system | | rounds | |
| seawater connection | | rules | |
| smothering | | safety | |
| starving | | | |







| Verbs | | | |
|------------------------------|---------------|-------------------|---------------|
| English | Your language | English | Your language |
| to burn | | to discharge | |
| to detect | | to lead to | |
| to ensure | | to take place | |
| to fight a fire | | to activate | |
| Verbs (in the passive voice) | | | |
| to be adjusted | | to be fitted with | |
| to be attached | | to be followed | |
| to be checked | | to be ignited | |
| to be detected | | to be jammed | |
| to be displayed | | to be monitored | |
| to be extinguished | | to be powered | |

2.A.2. Life-saving appliances

Life Saving Appliances concern all the equipment intended for the survival of people at sea in case of emergency (distress).

The SOLAS Convention, issued by the IMO, defines and stipulates rules to be observed by merchant ships. Chapter III of this convention is dedicated to Life Saving Appliances which are mandatory to have on board.

They are:

| Appliance | Photo | Definition / use |
|---|---|--|
| Lifebuoy |  | A lifebuoy is mainly used for a situation of "Person Overboard (Man Overboard). |
| Lifejacket |  | The life jacket is used for keeping people afloat. It is fitted with a small lamp and a whistle. |
| Immersion suit |  | An immersion suit is used for keeping the body temperature and prevent hypothermia, when the person is in cold water. |
| Portable VHF Handheld transceiver |  | It is used for short range communications especially during Search And Rescue operations. |
| SART (Search And Rescue Transponder) |  | A SART is a locating device which transmits a signal on the ship radar's frequency and makes a sequence of 12 dots on the screen. The sequence corresponds to the bearing of the life raft's position. |
| EPIRB (Emergency Position Indicating Radio Beacon) |  | An EPIRB transmits a distress alert to a satellite on 406 MHz and the position may be determined by the satellite or by the GPS integrated in the EPIRB. The transmitted signal also contains information which enables the Maritime Rescue Coordination Center (MRCC) to identify the ship. |





| | | |
|--|---|---|
| <p>Free fall lifeboat</p> |  | <p>It is used in case of abandoning ship.</p> |
| <p>Liferaft (insulated)</p> |  | <p>It is used in case of abandoning ship.</p> |
| <p>Liferaft container</p> |  | <p>It is used for stowing and protecting the life raft from the Sun and other elements.</p> |
| <p>Rescue boat</p> |  | <p>It is used for rescue purposes only. (Not very common on board cargo ships)</p> |

Figure 36: Life Saving Appliances.

Lifeboats and Life rafts

A **lifeboat** is a small and **rigid boat** carried on board for **emergency evacuation** in case of an imminent risk of human life. According to the requirements from SOLAS convention (Chapter III), lifeboats should be **unsinkable** in normal circumstances. The **cover** serves as protection from sun, wind and rain and it can also be used for collecting rainwater. It is normally made of a **reflective** or **fluorescent material** that is highly visible at sea. In terms of launching, lifeboats can be of “**free fall**” type (see fig. 34) or **lowered** from **davits** on a ship's deck.



Figure 37: Free fall lifeboat.

Lifeboats are **equipped with oars, flares and mirrors** for **signaling**, first aid supplies, and food and water for several days. They also have an **engine** for propulsion.

The International Convention for the Safety of Life at Sea (SOLAS) and the International **Life-Saving Appliance Code** (LSA Code) requires certain emergency equipment to be carried on each lifeboat and life raft used on international voyages. Modern lifeboats carry an Emergency Position-Indicating Radio Beacon (EPIRB) and a Search and Rescue Transponder (SART).

Lifeboat drills are mandatory on larger commercial ships, according to ISM code.

A life raft is a type of lifeboat but not rigid – it is inflatable. **Inflatable life rafts** may be fitted with auto-inflation (carbon dioxide or nitrogen) **canisters** or **mechanical pumps**. A pressure release mechanism is fitted on ships so that the canister automatically inflates the lifeboat and it becomes free from the sinking vessel.



Figure 38: Cylindrical container holding a life raft.

According to the LSA Code, "... *life rafts must be constructed so as to be capable of withstanding exposure for 30 days **afloat** in all sea conditions. They must also be constructed in such a way that when they are **dropped** into the water from a height of 18 m, the life raft and its equipment will operate satisfactorily*".

The life raft, its gas cylinders and all accessories is stowed in a container made of GRP (Glass Fiber reinforced Plastic). The container protects the life raft from the sun, wind and rain.

The life raft container is then **held** on a **cradle** and secured to it by a **strap** or **stowage wires**. The life raft can be launched onto the sea just by pulling a **lever**. All the stowage components such as steel wires, clip and **turnbuckle** are made of **stainless steel** and quite easy to **handle**, in case of emergency.

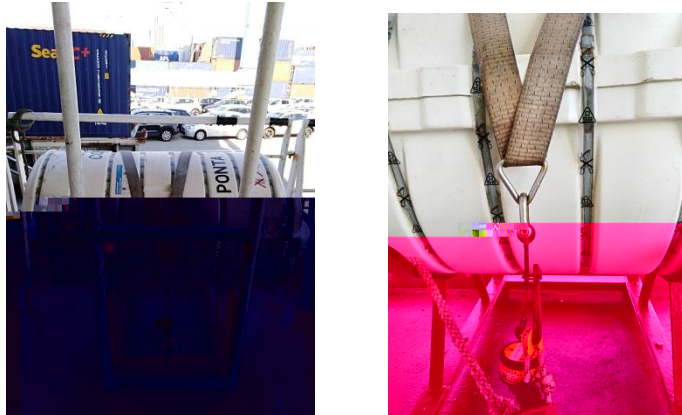


Figure 39: Strap for securing the container to the cradle.

In case the vessel sinks without launching the life raft, the Hydrostatic Release Unit will **be activated** to release the life raft automatically, it will emerge to the surface and then it will float after being inflated.

Regulations and Specifications

Following Extract from SOLAS Convention, Chapter III:

...

Definitions

For the purpose of this chapter, unless expressly provided otherwise:

1 Anti-exposure suit is a protective suit designed for use by rescue boat crews and marine evacuation system parties.

2 Certificated person is a person who holds a certificate of proficiency in survival craft issued under the authority of, or recognized as valid by, the Administration in accordance with the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, in force; or a person who holds a certificate issued or recognized by the Administration of a State not a Party to that Convention for the same purpose as the convention certificate.

3 Detection is the determination of the location of survivors or survival craft.

4 Embarkation ladder is the ladder provided at survival craft embarkation stations to permit safe access to survival craft after launching.

5 Float-free launching is that method of launching a survival craft whereby the craft is automatically released from a sinking ship and is ready for use.

6 Free-fall launching is that method of launching a survival craft whereby the craft with its complement of persons and equipment on board is released and allowed to fall into the sea without any restraining apparatus.

7 Immersion suit is a protective suit which reduces the body heat loss of a person wearing it in cold water.

8 Inflatable appliance is an appliance which depends upon non-rigid, gas-filled chambers for buoyancy and which is normally kept uninflated until ready for use.

9 Inflated appliance is an appliance which depends upon non-rigid, gas-filled chambers for buoyancy and which is kept inflated and ready for use at all times.

10 International Life-Saving Appliance (LSA) Code (referred to as "the Code" in this chapter) means the International Life-Saving Appliance (LSA) Code adopted by the Maritime Safety Committee of

the Organization by solution MSC.48(66), as it may be amended by the Organization, provided that such amendments are adopted, brought into force and take effect in accordance with the provisions of article VIII of the present Convention concerning the amendment procedures applicable to the annex other than chapter I.

11 Launching appliance or arrangement is a means of transferring a survival craft or rescue boat from its stowed position safely to the water.

...

17 Positive stability is the ability of a craft to return to its original position after the removal of a heeling moment.

18 Recovery time for a rescue boat is the time required to raise the boat to a position where persons on board can disembark to the deck of the ship. Recovery time includes the time required to make preparations for recovery on board the rescue boat such as passing and securing a painter, connecting the rescue boat to the launching appliance, and the time to raise the rescue boat. Recovery time does not include the time needed to lower the launching appliance into position to recover the rescue boat.

19 Rescue boat is a boat designed to rescue persons in distress and to marshal survival craft.

20 Retrieval is the safe recovery of survivors.

...

Following, there is another extract from SOLAS Convention Chapt. III, describing the quantity of appliances which are mandatory in cargo vessels according to the type of ship, tonnage and voyages.

SECTION III- CARGO SHIPS (Additional requirements)

Regulation 31

Survival craft and rescue boats

1 Survival craft

1.1 Cargo ships shall carry:

.1 one or more totally enclosed lifeboats complying with the requirements of section 4.6 of the Code of such aggregate capacity on each side of the ship as will accommodate the total number of persons on board; and

.2 in addition, one or more inflatable or rigid liferafts, complying with the requirements of section 4.2 or 4.3 of the Code (Life Saving Appliances Code), stowed in a position providing for easy side-to-side transfer at a single open deck level, and of such aggregate capacity as will accommodate the total number of persons on board. If the liferaft or liferafts are not stowed in a position providing for easy side-to-side transfer at a single open deck level, the total capacity available on each side shall be sufficient to accommodate the total number of persons on board.

1.2 In lieu of meeting the requirements of paragraph 1.1, cargo ships may carry:

.1 one or more free-fall lifeboats, complying with the requirements of section 4.7 of the Code, capable of being free-fall launched over the stem of the ship of such aggregate capacity as will accommodate the total number of persons on board; and

.2 in addition, one or more inflatable or rigid liferafts complying with the requirements of section 4.2 or 4.3 of the Code, on each side of the ship, of such aggregate capacity as will accommodate the total number of persons on board. The liferafts on at least one side of the ship shall be served by launching appliances.

1.3 In lieu of meeting the requirements of paragraph 1.1 or 1.2, cargo ships of less than 85 m in length other than oil tankers, chemical tankers and gas carriers, may comply with the following:

.1 they shall carry on each side of the ship, one or more inflatable or rigid liferafts complying with the requirements of section 4.2 or 4.3 of the Code and of such aggregate capacity as will accommodate the total number of persons on board;

Regulation 6

Communications

1 Paragraph 2 applies to all passenger ships and to all cargo ships of 300 gross tonnage and upwards.

2 Radio life-saving appliances

2.1 Two-way VHF radiotelephone apparatus

2.1.1 At least 3 two-way VHF radiotelephone apparatus shall be provided on every passenger ship and on every cargo ship of 500 gross tonnage and upwards. At least , 2 two-way VHF radiotelephone apparatus shall be provided on every cargo ship of 300 gross tonnage and upwards but less than 500 gross tonnage. Such apparatus shall conform to performance standards not inferior to those adopted by the Organization. If a fixed two-way VHF radiotelephone apparatus is fitted in a survival craft it shall conform to performance standards not inferior to those adopted by the Organization.**

2.1.2 Two-way VHF radiotelephone apparatus provided on board ships prior to 1 February 1992 and not complying fully with the performances standards adopted by the Organization may be accepted by the Administration until 1 February 1999 provided the Administration is satisfied that they are compatible with approved two-way VHF radiotelephone apparatus.

2.2 Radar transponders (SART)

At least one radar transponder shall be carried on each side of every passenger ship and of every cargo ship of 500 gross tonnage and upwards. At least one radar transponder shall be carried on every cargo ship of 300 gross tonnage and upwards but less than 500 gross tonnage. Such radar transponders shall conform to performance standards not inferior to those adopted by the Organization.

The radar transponders shall be stowed in such locations that they can be rapidly placed in any survival craft other than the liferaft or liferafts required by regulation 31.1.4.

(adapted from Korean company Samgong co.)

The Safety Plan

SOLAS convention also stipulates that all ships must show evidence that there is a safety plan easily available for everyone on board.

Safety signs on board ship alert the crew to hazards, equipment, escape routes, etc.

Example of Safety Plans

The following picture Indicates type and location of life saving appliances

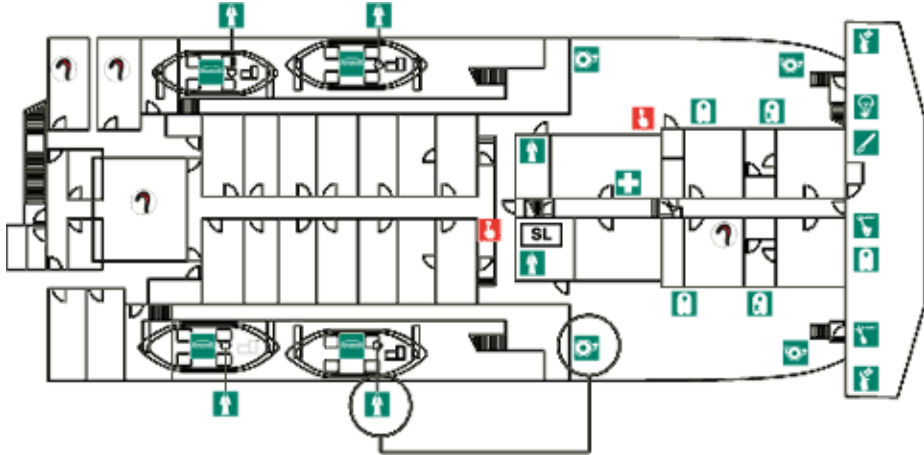


Figure 40: Safety plan.

Example of safety signs



(source) <https://www.yumpu.com>

Figure 41: Safety signs.

Specific Terminology

| Nouns and expressions | | | |
|------------------------|---------------|----------------|---------------|
| English | Your language | In English | Your language |
| appliances | | immersion suit | |
| life saving appliances | | inflatable | |
| bilge pump | | life buoy | |

| | | | |
|----------------|--|-------------------------|--|
| cradle | | life raft | |
| distress flare | | lifeboat | |
| fire pump | | line-throwing appliance | |
| fittings | | oars | |
| float free | | portable VHF | |
| free fall | | strap | |

| Verbs | | | |
|-------------------------------------|----------------------|-------------------|----------------------|
| English | Your language | In English | Your language |
| to brief | | to lower | |
| to float | | to muster | |
| to launch | | to secure | |
| To leak | | to release | |
| Verbs (in the passive voice) | | | |
| to be dropped | | to be launched | |
| to be fitted with | | to be lowered | |
| to be inflated | | to be released | |

2.B. Professional situations related to the topic

- Reading and understanding the Fire control plan
- Giving instructions to fire party – briefing during drills
- Checking and maintenance of fire detection and firefighting equipment;
- Safety drills on board - Drill for abandoning ship;
- Checking and maintenance of LSA (Life Saving Appliances)
- Reading and understanding ISM code and company’s SMS

2.C. IMO Standard Marine Communication Phrases

(extract from IMO Resolution A 22/Res.918 -- Section B - ON-BOARD COMMUNICATION PHRASES - pgs 80 and 81)

Orders for fire fighting

| In English | In your native language |
|---|--------------------------------|
| Start fire fighting. | |
| Take one / two / ... fire fighting teams / ... team(s) to scene. | |
| Go following route | |
| Go through engine room / no. ... hold(s)/tank(s) / superstructure /accommodation / ... space / manhole(s) to ... space / funnel / | |

| | |
|---|--|
| Go from~ outside / inside to ... ~ port side / starboard side to ... ~ ... to | |
|---|--|

| | |
|---|--|
| Take following (additional) safety measures and report. | |
| Have two / ... members in one team. .3.1.1 Number of members in fire fighting team /... team is: | |
| Have lifeline between each other / to outside. | |
| ... team members have lifelines to each other. | |
| ... team has lifelines to outside. | |
| Have rescue team on stand-by. | |
| Maintain visual contact / radio contact on walkie-talkie. | |

| | |
|---|--|
| Fire fighting team must have following outfit: | |
| Fire fighting team must have protective clothing /smoke helmets / breathing apparatus / | |

| | |
|---|--|
| Manning of fire fighting team / ... team(s) as follows: | |
| Chief Officer / Chief Engineer / ... in command of fire fighting team / ... team (no. ...). | |
| Following officer(s) / crew member(s) in fire fighting team /... team: ... | |

| | |
|--|--|
| Use water / foam / powder / CO2 / sand / .. in .. | |
|--|--|

| | |
|---------------------------------------|--|
| Run out fire hoses and report. | |
| Fire hoses run out. | |

| | |
|------------------|--|
| Water on! | |
| Water is on. | |

| | |
|---|--|
| Cool down ... with water and report. | |
| ... cooled down. | |

Cancellation of alarm

| | |
|--|--|
| Is the fire extinguished? | |
| Yes, fire (in ...) extinguished. | |
| No, fire (in ...) not extinguished (yet). | |
| Fire restricted to ... space / area. | |

| | |
|--|--|
| Post a fire watch and report. | |
| Fire watch posted (in ...space / area). | |

| | |
|---|--|
| Fire extinguishing systems / means remain on stand-by. | |
|---|--|

| | |
|---|--|
| Fire fighting team / .. team remain on stand-by. | |
|---|--|

| | |
|---|--|
| Rope off the fire area and report. | |
| Fire area roped off. | |

| | |
|--|--|
| Check the fire area every ... minutes / hour(s) for re-ignition and report. | |
| Fire area checked, no re-ignition. | |
| Fire area checked, re-ignition in ... space / area. | |
| Re-ignition extinguished. | |

| | |
|---|--|
| The fire alarm is cancelled (with following restrictions:) | |
|---|--|

Fire protection - Checking status of equipment

(within a context)

| | |
|------------------------------|---|
| Chief Mate | Mr. Mate, check all fire detection and fire fighting equipment. |
| 2nd Deck Officer | Ok, mr. Chief Mate, will do it right away. |
| Chief Mate | So, Mr. Mate, Is everything in order? |
| 2 nd Deck Officer | Yes, Sir. Everything is in order. |

| | |
|------------------|--|
| Chief Mate | Is everything in order? |
| 2nd Deck Officer | Negative. Fire extinguisher in crew's mess is missing. |

| | |
|--------------------------|--|
| Chief Mate | Mr. Mate, check the fire and smoke alarms and report. |
| 2n Deck officer | Ok. Mr. Chief Mate. |
| 2n Deck officer (on VHF) | 2 nd officer to chief mate, over |
| Chief Mate (on VHF) | Chief mate to 2 nd officer, over |
| 2n Deck officer(on VHF) | Mr. Chief mate, All fire and smoke alarms are operational. |
| Chief Mate (on VHF) | Ok. Understood. You may come to the bridge now |

| | |
|-----------------|---|
| Chief Mate | Check the portable extinguishers and report. |
| 2n Deck officer | All portable extinguishers are in position and operational. |

Context no.5

| | |
|-------------------------|---|
| 2 nd Officer | The inspection tags of the portable extinguishers in the officer's mess are broken. |
| Chief Mate | Ok, but what is the expire date? |
| 2nd Officer | The expire date is July 2015. |
| Chief Mate | Ok. Understood. Then, replace the extinguishers' tags. |

| | |
|-------------------------------|---|
| Chief Mate | Mr. Mate, check the fire and smoke alarms and report. |
| 2 nd mate | Ok. Mr. Chief Mate. |
| 2 nd mate (on VHF) | 2 nd officer to chief mate, over |
| Chief Mate (on VHF) | Chief mate to 2 nd officer, over |
| 2 nd mate (on VHF) | Mr. Chief mate, Smoke alarm(s) in galley are not operational. Will check and report soon. |
| Chief Mate (on VHF) | Ok. Understood. |
| 2 nd mate (on VHF) | Mr. Chief Mate, the fuse in alarm panel is blown. I called electrician to repair it. Smoke alarm will be operational in 30 minutes. |
| Chief Mate (on VHF) | Ok. Mr. Mate. You're dismissed. |

| | |
|-----------------|---|
| Chief Mate | Check the portable extinguishers and report. |
| 2n Deck officer | All portable extinguishers are in position and operational. |

| | |
|-----------------|---|
| Chief Mate | Check the portable extinguishers and report. |
| 2n Deck officer | One of the portable extinguishers in.the crew's mess is missing. It will be replaced as soon as possible. |

IMO STANDARD MARINE COMMUNICATION PHRASES)*(Extract from Section B - ON-BOARD COMMUNICATION PHRASES - pages 73 and 74)*

| English | Your native language |
|---|----------------------|
| Checking status of escape routes | |
| Check the escape routes and report. | |
| All escape routes are clear. | |
| The escape route(s) from ... (to ...) / via ... is / are blocked / not clear (yet). | |
| The escape route(s) from ... (to ...) / via ... will be clear in ... minutes.. | |

| | |
|---|--|
| Check the launching tracks and report. | |
| All launching tracks are clear. | |
| The launching track(s) of no. ...lifeboat / liferaft is / are not clear (yet). | |
| The launching track(s) of no. ... lifeboat / liferaft will be clear in ... minutes. | |

| | |
|---|--|
| Checking status of lifeboats / liferafts | |
| Check the launching tracks and report. | |
| All launching tracks are clear. | |
| The launching track(s) of no. ...lifeboat / liferaft is / are not clear (yet). | |
| The launching track(s) of no. ... lifeboat / liferaft will be clear in ... minutes. | |

| | |
|---|--|
| Check the working parts and report. | |
| All working parts are free. | |
| The roll(s) / block(s) / rigging / ... of no. ...lifeboat is / are not free (yet). | |
| The roll(s) / block(s) / rigging / ... of no. ... lifeboat will be free in ... minutes. | |

| | |
|---|--|
| Check the securings of the launching appliances and report. | |
| All securings are in the correct position. | |
| The securing of no. ... lifeboat / liferaft is not in the correct position. | |
| Correct the position of the securing . | |
| The securing of no. ... lifeboat / liferaft is damaged. | |
| Replace / repair the securing. | |
| The harbour pin(s) of no. ...lifeboat is / are missing. | |
| Replace the harbour pin(s). | |

| | |
|--|--|
| Check the fuel / oil of the lifeboat engine(s) and report. | |
| The fuel tank of no. ...lifeboat engine is full / not full. | |
| Fill up fuel. | |
| The oil level of no. ... lifeboat engine is normal / below normal. | |
| Fill up oil. | |
| Operate the lifeboat engine(s) and report. | |
| All lifeboat engines are operational. | |
| No. ... lifeboat engine is not operational (yet). | |
| No. ... lifeboat engine will be operational in ... minutes. | |

| | |
|---|--|
| Check the bilge pumps of the lifeboats and report. | |
| All bilge pumps are operational. | |

| | |
|---|--|
| The bilge pumps of no. ... lifeboat are not operational (yet). | |
| The bilge pumps of no. ... lifeboat will be operational in ... minutes. | |

| | |
|---|--|
| Check the drain plugs and report. | |
| All drain plugs are available. | |
| The drain plug(s) in no. ... lifeboat is / are missing. | |
| Replace the drain plug(s). | |

| | |
|---|--|
| Check the slip gear in the lifeboats and report. | |
| All slip gear is in the correct position and secured. | |
| The slip gear of no. ... lifeboat is not in the correct position. | |
| Correct the position of the slip gear. | |
| The slip gear of no. ... lifeboat is not secured. | |
| Secure the slip gear | |
| Check the lifeboat equipment and report. | |
| All lifeboat equipment is complete and operational. | |
| The lifeboat equipment is not complete. | |
| Complete the lifeboat equipment. | |

| | |
|---|--|
| Launch / hoist no. ... lifeboat(s) and report. | |
| The launching appliances are operational. | |
| The launching appliances are not operational. | |
| No. ... winch / davit is not operational (yet). | |
| No. ... winch / davit will be operational in ... minutes. | |
| Hoist no. ... lifeboat(s). | |
| Secure the lifeboat(s) and report. | |
| Lifeboat(s) is / are secured . | |

| | |
|---|--|
| Check the liferafts and report. | |
| All liferafts are in position and operational. | |
| No. ... liferaft(s) is / are not operational. | |
| The inflation cord of no. ... liferaft is not secured on board. | |
| Secure the inflation cord. | |
| No. ... liferaft container is damaged. | |
| Replace the liferaft container in the next port. | |

| | |
|--|--|
| The inspection tag of no. ... liferaft is expired. | |
| Replace the liferaft in the next port. | |

2.D. Role playing

Unit 2 - Role playing no. 1:

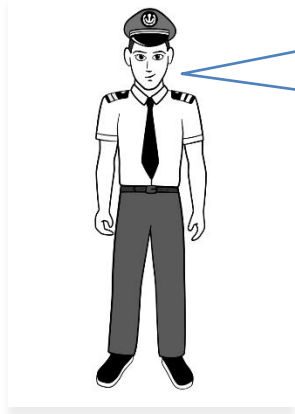
(Audio file: Unit 2- Role-playing no.1)

| Situation | | Fire in the engine room |
|---|--|-------------------------|
| <p>The 2nd mate is on watch and suddenly an alarm from the fire alarm panel sounds. Then, he receives a call from the engine room and the Chief Engineer (CE) informs that there is a fire near the generators. He informs that he has mustered the fire party. A few minutes after the fire alarm, the master is on the bridge.</p> | | |
| Character | Dialogue | |
| Chief Engineer | <i>There's a fire in the workshop near the generators. Fire party is mustered. We will fight the fire soon. Inform the master. Will keep you informed.</i> | |
| 2 nd mate | <i>Ok Chief.</i> | |
| Master | <i>What's going on?</i> | |
| 2 nd mate | <i>The Chief called. There's a fire in the workshop near the generators. He mustered the fire party and said that they were going to fight the fire at once. He also said they would keep us informed.</i> | |
| Master | <i>Sound the fire alarm. I'll wait for 2 minutes. If there's no call I'll send the seaman down there.</i> | |
| 2 nd mate | <i>Ok. I'll sound the fire alarm.</i> | |
| Master | <i>(telephone rings) Hello! This is Master.</i> | |
| Chief Engineer | <i>Master, the fire is now under control. We are cooling adjacent areas.</i> | |
| Master | <i>What was the origin?</i> | |
| Chief Engineer | <i>We still don't know exactly. We have to check.</i> | |
| Master | <i>Ok. Keep me informed, please. Thanks.</i> | |
| Chief Engineer | <i>Ok master.</i> | |

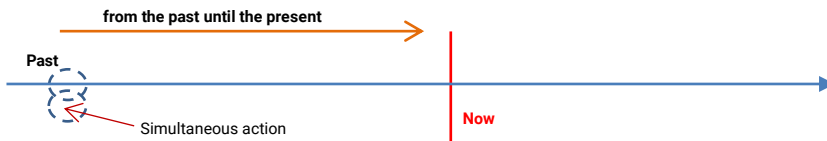
Unit 2

2.E. Use of Language and Grammar revision

Verb tenses



REMEMBER
Verbs illustrate actions!
 When you **describe** or **report** an event which happened in the past use the correct tense.
MAKE SURE THAT PEOPLE UNDERSTAND WHAT YOU SAY!



Use of the Simple past – action happened in the past but it is finished.

Use of the Present Perfect – action began in the past but it has not been finished.

Use of the Past Continuous – describing 2 simultaneous actions occurred in the past.

Figure 42: The Time line

| | If someone asks you: | You may answer: |
|------------------------|---|---|
| Simple Past | What happened? | The Engine room fire alarm <u>sounded</u> . |
| | What time did the alarm sound? | It <u>sounded</u> at 1305. |
| | Where was the fire? | The fire <u>was</u> in the engine turbocharger. |
| | What ports did the ship call? | The ship <u>called</u> Lisbon and Vigo. |
| Present Perfect | How long have you been on this ship? | I <u>have been</u> on this ship for 2 months. |
| | Have you detected the origin of the fire? | No, I <u>have not detected</u> the origin. |
| | Have you called the master? | Yes, I <u>have</u> (called the master). |

| | | |
|------------------------|--|---|
| Past Continuous | What were you doing when I called you? | <i>When you called me <u>I was checking</u> the batteries on the fly bridge.</i> |
| | | <i>While the 2nd mate <u>was preparing</u> the passage plan, the deck cadet <u>was acting</u> as a lookout, on the bridge.</i> |
| | | <i>By the time the fire started, I <u>was resting</u> in my cabin.</i> |

Reported Speech

When reporting what people said (reported / indirect speech) the verb tense usually changes. Reported Speech is mostly used for **reporting an event which happened before we speak** (in the past) or **to report what people said** in the past. Therefore, the verbs have to be in the past.

For example:

| Direct speech | Indirect speech |
|--|---|
| <i>"I'm going to check the radar ", he said.</i> | <i>He said he was going to check the radar.</i> |

Tense change

As a rule when you report something someone has said you go back a tense: (the tense on the left changes to the tense on the right):

| Direct speech | Indirect speech |
|---|---|
| Present simple She said, "It's cold outside." | Past simple She said it was cold outside. |
| Present continuous He said, "I'm calling on VHF." | Past continuous He said that he was calling on VHF. |
| Present perfect simple She said, "I've been on the ship for 4 months." | Past perfect simple She said she had been on the ship for 4 months. |
| Present perfect continuous The Chief Mate said, "I've been waiting for a promotion for seven months." | Past perfect continuous The Chief Mate said that he had been waiting for a promotion for seven months. |
| Past simple She said, "I sent the telex yesterday." | Past perfect She said she had sent the telex yesterday (the day before). |
| Past continuous The master said, "I was calling the shipowner" | Past perfect continuous the master said that he was calling the shipowner |
| Past perfect She said, "The ship had already started to manoeuvre when I called on VHF." | Past perfect NO CHANGE - She said the ship had already started to manoeuvre when She called on VHF. |
| Past perfect continuous She said, "I'd already been checking its track on the radar." | Past perfect continuous NO CHANGE - She said that she had already been checking its track on the radar. |

Modal verb forms also sometimes change:

| Direct speech | Indirect speech |
|--|--|
| will She said, "I'll teach you how to use the sextant tomorrow." | would She said she would teach me how to use the sextant tomorrow. |
| can The Bosun said, "I can check the windlass immediately ." | could The Bosun said that he could check the windlass immediately.. |
| must The master said, "I must have the voyage plan by tomorrow morning." | had to The Master said that he had to have the voyage plan the next morning. |
| shall She said, "What shall you have for dinner?" | should She asked what I should have for dinner. |
| may She said, "May I open a new browser?" | might She asked if she might open a new browser. |

Note - There is no change to; could, would, should, might and ought to.

| Direct speech | Indirect speech |
|--|---|
| "I might go ashore this afternoon", he said. | He said that he might go ashore in the afternoon. |

Time change

If the reported sentence contains an expression of time, you must change it to fit in with the time of reporting.

For example we need to change words like *here* and *yesterday* if they have different meanings at the time and place of reporting.

| Now | + 24 hours - Indirect speech |
|---------------------------------------|---|
| "Today's lesson is on presentations." | She said yesterday's lesson was on presentations. or She said yesterday's lesson would be on presentations. |

| Expressions of time if reported on a different day | |
|--|----------------------|
| this (evening) | that (evening) |
| Today | yesterday ... |
| these (days) | those (days) |
| now | then |
| (a week) ago | (a week) before |
| last weekend | the previous weekend |
| here | there |

| | |
|-------------|------------------------|
| next (week) | the following (week) |
| tomorrow | the next/following day |

In addition if you report something that someone said in a different place to where you heard it you must change the place (here) to the place (there).

For example:-

| | |
|----------------------------------|---|
| At work | At home |
| "How long have you worked here?" | She asked me how long I had worked there. |

Reporting Verbs

Said, told and asked are the most common verbs used in indirect speech.

We use **asked** to report questions: ----- For example: I **asked** Lynne what time the lesson started.

We use **told** with an object. ----- For example: Lynne **told** me she felt tired.

!Note - In the previous sentence, the object is "me"!

We usually use **said** without an object. ----- For example: Lynne **said** she was going to teach online.

If said is used with an object we must include **to** ; -----For example: Lynne **said to me** that she'd never been to China.

!Note – However, we usually use **told**. ----- For example: Lynne **told me** (that) she'd never been to China.

There are many other verbs we can use apart from said, told and asked.

These include:-

accused, admitted, advised, alleged, agreed, apologised, begged, boasted, complained, denied, explained, implied, invited, offered, ordered, promised, replied, suggested and thought.

Using them properly can make what you say much more interesting and informative.

For example:

He asked me to come to the party:-

He invited me to the party.

He begged me to come to the party.

He ordered me to come to the party.

He advised me to come to the party.

He suggested I should come to the party.

Use of 'That' in reported speech

In reported speech, the word **that** is often used.

*For example: He told me **that** he lived in Greenwich.*

However, **that** is optional.

For example: He told me he lived in Greenwich.

!Note - That is never used in questions, instead we often use *if*.

For example: He asked me if I would come to the party.

Report writing

I Structure of the Report

Introduction

State the purpose/aim of the report, when and how the information was gathered.

Main Body

All the information collected and analysed is presented clearly and in detail (break down the respondents into groups according to sex, age and place of residence, state the main differences between groups). Subheadings, numbers or letters can be used to separate each piece of information.

Conclusion

Sum up the points mentioned above. If necessary a recommendation can be included as well (one way of summing up is making some general comments).

II Useful hints and phrases:

Present Tenses, Reported Speech and an impersonal style should be used in survey reports. Use a variety of reporting verbs such as claim, state, report, agree, complain, suggest, etc.

When reporting the results of a survey, the figures gathered should be given in the form of percentages and proportions. Expressions such as "one in four" or "six out of ten" can be used, or exact percentages e.g. 25% of the people questioned, 68% of those who filled in the questionnaire, etc. Less exact expressions such as: the majority of those questioned, a large proportion of, a significant number of, etc. can also be used.

III Useful language for reports:

To introduce: The purpose/aim of this report, As requested, This survey was carried out/ conducted by means of...,the questionnaire consisted of etc.

To generalize: In general, generally, on the whole, etc.

To refer to a fact: The fact is that..., In fact, In practice, etc.

To conclude/ summarise: In conclusion, All things considered, To sum up, All in all, It is not easy to reach any definite conclusions, If any conclusions may be drawn from the data, It is clear that, The survey shows/indicates/demonstrates, etc.

IV A draft of a Sample Report

Survey of

On 8th February 1999, a survey was conducted by (who) at/ on (where)

The purpose of the survey was to (why)

The survey was conducted by means of a (how)

..... (main body of the report)

It is/ was concluded that

Recommendations

End of Unit 2 - Check your knowledge

Exercise 1:

- a) Define triangle of fire
- b) What is the international convention that rules most of the safety devices on board?
- c) What is a sprinkler system?
- d) What is a Fire Plan?

Exercise 2 :

Read the Standard Marine Communication Phrases and explain the meaning of the terms which are underlined:

Check the fire mains and report.

Fire mains is

The hydrant(s) in ... is / are not operational (yet)..

Hydrant is

The hose(s) to hydrant(s) in ... is / are worn/ cut.

Hose is

Worn means

The hose(s) / spanner (s) / nozzle(s) to hydrant(s) in ... is / are missing.

Replace the missing hose(s) / spanner(s) / nozzles(s).

The fire pump(s) in ... is / are not operational (yet).

Fire pump is

The water pipe(s) in ... is / are leaking.

Leaking means

The water pipe(s) in ... is / are blocked.

Blocked means

Exercise 3:

- a) The master said: "Don't forget to prepare the accommodation ladder for the pilot".
- b) Pilot to the OOW: "What is your present course?"
- c) The Chief Engineer called the Master and said: "We are having a problem with the engine but it will be solved in less than 1 hour".
- d) The VTS operator said: "Instruction: you must alter your course to 170°."
- e) The master said: "I advise you to check the position every 10 minutes."
- f) The Master said: "Have you transmitted the MREP to the VTS?"
- g) The agent told the master: "Master, bunkering is settled for tomorrow at 0800. Galp can only supply 20MT of IFO".
- h) The pilot station transmitted the following: "Pilot will board your vessel at 1200. Please prepare ladder on starboard side."

Exercise 4**Situation 1:**

| | |
|-----------------|---|
| Situation | Handing over the watch |
| Time | 0400 |
| People involved | Chief Officer and 2nd Officer |
| | |
| Chief Officer | <i>There are 2 vessels on our port bow. One is abeam at a distance of 5 nm and will cross our port quarter. The other, Polar Wind, is 6 nm from us on our port bow. She manoeuvred 5 minutes ago but she's still on collision course. Be aware!</i> |
| 2nd officer | <i>Did you make any contact with any of them?</i> |
| Chief Officer | <i>No.</i> |

Situation 2:

| | |
|----------------------------|--|
| Situation | Arrival at waiting buoy and preparing for anchor |
| Time | 0200 |
| People involved | Master, 2nd officer and Bosun |
| | |
| 2nd officer (on the phone) | <i>Master, it's 0200. We will arrive at the waiting buoy in 20 minutes.</i> |
| Master (on the phone) | <i>I will be on the bridge in 5 minutes. Call the Bosun and tell him to muster the anchor party and go to the bow.</i> |
| 2nd officer (on the phone) | <i>OK. Master, I will call the Bosun and tell him to muster the anchor party and go to the bow.</i> |
| Master | <i>At 0205 the master is on the bridge. At 0210 Why isn't the Bosun at the bow?</i> |
| 2nd officer | <i>I gave him your instructions and he agreed to them. I will call him again. 0212 2nd officer calls the Bosun and there is no response. Master, he is not responding. I have to go on deck and check what is happening.</i> |

Unit 3 - Navigation

Summary:

3.A- Reading - Terminology

- 3.A.1. Types of navigation
- 3.A.2. Colreg – Rules of the road
- 3.A.3. Buoyage
- 3.A.3. Meteorology

3.B. Professional situations related to topic:

Read and understand nautical publications; use navigational equipment correctly
Situational awareness and risk assessment in dense marine traffic ; decision making and action taking to avoid collision;
Identify buoys and signs as aids to navigation, during the day and at night

3.C. SMCP

- Meteorological warnings
-

3.D. Role playing

- Types of Navigation
- Colreg – Rules of the road
- Buoyage

3.E. Use of English/Grammar

- Modal verbs
- Passive voice

3.A. Types of Navigation

Navigation can be defined as the action of taking the ship safely from the **port of origin** to the **port of destination**.

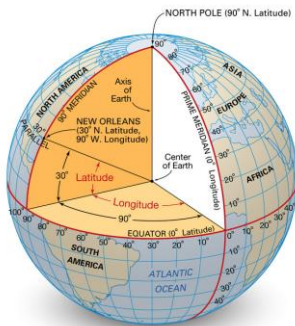


Figure 43: The globe and illustration of latitude and longitude.

(source: <https://www.britannica.com>)

Latitude measurements
 Portuguese seamen determined latitude by observing the elevation angle of the polestar—that is, the angle between its direction and the horizontal. They knew from astronomical studies that the star does not lie exactly on the extension of the Earth's axis, so that it appears to move daily in a small circle around the celestial pole, but the necessary correction (as much as 3 1/2° in the 15th century) could be applied by noting the position of the nearby star Kochab. When the navigators got close to the Equator, these stars fell below the horizon; there it became necessary to rely on observing the altitude of the noonday Sun and calculating latitude with the aid of an almanac.
 (source: <https://www.britannica.com>)

Navigation involves the determination of position and direction by different instruments and techniques. It is the navigator's task (Deck Officers in merchant vessels) to be constantly monitoring and controlling the ship's position throughout her track, at sea.

| Concept | Definition / Description |
|------------------|---|
| Latitude | The angular distance north or south of the equator. Latitude is expressed in degrees ranging from 0° at the Equator to 90° at the North and South poles. Latitude North Pole - 90° N Latitude South Pole - 90° S. |
| Longitude | The angular distance east or west of the Greenwich meridian. Longitude is expressed in degrees ranging from 0° at the Greenwich meridian to 180° east and west. |

Table 5: Latitude and Longitude.

After departure from a port, by starting the voyage, the master **sets a course** for the ship to be underway for the next port. However, it will be necessary to **change course** in order **to make head way** to her destination.

It will also be necessary **to change the course** several times in order **to make the course good**.

| Concept | Definition / Description |
|----------------------------|--|
| Course | the intended direction of movement of a vessel through the water in order to reach the destination that the ship is bound for . The course is expressed in 360 degree notation from north |
| Course made good | the course which a vessel makes "good" over ground, after allowing for the effect of currents, tidal streams and wind . |
| Heading of the ship | is the horizontal direction of the vessel's bow at a given moment measured in degrees clockwise from true north. |

Table 6: Course and heading.

| Position can be expressed in: | | Example |
|-------------------------------|--|--|
| Latitude | in degrees and minutes and decimals of a minute, 0 to 90° North or South of the Equator. | <i>Dangerous wreck in position 15 degrees 34 minutes North 061 degrees 29 minutes West."</i> |
| Longitude | in degrees and minutes and decimals of a minute, 0 to 180° East or West of Greenwich. | <i>My position is 34° 23.5' N and 015° 20.5' W</i> |
| Bearing | is relative to a well-defined charted object. The bearing shall be in the 360° notation from true north and shall be that of the position FROM the mark. | <i>"Your position bearing one three seven (137) degrees from Big Head lighthouse.</i> |

Table 7: Position being expressed.



Figure 44: Navigational chart and a ruler.

| Others in navigation are expressed in ... | | Example |
|---|--|---|
| Distance | in nautical miles (= 1852 metres) or cables (tenth of a mile). | <i>"My position bearing 137 degrees from Cabo da Roca lighthouse, distance 2 nautical miles".</i> |
| Speed | in knots (nautical miles per hour) and means "speed through the water". The term "ground speed" means the speed over the ground. | <i>"My present speed is 20 knots"</i> |
| Bearing (or azimuth) | in the 360° notation from true north, of a conspicuous point or another vessel. | <i>Tug boat is 120 degrees from you.</i> |
| Relative bearings | in degrees relative to the vessel's head (bow). This is usually in relation to the port or starboard bow. | <i>Buoy is 45 degrees on your port bow.</i> |

| | | |
|-----------------|---|--|
| Drifting | When the ship is driven away from her course due to wind, current or tide, then the ship is drifting. | <i>The ship is drifting 2° to starboard due to wind.</i> |
|-----------------|---|--|

Table 8: Other concepts in navigation.

Navigation techniques

| Navigation technique | Brief description | Instrument /equipment used |
|-----------------------------|---|---|
| Celestial navigation | <p>the observation of celestial bodies such as the Sun, Moon, planets and stars.</p> <p>By knowing which point on the rotating earth a celestial object is above and measuring its height above the observer's horizon.</p> <p>A chronometer is used to register the exact time of the observation and the nautical almanac is necessary for making the calculations.</p> | <ul style="list-style-type: none"> ✓ Sextant - to measure the body's angular height above the horizon. ✓ Nautical almanac and Chronometer |

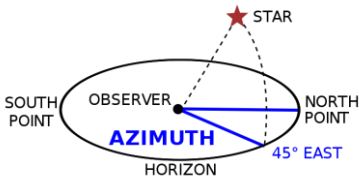


Figure 45: Azimuth.



Figure 46: Officer using the sextant

| Navigation technique | Brief description | Instrument /equipment used |
|------------------------------|--|---|
| Dead reckoning DR | The next position over the track of the ship is calculated by using the previous position , the ship's speed and then calculate the amount of miles travelled and have a position over the ship's | <ul style="list-style-type: none"> ✓ Speed log ✓ Navigational chart ✓ Chronometer ✓ Divider |
| Estimated position | | |

| | | |
|-----------|--|--|
| EP | <p>course, it is called a DR position. By correcting the DR position for leeway, current effects, and steering error the result is an estimated position or EP.</p> | |
|-----------|--|--|

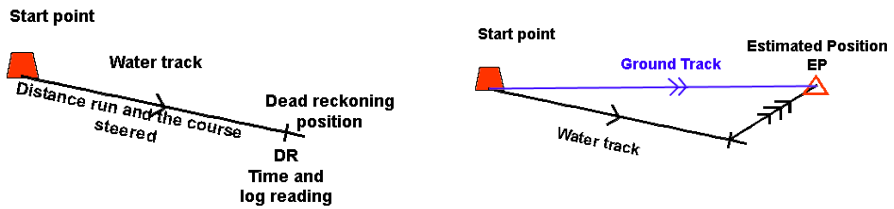


Figure 47: DR fix and Estimated position

| Navigation technique | Brief description | Instruments/equipment used |
|---------------------------|---|--|
| Coastal navigation | <p>The position is calculated by taking bearings to landmarks, both natural and manmade. With the minimum of two bearings it is possible to have a fix on the navigational chart.</p> | <ul style="list-style-type: none"> ✓ Navigational chart ✓ Gyrocompass repeater ✓ Bearing marker |

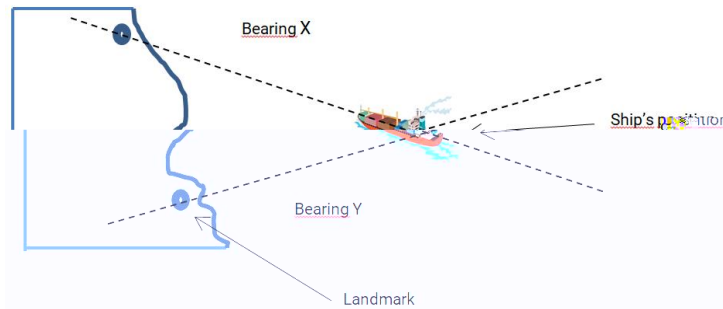


Figure 48: Principle of coastal navigation.

| Navigation technique | Brief description | Instruments /equipment used |
|----------------------|---|--|
| Pilotage | <p>navigating a vessel in restricted waters and fixing its position as precisely as</p> | <ul style="list-style-type: none"> ✓ Navigational chart (and electronic navigational chart) |

| | | |
|--|--|--|
| | <p>possible at frequent intervals. Accurate preparation and attention to detail are important.</p> | <ul style="list-style-type: none"> ✓ Gyrocompass repeater and bearing marker ✓ Radar |
|--|--|--|

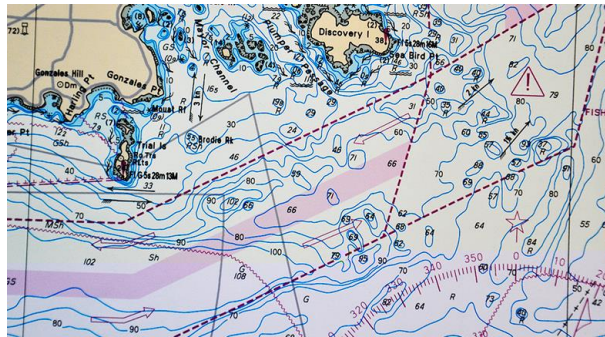


Figure 49: Navigation in restricted waters. (navigational chart).



Figure 50: Navigation in restricted waters.

| Navigation technique | Brief description | Instrument /equipment used |
|--|--|--|
| <p>Radio direction finding (presently not used for navigation)</p> | <p>Similar to coastal navigation. Bearings are defined by RDF signals transmitted by radio beacons, the radio version of a lighthouse. An RDF receiver with a highly directional antenna indicates the bearing of the direction of the radio beacon. The range of radio beacons transmitting in MF is less than 200 miles.</p> | <ul style="list-style-type: none"> ✓ Radio direction finder ✓ Radio beacon |

| | | |
|--|---|--|
| | (not in use for navigation but used by VTS stations for tracking the position of certain vessels) | |
|--|---|--|

| Navigation technique | Brief description | Instrument /equipment used |
|-------------------------|---|---|
| Radar navigation | On the radar display, distances and bearings to charted objects or landmarks can be measured and then have a fix (position on a navigational chart) The vessel must be within radar range of land or special radar aids to navigation. | <ul style="list-style-type: none"> ✓ Navigational chart ✓ Radar |



(By Hervé Cozanet - <http://www.marine-marchande.net/>, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=925865>)

Figure 51: Screen of a radar.

| Navigation technique | Brief description | Instrument /equipment used |
|-----------------------------|--|--|
| Satellite navigation | This technique uses a network of satellites (Global Positioning System), a radio receiver and an antenna. The receiver decodes the signals received from the satellite and determines the position of the vessel. The position (in latitude and longitude) is then showed on the display of the equipment. | <ul style="list-style-type: none"> ✓ GPS receiver (or another positioning system equipment) |



Figure 52: Global positioning system - constellation of satellites

3.A.2. Rules of the road - COLREG

Navigation lights and shapes

Navigation lights are essential for vessels to be sighted and for the other vessels to determine the **relative position** and **angle** and thus evaluate if there is danger of collision.

The International Regulations for Preventing Collisions at Sea (established in 1972) stipulate the requirements for the navigation lights on a vessel.

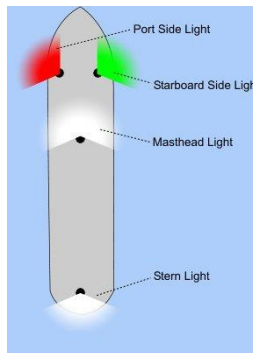


Figure 53: Basic navigation lights on board a ship (<http://www.nauticalsoftware.com>).

Extract from COLREG

Rule 21

Definitions

(a) **'Masthead light'** means a white light placed over the fore and aft centerline of the vessel showing an unbroken light over an arc of the horizon of 225 degrees and so fixed as to show the light from right ahead to 22.5 degrees abaft the beam on either side of the vessel.

(b) **'Sidelights'** means a green light on the starboard side and a red light on the port side each showing an unbroken light over an arc of the horizon of 112.5 degrees and so fixed as to show the light from right ahead to 22.5 degrees abaft the beam on its respective side. In a vessel of less


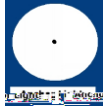
| | | | |
|-------------------------------|--|---|-------------------|
| <p>Towing Light</p> | <p>yellow light placed as near as is practicable at the stern. The light shine in an arc of 135 degrees.</p> |  | <p>Rule 21(d)</p> |
| <p>All-round Light</p> | <p>all-round light shines all around 360 degrees – white anchor light.</p> |  | <p>Rule 21(e)</p> |

Table 9: Navigation lights - Types of lights.



Figure 55: Mast of a cargo vessel with the navigation lights.

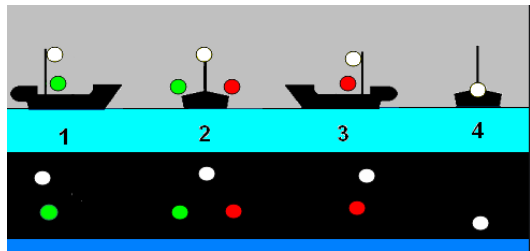


Figure 56: Basic lighting configuration.
<http://www.nauticalsoftware.com>

1. Vessel crossing from your starboard side;
2. Vessel dead ahead facing your bow;
3. Vessel crossing from your port side;
4. Vessel ahead of you on the same course.

Basic rules

| | |
|----------|---|
| <p>1</p> | <p>a vessel has the sidelights red and green and a stern light when it is underway (i.e. not anchored, moored or secured to a dock);</p> |
| <p>2</p> | <p>if a vessel is under power it will have one or two masthead lights depending on its length < 50 meters - one light and > 50 meters – two lights.</p> |

| | |
|---|--|
| | Since it is underway, it will also have the red, green sidelights and a stern light; |
| 3 | a vessel that is anchored will only have one or more 360° white anchor lights depending on its length < 50 meters – one anchor light; > 50 meters < 100 meters – two anchor lights one at the bow and one at the stern; > 100 meters – two anchor lights, one at the bow and one at the stern plus deck lights. |
| 4 | a sailboat (i.e. a boat under sail alone) will have red and green sidelights and a stern light (since it is not under power, it will not have a masthead light) |

Table 10: Basic rules - COLREG

In addition to the above, a vessel will have other lights and day shapes to characterize the nature and activity-

Lights with special significance

| Status | Lights | COLREG |
|---|--|-------------------------------|
| At anchor (<50 Meters length) | An all-round white light placed where it may best be seen. | Rule 30(a) |
| At anchor (>50 Meters < 100 Meters length) | An all-round white light in the fore part An all-round white light at or near the stern. If there are two lights, the forward light is higher than the aft light. | Rule 30(b) |
| At anchor (length > 100 Meters) | An all-round white light in the fore part An all-round white light at or near the stern; Use working or other lights to illuminate the decks. | Rule 30(c) |
| Vessel Not under Command | Two all around Red lights, inline, one above the other; | Rule 27(a)(i)&(ii) |

Table 11: Lights with special significance.

Day Shapes

The status of a vessel must also be indicated during the day and navigation light cannot be visible. Therefore, there are mast head signals, named Day Shapes, which indicate the status of a vessel. These are geometric shapes such as **ball, cylinder, cone** and **diamond**. When they are hung from a mast, alone or associated, they indicate the status of the vessel.

The color of **Day Shapes** is **black** and their sizes are defined in COLREG.

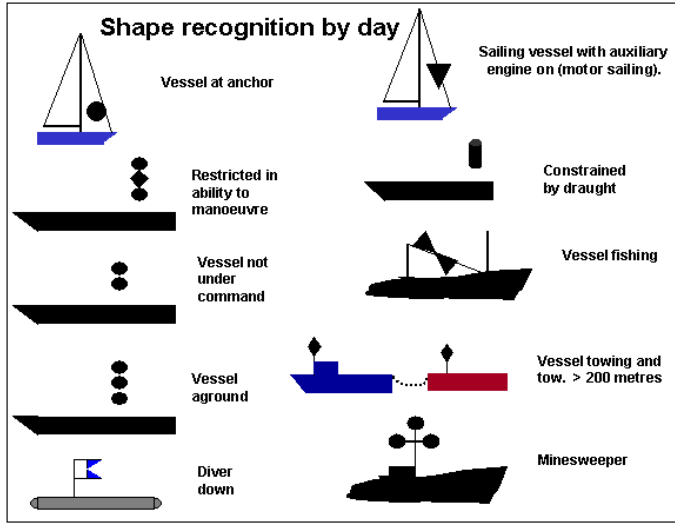


Figure 57: Day shapes

| Navigational status | Day shape | Restriction |
|------------------------------------|-------------------------|--|
| Vessel Under Sail & Power | Cone | > 12m |
| Anchored | Ball | > 7m (not in channel) > 20m (in anchorage) |
| Constrained by Draft | Cylinder | |
| Aground | 3 Balls (vert. line) | > 12m |
| Not Under Command | 2 Balls (vert. line) | > 12m |
| Restricted in Ability to Manoeuvre | 1 Ball+1 Diamond+1 Ball | > 12m (except dive boats) |
| Fishing (commercial) | 2 Cones (vert. line) | > 20m |
| Vessel Towing | Diamond | Tow > 200m |
| Vessel Being Towed | Diamond | Tow > 200m |

Table 12: Day shapes.

Rules of the Road

The International Convention to Avoid Collisions at Sea, also known as COLREG, is issued by the International Maritime Organization (IMO). The convention comprises the regulations that must be followed by those who navigate at sea as well as marine traffic controllers. The terms that follow are those specified in the convention and are applied to ships at sea or in restricted waters and define their priorities.


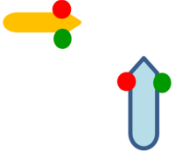







| Colreg term | Description | Illustration |
|--|--|--|
| <p>Stand-on (or non give-way) vessel</p> <p>My ship </p> | <p>My vessel has priority.</p> <p>My vessel does not have to manoeuvre (depending on the situation)</p> <p>When sighted, the other vessel which sees my vessel's port side or, in the dark, the red light.</p> <p>The other vessel should manoeuvre - to starboard.</p> |  |
| <p>Give way vessel:</p> <p></p> | <p>My vessel does NOT have priority.</p> <p>My vessel should manoeuvre (depending on the situation).</p> <p>When sighted, the other vessel which sees my vessel's starboard side or, in the dark, the green light. The other vessel (the stand-on vessel) does not have to manoeuvre.</p> |  |
| <p>Overtaking vessel</p> <p></p> | <p>My vessel comes from a bearing equal or above 112.5° at either side of the overtaken vessel. My vessel (the overtaking vessel) can only see the stern light of the vessel ahead and, in result of this, it is up to my vessel to alter course in order to pass safely, avoiding a close quarter situation.</p> |  |
| <p>Overtaken vessel</p> <p></p> | <p>My vessel sees the other vessel abaft the beam at a bearing equal or above of 112.5°. My vessel must maintain her course and speed, and it is up to the Overtaking Vessel to alter course</p> |  |
| <p>Dead ahead vessels / Head-on vessels</p> | <p>Vessels whose bows are steaming in range or near in range to each other.</p> <p>Both vessels should change course to starboard in order to give a safe berth or CPA (closest point of approach).</p> |  |

Figure 58: COLREG – traffic situations

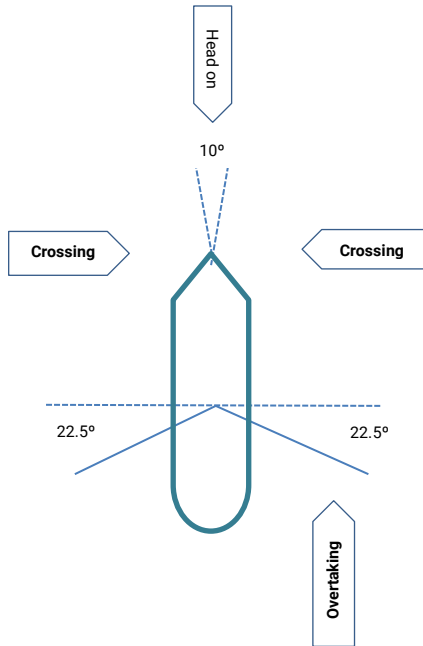


Figure 59: COLREG.

Sound Signals

Part D of COLREG, defines and describes the use of sound signals according to different circumstances.

There are three types of sound-signal equipment mentioned in the Rules.

| Sound signal equipment | | |
|------------------------|----------------|-----------------------------------|
| 1 | Whistle | |
| 2 | Bell | |
| 3 | Gong | Only for vessels >100 metres long |

Table 13: Sound signal equipment.

Note: The whistle and gong are used by larger vessels when anchored in poor visibility in addition to the normal sound signals.

| Blast | Equipment | Duration |
|-------------|-----------|----------------|
| Short blast | whistle | 1 second |
| Long blast | whistle | 4 to 6 seconds |

Table 14: Sound blasts.

When the ship is sailing, the following basic signals may be used to communicate with other ships:

| Blast | Meaning |
|---|---|
| One short blast | I am turning to starboard |
| Two short blasts | I am turning to port |
| Three short blasts | I am going astern |
| One long blast | I am moving (usually used in fog or at blind turns) |
| One long blast followed by two short ones | I am not under command |
| Five short rapid blasts | What are your intentions? |

Table 15: Sound basic signals.

Distress signals

As it is stipulated in Annex IV of COLREG, sound signals (among others) may also be used to require assistance, in a Distress situation.

Quote:

1. The following signals, used or exhibited either together or separately, indicate distress and need of assistance :

(a) ...

(b) a continuous sounding with any fog-signalling apparatus; ...

Buoyage

The **IALA** (International Association of Lighthouses and Aids to Navigation) is a non-governmental body that has worked over the years for the **improvement** of **navigational aids**. The implementation of **IALA buoyage system** began in the 1980s.

The IALA maritime buoyage system has helped mariners to navigate anywhere in the world and to fix their position more easily and therefore avoid dangers without uncertainty.

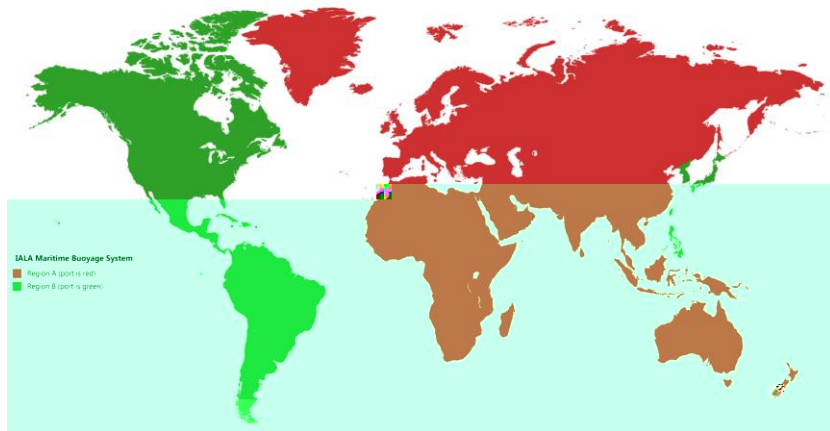


Figure 60: IALA Maritime Buoyage System.

The **IALA buoyage system** in use worldwide is divided in two different schemes only differing in the use of the colours. The IALA defines them as **Region A** and **Region B**:

IALA buoyage system comprises six types of marks:

- Lateral marks
- Cardinal marks
- Isolated danger Marks
- Safe Water Marks
- Special Marks
- Emergency Wreck Marking Buoy

Identifying the Mark

During the hours of daylight, a buoy or beacon's identification can be easily determined by observation of a number of factors including:

- Markings
- Shape
- Color/s of the NavAid
- Topmark
- Special Features

During the periods of darkness there is much less information available for identifying any particular ATON. It can be identified by the buoy or beacon's lighting including the color of the light, the light's phase and the light's period. These 3 items are often referred to as the Light's characteristics and are crucial in identifying any Aid to Navigation at night.

Light's Characteristics

| | |
|-----------------------|--|
| Light's Color | Red / Green / White / Yellow / Blue |
| Light's Phase | There are 6 primary light phases: Alternating / Fixed / Flashing / Isophase / Morse code / Occulting |
| Light's Period | the time, in which the light's phase repeats itself. It is measured in seconds. |

Table 16: Buoyage – Light's characteristics.

Aids in Identification

Markings - Depending on the type of mark, it may be lettered, named, or numbered and quite often they may be a combination of both numbers and letters.

Shapes - There are five basic buoy shapes:






| English | Shape | Your language |
|----------------------|---|---------------|
| Can (cylindrical) |  | |
| Nun (conical) |  | |
| spherical |  | |
| pillar |  | |
| spar |  | |

Table 17: Buoy shapes.






Note:

The shape of the buoy indicates the correct side on which to pass (except for the pillar and spar buoys).

The **colors are different** from IALA-A to IALA-B, but the **shapes will always remain the same**.

Colors - Aids to Navigation can be of solid colors or they may be horizontally or vertically striped of different colors. There are only 6 colors used in buoyage; *Red, Green, Yellow, Blue, and Black*.

Topmarks - Five topmarks are used in the IALA buoyage system

| English | Shape | Your language |
|-----------|---|---------------|
| Cylinders |  | |
| Spheres |  | |
| X's |  | |
| Crosses |  | |
| Cones |  | |

(courtesy of Sealite)

Table 18: Buoys topmarks.

Light's Characteristics

| | |
|-----------------------|---|
| Light's Color | Red / Green / White / Yellow / Blue |
| Light's Phase | There are 6 primary light phases: Alternating / Fixed / Flashing / Isophase / Morse code / Occulting |
| Light's Period | The time for the light's phase to repeat itself. It is measured in seconds. |

Table 19: Light's characteristics.

Types of buoys

There are three types of buoys: Lateral marks, Cardinal Marks and Isolated Danger Mark.

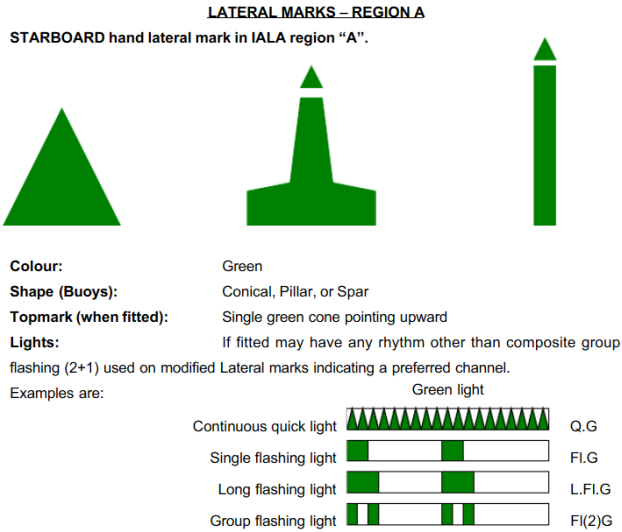


Figure 61: Region A Lateral mark – Starboard hand.

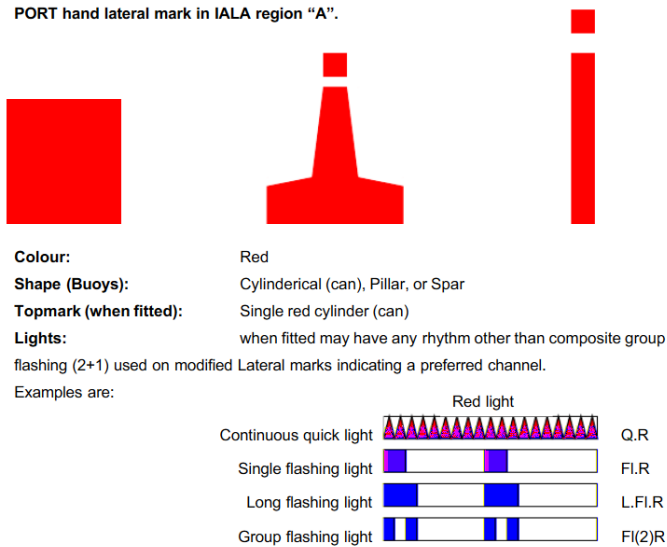


Figure 62: Region A Lateral mark – Port hand.

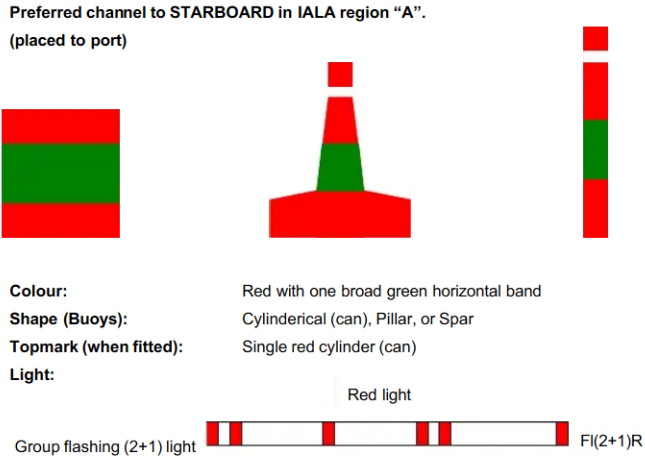


Figure 63: Region A Preferred channel to Starboard.

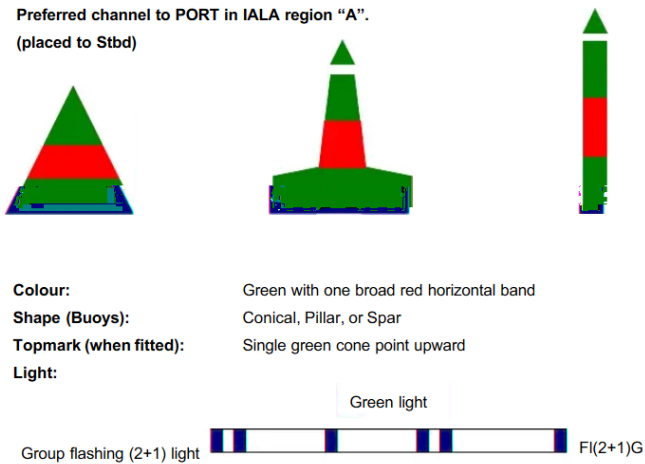
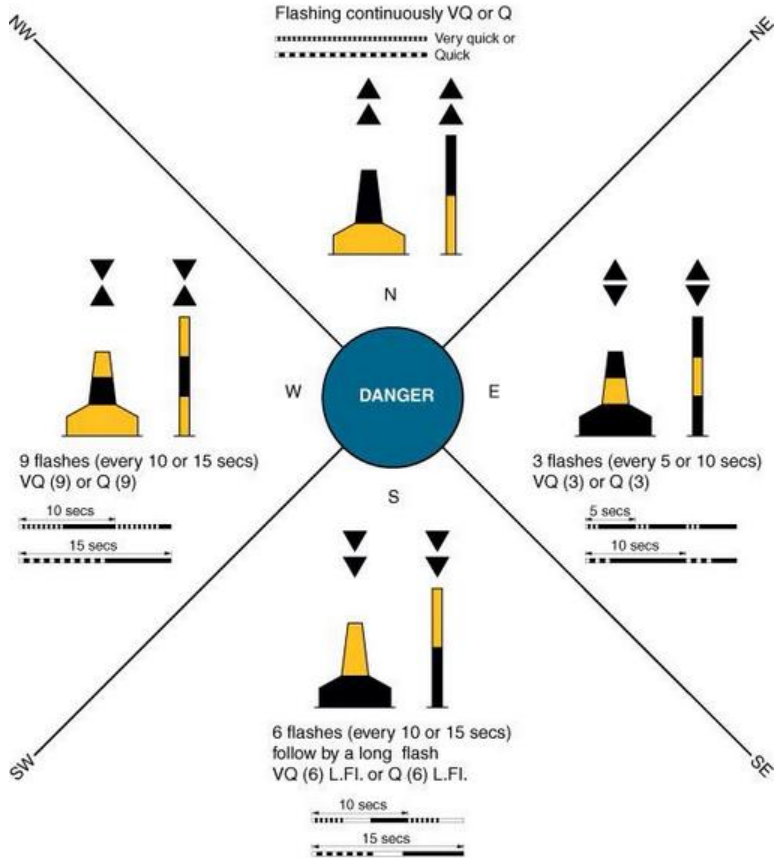


Figure 64: Region A Preferred channel to Port.

CARDINAL MARKS

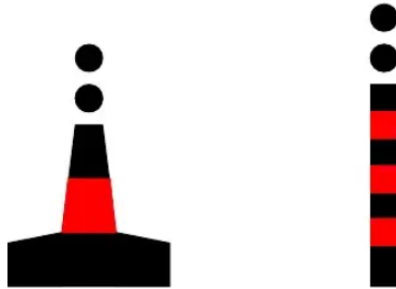
Top marks are always fitted (when practicable)
Buoy shapes are pillar or spar



The shorter period is for "very quick" flashes
 The longer period is for "quick" flashes.
 Quick is usually 50/60 per minute
 Very quick usually 100/120 per minute.

Figure 65: Cardinal Marks.

ISOLATED DANGER MARK



- Colour:** A black buoy with one or more broad red bands
- Shape (Buoys):** Pillar or spar
- Topmark (if carried):** A black double sphere topmark (one sphere vertically above the other)
- Retroreflector:** A blue band above a red band
- Light:** When lighted, an Isolated Danger mark shows a white flashing light showing a group of two flashes.



Figure 66: Isolated Danger Mark.

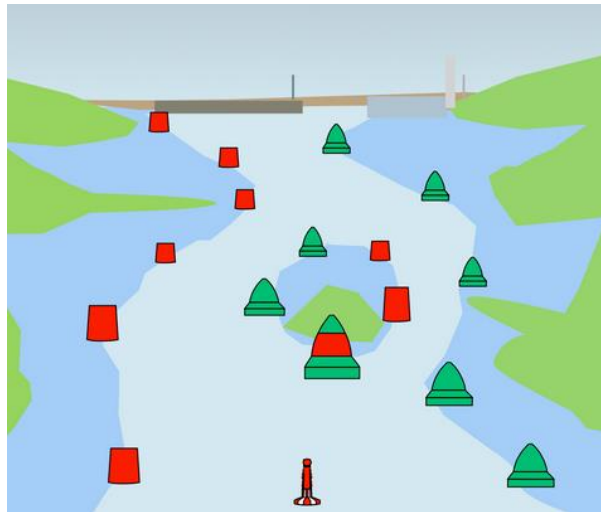


Figure 67: Preferred channel (to port) marks (region A)

A **Safe Water Mark**, is used to indicate that open, deep and safe water lies ahead or a safe route through shallow areas.

it may also be used to indicate the start and end of a buoyed section of a continuous narrow channel. The marker is sometimes known as **Fairway Buoy**.

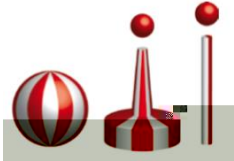


Figure 67: Safe water buoys.

| Nouns and expressions | | | |
|------------------------------|----------------------|---------------------|----------------------|
| English | Your language | English | Your language |
| drift | | tracking | |
| conspicuous point | | lighthouse | |
| landmark | | radiobeacon | |
| vessel's head (bow) | | directional antenna | |
| fix | | | |
| leeway | | | |
| leeward | | | |
| ocean current effects | | | |
| | | | |

| Verbs | | | |
|-------------------------------------|----------------------|----------------|----------------------|
| English | Your language | English | Your language |
| To be drifting | | To correct | |
| To range from ... to | | To track | |
| To set a course | | To manoeuvre | |
| To alter course | | | |
| To make headway | | | |
| | | | |
| Verbs (in the passive voice) | | | |
| To be decoded | | | |
| To be indicated | | | |
| To be sighted | | | |

3.A.3. Meteorology

Meteorology is the scientific study of the atmosphere in relation to climate and weather.

| | Definition | Example |
|----------------------------|---|---|
| Weather | the state of the atmosphere with respect to wind, temperature, cloudiness, moisture, pressure, etc – for a short period of time. | <i>The weather has been rough this week.</i> |
| Climate | the average weather conditions for a large area and over a long period of time | <i>Portugal has a very good climate. It is mild and sunny.</i> |
| Weather forecasting | the application of science and technology to forecast the state of the atmosphere during a future period of time for a specific area. | <i>The weather forecast for the next 24 hours contains a storm warning.</i> |

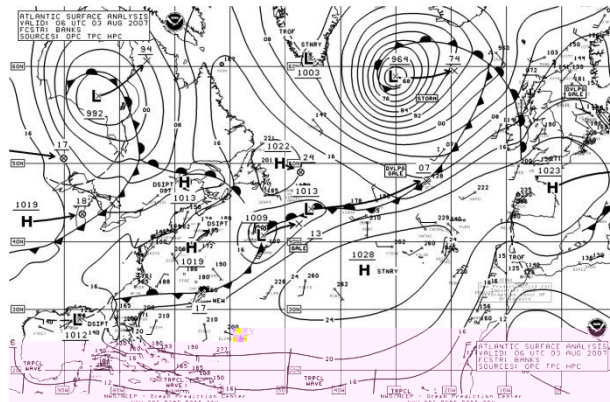


Figure 68: Synoptic chart.

Wind is caused by the differences in **atmospheric pressure**. When there is a difference in atmospheric pressure, air moves from the **higher** to the **lower pressure** area, resulting in winds of various speeds.

In meteorology, winds are characterized according to their **speed** (strength) and the **direction** from which the wind **is blowing**.

Example: - Wind South, force 6 (see Beaufort wind scale).
 - Wind northerly, 30 knots.

A **gust** of wind is any sudden increase of wind for a short period of time (usually a few seconds).

The **sea state** is a consequence of the strength (speed) of the wind – the waves or swell. **Waves** are caused by the wind blowing over a vast area of the water surface. .

Ocean waves can travel thousands of miles and their size can vary from small **ripples** to huge waves over 30 metres high.

At sea, there are two types of waves:

1. the **wind wave** - a wave created by the wind that is in the vicinity of the vessel;
2. the **swell wave** - those waves usually created by storms that may be thousands of miles away from our ship but travel great distances towards it.



Figure 69: Wave crests,

The weather conditions are also influenced by the ocean currents. An **ocean current** is a continuous, directed movement of ocean water generated by several forces. There are multiple variables that have an influence on the ocean currents, such as **shoreline** configurations, **interaction** with other currents among others.

Ocean currents can flow for great distances and together they create the great flow of the **global conveyor belt** which plays a dominant part in determining the climate of many of the Earth's regions

Figure 70: Sea currents around the globe.

Tides are the **rise** and **fall** of sea levels caused by the combined effects of the **gravitational forces** brought in by the Moon and the Sun as well as the rotation of the Earth.

| Beaufort wind scale | | | | | | |
|---------------------|---------|-----------|----------------------|------------|--|-------------|
| Wind scale | Wind | | | Sea | | |
| | Average | Range | Speed | State | Description | Wave Height |
| 0 | 0 | <1 kt | Calm | Calm | Sea like a mirror. | 0 |
| 1 | 2 kts | 1-3 kts | Light air | Smooth | Ripples with the appearance of scales are formed, but without foam crests. | 0.1 m |
| 2 | 5 kts | 4-6 kts | Light breeze | Smooth | Small wavelets , still short but more pronounced, crests have a glassy appearance and do not break. | 0.2 m |
| 3 | 9 kts | 7-10 kts | Gentle breeze | Slight | Large wavelets. Crests begin to break. Foam of glassy appearance. | 0.6 m |
| 4 | 13 kts | 11-16 kts | Moderate breeze | Moderate | Small waves, becoming longer. | 1 m |
| 5 | 19 kts | 17-21 kts | Fresh breeze | Rough | Moderate waves, taking a pronounced long form. (Chance of some spray). | 2 m |
| 6 | 24 kts | 22-27 kts | Strong breeze | Very Rough | Large waves begin to form; the white foam crests are more extensive everywhere. (Probably some spray). | 3 m |
| 7 | 30 kts | 28-33 kts | Near gale | High | Sea heaps up and white foam from breaking waves begins to be blown in streaks along the direction of the wind. | 4 m |
| 8 | 37 kts | 34-40 kts | Gale | Very High | Moderately high waves of greater length; edges of crests begin to break into spondrift. The foam is blown in well marked streaks along the direction of wind. | 5.5 m |
| 9 | 44 kts | 41-47 kts | Strong Gale | Very High | High waves. Dense streaks of foam along the direction of the wind. Crests of waves begin to topple, tumble and roll over. Spray may affect visibility. | 7 m |
| 10 | 52 kts | 48-55 kts | Storm | Phenomenal | Very high waves with long overhanging crests. The resulting foam in great patches is blown in dense white streaks along the direction of the wind. On the whole the surface of the sea takes a white appearance. Visibility affected. | 9 m |
| 11 | 60 kts | 56-63 kts | Violent Storm | Phenomenal | Exceptionally high waves. (Small and medium sized ships might not be | |

Shipping Weather Forecasts

Weather forecasts are usually made up of three different parts, such as:



Part One – Warnings;
Part Two – General Synopsis
Part Three – Forecast.

Figure 71: UK shipping weather forecast areas.

Example of a Weather forecast issued by UK:

Shipping weather forecast (Issued 20 November 23:15 UTC)

The general synopsis at 1800 UTC

High southern Norway 1036 expected northeast Forties 1031 by 1800 Thursday. New low expected 185 miles west of Fitzroy 983 by same time

| | |
|---|---|
| <p>Viking Wind - Southerly 4 or 5, occasionally 6 at first in west, becoming variable 3 later. Sea State - Slight or moderate. Weather - Wintry showers. Visibility - Good, occasionally poor.</p> | <p>Wight <u>Gale Warning: Gale warning issued 20 November 21:39 UTC</u> Easterly gale force 8 expected soon Wind - East or southeast 6 to gale 8. Sea State - Moderate or rough. Weather - Wintry showers later. Visibility - Good, occasionally poor late</p> |
| <p>Biscay Wind - In northeast, easterly or southeasterly 5 to 7, perhaps gale 8 later. In southwest, variable 4, becoming easterly 5 or 6, occasionally 7 later. Sea State- In northeast, moderate or rough. in southwest, moderate or rough. Weather- In northeast, fair. In southwest, occasional rain. Visibility - In northeast, moderate or good. In southwest, moderate or good.</p> | <p>North Utsire Wind - Variable, becoming northerly later, 3 or 4. Sea State - Slight. Weather - Wintry showers. Visibility - Good, occasionally poor.</p> |
| <p>Portland <u>Gale Warning: Gale warning issued 20 November February 20:10 UTC</u> Easterly gale force 8 imminent Wind - East or southeast 6 to gale 8. Sea State - Moderate or rough. Weather - Wintry showers later. Visibility - Good, occasionally poor later.</p> | <p>Plymouth <u>Gale Warning: Gale warning issued 20 November 09:39 UTC</u> Southeasterly gale force 8 expected soon Wind - East or southeast 6 to gale 8. Sea State- Moderate or rough. Weather - Wintry showers later. Visibility - Good, occasionally poor later</p> |
| <p>South Utsire Wind - Variable, becoming northerly later, 3 or 4. Sea State - Slight. Weather - Wintry showers. Visibility - Good, occasionally poor.</p> | <p>Forties Wind - Southerly or southeasterly 4 or 5, occasionally 6 at first in west, becoming variable 3 later. Sea State - Slight or moderate. Weather - Wintry showers. Visibility - Good, occasionally poor</p> |

Example of a Weather Forecast by Maritime Forecasters

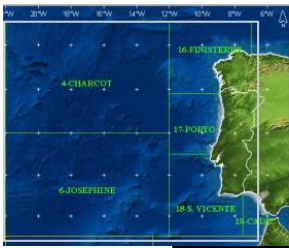


Figure 72: Forecast zone

```

HMRSHTSN ONQST
D SGDQ ATKKDSH
MC A O Q KKDK
I - T T T T T T
MD Q F KD QMH
FT CH M HM
LHKDR EQNL S
MC 07 R- HB
LHMGN MC QH
HM NMDR 3 B
F KD QMHMF
QMHMF HM
07 R- HBDMSD
06 ONQSN( M
II - WEATHER
KN . 872GO .
12////TSB. 0
27M10 . LN
III - FORECAST
4 - CHARCOT:
PT C 5 SN
SN 4 SN 5 HM
RD RNNM-M
C -
6 - JOSEPHINE:
PT C 4 SN
SN 4 HM EL
LNC-M DR
E Q S SGD
16 - FINISTERE:
R PT C 4 SN
CDBQ SN 5 SN
EL LNQM
17 - PORTO:
R. R 4 SN 6
K SDQ-LNC SN
DR 2-4 SN
18 - S.VICENTE:
.R 4 SN 6
ONNQ ADHMF
ESDQMNM-M DR
HM E Q RD
19 - CADIZ:
.R 4 SN 5
ESDQMNM MC
ONNQ RNNM MC
TMSHK LHCCCK
ADBLE M DR

```

RNTQBD9 HMRS HSTS N O DR D C DQ

Example of a Weather Forecast by NOAA National Weather Service, United States

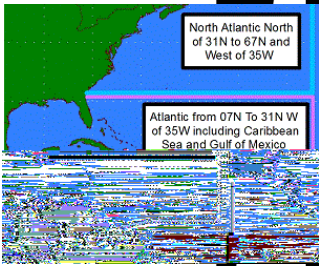


Figure 73: US forecast area.

ATLANTIC FROM 07N TO 31N WEST OF 35W INCLUDING CARIBBEAN SEA AND GULF OF MEXICO

R MNORHR KHC 01// TSB EQH MN 11 -
 13 GNTQ ENQDB HMC 01// TSB R S MN 1
 37 GNTQ ENQDB HMC 01// TSB RTM MN 1

-WARNINGS.
 - SKB SQNOHB QMHMF ---
 -SQNOHB K RSNL RSHDM Q 14-1M 44-2 / LA S 04// TSB MN 11 LN HMF DMD
 NQ /64 CDF S TL RTRS HMDC H 4 JS FTRSR 44 JS - SQNOHB K RSNQL
 ENQDB HMCR MD PT CQ MS ---0 RD PT CQ MS ---4/ ML R
 PT CQ MS --- M CQ MS - RD R 01 NQ FQD SDQ HSGHM 04/ ML D
 RDLHBHQBKD --- Q MS MC 07/ ML PT CQ MS HSG RD R SN 10 ES -
 DKRD GDQD HSG RD R SN 01 RDLHBHQBKD MC ML RDLHBHQBKD HMCR 1/ S
 RD R 7 SN 01 ML NE BDMSDQ D JS 01/ ML R PT CQ MS -

-24 HOUR FORECAST RSNQL RDA RSHD Q 16-/M 40-2 -L HLT L RTR
 HMCR 34 JS FTRSR 44 JS - SQNOHB K RSNQL EBD HMCR HSGHM 5/ ML RDLHBHQBKD ---7/
 ML MD PT CQ MS --- RD PT CQ MS - RD R 01 ES NQ FQD SDQ HSGHM 8/ ML D MC 5/
 ML RDLHBHQBKD HMCR R SN 07 ES - DKRD GDQD HSGHM 04/ ML D MC 01/
 RDLHBHQBKDR 11 JS - RD R 7 SN 01 ES -

-48 HOUR FORECAST RSNQL RDA RSHD Q 18-2M 35-2 -L HLT L RTR
 HMCR 24 JS FTRSR 33 JS - SQNOHB K RSNQL EBD HMCR HSGHM 6/ ML MD PT CQ MS --- MC
 7/ ML RD PT CQ MS --- 01 ES NQ FQD SDQ HSGHM 8/ ML D MC 5/ ML RDLHBHQBKDR
 HSG RD R SN 01 ES - DKRD GDQD HSGHM 01/ ML D MC 8/ ML RDLHBHQBKDR 11/ SN
 22 JS - RD R 7 SN 01 ES -

.72 HOUR FORECAST --- RHO SDC -

ENQDB RS HMCR HMCR MD Q BSH D SQNOHB K B BKNMDR RGNTKC AD TRDC HSG RD R SN HNM
 CTD SN TMBDQS HMC ENQDB RS SQ BJ ---RH D MC HMSDMRHS -

. SYNOPSIS AND FORECAST .

- SKB BNKC EQNMS EQNL 20M43 SN 15M46 SN 08M53 - DKRD GDQD D BDOS R MNSDC
 AN D ---EQNL 08M SN 01M NE EQNMS SN 54 M HMCR 1/ SN 2/ JS - RD R 8 SN 01
 ES ---D BDOS 01 SN 01 ES EQNL 13M SN 17M NE EQNMS SN 50 - M NE 10M D NE EQNMS SN
 KHMD EQNL 20M34 SN 12M4/ SN 10M44 R SN R HMCR 1/ SN 2/ JS - RD R SN 01 ES -
 QDL HMCDO NE QD M NE 08M NE 4/ SN KHMD EQNL 20M60 SN 14M64 SN 01M57
 HMCR 1/ JS NQ KDRR - RD R 7 SN 0/ ES OQHL QHK HM M SN MD R DKK -

.24 HOUR FORECAST BNKC EQNMS EQNL 20M41 SN 14M44 SN 11M50 - DKRD GDQD D BDOS R
 MNSDC AN D ---EQNL 15M SN 2/M NE EQNMS SN 45 M HMCR 1/ SN 2/ JS - RD R 8 SN 00
 ES - QDL HMCDO NE QD M NE KHMD EQNL 20M34 SN 08M44 SN 05M51 SN 13M55 SN
 20M51 HMCR 1/ JS NQ KDRR - RD R 7 SN 00 ES HM LH DC R DKK -

.48 HOUR FORECAST BNKC EQNMS EQNL 20M37 SN 12M43 SN 1/M54 - SGDM CHRRHO SHMF
 RS SHNM Q SN 08M45 SN 06M50 - DKRD GDQD D BDOS R MNSDC AN D ---M NE 18M NE
 EQNMS SN 40 M HMCR 1/ SN 14 JS - RD R 8 SN 00 ES - M NE 18M D NE EQNMS SN 33 R SN
 R HMCR 1/ SN 14 JS - RD R 8 SN 00 ES - QDL HMCDO NE QD M NE KHMD EQNL 20M33
 SN 15M4/ SN 15M42 SN 20M42 HMCR 1/ JS NQ KDRR - RD R SN 8 ES HM LH DC R DKK -

.ATLC FROM 09N TO 12N BETWEEN 38W AND 42W MD SN D HMCR 1/ SN 14 JS- RD R SN 8 ES- DKRD GDQD R NE 10M D NE 34 HMCR 1/ JS NQ KDRR- RD R 7 SN 8 ES HM LH DC M MC MD R DKK-
 .24 HOUR FORECAST R NE 0/M D NE 3/ HMCR 1/ JS NQ KDRR- RD R 7 ES HM LH DC M MC MD R DKK-
 .48 HOUR FORECAST R NE 0/M ADS DDM 34 MC 37 MD SN D HMCR 1/ SN 14 JS- RD R 7 ES- DKRD GDQD R NE 0/M ADS DDM 27 MC 38 HMCR 1/ JS NQ KDRR- RD R 7 ES HM LH DC M MC MD R DKK-
 .ATLC 42 HOUR FORECAST N OF 29N W OF 75W R HMCR 1/ SN 14 JS- RD R SN 7 ES-
 .48 HOUR FORECAST BNKC EQNMS EQNL 20M68 SN 2/M70 - M NE EQNMS M HMCR 1/ SN 2/ JS- RD R KDRR SG M 7 ES- M NE 18M D NE EQNMS SN KHMD EQNL 20M6/ SN 18M64 R HMCR 1/ SN 2/ JS- RD R 7 SN 0/ ES-
 .CARIBBEAN N OF 18N BETWEEN 73W AND 75.5W...INCLUDING THE WINDWARD PASSAGE--MD HMCR 1/ SN 14 JS- RD R KDRR SG M 7 ES-
 .12 HOUR FORECAST HMCR 1/ JS NQ KDRR- RD R KDRR SG M 7 ES-
 .CARIBBEAN N OF 15N BETWEEN 69W AND 72W NE WINDS 20 TO 25 KT. RD R KDRR SG M 7 ES-
 .12 HOUR FORECAST N OF 16N BETWEEN 70W AND 73W MD HMCR 1/ SN 14 JS- RD R KDRR SG M 7 ES-
 .24 HOUR FORECAST KHSSKD BG MFD-
 .30 HOUR FORECAST HMCR 1/ JS NQ KDRR- RD R KDRR SG M 7 ES-
 .REMAINDER OF AREA HMCR 1/ JS NQ KDRR- RD R KDRR SG M 7 ES-
 -ENQDB RSDQ FQ- M SHNM K GTQQHB MD BDMSDQ-

Shipping Forecast Terminology

Gale warnings

The description of gales is in accordance with internationally agreed definitions .

| | |
|-------------------------|--|
| Gale | Winds of at least Beaufort force 8 (34-40 knots) or gusts reaching 43-51 knots |
| Severe gale | Winds of force 9 (41-47 knots) or gusts reaching 52-60 knots |
| Storm | Winds of force 10 (48-55 knots) or gusts reaching 61-68 knots |
| Violent storm | Winds of force 11 (56-63 knots) or gusts of 69 knots or more |
| Hurricane force* | Winds of force 12 (64 knots or more) |

Table 21:

*Note: The term hurricane means a tropical cyclone which is common in the Caribbean and Eastern Pacific. In Asia (China Sea) , it is called a typhoon. Such tropical cyclones are not experienced in Europe.

Gale warning timing

The following terms are commonly used to indicate the expected times of the onset of a gale.

| | |
|-----------------------|--|
| Imminent | Expected within six hours of time of issue |
| Soon | Expected within six to 12 hours of time of issue |
| Later | Expected more than 12 hours from time of issue |
| Perhaps* Later | Used when a gale is considered possible in the "later" period, but the forecaster is not sufficiently sure to issue a warning. |

Table 22:

Visibility

These are internationally agreed definitions of visibility.

| | |
|-----------------|--|
| Fog | Visibility less than 1,000 metres |
| Poor | Visibility between 1,000 metres and 2 nautical miles |
| Moderate | Visibility between 2 and 5 nautical miles |
| Good | Visibility more than 5 nautical miles |

Table 23

Movement of pressure systems

These terms are used in the synopsis to describe speed of movement of weather patterns

| | |
|-----------------------|------------------------------|
| Slowly | Moving at less than 15 knots |
| Steadily | Moving at 15 to 25 knots |
| Rather quickly | Moving at 25 to 35 knots |
| Rapidly | Moving at 35 to 45 knots |
| Very rapidly | Moving at more than 45 knots |

Table 24

Pressure tendency in station reports

Reports from coastal stations give the pressure and a description of how the pressure has been changing.

| Term | Definition |
|------------------------------------|---|
| Rising (or falling) slowly | Pressure change of 0.1 to 1.5 hPa in the preceding three hours |
| Rising (or falling) | Pressure change of 1.6 to 3.5 hPa in the preceding three hours |
| Rising (or falling) quickly | Pressure change of 3.6 to 6.0 hPa in the preceding three hours |
| Rising (or falling) rapidly | Pressure change of more than 6.0 hPa in the preceding three hours |
| Now rising (or falling) | Pressure has been falling (rising) or steady in the preceding three hours, but at the time of observation was definitely rising (falling) |

Table 25

Wind direction

| Term | Definition |
|--------------------------|---|
| Wind direction | Indicates the direction from which the wind is blowing |
| Becoming cyclonic | Indicates that there will be considerable change in wind direction across the path of a depression within the forecast area |
| Veering | The changing of the wind direction clockwise, e.g. SW to W |
| Backing | The changing of the wind in the opposite direction to veering (anticlockwise), e.g. SE to E |

Table 26

Weather forecasts terminology

| Term | Definition |
|--------------|--|
| Fine: | Dry weather with mainly sunny or bright conditions - characterised by an absence of precipitation. |

| | |
|------------------------------|---|
| Dry: | Free from rain. |
| Precipitation: | Any type of water particle (e.g.rain, hail or snow), that falls to the ground. |
| Rain: | Precipitation from dense, continuous clouds. |
| Shower | Precipitation from individual clouds. Relatively short-lived and punctuated by periods of blue sky. |
| Drizzle: | Precipitation made up of small water droplets that are close to one another. |
| Snow | Frozen precipitation in the form of ice. |
| Fog: | Very small water droplets suspended in the air, which reduces visibility at ground level to less than a kilometre |
| Mist: | Like fog, but visibility is more than a kilometre. |
| Cloudy: | More cloud than clear sky. e.g the sun being obscured by cloud for long periods of time. |
| Overcast | Sky covered by cloud. |
| Low pressure system: | A low pressure system is usually formed by a mass of warm air being forced upwards by cold air. Air pressure decreases toward the centre and often results in unsettled weather conditions (pressure in hPa / mb) |
| High pressure system* | Also known as anti-cyclones high pressure systems are areas of high atmospheric pressure which have diverging winds. They generally create cooler, dryer temperatures, with little or no clouds. |
| Isobar | A line of equal or constant atmospheric pressure (see high and low pressure systems). Usually the closer isobars are together the stronger the winds are. |
| Front | The point at which two different air masses meet, sometimes resulting in severe weather changes. A cold front is where colder air overtakes and replaces warm air and a warm front is therefore where warm air overtakes and replaces colder air. |

Table 27

Distribution of weather phenomena

| Term | Definition |
|-------------------|---|
| Scattered | Showers/rain can occur anywhere in a particular area. Slightly more frequent than isolated conditions |
| Patchy: | Occurs irregularly over a particular area. |
| Widespread | Occurs extensively throughout an area. |
| Squally | Brief periods of violent wind or rain. |

Table 28

3.B. Professional situations related to topic

Understand Navigational charts and their symbols;
 Read and understand nautical publications related to Safety of Navigation;
 Read and understand COLREG;
 Understand Weather Charts and Weather forecasts from different sources;
 Listen and understand Navigational warnings broadcast by radiotelephony;

3.C. SMCP

(extract from IMO Resolution A 22/Res.918 -- **ON-BOARD COMMUNICATION PHRASES**)

Meteorological warnings

| English | Your language |
|--|---------------|
| Gale warning / storm warning was issued at ... UTC starting at ... UTC . | |
| Gale warning / storm warning. Wind at ... UTC in area ... (<i>met. area</i>) from direction ... (<i>cardinal points</i>) and force Beaufort ... backing / veering to ... (<i>cardinal points</i>). | |

| | |
|---|--|
| Tropical storm warning was issued at ... UTC starting at ... UTC. | |
| Tropical storm warning at ... UTC. Hurricane ... (<i>name</i>) / tropical cyclone / tornado/ willy-willy / typhoon / ... with central pressure of ... millibars/ hectopascals located in position | |
| Present movement ... (<i>cardinal points</i>) at ... knots. Winds of ... knots within radius of ... nautical miles of centre. Seas over ... metres. | |
| Further information on VHF Channel ... / frequency ... (at ... UTC). | |

Meteorological information

| | |
|--|--|
| Position of tropical storm ... (<i>name</i>) ..., path ... (<i>cardinal points</i>), speed of advance ... knots. | |
|--|--|

| | |
|---|--|
| Wind direction ...(<i>cardinal points</i>), force Beaufort ... in position | |
| Wind is backing / veering and increasing / decreasing. | |
| Wind is expected to increase / decrease in position ... to force Beaufort ... within the next... hours. | |

| | |
|----------------------------|--|
| Visibility in position ... | |
|----------------------------|--|

| | |
|--|--|
| ~ ... metres / nautical miles. ~ reduced by mist / fog / snow / dust / rain / .. ~ expected to increase / decrease to ... metres / nautical miles . within the next ... hours. | |
| Sea / swell in position ... ~ ... metres from ...(cardinal points). ~ .expected to increase / decrease within the next ... hours. | |
| Icing is expected / not expected in area | |

3.3.D. Role playing

Unit 3 -Role playing no. 1:

(Audio file: Unit 3- Role-playing no.1)

| Situation: Discussing navigation issues with master (passage plan) | |
|--|---|
| The 2 nd mate is preparing the passage plan for the next voyage. He's having a short meeting with the master to discuss some issues. The next voyage will be from Lisbon to Paranaguá, in Brasil, where they will load 56 000 tons of soya beans. According to the Charter-party, the laycan will be 6 days (from 10 to 16 December). | |
| Character | Dialogue |
| 2 nd mate | <i>Master, I'd like to discuss some issues about passage plan for next voyage.</i> |
| Master | <i>Ok. What is it?</i> |
| 2 nd mate | <i>According to my calculations our ETA to Paranagua will be 120800lt. I know you have been there already. Can you have a look at my planning now and give me your opinion?</i> |
| Master | <i>Let me see it then. I wouldn't choose this course. Look, if you deviate a little further west there are favourable currents which increase your speed significantly. Besides, the weather is more predictable in this area so, there is less risk of delay. Make you calculations again, I'm pretty sure you'll save 12 hours or more.</i> |
| 2 nd mate | <i>Yeah! You're right, we can take advantage of the currents. Let me make my calculations again.</i> |
| 1 hour later ... at the Master's office ... | |
| 2 nd mate | <i>Master, can I come in?</i> |
| Master | <i>Please, do!</i> |

| | |
|----------------------|--|
| 2 nd mate | <i>I've finished my calculations. We can save up to 14 hours if the weather is good. Look here, please. The ETA is now 111800lt.</i> |
| Master | <i>It's still not good but it's much better than what we had before. I have to send an email to the charterer. We cannot meet this deadline. We can never arrive on the 10th of December.</i> |
| 2 nd mate | <i>That's right, we can't.</i> |

Unit 3 - Role playing no. 2:

(Audio file: Unit 3-



Figure 74: Portuguese weather forecast

```

I - T T T T T T T T
F KD QMHMF TO SN 1/ DR EQNL D BN RS AD DDM QH DQ LBN C Q Q FT CH M
HM NMDR 06 ONQN( MC R- HBDSD( - DQ ONN HR QMHMF TO SN 1/ HKDR EQNL
SGD BN RS ADS DDM QH DQ LHMGN MC B OD R- HBDSD HM NMDR 06 ONQN( MC
07 R- HBDMSD(-GD R QMHMF TO SN 1/ LHMGN EQNL SGD BN RS ADS QH DQ
LHMGN MC QH DQ FT CH M HM NMD 06 ONQSN( MC 07 R- HBDSD( - FORM WARNING IN
ZONES 4 (CHARCOT) AND 16 (FINISTERRA). STRONG GALE WARNING IN ZONES WEST OF ZONE
6 (JOSEPHINE) AND 17 (PORTO) GALE WARNING IN ZONES AND 18 (S. VICENTE) AND EAST OF ZONE
6 (JOSEPHINE) DQ ONNQ HR QMHMF HM NMDR 3 BG QBNS( 5 INRDOGHMD(
05 EHMHRSDQD( 06 ONQSN( MC 07 R- HBDMSD(- GD DR QMHMF HM NMDR
3 BG QBNS( INRDOGHMD( 05 EHMHRSDQD( 06 ONQSN( MC 07 R- HBDMSD(-
    
```

| | |
|---|---|
| Situation: Storm warning received by officer of the watch | |
| The bulk carrier Port Estoril departed from Lisbon and is bound for New Orleans. The 2 nd mate is on watch and receives a Gale Warning on Navtex. He decides to call the master. | |
| Character | Dialogue |
| 2 nd mate | <i>Master, I have just received a Storm warning. The wind will increase drastically in the next 12 hours.</i> |

| | |
|--|--|
| Master | <i>I was expecting it. I'll be there in a minute.</i> |
| <i>... some minutes later, the master arrives at the bridge and then reads the warning then she looks at the chart makes some calculations, some measures with the divider and then she speaks to the 2nd mate...</i> | |
| Master | <i>We'll have rough weather soon. However we can avoid the worst area. We will avoid Josephine area and change our course to port. Steer 225° from now. Then, after 100 miles, steer 240°. Here is the position of that waypoint. Any questions?</i> |
| 2 nd mate | <i>Understood. 225 from now until the new waypoint on the chart, 100 nm from our present position.</i> |
| Master | <i>That's it. I'm on my way now. Call me if there are any changes. Anyway, I'll come back in an hour.</i> |
| 2 nd mate | <i>Ok, master. Thanks.</i> |
| Master | <i>See you later.</i> |

3.3.E. Use of the language

Modal verbs – What are Modal Verbs?

Modal verbs are special verbs which behave very differently from normal verbs. Here are some important differences:

1. Modal verbs do not take "-s" in the third person.

Examples:

The 1st Mate can speak Chinese.
She should relieve the 3rd engineer by 0800.

2. You use "not" to make modal verbs negative, even in Simple Present and Simple Past.

Examples:

You should not be late for hosting the pilot.
They might not come to our party on board.

3. Many modal verbs cannot be used in the past tenses or the future tenses.

Examples:

He will can go with us. Not Correct
She musted study very hard. Not Correct

Common Modal Verbs

| | |
|-----------------------|--|
| Can , Could | (meaning <i>to be able to.</i> ; <i>to have capacity for...</i>) |
| May, Might | (meaning <i>to have permission to</i> ; <i>to choose to ...</i>) |
| Must | (meaning <i>to have the obligation to ...</i> ; <i>to be mandatory</i>) or (...possibility ... <i>may be</i>) |
| Ought to | (meaning <i>to be recommended to do ...</i> ; <i>an advice ...</i>) |
| Shall , Should | (auxiliary verb for Future tense and Conditional tense; also meaning <i>advice...</i>) |
| Will , Would | (auxiliary verb for Future tense and Conditional tense) |

Expressions such as **had better**, **have to**, and **have got to**. are closely related to modals in meaning and are often interchanged with them.

Passive voice

Passive voice is used when the **focus is on the action**.

It is not important or not known, however, who or what is performing the action.

Example: *The radar was repaired.*

| | | | | |
|-----------------|-----------------------|-----------------|-----------------------|---------------|
| Active: | The electrician | will check | the navigation lights | future (will) |
| Passive: | The navigation lights | will be checked | by the electrician | |

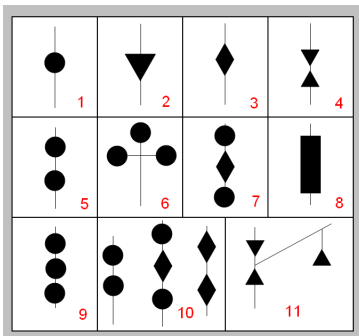
| | | | | |
|-----------------|--------------|---------------|--------------|--------|
| Active: | Fire | can cause | major damage | Modals |
| Passive: | Major damage | can be caused | by fire | |

End of Unit 3 - Check your knowledge

Exercise 1:

1. What is a sextant and what is it used for?
2. Explain the principle of celestial navigation.
3. What is a radio beacon?
4. When is radar navigation possible?
5. What is the ship's heading?
6. What is the difference between "course" and "course made good"?
7. What is the purpose of navigation lights mounted on board a ship?
8. Are green and red light only used to indicate Starboard side and Portside?
9. What is the meaning of power-driven vessels?
10. What is the yellow light used for?
11. Do all ships carry a yellow light? Why?
12. What system replaces navigation lights during the day?

Exercise 2:



| Shapes | Situation |
|--------|-----------|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | |
| 9 | |
| 10 | |

15. If a ship is on the wrong track of the fairway, you _____ report it to the VTS.
could / should / would / must
16. If the engine failed, we _____ be in serious trouble.
might / may / could / should
17. When the engine failed, the pilot _____ change course immediately.
should / would / must / had to
18. You _____ let the master know about the incident with the pilot.
should / had to / must / would
19. The malfunction in the radar _____ become worse if you don't have it repaired.
should / would / must / may
20. Last voyage, we _____ evacuate an injured crew member.
should / would / must / had to

Exercise 4:

Put the following sentences in the Passive voice:

1. The OOW checked the position several times during his watch.
2. In general, we may divide ports in two categories.
3. They have built ports with the purpose of handling special commodities
4. Shipping companies cannot afford additional expenses such as overtime
5. One has to pay clerking, checking and tallying.
6. The ship lost 2 containers during the storm.
7. Sometimes, they discharge the cargo directly to lorries, barges or rail wagons.
8. The loading operation covers all transport and handling of the cargo from the shed until stowed on board the ship.
9. Special firms perform lashing and securing when the ship's crew cannot do this work alone.
10. He checked the fuses of the Power Supply.
11. It is compulsory to test the radio communications equipment every week and record it on the Radio Logbook.
12. When the master arrived on the bridge the OOW had already solved the problem with the Auto-Pilot.
13. In the shipyard, they painted the ship with anti-fouling paint.
14. By the time the ship arrives, they will have repaired the quay.
15. The master always wants them to call him when the pilot arrives.
16. The master told the cadet to stay on the bridge during the manoeuvres.
17. They had to finish SAR operations during the night.
18. They have detected 3 small fires during the present voyage.
19. We must replace 2 fire extinguishers in the next port.
20. Port State Control inspected the ship in Dunkirk.

Unit 4 - Seamanship

Summary:

4.A. Reading - Terminology

- 4.A.1. Seamanship
- 4.A.2. Manoeuvres

4.B. Professional situations related to topic:

Manoeuvring the ship: giving orders to helmsman, anchoring, berthing

4.C. SMCP

-
-

4.D. Role playing

- Unit 4 RP no.1 -
- Unit 4 RP no.2 -
- Unit 4 RP no.3 -

4.E. Use of English/Grammar

-

4.A.1. Seamanship

Seamanship is the art or skill of handling, working, and navigating a ship (<https://www.merriam-webster.com/dictionary/seamanship>). A fundamental skill of professional seamanship is being able to manoeuvre a vessel with accuracy and precision.

A ship is usually sailing, on voyage, i.e., underway. When the ship is moving she may be in different situations, such as those which are described in the following table:

| English | Definition | Your language |
|-----------------------|--|---------------|
| To be underway | <i>on voyage</i> | |
| To be making headway | <i>to move forward</i> | |
| To be making sternway | <i>to move astern</i> | |
| To be making leeway | <i>being blown by the wind and moving sideways</i> | |
| To overtake a vessel | <i>to be faster than another vessel</i> | |
| To fall astern | <i>dropping behind another vessel</i> | |
| To proceed to ... | <i>to make way to ...</i> | |

Table 29:

When the ship is not moving she may be in different situations, such as those which are described in the following table:

| English | Definition | Your language |
|--------------------------|--|---------------|
| To be adrift | <i>not under command</i> | |
| To be aground (grounded) | <i>to be stuck on rocks or bottom</i> | |
| To be alongside | <i>to be moored</i> | |
| To be anchored | <i>to be secured by an anchor dredged onto the seabed</i> | |
| To be at quay | <i>to be moored</i> | |
| To be docked | <i>to be in dock (or drydock)</i> | |
| To be moored | <i>to be at the quay secured by the mooring lines (cables) to the bollards</i> | |
| To be stranded | <i>to be unable to proceed</i> | |

Table 30

The motions of the ship

Due to a wide variety of weather conditions the ship moves in different directions resulting in a series of forces upon the ship and its cargo. These forces may have a stressing effect on the ship's hull and the cargo. Securing the cargo on board is then a primary procedure once the sea conditions may change drastically within minutes. The ship's motions can be described as follows:

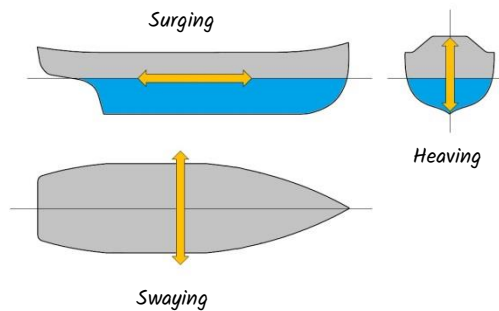


Figure 75: Translational motions of the ship.

Linear motions

| Motion | Definition | Your language |
|----------------|--|---------------|
| Surging | is the motion along the longitudinal axis | |
| Swaying | is the motion along the transverse axis | |
| Heaving | is the motion along the vertical axis. It involves up ward and downward acceleration of ships along their vertical axis. | |

Table 31

In surging and swaying the sea motion accelerates and decelerates the ship forward and backward.

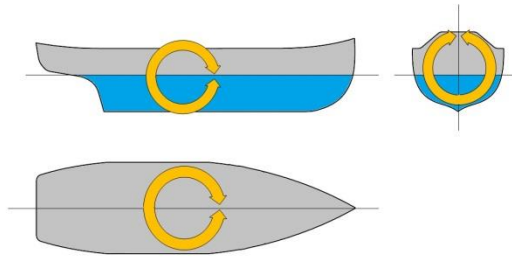


Figure 76: Rotational motions of the ship.

Rotational motions

| Motion | Definition | Your language |
|-----------------|--|---------------|
| Rolling | is the motion around the longitudinal axis. | |
| Pitching | is the motion around the transverse axis. The ship is lifted at the bow and lowered at the stern and vice-versa. Pitching angles vary with the length of the vessel. In short vessels they can be 5 to 8° and eventually more, while in very long vessels they are usually less than 5°. | |
| Yawing | is the motion around the vertical axis. It occurs due to the impossibility of steering a ship on a straight course. Depending on the sea conditions and rudder deflection, the ship will swing around its projected course. | |

Table 32

| | | |
|-----------------|--|--|
| Slamming | Another term to describe the hydrodynamic impacts which a ship undergoes due to the up and down motion of the hull, the entry into wave crests and the consequent abrupt immersion of the ship into the sea | |
|-----------------|--|--|

Table 33

The effect of the wind blowing onto the ship **sideways** will cause the ship to make leeway. The affect depends on the area of the superstructure. As the ship moves ahead the wind will make her **deviate** sideways and **off her due course**. The **leeway angle** is the **deviation**.

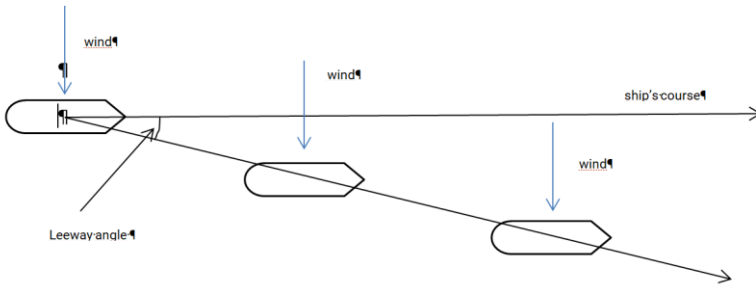


Figure 77: Action of wind on beam.

Specific terminology

| Nouns and expressions | | | |
|-----------------------|----------------------|--------------------|----------------------|
| English | <i>Your language</i> | English | <i>Your language</i> |
| | | Drifting | |
| | | Leeward , windward | |
| | | | |
| | | | |

| Verbs | | | |
|---------|----------------------|---------|----------------------|
| English | <i>Your language</i> | English | <i>Your language</i> |
| | | | |
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| Verbs (in the passive voice) | | | |
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4.A.2. Anchoring

Upon arrival at the approaches to the port of destination (or port of call) the ship may have to anchor and wait for **berthing instructions** or for any other reason.

The anchoring position will be **designated** by the port administration, the port VTS or some other entity. The master or the pilot shall identify the **anchoring position** before entering the anchorage area.

Planning for Anchoring – Calculating the length of cable

The method for anchoring and the number of **shackles** to be used depend on:
 the **depth** of water,
 the expected **weather** and
 the **holding ground**.

There is a simple rule to determine the length of cable **to be paid out**:

When conditions are considered standard:

$$\text{Length of cable} = [(\text{Depth of water in meters} \times 2) + 90] / 27.5$$

When holding power is not reliable or good:

(e.g. Strong Wind, Strong Current, Harder Sea bottom)

$$\text{Length of cable} = [(\text{Depth of water in meters} \times 3) + 140] / 27.5$$

| | Anchoring – step by step |
|-----------------|--|
| Planning | Check the depth of water on site Calculate the length of anchor chain (according to holding power of the bottom) Decide which fix reference point to be used for bearing |

| | |
|--|--|
| <p>Preparation</p> | <p>Check the anchoring position Be aware of the method of approach Decide which anchor to be used Decide which amount of cable to be paid out Call anchor party</p> |
| <p>Before letting go (at the forecastle)</p> | <p>Check the brake Take off the voyage securing devices Start the hydraulic system for the windlass Check VHF radio communication with the bridge Check the anchor shape to be hoisted and the anchor light. Check the forecastle lighting Make sure that all members of the anchor party are wearing protective clothing and helmets, gloves, safety shoes and goggles</p> |
| <p>Before letting go (at the bridge)</p> | <p>Check VHF radio communication with the bow; Check the engine remote control;</p> |
| <p>The manoeuvre (it depends on the type of ship and depth of water)</p> | <p>Walk out the anchor to half a shackle above the sea bottom Hold the cable on the brake and take the windlass out of gear Stop the vessel over ground Drop the anchor Control the speed of cable flow by the brake, to prevent the cable from pilling up. Bring anchor cable direction forward and Confirm anchor holds its position.</p> |
| <p>After manoeuvre</p> | <p>Hoist shape for "vessel at anchor" or turn ON the appropriate lights</p> |

Table 34: Anchoring – step by step.

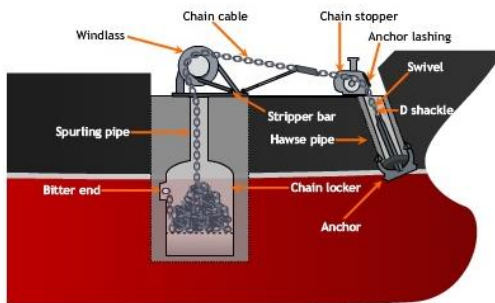


Figure 78: Anchor and anchor chain.

| English | Your language |
|----------------------------|---------------|
| Windlass | |
| Chain cable (anchor chain) | |
| Chain stopper | |
| Anchor lashing | |
| Swivel | |
| D shackle | |
| Hawse pipe | |
| Chain locker | |
| Bitter end | |

<http://shipsbusiness.com/anchoring-practice.html>

Moreover, there are certain procedures which are vital for safe anchoring:

The officer at the bow must confirm that there is no craft or any obstacle under the bow and then inform the Bridge;

The Master must make sure that the vessel GPS speed at the time of anchoring is near zero or slightly sternway;

The speed should be checked by visual markings and/or Radar ranges to landmarks or any other conspicuous targets;

Where means of communication between Bridge and the Anchoring party is by portable radio, the identification of the ship should be clear to avoid misinterpretation of instructions from other users of such equipment in the vicinity.¹

The Master must make sure that the swinging circle of the vessel is within a safe range towards other vessels at the anchorage site.

The swinging circle

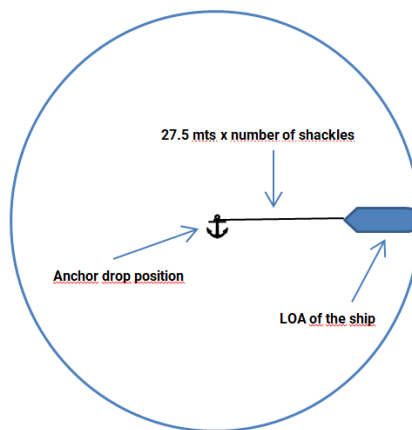


Figure 79: The swinging circle.

Emergency Anchoring

There are certain situations in which it is necessary to use the anchors as an emergency procedure. In case of engine failure it may be necessary to let go one or both anchors to prevent collision with another vessel or a particular structure.

¹ During the manoeuvres for anchoring there is a team at the bow and for berthing/ unberthing there are 2 teams on deck, one ahead and one astern. Each officer from the team holds a portable VHF to communicate with the bridge. The bridge is named "**Ship's name** control" and the portable sub-stations are named "**Ship's name** Alfa" (at the bow) and "**Ship's name** Bravo" (at the stern). In practice, it is more common to use the expressions "**Ship's name** Bridge", "**Ship's name** Bow" and "**Ship's name** Stern".

In critical situations, to arrest the movement of the vessel, it is preferable to let go both anchors simultaneously instead of one.

Therefore, anchors should be ready for letting go on arrival and departure from port, when in anchoring depths. The anchors should be held on the brake and any anchor lashings should be removed.

Weighing Anchor

Weighing the anchor, or anchor retrieval from seabed, is an operation that requires a lot of strength from the **windlass**. Therefore, it is recommended that the cable should **be kept** as vertical as possible in order to reduce the **load** on the windlass and it can be achieved by using the **engine** or **bow thruster**.

The officer at the bow should continuously report the **number of shackles** remaining in water.

At the same time the **Anchor wash** should be activated in order to clean the chain and the anchor before it is stowed in the **hawse pipe**.

When the anchor is in the hawse pipe, the **brake** should **be screwed up** and then the windlass **out of gear (disengaged)**.

The **bow stopper** is **put across** the chain and the manoeuvre is finished.

Specific terminology

| Nouns and expressions | | | |
|-------------------------------------|----------------------|----------------|----------------------|
| English | <i>Your language</i> | English | <i>Your language</i> |
| Brake | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| Verbs | | | |
| English | <i>Your language</i> | English | <i>Your language</i> |
| To be out of gear | | | |
| To weigh anchor | | | |
| | | | |
| | | | |
| Verbs (in the passive voice) | | | |
| To be held by the brake | | | |
| To be paid out | | | |
| To be disengaged | | | |
| | | | |
| | | | |

4.A.3. Berthing and unberthing

Berthing and unberthing

There are three important factors to be remembered before **berthing** and **unberthing**:

- planning
- team work
- Equipment check

Passage planning

- passage planning should be from berth to berth;
- before the manoeuvre, the bridge team should be briefed
- always brief the bridge team to ensure the officer of the watch (OOV), helmsman, lookout and pilot are fully aware of the expected manoeuvres and the likely effects of wind, tide and current
- pay careful attention to the dangers that are likely to be encountered during periods under pilotage
- always fully brief the pilot, making sure that he understands the ship's speed and manoeuvring characteristics
- always ask the pilot to discuss the passage and berthing plan. Ask questions if anything is unclear
- always check with the pilot that the ship will have under-keel clearance at all times
- always have your anchors ready to let go and forecastle manned in advance of berthing

Team work

Team work and effective communication between the people involved in berthing and unberthing manoeuvres is crucial. The master must ensure that:

- The bridge crewmembers are familiar with the expected approach to the berth and what is expected of them;
- there will be good bridge resource management and communication for the manoeuvre to run smoothly.

Equipment check

Before starting any manoeuvre, the master must make sure that all the equipment is fully operational, such as:

- Main engines - main engines and **thrusters** to be tested before **approaching** the pilot station or before departure;
- Steering gear – Both **steering motors** and **steering wheel** (manual mode) to be checked before approaching the pilot station or before departure;
- Bridge equipment – All bridge equipment to be **fully tested**. A bridge equipment check list should be used.

During the manoeuvres for anchoring or mooring, there are usually 2 teams on deck, one ahead and one astern. Each officer from the team holds a portable VHF to communicate with the bridge. The bridge is named **control** and the portable sub-stations are named **alfa** and **bravo**.

(In practice, it is more common to use the expressions **bridge**, **bow** and **stern** on board)

Use of tugs

For berthing and unberthing manoeuvres, tug assistance is necessary most of the times. Where wind, tide and current or the ship's handling characteristics create difficult **berthing conditions**, the use of tugs is essential. For example, a large ship berthing with a **bow thruster** may need a tug to control her **stern**.

In order to estimate the number of tugs to be used for the manoeuvre it is necessary to consider the ship's **windage** and the tug's **bollard pull** and **propulsion arrangements**.

Mooring

Mooring refers to the system for securing a ship to a quay. The **moorings**, or **mooring lines** of a ship must resist the forces due to the following factors:

- Wind
- Current
- Tides
- Surges** from passing ships
- Waves/swell
- Ice
- Changes in draught (draft), trim or list.

These factors cause **transverse** and **longitudinal forces** that would cause the ship to move away from the quay if she wasn't secured by mooring lines.

Good co-ordination and interaction between ship and shore, and well trained personnel is essential during mooring operations.

Terminals are responsible for the provision of mooring equipment on their berths. This equipment must also be appropriate, in both size and number, for the full range of ship sizes and types using the berths. **Mooring bollards**, **mooring hooks** or **rollers/pulleys** should be positioned in a suitable **layout** for the ships **to be handled**.

Although the mooring plan (layout of mooring lines) is responsibility of the master, the terminal, because of its knowledge of the operating environment, should provide proper information and advise the master regarding mooring line layout and operating limitations.

Mooring Lines

There are different types of mooring lines according to their function upon securing as it can be seen in the following figure.

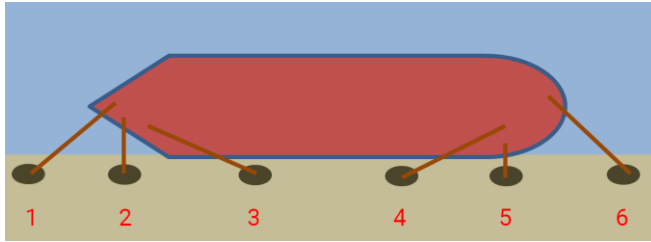


Figure 80: Mooring lines.

| Number | Name in English | Purpose | Your language |
|--------|-----------------------|-------------------------------|---------------|
| 1 | Bow line | To prevent backwards movement | |
| 2 | Forward Breast line | To keep close to pier | |
| 3 | After Bow Spring line | To prevent from advancing | |
| 4 | Forward Spring line | To prevent from moving back | |
| 5 | Quarter Breast line | To keep close to pier | |
| 6 | Stern line | To prevent forwards movement | |

Table 35: Mooring lines.

Specific terminology

| Nouns and expressions | | | |
|-----------------------|---------------|---------|---------------|
| English | Your language | English | Your language |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

| Verbs | | | |
|-----------------|---------------|---------|---------------|
| English | Your language | English | Your language |
| To alter course | | | |
| To leave berth | | | |
| | | | |
| | | | |
| | | | |

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|-------------------------------------|--|--|--|
| | | | |
| Verbs (in the passive voice) | | | |
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4.B. Professional situations related to topic

- Steering the ship: giving orders to helmsman
- Anchoring,
- Berthing
- Unberthing
- Working/ communicating with tugs
- Onboard communications during manoeuvres
- Communications with the terminal and mooring personnel ashore

4.C. SMCP

Anchoring

| In English | In you native language |
|---|------------------------|
| <i>Stand by port / starboard / both anchor(s) for letting go.</i> | |
| <i>Walk out the anchor(s).</i> | |
| <i>We are going to anchorage.</i> | |
| <i>We will let go port / starboard / both anchor(s).</i> | |
| <i>Put shackles in the water / in the pipe / on deck.</i> | |
| <i>Walk back port / starboard / both anchor(s) one / one and a half shackle(s).</i> | |
| <i>We will let go port / starboard / both anchor(s) ... shackle(s) and dredge it / them.</i> | |
| <i>Let go port / starboard / both anchor(s).</i> | |
| <i>Slack out the cable(s). Check the cable(s). Hold on the port / the starboard / both cable(s).</i> | |
| <i>How is the cable leading? The cable is leading ~ ahead / astern. ~ to port / to starboard.</i> | |

| | |
|--|--|
| ~ round the bow. ~ up and down. | |
| How is the cable growing? The cable is slack / tight / coming tight. | |
| Is / are the anchor(s) holding. Yes, the anchor(s) is / are holding. No, the anchor(s) is / are not holding. | |
| Is she brought up? Yes, she is brought up in position ... No, she is not brought up (yet). | |
| Switch on the anchor light(s). | |
| Hoist the anchor ball. | |
| Check the anchor position by bearings / by.... The anchor position is bearing ... degrees, distance ... kilometres / nautical miles to Check the anchor position every ... minutes. | |

Leaving the anchorage

| In English | In you native language |
|---|------------------------|
| How much cable is out? ... shackle(s) is / are out. | |
| Stand by for heaving up. | |
| Put the windlass in gear. The windlass is in gear. | |
| How is the cable leading? The cable is leading ~ ahead / astern. ~ to port / to starboard. ~ round the bow. ~ up and down. | |
| Heave up port / starboard / both cable(s). | |
| How much weight is on the cable? Much / too much weight is on the cable. No weight is on the cable. | |
| Stop heaving. | |
| How many shackles are left (to come in)? ... shackles are left (to come in). | |
| Attention! Turn in cable(s). | |
| The anchor(s) is / are aweigh. The cables are clear. | |
| The anchor(s) is / are clear of the water / home / foul / secured. | |

Tug assistance

| English | Portuguese |
|--|------------|
| We will take ... tug(s). | |
| The tug(s) will pull / push. | |
| We use the towing line(s) of your vessel. We use the towing line(s) of the tug(s). | |
| Stand by for making fast the tug(s). | |
| Use the centre lead / panama lead. Use the fairlead ~ on port side / starboard side. ~ amidships. ~ on port bow / starboard bow. ~ on port / starboard quarter. | |
| Send heaving line(s) to the tug(s). | |
| Send two towing line(s) to the tug(s). | |
| Lower towing line(s) ~ to the tug(s). ~ ... metre(s) from the water. | |
| Slack away towing line(s). | |
| Make fast the tug(s). Make fast the tug(s) ~ forward / aft. ~ on port bow / starboard bow. ~ on port quarter / starboard quarter. | |
| Make fast the forward / aft tug(s) alongside on port side / starboard side. | |
| Make fast ... tug(s) on each bow / quarter. | |
| Put the eyes of the towing line(s) on bitts. | |
| The tug(s) is / are fast (on ...). | |
| Keep clear of towing line(s). | |
| Stand by for letting go the tug(s). | |
| Let go the tug(s). | |
| Towing line(s) is/are broken. | |

4.D. Role playing

Unit 4 -Role playing no. 1:

(Audio file: Unit 4- Role-playing no.1)

Preparing for anchoring – on board the bulk carrier “”

| Situation | |
|--|--|
| <p>Date: 15 December, at 1900. The ship is approaching the port of Lisbon - ETA 170600LT. The ship is due to unload tons of corn in Trafaria grain elevator.</p> <p>The master has just received an email from the shipping agent stating (informing??) that the berth will only be available on the 19th at 1200. The ship must anchor upon arrival, near the bay of Cascais and wait for berthing instructions. Anchoring in this area does not require a pilot.</p> <p>The master meets the Chief mate on the bridge, to inform him about the email and brief him on anchoring manoeuvres.</p> | |
| Character | Dialogue |
| Master | <i>I've just received an email from our agent. We have to anchor in the bay of Cascais. In principle, we will berth in 2 days. The ship at the quay is delayed.</i> |
| Chief mate | <i>Ok, master. The chart is here on the table. What will be our anchoring position?</i> |
| Master | <i>(the master hands over a note to the chief mate...) Here's the position.</i> |
| Chief mate | <i>(...the chief mate uses the ruler on the chart and measures some distances with the dividers. Then, he makes some calculations...) Our ETA to anchoring position is tomorrow at 0500.</i> |
| Master | <i>Ok. Give instructions to the 2nd mate and bosun to have the anchor party ready for the manoeuvre at 0430.</i> |
| Chief mate | <i>Ok, master. I will. What anchor is to be used?</i> |
| Master | <i>We will use starboard anchor. Five shackles in the water.</i> |
| Chief mate | <i>Ok. We will use starboard anchor.</i> |
| Master | <i>Call the cadet for the manoeuvre. He should go with the 2nd mate to the bow.</i> |
| Chief mate | <i>I was thinking about it, actually!</i> |

Unit 4 -Role playing no. 2:

(Audio file: Unit 4- Role-playing no.2)

Anchoring manoeuvres– on board the bulk carrier "Port Estoril"

| Situation | |
|---|---|
| At 0430 the master arrives on the bridge. The Chief mate, the cadet and the helmsman are there. | |
| Character | Dialogue |
| | |
| | |
| | |
| | |
| | |
| Master | <i>Ok. Stop engine</i> |
| Chief mate | <i>Stop engine. Engine stopped.</i> |
| Master | <i>What is the present sounding?</i> |
| Chief mate | <i>40 meters, master.</i> |
| Master | <i>Port Estoril, bow this is bridge. Stand by for letting go.</i> |
| 2 nd mate | <i>Port Estoril, Stand by for letting go.</i> |
| Master | <i>Port Estoril, Bow this is bridge. Let go starboard anchor. Advise me when there are 2 shackles in the water.</i> |
| 2 nd mate | <i>Bridge, this is bow. There are 2 shackles in the water. Cable leading forward.</i> |
| Master | <i>Keep paying out until there are 4 shackles in the water.</i> |
| 2 nd mate | <i>Bridge this is bow. Four shackles in the water.</i> |
| Master | <i>Four shackles in the water. How is the cable leading?</i> |
| 2 nd mate | <i>Bridge this is bow.</i> |

| | |
|----------------------|---|
| | <i>Cable leading forward.</i> |
| Master | <i>Bow this is bridge. Keep paying out until there are 5 shackles in the water. Then, hold it on the brake.</i> |
| 2 nd mate | <i>Affirmative. Brought up.</i> |
| Master | <i>Screw the brake. Hoist the anchor signal.</i> |
| 2 nd mate | <i>Understood. Screw the brake. Hoist the anchor signal.</i> |
| Master | <i>Finished with manoeuvres.</i> |

4.E. Use of language

Prepositions

There are over 100 prepositions in English. The most common single-word prepositions are:

| | | | | | |
|----------------|----------------|----------------|-----------------|-------------------|----------------|
| about | before | despite | near | round | unlike |
| above | behind | down | of | since | until |
| across | below | during | off | than | up |
| after | beneath | except | on | through | upon |
| against | beside | for | onto | to | via |
| along | between | from | opposite | towards | with |
| among | beyond | in | out | under | within |
| around | by | inside | outside | underneath | without |
| as | | into | over | | |
| at | | like | past | | |

Examples:

*Do you know anything **about** our next port of call?*

*The radar antennas are positioned **above** the bridge.*

*The master is **in** her cabin.*

*The paper charts are stored **in** the drawers **beneath** the chart table.*

Although most prepositions are single words, some pairs and groups of words operate like single prepositions:

The most common prepositions that consist of groups of words are:

| | | | | | |
|-------------------|-------------------|-----------------------|--------------------|----------------------|------------------|
| ahead of | because of | except for | in spite of | on account of | owing to |
| apart from | due to | in addition to | inside of | on top of | such as |
| as for | | in front of | instead of | out of | thanks to |
| as well as | | in place of | near to | outside of | up to |

There is a ship **ahead of** us.

The ship was unable to approach the port **because of** the bad weather

Jack will be playing in the team **in place of** me.

In addition to getting a large fine, both crew members were put in prison for three months.

I always get nervous when I have to speak **in front of** an audience.

We estimate that there will be **up to** 10,000 seafarers with illegal labour contracts.

Prepositions and adjectives

Prepositions can also be used after adjectives.

Here are the most common **adjective + preposition** patterns.

| Adjectives | Preposition | Example |
|---------------------|-------------|--|
| aware, full | of | They weren't aware of the dangerous situation. |
| different, separate | from | Is French very different from Spanish? |
| due, similar | to | This ship is similar to the one we visited last week. |
| familiar, wrong | with | What's wrong with the windlass?? |
| surprised* | at (by) | We were really surprised at (by) the pilot's attitude. |
| interested | in | Most young people are not interested in going to sea. |
| responsible, good | for | Exercise is good for everyone. |
| worried, excited | about | We're really excited about our next voyage to Antarctica. |

End of Unit 4 - Check your knowledge:

Exercise 1:

1. Why the use of Colreg is so important for seafarers?
2. What is the meaning of "Non-give-way vessel"?
3. What is the term given to the vessel that has to alter her course?
4. You are heading North and the other vessel is going South in a way that both bows meet. What is the name given to those two vessels?
5. There are two vessels steaming opposite courses, and their bearings divert well from each other. Which vessel shall alter course? Why?

6. You have a vessel crossing your head from starboard at 8 miles. Her bearings vary significantly. What are your conclusions?

Exercise 2:

Pilot ladder ropes parted - pilot fell overboard

As the pilot was climbing the pilot ladder, the side ropes suddenly parted _____ near the main deck, causing the ladder and pilot to fall _____ the height _____ five metres _____ into the sea. Fortunately, the pilot was uninjured and managed to remain afloat _____ the aid _____ his personal flotation device (life vest). He was able to swim _____ the ship, which was making five knots _____ the water, and was quickly recovered _____ the pilot boat. Once onboard the pilot boat, instructions were given _____ the ship to rig another pilot ladder. The pilot re-boarded the ship and completed the berthing operation.

An investigation _____ the local port state control officer (PSCO) found no certification or evidence _____ periodic inspection and maintenance of the ship's pilot ladders. Repetitive rigging of the ladder _____ the same location and height had created a permanent weak spot _____ the ropes where the failure occurred. The crew was negligent _____ not visually inspecting the ladder _____ rigging and also failed to throw the mandatory lifebuoy (life ring) _____ line and light _____ the pilot had fallen _____ the sea.

It is very important that such glaring omissions _____ ship operation and crew training (in this case, poor maintenance of pilot ladder and crew's incorrect response to a man overboard emergency) are detected _____ ship's command, managers, auditors, surveyors and inspectors and corrective actions are effectively implemented.

(adapted from : <https://www.nautinst.org/en/forums/mars/index.cfm>)

Unit 5 - Keeping a Navigational Watch

Summary:

5.A. Reading - Terminology

- 5.A.1. Watchkeeping at sea
- 5.A.2.
- 5.A.3.

5.B. Professional situations related to topic:

Identify

5.C. SMCP

-
-

5.D. Role playing

- Unit 5 RP no.1:
- Unit 5 RP no.2:

5.E. Use of English/Grammar

-

5.1.A. Watchkeeping at sea

Officer in charge of a navigational watch

The officer in charge of the navigational watch is the master's representative and is responsible for the **safe navigation** of the ship and for **complying with** the International Regulations for Preventing Collisions at Sea, 1972.

There are some principles which must **be observed** in order to ensure **safety of navigation** and **protection of the marine environment**.

At all times, the officer must have these rules in mind for building up a proper situational awareness.

Performing the navigational watch

The officer in charge of the navigational watch shall:

- .1 keep the watch on the bridge;
- .2 in no circumstances leave the bridge until properly relieved;

.3 continue to be responsible for the safe navigation of the ship, despite the presence of the master on the bridge, until informed specifically that the master has assumed that responsibility and this is mutually understood; and

.4 notify the master when in any doubt as to what action to take in the interest of safety.

During the watch the course steered, position and speed shall be checked at sufficiently frequent intervals, using any available navigational aids necessary, to ensure that the ship follows the planned course.

The officer in charge of the navigational watch shall have full knowledge of the location and operation of all safety and navigational equipment on board the ship and shall be aware and take account of the operating limitations of such equipment.

The officer in charge of the navigational watch shall not be assigned or undertake any duties which would interfere with the safe navigation of the ship.

Officers of the navigational watch shall make the most effective use of all navigational equipment at their disposal.

When using radar, the officer in charge of the navigational watch shall bear in mind the necessity to comply at all times with the provisions on the use of radar contained in the International Regulations for Preventing Collisions at Sea, in force.

In cases of need the officer in charge of the navigational watch shall not hesitate to use the helm, engines and sound signalling apparatus. However, timely notice of intended variations of engine speed shall be given where possible or effective use made of UMS engine controls provided on the bridge in accordance with the applicable procedures.

Officers of the navigational watch shall know the handling characteristics of their ship, including its stopping distances, and should appreciate that other ships may have different handling characteristics.

A proper record shall be kept during the watch of the movements and activities relating to the navigation of the ship.

It is of special importance that at all times the officer in charge of the navigational watch ensures that a proper look-out is maintained. In a ship with a separate chart room the officer in charge of the navigational watch may visit the chart room, when essential, for a short period for the necessary performance of navigational duties, but shall first ensure that it is safe to do so and that proper look-out is maintained.

Operational tests of shipboard navigational equipment shall be carried out at sea as frequently as practicable and as circumstances permit, in particular before hazardous conditions affecting navigation are expected. Whenever appropriate, these tests shall be recorded. Such tests shall also be carried out prior to port arrival and departure.

Situational awareness

A proper look-out shall be maintained at all times in compliance with rule 5 of the International Regulations for Preventing Collisions at Sea, 1972 and shall serve the purpose of:

| | |
|---|---|
| 1 | maintaining a continuous state of vigilance by sight and hearing as well as by all other available means, with regard to any significant change in the operating environment; |
| 2 | fully appraising the situation and the risk of collision, stranding and other dangers to navigation; and |
| 3 | detecting ships or aircraft in distress, shipwrecked persons, wrecks, debris and other hazards to safe navigation. |

The look-out must be able to give full attention to the keeping of a proper look-out and no other duties shall be undertaken or assigned which could interfere with that task.

The duties of the look-out and helmsperson are separate and the helmsperson shall not be considered to be the look-out while steering, except in small ships where an unobstructed all-round view is provided at the steering position and there is no impairment of night vision or other impediment to the keeping of a proper look-out. The officer in charge of the navigational watch may be the sole look-out in daylight provided that on each such occasion:

In determining that the composition of the navigational watch is adequate to ensure that a proper look-out can continuously be maintained, the master shall take into account all relevant factors, including those described in this section of the Code, as well as the following factors:

| | |
|--|--|
| | visibility, state of weather and sea; |
| | traffic density, and other activities occurring in the area in which the vessel is navigating; |
| | the attention necessary when navigating in or near traffic separation schemes or other routing measures; |
| | the additional workload caused by the nature of the ship's functions, immediate operating requirements and anticipated manoeuvres; |
| | the fitness for duty of any crew members on call who are assigned as members of the watch; |
| | knowledge of and confidence in the professional competence of the ship's officers and crew; |
| | the experience of each officer of the navigational watch, and the familiarity of that officer with the ship's equipment, procedures, and manoeuvring capability; |
| | activities taking place on board the ship at any particular time, including radio communication activities and the availability of assistance to be summoned immediately to the bridge when necessary; |
| | the operational status of bridge instrumentation and controls, including alarm systems; |
| | rudder and propeller control and ship manoeuvring characteristics; |
| | the size of the ship and the field of vision available from the conning position; |
| | the configuration of the bridge, to the extent such configuration might inhibit a member of the watch from detecting by sight or hearing any external development; and |
| | any other relevant standard, procedure or guidance relating to watch keeping arrangements and fitness for duty which has been adopted by the Organization. |

Watch arrangements

The following shall be taken into account:

- .1 at no time shall the bridge be left unattended;
- .2 weather conditions, visibility and whether there is daylight or darkness;
- .3 proximity of navigational hazards which may make it necessary for the officer in charge of the watch to carry out additional navigational duties;
- .4 use and operational condition of navigational aids such as radar or electronic position-indicating devices and any other equipment affecting the safe navigation of the ship;
- .5 whether the ship is fitted with automatic steering;
- .6 whether there are radio duties to be performed;
- .7 unmanned machinery space (UMS) controls, alarms and indicators provided on the bridge, procedures for their use and limitations; and
- .8 any unusual demands on the navigational watch that may arise as a result of special operational circumstances.

Regular checks

| | |
|---|---|
| | Test the automatic pilot manually (once during the watch); |
| 1 | Check if the radio equipment is working properly; |
| 2 | Check if the UMS (unmanned machinery spaces) controls, alarms and indicators are operative; |
| 3 | Check if the navigation and signal lights and other navigational equipment are fully operational; |
| 4 | Check if the automatic pilot is steering the correct course; |

Magnetic Standard Compass and Gyro Compass

| | |
|--|---|
| | The standard and gyro-compasses are frequently compared and repeaters are synchronized with their master compass; |
| | The standard compass error is determined at least once a watch and, when possible, after any major alteration of course |

The officer in charge of the navigational watch shall bear in mind the necessity to comply at all times with the requirements in force of the International Convention for the Safety of Life at Sea,

(SOLAS) 1974 (including latest amendments). The officer of the navigational watch shall take into account:

.1 the need to station a person to steer the ship and to put the steering into manual control in good time to allow any potentially hazardous situation to be dealt with in a safe manner; and

.2 that with a ship under automatic steering it is highly dangerous to allow a situation to develop to the point where the officer in charge of the navigational watch is without assistance and has to break the continuity of the look-out in order to take emergency action.

Officers of the navigational watch shall be thoroughly familiar with the use of all electronic navigational aids carried, including their capabilities and limitations, and shall use each of these aids when appropriate and shall bear in mind that the echo-sounder is a valuable navigational aid.

The officer in charge of the navigational watch shall use the radar whenever restricted visibility is encountered or expected, and at all times in congested waters having due regard to its limitations.

The officer in charge of the navigational watch shall ensure that range scales employed are changed at sufficiently frequent intervals so that echoes are detected as early as possible. It shall be borne in mind that small or poor echoes may escape detection.

Whenever radar is in use, the officer in charge of the navigational watch shall select an appropriate range scale and observe the display carefully, and shall ensure that plotting or systematic analysis is commenced in ample time.

The officer in charge of the navigational watch shall notify the master immediately:

| | |
|----|--|
| 1 | if restricted visibility is encountered or expected; |
| 2 | if the traffic conditions or the movements of other ships are causing concern; |
| 3 | if difficulty is experienced in maintaining course; |
| 4 | on failure to sight land, a navigation mark or to obtain soundings by the expected time; |
| 5 | if, unexpectedly, land or a navigation mark is sighted or a change in soundings occurs; |
| 6 | on breakdown of the engines, propulsion machinery remote control, steering gear or any essential navigational equipment, alarm or indicator; |
| 7 | if the radio equipment malfunctions; |
| 8 | in heavy weather, if in any doubt about the possibility of weather damage; |
| 9 | if the ship meets any hazard to navigation, such as ice or a derelict; and |
| 10 | in any other emergency or if in any doubt. |

Despite the requirement to notify the master immediately in the foregoing circumstances, the officer in charge of the navigational watch shall in addition not hesitate to take immediate action for the safety of the ship, where circumstances so require.

The officer in charge of the navigational watch shall give watchkeeping personnel all appropriate instructions and information which will ensure the keeping of a safe watch, including a proper look-out.

Handing over the watch

The officer in charge of the navigational watch shall not hand over the watch to the relieving officer if there is reason to believe that the latter is not capable of carrying out the watch keeping duties effectively, in which case the master shall be notified.

Taking over the watch

The relieving officer shall ensure that the members of the relieving watch are fully capable of performing their duties, particularly as regards their adjustment to night vision. Relieving officers shall not take over the watch until their vision is fully adjusted to the light conditions.

Prior to taking over the watch relieving officers shall satisfy themselves as to the ship's estimated or true position and confirm its intended track, course and speed, and UMS controls as appropriate and shall note any dangers to navigation expected to be encountered during their watch.

Relieving officers shall personally satisfy themselves regarding the:

- .1 standing orders and other special instructions of the master relating to navigation of the ship;
- .2 position, course, speed and draught of the ship;
- .3 prevailing and predicted tides, currents, weather, visibility and the effect of these factors upon course and speed;
- .4 procedures for the use of main engines to manoeuvre when the main engines are on bridge control; and
- .5 navigational situation, including but not limited to:
 - .5.1 the operational condition of all navigational and safety equipment being used or likely to be used during the watch,
 - .5.2 the errors of gyro and magnetic compasses,
 - .5.3 the presence and movement of ships in sight or known to be in the vicinity,
 - .5.4 the conditions and hazards likely to be encountered during the watch, and
 - .5.5 the possible effects of heel, trim, water density and squat on under keel clearance.

If at any time the officer in charge of the navigational watch is to be relieved when a manoeuvre or other action to avoid any hazard is taking place, the relief of that officer shall be deferred until such action has been completed.

Responsibilities regarding avoidance of Collision and Grounding

The officer of the watch is the eyes and the brain of a ship – in the absence of the Master who may not be available on the Bridge always – though he may be called.

This important aspect should not be forgotten by the OOW. He is the only person who would have to take a decision to avoid immediate danger and has to also take the step to call up the Master for taking over when he cannot handle the situation – this should not be looked upon as in competence rather a call well in time would be much appreciated rather than have a collision.

The OOW may not face many decision making instances everyday, and if the scenario does appear so, then the Master would be on hand to lend advise.

On normal navigation duties the OOW has to strictly follow the Rules of the Road (COLREG's) and should not deviate from the spirit.

A casual attitude would be disastrous, in case of any doubt he should call the Master.

All actions to avoid a collision and stranding should be made as stated in the Rules, well in time. So that the OOW would be able to assess his action and have adequate time to take further actions if the action is not helpful.

The OOW should at all times have the Company's Order book (for Navigation) as well as the Master's standing orders open on the Chart table.

This may be looked upon as frivolous but in case of any doubt about a situation, these lines of instructions help in making a decision.

One of the most important thing is to remember that at all times the lives of many depend on him to make the correct decision. If the OOW feels he is unwell to perform his duties he has to bring the same to the Masters notice and asked to be relieved. Some cases when all the OOW and the Master are overworked, then he has to put in a special effort to rise above the situation. Rule Six and seven should be never forgotten and should be form the back bone of all navigating decisions.

Watch keeping under different conditions and in different areas

| | |
|------------------------------|---|
| Clear weather | <p>The officer in charge of the navigational watch shall take frequent and accurate compass bearings of approaching ships as a means of early detection of risk of collision and bear in mind that such risk may sometimes exist even when an appreciable bearing change is evident, particularly when approaching a very large ship or a tow or when approaching a ship at close range. The officer in charge of the navigational watch shall also take early and positive action in compliance with the applicable International Regulations for Preventing Collisions at Sea, 1972 and subsequently check that such action is having the desired effect.</p> <p>In clear weather, whenever possible, the officer in charge of the navigational watch shall carry out radar practice.</p> |
| Restricted visibility | <p>When restricted visibnwh9(n)7()6eqehcte()6(f)14(o)W)8(h-23(e)-11(e)15(i</p> |

| | |
|-------------------------------------|--|
| | <p>Preventing Collisions at Sea, 1972 with particular regard to the sounding of fog signals, proceeding at a safe speed and having the engines ready for immediate manoeuvre.</p> <p>In addition, the officer in charge of the navigational watch shall:</p> <ul style="list-style-type: none"> inform the master; post a proper look-out; exhibit navigation lights; and operate and use the radar. |
| In hours of darkness | <p>The master and the officer in charge of the navigational watch when arranging look-out duty shall have due regard to the bridge equipment and navigational aids available for use, their limitations; procedures and safeguards implemented.</p> |
| Coastal and congested waters | <p>The largest scale chart on board, suitable for the area and corrected with the latest available information, shall be used. Fixes shall be taken at frequent intervals, and shall be carried out by more than one method whenever circumstances allow.</p> <p>The OOW shall positively identify all relevant navigation marks.</p> |

Navigation with pilot on board

Despite the duties and obligations of pilots, their presence on board does not relieve the master or officer in charge of the navigational watch from their duties and obligations for the safety of the ship. The master and the pilot shall exchange information regarding navigation procedures, local conditions and the ship's characteristics. The master and/or the officer in charge of the navigational watch shall co-operate closely with the pilot and maintain an accurate check on the ship's position and movement.

If in any doubt as to the pilot's actions or intentions, the officer in charge of the navigational watch shall seek clarification from the pilot and, if doubt still exists, shall notify the master immediately and take whatever action is necessary before the master arrives.

Ship at anchor

If the master considers it necessary, a continuous navigational watch shall be maintained at anchor. While at anchor, the officer in charge of the navigational watch shall:

- determine and plot the ship's position on the appropriate chart as soon as practicable;
- when circumstances permit, check at sufficiently frequent intervals whether the ship is remaining securely at anchor by taking bearings of fixed navigation marks or readily identifiable shore objects;
- ensure that proper look-out is maintained;
- ensure that inspection rounds of the ship are made periodically;
- observe meteorological and tidal conditions and the state of the sea;
- notify the master and undertake all necessary measures if the ship drags anchor;
- ensure that the state of readiness of the main engines and other machinery is in accordance with the master's instructions;
- if visibility deteriorates, notify the master;
- ensure that the ship exhibits the appropriate lights and shapes and that appropriate sound signals are made in accordance with all applicable regulations; and
- take measures to protect the environment from pollution by the ship and comply with applicable pollution regulations.

| | |
|--|--|
| We are passing / we passed buoy ...(charted name) on port side / starboard side. | |
| .We are approaching buoy ...(charted name) on port side / starboard side. | |
| Buoy ...(charted name) ... is cables / nautical miles ahead. | |
| We are entering / we entered area ... | |
| We are leaving / we left area ... | |

Handing over the watch (in context)

Briefing on position

| | |
|-------------------------------|--|
| OOW handing over the watch | Our present position is 33. N and 012 W. |
| Officer taking over the watch | Ok, understood. |

| | |
|-------------------------------|---|
| OOW handing over the watch | Our present position is bearing 210 degrees, distance 6 nautical miles from..buoy (charted name). |
| Officer taking over the watch | How did you obtain this fix? |

| | |
|-------------------------------|---|
| OOW handing over the watch | The present position is nautical miles between and..... way point / reporting point ... |
| Officer taking over the watch | Ok. |

| | |
|-------------------------------|---|
| OOW handing over the watch | The next waypoint / reporting point is 5 nm west of Seagull's Point. ETA at 1255 UTC. |
| Officer taking over the watch | Right. What are the coordinates? |

| | |
|-------------------------------|---|
| OOW handing over the watch | Buoy .NS205. is 6 nautical miles ahead. We are passing the buoy on our port side. |
| Officer taking over the watch | Did you check it on the radar? |

| | |
|-------------------------------|---|
| OOW handing over the watch | We are leaving fishing traffic area but keep sharp lookout. |
| Officer taking over the watch | Did you have any problem during your watch? |

Briefing on navigational aids and equipment status

| | |
|-------------------------------|---|
| OOW handing over the watch | Port side radar is at 6. miles range scale. |
| Officer taking over the watch | Is the other on stand by? |

OOW handing over
the watch

The radar is relative head-up / north-up / course-up.

| | |
|-------------------------------|---|
| Officer taking over the watch | Where's the paper? |
| OOW handing over the watch | It's in the Log book, as usual. Have a good watch! |

Movements

| In English | In your native language |
|---|-------------------------|
| True course / gyro compass course / magnetic compass course is ... degrees. | |
| Gyro compass error is ... degrees plus / minus. Magnetic compass error is ... degrees east / west. | |
| Speed over ground / through water is ... knots. | |
| Set and drift is ... degrees, ... knots. | |
| We are making ... degrees leeway. | |
| The course board is written up. | |
| The next chart is within hours. | |

Draft

| | |
|--------------------------------------|--|
| Draft forward / aft is ... metres. | |
| Present maximum draft is ... metres. | |
| Underkeel clearance is ... metres. | |

Briefing on traffic situation in the area

| | |
|---|---|
| A vessel is ~ overtaking ... (cardinal points) of us. ~ passing on port side / starboard side. ~ on opposite course. | |
| A vessel is crossing from port side. The vessel ~ will give way. ~ has given way. ~ has not given way yet. ~ is standing on. ~ need not give way. | 2 |
| A vessel is crossing from starboard side. We ~ need not give way. ~ will stand on. ~ will alter course to give way. ~ have altered course to give way. | |
| The vessel will pass ... kilometres / ... nautical miles ahead / astern. | |

| | |
|--|--|
| I will complete the manoeuvre. | |
| A vessel ... (cardinal points) of us is on the same course. | |
| The bearing to the vessel in ... degrees is constant. | |
| There is heavy traffic / ... in the area. There are fishing boats / ... in the area. | |
| There are no dangerous targets on the radar . Attention. There are dangerous targets on the radar . | |
| Call the Master if any vessel passes with a CPA of less than miles. | |

Briefing on navigational aids and equipment status

| | |
|---|--|
| Port side / starboard side radar is at ... miles range scale. | |
| The radar is ~ relative head-up / north-up / course-up. ~ true-motion north-up / course-up. | |
| GPS / LORAN is / is not in operation. | |
| Echo sounder is at ... metres range scale. The echo sounder recordings are unreliable. | |
| I changed to manual / automatic steering (at ... UTC). | |
| Navigation lights are switched on / off. | |

Briefing on radiocommunications

| | |
|--|--|
| INMARSAT ...(type of system) is operational / is not operational. | |
| VHF DSC Channel 70 / VHF Channel ... / DSC controller is switched on. DSC frequency 2187.5 kHz is switched on. | |
| NAVTEX is switched on. | |
| Following was received on ... at ... UTC | |
| Shore based radar assistance / VTS / Pilot station is on VHF Channel | |
| The Pilot station / VTS station requires ~ flag State. ~ call sign / identification. ~ draft. ~ gross tonnage. ~ length overall. ~ kind of cargo. ~ ETA at ~ MAREP POSREP / | |

Briefing on record keeping

| In English | In your native language |
|---|-------------------------|
| The log books / record books are completed and signed. The note book entries will be copied (into the log books / record books) after the watch. | |
| Change the paper of the data logger / echo sounder / ... recorder. Refill the toner / ink of the data logger / echo sounder / ... recorder | |

Handing and taking over the watch/ conn

| | |
|---|--|
| The Master / Chief Engineer or an (engineer) officer handing over the watch should say: You have the watch now. The relieving officer should confirm and say: I have the watch now . | |
| The Master/Chief Engineer when called to the bridge/engine (control) room and formally taking over the watch, should confirm and say: I have the watch now. The officer of the watch should confirm and say: You have the watch now. | |

Trim, list and stability

| In English | In your native language |
|---|-------------------------|
| The vessel is on even keel (at present). The vessel is ... metres down by the head / stern (at present). | |
| There is no list (at present). (present) list is ... degrees to port / starboard. | |
| Fuel / ballast / fresh water / oil was transferred from (no.) ... tank(s) to (no.) ... tank(s) to correct the list. | |

| | |
|---|--|
| We must transfer fuel / ballast / fresh water / oil from (no.) ... tank(s) to (no.) ... tank(s) to correct the list. | |
| Deck cargo / cargo was restowed (in (no.) . .. hold(s)) to correct the list. We must restow cargo in (no.) ... hold(s) to correct the list. | |
| (present) stability is good / poor. | |
| (no.) ... double bottom tank(s) was / were filled to improve the stability. | |
| Fuel / ballast / fresh water / oil was transferred from (no.) ... tank(s) to (no.) ... tank(s) to improve the stability. We must transfer fuel / ballast / fresh water/ oil from (no.) ... tank(s) to (no.) ... tank(s) to improve the stability. Fore peak/after peak tank was filled/emptied to change the trim | |
| Cargo was restowed in (no.) ... hold(s) / on deck to improve the stability. We must restow cargo in (no.) ... hold(s) / on deck to improve the stability. | |
| Containers were restowed from ... to ... to improve the stability. We must restow containers from ... to ... to improve the stability. | |

Standard wheel orders

All wheel orders given should be repeated by the helmsman and the officer of the watch should ensure that they are carried out correctly and immediately.

All wheel orders should be held until countermanded. The helmsman should report immediately if the vessel does not answer the wheel.

When there is concern that the helmsman is inattentive s/he should be questioned:

"What is your heading ?" And he/she should respond:

"My heading is ... degrees."

| Order | Meaning | Your language |
|--------------------------|--|---------------|
| 1. Midships | <i>Rudder to be held in the fore and aft position.</i> | |
| 2. Port / starboard five | <i>5° of port / starboard rudder to be held.</i> | |

| | | |
|---|--|--|
| 3. Port / starboard ten | <i>10° of port / starboard rudder to be held.</i> | |
| 4. Port / starboard fifteen | <i>15° of port / starboard rudder to be held.</i> | |
| 5. Port / starboard twenty | <i>20° of port / starboard rudder to be held.</i> | |
| 6. Port / starboard twenty-five | <i>25° of port / starboard rudder to be held.</i> | |
| 7. Hard -a-port / starboard | <i>Rudder to be held fully over to port / starboard.</i> | |
| 8. Nothing to port/starboard | <i>Avoid allowing the vessel's head to go to port/starboard</i> | |
| 9. Meet her | <i>Check the swing of the vessel's head in a turn.</i> | |
| 10. Steady | <i>Reduce swing as rapidly as possible.</i> | |
| 11. Ease to five / ten | <i>Reduce amount of rudder to 5°/10°/15°/20° and hold. / fifteen / twenty</i> | |
| 12. Steady as she goes | <i>Steer a steady course on the compass heading indicated at the time of the order. The helmsman is to repeat the order and call out the compass heading on receiving the order. When the vessel is steady on that heading, the helmsman is to call out: "Steady on ..."</i> | |
| 13. Keep the buoy/ mark/ beacon/ ... on port side / starboard side. | | |
| 14. Report if she does not answer the wheel. | | |
| 15. Finished with wheel, no more steering. | | |

When the officer of the watch requires a course to be steered by compass, the direction in which s/he wants the wheel turned should be stated followed by each numeral being said separately, including zero, for example:

| Order | Meaning | Your language |
|--|----------------|----------------------|
| <i>Port, steer one eight two</i> | <i>182°</i> | |
| <i>Starboard, steer zero eight two</i> | <i>082°</i> | |
| <i>Port, steer three zero five</i> | <i>305°</i> | |

On receipt of an order to steer, for example, 182⁰, **the helmsman should repeat** it and bring the vessel round steadily to the course ordered. **When the vessel is steady** on the course ordered, the helmsman is **to call out**:

"Steady on one eight two".

The person giving the order should acknowledge the helmsman's reply.

If it is desired to steer on a selected mark the helmsman should be ordered to:

"Steer on ... buoy / ... mark / ... beacon".

The person giving the order should acknowledge the helmsman's reply.

Standard engine orders

Any engine order given should be repeated by the person operating the bridge telegraph(s) and the officer of the watch should ensure the order is carried out correctly and immediately.

| Order In English | Order in your language |
|--|------------------------|
| 1. (Port / starboard engines) Full ahead / astern | |
| 2. (Port / starboard engines) Half ahead / astern | |
| 3. (Port / starboard engines) Slow ahead / astern | |
| 4. (Port / starboard engines) Dead slow ahead / astern | |
| 5. Stop (port / starboard) engines | |
| 6. Emergency full ahead / astern | |
| 7. Stand by engine (Engine-room personnel fully ready to manoeuvre and bridge manned to relay engine orders.) | |
| 8. Finished with engines – no more manoeuvring. (Operation of engines no longer required.) | |

In vessels fitted with twin propellers, the word "both" should be added to all orders affecting both shafts, e.g. "Full ahead both", and "Slow astern both", except that the words "Stop all engines" should be used, when appropriate. When required to manoeuvre twin propellers independently, this should be indicated, i.e. "Full ahead starboard", "Half astern port", etc.

Where bow thrusters are used, the following orders are used:

| Order in English | Order in your language |
|--|------------------------|
| 1. Bow thruster full / half to port / starboard. | |
| 2. Stern thruster full / half to port / starboard. | |

| | |
|------------------------------|--|
| 3. Bow / stern thruster stop | |
|------------------------------|--|

Pilot on the bridge

Propulsion system

| In English | In your native language |
|---|-------------------------|
| Is the engine a diesel or a turbine? The engine is a diesel / turbine. | |
| Is the engine-room manned or is the engine on bridge control? The engine-room is manned. The engine is on bridge control. | |
| How long does it take to change the engines from ahead to astern? It takes ... seconds to change the engines (from ahead to astern). | |
| How long does it take to start the engines from stopped? It takes ... seconds to start the engines (from stopped). | |
| Is extra power available in an emergency? Yes, extra power is available. No, extra power is not available. | |
| Do you have a controllable or fixed pitch propeller? We have a controllable pitch propeller. We have a fixed pitch propeller. | |
| Do you have a right-hand or left-hand propeller? We have a right-hand / left-hand propeller. | |
| Do you have a single propeller or twin propellers? We have a single propeller / twin propellers. | |
| Do you have a bow thruster / stern thruster? We have one /two/.. bow thruster(s) / stern thruster(s). | |
| What is the maximum manoeuvring power ahead / astern? The maximum manoeuvring power ahead / astern is ... kilowatts. | |
| What are the maximum revolutions ahead / astern? The maximum revolutions ahead /astern are... | |
| Do the twin propellers turn inward or outward | |

| | |
|--|--|
| <p>when going ahead? The twin propellers turn inward / outward (when going ahead).</p> | |
|--|--|

Manoeuvring

| In English | In your native language |
|--|-------------------------|
| I require the pilot card / manoeuvring data. | |
| What is the diameter of the turning circle? The diameter of the turning circle is ... metres. | |
| What is the advance and transfer distance in a crash-stop? The advance distance is ... kilometres / nautical miles, the transfer distance is ... degrees (in a crash-stop). | |
| How long does it take from hard-a-port to hard-a-starboard? It takes ... seconds (from hard-a-port to hard-a-starboard). | |
| Is the turning effect of the propeller very strong? Yes, the turning effect (of the propeller) is very strong. No, the turning effect (of the propeller) is not very strong. | |
| Where is the whistle control? The whistle control is on the console / on | |
| What notice is required to reduce from full sea speed to manoeuvring speed? ... minutes notice is required (to reduce from full sea speed to manoeuvring speed). | |
| Do you have an automatic pilot? Yes, we have an automatic pilot. No, we do not have an automatic pilot. | |
| Give ... short / prolonged blast(s) (on the whistle). | |
| Stand by lookout. ~ on the bridge ~ on the forecastle ~ in the port/starboard wing | |
| Maintain a speed of ... knots. | |
| What is the (manoeuvring) speed at full / half / slow / dead slow ahead? The manoeuvring speed at full / half / slow / dead slow ahead is ... knots. | |
| What is the full sea speed / fairway speed? The full sea speed / fairway speed is ... knots. | |

Radar

| In English | In your native language |
|---|-------------------------|
| Is the radar operational? Yes, the radar is operational. No, the radar is not operational. | |
| Where is the radar antenna? The radar antenna is on | |
| Does the radar have any blind sectors? Yes, the radar has blind sectors from ... to ... degrees and from ... to ... degrees. No, the radar does not have any blind sectors. | |
| Change the radar to ~ ... miles range scale. ~ relative head-up / north-up / course-up. ~ true-motion north-up / course-up. | |

5.D. Role playing

Role playing exercise no.1

(Audio file: Unit 5- Role-playing no.1)

Draft and air draft

| Situation | |
|-----------|----------|
| | |
| Character | Dialogue |
| | |
| | |
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| | |

5.E. Use of the language

Conditionals

Conditionals describe the result or the consequence of a certain condition.

The *if* clause is the condition - *If you work hard*

and

the main clause describes the result - *you will have success.*

(The order of the clauses does not change the meaning)

If you work hard you will be successful.

you will be successful if you work hard.

Conditional sentences are often divided into different types.

| Describing real situations | | |
|---|-------------------------------------|----------------------------------|
| | If clause (condition) | Main clause (result) |
| 0 (zero) conditional To be used for describing present and real situations or facts | <i>If (when) I sit on the couch</i> | <i>I fall asleep immediately</i> |
| | (Simple present tense) | (Simple present tense) |
| 1st conditional To be used for describing future and real situations | <i>If you take this pill</i> | <i>You will feel better</i> |
| | (Simple present tense) | (Simple future tense) |

| Describing unreal or imaginary situations | | |
|---|--|---|
| | If clause (condition) | Main clause (result) |
| 2nd conditional To be used for describing present or future unreal or imaginary situations | <i>If I had more time</i> | <i>I would help you with your work.</i> |
| | (Simple past tense) | (Simple conditional tense) |
| 3rd conditional To be used for describing past unreal or imaginary situations | <i>If I had known about that vacancy</i> | <i>I would have applied to the job</i> |
| | (Past perfect tense) | (Conditional perfect tense) |

End of Unit 5 - Check your knowledge:

Exercise 1:

Imagine that your watch is almost over and your relief, Mr. Ho, a chinese deck officer has entered the bridge

He salutes you: "Good morning Mr. Student. How are you?"

You answer: _____

Then you start handing over the watch. Turn the following sentences into English:

Exercise 2:

Please refer to part B of SMCP. Read the phrases and complete them with real information.

Briefing on traffic situation in the area

A vessel is overtaking _____ of us

A vessel is on opposite _____.

A vessel is passing on _____ side.

A vessel is crossing from port side.

The vessel will _____ way.

The vessel has _____ way.

The vessel has not _____ way yet.

The vessel is _____ on.

The vessel need not _____ way.

A vessel is crossing from starboard side.

We need not _____ way.

We will _____ on. (maintain your course)

We will _____ course to give way.

We have _____ course to give way.

The vessel will pass . 2 _____ ahead of us.

I will _____ the manoeuvre.

A vessel _____ (cardinal points) of us is on the same _____.

The bearing to the vessel in _____ degrees is constant.

There is heavy traffic _____ the area.

There are fishing boats _____ the area.

There are no dangerous _____ on the radar .

Attention. There are dangerous _____ on the radar .

Call the Master if any vessel passes with a CPA of less than _____ . miles.

Call the Master if _____ .

PART II – Role-playing exercises

Role playing Exercise 1:

(individual work)

a)

| | |
|-----------|--|
| Role | 3 rd mate |
| Situation | 3 rd mate explains an extract from a technical manual to a deck cadet |
| | <ol style="list-style-type: none"> 1) Read and summarize the extract from a technical manual for 10 minutes. Make some notes to support your oral presentation; 2) After reading the extract, make an oral summary of it and don't forget to mention the following items: <ul style="list-style-type: none"> - the equipment; - the contents of the extract (the items) - the particulars of the operation or maintenance procedures |

b)

| | |
|-----------|---|
| Roles | Master and 3 rd mate |
| Situation | 3 rd mate explains the fault in Auto Pilot |
| | <p>0900 – verificou que o rumo tinha um desvio de 10° ; mudou o governo para Manual; verificou que os parâmetros do equipamento estavam corretos; Fez o teste do equipamento e acusou o erro 107 (falha no sistema hidráulico)</p> <p>0910 – Telefonou para a casa da máquina e informou sobre este problema; registou o evento no Diário</p> |

c)

| | |
|-----------|---|
| Roles | 3 rd mate and Deck cadet |
| Situation | Explaining the daily use of the radars |
| | <ul style="list-style-type: none"> - Ambos estão operacionais mas o seu uso varia de acordo com as situações; - O radar de estibordo tem o sistema ARPA e é usado principalmente quando o navio está em alto mar. - O radar de bombordo é usado quando o navio está a navegar em águas restritas e em aproximações a porto. É mais fiável para pequenas distâncias |

Role playing Exercise 2:

Summarize and translate basic operating instructions

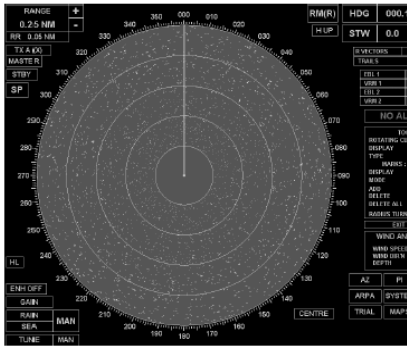
(listen to audio file: Unit 1, Role-playing no.3)

Following, there is an extract taken from the “Bridge Master E Radar Operating Instructions”

Basic Operation

Introduction

When TRANSMIT is selected from Standby, the system is switched to transmit. radars can only be set to transmit if the associated Master is already transmitting.



User Specified Data

The user data area of the display is located at the bottom right hand side, at the help area and function soft keys. The area is used to show information re to own ship and is available in both Standby and Transmit modes.

Fig. : Excerpt from a Technical Manual.

| |
|------------------|
| Situation |
| |

Use of Standard Marine Communication Phrases – Internal and External communications

3. 0630 - Reply from VTS Dunkirk - the vessel will anchor on arrival, 1' NW of fairway buoy; berthing will be at 1500 hours.
Reply from Pilots: - pilots are to board the ship on starboard side, thus it is necessary to have the combination ladder ready, 1.5 meters above water.
4. 0700 - OOW hands the AB a walky-talky and tells him to call anchor party and when on the forecastle, then call bridge for instructions.
5. 0730 - OOW calls master, greets him and informs on what has been made. The master tells OOW that in 20 minutes he will be on the bridge.
6. When bosun gets to forecastle he calls the bridge, and receives the order from OOW to purge windlass, remove anchor-chain stopper and lower anchor a cock-bill (above the waterline) , disengage/ put windlass off gear held by the brake. He is told to let bridge know when everything is as ordered.
7. 0745 – the master enters the bridge, greets both the mate and the helmsman and asks how things are.. OOW replies and OOW explains the happenings.

Assignment:

- a) Set up on board communication between Master, AB and Mate, 2nd engineer, bosun as per the above information ;
- b) Set up a communication on VHF between vessel, VTS and Pilots, making use of Message Markers .
- c) Use a narrator, when necessary;
- d) Translate the keywords to the specific term in Portuguese:

Keywords:

| English | Portuguese | English | Portuguese |
|----------------------|------------------------------|--------------|---|
| to purge windlass | <i>purgar o molinete</i> | anchor party | <i>Equipa p/ manobra de fundear</i> |
| anchor-chain stopper | <i>gato</i> | brake | <i>breca</i> |
| brake | <i>Breca</i> | a cock-bill | <i>ao lume de água</i> |
| anchor windlass | <i>molinete</i> | fairway buoy | <i>Bóia de águas limpas ou bóia de espera</i> |
| windlass off gear | <i>Molinete desengrenado</i> | held by | <i>Seguro por...</i> |

Additional information:

Radiocommunications procedures -- Internal communications

During the manoeuvres for anchoring or mooring, there are usually 2 teams on deck, one ahead and one astern. Each officer from the team has a portable VHF to communicate with the bridge. The bridge is named **control** and the portable sub-stations are named **alfa** and **bravo**.

Role playing Exercise 3:

The container Ship "Atlantic Star / PCNT" is bound for Tarragona.

On the 27 February at 1300 UTC the position of the ship is 39.6N 010.8E.

The lookout calls the attention of the OOW that there is something afloat on their bow, possibly in collision course. The OOW checks and sights a container.

He realizes that a Navigational Warning should be transmitted to all ships in their vicinity.

He calls the master and asks for permission to transmit the Nav Warning.

The master tells him that he will be on the bridge soon.

The master gives the OOW permission to transmit.

1) The OOW makes the first call on ch.16 and instructs to change to ch. 13.

| | Speaker | Script |
|---|---------|---|
| 1 | OOW | SECURITÉ SECURITÉ SECURITÉ ALL STATIONS ALL STATIONS ALL STATIONS THIS IS "ATLANTIC STAR" "ATLANTIC STAR" "ATLANTIC STAR" CALL SIGN PCNT" CHANGE TO CHANNEL 13 |

2) On ch. 13, the OOW transmits the appropriate message:

| | Speaker | Script (complete the message) |
|---|---------|---|
| 2 | OOW | SECURITÉ SECURITÉ SECURITÉ ALL STATIONS ALL STATIONS ALL STATIONS IN PSN 39.6N 010.8E TIME 1300 UTC DANGER TO OUT |

Role playing Exercise 4:

Write a report based on the following situation:

| | |
|--|---|
| Situation | Engine failure |
| Time | 0900 Local Time |
| People involved | Master, Chief engineer and 2 nd mate (OOW) |
| | SEQUENCE OF EVENTS AND DIALOGUES |
| Chief engineer calls the bridge | <i>"Good morning mr. Mate. There is an engine failure and we have to stop the engine for repairs. It will take 4 hours approximately".</i> |
| OOW, 2 nd mate | <i>"Ok chief. I will inform the master".</i> |
| OOW, 2 nd mate calls the master | <i>"Good morning master. The engine has to be stopped for emergency repairs and the chief engineer said that the repair will take approximately 4 hours. The weather is good, no wind or swell but there is dense traffic in the area".</i> |
| Master replies to the OOW. | <i>"Ok Mr. Mate. I will be on the bridge soon. In the meantime, please transmit the Urgency message on VHF"</i> |
| OOW | <i>"Ok master. I will do it immediately"</i> |

| Tense | Signal words | Use | Form | Examples affirmative | Examples negative | Examples interrogative |
|---------------------------|---|---|--|----------------------|--------------------|------------------------|
| Simple Present | every day sometimes always often usually seldom never first ... then | -something happens repeatedly -how often something happens -one action follows another -things in general with the following verbs (to love, to hate, to think, etc.) -future meaning: timetables, programmes | infinitive he/she/it + s | I work. | I don't work. | Do I work? |
| | | | | He works. | He doesn't work. | Does he work? |
| | | | | I go. | I don't go. | Do I go? |
| | | | | He goes. | He doesn't go. | Does he go? |
| Present Continuous | now at the moment Look! Listen! | -something is happening at the same time of speaking or around it -future meaning: when you have already decided and arranged to do it (a fixed plan, date) | to be (am/are/is) + infinitive + -ing | I'm working. | I'm not working. | Am I working? |
| | | | | He's working. | He isn't working. | Is he working? |
| | | | | I'm going. | I'm not going. | Am I going? |
| | | | | He's going. | He isn't going. | Is he going? |
| Simple Past | last ago in 1990 yesterday | - action finished in the past, mostly connected with an expression of time (no connection to the present) | regular: infinitive + -ed irregular: 2nd column of table of irregular verbs | I worked. | I didn't work. | Did I work? |
| | | | | He worked. | He didn't work. | Did he work? |
| | | | | I went. | I didn't go. | Did I go? |
| | | | | He went. | He didn't go. | Did he go? |
| Past Continuous | while | -an action happened in the middle of another action -someone was doing sth. at a certain time (in the past) - you do not know whether it was finished or not | was/were + infinitive + -ing | I was working. | I wasn't working. | Was I working? |
| | | | | He was working. | He wasn't working. | Was he working? |
| | | | | I was going. | I wasn't going. | Was I going? |
| | | | | He was going. | He wasn't going. | Was he going? |
| Present Perfect | just yet never ever already so far, up to now, | -you say that sth. has happened or is finished in the past and it has a connection to the present -action started in the past and continues up to the present | have/has + past participle* *(infinitive + -ed) or (3rd column of table of irregular verbs) | I have worked. | I haven't worked. | Have I worked? |
| | | | | He has worked. | He hasn't worked. | Has he worked? |
| | | | | I have gone. | I haven't gone. | Have I gone? |

| | | | | | | |
|-----------------------------------|--|---|---|----------------------|-------------------------|----------------------|
| | since for recently | | | He has gone. | He hasn't gone. | Has he gone? |
| Present Perfect Continuous | all day the whole day how long since for | -action began in the past and has just stopped -how long the action has been happening -emphasis: length of time of an action | have/has + been + infinitive + -ing | I have been working. | I haven't been working. | Have I been working? |
| | | | | He has been working. | He hasn't been working. | Has he been working? |
| | | | | I have been going. | I haven't been going. | Have I been going? |
| | | | | He has been going. | He hasn't been going. | Has he been going? |
| Past Perfect (Simple) | already just never | mostly when two actions in a story are related to each other: the action which had already happened is put into Past Perfect, the other action into Simple Past the past of the Present Perfect | had + past participle* *(infinitive + -ed) or (3rd column of table of irregular verbs) | I had worked. | I hadn't worked. | Had I worked? |
| | | | | He had worked. | He hadn't worked. | Had he worked? |
| | | | | I had gone. | I hadn't gone. | Had I gone? |
| | | | | He had gone. | He hadn't gone. | Had he gone? |
| Past Perfect Continuous | how long since for | how long something had been happening before something else happened | had + been + infinitive + ing | I had been working. | I hadn't been working. | Had I been working? |
| | | | | He had been working. | He hadn't been working. | Had he been working? |
| | | | | I had been going. | I hadn't been going. | Had I been going? |
| | | | | He had been going. | He hadn't been going. | Had he been going? |
| will - future | | -predictions about the future (you think that sth. will happen) -you decide to do sth. spontaneously at the time of speaking, you haven't made a decision before -main clause in type I of the if clauses | will + infinitive | I'll work. | I won't work. | Will I work? |
| | | | | He'll work. | He won't work. | Will he work? |
| | | | | I'll go. | I won't go. | Will I go? |
| | | | | He'll go. | He won't go. | Will he go? |
| going to - future | | -when you have already decided to | be (am/are/is) + | I'm going to work. | I'm not going to work. | Am I going to work? |

| | | | | | | |
|----------------------------------|--|---|---|--------------------------|-----------------------------|----------------------------|
| | | do sth. in the future -what you think what will happen | going to + infinitive | He's going to work. | He's not going to work. | Is he going to work? |
| | | | | I'm going to go. | I'm not going to go. | Am I going to go? |
| | | | | He's going to go. | He's not going to go. | Is he going to go? |
| Future Continuous | | -An action will be in progress at a certain time in the future. This action has begun before the certain time. -Something happens because it normally happens. | will + be + infinitive + ing | I'll be working. | I won't be working. | Will I be working? |
| | | | | He'll be working. | He won't be working. | Will he be working? |
| | | | | I'll be going. | I won't be going. | Will I be going? |
| | | | | He'll be going. | He won't be going. | Will he be going? |
| Future Perfect Simple | | sth. will already have happened before a certain time in the future | will + have + past participle* *(infinitive + -ed) or (3rd column of table of irregular verbs) | I'll have worked. | I won't have worked. | Will I have worked? |
| | | | | He'll have worked. | He won't have worked. | Will he have worked? |
| | | | | I'll have gone. | I won't have gone. | Will I have gone? |
| | | | | He'll have gone. | He won't have gone. | Will he have gone? |
| Future Perfect Continuous | | sth. will already have happened before a certain time in the future emphasis: length of time of an action | will + have + been + infinitive + ing | I'll have been working. | I won't have been working. | Will I have been working? |
| | | | | He'll have been working. | He won't have been working. | Will he have been working? |
| | | | | I'll have been going. | I won't have been going. | Will I have been working? |
| | | | | He'll have been going. | He won't have been going. | Will he have been working? |
| Conditional Simple | | sth. that might happen main clause in type II of the Conditional sentences | would + infinitive | I would work. | I wouldn't work. | Would I work? |
| | | | | He would work. | He wouldn't work. | Would he work? |
| | | | | I would go. | I wouldn't go. | Would I go? |

| | | | | | | |
|---------------------------------------|--|--|--|----------------------------|-------------------------------|-----------------------------|
| | | | | He would go. | He wouldn't go. | Would he go? |
| Conditional Continuous | | sth. that might happen emphasis: length of time of an action | would + be + infinitive + ing | I would be working. | I wouldn't be working. | Would I be working? |
| | | | | He would be working. | He wouldn't be working. | Would he be working? |
| | | | | I would be going. | I wouldn't be going. | Would I be going? |
| | | | | He would be going. | He wouldn't be going. | Would he be going? |
| Conditional Perfect | | - sth. that might have happened in the past (It's too late now.) -main clause in type III of the if clauses | would + have + past participle* *(infinitive + -ed) or (3rd column of table of irregular verbs) | I would have worked. | I wouldn't have worked. | Would I have worked? |
| | | | | He would have worked. | He wouldn't have worked. | Would he have worked? |
| | | | | I would have gone. | I wouldn't have gone. | Would I have gone? |
| | | | | He would have gone. | He wouldn't have gone. | Would he have gone? |
| Conditional Perfect Continuous | | -sth. that might have happened in the past (It's too late now.) -emphasis: length of time of an action | would + have + been + infinitive + ing | I would have been working. | I wouldn't have been working. | Would I have been working? |
| | | | | He would have been going. | He wouldn't have been going. | Would he have been working? |
| | | | | I would have been going. | I wouldn't have been going. | Would I have been going? |
| | | | | He would have been going. | He wouldn't have been going. | Would he have been going? |

PART IV – Key to Exercises

Unit 1 - Check your knowledge

1. A gyro compass is an electronic device which indicates the true north and it is used for navigating.
2. An echo sounder is an equipment which is used for measuring the depth of the water under the ship's keel.
3. The principle of operation of the echo sounder is based on the characteristic of the sound waves to be reflected by surfaces, in this case the seabed.
4. The NAVTEX equipment is very important for the ship's safety because it is used for receiving Navigational Warnings.
5. The radar is very important because it is the only means for navigating in conditions of restricted visibility, i.e., in fog and in darkness.
6. AIS means Automatic Identification System and its function as an Aid to Navigation is to transmit and receive a signal which contains information about the ship, such as, position, name, call sign, type of vessel, cargo carried, etc.

Unit 2 - Check your knowledge

Unit 3 - Check your knowledge

Unit 4 - Check your knowledge

Bibliography

- Dokkum, K. van. *Ship Knowledge*. Enkhuizen: Dokmar, 2003.
- Grice, Toni. *English for Mariners*. Munster: Arbeitsbereich Linguistik, 2009.
- Harmer, Jeremy. *How to Teach English*. London: Pearson Longman, 2012.
- IMO. *Model Course 3.17 Maritime English*. London: International Maritime Organization, 2015.
- . *Model Course 7.03 Officer in charge of a navigational watch*. London: International Maritime Organization, 2014.
- IMO SMCP. London: International Maritime Organization, 2002.
- IMO. SMCP. London: International Maritime Organization, 2002.
- Kluijven, P.C. van. *Internacional Maritime Language Programme*. Alkmaar, The Netherlands: Alk & Heijnen, 2017.
- Scrivener, Jim. *Learning Teaching*. London: Mac Millan, 2011.