°

SEAFARERS TRAINING CENTER INC

RATING FORMING PART OF A NAVIGATIONAL WATCH

In accordance to International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), 1978, as amended.

SCOPE

This course aims to provide the training for candidates ***RATING FORMING PART OF A NAVIGATIONAL WATCH,*** in accordance with the Regulation II/4, Section A-II/4 and Table A-II/4 of the STCW Convention 78', as amended.

OBJECTIVE

This is the minimum standards of competence in ***RATING FORMING PART OF A NAVIGATIONAL WATCH***, a trainee will be competent to take appropriate measures for the safety of personnel and of the ship and to use fire appliances correctly. The trainee will also have a knowledge of ***RATING FORMING PART OF A NAVIGATIONAL WATCH***.

ENTRY STANDARS

The course is open to all seafarers.

COURSE CERTIFICATE

Completion of the course and demonstration of competence, a document will be issued certifying that the holder has met the standard of competence.

COURSE INTAKE LIMITATIONS

The maximum number of trainees attending each session will be 25 persons.

STAFF REQUITMENTS

The following are the minimum qualification for instructor presenting a course that follows this course the instructor in charge shall:
Have appropriate training techniques and training methods and meet the requirements of STCW Convention 78', as amended, I/6 (IMO6.09).

TEACHING AIDS

Instructor Manual
Power Point
Videos

BIBLIOGRAPHY

- Bridge procedures guide, fifth edition 2016, Published by Marisec Publications 38 St Mary Axe London, EC3A 8BH.
- Lookout Training Handbook; Special Publication, February 2000, edition prepared by SMC

(SW) Jerry Lutes.

- COLREGS; Rule 5: Look-Out.
- Chapter 9 Shipboard Compasses; R. R. Hobbs, Marine Navigation 1: Piloting, United State Naval Institute Annapolis, Maryland 1981.
- Module 5: Standard Maritime Orders, Reference: English for Maritime Students.
- RFPNW Helmsman, Lookout & assisting the watch review topics.
- Chapter 6 Compasses; National Imagery and Mapping Agency.

COURSE TIMETABLE

COURSE	MODEL IMO	LOAD TIME	INSTALLATION	EQUIPMENT	INSTRUCTOR
RATINGS FORMING PART OF A NAVIGATIONAL WATCH	Rule II/4, Sección A-II/4 y Tabla A-II/4	40hours	Installation for theoretical and practice	Ship For practice or simulator	1. Course rating forming part of a navigational watch. 2. IMO Model Course Instructor 6.0.9

COURSE OUTLINE

KNOWLEDGE , UNDERSTANDING AND PROFICIENCY SUBJECT AREA	LECTURE HOURS	PRACTICAL HOURS
1. STEER THE SHIP AND COMPLY WITH HELM ORDERS IN THE ENGLISH LANGUAGE		
1.1 USE OF MAGNETIC AND GYRO-COMPASSES	1.0	1.0
1.2 HELM ORDERS	1.0	1.0
1.3 CHANGE-OVER FROM AUTOMATIC PILOT TO HAND STEERING AND VICE VERSA	1.0	1.0
2. KEEP A PROPER LOOK-OUT BY SIGHT AND HEARING		
2.1 RESPONSIBILITIES OF A LOOK-OUT, INCLUIDING REPORTING THE APPROXIMATE BEARING OF A SOUND SIGNAL , LIGHT OR ORDER OBJECT IN DEGREES OR POINT	5.0	2.0
3. CONTRIBUTE TO MONITORING AND CONTROLLING SAFE WATCH		
3.1 SHIPBOARD TERMS AND DEFINITIONS	3.0	-
3.2 USE OF APPROPRIATE INTERNAL COMMUNICATE ALARM SYTEMS	4.0	2.0
3.3 ABILITY TO UNDERSTAND ORDERS AND TO COMMUNICATE WITH THE OFFICER OF THE WATCH ON MATTERS RELEVANT TO WATCHEEPING DUTIES	2.0	1.0
3.4 PROCEDURES FOR THE RELIEF MAINTENANCE AND HANDOVER OF A WATCH	2.0	1.0

3.5 INFORMATION REQUIRED TO MAINTAIN A SAFE WATCH	2.0	1.0
3.6 BASIC ENVIRONMENTAL PROTECTION PROCEDURES	1.0	-
4. OPERATE EMERGENCY EQUIPMENT AND APPLY EMERGENCY PROCEDURES		
4.1 KNOWLEDGE OF EMERGENCY DUTIES AND ALARM SIGNALS	1.5	0.5
4.2 KWOLEDGE OF PYROTECHNIC DISTRESS SIGNALS SATELLITE , EPIRBS AND SARTS	1.5	0.5
4.3 AVOINDANCE OF FALSE DISTRESS ALERTS AND ACTION TO BE TAKEN IN EVENT OF ACCIDENTAL ACTIVITION	1.0	0.5
5. ASSESSMENT	1.0	1.5
SUB-TOTAL	27	13
TOTAL	**40 HOURS**	

MANUAL

1. STEER THE SHIP AND COMPLY WITH HELM ORDERS IN THE ENGLISH LANGUAGE

The International Phonetic Alphabet

Letter	Code Word	Letter	Code Word	Letter	Code Word
A	Alpha	J	Juliet	S	Sierra
B	Bravo	K	Kilo	T	Tango
C	Charlie	L	Lima	U	Uniform
D	Delta	M	Mike	V	Victory
E	Echo	N	November	W	Whisky
F	Foxtrot	O	Oscar	X	X-ray
G	Golf	P	Papa	Y	Yankee
H	Hotel	Q	Quebec	Z	Zulu
I	India	R	Romeo		

B. The Phonetic Numbers

Figure	Code Word
0	Nadazero
1	Unaone
2	Bissotwo
3	Terrathree
4	Kartefour
5	Pentafive
6	Soxisix
7	Setteseven
8	Oktoeight
9	Novenine
Full Stop	Stop
Decimal Point	Decimal

C. Selected Phrases from the SMCP

In radiotelephone communication messages can sometimes be misconstrued when proper phrases are not used. In the advent of modern communication, a new generation of radio slang has been produced and is becoming common. Although they are easily understood by a native speaker,

these words and phrases can be easily misunderstood by a non-native speaker.

A. Responses

1. When the response to a question is in the affirmative, say 'Yes'.
2. When the response to a question is in the negative, say 'No'.
3. When the information is not immediate available but soon will be, say 'Stand by'.
4. When the required information cannot be obtained, say 'No information'.
5. When a message has not been properly heard, say 'Say again'.
6. When a message is not understood, say 'Message not understood'.

2. Sometimes, incorrect terms are used in radio communication. Here are some examples:

1. 'Affirmative', 'Roger', 'Wilco', 'Right', instead of 'Yes'
2. 'Negative', 'No way', instead of 'No'.
3. 'Wait', 'Wait one' (meaning 'wait one minute'), or 'Hang on', instead of 'Stand by'
4. 'Don't know' instead of 'No information'
5. 'Repeat' instead of 'Say again'

B. Urgent Messages

1. Mayday – used to prefix distress

Example:

Mayday. Mayday. This is Cassandra. I need help, I am sinking.

2. Pan – used to prefix urgency

Example:

Pan. Pan. This is Cassandra. I require medical assistance.

3. Securite – used to prefix safety signals

Example:

Securite. Securite. Floating wreckage in position…

4. Attention – may be used at the beginning of an important message

Example:

Attention. Attention all ships. A warning of storms was issued at 1400 hours starting…

EXERCISES

A. Responses

Give the correct responses to the following statements:

1. Pilot station. This is Cassandra. Is it clear for me to enter traffic lane?
2. Pilot station. This is Cassandra. May I proceed?
3. What is your draught?
4. Princess . This is Cassandra. Is there any other traffic?
5. Princess you are steering a dangerous course. There is fishing gear ahead of you.
6. Princess. Vessel ahead of you is on opposite course.

B. Urgent Messages

Use the correct prefix and state the correct message.

1. Mayday

a. Your ship is in distress. You are in position 38° North and 02° East. Your ship is on fire and you have a dangerous cargo on board.

b. Your ship is in distress. You have been in a collision and you need help.

c. Your ship is in distress. You are in position 15° South, 150° East. You are on fire in the accommodation.

2. Pan

a. You have lost a man overboard in position 80° South and 32° East. You require help with search and rescue from all ships in the area.

b. A crewman is seriously injured, and you require medical assistance.

3. Securite

a. You sight a drifting mine 2 miles 330° from St. Nicholas Point. Warn other ships.

b. New harbor radio beacon service has been discontinued. Warn other ships.

c. Tropical storm Sally is reported in position 15° North, 75° West. What would the radio station issuing the warning say?

1.1 USE OF MAGNETIC AND GYRO- COMPASSES

Gyrocompass

Instruments for detecting orientation or position have always represented a very desirable technology that could change the way trade, navigation, warfare, land surveys and many other things function. Naval navigation represented one of the big reasons why many governments, scientific institutes, and independent inventors put so much time and effort into discovering new ways that could help ship locate their exact position into open seas and enable them to travel easily over very long distances away from the coasts that could be used as landmarks for their journeys. While the magnetic compasses and various other devices that used the position of the sun to calculate position and orientation of the ship in the sea were useful, they were not 100% reliable all the time and they could

not be used in all situations (most notably, the sun and solar compasses were useless if the ship experienced heavy clouds over period of several days). Even though magnetic compasses were accurate (distinction between true north of the Earth and magnetic north that they pointed to was not problematic in all but some most limiting cases when the ships or land parties were very close to the polar regions), those compasses started experiencing erratic behavior when they started being used on ships that were made from metal hulls. Metal from the ship construction interfered with the way compass worked, twisting the magnetic field of the earth around the ship and thus changing the direction of the compass.

To combat this, many investors around the world tackled the problem of the naval navigation and came to several non-magnetic solutions, many not good enough for regular use but few who had tremendous potential. The most successful one was without the doubt gyrocompass, complicated but very precise non-magnetic compass that was based on a technology that could detect and react to the rotation of the Earth (thus not mislead ships by pointing to the magnetic north which can naturally change position over time), and maintain the position pointed toward the trough north even though any ship rotation. Since gyrocompass was not relying on any magnetic readings, it could be safely used on metal-hull ships, although the reduced amount of rotation very near the polar regions would make even these devices unreliable. They would also work without issues during bad weather and night.

On board a vessel at sea, there are three principal references for direction: the ship's longitudinal axis, the magnetic meridian, and the true or geographic meridian. The horizontal direction of one terrestrial point from another, expressed as an angle from 0000 clockwise to 3600 , is termed a bearing. Bearings measured using the ship's longitudinal axis as the reference direction are called relative bearings, indicated by the abbreviation R following the bearing. Those based upon the magnetic meridian, determined by use of the magnetic compass, are referred to as magnetic bearings, abbreviated M. And bearings given with reference to the geographic meridian, determined by the use of the ship's gyrocompass, are true bearings, abbreviated by the letter T. The ship's head, or heading, can be thought of as a special bearing denoting the direction in which the ship is pointing; it can be expressed either with reference to magnetic or true north, or with respect to the north axes of the magnetic or gyrocompasses. No matter what reference direction the navigator uses for the ship's head and other bearings, however, they must first be converted to true bearings before they can be used in the navigation plot. In practice, relative bearings are not normally used for navigation purposes; they find their most extensive use in relating an object's position relative to the ship's bow, for purposes of visualizing the physical relationships involved. Ordinarily they are estimated visually, but if the ship's gyro system becomes inoperative, exact relative bearings to land or seamarks can be shot with a bearing circle or alidade. In order to use relative bearings in a navigation plot, the navigator must have a method of determining the ship's true head when the gyro is inoperative, so as to be able to convert the relative bearings to true. The Magnetic Compass Virtually all vessels, from the smallest of recreational craft to the jumbo tanker and aircraft carrier, are fitted with at least one magnetic compass.

The Standard Compass

Shrouded in canvas and abandoned on the compass deck, the 'standard' magnetic compass is generally neglected; out of sight and out of mind.

The principal function of the 'standard' magnetic compass, as defined by regulation, is not a heading reference but for navigation by taking bearings. Many of the 'standard' compass requirements are to meet that function, particularly siting for as much an uninterrupted view of the horizon as possible. On modern vessels, the ability to take bearings from the 'standard' compass is not foremost in operational requirements.

The modern role for the magnetic compass is more for testing the integrity of a gyro compass and providing an emergency heading reference should the gyro fail, effectively, a 'steering' compass in front of the helmsman.

Regulations allow the 'standard' compass to take the role of a 'steering' compass if it can display the heading at the main steering station. The common arrangement of the 'standard' compass on the compass deck with a projection tube to the wheelhouse below satisfies the compass regulations.

'Standard' Compass on a small general purpose vessel.

Projection assembly to view the 'standard' compass heading from the steering station.

The use of the 'standard' compass as a 'steering' compass (by projection) has several significant weaknesses and generally fails to provide the mariner with an easy to read, stable heading reference.

The view of the compass through the projection assembly is often unclear and may diminish further with age. Furthermore the compass card's stability in a seaway can be affected from uncorrected vertical forces and accelerations inclining the card and bowl from the horizontal plane. Such instability may be very evident when rolling on northerly or southerly headings.

Compass Siting

Familiar with the short comings of the 'Standard' compass and seeking to better understand magnetism on modern ships, some research was undertaken to improve the performance of compasses on ships. The field strengths at the compass site in the binnacle and at a position near the lower mirror of the projection tube at the steering station were recorded on a number of vessels.

It soon became apparent that there is a viable option to have a magnetic compass in the wheelhouse at the main steering station. The basic magnetic information recorded for a recently built ship is shown below. (I am very grateful to Captain Ramu Ratish and 2/Off Montu Biswa for taking measurements in different geographic locations, including the magnetic equator at two in the morning.)

	Binnacle	Wheelhouse
Horizontal Directive force	79% of H	77% of H
Vertical Directive force	121% of Z	120% of Z
Horizontally induced vertical force	17% of H	3% of H

(H = horizontal component of Earth's magnetic field,
Z = vertical component of Earth's magnetic field.)

modern post panamax bulkcarrier.

Simultaneous three axis magnetic field strength measurements in wheelhouse and binnacle

It can be seen the uncorrected directive force (λ) at the site within the wheelhouse is not significantly less than the directive force (corrected λ_2) at the standard compass. The significant difference lies in the horizontally induce vertical field ("g" rod) which is upwards on a northerly heading and downwards on a southerly heading.

Whilst magnetic readings taken on different ships had similar outcomes, the greatest difference observed between the directive force at the binnacle and in the wheelhouse was surprisingly on a tug , with a directive force of 86% of H at the binnacle and 68% of H in the wheelhouse. This commends further research into understanding magnetic shielding arising from wheelhouse design.

Tug Boat

Measuring magnetic field strengths on a tug boat.

As a result of the research coupled with the aim of delivering an easy to read stable compass, the following design of compass card, bowl and binnacle, along with its siting at the main steering station is submitted as a modern alternative to the 'standard' magnetic compass.

Proposed compass and binnacle sited in wheelhouse.

Easy to read
By placing the compass directly in front of the main steering station in the wheelhouse, the compass can be viewed directly. The design of the compass provides an easy to read and comprehend ego-centric heading reference that can also be viewed from the area adjacent the main steering station.

Compass bearings of objects beyond the wheel house windows can be taken by sighting across the sighting peg. This provides pilotage and collision assessment functions in the event of gyro failure. As for all-round bearings, a wing repeater can be used as a pelorus in the event of gyro failure.

Stable Card
Greater compass card stability than the 'standard' compass is achieved by
compass and binnacle design. Further, by placing the compass in the wheel house, the compass not only enjoys a more benign environment compared to extreme weather conditions outside, the compass also has a more stable vertical force by having the symmetry of a deck above and below.

For more detailed information on the compass and binnacle design, please read their details from these links at compass and binnacle.

The time has come to bring the magnetic compass inside to be revived.

Further Research & Development

The current research has been limited to a small sample size and type of ship along with basic 'proof of concept' prototype compasses and binnacles.

The effectiveness of the proposed compass could be assessed by placing the compass in th described binnacle with a reflecting mirror so the binnacle can take the place of the projection tube into the wheel house. By this means, the current 'standard' compass requirements can be complied with and a direct comparison of performance made.

Correcting Heeling Error

Contemporary binnacles correct the vertical field by a magnet called the heeling error magnet. The accepted practice of correcting the vertical field is to place the heeling error magnet at a position and orientation to bring the vertical field at the compass to an equal multiplier to the horizontal field.

With a typical assumption of the mean horizontal magnetic field at the compass being 80% of the ambient earth's horizontal magnetic field, the heeling error magnet is set to cause 80% of the ambient earth's vertical magnetic field at the compass site.

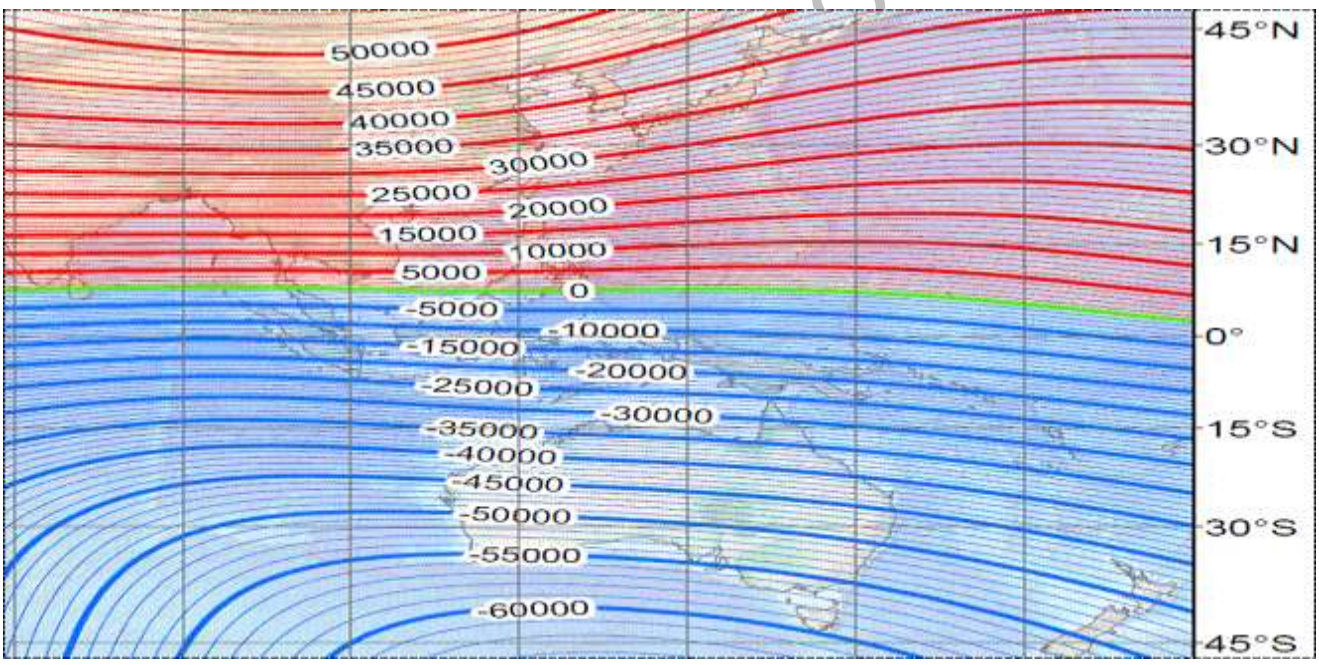
This is a departure from the compass adjusting goal of correcting like with like; permanent magnets for permanent magnetic fields and soft iron for induced magnetic fields.

If a vessel's heeling error magnet is set in a location of ambient vertical field strength of -40μTeslas the resulting vertical field at the compass would be 80% of -40 = -32μTeslas. If the vertically induced soft iron causes the mean vertical field at the compass to in fact be 120% of the ambient earth's vertical magnetic field, the heeling error magnet is correcting for -16μTeslas of induced magnetism.

Should the vessel voyage to a location of ambient vertical field strength of +40µTeslas, the vertical field strength at the compass will be +16µTeslas from the heeling error magnet plus +48µTeslas from the ambient earths field by the multiplier of 120%. This is a total of 64µTeslas, which is double the field strength of the required +32µTeslas to have the vertical field of an equal multiplier of the horizontal field.

This vertical field will cause heeling error when the vessel is not level. As the vessels rolls, the compass card will oscillate, especially on northerly or southerly headings. The contemporary binnacle design allows the user to adjust the heeling error magnet to reduce the compass card oscillations on a northerly or southerly course. This change in the heeling error magnet may effectthe fore & aft field at the compass due to the changed induction of the flinders bar, which in turn will cause deviations on easterly and westerly headings. Subject to the positioning of other soft iron correctors, the athwartship field may also be altered. This is clearly not conducive to correcting a compass for a global voyage.

The ideal magnetic correctors would allow for the correction of the compass to be valid for a vessel's voyage and in all geographic areas of operation. The improved binnacle design achieves this.



Map developed by NOAA/NGDC & CIRES
http://ngdc.noaa.gov/geomag/WMM/
Map reviewed by NGA/BGS
Published January 2010

1.2 HELM ORDERS

Standard Wheel Orders

The art of steering a ship can be gained by practice. The ship's head, rudder and steering wheel all turn the same way, that is, to turn the ship to starboard one must turn the wheel to starboard. The angle of turn given to the rudder is shown in degrees on the helm indicator situated forward of the wheel.

All orders received by the helmsman are to be repeated twice; once when the order is received and again when the order has been carried out. This is to ensure that the helmsman has both understood and carried out the orders correctly.

Here are some standard wheel orders taken from the Standard Marine Communication Phrases (SMCP) list:

Order	Meaning
Midships	Rudder to be held in the fore and aft position
Port five	5° of port rudder to be held.
Port ten	10° of port rudder to be held.
Port fifteen	15° of port rudder to be held.
Port twenty	20° of port rudder to be held.
Port twenty-five	25° of port rudder to be held.
Hard-a-port	Rudder to be held fully over to port.
Starboard five	5° of starboard rudder to be held.
Starboard ten	10° of starboard rudder to be held.
Starboard fifteen	15° of starboard rudder to be held.
Starboard twenty	20° of starboard rudder to be held.
Starboard twenty-five	25° of starboard rudder to be held.
Hard-a-starboard	Rudder to be held fully over to starboard.
Ease to five	Reduce amount of rudder to 5° and hold.
Ease to ten	Reduce amount of rudder to 10° and hold.
Ease to fifteen	Reduce amount of rudder to 15° and hold.
Ease to twenty	Reduce Amount of rudder to 20° and hold.
Steady	Reduce swing as rapidly as possible.
Steady as she goes	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 ship is stead on that heading, the helmsman is to call out: "Stead…"

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

Order	Course to be steered
"Port, steer one eight two"	182°
"Starboard, steer zero eight two"	082°
"Port, steer three zero five"	305°

b. On receipt of the order to steer, for example, 182°, the helmsman should repeat it and bring the ship round steadily to the course ordered. When the ship 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 call out.
If it is desired to steer on a selected mark the helmsman should be ordered to:

"Steer on…buoy…(mark)…(beacon)"

The helmsman should repeat the order and when steady on the mark call out:

"Steady on…buoy…(mark)…(beacon)"

The person giving the order should acknowledge the helmsman's call out.

B. **Standard Engine Orders**

Any engine order given should be repeated by the person operating the bridge telegraph/s and the officers of the watch should ensure that the order is carried out correctly and right away.

Listed below are some standard engine orders from the SCMP manual.

Order	Meaning
Full ahead	Maximum manoeuvring engine revolutions for ahead propulsion.
Half ahead	Revolutions as indicated in ship's orders.
Slow ahead	Revolution as indicated in ship's orders.
Dead slow ahead	Revolutions as indicated in ship's orders.
Stop engine/s	No engine revolutions.
Dead slow astern	Revolutions as indicated in ship's orders.
Slow astern	Revolutions as indicated in ship's orders.
Half astern	Revolutions as indicated in ship's orders.

Full astern	Revolutions as indicated in ship's orders.
Emergency full ahead/astern	Revolutions as indicated in ship's orders.
Stand by engine	Engine-room personnel fully ready to manoeuvre and bridge manned with personnel to relay engine orders.
Finished with engines	Movement of engineer/s no longer required.

Examples:

Order	**Meaning**
Bow thrust full/half to port	Ship's head to move to port with power as specified.
Bow thrust full/half to starboard	Ship's head to move to starboard with power as specified.
Stern thrust full/half to port	Ship's stern to move to port with power as specified.
Stern thrust full/half to starboard	Ship's stern to move to starboard with power as specified.
Bow/stern thrust stop	No bow/stern thrust revolutions.

For vessels with variable pitch propellers, the meaning of the order would include the combination of pitch and revolutions as indicated in ship's orders.

1.3CHANGE-OVER FROM AUTOMATIC PILOT TO HAND STEERING AND VICE VERSA

Design of steering gears have been influenced over the years by the rules and regulations of national authorities and classification subjects. Any changes of real substance tend nowadays to originate from the international

Maritime Organizations (I.M.O.) conventions and regulations. Classification society requirements are as follows;

1. All ships to have power operated main gear capable of displacing the rudder from 35° port to 35° starboard at the deepest draught and at maximum service speed. Must also be capable of displacing the rudder from 35° port to 30° starboard in 28 seconds and vice versa.
2. The auxiliary gear must be power operated and capable of being brought rapidly into action. The auxiliary gear is only required to steer the ship at either 7 knots or half service speed
3. If the main gear comprises two or more identical power units, then a single failure of either power unit or piping must not impair the integrity of the remaining part of the steering gear
4. Each power unit must be served by at least two electrical circuits from the main switchboard. One circuit may pass through the emergency switchboard. All circuits to be separated as widely as possible throughout their length.
5. All power operated gears to be fitted with shock relieving arrangements to protect against the action of heavy seas.
6. An efficient brake or locking arrangement to be fitted to enable the rudder to be maintained stationary
7. the maximum power developed by the gear is proportional to T x S where T = rudder torque
   S = Speed of rudder movement

also T = A x P x sinq x V2
where A = rudder area
P = centre of pressure
q = rudder angle
V = velocity of the ship

Special requirements

Owners may specify additional requirements such as faster hard-over to hard-over time, strength of components above that required by the Rules, additional control points and additional duplication,

New tankers of 100 000dwt and above-shall comply with the following

The main steering gear shall comprise of either

- two independent and separate power actuating systems each capable of meeting the hard over port to 30° starboard in 28 sec requirements,

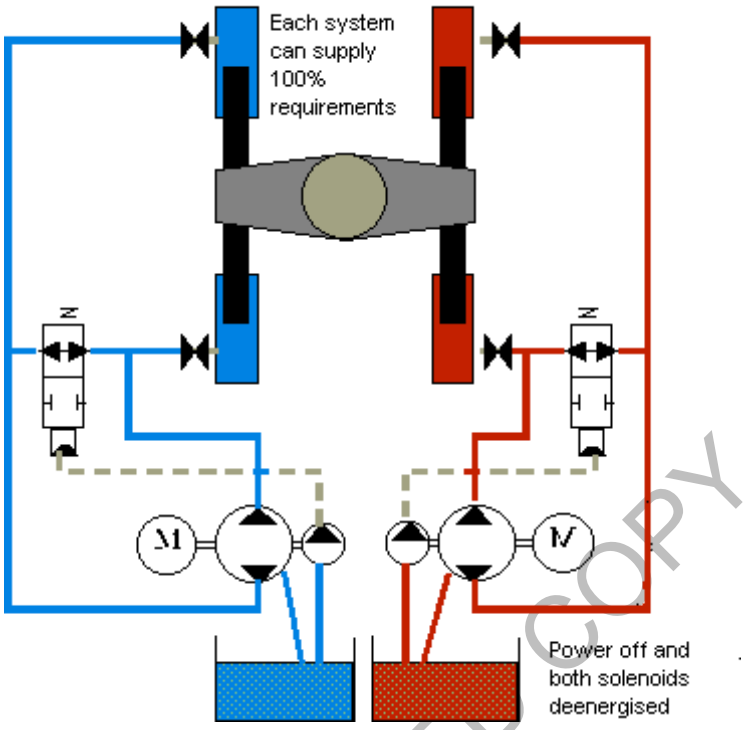
  or

- at least two identical power actuating systems which acting simultaneously in normal operation, shall be capable of meeting the hard over requirements. Where necessary to comply with this requirement inter connection of hydraulic power systems shall be provided. Loss of hydraulic fluid from one system shall be capable of being detected and the defective system isolated so that the other system shall remain fully operational

In the event of loss of steering capability due to a single failure other than the tiller, quadrant or components serving the same purpose (these are excluded from single failure concepts), or seizure of the rudder actuators. The steering capability shall be regained in not less than 45 seconds after the loss of one power actuating system.

Steering gear other than hydraulic should meet the same standards.

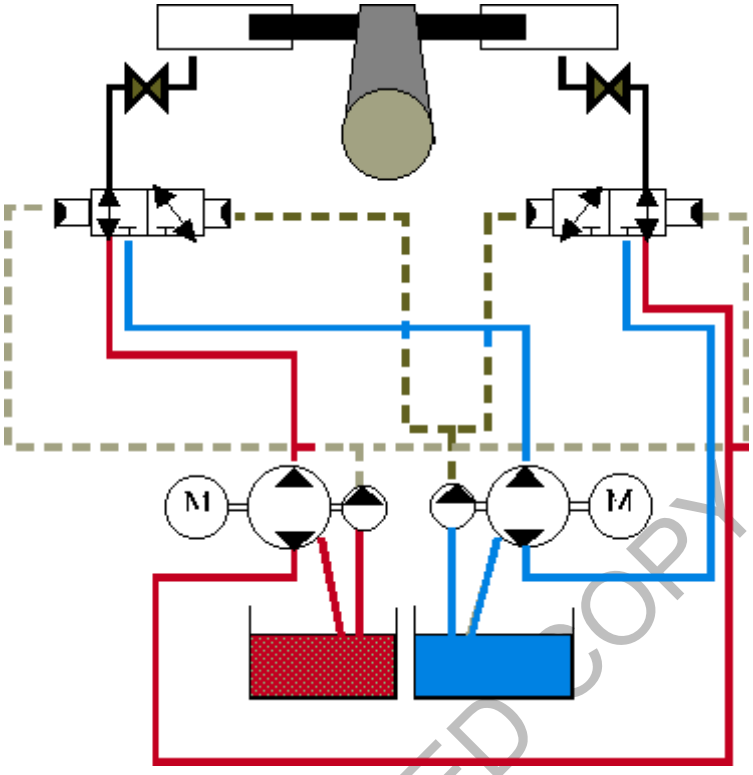
Example of suitable system permissible for all ships



The system shown consists of two sets of rams but could equally be two rotary vane units. With no power on the solenoids are in by-pass mode with oil being allowed to pass freely from one side to the other. When an electric motor is started the control pump supplies oil to the solenoid shutting it. High pressure oil from the main unit is now fed to the rams as required. The other unit remains in by-pass until the electric motor is started.

Low level alarms are fitted to the tanks. Low low changeovers may also be fitted so that in the event of oil loss from one system, the other system is started.

New tankers between 10 000gt upwards to 100 000tdwt



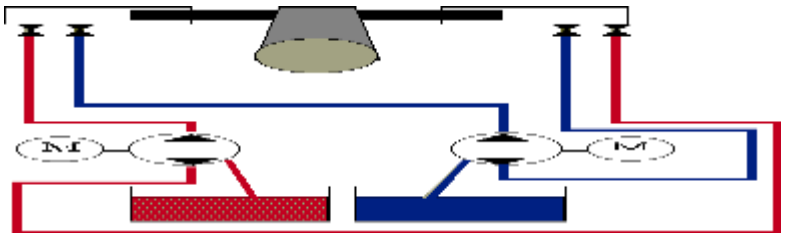
For these tankers the single failure criterion need not apply to the rudder actuator or actuators subject to certain requirements being fulfilled. These include a requirement that steering be regained within 45 seconds following failure of any part of the piping system or power units and a special stress analysis of non-duplicated rudder actuators.

The left hand unit is shown in operation.

For this basic arrangement the power units must be identical

New ships 70 000gt and upwards

system suitable for all ships except tankers of 10 000 gt and above

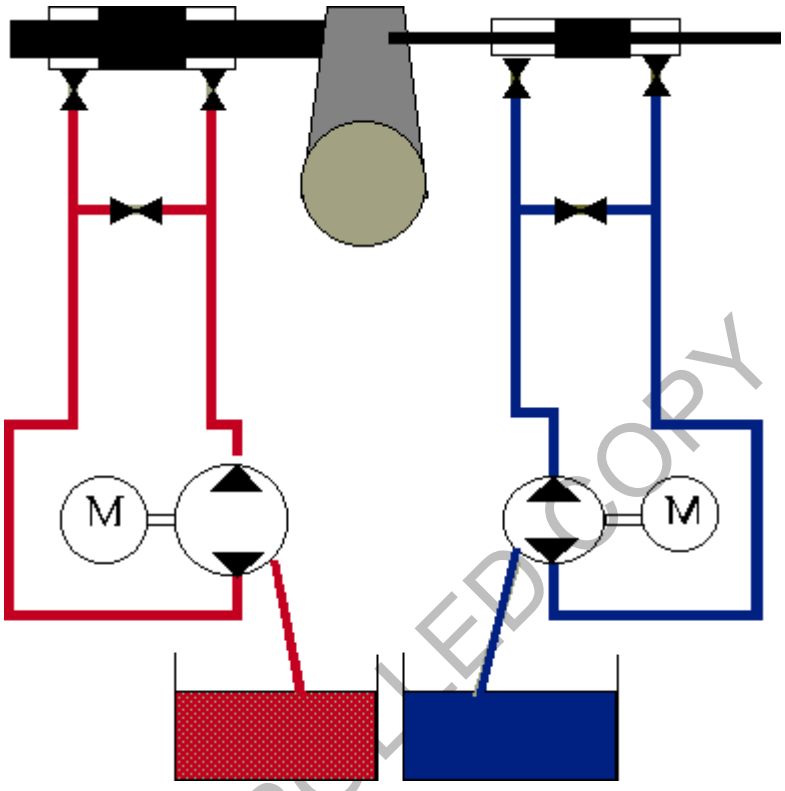


The main steering shall comprise two or more power units and that the main steering gear is so arranged that, after a single failure in its piping system or in one of the power units the defect can be isolated so that steering can be speedily regained.

'Speedily' is intended to mean the provision of duplicate hydraulic circuits or , for example, a conventional four ram steering gear with a common hydraulic circuit with appropriate isolating valves

New ships of less than 70 000 gt and tankers less than 10 000 gt

suitable system



Single failure is not applicable as a rule, however, attention is drawn to the requirement that auxiliary steering gear be independent of any part of the main gear except the tiller. There is no requirement that main and auxiliary power units be identical.

The auxiliary steering gear must be capable of putting the rudder over from 15° from one side to the other in not more than 60 seconds with the ship at its deepest draught and running ahead at half maximum speed or 7 knots.

Existing tankers of 40 000gt and upwards

The steering gear shall be arranges so that in the event of single failure of the piping or one of the power units, steering capability can be maintained or the rudder movement can be limited so that steering capability can be speedily regained by

- An independent means of restraining the rudder

  or

- fast acting valves to isolate the actuator or actuators from the external hydraulic piping together with a means of directly refilling the actuators by a fixed independent power pump and piping system

or

- An arrangement so that, where hydraulic power systems are interconnected any loss of hydraulic fluid from one system shall be detected and the defective system shut off either automatically or remotely from the bridge so that the other system remains intact

Requirements for all new ships

- Administrations must be satisfied in respect to the main and auxiliary steering gear provided for every ship that all components and the rudder stock are of sound construction
- Every component, where appropriate, utilise anti-friction bearings which will be permanently lubricated or provided with lubricant fittings
- Parts subjected to hydraulic pressures should be designed to cope with 1.25 maximum working pressure when the rudder is hard over at maximum draught and service speed
- special requirements for fatigue resistance(due to pulsating hydraulic pressure), relief valves and oil cleanliness
- Low level alarm to be fitted to each hydraulic reservoir.
- Fixed storage capacity sufficient to recharge on system

Auxiliary steering gear

The other set of steering (auxiliary) may be an arrangements of blocks and tackles or some other approved alternative method.

The auxiliary steering gear need only be capable of steering the ship at navigable speed, but it must be capable of being brought speedily in to action in an emergency. Navigable speed is one half of maximum service speed ahead or 7 knots whichever is the greater.

The auxiliary steering gear must be a power operated type if the rudder stock exceeds 230mm for passenger ships and 250mm for cargo vessels. No additional means of steering is required when electric or electro-hydraulic steering gear is fitted having two independent motors or two sets of pumps and motors.

Electrical Supply

Short circuit protection and overload alarm are to be provided in steering gear circuits. Indicators for running indication of steering gear motors are to be installed on the navigation bridge and at a suitable machinery control position. Each electric or electro-hydraulic steering gear shall be served by at least two independent circuits fed from the main switchboard. Cables for each circuit led through a separate route as far apart as possible so that damage to one cable does not involve damage to the other. A change over switch is fitted in an approved position to enable power supplies to be interchanged. One circuit may pass through an emergency switchboard.

Rudders

In passenger ships where the rudder stock exceeds 230mm, an alternative steering position remote from the main position is to be provided. Failure of one system must not render the other system

inoperable. Provision made to transmit orders from bridge to alternative position. The exact position of the rudder must be indicated at principal steering positions. An efficient braking or locking device must be fitted to the steering gear to enable the rudder to be held stationary if necessary. Spring or hydraulic buffer relief valves fitted in steering gear system to protect the rudder and steering gear against shock loading due to heavy seas striking the rudder. Suitable stopping arrangements are to be provided so as to restrict the total travel of the rudder. Stops or cut outs on the steering gear are arranged so that it operates on a smaller angle of helm than the rudder stops.

Rudder restraint

Since failure of a single hydraulic circuit can lead to unrestricted movement of the rudder, tiller and rams, repair and recharging may not be possible. Difficulty arises with which the speed a restraint whether in the form of a mechanical or hydraulic brake can be brought in to use.

Due to the possibility of considerable damage occurring before it could, regulations have concentrated on continuity of steering rather than a shut down and repair solution

Testing and drills

1. Within 12 h before departure, the ship's steering gear shall be checked and tested by the ship's crew. The test procedure shall include, where applicable, the operation of the following:
    1. the main steering gear;
    2. the auxiliary steering gear;
    3. the remote steering gear control systems;
    4. the steering positions located on the navigation bridge;
    5. the emergency power supply;
    6. the rudder angle indicators in relation to the actual position of the rudder;
    7. the remote steering gear control system power failure alarms;
    8. the steering gear power unit failure alarms; and
    9. automatic isolating arrangements and other automatic equipment.
2. The checks and tests shall include:
    1. the full movement of the rudder according to the required capabilities of the steering gear;
    2. a visual inspection of the steering gear and its connecting linkage; and
    3. the operation of the means of communication between the navigation bridge and steering gear compartment.
3.
    1. Simple operating instructions with a block diagram showing the change-over procedures for remote steering gear control systems and steering gear power units shall be permanently displayed on the navigation bridge and in the steering gear compartment.
    2. All ships' officers concerned with the operation or maintenance of steering gear shall be familiar with the operation of the steering systems fitted on the ship and with the procedures for changing from one system to another.
4. In addition to the routine checks and tests prescribed in paragraphs (a) and (b), emergency steering drills shall take place at least once every three months in order to practise emergency steering procedures. These drills shall include direct control from within the steering gear

compartment, the communications procedure with the navigation bridge and, where applicable, the operation of alternative power supplies.

5. The Administration may waive the requirement to carry out the checks and tests prescribed in paragraphs (a) and (b) for ships which regularly engage on voyages of short duration. Such ships shall carry out these checks and tests at least once every week.
6. The date upon which the checks and tests prescribed in paragraphs (a) and (b) are carried out and the date and details of emergency steering drills carried out under paragraph (d), shall be recorded in the log-book as may be prescribed by the Administration.

2. KEEP A PROPER LOOK-OUT BY SIGHT AND HEARING

Every vessel shall at all times maintain a proper lookout by sight and hearing as well as by all available means appropriate in the prevailing circumstances and conditions so as to make a full appraisal of the situation and of the risk of collision." COLREGS Rule 5

Rule 5 is a short rule that places a large responsibility on the mariner. Rather than specific duties, equipment, places, times, and number of persons, Rule 5 requires the master to decide how best to maintain a proper lookout. Instead of giving us precise guidance on the adequacy of the lookout, the Rule uses vague terms such as "proper" and "appropriate." Only in this way could the Rule reasonably provide for all vessels at all times. Requirements covering even the most common situations would have been intolerably detailed and complex.

The lookout requirement of Rule 5 relies heavily on common sense and good seamanship. If you are able to comply with the Steering and Sailing Rules (Part B of the Rules) and with Rule 34--all of which depend on lookout information--you will no doubt have met the demands of Rule 5. A proper lookout, therefore, provides all the information needed to comply with those Rules. If the information collected by the lookout is insufficient, then the master must intensify his or her lookout efforts (for example, by turning on the radar) or reduce the need for information (for example, by slowing a fogbound vessel).

The "information gap" that sometimes opens between the amount of information collected and the amount needed to comply with the other Rules is a leading cause of most collisions. Too often vessels collide because they their masters have either ignored the gap or have filled it with assumptions. An appreciation of the lookout requirement will take the mariner halfway toward avoiding collisions.

Definition and Purpose of the Lookout

What is a "lookout"? Perhaps the most common image that leaps to mind is that of a lone seaman wearing yellow foul-weather gear and a navy watch cap, stationed at the very bow of the ship and peering out into the gloom to catch a flicker of light or the moan of a foghorn. This perception is misleading. The term, as used by the Rules, denotes not a person but rather the systematic collection of information.

Responsibility for maintaining a proper lookout lies with the vessel's operator, not with a subordinate designated as "lookout." The vessel's operator--that is, master, watch officer, or person in charge--is

the lookout manager. If the operator can keep a lookout personally, then coordinating the collection and analysis of information is relatively straightforward. But if the operator, that is, the decision-maker, must rely on others to gather the information, then management of a proper lookout becomes more complicated. The operator must ensure that information on the vessel's surroundings is detected in a timely manner and promptly communicated, so that he or she can correctly analyze the situation.

The purpose of the lookout is simple, so simple that it can easily be overlooked. As the purpose of the navigation rules is to prevent collisions, it follows that the purpose of the lookout is to collect the information needed to avoid collisions. This fundamental reason for maintaining a proper lookout is something to keep in mind.

Duty of the Lookout

Traditionally, the duty of the lookout was to watch out for vessels, lights, and other objects (such as reefs, shoals, and icebergs) by sight and hearing alone and to report their presence to the vessel's operator promptly. The lookout was allowed some discretion on what to report in crowded waters and would be assigned no other duties that would interfere with this important function.

Although the traditional principles of the lookout are still pertinent, today's mariner has tools available that greatly extend the distance over which information can be detected. Today, a proper lookout is a team effort. Yet the master of the vessel is the one held accountable. For this reason, the master must see to it that each member of the lookout team is competent in the use of equipment and diligent in the performance of that duty.

The master, who knows the vessel's needs for information and who has the authority and the Rule 5 responsibility, should determine the duties of each member of the lookout team. It is the master's duty to ensure that a proper lookout is maintained at all times. That duty cannot be delegated.

Tools of the Lookout

Sight, hearing, and "all available means" are tools of the lookout. While not too long ago "all available means" was limited to the spyglass, modern mariners have a wealth of tools with which to extend the human senses.

Human sight and hearing have, of course, their limitations. Near sightedness may be uncorrected or poorly corrected. Even good eyesight is affected by environmental factors such as ambient light, weather conditions, water spray, or wind. Fatigue can also affect vision, as can moving between extremes of light. Similarly, hearing my be impaired. The noise of wind and wave and ship's machinery may mask the sound you want to hear. The blast from a ship's own whistle blocks out other noises and will temporarily, perhaps permanently, reduce the hearing of the lookout. Hearing testing would be advised.

Fortunately, mechanical means for maintaining a lookout are available. "Available" to Rule 5 means "shall be used" in appropriate circumstances. Some of these "other means" are listed below:

- Binoculars
- Radar
- VHF bridge-to-bridge radiotelephone

- Automated radar plotting aids (sometimes called collision avoidance radar)
- Differential GPS (DGPS) satellite navigation equipment
- Automatic Identification Systems (AIS) radio transponders
- Vessel traffic services
- Navigation and piloting instruments

Radar has assumed such importance on modern vessels that Rule 6 (Safe Speed) and Rule 7 (Risk of Collision) discuss it specifically. Most commercial vessels are now fitted with radar, and probably anyone who has seriously ventured out on the water has some concept of what radar is and what it does. Why then are there so many radar-assisted collisions--collisions that occur even though the other vessel was observed on the radar screen? And why are there still night-time collisions when the radar was either not turned on or not observed? As with most tools, radar will not provide any benefit unless used, and used correctly.

A lookout may check an empty radar screen and believe nothing is there because he or she can't see anything. What may have happened, though, is that a weak contact with a small nearby vessel is lost when the radar operator twisted the sensitivity knob to reduce sea-surface clutter. Collisions occur because radar observers rely on capabilities the radar does not have.

A lookout may observe a contact on radar, begin to form a mental pisture of the other vessel, an possibly make a course change. A few minutes later, upon checking the screen, the oberver "confirms" the other vessel's imagined course and speed a not leading to a collision. In making this "confirmation," the radar observer has incorporated a string of assumptions into the process. If the oberver had taken the time to plot the tracks, rether than rely on assumptions, he or she would have seen that the vessels were in fact on a collision course. We cannot emphasize enough how important it is to distinguish between assumption and fact in your decision making. Consciously seek out, do not unconsciously suppress, conflicting evidence. It is very difficult to calculate mentally another vessel's relative course and speed after observing a radar blip two or three times--difficult to the point of impossibility. Assumption making is not one of the "other means" referenced in Rule 5.

If you are fortunate enough to have more advanced (computer-enhanced) radar equipment, your job will be easier; just keep in mind that all aids have their limitations. Do not assume a machine will do your job for you.

Some mariners believe that radar is not necessary on clear nights, yet collisions continue to happen in those conditions. In one such instance, a ship not using its radar ran into a large, newly constructed oil platform in the Gulf of Mexico. The platform was inadequately lighted, but so are many other vessels and objects. Just because you can't see something at night in good visibility doesn't mean it isn't there.

Rule 5 does not require the installation of radar, but if radar is installed it must be used whenever it would contribute to the quality of the lookout. What are your obligations if radar is installed on your vessel but is not working properly? Rule 5 does not require that mafunctioning radar be used. If the problem is temporary, such as signal blockage caused by a heavy rainstorm, the use of radar can be suspended but not abandoned.

Radar can be carried one step further by incorporating a computer to calculate the courses and speeds of other vessels the radar detects. The computer than relates that information to the vessel's own course and speed. The automated radar plotting aid (ARPA) displays position, course, and speed for

each target and signals when it detects risk of collision. Some ARPAs will also display the projected future track of each vessel, all against the background of an electronic chart of the area.

Because all of the information on the vessels comes from radar, ARPA's technical limitations are the same as radar's. However easy it is to become overdependent on radar, it is much easier to relinquish the lookout function, including decision-making, to the magic-box ARPA. A poor understanding of this very useful tool may lead the unwary mariner into extremis.

Automatic Identification Systems (AIS) have been implemented in some areas to advance the state of the art even further. AIS uses radio transponders in much the same way as the mandatory aircraft T-CAS collision avoidance system uses Mode-S radar transponders to transmit encoded information from each aircraft to other aircraft in the area and to air traffic controllers. In the case of the shipborne AIS, this information can include vessel identification, GPS/DGPS position, course, speed, navigation status, dimensions, or cargo. Combined with a display capability, AIS presents critical navigation and vessel traffic information to the bridge team. AIS systems at present are limited and have not been standardized, although an international standard is being actively pursued, and it seems likely that carriage requirements for such equipment will follow adoption of an international standard.

In many situations the best way to find out if other vessels are in the area is to ask. A blind call on the radiotelephone may elicit an answer from an undetected vessel, or a call about traffic to a known vessel may produce useful information, such as any planned course changes. In a number of heavily trafficked areas the mariner can call a vessel traffic service (VTS) for advisory information. The VTS operators keep track of all major vessels' positions, course, and speeds, as well as accumulate information on navigation hazards. This service will be discussed in more detail with Rule 10.

The tools available to aid the mariner in maintaining a lookout will continue to develop. The use of shipboard radar transponders in conjunction with ARPAs and radiotelephones, for example, is being explored. The continued exploitation of microprocessor technology will make available new means for maintaining a proper lookout. Whatever changes the future will bring, Rule 5 will continue to require that the person directing the movement of the vessel know the benefits and limitations of any new devices and be able to use them. Continuing education is part of the navigation rules.

Prevailing Circumstances and Conditions

A proper lookout is that which is sufficient to prevent a collision, without any allowance for good luck, in the prevailing circumstances and conditions. Tp give substance to this definition, we offer more specific observations:

- A lookout in the open ocean can be less intense than one in coastal or inland waters. It cannot, however, be abandoned--midocean collisions do occur.
- A lookout on a vessel at anchor is required, with the level of effort depending upon the location of the anchorage, depth of water, type of ground tackle, wind, currents, waves, and so forth. The lookout should determine whether the anchor is dragging and should warn other vessels of the anchored vessel's presence.
- The means and methods for maintaining a lookout vary with night and day. At night, lookouts should make greater use of binoculars and radar. Masters should post observers away from the vessel's own lights so as not to impair the night vision of the lookout. During the day and in good visibility, a vessel can be seen at a much greater distance , as indicated by the fact that a

masthead light for the largest vessel need be visible for only six miles and for the smallest vessel, only two miles. During daylight, and under the most favorable conditions, the watch officer on a large vessel may perform the lookout alone.

- The size and arrangement of a vessel have a direct bearing on the effort required to maintain a proper lookout. On small vessels where there is an unobstructed all-around view and where there is no impairment of night vision, the craft's operator may both steer and keep the lookout. Unobstructed view, simple controls, no distractions, and high maneuverability are important here.
- Visibility is generally the key factor in maintaining a proper lookout. As the visibility decreases, the level of effort to maintain a proper lookout increases tremendously. Sight needs to be augmented by hearing, radar, and radiotelephone. Unless you are in the open ocean, you should seek precise navigational information. In the case of low-lying fog, at least one person should be positioned high enough to see over the fog.

Full Appraisal of the Situation and Risk of Collision

These last words restate the purpose of Rule 5. It is this broad objective that you should keep in mind when managing the lookout. If there is not enough information to assess the situation, you should tap all your resources to gather more. If you are still unable to acquire the information you need, then you should take steps immediately to reduce your requirement for information--for example, by slowing or stopping. Otherwise, you are violating Rule 5. This is not one of those circumstances where doing more with less is a virtue.

Although it is true that the determination of a proper lookout is left to the mariner, it is also true that courts of law assign as a contributory fault the lack of a proper lookout in a very large proportion of collision cases.

2.1 RESPONSIBILITIES OF A LOOK-OUT, INCLUIDING REPORTING THE APPROXIMATE BEARING OF A SOUND SIGNAL , LIGHT OR ORDER OBJECT IN DEGREES OR POINT

The lookout should inform the Able Seaman (AB) when he observes any of the following:

- Any kind of floating object
- Navigation mark or lights
- Any type of distress signal from other ships or ports
- Land
- Ice, irrespective of size or form
- Any type of ship irrespective of its size
- Sandbags or prominent navigational features
- Problem with any of the ship’s navigation systems, including navigational lights
- Any kind of hazards or derelicts that can be dangerous to the ship’s navigation
- The main duties of a lookout are: To give utmost attention through sight, hearing, and any other means in order to assess any change in the operating environment

Detecting and reporting on ships, shipwrecks, debris, shipwrecked person, and other navigational hazards

Reporting on possibilities of collision, stranding, and other dangers to navigation

The lookout should remain at his position at all times until he is relieved from his duties. On relieving, he should provide all the information to his reliever about things that he has reported.

The job of lookout is mostly carried out by Able Seaman (AB) or Ordinary seaman (OS) of the ship. However, it is to note that the lookout duties cannot be shared with other works.

Today, the job of a lookout is of utmost importance on ships plying in piracy affected areas.

Aids to navigation

Aids to navigation are special structures like lighthouses, lightships, beacons, buoys, etc that are used to enhance safety by providing more opportunities to obtain LOPs.

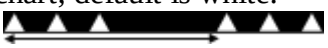
These lights and marks are prescribed across the world by the International Association of Lighthouse Authorities (IALA). In 1977 this **IALA** endorsed two maritime buoyage systems putting an end to the 30 odd systems existing at that time. Region A - **IALA A** covers all of Europe and most of the rest of the world, whereas region B - **IALA B**covers only the Americas, Japan, the Philippines and Korea. Fortunately, the differences between these two systems are few. The most striking difference is the **direction of buoyage**.
All marks within the IALA system are distinguished by:

- Shape
- Colour
- Topmark
- Light

Light identification

During daytime, the identification of aids to navigation is accomplished by observing: **location**, **shape**, **colour scheme**, **auxiliary features** (sound signals, RACON, RC, etc) or **markings** (name, number, etc).

During the night, we use the features of the aid to navigation's **light** to both identify it and ascertain its purpose. There are three features to describe the light:

- **Colour**: Either white, red, green or yellow. If no colour is stated in the chart, default is white.
- **Period**: The time in seconds needed for one complete cycle of changes.  The arrow indicates the 10 second period of this flashing light “Fl(3) 10s”.
- **Phase characteristic**: The particular pattern of changes within one complete cycle (hence, within one period). Below are the most common types:

- **Fixed** **F**
 This light shines with an unblinking and steady intensity and is always on. In this example a yellow fixed light is shown.
- **Flashing** **Fl**:
 The duration of the light is always less than the duration of the darkness. The frequency does not exceed 30 times per minute.
- **Quick Flashing** **Q**:
 Again, the duration of quick flash is less than the darkness. The frequency is at least 60 times per minute.
- **Very Quick Flashing** **VQ**:
 Also here, the duration of very quick flash is less than the darkness. The frequency is at least 100 times per minute.
- **Interrupted Quick Flashing** **IQ**:
 Like Quick Flashing with one moment of darkness in one period.
- **Isophase** **Iso**:
 This Light has equal duration between light and darkness. A period consists of both a light and a dark interval. Also called Equal Interval (E Int).
- **Group Flashing Gp** **Fl(x+x)**:
 This is actually a combination of two patterns in one period. In this example the first 2 flashes followed by the pattern of 3 flashes result in: Gp Fl(2+3).
- **Occulting** **Occ**:
 Occulting is the opposite of flashing, the light is more on then off.
- **Alternating** **AL**:
 An alternating light changes colour. This special purpose light is typically used for special applications requiring the exercise of great caution. In this example ALT.WG is shown, alternating between green and white.
- **Morse U Mo (U)**:
 This light shows two flashes and a longflash, which is equivalent to the letter "U" in Morse code.
- **Long-Flashing** **LFl**:
 This light has one long flash in a period. A long flash is at least 2 seconds long.

Let's look at some examples using colour, period and phase characteristics. The arrows mark the periods:

-  **Fl (4) 8s**
-  **Oc (2+3) 10s**
-  **Iso G 4s**

All lighted aids to navigation are either **major** or **minor lights**, where major lights are used for key navigational points along sea-coasts, channels and harbour and river entrances. These lights are normally placed in lightships, lighthouses and other permanently installed structures, providing both high intensity and high reliability of the lights. Major lights are then subdivided in **primary lights** (very strong, long range lights used for the purpose of making landfalls or coastal passages) and **secondary lights** (shorter range lights found for example at harbour and river entrances). Important details of (especially) primary lights can be found in a reference called **the Light List** where information (about

pedestals etc.) can be found which is not included in the chart. Minor lights on the other hand are likely to be found within harbours, along channels and rivers. These have a low to moderate intensity and sometimes mark isolated dangers.

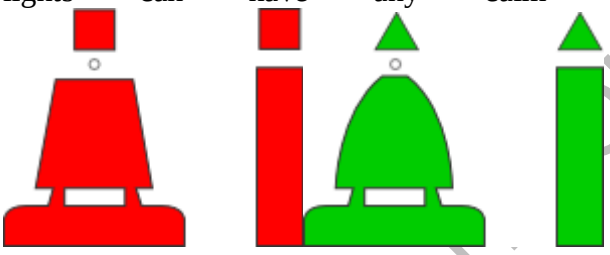
Six types of navigation buoys:

- **Lateral**
- **Cardinal**
- **Isolated danger**
- **Safe water**
- **New wreck**
- **Special**

Lateral buoys and marks

The location of lateral buoys defines the borders of channels and indicates the direction.
Under IALA A red buoys mark the port side of the channel when returning from sea.
Under IALA B green buoys mark the port side of the channel when returning from sea.
See below for the **directions of lateral buoys in IALA A and IALA B**.

Red buoys have even numbers and red lights; green buoys have odd numbers and green lights. Lateral lights can have any calm phase characteristic except FL (2+1).



Generally, when two channels meet, one will be designated the preferred channel (i.e. most important channel). The buoy depicted on the right indicates the preferred channel to starboard under IALA A. The light phase characteristic is R FL (2+1):

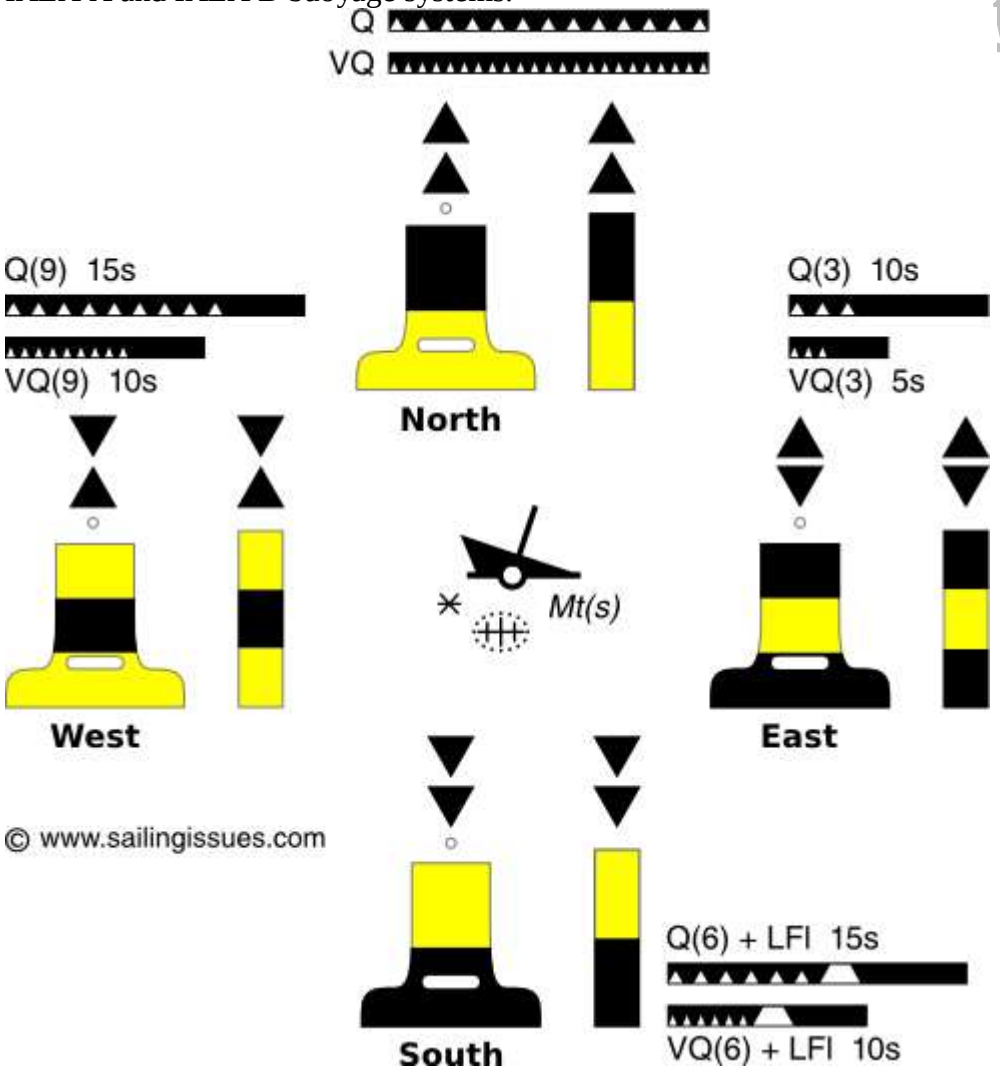
The buoy depicted on the left indicates the preferred channel to port under IALA A. These buoys are marked with the names and numbers of both channels. The light phase characteristic

is G FL (2+1):

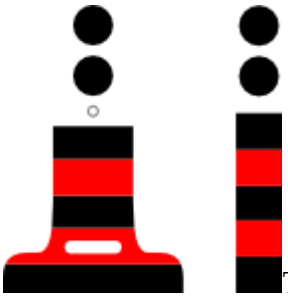
For an example of lateral buoys used to mark a (preferred) channel, see **direction of buoyage** below.

Cardinal buoys

The four cardinal buoys indicate the safe side of a danger with an approximate bearing. For example, the West cardinal buoy has safe water on its West and the danger on its East side. Notice the "clockwise" resemblance of the light phase characteristics. The top marks consist of two black triangles placed in accordance with the black/yellow scheme of the buoy. When a new obstacle (not yet shown on charts) needs to be marked, **two** cardinal buoys - for instance a South buoy and an East buoy - will be used to indicate this "uncharted" danger. The cardinal system is identical in both the IALA A and IALA B buoyage systems.

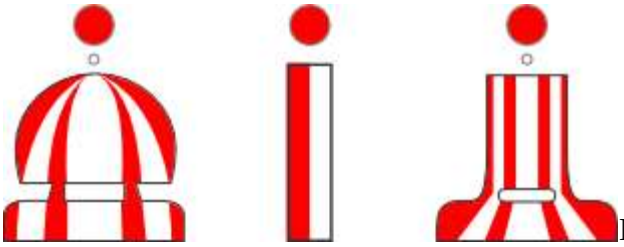


Marks indicating isolated dangers



This type of buoy indicates the position of an isolated danger, contrary to cardinal buoys which indicate a direction away from the danger. Body: black with red horizontal band(s); Topmark: 2 black spheres. The light (when present) consists of a white flash: Fl(2).

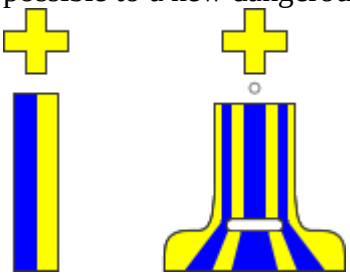
Marks indicating safe water



Notice that whereas most horizontal striping spells "danger", this safe water buoy is vertically striped. These marks are for example seaward of all other buoys (lateral and cardinal) and can be used to make landfall. Body: red and white vertical stripes; Topmark (if any): single red sphere. Lights are typically calm and white: Morse A, Iso, Occ or LFl 10s.

Marks for new wrecks

After the sinking of the "**Tricolor**" in the Pas de Calais (Dover Straits) in 2002, several other vessels hit the wreck despite standard radio warnings, three guard ships and a lighted buoy. This incident spawned a new type of buoy, the **emergency wreck marking buoy**, which is placed as close as possible to a new dangerous wreck.



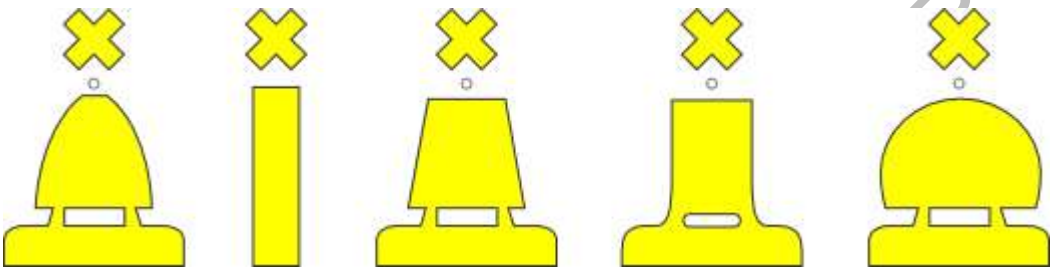
The emergency wreck marking buoy will remain in position until: a) the wreck is well known and has been promulgated in nautical publications; b) the wreck has been fully surveyed and exact details such as position and least depth above the wreck are known; and c) a permanent form of marking of the wreck has been carried out.

The buoy has the following characteristics:

- A pillar or spar buoy, with size dependant on location.
- Coloured in equal number and dimensions of blue and yellow vertical stripes (minimum of 4 stripes and maximum of 8 stripes).
- Fitted with an alternating blue and yellow flashing light with a nominal range of 4 nautical miles where the blue and yellow 1 second flashes are alternated with an interval of 0.5 seconds. B1.0s + 0.5s + Y1.0s + 0.5s = 3.0s 
- If multiple buoys are deployed then the lights will be synchronized.
- A racon Morse Code "D" and/or **AIS** transponder can be used.
- The top mark, if fitted, is a standing/upright yellow cross.

It is important to realize - especially for the colour-blind - that this new buoy breaches the useful and crucial convention: vertical stripes equal safety, horizontal stripes equal danger.

Special buoys and marks



I have saved these buoys for last since they lack an actual navigational goal. Most of the time these yellow buoys indicate pipelines or areas used for special purposes.
I have drawn the five official IALA shapes, from left to right: **conical**, **spar**, **cylindrical**, **pillar** and **spherical**.

Chart symbols

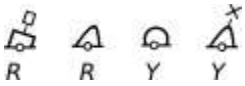
The seafaring nations of the world - members of the **International Hydrographic Organization** - agreed in 1982 on an universal set of chart symbols, abbreviations, colours, etc to be used in the nautical chart, in order to obtain uniformity.

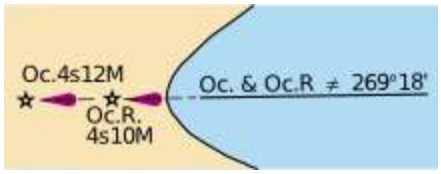
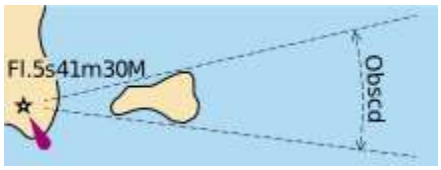
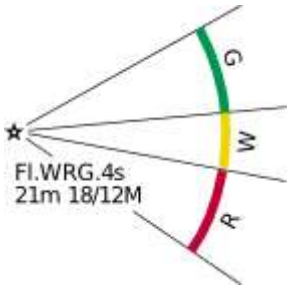
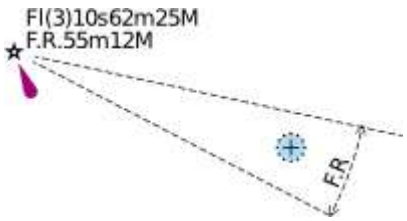
On regular charts a white, red, yellow or green lights will be indicated by , and on GPS displays and modern multi-coloured charts in specific colours: , with the yellow coloured lobe indicating a white light.
The precise position of a chart symbol is its center, or is indicated with a line and circle , the "position circle".

Two distinct types of sea mark are drawn differently in the chart:

- **beacons** - fixed to the seabed; drawn upright;
- **buoys** - consisting of a floating object that is usually anchored to a specific location on the sea floor; drawn at an oblique angle and with oblique numbering, descriptions of colours and light characteristics.

	Major floating light (light-vessel, major light-float, LANBY)

	Light-vessel
	Major light; minor light
	Green or black buoys (symbols filled black): *G* = Green ; *B* = Black
	Green or black beacon (symbol filled black). Note the upright G, instead of an oblique *G*
	Single coloured buoys other than green and black: *Y* = Yellow ; *R* = Red
	Coloured beacon other than green and black, the symbol is again filled black so only the shape of the topmark is of navigational significance.
	Multiple colours in horizontal bands, the colour sequence is from top to bottom
	Multiple colours in vertical or diagonal stripes, the darker colour is given first. *W* = White
	Spar buoy (here a safe water mark)
	Lighted marks on multi-coloured charts, GPS displays and chart plotters.
	Lighted red beacon on standard charts.
	Red beacon and green buoy with topmark, colour, radar reflector and designation. Red buoys and marks are given even numbers, green buoys and marks are given odd numbers.
	The black symbol indicates a true radar reflector. Other radar-conspicuous objects - natural or manmade - which are known to give an *unexpectedly* strong radar response may be distinguished by the magenta symbol.

	Wave-actuated bell buoy to the left, and to the right a Light buoy, with a horn giving a single blast every 15 seconds, in conjunction with a wave-actuated whistle. Other sounds include "Gong", "Siren", "Diaphone" (Dia). The fog signal symbol may be omitted when a description of the signal is given.
	**Leading beacons** - Leading line (firm line is the track to be followed)
	**Leading lights** (≠ : any two objects in line under each other). Bearing given in degrees and minutes. The lights are synchronized. The red light has a shorter nominal range (the distance from which the light can be seen): 10 nautical miles.
	All-round light with obscured sector
	Sector light on multi-coloured charts. The elevation is 21 metres (height of the light structure above the chart datum used for elevations). The nominal range of the white light is 18 nautical miles. The range of the green and red light is 12 nautical miles.
	Main light visible all-round with red subsidiary light seen over danger. The fixed red light has an elevation of 55 metres and a nominal range of 12 nautical miles. The flashing light is white, with three flashes in a period of 10 seconds. The elevation is higher than the red light: 62 metres and the range of the white light is 25 nautical miles.
	Symbol showing direction of buoyage (where not obvious)
	Symbol showing direction of buoyage (where not obvious), on multi-coloured charts (red and green circles coloured as appropriate), here IALA A

Full example of a light description in the chart:

Fl(3)WRG.15s21m15-11M

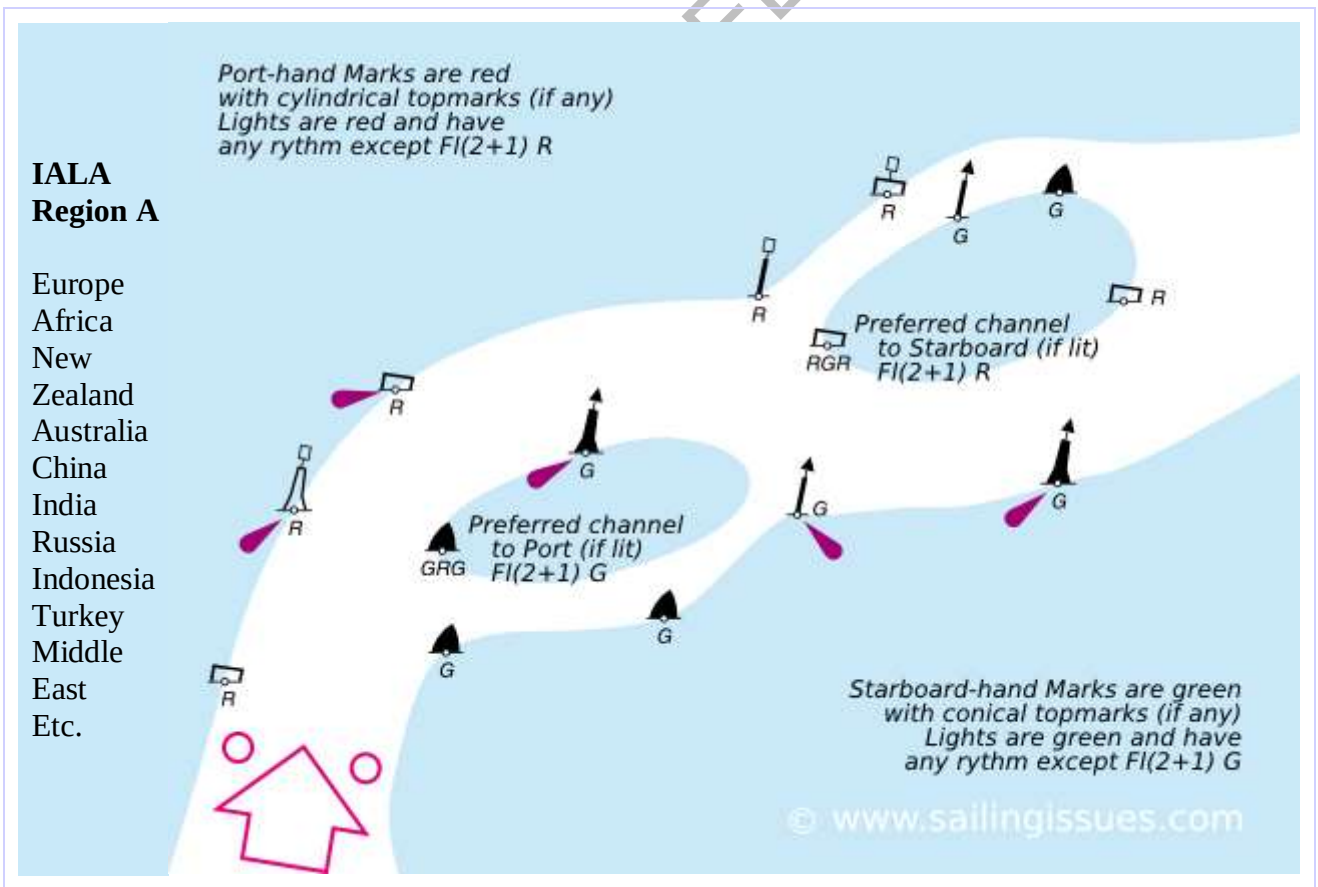
Class of light: group flashing repeating a group of three flashes;
Colours: white, red, green, exhibiting the different colours in defined sectors;
Period: the time taken to exhibit one full sequence of 3 flashes and eclipses: 15 seconds;
Elevation of light : 21 metres;
Nominal range(s): white 15 M, green 11 M, red between 15 and 11 M, where "M" stands for nautical miles.

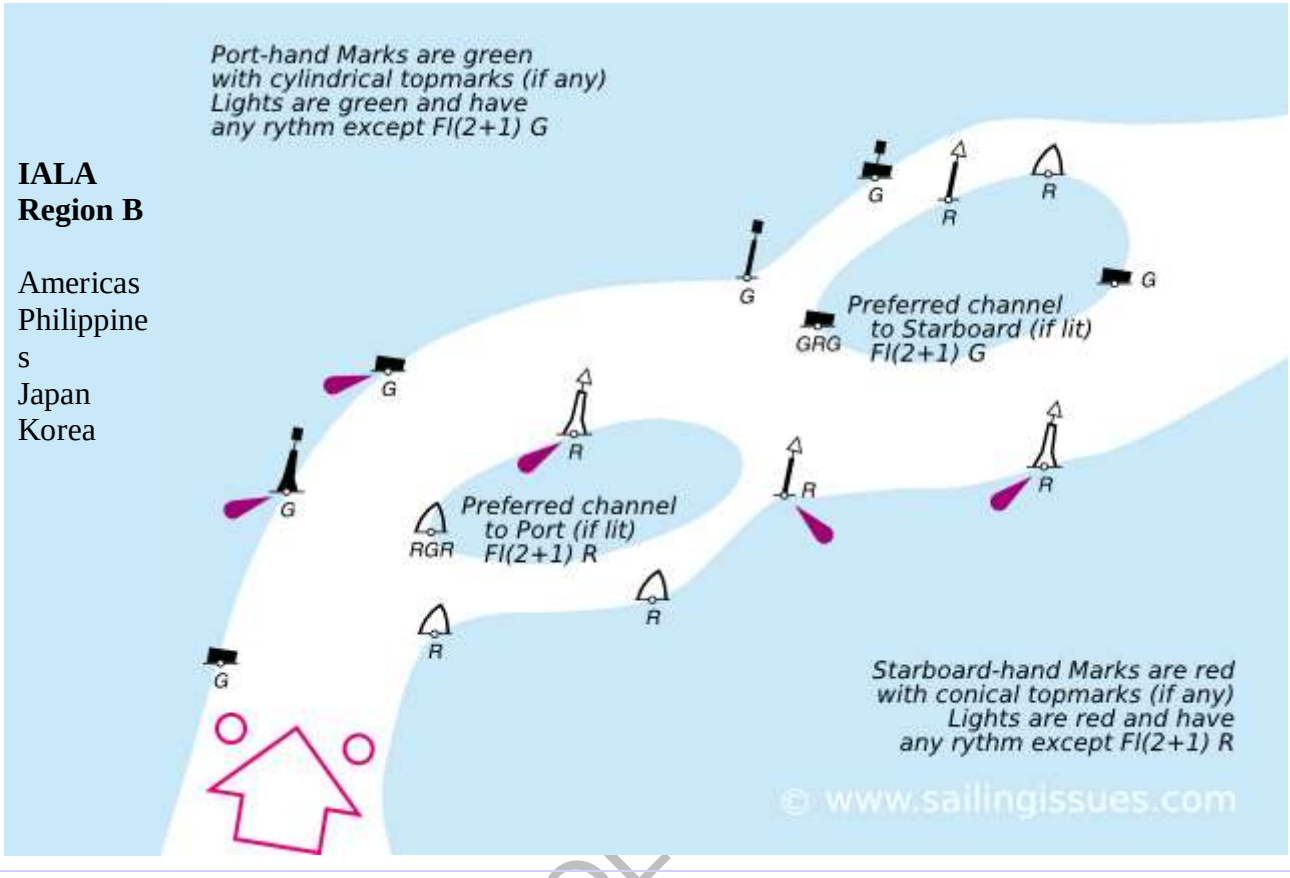
Lateral Marks - direction of buoyage

Lateral marks are generally for well-defined channels and there are two international Buoyage Regions - A and B - where these Lateral marks differ. Where in force, the IALA System applies to all fixed and floating marks except landfall lights, leading lights and marks, sectored lights and major floating lights.

The standard buoy shapes are cylindrical (can) , conical , spherical , pillar and spar , but variations may occur, for example: minor light-floats . In the illustrations below, only the standard buoy shapes are used.

In the case of fixed beacons - lit or unlit - only the shape of the topmark is of navigational significance.





Visibility of lights

It is important to know at what distance we may (begin to) see a certain light, and when we can expect to lose sight of it, especially when making landfall. Several practical ranges are used to the describe the visibility of lights in navigation:

- The **meteorological range** is based on the current atmospheric conditions. The table below shows that the atmosphere immensely influences the visibility of light travelling through it.

Meteorological Optical Range Table

Code No.	Weather	Distance (m)		Code No.	Weather	Distance (nm)
0	Dense fog	Less than 50		5	Haze	1.0 - 2.0
1	Thick fog	50 - 200		6	Light haze	2.0 - 5.5
2	Moderate	200 - 500		7	Clear	5.5 - 11.0
3	Light fog	500 - 1000		8	Very clear	11.0 - 27.0
4	Thin fog	1000 - 2000		9	Exceptionally clear	Over 27.0

- The **geographic range** is based on the elevation of the light. A higher light means that its horizon is farther away, see **distance of horizon**. Moreover, if the observer's height of eye is higher than sea level the light can been seen beyond its geographic range, the **dipping range**. However, on sailing yachts this potential is limited.

- The **nominal range** of a light is based on its candlepower, and is typically the range mentioned in the chart. The nominal range is the maximum distance at which a light can be seen in weather conditions where visibility is **10 nm**. If not stated in the chart, consult the List of Lights or a nautical almanac.

  So, a minor light - perched on a 70m high cliff - with a geographic range of 20 nm will not be detectable by the human eye at a distance of 6 nm

  1. if the nominal range is just 5 nm.
  2. if the meteorological range is just 5 nm due to a light haze.

Because of the limiting factor of the geographic range, most major lights will never be seen from a sailing yacht 20 nm away. Yet, it is sometimes possible to take a bearing on the **loom** of the light: its reflection against the clouds.

Loom

Dipping distance or range

Different coloured lights with equal candlepower have different ranges. White light is the most visible followed by yellow, green and then red. Therefore, at extreme ranges an “AL WG” can resemble a “Fl W”.

The range of a lit buoy is never indicated - with the exception of a LANBY - but on a clear night the maximum range is 3 nm, yet often considerably less.

There are 2 visual clues to determine your distance from a buoy: at about 0.5 nm, the light will rise up from the horizon, and at about 200m, the light will reflect in the surface.

		
Buoy at less than 3 nm	Buoy at less than 0.5 nm	Buoy at less than 200m

Glossary

- **Navigation aid**: An onboard instrument, device, chart, method, etc., intended to assist in the navigation.
- **Aid to navigation**: A device or structure external to the ship, designed to assist in determination of position, to define a safe course, or to warn of dangers or obstructions.
- **Mark, seamark, navigation mark**: An artificial or natural object of easily recognizable shape or colour, or both, situated in such a position that it may be identified on a chart. A fixed artificial navigation mark is often called a Beacon.
- **Light characteristics**: The sequence and length of light and dark periods and the colour or colours by which a navigational light is identified.
- **Topmark**: One of more objects of characteristic shape placed on top of a buoy or beacon to aid in its identification.
- **Lateral Mark**: An aid to navigation intended to mark the sides of a channel or waterway.
- **Cardinal Marks**: An IALA aid to navigation intended to show the location of a danger to navigation based on its position relative to the danger using the "cardinal point": north, east, south, west.
- **Isolated danger Marks**: An IALA aid to navigation marking a danger with clear water all around it; it has a double ball topmark and is black with at least one red band. If lighted its characteristic is Fl(2).
- **Sector light**: A light having sectors of different colours or the same colour in specific sectors separated by dark sectors.
- **Light sector**: As defined by bearings from seaward, the sector in which a navigational light is visible or in which it has a distinctive colour difference from that of adjoining sectors, or in which it is obscured.
- **Lighthouse**: A distinctive structure exhibiting a major navigation light.
- **Light List**: A publication giving detailed information regarding lighted navigational aids and fog signals.
- **Landfall**: The first sighting (even by radar) of land when approached from seaward.
- **Range**: Two or more objects in line. Such objects are said to be in range. An observer having them in range is said to be on the range. Two beacons are frequently located for the specific purpose of forming a range to indicate a safe route or the centerline of a channel.
- **Leading line**: On a nautical chart, a straight line, drawn through leading marks. A ship moving along such line will clear certain dangers or remain in the best channel.
- **Range lights, leading lights**: Two or more lights at different elevations so situated to form a range (leading line) when brought into transit. The one nearest to the observer is the from light and the one farthest from the observer is the rear light. The front light is at a lower elevation than the rear light.

- **Lights in line**: Two or more lights so situated that when observed in transit they define a position: the limit of an area, an alignment used for anchoring, etc. Not to be confused with range lights, which mark a direction to be followed.
- **Light-float** : A buoy having a boat-shaped body. Light-floats are nearly always unmanned and are used instead of smaller lighted buoys in waters where strong currents are experienced.
- **Primary (sea-coast) light**: A light established for purpose of making landfall or coastwise past from headland to headland.
- **Secondary light**: A major light, other than a primary (sea-coast) light, established at harbour entrances and other locations where high intensity and reliability are required.
- **Major light**: A light of high intensity and reliability exhibited from a fixed structure (lighthouse) or on marine site (except range lights). Major lights include primary sea-coast and secondary lights.
- **Minor light**: An automatic unmanned light on a fixed structure usually showing low to moderate intensity. Minor lights are established in harbours, along channels, along rivers, and in isolated dangers.
- **Visual range**: The extreme distance at which an object of light can be seen.
- **Geographic range**: The extreme distance limited by the curvature of the earth and both the heights of the object and the observer.
- **Bobbing a light**: Quickly lowering the height of eye and raising it again when a navigational light is first sighted to determine if the observer is at the geographic range of the light.
- **Luminous range**: The extreme distance limited only by the intensity of the light, clearness of the atmosphere and the sensitiveness of the observer's eye.
- **Luminous range diagram**: A diagram used to convert the nominal range of a light to its luminous range under existing conditions.
- **Charted or Nominal Range**: The nominal range is indicated in the chart next to the light or can be found in the Light List. This is the maximum distance at which a light may be seen at night based upon intensity and 10 nautical miles of visibility.
- **Meteorological Range**: The meteorological range is based on the current atmospheric conditions. Weather in the form of haze, mist or rain is often a limiting factor in the visibility of the light travelling through it. The meteorological optical range table ranks from 0 (dense fog : less than 50 metres of visibility) to 9 (exceptionally clear : more than 27 kilometres of visibility).

3.CONTRIBUTE TO MONITORING AND CONTROLLING SAFE WATCH

Contribute to monitoring and controlling a safe watch (covers shipboard terms and definitions, use of internal communication and alarm systems, have the ability to understand orders and to communicate with the officer of the watch in matters relevant to watch-keeping duties, be familiar with the procedures for the relief, maintenance and hand-over of a watch, the information required to maintain a safe watch and basic environmental protection procedures).

Operate emergency equipment and apply emergency procedures (covers knowledge of emergency duties and alarm signals, knowledge of pyrotechnic distress signals, satellite EPIRB's and SARTS, avoidance of false distress alerts and action to be taken in the event of accidental activation).

3.1SHIPBOARD TERMS AND DEFINITIONS

Abaft the beam: Said of the bearing of an object which bears between the beam and the stern (further back than the ship's middle).
Abaft: A relative term used to describe the location of one object in relation to another, in which the object described is farther aft than the other. Thus, the mainmast is abaft the foremast (in back of).
Abandon ship: Get away from the ship, as in an emergency.
Abeam: The bearing of an object 90 degrees from ahead (in a line with the middle of the ship).
Able bodied seaman: The next grade above the beginning grade of ordinary seaman in the deck crew.
Aboard: In the vessel (on the ship).
Aboveboard: Above decks; without concealment of deceit (out in the open).
Abreast: Abeam of (alongside of).
Accommodation ladder: The portable steps from the gangway down to the waterline.
Admiral: Comes from the Arabic "Emir" or "Amir" which means "First commander" and "Al-bahr which means "the sea". Emir-al-barh evolved into Admiral.
Adrift: Loose from the moorings (not tied or secured).
Afloat: Floating.
Aft: At, near, or toward the stern (back end).
Aground: Resting on the bottom.
Ahoy: A call used in hailing a vessel or boat (hey!).
Air tank: A metal air-tight tank built into a boat to insure flotation even when the boat is swamped.
Alee: To the leeward side (away from the wind).
Alive: Alert (pep it up!).
All hands: The entire crew.
All standing: To bring to a sudden stop.
Aloft: Above the upper deck (above).
Alongside: Side to side.
Amidships: In or towards the middle of a ship in regard to length or breadth (center of).
Anchor: A device or iron so shaped to grip the bottom and holds a vessel at anchor by the anchor chain.
Anchor bar: Wooden bar with an iron shod, wedge: shaped end, used in prying the anchor or working the anchor or working the anchor chain. Also used to engage or disengage the wild-cat.
Anchor chain: Heavy, linked chain secured to an anchor for mooring or anchoring.
Anchor lights: The riding lights required to be carried by vessels at anchor.
Anchor watch: The detail on deck at night, when at anchor, to safeguard the vessel (not necessarily at the anchor; a general watch).
Anchor's aweigh: Said of the anchor when just clear of the bottom (leaving or moving).
Anchorage: A place suitable for anchoring.
Ashore: On the shore (on land).
Astern: The bearing of an object 180 degrees from ahead (behind).
Athwartships: At right angles to the fore-and-aft line of the vessel (sideways-across).
Avast: An order to stop or cease hauling (stop action at once).
Awash: Level with the water (water ready to, or slightly covering decks).
Awning: A canvas canopy secured over the ship's deck as a protection from the weather (covering).
Aye, aye, sir: The reply to an officer's order signifying that he is understood and will be obeyed (I understand).

Bail: To throw water out of a boat; a yoke, as a ladder bail (rung).
Ballast tanks: Double bottoms for carrying water ballast and capable of being flooded or pumped out at will.
Ballast: Heavy weights packed in the bottom of a boat or ship to give her stability.
Batten down: To make watertight. Said of hatches and cargo (tie up or secure).
Beachcomber: A derelict seaman found unemployed on the waterfront, especially in a foreign country (seaman without a ship).
Beam wind: A wind at right angles to a vessel's course (wind blowing at the ship's side.)
Bear a hand: To assist or help.
Bear down: To approach (overtake or come up to).
Bearing: The direction of an object (with reference to you, your ship, another object).
Becalmed: A sailing vessel dead in the water due to lack of wind (not moving).
Becket: A rope eye for the hook of a block. A rope grommet used in place of a rowlock. Also, a small piece of rope with an eye in each end to hold the feet of a sprit to the mast. In general any small rope or strap used as a handle.
Belay: To make fast as to a pin or cleat. To rescind an order (tie up).
Belaying pin: A wooden or iron pin fitting into a rail upon which to secure ropes.
Bells: see Ships Time
Belly strap: A rope passed around (center) a boat or other object for hanging.
Below: Beneath the deck (under).
Bend: The twisting or turning of a rope so as to fasten it to some object, as a spar or ring.
Berth: A vessel's place at anchor or at a dock. Seaman's assignment.

Between decks: The space between decks. The name of the deck or decks between the ceiling and main deck.
Bight: Formed by bringing the end of a rope around, near to, or across its own part.
Bilge: The curved part of a ship's hull where the side and the flat bottom meet.
Binnacle: The stand, usually of brass or non-magnetic material in which the compass rests and which contains the compensating magnets (compass holder).
Bitter end: The last part of a rope or last link in an anchor chain.
Bitts: A pair of vertical wooden or iron heads on board ship, used for securing mooring or towing lines. Similar to dock bollards.
Black gang: Member of the engine-room force, which included the engineers, firemen, oilers, and wipers.
Block and block: Same as two blocks.
Block: An apparatus consisting of an outside shell and a sheave through which a rope may be passed (pulley).
Boat-fall: A purchase (block and tackle) for hoisting a boat to its davits.
Bollard: An upright, wooden or iron post to which hawsers or mooring lines may be secured.
Boom: A spar used for fore and aft sails.
Boom cradle: A rest for a cargo-boom when lowered for securing for sea.
Boot-topping: The anti-corrosive paint used on and above the waterline.
Bos'n: Shortening of the old term "boatswain," an unlicensed member of the crew who supervises the work of the deck men under direction of the first mate.
Bos'n's chair: The piece of board on which a man working aloft is swung.
Bos'n's chest: The deck chest in which the bos'n keeps his deck gear.
Bos'n's locker: The locker in which the bos'n keeps his deck gear.
Bow: The forward part of a vessel's sides (front).
Bowsprit: A spar extending forward from the stem.
Boxing the compass: Calling names of the points of the compass in order.
Break ground: Said of anchor when it lifts clear of the bottom.
Breaker: A small cask for fresh water carried in ship's boats. A sea (wave) with a curl on the crest.
Bridge: The raised platform extending athwartships, the part of the ship from which the ship is steered and navigated.
Bright work: Brass work, polished (also varnished wood work in yachts).
Bulkhead: Transverse or longitudinal partitions separating portions of the ship ("walls" in a ship).
Bunk: Built-in bed aboard ship.
Bunker: Compartment for the storage of oil or other fuel.
By the board: Overboard (over the side).
By the head: Deeper forward (front end deepest in water).
By the Run: To let go altogether.

Cabin: The captain's quarters. The enclosed space of decked-over small boat.
Cable-laid: The same as hawser-laid.
Cable-length: 100 fathoms or 600 feet (6 feet to a fathom).
Cable: A chain or line (rope) bent to the anchor.
Calm: A wind or force less than one knot (knot: 1 nautical mile per hour).
Camel: A wooden float placed between a vessel and a dock acting as a fender.
Capstan-bar: A wooden bar which may be shipped in the capstan head for heaving around by hand (to heave up anchor or heavy objects by manpower).
Capstan: The vertical barrel device used to heave in cable or lines.
Captain of the Head: A guy who gets Head (toilet) cleaning detail.
Cardinal points: The four principal points of the compass: North, East, South and West.
Cast off: To let go.
Caulk: To fill in the seams with cotton or oakum.
Chafe: To wear the surface of a rope by rubbing against a solid object.
Chafing gear: A guard of canvas or rope put around spars, mooring lines, or rigging to prevent them from wearing out by rubbing against something.
Chain locker: A compartment forward where the chain cable is stowed.
Charley Noble: The galley smoke-pipe (cook's stove pipe), named after The English sea captain who was noted for the scrupulous cleanliness and shine of the brass aboard his ship.
Check: To ease off gradually (go slower and move carefully).
Chief mate: Another term for first mate.
Chief: The crew's term for the chief engineer.
Chock: A heavy wooden or metal fitting secured on a deck or on a dock, with jaws, used for the lead or to guide lines or cables.
Choked: The falls foul in a block. The falls may be chocked or jammed intentionally for a temporary securing (holding).
Cleat: A fitting of wood or metal, with horns, used for securing lines (tying up).
Clipper bow: A stem curving up and forward in graceful line.

Coaming: The raised frame work around deck openings, and cockpit of open boats (hatch coaming).
Cockpit: The well of a sailing vessel, especially a small boat, for the wheel and steerman.
Colors: The national ensign.
Cofferdam: The space between two bulkheads set close together, especially between fuel tanks (two walls separated to use for drainage or safety).
Coil: To lay down rope in circular turns.
Coming around: To bring a sailing vessel into the wind and change to another tack. One who is influenced to a change of opinion.
Cork fenders: A fender made of granulated cork and covered with woven tarred stuff.
Cradle: A stowage rest for a ship's boat.
Crossing the line: Crossing the Equator.
Crow's nest: The platform or tub on the mast for the look-out.
Cut-water: The foremost part of the stem, cutting the water as the vessel forges ahead.

Davit: A curved metal spar for handling a boat or other heavy objects.
Dead ahead: Directly ahead on the extension of the ship's fore and aft line.
Dead light: Steel disc, that is dogged down over a porthole to secure against breakage of the glass and to prevent light from showing through.
Derelict: An abandoned vessel at sea (a danger to navigation).
Dip: A position of a flag when lowered part way in salute (method of salute between vessels, like planes dipping wings).
Displacement: The weight of the water displaced by a vessel.
Distress signal: A flag display or a sound, light, or radio signal calling for assistance.
Ditty-bag: A small bag used by seamen for stowing small articles.
Doldrums: The belt on each side of the Equator in which little or no wind ordinarily blows.
Dolphin: A cluster of piles for mooring.
Double up: To double a vessel's mooring lines.
Dowse: To take in, or lower a sail. To put out a light. To cover with water.
Draft: The distance from the surface of the water to the ship's keel (how deep the ship is into the water).
Drag: A sea anchor contrived to keep a vessel's head to the wind and sea.
Dressing ship: A display of national colors at all mastheads and the array of signal flags from bow to stern over the masthead (for special occasions and holidays).
Dry dock: A basin for receiving a vessel for repairs, capable of being pumped dry (to repair vessel and scrape marine growth from bottom).
Dungarees: Blue working overalls.

Eagle Flies: Pay day
Easy: Carefully (watch what you're doing).
End-for-end: Reversing the position of an object or line.
End seizing: A round seizing at the end of a rope.
Ensign: (1) The national flag. (2) A junior officer.
Even keel: Floating level (no list).

Fake: A single turn of rope when a rope is coiled down.
Fake down: To fake line back and forth on deck.
Fantail: After deck over counter. The part of a rounded stern which extends past the rearmost perpendicular.
Fathom: Six feet. Comes from the Dutch word "fadom" which was the distance between fingertips of outstretched hands.
Fend off: To push off when making a landing.
Fender: Canvas, wood or rope used over the side to protect a vessel from chafing when alongside another vessel or a dock.
Fid: A tapered wooden pin used to separate the strands when splicing heavy rope.
Field day: A day for general ship cleaning.
Flemish down: To coil flat down on deck, each fake outside the other, beginning in the middle and all close together.
Fo'c'sle: A modem version of the old term "forecastle," or bow section of the ship, where the crew lived.
Fog horn: A sound signal device (not necessarily mechanically operated).
Fog-bound: Said of a vessel when forced to heave to or lie at anchor due to fog.
Fore peak: The part of the vessel below decks at the stem.
Forecastle: A compartment where the crew lives.
Forefoot: The heel of the stem where it connects to the keel.
Foul: Jammed, not clear.
Fouled hawse: Said of the anchor chain when moored and the chain does not lead clear of another chain.

Founder: To sink (out of control).
Freeboard: The distance from the surface of the water to the main deck or gunwale.
Freeing port: A port in the bulwark for the purpose of freeing the deck of water.
Freighter: A ship designed to carry all types of general cargo, or "dry cargo."

G.I.: Anything of Government Issue.
Gantline: A line rove through a single block secured aloft.
Garboard strake: The strake next to the keel (running fore and aft).
Gather way: To attain headway (to get going or pick up speed).
Gear: The general name for ropes, blocks and tackles, tools, etc. (things).
Gilguy (or gadget): A term used to designate an object for which the correct name has been forgotten.
Gipsey (gypsey): A drum of a windlass for heaving in line.
Glass: Term used by mariners for a barometer.
Glory hole: Steward's quarters.
Go adrift: Break loose.
Golden Slippers: Tan work shoes issued to U.S. Maritime Service trainees
Grapnel: A small anchor with several arms used for dragging purposes.
Grating: A wooden lattice-work covering a hatch or the bottom boards of a boat; similarly designed gratings of metal are frequently found on shipboard.
Graveyard watch: The middle watch.
Green sea: A large body of water taken aboard (ship a sea).
Ground tackle: A term used to cover all of the anchor gear.
Grounding: Running ashore (hitting the bottom).
Gunwale: The upper edge of a vessel or boat's side.

Hail: To address a vessel, to come from, as to hail from some port (call).
Half-mast: The position of a flag when lowered halfway down.
Halliards or halyards: Ropes used for hoisting gaffs and sails, and signal flags.
Hand lead: A lead of from 7 to 14 pounds used with the hand lead line for ascertaining the depth of water in entering or leaving a harbor. (Line marked to 20 fathoms.)
Hand rail: A steadying rail of a ladder (banister).
Hand rope: Same as "grab rope" (rope).
Hand taut: As tight as can be pulled by hand.
Hand: A member of the ship's company.
Handybilly: A watch tackle (small, handy block and tackle for general use).
Hang from the yards: Dangle a man from one of the yard arms, sometimes by the neck, if the man was to be killed, and sometimes by the toes, if he was merely to be tortured. A severe punishment used aboard sailing ships long ago. Today, a reprimand.
Hatch: An opening in a ship's deck for passageway or for handling cargo or stores.
Hawse buckler: An iron plate covering a hawse hole.
Hawse-pipes: A pipe lead-in for anchor chain through ship's bow.
Hawser: A rope used for towing or, mooring.
Hawser-laid: Left-handed rope of nine strands, in the form of three three-stranded, right-handed ropes.
Head: The ship's water closet (toilet or wash-room). The upper edge of a quadrilateral sail.
Head room: The height of the decks, below decks.
Heart: The inside center strand of rope.
Heave: To haul or pull on a line; to throw a heaving line.
Heave around: To revolve the drum of a capstan, winch or windlass. (Pulling with mechanical deck heaving gear).
Heave away: An order to haul away or to heave around a capstan (pull).
Heave in: To haul in.
Heave short: To heave in until the vessel is riding nearly over her anchor.
Heave taut: To haul in until the line has a strain upon it.
Heave the lead: The operation of taking a sounding with the hand lead (to find bottom).
Heave to: To bring vessel on a course on which she rides easily and hold her there by the use of the ship's engines (holding a position).
Heaving line: A small line thrown to an approaching vessel, or a dock as a messenger.
Hemp: Rope made of the fibers of the hemp plant and used for small stuff or less than 24 thread (1.75 inch circumference). (Rope is measured by circumference, wire by diameter.)
High, wide and handsome: Sailing ship with a favorable wind, sailing dry and easily. A person riding the crest of good fortune
Hoist away: An order to haul up.
Holiday: An imperfection, spots left unfinished in cleaning or painting.
Hold: The space below decks utilized for the stowage of cargo and stores.
Holy stone: The soft sandstone block sailors use to scrub the deck, so-called, because seamen were on their knees to use it.
Horse latitudes: The latitudes on the outer margins of the trades where the prevailing winds are light

and variable.
House flag: Distinguishing flag of a merchant marine company flown from the mainmast of merchant ships.
House: To stow or secure in a safe place. A top-mast is housed by lowering it and securing it to a lowermast.
Hug: To keep close.
Hulk: A worn out vessel.
Hull down: Said of a vessel when, due to its distance on the horizon, only the masts are visible.
Hurricane: Force of wind over 65 knots.

Ice-bound: Caught in the ice.
Inboard: Towards the center line of a ship (towards the center).
Irish pennant: An untidy loose end of a rope (or rags).

Jack: The flag similar to the union of the national flag.
Jack Tar: Sailors were once called by their first names only, and Jack was their generic name. Tar came from seamen's custom of waterproofing clothing using tar.
Jacob's ladder: A ladder of rope with rungs, used over the side.
Jam: To wedge tight.
Jettison: To throw goods overboard.
Jetty: A landing wharf or pier; a dike at a river s mouth.
Jews harp: The ring bolted to the upper end of the shank of an anchor and to which the bending shackle secures.
Jolly Roger: A pirate's flag carrying the skull and cross-bones.
Jump ship: To leave a ship without authority (deserting).
Jury rig: Makeshift rig (emergency rig).

Keel: The timber or bar forming the backbone of the vessel and running from the stem to the stem post at the bottom of the ship.
Keel-haul: To tie a rope about a man and, after passing the rope under the ship and bringing it up on deck on the opposite side, haul away, dragging the man down and around the keel of the vessel. As the bottom of the ship was always covered with sharp barnacles, this was a severe punishment used aboard sailing ships long ago. Today, a reprimand.
Keep a sharp look-out: A look-out is stationed in a position to watch for danger ahead. To be on guard against sudden opposition or danger.
King-spoke: The upper spoke of a steering wheel when the rudder is amidships, usually marked in some fashion (top spoke of neutral steering wheel).
Kink: A twist in a rope.
Knock off: To stop, especially to stop work.
Knocked down: The situation of a vessel when listed over by the wind to such an extent that she does not recover.
Knot: Speed of 1 nautical mile per hour (1.7 land miles per hour).
Knot: A twisting, turning, tying, knitting, or entangling of ropes or parts of a rope so as to join two ropes together or make a finished end on a rope, for certain purpose.

Labor: A vessel is said to labor when she works heavily in a seaway (pounding, panting, hogging and sagging).
Ladder: A metal, wooden or rope stairway.
Lame duck: Term for disabled vessel that had to fall out of a convoy and thus became easy prey for submarines.
Landlubber: The seaman's term for one who does not go to sea.
Lanyard: A rope made fast to an article for securing it (knife lanyard, bucket lanyard, etc.), or for setting up rigging.
Lashing: A passing and repassing of a rope so as to confine or fasten together two or more objects; usually in the form of a bunch.
Launch: To place in the water.
Lay aloft: The order to go aloft (go up above).
Lazaretto: A low headroom space below decks used for provisions or spare parts, or miscellaneous storage.
Lee shore: The land to the leeward of the vessel (wind blows from the ship to the land).
Leeward: The direction away from the wind.
Liberty: Permission to be absent from the ship for a short period (authorized absence).
Life-line: A line secured along the deck to lay hold of in heavy weather; a line thrown on board a wreck by life-saving crew; a knotted line secured to the span between life-boat davits for the use of the crew when hoisting and lowering.
Line: A general term for light rope.
Logbook: A book containing the official record of a ship's activities together with remarks concerning

the state of the weather, etc.
Longitudinal: A fore and aft strength member of a ship's structure.
Longshoreman: A laborer who works at loading and discharging cargo.
Lookout: The man stationed aloft or in the bows for observing and reporting objects seen.
Loom: The part of an oar between the blade and handle. The reflection of a light below the horizon due to certain atmospheric conditions.
Loose: To unfurl.
Lubber line: The black line parallel with ship's keel marked on the inner surface of the bowl of a compass, indicating the compass direction of the ship's head.
Lurch: The sudden heave of the ship.
Lyle gun: A gun used in the life-saving services to throw a life line to a ship in distress or from ship to shore and used when a boat cannot be launched.

Make colors: Hoisting the ensign at 8 a.m. and down at sunset.
Make the course good: Steering; keeping the ship on the course given (no lazy steering).
Make the land: Landfall. To reach shore.
Make water: To leak; take in water.
Man ropes: Ropes hung and used for assistance in ascending and descending.
Manhole: An opening into a tank or compartment designed to admit a man.
Manila: Rope made from the fibers of the abaca plant.
Marlinspike: Pointed iron implement used in separating the strands of rope in splicing, marling, etc.
Maroon: To put a person ashore with no means of returning.
Marry: To temporarily sew the ends of two ropes together for rendering through a block. Also to grip together parts of a fall to prevent running out. To marry strands to prepare for splicing.
Mast step: The frame on the keelson of boat (does not apply on ships) to which the heel of a mast is fitted.
Master: A term for the captain, a holdover from the days when the captain was literally, and legally, the "master" of the ship and crew. His word was law.
Masthead light: The white running light carried by steam vessel underway on the foremast or in the forepart of the vessel.
Masthead: The top part of the mast.
Mess gear: Equipment used for serving meals.
Messenger: A light line used for hauling over a heavier rope or cable.
Messman: A member of the steward's department who served meals to officers and crew.
Mole: A breakwater used as a landing pier.
Monkey fist: A knot worked into the end of a heaving line (for weight).
Monkey island: A flying bridge on top of a pilothouse or chart house.
Mooring: Securing to a dock or to a buoy, or anchoring with two anchors.
Mother Carey's chickens: Small birds that foretell bad weather and bad luck.
Mousing: Small stuff seized across a hook to prevent it from unshipping (once hooked, mousing keeps the hook on).
Mud scow: A large, flat: bottomed boat used to carry the mud from a dredge.
Mushroom anchor: An anchor without stock and shaped like a mushroom.

Nantucket sleigh ride: A term for what frequently happened to Nantucket whalers when they left the whaling ship in a small boat to go after a whale. If they harpooned the whale without mortally wounding it, the animal took off with the whaleboat in tow.
Neptune: The mythical god of the sea.
Net tonnage: The cubical space available for carrying cargo and passengers.
Netting: A rope network.
Not under command: Said of a vessel when unable to maneuver.
Not under control: Same as not under command.

Oakum: Material used for caulking the seams of vessels and made from the loose fibers of old hemp rope.
Off and on: Standing toward the land and off again alternately.
Officer of the watch: The officer in charge of the watch.
Oil bag: A bag filled with oil and triced over the side for making a slick in a rough sea (to keep seas from breaking).
Oilskin: Waterproof clothing.
Old man: The captain of the ship.
On report: In trouble.
On soundings: Said of a vessel when the depth of water can be measured by the lead (within the 100 fathom curve).
Ordinary seaman: The beginning grade for members of the deck department. The next step is able bodied seaman.
Out of trim: Not properly trimmed or ballasted (not on even keel; listing).

Outboard: Towards the sides of the vessel (with reference to the centerline).
Over-all: The extreme deck fore and aft measurement of a vessel.
Overhang: The projection of the stern beyond the sternpost and of the bow beyond the stem.
Overhaul: Get gear in condition for use; to separate the blocks of a tackle to lengthen the fall (ready for use again).
Overtaking: Said of a vessel when she is passing or overtaking another vessel.

Pad eye: A metal eye permanently secured to a deck or bulkhead (for mooring any blocks and tackle).
Painter: A short piece of rope secured in the bow of a small boat used for making her fast.
Palm and needle: A seaman's sewing outfit for heavy work.
Part: To break.
Pass a line: To reeve and secure a line.
Pass a stopper: To reeve and secure a stopper (hold a strain on a line while transferring it).
Pass down the line: Relay to all others in order (a signal repeated from one ship to the next astern in column).
Pass the word: To repeat an order for information to the crew.
Pay off: To turn the bow away from the wind; to pay the crew.
Pay out: To slack out a line made fast on board (let it out slowly).
Pay: To fill the seams of a vessel with pitch.
Pier head jump: Making a ship just as it is about to sail.
Pile: A pointed spar driven into the bottom and projecting above the water; when driven at the corners of a dock, they are termed fender piles.
Pilot boat: A power or sailing boat used by pilots (men who have local knowledge of navigation hazards of ports).
Pin: The metal axle of a block upon which the sheave revolves.
Pitch: A tar substance obtained from the pine tree and used in paying the seams of a vessel. Motion of vessel.
Pitting: Areas of corrosion.
Planking: Broad planks used to cover a wooden vessel's sides, or covering the deck beams.
Plait: To braid; used with small stuff.
Play: Freedom of movement.
Plimsoll mark: A figure marked on the side of merchant vessels to indicate allowed loading depths. Named after Samuel Plimsoll, English Member of Parliament and maritime reformer.
Plug: A wooden wedge fitting into a drainage hole in the bottom of a boat for the purpose of draining the boat when she is out of water.
Point: To taper the end of a rope; one of the 32 divisions of the compass card. To head close to the wind.
Poop deck: A partial deck at the stern above the main deck, derived from the Latin "puppio" for the sacred deck where the "pupi" or doll images of the deities were kept.
Pooped: An opening in a ship's side, such as an air port, or cargo port.
Port side: The left side of a vessel when looking forward.
Port: The left side of the ship.
Posh: elegant, luxurious. Originally an acronym for Port Over Starboard Home. Created by British travelers to India or Australia, describing the preferred accommodations aboard ship, which lessened effects of the tropical sun on the cabins during the voyage.
Pouring oil on troubled waters: Heavy-weather practice of pouring oil on the sea so as to form a film on the surface, thus preventing the seas from breaking. To smooth out some difficulty.
Pratique: A permit by the port doctor for an incoming vessel, being clear of contagious disease, to have the liberty of the port.
Preventer: A rope used for additional support or for additional securing, e.g., preventer stay.
Pricker: Small marlinespike.
Privileged vessel: One which has the right of way.
Prolonged blast: A blast of from 4 to 6 seconds' duration.
Prow: The part of the bow above the water.
Punt: A rectangular flat- bottomed boat used by vessels for painting the ship's side and general use around the ship's water: line, fitted with oar-locks on each side and usually propelled by sculling.
Purchase: A tackle (blocks and falls).
Put to sea: To leave port.

Quarantine: Restricted or prohibited intercourse due to contagious disease.
Quarter: That portion of a vessel's side near the stern.
Quartering sea: A sea on the quarter (coming from a side of the stern).
Quarters bill: A vessel's station bill showing duties of crew.
Quarters: Living compartments.
Quay: A cargo-discharging wharf.

Rake: The angle of a vessel's masts from the vertical.

Ratline: A short length of small rope "ratline stuff" running horizontally across shrouds, for a ladder step.
Reef: To reduce the area of a sail by making fast the reef points (used in rough weather).
Reeve: To pass the end of a rope through any lead such as a sheave or fair: lead.
Registry: The ship's certificate determining the ownership and nationality of the vessel. Relieving tackle: A tackle of double and single blocks rove with an endless line and used to relieve the strain on the steering engine in heavy weather or emergency.
Ride: To lie at anchor; to ride out; to safely weather a storm whether at anchor or underway.
Rig: A general description of a vessel's upper: works; to fit out.
Rigging: A term applied to ship's ropes generally.
Right: To return to a normal position, as a vessel righting after heeling over.
Ringbolt: A bolt fitted with a ring through its eye, used for securing, running, rigging, etc.
Rips: A disturbance of surface water by conflicting current or by winds.
Rise and shine: A call to turn out of bunks.
Roaring forties: That geographical belt located approximately in 40 degrees south latitude in which are encountered the prevailing or stormy westerlies.
Rudder post: That part of a rudder by which it is pivoted to the sternpost.
Run down: To collide with a vessel head on.
Rustbucket: Sailors' term for an old ship that needed a lot of paint and repairs.

Sailing free: Sailing other than close; hauled or into the wind (wind astern).
Salty character: A nautical guy, often a negative connotation.
Salvage: To save a vessel or cargo from total loss after an accident; recompense for having saved a ship or cargo from danger.
Scale: To climb up. A formation of rust over iron or steel plating.
School: A large body of fish.
Scuppers: Openings in the side of a ship to carry off water from the waterways or from the drains.
Scuttle: To sink a vessel by boring holes in her bottom or by opening sea valves.
Scuttle butt: The container of fresh water for drinking purpose used by the crew; formerly it consisted of a cask.
Scuttle butt story: An unauthoritative story (a tall story).
Sea anchor: A drag (drogue) thrown over to keep a vessel to the wind and sea.
Sea chest: A sailor's trunk; the intake between the ship's side and a sea valve.
Sea dog: An old sailor.
Sea going: Capable of going to sea.
Sea lawyer: A seaman who is prone to argue, especially against recognized authority (big mouth).
Sea painter: A line leading from forward on the ship and secured to a forward inboard thwart of the boat in such a way as to permit quick release.
Seaworthy: Capable of putting to sea and able to meet sea conditions.
Secure for sea: Prepare for going to sea, extra lashing on all movable objects.
Secure: To make fast; safe; the completion of a drill or exercise on board ship.
Seize: To bind with small rope.
Semaphore: Flag signaling with the arms.
Set the course: To give the steersman the desired course to be steered.
Set up rigging: To take in the slack and secure the standing rigging.
Settle: To lower, sink deeper.
Shackle: A U-shaped piece of iron or steel with eyes in the end closed by a shackle pin.
Shaft alley: Covered tunnels within a ship through which the tail shafts pass.
Shake a leg: An order to make haste.
Shakedown cruise: A cruise of a new ship for the purpose of testing out all machinery, etc. Shank: The main piece of the anchor having the arms at the bottom and the Jew's harp at the top.
Shanghaied: The practice of obtaining a crew by means of force. Crews were hard to get for long voyages, and when the unwilling shipmate regained consciousness, he found himself bound for some remote port, such as Shanghai. One who is forced to do something against his will.
Shape a course: To ascertain the proper course to be steered to make the desired point or port. Shark's mouth: The opening in an awning around the mast.
Sheave: The wheel of the block over which the fall of the block is rove.
Sheer: A sudden change. The longitudinal dip of the vessel's main deck.
Sheet: The rope used to spread the clew of head sails and to control the boom of boom sails.
Shell: The casing of a block within which the sheave revolves.
Ship: To enlist; to send on board cargo; to put in place; to take on board.
Ships time: Ships time was counted by the half hour, starting at midnight. A half hour after twelve was one bell; one o'clock, two bells; and so on until four o'clock, which was eight bells. The counting then started over again, with 4:30 being one bell.
Short stay: When the scope of chain is slightly greater than the depth of water.
Shorthanded: Without sufficient crew.
Shot: A short length of chain, usually 15 fathoms (90 feet). (Method of measuring chain.)

Shove in your oar: To break into a conversation.
Shrouds: Side stays from the masthead to the rail..
Side lights: The red and green running lights, carried on the port and starboard sides respectively, of vessels under-way.
Sing out: To call out.
Sister hooks: Two iron flatsided hooks reversed to one another.
Skids: Beams sometimes fitted over the decks for the stowage of heavy boats or cargo.
Skipper: The captain.
Sky pilot: A chaplain.
Skylight: A covering, either permanent or removable, to admit air and light below decks.
Slack: The part of a rope hanging loose; the opposite of taut.
Slack water: The condition of the tide when there is no horizontal motion.
Slip: To let go by unshackling, as a cable.
Slop chest: Stock of merchandise, such as clothing, tobacco, etc., maintained aboard merchant ships for sale to the crew
Slush: White-lead and tallow used on standing rigging.
Smart: Snappy, seamanlike; a smart ship is an efficient one.
Smothering lines: Pipe lines to a compartment for smothering a fire by steam or by a chemical.
Snatch: block: A single block fitted so that the shell or hook hinges to permit the bight of a rope to be passed through.
Snub: To check suddenly.
Sny: A small toggle used on a flag.
Sound: To measure the depth of the water with a lead. Also said of a whale when it dives to the bottom.
Sound out a person: To obtain his reaction to something.
Southwester: An oil-skin hat with broad rear brim.
Span: A wire rope or line between davit heads.
Spanner: A tool for coupling hoses.
Sparks: The radio operator.
Speak: To communicate with a vessel in sight.
Spill: To empty the wind out of a sail.
Splice: The joining of two ends of a rope or ropes by so intertwining the strands, as but slightly to increase the diameter of the rope.
Spring line: Usually of the best wire hawsers; one of the first lines sent out in mooring. "Springs in and springs out" a vessel.
Squall: A sudden and violent gust of wind.
Squeegee: A deck dryer composed of a flat piece of wood shod with rubber, and a handle. Stanchions: Wooden or metal uprights used as supports (posts).
Stack: The ship's funnel or smokestack.
Stand by: A preparatory order (wait: be ready).
Standard compass: The magnetic compass used by the navigator as a standard.
Standing part: That part of a line or fall which is secured.
Standing rigging: That part of the ship's rigging which is permanently secured and not movable, such as stay, shrouds, etc.
Starboard The right side of the ship.
Station bill: The posted bill showing stations of the crew at maneuvers and emergency drills.
Staunch: Still, seaworthy, able.
Stay: A rope of hemp, wire or iron leading forward or aft for supporting a mast.
Steady: An order to hold a vessel on the course she is heading.
Steerage way: The slowest speed at which a vessel steers.
Steering wheel: The wheel operating the steering gear and by which the vessel is steered.
Stem the tide: Stemming the tide or sea means to head the vessel's bow directly into the current or waves. Overcome adverse circumstances.
Stem: The timber at the extreme forward part of a boat secured to the forward end of the keel.
Stern anchor: An anchor carried at the stern.
Stern board: Progress backwards.
Stern: The after part of the vessel (back of).
Stevedore: A professional cargo loader and unloader.
Stopper: A short length of rope secured at one end, and used in securing or checking a running rope, e.g., deck stopper, boat fall stopper, etc.
Storeroom: The space provided for stowage of provisions or other materials.
Storm warning: An announced warning of an approach of a storm.
Stove: Broken in.
Stow: To put in place.
Stowaway: A person illegally aboard and in hiding.
Strake: A continuous planking or plating fitted out to and from stem to stern of a vessel's side.
Strand: A number of yarns, twisted together and which in turn may be twisted into rope; a rope is

stranded when a strain is broken; rope may be designated by the number of strands composing. Rope is commonly three-stranded. A vessel run ashore is said to be stranded.
Strap: A ring of rope made by splicing the ends, and used for slinging weights, holding the parts of a block together, etc. A rope, wire or iron binding, encircling a block and with a thimble seized into it for taking a hook. Small straps used to attach a handybilly to the hauling part of a line.
Strongback: A light spar set fore and aft on a boat, serving as a spread for the boat cover.
Surge: To ease a line to prevent it from parting or pulling, meanwhile holding the strain.
Swab: A mop.
Swamp: Sink by filling with water.
Swell: A large wave.
Swing ship: The evolution of swinging a ship's head through several headings to obtain compass errors for the purpose of making a deviation table.
Swinging over: Swing of the boom from one side of the ship to the other when the tack is changed.

Taffrail log: The log mounted on the taffrail and consisting of a rotator, a log line and recording device (to measure distance run through the water).
Tail shaft: The after section of the propeller shaft.
Take a turn: To pass a turn around a belaying pin or cleat.
Take in: To lower and furl the sails.
Taking on more than you can carry: Loaded with more cargo than a ship can safely navigate with. Drunk.
Tanker: A ship designed to carry various types of liquid cargo, from oil and gasoline to molasses, water, and vegetable oil.
Tarpaulin: Heavy canvas used as a covering.
Taut: With no slack; strict as to discipline.
That's high: An order to stop hoisting.
Thimble: An iron ring with a groove on the outside for a rope grommet or splice.
Three sheets to the wind: Sailing with three sheet ropes running free, thus making the ship barely able to keep headway and control. Drunk.
Throwing a Fish: Saluting
Thwart: The athwartships seats in a boat on which oars-men sit.
Thwartships: At right angles to the fore and aft line (across the ship).
Toggle: A small piece of wood or bar of iron inserted in a knot to render it more secure, or to make it more readily unfastened or slipped.
Top-heavy: Too heavy aloft.
Tow: To pull through water; vessels towed.
Track: The path of the vessel.
Trades: The practically steady winds blowing toward the equator, N.E. in the northern and SE. in the southern hemisphere.
Trice: To lash up.
Tricing line: A line used for suspending articles.
Trick: The period of time during which the wheelsman remains at the wheel.
Trim: The angle to the horizontal at which a vessel rides.
Trip: To let go.
Tripping line: A line used for capsizing the sea anchor and hauling it in.
Truck: The flat circular piece secured on the top of the mast.
Tug boat: A small vessel fitted for towing.
Turn in all standing: Go to bed without undressing.
Turn to: An order to commence ship's work.
Turn turtle: To capsize.
Turn-buckle: A metal appliance consisting of a thread and screw capable of being set up or slacked back and used for setting up on rigging.
Two blocks: When the two blocks of a tackle have been drawn as close together as possible.

Umbrella: The cone-shaped shield at the top of the smokestack.
Unbend: To untie.
Under below: A warning from aloft (heads up).
Undermanned: Insufficient number of crew; shorthanded.
Undertow: A subsurface current in a surf.
Underway: Said of a vessel when not at anchor, nor made fast to the shore, or aground.
Unship: To take apart or to remove from its place.
Unwatched: Said of a lighthouse not tended.
Up anchor: Hoist or haul in the anchor.

Vast: An order to cease (stop).
Veer: To slack off or move off; also said of a change of direction of wind, when the wind shifts to a different direction.

Ventilator cowl: The swiveled opening at the top of a ventilator.
Ventilator: A wooden or metal pipe used to supply or to exhaust air.

Waist: The portion of the deck between the forecastle and quarterdeck of a sailing vessel.
Wake: A vessel's track through the water.
Waste: Cotton yarn used for cleaning purposes.
Watch cap: A canvas cover secured over a funnel when not in use. Sailor's headwear, woolen type, capable of covering the ears in cold weather.
Watch officer: An officer taking his turn as officer of the watch.
Water breaker: A small cask carried in ship's boats for drinking purposes.
Water's edge: The surface of the water.
Water-logged: Filled with water but afloat.
Waterline: The line painted on the side of the vessel at the water's edge to indicate the proper trim.
Watertight: Capable of keeping out water.
Waterway: The gutter at the sides of a ship's deck to carry off water.
Weather eye: To keep a weather eye is to be on the alert (heads up).
Weather side: The windward side (from where the wind is blowing).
Weigh: Lift anchor off the bottom.
Well enough: An order meaning sufficient (enough).
Where away: A call requesting direction in answer to the report of a lookout that an object has been sighted.
Whipping: A method of preventing the ends of a line from unlaying or fraying by turns of small stuff, stout twine or seizing wire with the ends tucked.
White cap: The white froth on the crests of waves.
Wide berth: At a considerable distance.
Wildcat: A sprocket wheel on the windlass for taking links of the chain cable.
Winch: An engine for handling drafts of cargo secured on deck and fitted with drums on a horizontal axle.
Windlass: An anchor engine used for heaving in the chain cable and anchor.
Wiper: A general handyman in the engine room.

Yaw: To steer wildly or out of line of course.

3.2 USE OF APPROPRIATE INTERNAL COMMUNICATE ALARM SYTEMS

Radio telecommunication at sea had undergone a sea change in the last century. After the days of semaphores and flags (which is still relevant today in some cases), radio brought about a drastic change in marine communication at sea.

From the early years of the last century, ships started fitting radio for communicating distress signals among themselves and with the shore. Radio telegraphy using Morse code was used in the early part of the twentieth century for marine communication.

In the seventies, after considering the studies of the International Telecommunication Union, IMO brought about a system where ship-to-ship or ship-to-shore communication was put into action with some degree of automation, wherein a skilled radio officer keeping 24×7 watch was not required.

Photograph by Ram
Photograph by Ram

Marine communication between ships or with the shore was carried with the help of on board systems through shore stations and even satellites. While ship-to-ship communication was brought about by VHF radio, Digital Selective Calling (DSC) came up with digitally remote control commands to transmit or receive distress alert, urgent or safety calls, or routine priority messages. DSC controllers can now be integrated with the VHF radio as per SOLAS (Safety Of Life at Sea) convention.

Satellite services, as opposed to terrestrial communication systems, need the help of geo-stationary satellites for transmitting and receiving signals, where the range of shore stations cannot reach. These marine communication services are provided by INMARSAT (a commercial company) and COSPAS – SARSAT (a multi-national government funded agency).

While INMARSAT gives the scope of two way communications, the Corpas Sarsat has a system that

is limited to reception of signals from emergency position and places with no facilities of two way marine communications, indicating radio beacons (EPIRB).

For international operational requirements, the Global Maritime Distress Safety System (GMDSS) has divided the world in four sub areas. These are four geographical divisions named as A1, A2, A3 and A4.

Different radio communication systems are required by the vessel to be carried on board ships, depending on the area of operation of that particular vessel.

A1 – It's about 20- 30 nautical miles from the coast, which is under coverage of at least one VHF coast radio station in which continuous DSC alerting is available. Equipment used: A VHF, a DSC and a NAVTEX receiver (a navigational telex for receiving maritime and meteorological information).

A2 – This area notionally should cover 400 nautical miles off shore but in practice it extends up to 100 nautical miles off shore but this should exclude A1 areas. Equipment used: A DSC, and radio telephone (MF radio range) plus the equipment required for A1 areas.

A3 – This is the area excluding the A1 & A2 areas. But the coverage is within 70 degrees north and 70 degree south latitude and is within INMARSAT geostationary satellite range, where continuous alerting is available. Equipment used: A high frequency radio and/ or INMARSAT, a system of receiving MSI (Maritime Safety Information) plus the other remaining systems for A1 and A2 areas.

A4 – These are the areas outside sea areas of A1, A2 and A3. These are essentially the Polar Regions North and South of 70 degree of latitude. Equipment used: HF radio service plus those required for other areas.

All oceans are covered by HF marine communication services for which the IMO requires to have two coast stations per ocean region. Today almost all ships are fitted with satellite terminal for Ship Security Alerts System (SSAS) and for long range identification and tracking as per SOLAS requirements.

On distress, Search and Rescue operations from Maritime Rescue Co-ordination centers are carried out among other methods, with the help of most of these marine navigation tools. Naturally, the sea has become a lot safer with these gadgets and other important navigation tools recommended by the IMO and as enshrined in GMDSS.

3.3 ABILITY TO UNDERSTAND ORDERS AND COMMUNICATE WITH THE OFFICER OF THE WATCH ON MATTERS RELEVANT TO WATCHEEPING DUTIES

Sailing a vessel in the unpredictable seas is not an easy task to perform. Unlike other modes of transportations, sea voyages are always challenged by often chaotic climate conditions. However, it's always the teamwork by a group of trained seafarers abroad the ships that help journeys reach destinations.

Similar to other industries, the marine sector also involves a certain order of hierarchy in jobs to make the operation of a vessel smooth and coordinated. Be it a cruise ship or cargo vessel, the hierarchy, from the Captain to steward, is essential for maintaining an order abroad the ships.

3.4 PROCEDURES FOR THE RELIEF MAINTENANCE AND HANDOVER OF A WATCH

Will be kept in an appropriate place in rule 5 of the International Regulations to Prevent Collisions, 1972, which shall have as its object:
.1 maintain visual and aural surveillance at all times, also using
any other means available to observe another significant change in the
operational conditions;
.2 fully appreciate the circumstances and risks of boarding, stranded and
Other dangers that you may have for navigation.
.3 detect the presence of ships or aircraft in danger, shipwrecked, remains of
shipwreck, drifting objects and other risks for the safety of navigation.

The monitoring in conditions to maintain an adequate surveillance and will not take charge of the load. nor will assign other tasks that may hinder this service.

The tasks of surveillance and helmsman are different
performs surveillance functions while governing the vessel, except for small vessels in the
that from the coxswain position you have visibility throughout the horizon with no elements and no

There are difficulties for night vision or other impediment to maintain vigilance
Adequate The officer of the guard will act as the only watchman of the day, provided that;
the situation has been assessed and there is no doubt that the Measure is safe;
all relevant factors have been taken into account, including:

- weather conditions, visibility, traffic density, proximity to
- danger to navigation, and the necessary attention when navigating near a traffic separation device, and;
- immediate assistance may be available on the bridge when a change of situation as necessary.

3.5 INFORMATION REQUIRED TO MAINTAIN A SAFE WATCH

It is important to understand the following information:

- Ship Position
- Possible maneuvers
- If the navigation equipment is operational
- Orders of the Captain
- How much distance to change course
- If it is coming to port

3.6 BASIC ENVIRONMENTAL PROTECTION PROCEDURES

Procedures for operational control on board ships include:

1) Reduction of Marine Pollution on board

2) Prevention of leaks and spills of oil and chemical products on board ships

3) Provision on board for education and on-the-job training

4) Bans on exchange of Ballast Water in regulated coastal areas and the practice of exchange of ballast water at high seas

5) Research on restrictions at various ports;

6) Research and study of facilities and equipment to handle ballast water

7) Reduction of Wastes on board

8) Reduction of the quantity of waste generated on board ships

9) Compliance of GARBAGE management plan ;

10) Research into and study of the introduction of, waste disposal facilities and equipment

11) Reduction of Consumption of Natural Resources

12) Prevention of Air Pollution

13) Reduction of the consumption of fuel oil and lubricating oil (a cutback in the emissions of CO2, NOx and SOx)

14) Provision on board ships of education to raise awareness and on-the-job training,

15) Research into and study of the introduction of, laborsaving and efficient shipboard facilities and equipment

16) Reduction of the generation of Dioxin

17) Proper use of incinerators

18) Proper control of plastics;

19) Proper control of ozone depleting substances

20) Social Contribution & Provision of Weather Data Collection on board

21) Instruction to conduct weather observations on board ships

22) Otherwise, participation in marine weather observation and technical cooperation

4.1 KNOWLEDGE OF EMERGENCY DUTIES AND ALARM SIGNALS

An emergency does not come with an alarm but an alarm can definitely help us to tackle an emergency or to avoid an emergency situation efficiently and in the right way. Alarm systems are installed all over the ship's systems and machinery to notify the crew on board about the dangerous situation that can arise on the ship.

Alarm on board ships are audible as well as visual to ensure that a person can at least listen to the audible alarm when working in a area where seeing a visual alarm is not possible and vice versa

It is a normal practice in the international maritime industry to have alarm signal for a particular warning similar in all the ships, no matter in which seas they are sailing or to which company they belongs to. This commonness clearly helps the seafarer to know and understand the type of warning or emergency well and help to tackle the situation faster.

The main alarms that are installed in the ship to give audio-visual warnings are as follows:

1) General Alarm: The general alarm on the ship is recognized by 7 short ringing of bell followed by a long ring or 7 short blasts on the ship's horn followed by one long blast. The general alarm is sounded to make aware the crew on board that an emergency has occurred.

2) Fire Alarm: A fire alarm is sounded as continuous ringing of ship's electrical bell or continuous sounding of ship's horn.

3) Man Overboard Alarm: When a man falls overboard, the ship internal alarm bell sounds 3 long rings and ship whistle will blow 3 long blasts to notify the crew on board and the other ships in nearby vicinity.

4) Navigational Alarm: In the navigation bridge, most of the navigational equipments and navigation lights are fitted with failure alarm. If any of these malfunctions, an alarm will be sounded in an alarm panel displaying which system is malfunctioning.

5) Machinery space Alarm: The machinery in the engine room has various safety devices and alarms fitted for safe operation. If any one of these malfunctions, a common engine room alarm is operated and the problem can be seen in the engine control room control panel which will display the alarm.

6) Machinery Space CO2 Alarm: The machinery space is fitted with CO2 fixed with fire extinguishing system whose audible and visual alarm is entirely different from machinery space alarm and other alarm for easy reorganization.

7) Cargo Space CO2 Alarm: The cargo spaces of the ship are also fitted with fixed fire fighting system which has a different alarm when operated.

8) Abandon Ship Alarm: When the emergency situation on board ship goes out of hands and ship is no longer safe for crew on board ship. The master of the ship can give a verbal Abandon ship order, but

this alarm is never given in ship's bell or whistle. The general alarm is sounded and every body comes to the emergency muster station where the master or his substitute (chief Officer) gives a verbal order to abandon ship.

9) Ship Security Alarm System: Most of the ocean going vessels are fitted with security alert alarm system, which is a silent alarm system sounded in a pirate attack emergency. This signal is connected with different coastal authorities all over the world via a global satellite system to inform about the piracy.

Different Alarm signals of the vessel are clearly described in the muster list along with the action to be carried out so that all the crew member can perform there duties within no time in actual emergency.

4.2 KWOLEDGE OF PYROTECHNIC DISTRESS SIGNALS SATELLITE , EPIRBS AND SARTS

Pyrotechnic Signals
These are the means capable of undergoing self-contained and self-sustained exothermic chemical reactionsfor the production of heat, light, gas, smoke and/or sound. These include rocket parachute flares, hand flares, buoyant smoke signals, line throwing appliance etc. Further on this can be read at pyrotechnic signalling.

Non-Pyrotechnic Signalling
As opposed to pyrotechnic signalling, these are the methods used without the necessity of an exothermic reaction to attract attention at the time of distress. Following are the means of non pyrotechnic signalling used onboard ships:

1. Orange Signal Flag: Listed under the Annex IV of the IMO International Regulations For Preventing Collisions At Sea, this signal consists of a square flag which has above or below it a ball or any other object that resembles a ball. This flag is hung atop or hoisted on a high pedestal to make it conspicuous to the vessel or aircraft or the entity one needs to attract the attention of. It is an effective means of distress signalling by the day as by the night this become redundant for the purposes of signalling. Orange is the internationally chosen highly visible colour chosen for most visual distress signalling methods.

2. Marker Dyes: In accordance with the Annex IV as mentioned above, a dye marker may be used for the purposes of distress signalling. Such dye is put out into the sea and it ends up colouring the immediate area covering around 50 metres of water.

3. SOS: The universally known SOS as per the Morse Code which basically is the most widely known way to communicate distress. Such a signal sent by radiotelephony or any other method such as sounding it on the ship's whistle is a non pyrotechnic means of signalling.

4. Radio Signals: As part of the GMDSS, radio signalling is a method of communicating distress at sea. A distress alert may be sent by the Digital Selective Calling methods transmitted on the VHF channel 70 or the following MF/HF frequencies:

2187.5 kHZ
8414.5 kHZ
4207.5 kHZ
6312 kHZ
12577 kHZ
16804.5 kHZ

5. Mirrors: Better known as a Heliograph, a mirror might be used while onboard and mostly on a survival craft to reflect the sunshine towards the entity that one needs to attract the attention of. These mirrors not only reflect the light to pinpoint the location of the emergency but are also non-corrosive at the same time. This helps to prolong their usage for a longer period of time.

6. Continuous sounding on the fog sign calling apparatus onboard is a way to communicate distress

7. When the word "Mayday" is communicated verbally via radiotelephony, it indicates distress

8. As per the International Code of Signals (INTERCO), the flag NC indicates distress

9. Slowly and repeatedly raising and lowering arms outstretched to each side indicates distress

10. A ship to shore distress alert which is transmitted by the ship's satellite communication system (INMARSAT) or any other mobile satellite service also termed as the ship earth station. This is a quick and instant method to let Search and Rescue Authorities to know of a distress situation

11. Signals transmitted by the Emergency Position Indicating Radio Beacon (EPIRB) indicate distress

12. Signals transmitted by the Search and Rescue Radar Transponder (SART) also indicate distress

SART

13. A piece of orange coloured canvas with a black square and a circle or other appropriate symbol which may be identified from air may be used to communicate distress

14. In old practice, an inverted national flag hoisted was also considered a means to communicate distress

15. A floating man – overboard pole or Dan Buoy (a compact, self-contained device, specifically designed to make rescue and recovery a simpler operation. There is no need to set or activate the SOS. Dan Buoy – just throw it into the water, towards the person overboard) can be used to indicate that a person is in distress in the water and is ordinarily equipped with a yellow and red flag (international code of signals flag "O") and a flashing lamp or strobe light.

The INTERCO and the IAMSAR Vol III must be read thoroughly to familiarise oneself with myriad means to communicate and assist in times of distress. All the above signals must be adhered to in order that they might be used to indicate distress only so that they are not confused with any signalling. All non-pyrotechnic methods of signalling need to comply with the USCG standards in order to be utilised. In fact, any method may be used at the time of emergency that is out of the ordinary to indicate that there is a problem onboard; flames on a vessel wherein a barrel is set on fire to attract attention or inverting the sails (old practice) are some of them.

Pyrotechnic signals are visual and attract immediate attention to the casualty of the distressed vessel or persons. However, with the advancement of technology, quicker and better means of communicating distress have come about and the ship's crew must be thorough with each and everyone of them. Recurrent and a firm drill system must be put in place and executed with diligence to ensure swift action in the event of an emergency.

4.3 AVOINDANCE OF FALSE DISTRESS ALERTS AND ACTION TO BE TAKEN IN EVENT OF ACCIDENTAL ACTIVITION

7R-22D1: What action should you take after sending a false Distress alert on VHF?

Make a voice announcement to cancel the alert on Ch-16.

Send a DSC cancellation message on Ch-70.

Make a voice announcement to cancel the alert on Ch-13.

Make a voice announcement to cancel the alert on Ch-22A.

7R-22D2: A crewmember has accidentally transmitted a VHF-DSC Distress Alert. What action should be taken?

Turn off the power to the unit to stop the DSC call then turn power back on and make a voice announcement to cancel the alert on Ch-16.

Send a DSC call canceling the Distress Alert.

No specific action is necessary.

Turn off the power and make a voice announcement to cancel the alert on Ch-70.

7R-22D3: What actions should be taken to prevent the transmissions of false distress alerts?

All of the above

Proper watch officer instruction in training.

Insure that the protective cover over the “Distress Hot Key” is secure.

Do not use DSC for relaying “ALL SHIPS” distress alerts.

7R-22D4: The EPIRB on the bridge wing is observed with the strobe light flashing and the control switch in the “ON” position. What action should be taken?

Both of the above

Disable the EPIRB

Contact the nearest USCG Coast Station, give them your EPIRB’s I.D. number and advise that your unit was inadvertently activated.

None of the above

7R-22D5: You have been monitoring your 3-cm radar screen and a series of 12 concentric circles suddenly appears centered on the screen. What is the most likely cause of this situation?

Your own vessel’s SART has been activated.

There is a survival craft within 3 nm distance.

There is a fault in the radar.

None of the above

7R-22D6: The EPIRB on the bridge wing is observed with the strobe light flashing and the control switch in the “OFF” position. What action should be taken?

Both b) and c) are correct

Place the control switch in the ‘OFF” position.

Assume the unit is transmitting and disable the EPIRB.

Contact the nearest USCG Coast Station, give them your EPIRB’s I.D. number and advise that your unit was inadvertently activated.